Big B Mini Mart Site

Remedial Investigation and Feasibility Study

Prepared for

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Public Review Draft

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Remedial Investigation/Feasibility Study

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
ABS	Acrylonitrile-butadiene-styrene
API	American Petroleum Institute
ARAR	Applicable or relevant and appropriate requirement
AS	Air sparge
bgs	Below ground surface
BNSF	BNSF Railway
BTEX	Benzene, toluene, ethylbenzene, and xylenes
COC	Contaminant of concern
CSM	Conceptual Site Model
DCA	Disproportionate Cost Analysis
DRO	Diesel-range organics
DTP	Depth to product
DTW	Depth to water
Ecology	Washington State Department of Ecology

Acronym/ Abbreviation	**Definition**
ft^2/d	Square feet per day
GRO	Gasoline-range organics
ISCO	In Situ Chemical Oxidation
LNAPL	Light non-aqueous phase liquid
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
MPE	Multi-phase extraction
MTCA	Model Toxics Control Act
NAPL	Non-aqueous phase liquid
NES	Northwest Environmental Services
POTW	Publicly Owned Treatment Works
ppm	Parts per million
PVC	Polyvinyl chloride
RAO	Remedial action objective
RI/FS	Remedial investigation and feasibility study
Site	Big B Mini Mart Site
SVE	Soil vapor extraction
TEE	Terrestrial Ecological Evaluation
TOC	Top of casing
TPH	Total petroleum hydrocarbon
UST	Underground storage tank
WAC	Washington Administrative Code

1.0 Introduction

Floyd|Snider has prepared this remedial investigation and feasibility study (RI/FS) in accordance with the Scope of Work per the 2015 Agreed Order No. DE 10813 between the Washington State Department of Ecology (Ecology) and the Potentially Liable Parties (PLPs) for the Big B Mini Mart Site (Site) located 1611 S. Canyon Road in Ellensburg, Washington (Figure 1.1).

1.1 PURPOSE

This RI/FS provides a summary of the nature and extent of contamination at the Site, evaluates cleanup action alternatives, and identifies the proposed cleanup action alternative at the Site in accordance with the requirements of Washington Administrative Code (WAC) 173-340-350. The proposed cleanup action alternative that is put forward in this document will be subject to public review and comment in a draft Cleanup Action Plan.

1.2 DOCUMENT ORGANIZATION

The RI/FS is organized as follows:

- **Section 2.0—Site Description and Background:** Provides information on the location, ownership, and current land use of the Site. A history of the Site and summary of previous site investigations and remedial actions are included.
- **Section 3.0—Recent Remedial Investigation Activities and Interim Action:** Summarizes the RI investigation activities performed by Floyd|Snider and others.
- **Section 4.0—Physical Setting:** Presents the Site geology and hydrogeology.
- **Section 5.0—Nature and Extent of Contamination:** Presents the nature and extent of contamination in the affected environmental media.
- **Section 6.0—Conceptual Site Model:** Presents the Conceptual Site Model (CSM) for the Site, including the contaminants of concern (COCs), release mechanisms, exposure pathway and receptors, and preliminary cleanup levels.
- **Section 7.0—Remedial Action Objectives and Development of Remedial Action Alternatives:** Presents the remedial action objectives (RAOs) for the Site, threshold requirements, and selection criteria.
- **Section 8.0—Identification of Remedial Action Technologies:** Identifies and briefly describes the potential remedial technologies for remediation of petroleum hydrocarbons and light non-aqueous phase liquid (LNAPL) in soil and groundwater.
- **Section 9.0—Alternatives Evaluation and Disproportionate Cost Analysis:** Evaluates alternatives comparatively with the Model Toxics Control Act (MTCA) requirements for a cleanup action per Washington Administrative Code (WAC) 173-340-360.

- **Section 10.0—Evaluation Criteria:** This section presents a description of the threshold requirements for cleanup actions under MTCA and the addition criteria used in this FS to evaluate the cleanup action alternatives.
- **Section 11.0—Evaluation, Comparison, and Recommendation of Cleanup Alternatives:** Presents the proposed alternative and the Disproportionate Cost Analysis (DCA).
- **Section 12.0—References:** Presents the reference information for materials cited in the document.

2.0 Site Description and Background

2.1 SITE DESCRIPTION

The Site is located in Kittitas County (parcel No. 958654) within Township 17N, Range 18E, and Section 11. The Site is located on approximately 43,960 square feet or 1.05 acres of rectangular paved and unpaved land. The southern half of the parcel consists of currently inactive service station facilities, and the northern half contains approximately 18,500 square feet of unused paved area (Figure 1.2). The Site was first developed as a service station in the early 1970s. There is no known prior site use. The southern half of the property includes two former pump islands (northern and southern), a closed convenience store, and former locations of underground storage tanks (USTs) including two former 10,000 gallon steel USTs, a former 4,000-gallon steel UST on the north side of the store, and a former 12,000-gallon baffled steel UST (split into 8,000-gallons of diesel storage and 4,000-gallons of unleaded gasoline storage) on the south end of the property (see Figure 2.1).

An active gasoline station and convenience shop, the Astro Express Mart (also known as Toad's), is located to the south of the Site at 1703 S. Canyon Road. An interim action was conducted in 2016 at Toad's (Cleanup Site ID 12318), which consisted of excavation and disposal of petroleum-contaminated soil offsite. Ecology considers the Big B Site to include a portion of the Toad's property due to migration of groundwater beyond the Big B property line. This document focuses on soil and groundwater conditions primarily related to releases from the Big B Site, it does not describe releases attributable to the Toad's site nor does it describe cleanup activities to remediate and monitor those releases.

2.2 SITE USE, OWNERSHIP, PREVIOUS INVESTIGATIONS, AND REMEDIAL ACTIONS

The property is the location of a currently inactive gas station and convenience store. BNSF Railway (BNSF) is a former owner of the property. The property transferred from BNSF to Big B, LLC, the current owner, on June 30, 2014. The Zbinden Oil Company leased the Site from BNSF from April of 1971 through March of 2002. The Zbinden Oil Company owned the facilities on the Site from 1972 through at least 1986. The Zbinden Oil Company subleased the Site to Bernhard E. Schneider from February of 1986 through September of 1989. The Zbinden Oil Company subleased the Site to Balbir Singh and Gurmit Singh Kaila starting in September of 1989 through March of 2002. In March of 2002, Mr. Singh and Mr. Kaila began leasing directly from BNSF. Mr. Singh and Mr. Kaila continued operation of the facility until Neela Tara, Inc., assumed operations in September 2007, which continued until September 2009. Short Stop, LLC, acquired operation of the station following the end of Neela Tara, Inc.'s, business tenure. In 1990, during an excavation for a UST replacement, a diesel release was discovered from a leak in a fuel distribution line. In December 1990, a former operator, Mr. Balbir Singh, performed an interim action as part of an independent remedial action to remove diesel-contaminated soil and free product. A report of a release was received by Ecology and an initial investigation conducted in 1990–1991 that resulted in a "Further Action" determination and a Site Hazard Assessment. Currently, the Site is ranked as a "3" by Ecology.

Three of the USTs failed cathodic protection audits in June 2010, and in December 2010 the tanks failed corrosion protection tests. In February 2011, Northwest Environmental Services (NES) collected groundwater samples from four wells, though the locations of the samples were not conclusively identified. The analyses showed diesel, gasoline, lead, benzene, toluene, and xylenes at concentrations greater than the MTCA Method A groundwater cleanup levels.

Two months after the sampling, a field investigation by Ecology UST inspectors on April 6, 2011, detected free product liquid consisting of gasoline-range hydrocarbons floating on groundwater in multiple monitoring or observation wells at the Site. The estimated thickness of free product (light non-aqueous phase liquid, or LNAPL) was at least 0.04 feet (approximately 0.5 inch).

Short Stop, LLC, ceased active operations by pumping the product from the USTs in July 2014, thus placing the station’s status into temporary closure. The UST system was permanently closed in November 2016.

Historical and current tests of groundwater at the Site show that petroleum hydrocarbons contamination exceeds MTCA cleanup standards.

2.2.1 SEACOR 1990

In November 1990, LNAPL was observed to be accumulating on the groundwater surface within a test pit located north of the northern 10,000-gallon UST basin for the purpose of installing another UST. Subsequently, a fuel leak in the fiberglass fuel supply line near the northern pump island was discovered and repaired. In December 1990, approximately 420 cubic yards of impacted soil was excavated between the 10,000-gallon diesel UST and the more northern pump island. Diesel-range organics (DRO) at concentrations exceeding the MTCA Method A cleanup level were detected in western and southern sidewalls of the excavation. The extent of the excavation was limited due to utilities to the east, the property boundary to the west, the pump island to the north, and the UST basin to the south. Due to the limited extent of excavation, soil contamination remained in place following this interim action. Clean fill was transported to the Site and used to backfill the excavation. Impacted soil was stockpiled in an area located approximately 150 feet to the north of the northern pump island and eventually disposed of off-site (SEACOR 1991).

In conjunction with the excavation activities, five monitoring wells (MW-1 through MW-5) were installed on the property (refer to Figure 2.1). Soil results for MW-2 contained gasoline-range organics (GRO) and total xylene concentrations exceeding their respective MTCA Method A cleanup levels. Two rounds of groundwater sampling was conducted and results indicated that petroleum hydrocarbons were present at concentrations that exceeded their respective MTCA cleanup levels in monitoring wells MW-2 through MW-5. The second round of groundwater sampling and analysis showed that benzene concentrations varied from 81 to 580 micrograms per liter (µg/L) and diesel was detected at concentrations ranging from 2,100 to 160,000 µg/L. Analysis for lead in either soil or groundwater was not performed even though it was likely that the UST system once contained leaded gasoline. The SEACOR investigation did not define the extent of the groundwater contamination since the impacted downgradient wells were located near the property boundary and no attempt was made to find the downgradient extent of the contamination plume.

2.2.2 Ecology and SAIC 1991

In April 1991, Ecology conducted site hazard assessment activities, which included installing an upgradient monitoring well (MW-6), and collecting groundwater and surface water samples (DPRA and SAIC 1991). The surface water sample was collected at the irrigation ditch outfall underneath the Interstate 90 overpass at Canyon Road. Soil samples were not collected from monitoring well MW-6 due to no recovery. Groundwater samples from monitoring well MW-6 and the irrigation ditch outfall indicated that all analytes were less than their respective laboratory detection limits.

2.2.3 Ecology 2011

In February 2011, NES collected groundwater samples from four wells. The analyses showed diesel, gasoline, lead, benzene, toluene, and xylenes at concentrations greater than the MTCA Method A groundwater cleanup levels.

Free product consisting of GRO floating on groundwater was observed by the Ecology UST inspection team conducting field investigation on April 6, 2011, at the Site (Agreed Order No. DE 10813). The estimated thickness of free product or LNAPL was at least 0.04 feet (approximately 0.5 inch).

3.0 Recent Remedial Investigation Activities and Interim Action

Floyd|Snider, in accordance with the requirements of the 2015 Agreed Order, prepared an Ecology-approved RI Work Plan (Floyd|Snider 2014 and 2016) and completed the activities in that work plan, including initial and supplemental site investigation activities in order to define the Site COCs, fully delineate hydrocarbon impacts in soil and to investigate groundwater quality and flow direction. Initial field activities in May 2015 included digging 22 test pits, installing new monitoring wells (MW-1A, MW-4A, MW-5A, and MW-7), collecting soil and groundwater monitoring samples, analyzing product samples from MW-2 and MW-5A, and conducting a survey of the geographic and vertical coordinates of the monitoring wells. Initial groundwater sampling events occurred in May, July and October 2015. Soil, groundwater, and LNAPL analytical data are presented in Tables 3.1 through 3.6 and discussed in Section 5.0.

The following summarizes the supplemental investigation activities completed in March and April 2016.

3.1 SUPPLEMENTAL REMEDIAL INVESTIGATION ACTIVITIES

Based on the initial investigation results, residual hydrocarbon impacts in soil were generally delineated beneath the property; however, data gaps remained, including delineating the extent of LNAPL beneath the property, and the lateral extension of impacted groundwater to the east and southeast. Therefore, the following supplemental investigation activities were conducted in order to investigate these data gaps:

- Installation of 22 LNAPL piezometers
- Installation of three additional groundwater monitoring wells along the eastern property boundary
- Groundwater sampling
- Performance of two LNAPL monitoring events

Piezometer and monitoring well locations are shown on Figure 2.1.

3.1.1 Piezometer Installation and Monitoring

In order to investigate the extent and thickness of LNAPL on the property, 22 piezometers (PZ-1 through PZ-22) were installed. The piezometers were constructed of 2-inch-diameter Schedule 40 polyvinyl chloride (PVC) 0.02-inch slotted screen and casing. A backhoe was used to install the piezometers under Floyd|Snider field staff supervision[1]. Installation activities included digging a test pit down to 8 feet. Five-foot-long screens were set in the test pit between 3 and 8 feet below

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[1] These piezometers are not considered wells that are regulated by Ecology. In July 2011, the definition for wells was changed by the legislature to exempt any device or instrument less than 10 feet in depth for the sole purpose of performing soil or water testing as long as there is not withdrawal of water other than that necessary to perform the testing. (Revised Code of Washington Chapter 18.104).

ground surface (bgs). Next, the piezometers were placed within each pit and protected within a 10-foot-long, 3-inch-diameter, acrylonitrile-butadiene-styrene (ABS) Schedule 40 casing during backfilling. As the test pit was backfilled, the ABS casing was removed, exposing the screen to the LNAPL within the smear zone. The piezometer casings were constructed as temporary sampling point with a bare “stickup” above ground. Monitoring of LNAPL thickness in all site wells and piezometers occurred on March 23 and again on April 19, 2016.

3.1.2 Monitoring Well Installation

Three new monitoring wells (MW-8, MW-9, and MW-10) were installed along the eastern property boundary to investigate the extent of the dissolved-phase plume to the east and southeast adjacent to the right-of-way of Canyon Road (Figure 2.1). The wells were installed using a hollow-stem auger by Environmental Services Network. The auger borings were advanced to depths between 13 and 14 feet bgs.

Each monitoring well was constructed of pre-packed, 2-inch-diameter Schedule 40 PVC pipe with a flush threaded riser, including a threaded end plug and a machine-slotted 10-foot-long, 10-slot well screen. Wells MW-9 and MW-10 were screened from 4 to 14 feet bgs, and MW-8 was screened from 3 to 13 feet bgs. The annular space and pre-pack around the screen zone consists of clean silica sand. The annular space above the silica sand was sealed with bentonite chips. Bentonite placed above the water table was hydrated with potable water. All materials were placed concurrently with casing withdrawal. The surface of each well was completed with a flush-mounted, traffic grade, steel monument, and the wells were secured by a lockable gasket cap.

As-built construction details, including the total depth of each boring and the placement depths of the filter sand pack, the bentonite seal, and the surface completion were measured to the nearest 0.1 foot. Well logs, including soil sample description and as-built construction details, are included as Appendix A.

The newly installed wells were developed with a surge block followed by purging with an electric pump. Surging and purging were repeated until evacuated water was visibly clean and essentially sand-free. Well development continued until 10 well volumes were purged. All down-hole well development tools were decontaminated prior to use for each well. Top of casings (TOCs) for each new well was professionally surveyed in relation to the NAVD 88.

3.1.3 Groundwater and Product Sampling

Four groundwater monitoring and sampling events have been conducted in May, July, and October of 2015 and one final event in March of 2016. All groundwater sampling events were conducted using low-flow sampling protocols outlined in the approved Work Plan (Floyd|Snider 2014). During the first three monitoring events, monitoring wells MW-1A, MW-3, MW-4, and MW-7 were sampled. During the March 23, 2016 sampling event, groundwater samples were collected from monitoring wells MW-2, MW-4A, MW-5A, MW-8, MW-9, and MW-10. In addition, two groundwater samples each were collected from monitoring wells MW-2, MW-4A, and MW-5A in order to assess the vertical extent (thickness) of the dissolved-phase groundwater plume in accordance to the 2016 supplemental work plan. One sample was collected via peristaltic pump 7 feet below the TOC (just below the LNAPL layer) and the second at 14 feet below the TOC (well below the LNAPL layer). Results showed similar concentrations with depth. It is uncertain as to the representativeness of these samples due to the presence of LNAPL in the well as the time of sampling. Depth to groundwater and LNAPL measurements were collected from all monitoring wells prior to sampling. LNAPL samples were collected from monitoring wells MW-2, MW-4A, and MW-5A. LNAPL analytical results are presented in Table 3.6. The laboratory analytical reports are included as Appendix B and discussed in Section 5.2.

3.1.4 Light Non-Aqueous Phase Liquid Monitoring and Baildown Test/Pre-Interim Action Transmissivity Estimates

Following the installation of the piezometers and new monitoring wells, depth to water (DTW) and LNAPL thicknesses were recorded 24 hours after installation. Additional LNAPL monitoring events occurred on April 19, 2016 and June 16, 2016. Additional LNAPL monitoring events occurred on a monthly basis between October 2016 and October 2017, as part of the interim action at the Site to remove LNAPL as described in Section 3.1.5 below.

LNAPL transmissivity is a metric used to evaluate LNAPL hydraulic recoverability. To estimate LNAPL transmissivity, baildown tests were completed on wells MW-4A and MW-5A, which had LNAPL thicknesses of 0.51 and 1.01 feet, respectively, greater than the required 0.5 feet for baildown tests. Prior to conducting the baildown tests, depth to product (DTP; i.e., LNAPL) and depth to water (DTW) from the TOC were recorded. LNAPL was then removed rapidly using a peristaltic pump in order to remove only LNAPL during the baildown stage. Following removal of LNAPL, DTP and DTW were recorded with an interface probe. Measurements were taken more frequently during the initial recovery period, and the frequency of measurements decreased over time. Measurements continued until complete LNAPL recovery was achieved. However, LNAPL thickness in monitoring well MW-4A never recovered beyond 0.01 feet over a recovery time of 230 minutes.

Results from the bail down tests indicate that LNAPL thickness in well MW-5A returned to the pre-bail down thickness after approximately 219 minutes. Transmissivity could not be calculated for monitoring well MW-4A since LNAPL did not recover during the period of observation. The American Petroleum Institute's (API) 2012 LNAPL transmissivity Workbook was used to calculate transmissivity for MW-5A (API 2012). API's workbook uses LNAPL drawdown and recharge measurements as a function of time to calculate an LNAPL transmissivity value. A mean LNAPL transmissivity value of 1.56 square feet per day (ft^2/d) was calculated for MW-5A. Transmissivity is an indicator of the formation to transmit to a well and depends on soil type, LNAPL type, saturation, and thickness of the mobile LNAPL. The higher the transmissivity is, the higher the LNAPL recoverability will be. Sites with an LNAPL transmissivity value greater than 0.8 ft^2/d are good candidates for LNAPL recovery efforts (ITRC 2009). Generally, LNAPL transmissivity values of 0.1 ft^2/d are below the recoverability range. Transmissivity worksheet input, LNAPL recovery charts, and results are included as Appendix C.

3.1.5 Interim Action

In October 2016, off-property investigation activities coincided with an Ecology-required Interim Action to decommission and remove the four USTs and install a sump/skimmer system within a recovery trench dug along the southern boundary of the property. The objective of the Interim Action activities was to remove LNAPL, as stated in Ecology's June 9, 2016, letter (Ecology 2016a). The interim action also included delineation of the lateral extent of soil contamination and/or LNAPL that may have migrated beyond the property boundary onto the adjacent Toad's site or into the BNSF line right-of-way. During the Interim Action activities, which ceased in October of 2017, a total of approximately 364 gallons of LNAPL was recovered. Detailed results from the interim action activities and off-property investigations are included in Appendix D.

3.1.6 Supplemental Off-Property Investigations

On November 6, 2017, TRC Environmental, on behalf of BNSF and Big B conducted a supplemental off-property investigation at Ecology's request. Soil and groundwater samples at three off property locations (B-1 through B-3) were collected in order to delineate the extent of petroleum hydrocarbons in soil and groundwater (Figure 2.1). These locations are all located due west of the existing railroad berm, approximately 25 feet west of the rail centerline. Soil samples were collected continuously to a depth of 10 feet using a Geoprobe®, and groundwater samples were collected using a small-diameter temporary PVC well casing with a prepacked screen that was inserted into the Geoprobe® boring approximately from 5 to 10 feet bgs. Soil and groundwater analytical results from all three borings indicate that total petroleum hydrocarbon (TPH) concentrations were less than MTCA Method A cleanup levels. These off-property soil borings were successful in delineating the full extent of soil and groundwater impacts to the west and southwest. Activities and results are summarized in the Interim Action Report, which is included as Appendix D.

4.0 Physical Setting

4.1 GEOLOGY

The subsurface soils beneath the property consists of brown medium to coarse, gravelly sand to a sandy, coarse gravel and cobbles with approximately 20% large gravel and cobbles from the surface to approximately 14 feet bgs, which is the maximum depth that soils were sampled with the drill rig. A dark brown silt layer with some organic matter was encountered between 3 and 5 feet bgs in the southeastern half of the property. All site soils are considered to have been deposited as recent alluvium in the floodplain of the Yakima River. Comparison of the test pit and soil boring logs across the Site show lateral and vertical heterogeneity typical of alluvial settings.

4.2 HYDROGEOLOGY

During the four groundwater monitoring events, the depth to groundwater across the Site was typically found to occur between 3.9 and 7.1 feet bgs. Groundwater elevations fluctuated seasonally, with variations of up to 2.5 feet observed. The local groundwater table is affected by agricultural irrigation, which may affect the natural seasonal pattern of groundwater fluctuation. Typically, the irrigation network is filled in mid-March and is drained in mid-October.

The July and October sampling events established groundwater flow direction over a larger area using data collected from the Toad Station. Based on these events, groundwater flow direction is generally to the southeast, toward the Toad's site. However, during the March 2016 event, groundwater flow direction was to the southwest. The change in groundwater flow direction was noted after the construction of the perimeter barrier wall surrounding the remediated area near the dispensers at the Toad's site. It is not known if this deviation in groundwater flow is an anomaly or whether this flow pattern is more prevalent. Groundwater contour elevations and the presumed overall groundwater flow direction for all four monitoring events are presented in Figures 4.1 through 4.4.

5.0 Nature and Extent of Contamination

5.1 SOIL IMPACTS

The lateral extent of soil contamination at the Site is shown on Figure 5.1 and soil analytical data are presented in Tables 3.1 and 3.2. Petroleum-impacted soil was encountered at depths ranging between 3.5 and 7 feet bgs. The most heavily impacted areas are in the southern portion of the property and downgradient of the former 12,000-gallon baffled UST. The primary COCs in soil at the Site are GRO, DRO, benzene, toluene, ethylbenzene, and xylenes (BTEX), and naphthalene. All other soil contaminants that are required by Ecology to be tested (e.g., fuel additives and naphthalene), were analyzed for but were either less than their respective MTCA Method A cleanup levels or less than laboratory detection limits except for naphthalene in soil near the central dispenser area. GRO has been detected up to 3,700 milligrams per kilograms (mg/kg) and DRO up to 24,000 mg/kg. The distribution of benzene is generally associated with GRO impacts. Heavy oil-range organics (ORO) and Lead concentrations were either non-detect or at concentrations less than cleanup levels.

The majority of the Site contamination consists of DRO associated with the diesel release in the former UST location in the southern portion of the property and the former diesel USTs north of the station building. DRO detections at concentrations exceeding MTCA Method A cleanup levels have been measured in several wells downgradient on the Toad’s property including in wells downgradient of the dispenser islands on Toad’s, which had a documented release of both diesel and gasoline. The extent to which the DRO and or GRO detections on the Toad’s property are the result of releases from the Big B Site or the Toad’s site is not clear as both gasoline and diesel appear to have been released at both sites.

Along with DRO detections, GRO was detected at concentrations up to 3,000 mg/kg in the southern portion of the Big B property. The only area that has a gasoline release (i.e., GRO and benzene detections in soil without elevated DRO concentrations) is within the vicinity of the former well MW-2 near the former fuel dispensers along the central eastern side of the property. Chromatograms are included in the laboratory reports in Appendix B.

DRO detections off-property, south of the property line, and on the Toad’s site, show a decrease in concentrations and then a slight increase in DRO concentrations in the southern most soil samples that are located adjacent to and just north of the Toad’s remedial excavation extent.

5.2 GROUNDWATER IMPACTS

The lateral extent of dissolved-phase hydrocarbons in groundwater includes the areas east of the station building and south to southeast of the southern USTs. DRO is the primary COC in groundwater, which has been detected in monitoring wells MW-2, MW-4A, MW-5A, MW-8, and MW-9 at concentrations exceeding the MTCA Method A cleanup level. LNAPL has been observed in MW-2, MW-4A, MW-5A, and MW-9, but never in MW-8. Following the Interim Action, LNAPL thickness in wells are much reduced or entirely absent. GRO and benzene are present at concentrations exceeding MTCA A cleanup levels in wells MW-2 and MW-8, located on either side of the fuel pumps. The lateral extent of the dissolved-phase plume has been defined to the west by monitoring wells MW-3, MW-7, and groundwater grab samples collected by TRC Environmental from borings B-1 through B-3 located in the BNSF right of way.

Hydrocarbon concentrations along the eastern property boundary are greater than their respective MTCA Method A cleanup levels in monitoring wells MW-8 and MW-9, but less than cleanup levels in MW-10. GRO concentrations were detected at higher concentrations than DRO in monitoring well MW-8, and DRO concentrations were detected at higher concentrations than GRO in monitoring well MW-9. There is a gasoline component in the vicinity of the former MW-2, which is supported by the soil data including analytical results at TP-1 and TP-4 though DRO is the primary in the southern portion of the property and on the north portion of the Toads Express Mart property, groundwater and soil analytical results indicate lower concentrations of GRO associated with the higher levels of DRO.

On the Toad's property to the south, monitoring wells MW-1, MW-2, MW-10, MW-5R, and MW-8 had detections of DRO at concentrations that exceed their respective MTCA Method A cleanup levels during the September 2017 sampling event.

The current extent of the dissolved-phase plume from the Big B Site is shown on Figure 5.2. It is clear that this plume extends off-property to the east and southeast and may extend onto the Canyon Road right-of-way and onto the northern portion of the Toad's property to the south. However, based on the recent groundwater analytical data collected on the west side of the BNSF rail line, and well as recent groundwater monitoring data supplied by the Toad's site, the Big B plume does not co-mingle with the limited area of DRO contamination still present on the Toad's site in the vicinity of their pump island nor does it extend to the west side of the rail line (Figure 5.2). An interim action was performed on the Toads property by their consultant to address separate phase contamination near their dispenser island by excavation of contaminated soil and replacement with clean fill and construction of a concrete containment structure. Analytical data for the Big B Site and Toad's site are summarized in Tables 3.3, 3.4, and 3.5.

5.3 LIGHT NON-AQUEOUS PHASE LIQUID

LNAPL has been consistently observed in monitoring wells MW-2, MW-4A, MW-5A, and MW-9. Quarterly observations indicate that LNAPL thickness increases as groundwater elevations decrease seasonally. In order to delineate the LNAPL extent, 29 piezometers were installed and select piezometers were monitored on a monthly basis between March 2016 and November 2017. Figure 5.3 shows the thickness and extent of LNAPL during the most recent monitoring event in November of 2017. LNAPL measurements indicate that three separate LNAPL areas beneath the property (refer to Section 9.0). The northern LNAPL area is limited to the vicinity of PZ-20, just north of the former 10,000 diesel USTs. The middle LNAPL plume is limited to the vicinity of the pump islands and east of the station building, around the former MW-2 and PZ-13. The southern LNAPL area is within the vicinity of the southern UST basin and this area was subjected to an interim action to remove LNAPL as LNAPL thicknesses are the greatest in the southern portion of the property. Recorded LNAPL thicknesses for select wells and piezometers, between March and October 2017 are presented in Table 5.1. LNAPL thicknesses in relation to groundwater elevation, for select piezometers and wells (PZ-1, PZ-2, PZ-3, PZ-4, MW-4A, and MW-5A), are shown on Figures 5.4 through 5.9. These figures indicate that LNAPL thickness has decreased significantly since the interim action activities. Approximately 364 gallons of LNAPL have been removed since the start of the interim action activities.

LNAPL samples were collected and analyzed from wells MW-2A, MW-4A, MW-5A, and from the southern and northern UST pits. Analytical data indicate that LNAPL is mainly diesel. LNAPL analytical data are presented in Table 3.6.

During the interim action activities and off-property investigation, Sudan IV dye field kits were used to identify the presence of LNAPL (either residually trapped or mobile) in select soil samples after the sample had been shaken in water. The red dye stains petroleum products and provides a visual contrast for the presence of LNAPL in soil samples but does not distinguish the product type. In addition, concentrations between 500 parts per million (ppm) and 2,500 ppm can be observed by the bead turning pink. Sudan IV field kit results indicated a distinct LNAPL layer in locations PZ-23, PZ-24, PZ-28, and PZ-29, which are all locations with DRO concentrations between 12,000 to 13,000 mg/kg. However, since the installation of the piezometers, only PZ-23 has had a recordable LNAPL thickness, which had a DRO concentration of 13,000 mg/kg in soil. LNAPL thickness monitoring has occurred at the Site at least once a month since November 2016, and LNAPL has never been observed in piezometers PZ-24, PZ-28, or PZ-29.

5.4 TERRESTRIAL ECOLOGICAL EVALUATION

Under MTCA, exposure of terrestrial organisms to impacted soils must be evaluated by performing a Terrestrial Ecological Evaluation (TEE) as described in WAC 173-340-7491. This evaluation involves examination of the nature of potential ecological receptors, the toxicity of soil contaminants to terrestrial organisms, and the presence and nature of exposure pathways. All contaminated soil at the Site is covered by buildings, pavement, and other physical barriers, such as an adjacent rail line. These barriers will prevent plants and wildlife from being exposed to the soil contamination, provided that an environmental covenant is imposed on portions of the impacted property and ensure that the exposure pathway is mitigated. As required by the MTCA, a simplified TEE was completed for the Site using WAC 173-340-7492, Table 749-1, and is included as Appendix E. Based on the results of Table 749-1, the TEE cannot be ended at this point. The TEE will be re-evaluated after cleanup activities.

6.0 Conceptual Site Model

In order to more fully understand the relationship between contaminants, affected environmental media, indoor media, and human receptors, a CSM was developed. Under WAC 173-340-200, MTCA defines a CSM as "a conceptual understanding of a site that identifies potential or suspected sources of hazardous substances, types, and concentrations of hazardous substances, potentially impacted media, and actual and potential exposure pathways and receptors." These components will be discussed in the sections below, as an introduction to presenting the CSM.

6.1 RELEASE MECHANISMS AND PRIMARY CONTAMINATED MEDIA

Site history indicates that the primary sources include the historical USTs, underground piping, dispenser islands, and other facilities associated with the service station activities. Impacts likely occurred from discharges of petroleum products via leaks or spills from subsurface UST systems. Contamination moved through the unsaturated zone, either by lateral and downward transport to the water table or by lateral transport and smearing within the saturated zone.

The northern half of the parcel is paved and does not contain any station facilities, and no evidence of contamination has been observed on this portion of the property. The southern half of the parcel, which contained service station facilities, such as USTs, fuel dispenser islands, underground fuel lines, and the station building. The station facilities were decommissioned and the USTs were removed in October 2016. Residual soil impacts are present between 3.5 and 7 feet bgs within the vicinity of the northwestern and southern UST basins and fuel dispensers.

6.2 CONTAMINANTS OF CONCERN AND IMPACTED MEDIA

Site COCs and impacted media are summarized in Table 6.1 based on exceedances of their respective MTCA Method A cleanup levels.

Table 6.1
Affected Media and Site Contaminants of Concern

	Media		
Constituent	**Soil**	**Groundwater**	**Indoor Air (Potential Risk)**
GRO	COC	COC	COC[1]
BTEX	COC	COC	COC
DRO	COC	COC	COC[2]
Naphthalene	COC	N/A	COC

Notes:
1 Includes volatile petroleum hydrocarbon fractions of gasoline and all other potential gasoline constituents (BTEX, n-hexane, methyl tert-butyl ether, and naphthalene).
2 Per Ecology's Vapor Intrusion Implementation Memorandum No. 14 (Ecology 2016b), an assessment of vapor intrusion due to diesel fuel and weathered gasoline is required whenever DRO concentrations exceed 250 mg/kg.

6.3 CURRENT AND POTENTIAL LAND USE

The current land use at the Site is an inactive gasoline service station. The property and the surrounding property are zoned as commercial use. It is anticipated that the Site will eventually be used as a fueling station or other commercial use. Canyon Road, a major arterial, is present at the east boundary. The area to the north and to the west beyond the railroad tracks is undeveloped. A gasoline service station is located adjacent to the south.

6.4 POTENTIAL EXPOSURE PATHWAYS/RECEPTORS

Impacted media at the Site includes soil and groundwater. MTCA WAC 173-340-200 defines an exposure pathway as "the path a hazardous substance takes or could take from a source to an exposed organism." An exposure pathway describes the mechanism by which an individual or population is exposed or has the potential to be exposed to hazardous substances at or originating from a site." Primary exposure pathways are those routes that are known to be currently transporting petroleum contaminants to or within a certain medium (such as soil impacts to groundwater). Secondary exposure pathways are those routes that: (a) have transported contaminants in the past, but may not be currently, such as releases from USTs; or (b) may transport contaminants in the future, but do not currently. Precluded exposure pathways are those that are not possible at any time, based on physical evidence, and are therefore considered closed pathways.

Petroleum constituents have been detected in soil and groundwater. Therefore, soil and groundwater (with LNAPL) are impacted media but may also be considered contaminant sources. The potential exposure pathways associated with each medium/source are discussed below, along with rational for including or excluding that pathway.

6.4.1 Soil and Soil Vapor

Soil and soil vapor are potential exposure pathways to future on-site workers during construction and/or redevelopment activities. The impacted soil is considered to present a potential direct-contact exposure pathway, leaching to groundwater pathway, and soil vapor to indoor air pathway (once a permanent station building is constructed). The Site is currently inactive and is fenced so restricted to pedestrians. The point of compliance for soil is from ground surface to 15 feet bgs. In addition, impacted soil is present within the upper 6 feet, which creates a potential TEE pathway for any unpaved portion of the site, such as on the BNSF right-of-way.

For commercial land usage, the TEE screening values for GRO and DRO are 12,000 and 15,000, respectively, providing that the concentration does not exceed residual saturation at the soil surface (i.e., no NAPL at soil surface). Soil concentrations exceeding these TEE screening values exist at a shallow soil depth (within 6 feet bgs) in the vicinity of MW-4A, MW-5A, and TP5 (test pit #5).

6.4.2 Groundwater and Surface Water

The highest beneficial use of groundwater is assumed to be as a future source of drinking water. Currently, groundwater at this Site is not utilized for drinking. Within one mile of the Site, are a number of hay field irrigation wells and several single household domestic wells, however, these wells are all screened with a deeper water bearing zone (60 to 200 feet) and are not located within 500 feet of the subject property[2]. Given that the extent of groundwater contamination is limited and found only in the uppermost feet of the aquifer, it currently does not pose a current threat to nearby well users. The potable drinking water pathway is considered complete but with a low potential for exposure based on the lack of drinking water wells in the vicinity of the plume.

Grab samples from B-1 through B-3 indicate that the dissolved-phase plume has been delineated to the west and southwest; therefore, there is no discharge of contaminants to the surface water of Wilson Creek, which is approximately 300 feet south-southwest of the Site. Therefore, surface water is not considered to be a pathway of exposure.

6.5 DATA NEEDS

The potential for soil vapor to indoor air has not been assessed as there are no occupied structures on-site. Soil vapor risk will be evaluated following remedial activities.

6.6 PROPOSED CLEANUP STANDARDS

Under MTCA [WAC 173-340-200], a cleanup level is defined as “the concentration of a hazardous substance in soil, water, air, or sediment that is determined to be protective of human health and the environment under specified exposure conditions.” Cleanup levels, in combination with points of compliance, typically define the area or volume of soil, water, air, or sediment at a site that must be cleaned up. MTCA further specifies that the first step in determining cleanup levels is to identify the potentially impacted media, the current and potential pathways of exposure, the current and potential receptors, and the current and potential land and resource uses. The potentially impacted media are discussed in this section. In addition, the current and potential pathways of exposure, the current potential receptors, and cleanup levels are presented below.

6.6.1 Soil

MTCA provides three approaches for establishing soil cleanup levels: Method A, Method B, and Method C. Cleanup levels shall be based on the reasonable maximum exposure to occur during both current and future land uses. Groundwater is impacted at the Site, and the Site is not zoned for industrial use; therefore, soil analytical results are compared to MTCA Method A cleanup levels and/or Method B cleanup levels. Under Method A, cleanup levels are determined by the most stringent criteria specified under state and federal laws and Tables 720-1, 740-1, and 745-1 of MTCA. WAC 173-340-700(8) allows for the use of more than one Method for establishing cleanup levels at a single site (mixing of methods).

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[2] https://fortress.wa.gov/ecy/waterresources/map/WCLSWebMap/WellConstructionMapSearch.aspx

Impacted soil is present within the upper 6 feet, which creates a potential ecological exposure pathway. The Site is considered a commercial site. Industrial/commercial soil concentrations for the protection of terrestrial ecological receptors can be applied, which are 12,000 and 15,000 mg/kg for GRO and DRO, respectively. These concentrations are greater than MTCA Method A and proposed residual saturation and remediation levels. Table 6.2 presents soil cleanup levels for site COCs.

Table 6.2
Proposed Soil Cleanup Levels

Contaminant of Concern	On-Property Maximum Detected Concentration (mg/kg)	Protection of Groundwater MTCA Method A (mg/kg)	Cleanup Levels for Protection of Terrestrial Ecological Receptors[1] (mg/kg)	Proposed Soil Cleanup Level (mg/kg)
DRO	24,000	2,000	15,000	2000
GRO	3,700	30[2]	12,000	30
Benzene	1.1	0.03	NA	0.03
Ethylbenzene	15	6	NA	6
Toluene	11	7	NA	7
Xylenes	47	9	NA	9
Naphthalene	6.9	5	NA	5

Notes:

1 Concentrations derived from WAC Table 749-2 and using the levels for Industrial/Commercial Sites.
2 Use this value when benzene is present in soil.

Abbreviation:

NA Not applicable

6.6.2 Groundwater

Groundwater cleanup levels are based on estimates of the highest beneficial use and the reasonable maximum exposure expected to occur under both current and potential future site use. Under MTCA 173-340-720, drinking water is the highest beneficial use and exposure to contaminants through ingestion and other domestic uses represents the reasonable maximum exposure for all sites. Therefore, groundwater analytical results are compared to MTCA Method A cleanup levels for all groundwater COCs. Table 6.3 presents groundwater cleanup levels for site COCs.

Table 6.3
Proposed Groundwater Cleanup Levels

Contaminant of Concern	Maximum Detected Concentration (µg/L)	MTCA Method A Groundwater (µg/L)	Proposed Cleanup Level (µg/L)
DRO	3,400	500	500
GRO	2,400	800[1]	800
Benzene	270	5	5

Note:

1 Use this value when benzene is present.

6.6.3 Vapor

Soil gas to indoor air has not been assessed yet given that there are no occupied buildings on site and future remedial actions will remove most of the hydrocarbon sources. Therefore, after remedial actions, vapor intrusion will be assessed. Soil gas concentrations will be compared to screening levels presented in Table B-1 of Ecology's update 2016 Vapor Intrusion Guidance (Ecology 2016b and 2016c). If there is potential for a vapor risk to future buildings, then additional excavation will occur.

6.7 STANDARD POINTS OF COMPLIANCE

The point of compliance is defined by Ecology to be the point (horizontal or vertical) where the established cleanup levels must be achieved. The standard soil and groundwater points of compliance will be observed. Per WAC 173-340-720(8)(b), the standard groundwater point of compliance is from the ". . . uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site." Therefore, the groundwater point of compliance for the Site is groundwater throughout the Site to a depth of 14 feet bgs, which corresponds to the maximum depth of observed groundwater contamination[3]. Per Ecology, for the protection of groundwater, the soil point of compliance is defined as the soils throughout the site (WAC 173-340-740(6)(b)). The soil point of compliance for the Site is soils throughout the Site to a depth of 15 feet bgs.

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[3] The 14 foot depth of groundwater contamination is based on observations including the PID readings and field screening indications obtained from the boring locations, as well as a combination of groundwater analytical data together with the well screen intervals.

7.0 Remedial Action Objectives and Development of Remedial Action Alternatives

7.1 REMEDIAL ACTION OBJECTIVES

Primary RAOs for the Site are to remove, to the extent practicable, LNAPL accumulations on the water table. In addition, remedial actions will be conducted to protect groundwater and address any future vapor intrusion concerns.

A permanent cleanup action shall be used to achieve the cleanup levels for ground water in WAC 173-340-720 at the standard point(s) of compliance where a permanent cleanup action is practicable or determined by the department to be in the public interest.

Under WAC 173-340-360(2)(c)(ii)(A), the minimum requirements for non-permanent groundwater cleanup actions (when a permanent cleanup action is not required), “treatment or removal of the source of the release shall be conducted for liquid wastes. This includes removal [sic] free product consisting of petroleum and other LNAPL from the ground water using normally-accepted engineering practices.” A secondary, although equally important, RAO is to prevent ecological receptors (plants and animals) from exposure to contaminants. Each cleanup action alternative proposed will be evaluated for its ability to accomplish the RAOs.

7.2 GENERAL CATEGORIES OF REMEDIAL ACTIONS

The general categories of remedial action are identified for the Site include the following:

- Monitored Natural Attenuation
- Institutional Controls
- In situ Remediation
- Ex situ Remediation

These categories of remedial action can generally be applied as components of remedial actions and in some cases as standalone remedies.

Monitored Natural Attenuation. This involves regular soil and/or groundwater sampling to monitor the results of one or more naturally occurring physical, chemical, or biological process that reduces the mass, toxicity, volume, or concentration of contaminants in soil. However, this alternative must be paired with source removal, by itself it is not a complete remedial action and so is eliminated from further consideration as a stand-alone remedy.

Institutional Controls. Institutional controls are physical, legal, and administrative measures that are implemented to minimize or prevent human exposure to contamination by restricting access to the Site. Institutional controls often involve deed restrictions or covenants, site advisories, use restrictions, or consent decrees, and would be implemented at the Site to limit or prohibit activities that may interfere with the integrity of any cleanup action or result in exposures to hazardous substances at the Site. Institutional controls are typically implemented in addition to other technologies when those technologies leave COCs on-site at concentrations greater than cleanup levels. Similar to monitored natural attenuation, the institutional controls alternative as a stand-alone alternative is eliminated from further consideration, but the implementation of institutional controls in conjunction with other remedies is retained.

In Situ Remediation. In situ remediation involves treating in place the soil and groundwater to reduce contaminants to concentrations that comply with established cleanup standards. In situ soil remediation alternatives include soil vapor extraction (SVE), multi-phase extraction (MPE), bioremediation and/or chemical oxidant applications. Groundwater remediation alternatives include air sparge (AS), MPE, enhanced bioremediation (bioventing or bio-sparging) and/or chemical oxidant injections. In situ remediation can require several years to reduce the contaminant concentrations to less than MTCA cleanup levels depending on-site conditions and the effectiveness of the treatment system. In situ treatment can be a part of a combined remedy to bring down aqueous phase contaminant concentrations to near compliance and then transition from active remediation to passive remediation (e.g., monitored natural attenuation). The overall effect is to reduce the restoration time frame.

The majority of the contamination in groundwater at the Site generally consists of mid-weight hydrocarbons, as opposed to lighter and more volatile COCs such as benzene that are more amenable to several in situ technologies such as SVE, MPE, or AS. Mid-weight hydrocarbons are more effectively addressed in situ by enhanced aerobic bioremediation technologies versus in situ technologies such as SVE or AS that rely on physical properties of contaminants to be effective.

Ex Situ Remediation. Ex situ remediation includes excavation of contaminated soil and either aboveground treatment or off-site disposal. Aboveground treatment technologies include biopiles, landfarming and low-temperature thermal desorption. Off-site disposal consists of contaminated soil excavation and transport to an engineered, permitted landfill. Excavation and disposal provides the quickest permanent solution. Off-site disposal does not specifically address groundwater contamination except through removal of a continuing contaminant source. Follow on in situ remediation techniques would likely be required in combination with source removal to remediate groundwater and any contaminated soil left in place. Contaminated soil excavated from the Site would likely be either landfarmed onsite and/or transported to the Anderson Rock and Demolition Pit in Yakima, Washington, for landfarming.

8.0 Identification of Remedial Action Technologies

Initial remedial action alternatives were identified with the primary focus of the remediation alternatives to remove the on-site source areas for the gasoline and diesel plumes in groundwater. Alternatives that do not meet the threshold requirements and/or are technically infeasible at the Site are eliminated. Remedial technologies that pass a preliminary screening are assembled into alternatives for further evaluation according to the MTCA criteria.

8.1 ELIMINATED TECHNOLOGIES

The following technologies were removed from consideration due to interpreted site-specific conditions:

Soil Vapor Extraction. Unsaturated zone soil remediation technology in which a vacuum is applied through extraction wells to the soil to induce the controlled flow of air and remove mostly volatile contaminants from the soil. The vapor stream is treated to recover or destroy the contaminants. SVE for vadose zone remediation is effective when the primary contaminants are gasoline-related which are typically easily volatilized. However, the majority of the contaminants are related to the diesel release. Gasoline-related contaminants at the Site are present but are not extensive. Site conditions are not favorable for this technology.

Pump and Treat. Groundwater is pumped from extraction wells or recovery trenches to one of a variety of potential ex situ treatment processes such as liquid phase carbon adsorption or column air stripping or discharge to the local publicly owned treatment works. Given the high groundwater table and recharge rate, pump and treat options/hydraulic recovery options for LNAPL are eliminated due to costs. In addition, the City of Ellensburg's Publicly Owned Treatment Works (POTW) will not accept any additional volume of wastewater to their facility.

Dual-Phase Extraction. Generally, a high vacuum system is used to remove simultaneous various combinations of contaminated groundwater, separate-phase petroleum product, and hydrocarbon vapor from unsaturated soils. Extracted liquids and vapor are treated and/or collected for disposal. For the same reasons as the above technology, conditions are not favorable for this technology.

Bioslurping. Bioslurping is a variation on dual-phase extraction that utilizes elements of both bioventing and free product recovery to simultaneously recover free product and bioremediate vadose zone soils. Bioslurping can improve free-product recovery efficiency without extracting large quantities of groundwater. Vacuum-enhanced pumping allows LNAPL to be lifted off the water table and released from the capillary fringe. This minimizes changes in the water table elevation, which minimizes the creation of a smear zone. Bioventing of vadose zone soils is achieved by withdrawing soil gas via the vacuum applied to each recovery well. When free-product removal activities are completed, the bioslurping system is easily converted to a conventional bioventing system to complete the remediation. The restoration time frame for this technology is not reasonable when compared to other technologies, and therefore, is not retained.

Enhanced Biodegradation. The activity of naturally occurring microorganisms (e.g., fungi, bacteria) is stimulated by adding water-based amendments to contaminants dissolved in groundwater and/or on saturated contaminated soils to enhance the biological degradation of organic contaminants. In the presence of sufficient oxygen (aerobic conditions), microorganisms will ultimately convert many organic contaminants to carbon dioxide, water, and microbial cell mass. In situ bioremediation via recirculation typically involves the percolation or injection of solutions containing an electron acceptor (oxygen) and nutrients through saturated zone soils at the upgradient end of the release. The treated groundwater is then recovered by pumping at the downgradient end of the treatment area where it is mixed on-site with additional amendments and re-injected. To control the flow of amended groundwater from dispersing off-site, pumping rates need to be greater than injection rates. This technology is rejected due to excessive complications associated with its operation and it also requires the off disposal of treated water, which is not possible due to limitations of the City of Ellensburg POTW.

Air Sparging. Air is injected through a contaminated aquifer, where it passes horizontally and vertically through channels in the soil column, creating an underground stripper that removes contaminants by volatilization. This injected air helps to flush the contaminants up into the unsaturated zone where a vapor extraction system is usually implemented in conjunction with AS to remove the generated vapor phase contamination. AS generally volatilizes constituents that are gasoline-related which are typically easily volatilized. This technology is not as favorable for diesel-related constituents, which are the primary constituents in groundwater.

Surfactant Soil Flushing. Water, or water containing an additive to enhance contaminant solubility, is applied to the soil or injected into the groundwater to raise the water table into the contaminated soil zone. Contaminants are leached into the groundwater, which is then extracted and treated. By itself, surfactant flushing can remove a significant portion of the subsurface NAPL but generates large amounts of wastewater. However, surfactant flushing alone may not reduce the subsurface contaminant concentration to a level necessary for site closure and more effective when the LNAPL plume is small and thin. Therefore, this technology is not retained.

Permeable Reactive Barrier (a.k.a. passive treatment wall). Reactive media promotes degradation of benzene/TPH in groundwater in situ as it travels through the barrier. Commonly configured as a “funnel and gate,” with sections of impermeable barrier to channel groundwater into a smaller treatment zone. The treatment zone may utilize passive adsorption media such as peat or leaf compost, bone char, or granulated activated carbon. However, due to the presence of a LNAPL plume that extends off-property, this technology is not feasible and is not retained.

Barrier Wall. A barrier wall effectively provides a physical barrier to groundwater flow by creating a zone of substantially lower hydraulic conductivity than the surrounding formation that impedes the transport of contaminants beyond the wall. The wall can be constructed of mixtures of on-site soil, cement, and/or bentonite (slurry wall), or consist of interlocking panels of plastic or steel driven into the ground (sheetpile). Barrier walls are often used in conjunction with groundwater extraction to maintain hydraulic control of the plume and prevent the migration of contaminants around or underneath the barrier. This technology is not favorable for the reasons listed above.

In Situ Chemical Oxidation (ISCO). ISCO uses chemical contact and reactions with petroleum hydrocarbons to convert a hydrocarbon mass to carbon dioxide and water. Chemical oxidants include hydrogen peroxide, permanganate, and ozone. Initial screening indicated that site utilities might be an issue for this technology. ISCO treatment will reduce the contaminant mass associated with LNAPL, but it is difficult or impracticable to apply enough oxidant to treat all of the LNAPL; therefore, this is not a technology that can be used alone at the Site.

8.2 RETAINED TECHNOLOGIES

The screening process resulted in rejecting or retaining technologies based on whether the technology is capable of attaining cleanup levels and meeting the MTCA threshold criteria, given the COCs and impacted media, effectiveness and proven success at similar sites, and applicability of the of the technology within site specific constraints. The retained technologies are summarized below and then aggregated into remedial alternatives for evaluation in Section 9.0.

8.2.1 Retained Soil Remediation Technologies

Based on the preliminary technology screening, the technologies discussed below were retained for further evaluation to address groundwater and soil contamination and the presence of LNAPL.

Excavation and Off-site Treatment. Excavation of areas of contaminated soil using standard construction equipment and transport to the Anderson Pit for landfarming. Excavated areas would be subjected to confirmation soil sampling prior to backfill and regrading.

Excavation and On-Site Treatment. Excavation of areas of contaminated soil using standard construction equipment and on-site treatment (landfarming). Excavated areas and landfarmed soil would be subjected to confirmation soil sampling prior to backfill, compaction, and regrading. Soil treated on-site could be used for backfill if treated to cleanup standards.

Bioventing/Biosparging. Bioventing, a remedy for unsaturated zone petroleum-contaminated soils, stimulates the biodegradation of readily degradable compounds in soil by providing oxygen to existing soil microorganisms. In contrast to SVE, bioventing uses low air flow rates to provide only enough oxygen to sustain microbial activity. Oxygen is most commonly supplied through very low rates of direct air injection into residual contamination in the contaminated vadose zone soil. Vapors are not extracted and therefore air treatment is not required. Biosparging is similar to bioventing but acts to treat contaminated groundwater by adding oxygen to groundwater via low pressure air delivery sparge points (similar to air sparging points). This technology is primarily used to remediate DRO, in contrast to SVE, which is used effectively on GRO.

9.0 Alternatives Evaluation and Disproportionate Cost Analysis

Based on detailed screening, three remedial alternatives (Alternatives 1 through 3) were developed to address soil and groundwater contamination-site-wide in a reasonable restoration time frame. The three selected remedial alternatives provide a range of permanent cleanup actions for contaminated soil and groundwater at the Site. Each remedial alternative includes soil and groundwater monitoring to confirm effectiveness. The proposed alternatives are:

- Alternative 1: Excavation of all soil on both Big B and Toad's and on BNSF right of way (to maximum extent practicable- some may extend under the BN rail line or possibly the Canyon Road right of way) exceeding MTCA Method A Cleanup Levels .
- Alternative 2: Excavation of soil with LNAPL only, which addresses the requirement to remove LNAPL to the maximum extent practical. The remaining soil above cleanup levels outside of the LNAPL areas would be addressed by bioventing. Groundwater contamination to be addressed by biosparging as a contingency.
- Alternative 3: Excavation of soil within the LNAPL areas extent only, which addresses the requirement to remove LNAPL to the maximum extent practical. Following excavation, ISCO would be used to achieve Method A cleanup levels in remaining soil that exceeds MTCA Method A cleanup levels. Bioventing will be used as contingency if needed.

9.1 ALTERNATIVE 1—EXCAVATION OF SOIL EXCEEDING MTCA METHOD A CLEANUP LEVELS

Alternative 1 consists of excavation of approximately 3,500 cubic yards of contaminated soil exceeding MTCA Method A cleanup levels to the maximum extent practicable beneath the Site. The northern half of the property is paved and can contain up to approximately 1,000 cubic yards of contaminated soil for landfarming in biopiles if placed in approximately a pile with a 1-foot lift. Therefore, given the impracticality of on-site treatment due to space limitations, remaining contaminated soil would need to be transported to the Anderson Pit in Yakima for landfarming. This alternative includes compliance monitoring of groundwater and soil. Bioventing would not be necessary with this alternative because all accessible soil source material beneath the Big B, BNSF, and Toad's properties would be removed. If following soil removal, groundwater levels do not come into compliance, biosparging would be used as a contingent remedy to achieve compliance.

9.1.1 Remove Impacted Soil to the Maximum Extent Possible

This alternative includes the excavation of the entire area of contaminated soil beneath the Site to the maximum extent possible. Full excavation of all contaminated soil may be limited if soil contamination is found to extend under the BNSF rail embankment. Excavation of contaminated soil would involve removal and stockpiling the upper 3 feet of clean overburden followed by the removal of approximately 3 to 8 feet of underlying contaminated soil. The upper 3 feet of clean overburden would be used as backfill if suitable. Excavation would be conducted using standard construction equipment. Free product, if visible on the water table, would be removed using a vacuum truck and transported off-site for disposal. The excavation extent of soil exceeding MTCA Method A cleanup levels is shown on Figure 9.1.

9.1.2 Costs

The total estimated cost for Alternative 1 including, an engineering design report, construction implementation, monitoring, and reporting are approximately $856,000 for off-site disposal of all contaminated soil. A 30-percent contingency was applied to these estimates.

9.1.3 Restoration Time Frame

The remediation time frame for soil is short, estimated at 3 to 4 weeks. Alternative 1 will effectively remove approximately 95 percent of the hydrocarbon mass remaining at the Site; a portion of the contamination will remain inaccessible beneath the road and the BNSF property. Refer to Appendix F for mass calculations. The groundwater restoration time frame is estimated to be 5 years based on experience. After remedial activities, groundwater monitoring will be conducted for at least 5 years to confirm effectiveness. Groundwater monitoring will include collection of natural attenuation parameters to demonstrate degradation following the excavation of the majority of source mass.

9.2 ALTERNATIVE 2—REMOVAL OF LNAPL SATURATED SOIL AND ONSITE TREATMENT – BIOVENTING

Alternative 2 consists of excavation of soil within the footprint of the current LNAPL plume beneath the Site, while leaving behind residual hydrocarbon contamination in the soil outside of the LNAPL areas. Approximately 1,000 cubic yards of contaminated soil would be excavated and land-farmed on-site to concentrations less than MTCA Method A cleanup levels and then reused as vadose zone backfill. Cobbles and large gravel would be separated out from the contaminated soil prior to treatment to reduce the landfarming treatment volume. Bioventing piping would be installed in trenches dug within remaining areas of impacted soil. This alternative includes compliance monitoring of soil and groundwater and institutional controls.

9.2.1 Remove LNAPL Saturated Soil

This alternative includes the excavation of the entire area of LNAPL-containing soil beneath the Big B, BNSF, and Toad’s properties to the maximum extent possible, as shown on Figure 9.1. Excavation of contaminated soil would involve removal and stockpiling the upper 3 feet of clean overburden followed by the removal of approximately 3 to 8 feet of underlying contaminated soil. Contaminated soil would be stockpiled on-site for ex situ biological treatment. The upper 3 feet of clean overburden would be used as backfill if suitable. Excavation would be conducted using standard construction equipment. Free product, if visible on the water table, would be removed using a vacuum truck and transported off-site for disposal.

9.2.2 On-Site Ex Situ Biological Treatment

Excavated contaminated soil will be treated onsite and re-used as vadose zone backfill. This alternative includes using a grizzly to separate the cobbles from the finer soil and stockpiling contaminated soil on-site using a 1-foot lift in the northern portion of the lot. Excavated soil would be mixed with soil amendments and stockpiled within a treatment area that includes aeration and tilling. Moisture, heat, nutrients, oxygen, and pH can be controlled to enhanced biodegradation. The northern, paved portion of the property provides a large, paved treatment area (approximately 22,500 square feet as a treatment area). Soil would also be placed on a plastic liner and bermed to contain stormwater. Biological amendments would be reapplied to the soil during tilling activities, which would occur at least once a month for a 1- to 3-month estimated treatment period during the warm spring to summer months.

9.2.3 Confirmation Sampling and Groundwater Monitoring

Confirmation sampling and analysis of treated stockpiled soil for COCs would be required prior to backfilling. The number of confirmation samples will depend on the volume of stockpiled soil and follow Ecology’s guidance for sampling stockpiles. Groundwater monitoring will be conducted on compliance wells after excavation activities per a groundwater monitoring plan that will be described in the Engineering Design Report. If following soil removal, groundwater levels do not come into compliance, biosparging would be used as a contingent remedy to achieve compliance.

9.2.4 Bioventing

Bioventing will be used with this alternative in order to remediate impacted soil remaining in the vadose zone. Bioventing lines would likely consist of horizontal piping placed above the groundwater table in areas with remaining residual contamination. A small blower will be placed above ground and tied into the bioventing lines. This blower will provide fresh air to the subsurface soils to stimulate aerobic degradation.

9.2.5 Vapor Assessment

Vapor samples will be collected to assess if soil remaining after LNAPL excavation and backfilling poses a risk of vapor intrusion. If the post-remediation vapor assessment indicates a risk to indoor air, then additional excavation of contaminated soil will be implemented to address any vapor risk. The details of the vapor intrusion assessment are beyond the scope of this RI/FS but will be included in a vapor risk assessment work plan, if needed.

9.2.6 Costs

The estimated costs for Alternative 2 including a draft engineering design report, construction implementation, installation of bioventing system, monitoring, and reporting is approximately $395,000. A contingency amount of 30 percent was applied to this estimate.

9.2.7 Restoration Time Frame

The restoration time frame to remove LNAPL is short, estimated at 2 weeks, and for on-site treatment an additional 4 to 12 weeks. Alternative 2 will remove approximately 70 percent of the current hydrocarbon mass. Refer to Appendix F for mass calculations. The remaining accessible mass (i.e., not beneath the road or BNSF property) will be treated in situ with bioventing. The restoration time frame for remaining contaminated soil and groundwater is estimated to be 5 years based on experience. Groundwater monitoring is expected to last for 10 years. Groundwater monitoring will include collection of natural attenuation parameters to demonstrate the effectiveness of bioventing. If within 5 years following soil removal and treatment, groundwater contaminant concentrations do not come into compliance, biosparging would be used as a contingent remedy to achieve compliance.

9.3 ALTERNATIVE 3—REMOVE LNAPL AND TREAT RESIDUAL SOIL WITH ISCO

Alternative 3 consists of excavation of the LNAPL to the extent practicable followed by ISCO. This alternative includes compliance monitoring of soil and groundwater following remedial activities.

9.3.1 Remove LNAPL to the Maximum Extent Possible

This alternative includes the excavation of the entire area of the known LNAPL extent beneath the Big B, BNSF, and Toad’s properties to the maximum extent possible. Excavation of contaminated soil would involve removal and stockpiling the upper 3 feet of clean overburden followed by the removal of approximately 3 to 8 feet of underlying contaminated soil containing LNAPL. Approximately 1,000 cubic yards of contaminated soil would be land-farmed on-site to concentrations less than MTCA Method A cleanup levels and reused in the upper vadose zone following confirmation sampling (refer to Appendix G notes column for calculations and Figure 9.1 for area). Excavation would be conducted using standard construction equipment. Free product, if visible on the water table, would be removed using a vacuum truck or adsorbents and transported off-site for disposal.

9.3.2 ISCO

Approximately 2,365 cubic yards of soil contaminated above MTCA Method A cleanup levels, following NAPL removal, will be treated by ISCO. This will be done by mixing on-site following NAPL excavation using machinery to mix soil and oxidants together. Areas that are inaccessible to excavation and in situ mixing may be treated by injection if practical. See Appendix G for calculations and Figure 9.1 for ISCO treatment areas.

9.3.3 Confirmation Sampling and Groundwater Monitoring

Confirmation sampling and analysis of treated stockpiled soil would be required prior to backfilling. The number of confirmation samples will depend on the volume of stockpiled soil and follow Ecology’s guidance for sampling stockpiles. Groundwater monitoring following excavation will be described in the Engineering Design Report. If within 5 to 10 years following soil removal and treatment, groundwater contaminant concentrations do not come into compliance, biosparging would be used as a contingent remedy to achieve compliance.

9.3.4 Institutional Controls

Institutional controls may be required following remedy implementation. Institutional controls will also include a prohibition of the installation of water wells and other standard restrictions whenever residual levels of soil and/or groundwater contamination is left on site.

9.3.5 Costs

The estimated costs for Alternative 3 including, a draft cleanup action plan, implementation, oversight, reporting, and monitoring is approximately $533,000. A 30-percent contingency amount was applied to these estimates.

9.3.6 Restoration Time Frame

The restoration time frame to remove soil to the remediation level is short, estimated at 3 weeks form removal and 12 weeks for on-site soil treatment. Alternative 3 will effectively remove approximately 70 percent of the mass. Refer to Appendix F for mass calculations. The mass remaining in the in situ contaminated soil, not beneath the road or BNSF property, will be treated by ISCO. After remedial activities, the restoration time frame for groundwater is estimated at about 5 years based on experience. Groundwater monitoring expected to last for 10 years. Groundwater monitoring will include collection of natural attenuation parameters to demonstrate continued degradation following the excavation.

10.0 Evaluation Criteria

This section presents a description of the threshold requirements for cleanup actions under MTCA and the addition criteria used in this FS to evaluate the cleanup action alternatives. Each remediation alternative was assessed relative to the MTCA requirements referenced below. A more detailed discussion of each requirement and its applicability to the remediation alternatives is discussed in "Evaluation Criteria."

- Threshold Requirements – WAC 173-340-360(a)
- Other Requirements – WAC 173-340-360(b)
- DCA – WAC 173-340-360(e) and (f)

10.1 MTCA THRESHOLD REQUIREMENTS

The cleanup standards presented in Section 6.0 and RAOs presented in Section 7.0 provide the basis for identifying remedial technologies and developing remedial alternatives for evaluation, and the recommending of a preferred alternative for the final cleanup action. The four threshold criteria that all remedial alternatives must satisfy, as specified in WAC 173-340-360(2), were used as part of the preliminary screening (refer to Section 8.0).

- Protect Human Health and the Environment
- Comply with cleanup standards (WAC 173-340-700 through -760)
- Comply with applicable state and federal laws (WAC 173-340-710)
- Provide for compliance monitoring (WAC 173-340-410 and WAC 173-340-720 through WAC 173-340-760)

To allow selection from among alternatives that meet the threshold requirements, WAC 173-340-360(3) specifies three other criteria that alternatives must achieve:

- Use permanent solutions to the maximum extent practicable
- Provide for reasonable restoration time frame
- Consider public concerns

To determine whether the cleanup action utilizes a permanent solution to the maximum extent practicable, MTCA requires that a DCA be conducted as part of the alternatives evaluation.

10.1.1 Protection of Human and Health and the Environment

All proposed cleanup alternatives will protect human health and the environment in both the short-term and long-term. In addition, all will permanently reduce the identified risks presently posed to human health and the environment through a combination of excavation followed by bioventing and monitoring of groundwater.

10.1.2 Compliance with Cleanup Standards and Remediation Levels

Use of remediation levels and compliance with cleanup standards require, in part, that cleanup levels are met at the applicable points of compliance. If a remedial action does not comply with cleanup standards, the remedial action is an interim action, not a cleanup action. When a cleanup action involves containment of soils with hazardous substance concentrations exceeding cleanup levels at the point of compliance, the cleanup action may be determined to comply with cleanup standards, provided the requirements specified in WAC 173-340-740(6)(f) are met. The use of remediation levels is consistent with the MTCA as cleanup standards and remedial actions to achieve cleanup standards are proposed for all site COCs.

Cleanup alternatives must also comply with applicable or relevant and appropriate requirements (ARARs) in accordance with WAC 173-340-710. An evaluation of the ARARs potentially applicable to each remedial alternative was completed and is summarized in Summary of ARARs, Table 10.1. The remedial alternatives evaluated in this FS comply with the intent.

10.1.3 Compliance with Applicable State and Federal Laws

Cleanup actions conducted under MTCA must comply with applicable state and federal laws. The term "applicable state and federal laws" includes legally applicable requirements and those requirements that Ecology determines to be relevant and appropriate as described in WAC 173-340-710.

10.1.4 Provision for Compliance Monitoring

The cleanup action must allow for compliance monitoring in accordance with WAC 173-340-410. Compliance monitoring consists of protection monitoring, performance monitoring, and confirmation monitoring. Protection monitoring is conducted to confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of a cleanup action. Performance monitoring is conducted to confirm that the cleanup action has attained cleanup standards and, if appropriate, remediation levels or other performance standards. Confirmation monitoring (groundwater and/or soil) is conducted to confirm the long-term effectiveness of the cleanup action once cleanup standards and, if appropriate, remediation levels or other performance standards have been attained.

10.2 OTHER MTCA REQUIREMENTS

Under MTCA, when selecting from the alternatives that meet the minimum requirements described above, the alternatives shall be further evaluated against the following additional criteria.

10.2.1 Use permanent solutions to the maximum extent practicable

MTCA requires that when selecting from cleanup action alternatives that fulfill the threshold requirements, the selected action shall use permanent solutions to the maximum extent practicable (WAC 173-340-360(2)(b)(i)). MTCA specifies that the permanence of these qualifying alternatives shall be evaluated by balancing the costs and benefits of each of the alternatives using a “disproportionate cost analysis” in accordance with WAC 173-340-360(3)(e). The criteria for conducting this analysis are described below.

10.2.2 Provide a reasonable restoration time frame [WAC 173-340-360(2)(b)(ii)]

In accordance with WAC 173-340-360(2)(b)(ii), MTCA places a preference on those cleanup action alternatives that, while equivalent in other respects, can be implemented in a shorter period of time. WAC 173-340-360(4)(b) specifies that the following factors be considered in establishing a “reasonable” time frame:

- Potential risks to human health and the environment
- Practicability of achieving a shorter restoration time frame
- Current use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site
- Potential future use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site
- Availability of alternate water supplies
- Likely effectiveness and reliability of institutional controls
- Ability to control and monitor migration of hazardous substances from the Site
- Toxicity of the hazardous substances at the Site
- Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the Site or under similar site conditions.

10.2.3 Consideration of public concerns (WAC 173-340-360(2)(b)(iii))

The draft RI/FS Report will be issued for public comment, which will provide the public an opportunity to express any concerns. Those concerns will be considered by Ecology and, if appropriate, a responsiveness summary may be prepared and the RI/FS Report modified in response to the public concerns.

10.3 MTCA SELECTION CRITERIA AND DISPROPORTIONATE COST ANALYSIS

Technologies that meet the threshold requirements listed above and pass the initial screening presented in Section 8.0 are assembled into alternatives and subjected to a more detailed analysis to select the alternative that “uses permanent solutions to the maximum extent practicable.”

MTCA requires that cleanup actions be permanent to the maximum extent practicable and requires that a DCA be used when the cleanup alternatives being considered are not permanent as defined under WAC 173-340-200. Evaluation of the practicability of a given alternative is a comparative evaluation of whether the incremental increase in cost associated with increasingly protective cleanup actions is substantial and disproportionate to the incremental increase in environmental benefit. In the DCA, cleanup alternatives are arranged from most to least permanent based on the criteria specified in WAC 173-340-360(f). Costs are disproportionate to benefits if the incremental costs of the more permanent alternative exceed the incremental benefits achieved by the lower cost alternative (WAC 173-340-360(3)(e)(i)). Alternatives that exhibit disproportionate costs are considered “impracticable.” Where the benefits of two alternatives are equivalent, MTCA specifies that Ecology select the least costly alternative (WAC 173-340-360(e)(ii)(c)). In the DCA, the following criteria are evaluated (WAC 173-340-360(3)(e) through (f)):

- Overall protectiveness
- Permanence
- Cost
- Effectiveness over the long term, which includes reductions in toxicity, mobility, and volume
- Management of short-term risks
- Technical and administrative implementability
- Consideration of public concerns

In addition to these criteria, the restoration time frame must be considered when choosing between alternatives. Each of the MTCA criteria used in the DCA is described below.

10.3.1 Protectiveness

The overall protectiveness of each alternative is evaluated based on human health and the environment, including the degree to which site risks are reduced, the risks during implementation, and the improvement of overall environmental quality. Both on-site and off-site risk reduction resulting from implementing the alternative are considered.

10.3.2 Permanence

MTCA specifies that when selecting a cleanup action alternative, preference shall be given to actions that are “permanent solutions to the maximum extent practicable.” Evaluation criteria includes the degree to which the alternative permanently reduces the toxicity, mobility or mass of hazardous substances; the effectiveness of the alternative in destroying the hazardous substances; the reduction or elimination of hazardous substance releases and sources of releases.

10.3.3 Cost

The analysis of cleanup action alternative costs under MTCA includes costs associated with implementing an alternative including design, construction, long-term monitoring, and institutional controls. Costs are intended to be comparable among different alternatives to assist in the overall analysis of relative costs and benefits of the alternatives. The costs to implement an alternative include capital costs, the cost of construction, the net present value of any long-term costs and agency oversight costs. Long-term costs include operation and maintenance costs, monitoring costs, equipment replacement costs and the cost of maintaining institutional controls.

10.3.4 Long-Term Effectiveness

Long-term effectiveness is a parameter that expresses the degree of certainty that the alternative will be successful in maintaining compliance with cleanup standards over the long-term performance of the cleanup action, including the long-term reliability, the magnitude of residual risk, and the effectiveness of controls required to manage treatment residues and remaining waste.

10.3.5 Management of Short-Term Risks

Evaluation of this criterion considers the relative magnitude and complexity of actions required to maintain protection of human health and the environment during implementation of the cleanup action. Cleanup actions carry short-term risks such as potential mobilization of contaminants during construction or safety risks typical of large construction projects. Some short-term risks can be managed through best practices during project design and construction, while other risks are inherent to project alternatives and can offset the long-term benefits of an alternative.

10.3.6 Implementability

Implementability is an overall metric expressing the relative difficulty and uncertainty of implementing the cleanup action. Evaluation of implementability includes the availability of necessary off-site facilities, services, and materials; administrative and regulatory requirements; scheduling, size, and complexity of construction; monitoring requirements; access for construction, operations, and monitoring; and integration with existing facility operations.

10.3.7 Consideration of Public Concerns

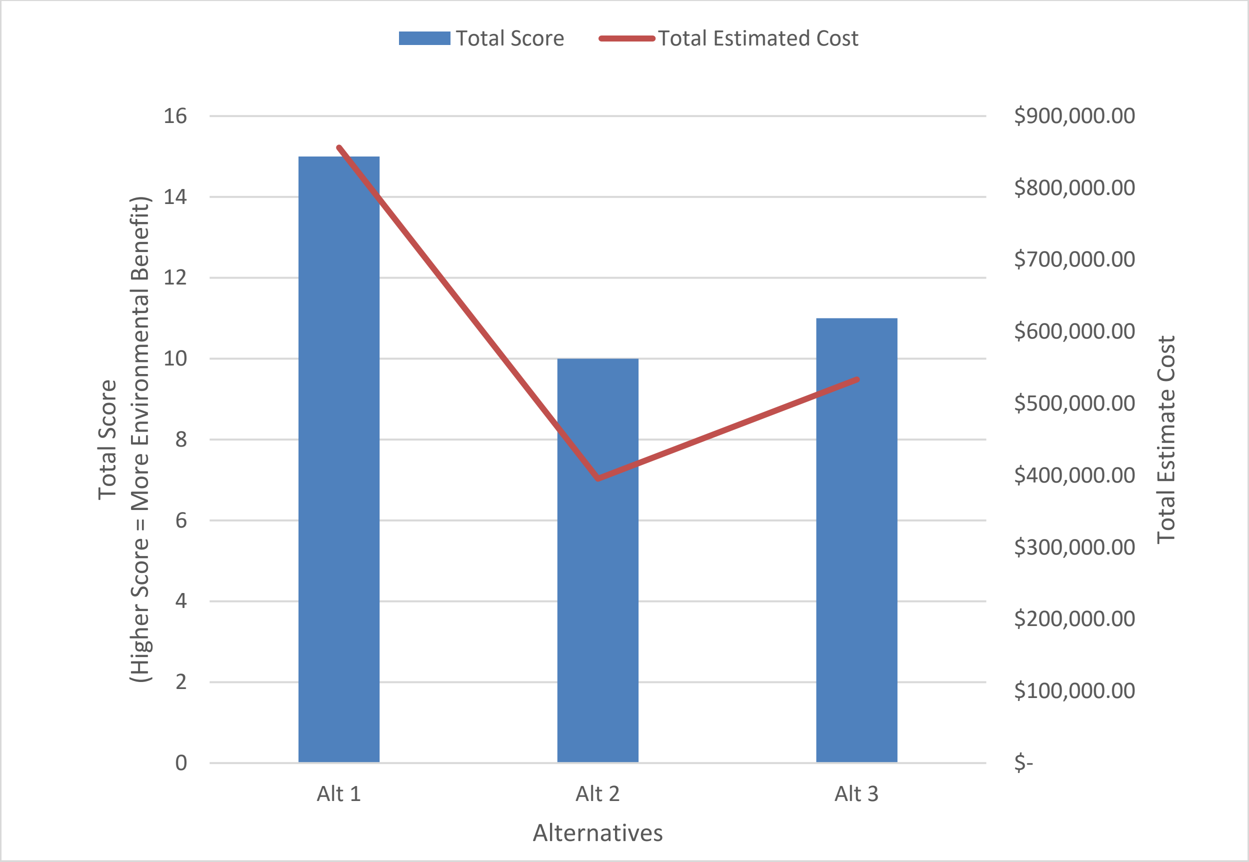
The public involvement process under MTCA is used to identify potential public concerns regarding cleanup action alternatives. The extent to which an alternative addresses those concerns is considered as part of the evaluation process. This includes concerns raised by individuals, community groups, local governments, tribes, federal and state agencies, and other organizations that may have an interest in or knowledge of the Site. In particular, public concerns for this site generally would be associated with environmental issues and cleanup action performance, which are addressed under other criteria such as protectiveness and permanence.

11.0 Evaluation, Comparison, and Recommendation of Cleanup Alternatives

This section provides an evaluation and comparative analysis of cleanup action alternatives developed for the Site. The alternatives are evaluated with respect to the MTCA evaluation criteria described above.

Figure 11.1 compares the DCA analysis total score and the estimated cost to implement each alternative. The DCA analysis is presented in Table 11.1 and summarized in Table 11.2.

Figure 11.1
Disproportionate Cost Analysis Summary



Based on the minimum threshold, other criteria, and DCA, remedial Alternative 2 is the proposed alternative. Alternative 1 has environmental benefits that are slightly greater than Alternatives 2 and 3, but has a much higher cost. The primary cost factor between alternatives is the cost associated with off-site soil treatment versus on-site treatment. All alternatives treat 95 percent of the total amount of soil contamination. Alternatives 1 and 3 treat the 95 percent in a short time versus Alternative 2, which treats 70 percent of the soil contamination in short time frame and 25 percent in a longer time frame. The cost for Alternative 2 is significantly lower than Alternatives 1 or 3, however. Also, the 5-year groundwater restoration time frame is equal across all alternatives. Alternative 2 is the proposed preferred remedial alternative.

Alternative 2 provides both soil and groundwater remediation through excavation that will remove all visible LNAPL from the Site, treats that excavated soil on Site in a biopile during one season, and reuses that soil on Site as backfill. Remaining contaminated soil above cleanup levels will be treated in situ using bioventing until cleanup levels in soil are achieved. Vapor intrusion risk will be assessed following LNAPL removal and backfilling by sampling of shallow soil vapor. If a risk of vapor intrusion is found, then that risk will be addressed by excavation of those soils causing the excess risk.

Biosparging will only be required as a contingency measure if groundwater cleanup levels are not being achieved in a reasonable restoration time frame. Compliance with cleanup levels will be assessed during each 5-year review. It is expected that groundwater cleanup levels will be achieved or on a downward trend that will achieve compliance within 5 years following remedy implementation. Details of how groundwater compliance will be measured and how the bioventing contingency will be put in place will be detailed in the draft cleanup action plan.

Implementation of the preferred remedy will include plans to address the following issues: compliance with application regulations (e.g., Solid Waste Handling Regulations), visibility of the biopile, odor, or options for soil re-use or disposal if cleanup levels are not achieved during biopile remediation efforts, which are expected to last for one summer (90 days or less).

12.0 References

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Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Tables

PUBLIC REVIEW DRAFT

Table 3.1
Soil Analytical Data

	Analysis Method	USEPA 8021B/8260C[1]				NWTPH-Gx	NWTPH-Dx		USEPA 6020A
	Analyte	Benzene	Toluene	Ethylbenzene	Xylene (total)	Range Organics	Diesel-Range Organics[4]	Oil-Range Organics[4]	Lead
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	MTCA Method A Cleanup Level	0.03	7	6	9	30/100[2]	2,000	2,000	250
Sample ID	Date								
MW4A-6-6.5	05/05/2015	**0.13**	0.05 U	3.8	9	**890**	**15,000**	250 U	2.08
MW5A-6-6.5	05/05/2015	**0.067**	0.05 U	3.9	**13**	**2,600**	**21,000**	330 JM	4.28
MW7-5-5.5	05/05/2015	0.02 U	0.1 U	1.4	4.4	**740**	**7,200**	250 U	--
TP1-4-4.5	05/06/2015	**0.048**	0.05 U	1.4	0.1 U	**670**	250 JM	250 U	12
TP1-6.5-7	05/06/2015	**0.7 J**	**8.8 J**	**12 J**	**13 J**	**1,200**	**8,200**	250 U	--
TP2-5-5.5	05/06/2015	**0.31 J**	0.89 J	**10 J**	**47 J**	**3,700**	**11,000**	250 U	--
TP3-5-5.5	05/06/2015	--	--	--	--	25 U[3]	**6,500**	250 U	--
TP4-6-6.5	05/06/2015	***0.2 U***	4.1	**15**	**20**	**2,500**	**13,000**	250 U	--
TP5-6-6.5	05/06/2015	***0.2 U***	1.3	**6.8**	**19**	**1,900**	**24,000**	410 JM	--
TP6-5-5.5	05/06/2015	0.02 U	1.1	3.8	**9.4**	**1,100**	**4,400**	250 U	--
TP7-5-5.5	05/06/2015	***0.2 U***	0.2 U	0.97	6.9	**890**	**12,000**	250 U	--
TP8-6-6.5	05/06/2015	0.02	0.1 U	2.5	**14**	**1,100**	**6,500**	250 U	--
TP9-5-5.5	05/06/2015	***0.2 U***	**11 J**	**12 J**	**33 J**	**2,900**	**14,000**	280 JM	--
TP10-6-6.5	05/06/2015	**0.16 J**	0.05 U	1.8	0.1 U	**200**	50 U	250 U	3.31
TP10-6-6.5B	05/06/2015	--	--	--	--	24 U[3]	61 U[3]	303 U[3]	--
TP11-5-5.5	05/06/2015	--	--	--	--	25 U[3]	93	250 U	--
TP12-6-6.5	05/06/2015	**1.1**	3.9	4	6.7	**780**	1,000	250 U	--
TP13-5.5-6	05/05/2015	--	--	--	--	25 U[3]	63 U[3]	314 U[3]	--
TP14-5-5.5	05/05/2015	--	--	--	--	22 U[3]	55 U[3]	273 U[3]	--
TP15-5-5.5	05/06/2015	**0.28**	1.6	2.3	5.7	**460**	660	250 U	--
TP16-5-5.5	05/05/2015	0.02 U	4	4.9	**14**	**1,400**	**4,100**	250 U	--
TP17-5.5-6	05/05/2015	--	--	--	--	23 U[3]	1,300	250 U	--
TP18-5-5.5	05/05/2015	0.03 U	0.05 U	0.097	0.1 U	**960**	**3,900**	250 U	5.23
TP19-6-6.5	05/05/2015	--	--	--	--	22 U[3]	440	250 U	--
TP20-4-4.5	05/05/2015	--	--	--	--	22 U[3]	55 U[3]	276 U[3]	--
TP21-4.5-5	05/06/2015	--	--	--	--	25 U[3]	63 U[3]	314 U[3]	--
TP22-5.5-6	05/06/2015	--	--	--	--	25 U[3]	61 U[3]	307 U[3]	--
TP22-5.5-6B	05/06/2015	--	--	--	--	25 U[3]	63 U[3]	314 U[3]	--
Stockpile-032316	03/23/2016	--	--	--	--	**910**	**11,000**	250 U	--
PZ-23-6'-7'	10/27/2016	0.03 U	0.05 U	0.97	0.1 U	**1,800**	**13,000**	250 U	2.11
PZ-24-5'-6'	10/27/2016	0.03 U	0.05 U	1.9	2.6	**1,100**	**12,000**	250 U	5.89
PZ-25-5'-6'	10/27/2016	0.03 U	0.05 U	0.24	0.25	**1,300**	**2,500**	250 U	9.44
PZ-26-6'-7'	10/27/2016	0.03 U	0.05 U	0.05 U	0.1 U	**220**	720	250 U	2.47
PZ-27-6'-7'	10/27/2016	0.03 U	0.05 U	0.05 U	0.1 U	**110**	360	250 U	1.88
PZ-28-6'-7'	10/27/2016	0.03 U	0.05 U	2.5	3.19	**1,100**	**13,000**	250 U	2.34
PZ-29-6'-7'	10/27/2016	**0.039**	0.05 U	2.8	3.453	**3,000**	**12,000**	250 U	2.56
FS-2-6'-7'	10/27/2016	0.03 U	0.05 U	0.05 U	0.1 U	**270**	**3,000**	290 JM	3.25
FS-3-6'-7'	10/27/2016	0.03 U	0.05 U	0.05 U	0.1 U	**300**	990	250 U	4.73
B-1-5'-7'	11/06/2017	0.00305 U	0.00609 U	0.00306 U	0.0091 U	0.122 U	4.87 U	12.2 U	--
B-2-5'-7'	11/06/2017	0.00333 U	0.00665 U	0.00333 U	0.01 U	0.133 U	5.33 U	13.3 U	--
B-3-5'-7'	11/06/2017	0.00285 U	0.0057 U	0.00285 U	0.0086 U	0.114 U	4.56 U	11.4 U	--
Toad's Soil Analytical Data									
MW1-7'	01/13/2015	0.0348 U	0.139 U	0.352	0.619	**166**	746	51.9	--
MW2-6'	01/13/2015	0.0429 U	0.172 U	0.234	0.527	**369**	**6,660**	180 U	--
MW3-7'	01/14/2015	0.0085 U	0.0265 U	0.0177 U	0.0531 U	3.54 U	25 U	50 U	--
P1-1-8'	04/28/2016	0.0116 U	0.0578 U	0.0289 U	0.0867 U	16.7	35.8	50 U	--
P2-1-6'-7'	04/28/2016	0.0198 U	0.099 U	0.0525	0.149 U	**579**	**4,540**	50 U	--
P3-7' (MW-15)	04/28/2016	0.011 U	0.0548 U	0.0274	0.0821 U	5.48 U	25 U	50 U	--
P4-7'	04/28/2016	0.0538 U	0.269 U	0.256	0.404 U	**1,240**	**3,670**	50 U	--
P5-7'	04/28/2016	0.0488 U	0.244 U	0.903	0.437	**1,110**	**5,750**	50 U	--
P6-7' (MW-12)	04/28/2016	0.131 U	0.657 U	3.29	7.14	**2,580**	**13,500**	50 U	--
P7-4.5'	04/28/2016	0.0122 U	0.0609 U	0.0305 U	0.0914 U	**117**	370	50 U	--
P7-5.5'	04/28/2016	0.0134 U	0.0668 U	0.0822	0.1 U	**214**	**9,050**	337	--
P7-7'	04/28/2016	0.0439 U	0.22 U	0.448	0.329 U	**1,470**	**6,570**	50 U	--
P7-9.5'	04/28/2016	0.012 U	0.0602 U	0.0301 U	0.0902 U	6.02 U	25 U	50 U	--
P8-7'-8'	04/28/2016	0.0491 U	0.246 U	0.123 U	0.368 U	**1,190**	**6,090**	50 U	--
P9-7'	04/28/2016	0.00985 U	0.0492 U	0.0246 U	0.0738 U	**346**	**4,450**	50 U	--

Table 3.1
Soil Analytical Data

	Analysis Method	**USEPA 8021B/8260C[1]**				**NWTPH-Gx**	**NWTPH-Dx**		**USEPA 6020A**
	Analyte	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene (total)**	**Range Organics**	**Diesel-Range Organics[4]**	**Oil-Range Organics[4]**	**Lead**
	Units	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
	MTCA Method A Cleanup Level	**0.03**	**7**	**6**	**9**	**30/100[2]**	**2,000**	**2,000**	**250**
Sample ID	**Date**								
Toad's Soil Analytical Data (continued)									
P10-6'-7' (MW-13)	04/28/2016	0.23 U	1.15 U	4.24	3.85	**2,860**	**11,500**	50 U	--
P11-6.5'-7'	04/28/2016	0.0479 U	0.24 U	0.12 U	0.359 U	**1,130**	**3,140**	50 U	--
P12-6.5'-7'	04/28/2016	0.0253 U	0.126 U	0.0632 U	0.253 U	**984**	**4,680**	50 U	--
P13-6.5'	04/28/2016	0.0459 U	0.229 U	0.755	0.344 U	**1,500**	**7,580**	50 U	--
P14-6.5'	04/28/2016	0.11	0.522 U	3.79	8.58	**2,070**	**11,400**	50 U	--
P15-4'	04/28/2016	0.0178 U	0.0892 U	0.687	2.43	**180**	249	50 U	--
P15-7'	04/28/2016	0.134	0.262 U	5.67	**14.6**	**2,570**	**14,900**	50 U	--
P16-4'	04/28/2016	0.0148 U	0.074 U	0.0577	0.246	**32.3**	33	50 U	--
P16-7'	04/28/2016	0.121	0.224 U	4.66	**9.65**	**2,790**	**10,500**	50 U	--
P17-4'	04/28/2016	0.0564	0.282 U	0.141 U	0.55	**1,390**	**14,700**	50 U	--
P17-7'	04/28/2016	0.112	0.211 U	4.34	4.36	**3,570**	**10,600**	50 U	--
P18-7'	04/28/2016	0.0218 U	0.109 U	0.0546 U	0.218 U	**585**	**4,230**	50 U	--
P19-7'	04/28/2016	0.0119 U	0.0594 U	0.0297 U	0.0891 U	5.94 U	25 U	50 U	--
P20-7'	04/28/2016	0.0136 U	0.068 U	0.034 U	0.102 U	6.80 U	25 U	50 U	--

Notes:

Italic	Non-detect with a reporting limit that exceeds criteria.
Red/Bold	Detected at a concentration that exceeds the MTCA Method A cleanup level.
1	Volatile organic compounds were only analyzed if there were gasoline detections with the NWTPH-HCID screening results.
2	Criterion is for Benzene Present/No Detectable Benzene.
3	NWTPH-HCID screening result, which has been adjusted to reflect dry weight.
4	Silica Gel Cleanup was not used

Abbreviations:

mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act

Qualifiers:

J	Analyte was detected, concentration is considered an estimate.
JM	Concentration is considered an estimate, the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
U	Analyte was not detected at the given reporting limit.

Table 3.2
Additional Soil Analytical Data

		Location	MW-4A	MW-5A	TP-1	TP-10	TP-18
		Sample ID	MW4A-6-6.5	MW5A-6-6.5	TP1-4-4.5	TP10-6-6.5	TP18-5-5.5
		Sample Date	05/05/2015	05/05/2015	05/06/2015	05/06/2015	05/05/2015
Analyte	**MTCA Method A Cleanup Level**	**Units**					
Volatile Organic Compounds by USEPA 8260C							
1,2-Dibromoethane	0.005	mg/kg	0.005 UJ	0.005 UJ	0.005 U	0.005 U	0.005 UJ
1,2-Dichloroethane	11	mg/kg	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethanol	--	mg/kg	50 U	50 U	50 U	50 U	50 U
Methyl Tert-Butyl Ether	0.1	mg/kg	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Naphthalene	5	mg/kg	2.7	3.8	**6.9**	2.9	0.05 U
n-Hexane	--	mg/kg	0.25 U	0.25 U	0.45	0.66 J	0.69

Notes:

--	No criteria available.
Red/Bold	Detected at a concentration that exceeds the MTCA Method A cleanup level.

Abbreviations:

mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act

Qualifiers:

J	Analyte was detected, concentration is considered an estimate.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, the given reporting limit is considered an estimate.

Table 3.3
Groundwater Analytical and Elevation Data

						Analysis Method	NWTPH-Gx	NWTPH-Dx		USEPA 8206C				
Sample (Well ID)	TOC Elevation	Date	DTW	DTL	LNAPL Thickness (feet)	Groundwater Elevation^2	Gasoline Range Organics	Diesel Range Organics	Motor Oil Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-1A	1490.76	05/07/2015	4.65	--	--	1486.11	100 U	88 x	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.76	5/7/2015 (DUP)	4.65	--	--	1486.11	100 U	90 x	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.76	07/16/2015	4.85	--	--	1485.91	100 U	50 U	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.76	7/16/2015 (DUP)	4.85	--	--	1485.91	100 U	50 U	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.76	10/20/2015	5.75	--	--	1485.01	100 U	100 x	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.76	10/20/2015 (DUP)	5.75	--	--	1485.01	100 U	110 x	280 U	0.35 U	1 U	1 U	2 U	1 U
	1490.76	03/23/2016	4.35	--	--	1486.41	--	--	--	--	--	--	--	--
	1490.76	04/19/2016	4.35	--	--	1486.41	--	--	--	--	--	--	--	--
MW-2	1491.35	05/07/2015	5.46	5.37	0.09	1485.96	Not Sampled Due to the Presence of LNAPL							
	1491.35	07/16/2015	5.61	5.52	0.09	1485.81	Not Sampled Due to the Presence of LNAPL							
	1491.35	10/20/2015	6.8	6.39	0.41	1484.88	Not Sampled Due to the Presence of LNAPL							
	1491.35	3/23/2016^3	5.17	5.13	0.04	1486.21	**2,400**	**1,400**	250 U	**270**	3.1	5.9	2.3	3.4
	1491.35	3/23/2016^4	5.17	5.13	0.04	1486.21	**2,300**	**1,300**	250 U	**260**	3.1	4.2	2.0 U	3.2
MW-3	1490.31	05/07/2015	4.31	--	--	1486.00	100 U	250 x	250	0.35 U	1 U	1 U	2 U	1 U
	1490.31	07/16/2015	4.51	--	--	1485.80	100 U	180	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.31	10/20/2015	5.34	--	--	1484.97	100	200 x	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.31	03/23/2016	4.11	--	--	1486.20	--	--	--	--	--	--	--	--
MW-4A	1489.46	05/07/2015	3.60	--	--	1485.86	740	**2,400**	250 U	1.1	1 U	6.8	18	4.2
	1489.46	07/16/2015	3.77	--	--	1485.69	140	**1,600**	250 U	0.35 U	1 U	1 U	2 U	1 U
	1489.46	10/20/2015	4.62	--	--	1484.84	120	**1,200**	250 U	0.35 U	1 U	1 U	2 U	1 U
	1489.46	3/23/2016^3	4.43	3.22	1.21	1486.00	480	**3,400**	250 U	0.86	1 U	1	4.9	1.6
	1489.46	3/23/2016^4	4.43	3.22	1.21	1486.00	440	**2,400**	250 U	0.67	1 U	1.6	6.0	2.0
MW-5A	1489.95	05/07/2015	4.50	4.05	0.45	1485.81	Not Sampled Due to the Presence of LNAPL							
	1489.95	07/16/2015	4.62	4.20	0.42	1485.67	Not Sampled Due to the Presence of LNAPL							
	1489.95	10/20/2015	6.04	5.01	1.03	1484.73	Not Sampled Due to the Presence of LNAPL							
	1489.95	3/23/2016^3	4.44	3.80	0.64	1486.02	670	**2,000**	250 U	2.6	1 U	1 U	5.6	1.5
	1489.95	3/23/2016^4	4.44	3.80	0.64	1486.02	800	**2,600**	250 U	4.6	1 U	1.7	9.6	3.2
MW-7	1490.72	05/07/2015	4.79	--	--	1485.93	100 U	240	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.72	07/16/2015	4.96	--	--	1485.76	100 U	100	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.72	10/20/2015	5.84	--	--	1484.88	100 U	50 U	250 U	0.35 U	1 U	1 U	2 U	1 U
	1490.72	03/23/2016	4.56	--	--	1486.16	--	--	--	--	--	--	--	--
MW-8	1490.85	03/23/2016	4.57	--	--	1486.28	**2,400**	**1,000** x	250 U	**8.4**	1 U	84	2 U	45
MW-9	1490.33	03/23/2016	4.19	--	--	1486.14	**1,800**	**3,200**	250 U	2.2	1.3	63	78	28
MW-10	1490.83	03/23/2016	4.60	--	--	1486.23	230	270 x	250 U	0.41	1 U	1 U	2 U	1 U
	1490.83	3/23/2016 (DUP)	4.60	--	--	1486.23	250	260 x	250 U	0.47	1 U	1 U	2 U	1 U
B-1W	--	11/06/2017	--	--	--	--	100 U	411	250 U	1.00 U	1.00 U	1.00 U	3.00 U	--
B-2W	--	11/06/2017	--	--	--	--	100 U	244	250 U	1.00 U	1.00 U	1.00 U	3.00 U	--
B-3W	--	11/06/2017	--	--	--	--	100 U	200 U	250 U	1.00 U	1.00 U	1.00 U	3.00 U	--
						MTCA Method A Cleanup Level	**800/1,000^1**	**500**	**500**	**5**	**1,000**	**700**	**1,000**	**160**

Notes:

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

Red/Bold Detected exceedance of criteria.

1 Criteria is for benzene present/no detectable benzene.

2 Groundwater elevation corrected for the presence of LNAPL.

3 Groundwater sampled at 7 feet below the top of casing.

4 Groundwater sampled at 14 feet below the top of casing.

Abbreviations:

DTL Depth to LNAPL

DTW Depth to water

LNAPL Light non-aqueous phase liquids

µg/L Micrograms per liter

MTCA Model Toxics Control Act

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.4
Additional Groundwater Analytical Data

		Location	MW-1A		MW-3	MW-4A	MW-7
		Sample ID	**MW1A-4-14**	**MW1A-4-14B**	**MW3-4-14**	**MW4A-4-14**	**MW7-4-14**
		Sample Date	**05/07/2015**	**05/07/2015**	**05/07/2015**	**05/07/2015**	**05/07/2015**
Analyte	**MTCA Method A Cleanup Level**	**Units**					
Metals by USEPA 6020A							
Lead	15	µg/L	1 U	1 U	1 U	1 U	1 U
Volatile Organic Compounds by USEPA 8260C							
Benzene	5	µg/L	0.35 U	0.35 U	0.35 U	1.1	0.35 U
Ethylbenzene	700	µg/L	1 U	1 U	1 U	6.8	1 U
Toluene	1,000	µg/L	1 U	1 U	1 U	1 U	1 U
Total Xylenes	1,000	µg/L	2 U	2 U	2 U	11	2 U
1,2-Dibromoethane[1]	0.01	µg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-Dichloroethane	5	µg/L	1 U	1 U	1 U	1 U	1 U
Ethanol	--	µg/L	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Methyl Tert-Butyl Ether	20	µg/L	1 U	1 U	1 U	1 U	1 U
Naphthalene	160	µg/L	1 U	1 U	1 U	4.2	1 U
n-Hexane	--	µg/L	1 U	1 U	1 U	1 U	1 U
Total Petroleum Hydrocarbons by NWTPH-Gx							
Gasoline-Range Organics	800/1,000[2]	µg/L	100 U	100 U	100 U	740	100 U
Total Petroleum Hydrocarbons by NWTPH-Dx							
Diesel-Range Organics	500	µg/L	88 JM	90 JM	250 JM	**2,400**	240
Oil-Range Organics	500	µg/L	250 U	250 U	250 U	250 U	250 U

Notes:

--	No criteria available.
Red/Bold	Detected at a concentration that exceeds the MTCA Method A cleanup level.
1	Analyzed by USEPA 8011M.
2	Criterion is for Benzene Present/No Detectable Benzene.

Abbreviations:

µg/L	Micrograms per liter
MTCA	Model Toxics Control Act

Qualifiers:

JM	Concentration is considered an estimate, the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
U	Analyte was not detected at the given reporting limit.

Table 3.5
Toad's Site Groundwater Data

Monitor Well MW1 / MW1A

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			--------------------------------------- micrograms per liter (ug/L) ---------------------------------------															
	01/14/15	--	3090	461	<192	7.58	<500	40.8	49.9	10.1	--	--	--	--	--	--	--	--
	03/25/15	--	<50	182	<194	<125	<500	<250	<750	--	--	--	--	--	--	--	--	--
	04/15/15	--	725	1640	<190	0.26	<0.500	4.08	1.10	1.32	--	--	--	--	--	--	--	<0.112
LNAPL = 0.07'	11/11/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Slight sheen	05/26/16	--	279	2000	<377	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	0.56	<1.00	<1.00	--
Slight sheen	06/30/16	--	754	5310	<381	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	1.56	3.56	<1.00	1.56	1.57
Sheen	10/03/16	--	282	2430	<377	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	<2.00
Clear & odor	03/17/17	--	1810	11.7k	<1510	<0.200	<1.00	9.93	11.3	6.32	<1.00	<0.500	<0.500	5.92	--	8.18	29.2	0.378
LNAPL = 0.10'	09/25/17	--	3260	2340k	<40k	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Monitor Well MW2

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			--------------------------------------- micrograms per liter (ug/L) ---------------------------------------															
	01/14/15	--	2450	483	<189	1	<500	16	29	6.52	--	--	--	--	--	--	--	--
	03/25/15	--	4460	7760	<194	4.4	<5	75	122		--	--	--	--	--	--	--	--
	04/15/15	--	794	--		<0.125	<0.500	1.36	<0.750	1.44	--	--	--	--	--	--	--	<0.112
Slight sheen	11/11/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
No sheen	06/30/16	--	663	2780	<381	<0.200	<1.00	0.57	<1.50	3.00	<1.00	<0.500	<0.500	1.24	1.94	1.12	3.98	--
Slight sheen	10/03/16	--	392	1310	<381	<0.200	<1.00	<0.500	<1.50	2.04	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	1.76	3.04
Water clear	03/17/17	--	1120	2780	<151	0.310	<1.00	1.24	<1.50	4.57	<1.00	<0.500	<0.500	3.26	--	1.77	6.24	3.00
Water clear	09/25/17	--	492	1620	<168	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.5
Toad's Site Groundwater Data

Monitor Well MW3

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			------------------------------------- micrograms per liter (ug/L) -------------------------------------															
	01/15/15	--	<50	292	<190	0.30	<500	<250	<750	--	--	--	--	--	--	--	--	--
Sheen present	03/25/15	G,D	6840	--	--	7.20	<5	80.1	280	--	--	--	--	--	--	--	--	--
	04/15/15	--	<50	--	--	<0.125	<0.500	<0.250	<0.750	--	--	--	--	--	--	--	--	0.762
Sheen = 0.01 ft	11/11/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
No sheen	06/30/16	--	<100	713	<377	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<0.500	<1.00	<1.00	--
No sheen	10/03/16	--	<100	358	<388	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	3.02
Some turbidity	03/17/17	--	<100	562	<151	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	--	<1.00	<1.00	--
Water clear	09/25/17	--	<100	394	<170	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Monitor Well MW4

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			------------------------------------- micrograms per liter (ug/L) -------------------------------------															
LNAPL = 0.01 '	01/15/15	--	5310	19600	<1890	156	<5	113	142	53	--	--	--	--	--	--	--	--
LNAPL = 1.22 '	03/12/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LNAPL = 0.53 '	03/25/15	G,D	<50	266	<190	<0.125	<0.500	<0.250	<0.750	--	--	--	--	--	--	--	--	--
LNAPL = 1.22 '	11/11/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Abandoned MW4 on April 20, 2016																	
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.5
Toad's Site Groundwater Data

Monitor Well MW5

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			-------------------------------------- micrograms per liter (ug/L) --------------------------------------															
LNAPL = 0.02 '	01/15/15	--	7280	272000	<4710	--	--	--	--	40	--	--	--	--	--	--	--	--
LNAPL = 1.48 '	03/12/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LNAPL = 0.78 '	03/25/15	G,D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LNAPL = 1.31'	11/11/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Abandoned MW5 on Nov 30, 2015																	
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Monitor Well MW5R

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			-------------------------------------- micrograms per liter (ug/L) --------------------------------------															
	Installed replacement well MW5A on May 5, 2016																	
Water clear	06/30/16	--	127	198	<381	0.54	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<0.500	<1.00	<1.00	<0.225
Water clear	10/03/16	--	120	309	<381	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	--
Water clear	03/17/17	--	<100	577	<157	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	--	<1.00	<1.00	--
Water clear	09/25/17	--	<100	522	<151	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.5
Toad's Site Groundwater Data

Monitor Well MW6

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			------------------------------------ micrograms per liter (ug/L) ------------------------------------															
Water clear	03/25/15	--	70	216	<190	<0.125	<0.500	<0.250	<0.750	--	--	--	--	--	--	--	--	--
Water clear	04/15/15	--	67.7	--	--	<0.125	<0.500	<0.250	<0.750	--	--	--	--	--	--	--	--	1.68
Water clear	11/11/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Water clear	06/30/16	--	<100	<189	<377	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<0.500	<1.00	<1.00	--
Water clear	10/03/16	--	<100	<189	<377	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	--
Slight turbidity	03/17/17	--	<100	242	<152	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	--	<1.00	<1.00	--
Water clear	09/25/17	--	<100	<86	<172	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Monitor Well MW7

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			------------------------------------ micrograms per liter (ug/L) ------------------------------------															
Water clear	03/25/15	--	<50	152	<190	0.16	<0.500	<0.250	<0.750	--	--	--	--	--	--	--	--	--
Water clear	04/15/15	--	<50	--	--	<0.125	<0.500	<0.250	<0.750	--	--	--	--	--	--	--	--	0.538
Water clear	11/11/15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Water clear	06/30/16	--	191	1280	<381	0.51	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<0.500	<1.00	<1.00	--
Water clear	10/03/16	--	<100	458	<381	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	--
Water clear	03/17/17	--	<100	663	<151	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	--	<1.00	<1.00	--
Water clear	09/25/17	--	<100	412	<172	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.5
Toad's Site Groundwater Data

Monitor Well MW8

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			-------------------------------------- micrograms per liter (ug/L) --------------------------------------															
Water clear	06/30/16	--	<100	254	<381	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<0.500	<1.00	<1.00	0.850
Water clear	10/03/16	--	<100	390	442	<0.200	<1.00	<0.500	1.58	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	--
Water clear	03/17/17	--	<100	718	<151	<0.200	<1.00	<0.500	1.58	<2.00	<1.00	<0.500	<0.500	<1.00	--	<1.00	<1.00	--
Water clear	09/25/17	--	<100	550	<151	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Monitor Well MW9

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			-------------------------------------- micrograms per liter (ug/L) --------------------------------------															
Water clear	06/30/16	--	136	338	<377	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<0.500	<1.00	<1.00	<0.225
Water clear	10/03/16	--	<100	410	<377	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	--
Water clear	03/17/17	--	<100	1500	<151	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	--	<1.00	<1.00	--
Water clear	09/25/17	--	<100	447	<151	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.5
Toad's Site Groundwater Data

Monitor Well MW10

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			------------------------------------- micrograms per liter (ug/L) -------------------------------------															
Slight sheen	06/30/16	--	887	7770	<381	2.11	<1.00	4.70	<1.50	2.69	<1.00	<0.500	<0.500	3.17	5.63	<1.00	14.50	0.45
Sheen	10/03/16	--	777	1310	<377	1.23	<1.00	1.54	<1.50	2.63	<1.00	<0.500	<0.500	4.18	<1.00	<1.00	5.69	<0.200
Clear & odor	03/17/17	--	637	2080	<151	0.68	<1.00	1.22	<1.50	2.08	<1.00	<0.500	<0.500	2.78	--	<1.00	2.71	0.444
Slight sheen	09/25/17	--	969	37100	<7480	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Monitor Well MW11

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			------------------------------------- micrograms per liter (ug/L) -------------------------------------															
Water clear	06/30/16	--	315	339	<381	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	1.09	<1.00	<1.00	<0.225
Water clear	10/03/16	--	143	318	<377	<0.200	<1.00	<0.500	1.86	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	--
Water clear	03/17/17	--	<100	1400	<154	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	--	<1.00	<1.00	--
Water clear	09/25/17	--	<100	386	<150	<0.200	<1.00	<0.500	<1.50	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.5
Toad's Site Groundwater Data

Monitor Well MW12

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			-------------------------------------- micrograms per liter (ug/L) --------------------------------------															
LNAPL present	05/26/16	--	1840	6900	<377	0.480	<1.00	5.56	11.5	5.42	<1.00	<0.500	<0.500	3.07	8.63	27.2	11.6	--
Sheen	06/30/16	--	2520	3350	<449	1.39	<1.00	14.1	19.2	9.93	<1.00	<0.500	<0.500	6.05	12.6	21.6	50.8	49.0
Slight Sheen	10/03/16	--	777	909	<426	<0.200	<1.00	1.54	<1.50	2.70	<1.00	<0.500	<0.500	1.64	<1.00	3.39	4.02	11.4
Slight turbidity	03/17/17	--	3310	10100	<154	240	463	<100	336	--	--	--	--	--	--	--	--	--
Sheen	09/25/17	--	<20k	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Monitor Well MW13

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			-------------------------------------- micrograms per liter (ug/L) --------------------------------------															
LNAPL present	05/26/16	--	3170	3580	<377	2.48	<1.00	5.54	1.63	6.12	<1.00	<0.500	<0.500	16.3	39.3	4.39	26.2	--
Sheen	06/30/16	--	3390	1900	<421	4.05	<1.00	18.1	1.52	13.9	<1.00	<0.500	<0.500	15.3	34.6	2.61	57.1	--
Sheen	10/03/16	--	2370	1910	<421	0.54	<1.00	5.56	<1.50	6.16	<1.00	<0.500	<0.500	14.9	<1.00	<1.00	3.91	18.4
Sl turbid; odor	03/17/17	--	3120	3930	<165	0.65	<1.00	2.28	<1.50	5.28	<1.00	<0.500	<0.500	14.9	--	<1.00	1.00	65.8
No sheen	09/25/17	--	Not sampled			--	--	--	--	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.5
Toad's Site Groundwater Data

Monitor Well MW14

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			-- micrograms per liter (ug/L) --															
LNAPL present	05/26/16	--	1440	7730	<377	1.28	<1.00	2.24	3.20	3.30	<1.00	<0.500	<0.500	3.77	8.49	1.25	9.5	--
LNAPL present	06/30/16	--	4560	7980	<412	2.11	<1.00	13.4	13.0	12.1	<1.00	<0.500	<0.500	12.1	27.1	10.0	61.5	234
Sheen	10/03/16	--	2500	7730	<408	1.43	<1.00	10.9	<1.50	11.5	<1.00	<0.500	<0.500	10.4	<1.00	6.3	45.4	8.84
LNAPL = 0.23'	03/17/17	--	5840	2450	<39.2	5.77	<1.00	80.5	<1.50	50.4	<1.00	<0.500	<0.500	23.3	--	20.2	178	45.2
LNAPL = 0.36'	09/25/17	--	Not tested; except for sulfur content, which was 0.165% (1.65 mg/L)										--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Monitor Well MW15

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			-- micrograms per liter (ug/L) --															
Water clear	05/26/16	--	<100	<189	<377	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<0.500	<1.00	<1.00	--
Water clear	06/30/16	--	<100	<204	<408	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<0.500	<1.00	<1.00	--
Water clear	10/03/16	--	<100	<200	<400	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	<1.00	<1.00	<1.00	--
Water clear	03/17/17	--	<100	<377	1010	<0.200	<1.00	<0.500	<1.50	<2.00	<1.00	<0.500	<0.500	<1.00	--	<1.00	<1.00	--
Water clear	09/25/17	--	Not sampled			--	--	--	--	--	--	--	--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.5
Toad's Site Groundwater Data

Pizometer Well PZ-23

Well Data	Date Sampled	NWTPH -HCID	Gx	Dx-D	Dx-O	B	T	E	X	N	MTBE	EDB	EDC	iso-PB	n-PB	1,3,5-TMB	1,2,4-TMB	T Pb
			micrograms per liter (ug/L)															
LNAPL = 0.16'	09/25/17	--	Not tested; except for sulfur content, which was 0.109% (1.09 mg/L)										--	--	--	--	--	--
MTCA, Method A Cleanup Limits			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**	**160**	**20**	**0.01**	**5**	**NL**	**NL**	**NL**	**NL**	**15**

NOTES:

NWTPH-HCID indicates petroleum compounds detected in the Gasoline, Diesel and/or Oil range of hydrocarbons
It is a qualitative test and will include detect solvents or other petroleum related compounds within these ranges

Gx means NWTPH-Gx, which is a quantitative test for total petroleum hydrocarbons in the gasoline range
Dx-D means NWTPH-Dx, which is a quantitative test for total petroleum hydrocarbons isolated to the diesel range
Dx-O means NWTPH-Dx, which is a quantitative test for total petroleum hydrocarbons isolated to the oil range

B = benzene
T = toluene
E = ethyl-benzene
X = xylenes
N = naphthylene

MTBE = methyl tert-butyl ether
EDB = 1,2-dibromoethane
EDC = 1,2-dichloroethane
iso-PB = iso-Propylbenzene
n-PB = n-Propylbenzene

1,2,4-TMB = 1,2,4-Trimethylbenzene
1,3,5-TMB = 1,3,5-Trimethylbenzene
T Pb = Total lead

Red indicates detected concentration excedes MTCA, Method A cleanup limit

Source: Robert D. Miller Consulting, Inc. 2017

Table 3.6
LNAPL Analytical Data

	Location	MW-2	MW-4A	MW-5A	Southern UST Pit	Northern UST Pit
	Sample ID	**MW2-4-14 LNAPL**	**MW4A-4-14 LNAPL**	**MW5A-4-14 LNAPL**	**Baffeld UST-LNAPL**	**N.Diesel-UST-LNAPL**
	Sample Date	**05/07/2015**	**03/23/2016**	**05/07/2015**	**10/25/2016**	**10/27/2016**
Analyte	**Units**					
Metals by USEPA 6020A						
Lead	mg/kg	27.5	1 U	1 U	1 U	11.1 U
Volatile Organic Compounds by USEPA 8260C						
Benzene	mg/kg	60 U	60 U	60 U	60 U	60 U
Ethylbenzene	mg/kg	660	220	210	100 U	100 U
Toluene	mg/kg	100 U	100 U	100 U	100 U	100 U
Total Xylenes	mg/kg	220	460	630	200 U	200 U
1,2-Dibromoethane	mg/kg	100 U	100 U	100 U	100 U	100 U
1,2-Dichloroethane	mg/kg	100 U	100 U	100 U	100 U	100 U
2,2,4-Trimethylpentane	mg/kg	4,600	1,000 U	1,000 U	--	--
Ethanol	mg/kg	100,000 U	100,000 U	100,000 U	--	--
Methyl Tert-Butyl Ether	mg/kg	100 U	100 U	100 U	100 U	100 U
Naphthalene	mg/kg	690	180	210	100 U	100 U
n-Butane	mg/kg	1,000 U	1,000 U	1,000 U	--	--
n-Hexane	mg/kg	500 U	500 U	500 U	500 U	500 U
Total Petroleum Hydrocarbons by NWTPH-Gx						
Gasoline-Range Organics	mg/kg	150,000	110,000	61,000	--	--
Total Petroleum Hydrocarbons by NWTPH-Dx						
Diesel-Range Organics	mg/kg	900,000	930,000	870,000 J	890,000	900,000
Oil-Range Organics	mg/kg	50,000 U	50,000 U	50,000 U	50,000 U	50,000 U

Abbreviations:

LNAPL	Light non-aqueous phase liquid
mg/kg	Milligrams per kilogram
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered an estimate.
U	Analyte was not detected at the given reporting limit.

Table 5.1
LNAPL Thicknesses and Groundwater Depth over Time

Wells/ Piezometers[1]	Date	DTP	DTW	LNAPL Thickness
PZ-1	03/22/2016	6.28	6.31	0.03
	03/23/2016	6.37	6.45	0.08
	04/19/2016	5.88	5.95	0.07
	10/24/2016	6.87	7.09	0.22
	10/28/2016	6.50	6.69	0.19
	11/07/2016	6.56	6.75	0.19
	11/10/2016	6.73	6.87	0.14
	12/22/2016	7.69	7.77	0.08
	01/05/2017	7.87	7.97	0.10
	02/27/2017	6.51	6.64	0.13
	03/22/2017	--	6.25	0.00
	03/23/2017	6.20	6.22	0.02
	03/27/2017	6.27	6.29	0.02
	04/04/2017	6.52	6.53	0.01
	04/17/2017	6.27	6.28	0.01
	05/17/2017	6.08	6.15	0.07
	06/05/2017	6.45	6.49	0.04
	07/12/2017	7.08	7.09	0.01
	08/15/2017	7.33	7.34	0.01
	09/18/2017	7.35	7.36	0.01
	10/16/2017	7.65	7.67	0.02
	11/29/2017	6.90	6.93	0.03
PZ-2	03/22/2016	--	6.80	0.00
	03/23/2016	--	6.81	0.00
	04/19/2016	6.12	6.58	0.46
	10/24/2016	6.87	7.09	0.22
	10/28/2016	7.13	7.78	0.65
	11/07/2016	7.00	7.70	0.70
	11/10/2016	7.04	7.53	0.49
	12/22/2016	7.76	8.13	0.37
	01/05/2017	7.97	8.39	0.42
	02/27/2017	6.99	7.35	0.36
	03/22/2017	6.37	7.19	0.82
	03/23/2017	6.42	7.21	0.79
	03/27/2017	6.54	6.71	0.17
	04/04/2017	6.65	7.14	0.49
	04/17/2017	6.45	6.47	0.02
	05/17/2017	6.15	7.08	0.93
	06/05/2017	6.61	7.29	0.68
	07/12/2017	7.16	7.33	0.17
	08/15/2017	7.42	7.50	0.08
	09/18/2017	7.46	7.49	0.03
	10/16/2017	7.62	7.63	0.01
	11/29/2017	--	7.20	0.00
PZ-3	03/22/2016	--	6.61	0.00
	03/23/2016	--	6.65	0.00
	04/19/2016	6.01	6.08	0.07
	10/24/2016	7.02	7.81	0.79
	10/28/2016	6.92	7.61	0.69
	11/07/2016	6.81	7.37	0.56
	11/10/2016	6.73	7.30	0.57
	12/22/2016	7.41	7.94	0.53
	01/05/2017	7.66	8.03	0.37
	02/27/2017	6.64	7.15	0.51
	03/22/2017	6.15	6.29	0.14
	03/23/2017	6.18	6.35	0.17
	03/27/2017	6.26	6.38	0.12
	04/04/2017	6.39	6.55	0.16
	04/17/2017	6.21	6.28	0.07
	05/17/2017	5.95	6.01	0.06
	06/05/2017	6.36	6.84	0.48
	07/12/2017	6.85	6.99	0.14
	08/15/2017	7.08	7.13	0.05
	09/18/2017	7.12	7.29	0.17
	10/16/2017	7.31	7.39	0.08
	11/29/2017	6.85	7.03	0.18

Table 5.1
LNAPL Thicknesses and Groundwater Depth over Time

Wells/ Piezometers[1]	Date	DTP	DTW	LNAPL Thickness
PZ-4	03/22/2016	--	7.10	0.00
	03/23/2016	7.11	7.13	0.02
	04/19/2016	6.46	6.67	0.21
	10/24/2016	7.55	7.95	0.40
	10/28/2016	7.47	7.75	0.28
	11/07/2016	7.31	7.75	0.44
	11/10/2016	7.33	7.72	0.39
	12/22/2016	8.00	8.63	0.63
	01/05/2017	8.22	8.81	0.59
	02/27/2017	7.26	7.71	0.45
	03/22/2017	6.74	7.00	0.26
	03/23/2017	6.78	7.13	0.35
	03/27/2017	6.84	6.95	0.11
	04/04/2017	6.66	7.35	0.69
	04/17/2017	6.79	6.91	0.12
	05/17/2017	6.55	6.81	0.26
	06/05/2017	6.91	7.68	0.77
	07/12/2017	7.48	7.51	0.03
	08/15/2017	--	7.73	0.00
	09/18/2017	7.75	7.77	0.02
	10/16/2017	--	7.92	0.00
	11/29/2017	7.47	7.50	0.03
PZ-5	10/24/2016	7.58	7.60	0.02
	10/28/2016	--	7.47	0.00
	11/10/2016	--	7.13	0.00
	12/22/2016	7.81	7.83	0.02
	01/05/2017	8.05	8.06	0.01
	02/27/2017	--	7.02	0.00
	03/22/2017	6.51	6.52	0.01
	03/23/2017	6.55	6.57	0.02
	03/27/2017	6.61	6.62	0.01
	04/04/2017	6.74	6.75	0.01
	04/17/2017	6.56	6.57	0.01
	05/17/2017	6.30	6.32	0.02
	06/05/2017	6.78	6.81	0.03
	09/18/2017	--	7.57	0.00
	10/20/2017	--	7.72	0.00
	11/29/2017	--	7.29	0.00
PZ-6	10/24/2016	7.92	7.97	0.05
	10/28/2016	7.82	7.91	0.09
	11/10/2016	7.69	7.78	0.09
	12/22/2016	7.39	7.46	0.07
	01/05/2017	8.63	8.69	0.06
	02/27/2017	7.61	7.70	0.09
	03/23/2017	7.07	7.11	0.04
	04/17/2017	7.11	7.12	0.01
	05/17/2017	6.90	6.91	0.01
	06/05/2017	7.26	7.36	0.10
	09/18/2017	--	8.06	0.00
	10/16/2017	--	8.15	0.00
	11/29/20171	--	7.80	0.00
PZ-7	10/24/2016	--	7.67	0.00
	11/10/2016	--	7.45	0.00
	02/27/2017	--	7.35	0.00
	05/17/2017	--	6.60	0.00
	06/05/2017	--	7.01	0.00
	11/29/2017	--	7.54	0.00
PZ-8	10/24/2016	8.50	8.65	0.15
	10/28/2016	8.41	8.51	0.10
	11/10/2016	7.21	7.35	0.14
	12/22/2016	7.88	8.16	0.28
	01/05/2017	8.09	8.39	0.30
	02/27/2017	7.11	7.14	0.03
	03/23/2017	6.62	6.67	0.05
	04/17/2017	6.63	6.69	0.06
	05/17/2017	6.48	6.49	0.01
	06/05/2017	6.90	7.01	0.11
	07/12/2017	7.37	7.39	0.02
	11/29/2017	Damaged		

Table 5.1
LNAPL Thicknesses and Groundwater Depth over Time

Wells/ Piezometers^1	Date	DTP	DTW	LNAPL Thickness
PZ-9	12/22/2016	--	0.00	0.00
	01/05/2017	--	0.00	0.00
	02/27/2017	--	7.51	0.00
	05/17/2017	--	6.74	0.00
	06/05/2017	--	7.18	0.00
	08/15/2017	--	7.98	0.00
	11/29/2017	--	7.71	0.00
PZ-10	03/23/2016	--	6.92	0.00
	04/19/2016	6.28	6.36	0.08
	10/24/2016	5.15	5.80	0.65
	04/17/2017	4.47	4.51	0.04
	05/17/2017	4.20	4.49	0.29
	06/05/2017	4.64	4.90	0.26
	08/15/2017	--	5.35	0.00
	09/18/2017	5.45	5.48	0.03
	10/16/2017	--	5.55	0.00
	11/29/2017	5.11	5.27	0.16
PZ-13	03/23/2016	--	8.08	0.00
	04/19/2016	7.43	7.68	0.25
	10/24/2016	--	5.71	0.00
PZ-20	03/23/2016	--	7.92	0.00
	04/19/2016	7.35	7.45	0.10
	10/24/2016	5.08	5.14	0.06
PZ-23	10/28/2016	--	4.97	0.00
	11/10/2016	--	4.85	0.00
	02/27/2017	4.78	4.91	0.13
	05/17/2017	--	4.05	0.00
	9/30/2017^2	--	--	0.16
	11/29/2017	4.97	5.00	0.03
MW-14 (Toad's	10/24/2016	--	4.78	0.00
	10/28/2016	--	4.67	0.00
	02/27/2017	4.46	4.89	0.43
	05/17/2017	3.71	3.85	0.14
	9/30/2017^2	--	--	0.36
MW-4A	05/07/2015	--	3.60	0.00
	07/16/2015	--	3.77	0.00
	10/20/2015	--	4.62	0.00
	03/23/2016	3.22	4.43	1.21
	04/19/2016	2.70	3.21	0.51
	10/24/2016	3.76	4.42	0.66
	10/28/2016	3.82	4.41	0.59
	11/10/2016	3.71	3.94	0.23
	02/27/2017	4.65	4.70	0.05
	03/23/2017	--	3.18	0.00
	04/17/2017	--	3.20	0.00
	05/17/2017	2.89	2.91	0.02
	06/05/2017	3.33	3.41	0.08
	08/15/2017	4.00	4.11	0.11
	09/18/2017	4.03	4.29	0.26
	10/16/2017	4.25	4.34	0.09
	11/29/2017	3.78	3.95	0.17
MW-5A	05/07/2015	4.05	4.50	0.45
	07/16/2015	4.20	4.62	0.42
	10/20/2015	5.01	6.04	1.03
	03/23/2016	3.80	4.44	0.64
	04/19/2016	3.10	4.11	1.01
	10/24/2016	4.32	4.67	0.35
	10/28/2016	4.20	4.71	0.51
	11/10/2016	4.10	4.50	0.40
	02/27/2017	4.02	4.37	0.35
	03/23/2017	3.52	4.01	0.49
	04/04/2017	3.75	3.89	0.14
	04/17/2017	3.59	3.61	0.02
	05/17/2017	3.31	3.32	0.01
	06/05/2017	3.69	4.15	0.46
	07/12/2017	4.21	4.34	0.13
	08/15/2017	4.45	4.51	0.06
	09/18/2017	4.49	4.52	0.03
	10/16/2017	4.65	4.71	0.06
	11/29/2017	--	4.22	0.00

Table 5.1
LNAPL Thicknesses and Groundwater Depth over Time

Wells/ Piezometers[1]	Date	DTP	DTW	LNAPL Thickness
MW-9	10/24/2016	4.73	4.84	0.11
	10/28/2016	4.65	4.66	0.01
	11/10/2016	--	4.51	0.00
	02/27/2017	--	4.43	0.00
	03/23/2017	--	3.91	0.00
	04/17/2017	--	3.98	0.00
	05/17/2017	3.68	3.70	0.02
	06/05/2017	4.10	4.14	0.04
	08/15/2017	--	4.80	0.00
	10/16/2017	5.01	5.07	0.06
	11/29/2017	4.60	4.61	0.01
East Sump	11/23/2016	8.16	8.26	0.10
	12/05/2016	8.32	8.39	0.07
	01/05/2017	8.91	9.01	0.10
	02/01/2017	8.91	9.00	0.09
	02/27/2017	7.90	8.02	0.12
	03/22/2017	7.36	7.41	0.05
	03/23/2017	7.40	7.51	0.11
	03/27/2017	7.47	7.50	0.03
	04/17/2017	7.41	7.44	0.03
	05/17/2017	7.14	7.25	0.11
	06/05/2017	7.56	7.75	0.19
	08/15/2017	8.30	8.36	0.06
	09/18/2017	8.33	8.38	0.05
	10/16/2017	8.50	8.52	0.02
	11/29/2017	8.10	8.15	0.05
West Sump	11/23/2016	7.61	7.73	0.12
	12/05/2016	7.85	7.97	0.12
	01/05/2017	8.44	8.47	0.03
	02/01/2017	8.43	8.45	0.02
	02/27/2017	--	7.42	0.00
	03/22/2017	6.90	6.93	0.03
	03/23/2017	6.95	6.99	0.04
	03/27/2017	6.69	6.70	0.01
	04/17/2017	6.64	6.65	0.01
	05/17/2017	6.35	6.45	0.10
	06/05/2017	6.81	7.00	0.19
	08/15/2017	7.82	7.85	0.03
	09/18/2017	7.85	7.89	0.04
	10/16/2017	8.07	8.10	0.03
	11/29/2017	7.61	7.62	0.01
North Sump	11/23/2016	8.21	8.33	0.12
	12/05/2016	8.44	8.48	0.04
	01/05/2017	9.03	9.11	0.08
	02/01/2017	9.03	9.08	0.05
	02/27/2017	8.03	8.14	0.11
	03/22/2017	7.51	7.93	0.42
	03/23/2017	7.55	7.67	0.12
	03/27/2017	7.94	7.95	0.01
	04/17/2017	7.88	7.91	0.03
	05/17/2017	7.61	7.69	0.08
	06/05/2017	8.04	8.27	0.23
	08/15/2017	8.44	8.45	0.01
	09/18/2017	8.48	8.51	0.03
	10/16/2017	--	8.65	0.00
	11/29/2017	8.22	8.23	0.01

Notes:

-- LNAPL was not detected.

1 Only wells or piezometers that have more than one recorded measurement of LNAPL thicknesses are included, except for select locations like PZ-7 and PZ-9.

2 LNAPL thickness recorded by Bob Miller.

Abbreviations:

DTP Depth to product
DTW Depth to water
LNAPL Light non-aqueous phase liquid

Table 10.1
Applicable or Relevant and Appropriate Requirements

Applicable or Relevant and Appropriate Requirements	Regulated Activity	Alternative 1	Alternative 2	Alternative 3	Evaluation
Kittitas County Codes					
Municipal Code 12.06	Stormwater Management Regulations	Applies	Applies	Applies	Less than one acre of disturbance is anticipated but best management practices will be applied
Municipal Code 9.45	Noise Control	Applies	Applies	Applies	Construction actions will meet the requirements of this chapter.
Washington State					
Kittitas Clean Air	Emissions	Applies	Applies	Applies	Notice of Construction required for new potential emission sources.
Washington Administrative Code 173-400	Emissions	Applies	Does Not Apply	Applies	Regulates potential air pollution. Administrated through Kittitas County Clean Air Agency
Washington Administrative Code 173-201A	Water Quality Standards for Surface Waters	Applies	Applies	Applies	The Model Toxics Control Act (MTCA) requires cleanup actions comply with applicable regulations.
Washington Administrative Code 173-303	Dangerous Waste Management	Does Not Apply	Does Not Apply	Does Not Apply	It is unlikely impacted soil and/or groundwater will designate as a dangerous waste.
Washington Administrative Code 173-340	Toxic Waste Cleanup (MTCA)	Applies	Applies	Applies	The remedial action will be conducted under MTCA. Remedial alternatives will comply with MTCA regulations.
Washington Administrative Code 173-350	Management of Solid Waste	Applies	Applies	Applies	The excavated soil is considered solid waste, whether it is transported to Andersons or placed in biopiles.
Washington Administrative Code 197-11 and 173-802	State Environmental Policy Act (SEPA)	Applies	Applies	Applies	A SEPA review is required for projects with potential significant environmental impacts.
Washington Administrative Code 173-218	Underground Injection Controls (UICs)	Does Not Apply	Does Not Apply	Does Not Apply	UIC regulations apply to oxidant injection galleries and wells.
RCW 90.48	Water Pollution Control (Construction Stormwater Permit)	Applies	Applies	Applies	A stormwater pollution prevention plan (SWPPP) is required for the applicable remediation alternatives.
Washington Administrative Code 173-160	Construction and Maintenance of Wells	Applies	Applies	Applies	Requirements are applicable to construction of monitoring wells and soil borings
Washington Administrative Code 173-162	Rules and Regulations Governing the Licensing of Well Contractors and Operators	Applies	Applies	Applies	The regulation establishes training standards for well contractors and operators
Federal Regulations					
Title 40 Code of Federal Regulations 131	Water Quality Standards (National Toxics Rule)	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 40 Code of Federal Regulations 141	Drinking Water Regulations	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 40 Code of Federal Regulations 143	National Secondary Drinking Water Standards	Applies	Applies	Applies	MTCA requires these be considered in establishing cleanup levels.
Title 40 Code of Federal Regulations 260-268	Hazardous Waste (Resource Conservation and Recovery Act)	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 33 of United States Code, Chapter 26	Water Pollution Control (Clean Water Act)	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 40 Code of Federal Regulations 50	Clean Air Act	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 40 Code of Federal Regulations 58	Ambient Air Quality Monitoring	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.

Table 11.1
Evaluation of Cleanup Alternatives

Potential Alternative	Description	Disproportionate Cost Analysis – Relative Benefits Ranking[1]							Sustainability		Considered Potentially Applicable
		Protectiveness	Permanence	Long-Term Effectiveness	Implementability	Short-term Risk	Public Concerns[2]	Cost	Economic	Environmental	
Alternative 1: Full Soil Excavation to MTCA Method A CULs and Offsite Disposal	Excavation of approximately 3,500 cubic yards of soil exceeding MTCA Method A Cleanup levels to the maximum extent practicable. Soil will be transported offsite for disposal.	Highest level of protectiveness; impacted soil removed from beneath the Site to MTCA Method A cleanup levels. **Score: 3**	This alternative will achieve the highest level of permanence and reduce contaminant contaminations in groundwater and soil. **Score: 3**	Effective in permanently removing impacted soil below MTCA Method A cleanup levels to the maximum extent practicable and most effective in reducing groundwater concentrations. **Score: 3**	Implementable, technically possible, offsite disposal facilities are available. Excavation below the water table is not as feasible and shoring would be required. Stormwater construction management likely required. **Score: 3**	This alternative involves excavation to the groundwater interface. Shoring is required adjacent to a sidewalk and roadway, which can be a potential public safety concern. **Score: 2**	Likely public concerns regarding excavation safety and trucks entering and exiting the Site with impacted soil and clean backfill. Potential concern with impacted soil remaining beneath the right of way. **Score: NA**	Very High Approximately $856,082 **Score: 1**	High economic loss to future development of the property.	Partial negative balance of environmental impact due to CO_2 emissions from numerous trucks hauling soil to and from Anderson Pit. The increase in the carbon footprint due to raw material consumption (fuels and electricity), greenhouse gas emissions (heavy equipment and operating system) is not ideal or as sustainable Alternatives 2 and 3. In addition, Anderson Pit landfarms the petroleum impacted soil they receive.	Yes but the overall cost is high. Groundwater monitoring will be required.
Alternative 2: Excavation of LNAPL saturated soil, landfarmed, and installation of bioventing and a biosparging system as a contingency.	Excavation of approximately 1,000 cubic yards of soil exceeding Residual saturation levels to the maximum extent practicable. A grizzly will be used to separate cobbles and large gravel for finer material. Soil will be treated onsite in 1-foot lifts and reused as backfill. Bioventing and biosparging lines will be installed in areas of remaining residual contamination in order to remediate the vadose zone.	Moderate level of protectiveness; soil will be removed from beneath the Site to residual saturation levels to eliminate LNAPL accumulating on the groundwater. Bioventing will enhance biodegradation for remaining concentrations in the vadose zone and groundwater, which will help eliminate any vapor intrusion concerns. Remaining concentrations will be less than acceptable ecological levels for commercial properties. **Score: 1**	This alternative will achieve a moderately high level of permanence and will reduce contaminant contaminations in groundwater and soil to acceptable levels. **Score: 1**	Effective in permanently reducing concentrations in soil and groundwater to less than MTCA Method A cleanup levels. Biosparging will only be required as a contingency measure if groundwater cleanup levels are not being achieved in a reasonable restoration time frame **Score: 1**	Implementable and technically feasible. The lower volume of soil can easily be treated onsite in a 1- to 1.5-foot lift. Soil type is ideal for bioventing and biosparging and air discharge permits are not required. **Score: 1**	This alternative involves excavation to the groundwater interface but is not as extensive as Alternatives 1 and 3. Excavation adjacent to a sidewalk and roadway is limited and public safety concern is very minimal. **Score: 3**	Likely public concerns regarding excavation safety and equipment entering and exiting the Site during mob and demob. Site will be fenced and petroleum odors generated during landfarming and till will be minimal. Potential concern with impacted soil remaining beneath the right of way. **Score: NA**	Lowest Approximately $395,537 **Score: 3**	Lowest economic loss to future development of the property.	Partial negative balance of environmental impact due to raw material consumption (fuels and electricity), greenhouse gas emissions (heavy equipment and operating system), and noise and nuisance dust generation. This alternative is more sustainable than Alternative 1.	Yes, will require groundwater monitoring and potential future soil excavation to address vapor intrusion pathways.

Table 11.1
Evaluation of Cleanup Alternatives

Potential Alternative	Description	Disproportionate Cost Analysis – Relative Benefits Ranking[1]							Sustainability		Considered Potentially Applicable
		Protectiveness	Permanence	Long-Term Effectiveness	Implementability	Short-term Risk	Public Concerns[2]	Cost	Economic	Environmental	
Alternative 3: Excavation of soil to remediation levels, landfarmed, chem-ox treatment, and installation of bioventing system as a contingency.	Excavation of approximately 1,600 cubic yards of soil exceeding Residual saturation levels to the maximum extent practicable. A grizzly will be used to separate cobbles and large gravel for finer material. Soil will be treated onsite in 1-foot lifts and reused as backfill. Bioventing lines will be installed to remediate residual soil impacts and groundwater, if needed.	Moderately high level of protectiveness; soil will be removed from beneath the Site to remediation levels, which are protective of groundwater. Bioventing will be used to treat any residually-contaminated soil. Remaining concentrations will be less than acceptable ecological levels for commercial properties. **Score: 2**	This alternative will achieve a high level of permanence and will reduce contaminant contaminations in groundwater and soil to acceptable levels. **Score: 2**	Effective in permanently reducing concentrations in soil and groundwater to less than MTCA Method A cleanup levels. **Score: 2**	Implementable and technically feasible. The paved area in the northern portion of the property may not have a sufficient enough area to treat the volume of soil removed, unless the grizzly can removed enough cobbles and large gravel. Soil type is ideal for bioventing and air discharge permits are not required. **Score: 2**	This alternative involves excavation to the groundwater interface but is not as extensive as Alternatives 1 and 3. Excavation adjacent to a sidewalk and roadway is limited and public safety concern is very minimal. **Score: 1**	Likely public concerns regarding excavation safety and equipment entering and exiting the Site during mob and demob. Site will be fenced and petroleum odors generated during landfarming and till will be minimal. Potential concern with impacted soil remaining beneath the right of way. **Score: NA**	Low Approximately $533,538 **Score: 2**	Low economic loss to future development of the property	Partial negative balance of environmental impact due to raw material consumption (fuels and electricity), greenhouse gas emissions (heavy equipment and operating system), and noise and nuisance dust generation. This alternative is more sustainable than Alternative 1.	Yes, will require groundwater monitoring and potential future soil excavation to address vapor intrusion pathways

Note:

1 Alternatives were scored using a scale of 1 to 5 with a score of 1 being the least amount of benefits provided by the alternative and a score of 5 being the most amount of benefits provided by the alternative.

2 Public Concern scores are not used in the Disproportionate Cost Analysis Summary

Abbreviations:

CO_2	Carbon dioxide
CUL	Cleanup level
LNAPL	Light non-aqueous phase liquid
MTCA	Model Toxics Control Act

Table 11.2
Summary of MTCA Evaluation and Ranking of Cleanup Action Alternatives

Alternative Ranking Under MTCA	**Alternative 1:** Full Soil Excavation to MTCA Method A CULs and Offsite Disposal.	**Alternative 2:** Excavation of LNAPL saturated soil, landfarmed, and installation of bioventing and biosparging system.	**Alternative 3:** Excavation of soil to remediation levels, landfarmed, chem-ox treatment, and installation of bioventing system
1. Compliance with MTCA Threshold Criteria[1]	Yes	Yes	Yes
2. Restoration Time Frame	Soil remediation timeframe is moderate (estimated at 3 weeks, might be longer depending on available trucks and trailers). Groundwater monitoring expected for up to 5 years.	Removal of LNAPL remediation timeframe is relatively short (2 weeks of excavation and 12 weeks for on-site treatment) with bioventing estimated at about 18-36 months. Groundwater monitoring expected for 5-10 years. Biosparging will only be required as a contingency if groundwater cleanup levels are not being achieved in a reasonable restoration time frame.	Removal of soil to remediation level timeframe is relatively short (2 weeks of excavation and chem-ox application and 12 weeks for on-site treatment). The need for bioventing will be based on groundwater monitoring results. Chem-Ox treatment is estimated at about 18-36 months. Groundwater monitoring expected for 5-10 years.
3. Disproportionate Cost Analysis Relative Benefits Ranking			
Protectiveness	3	1	2
Permanence	3	1	2
Cost[2]	1	3	2
Long-Term Effectiveness	3	1	2
Management of Short-Term Risks	2	3	1
Technical and Administrative Implementability	3	1	2
Total of Scores[3]	15	10	11
4. Disproportionate Cost Analysis	$856,082	$395,537	$533,538
Costs Disproportionate to Incremental Benefits	Yes	No	No
Restrictive Covenant	None	Yes	Yes
Practicability of Remedy	Practicable	Practicable	Practicable
Remedy Permanent to Maximum Extent Practicable	Yes—permanent remedy for LNAPL, groundwater protection, and vapor intrusion	Yes—permanent remedy for LNAPL and groundwater protection	Yes—permanent remedy for LNAPL and groundwater protection
Overall Alternative Ranking	**3rd**	**1st**	**2nd**

Notes:

Blank cells are intentional.

[1] WAC 173-340-360(2)(a).

[2] Low cost is a benefit.

[3] Alternatives were scored using a scale of 1 to 3 with a score of 1 being the least amount of benefits provided by the alternative and a score of 3 being the most amount of benefits provided by the alternative.

Abbreviations:

CUL	Cleanup level
LNAPL	Light non-aqueous phase liquid
MTCA	Model Toxics Control Act

Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Figures

PUBLIC REVIEW DRAFT

Note:
· Orthoimage provided by Esri, 7/19/2010.

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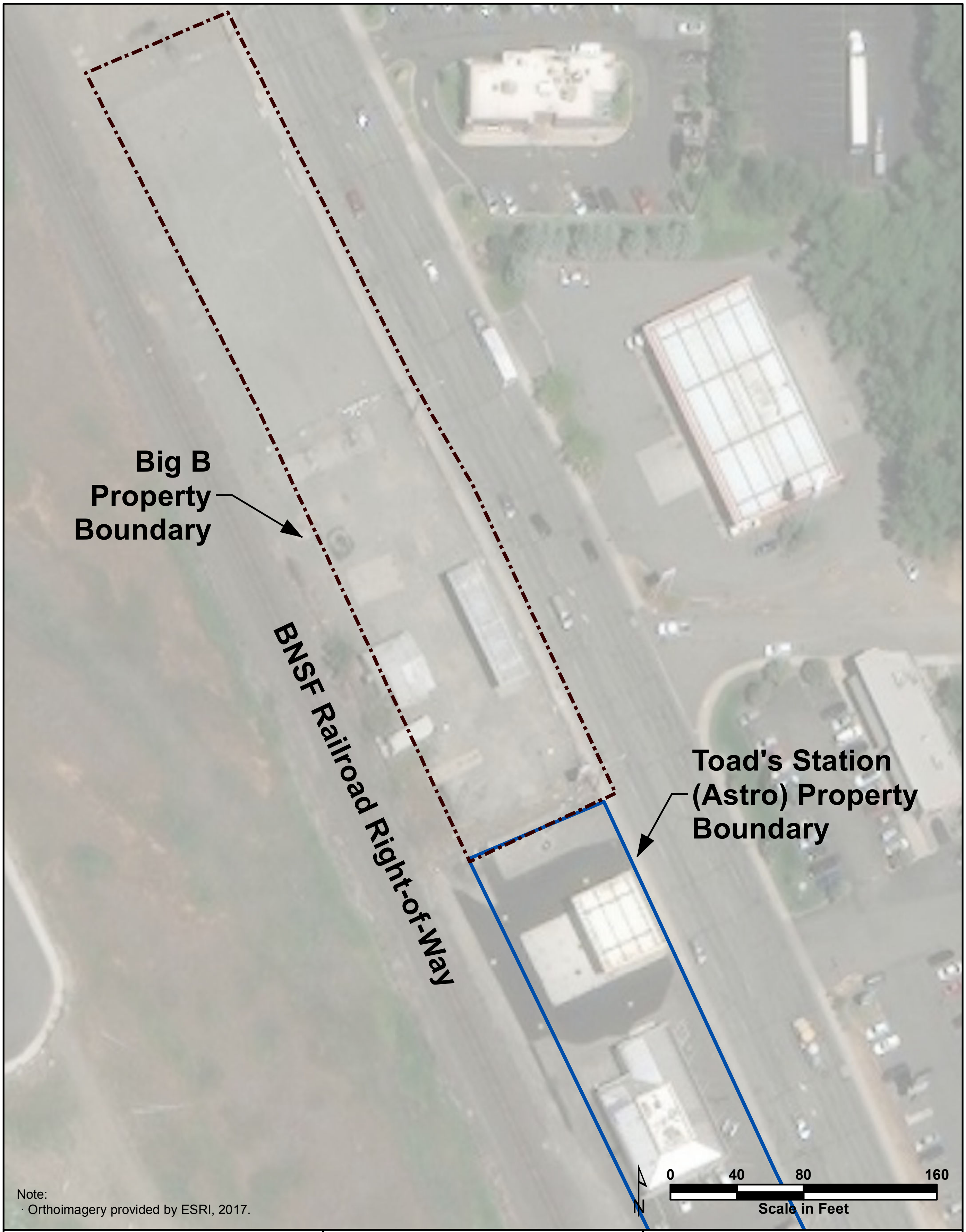
Remedial Investigation/Feasibility Study
Big B Mini Mart
Ellensburg, Washington

Figure 1.1
Vicinity Map

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS 2017\Figure 1.1 Vicinity Map.mxd
3/26/2018



Note:
· Orthoimagery provided by ESRI, 2017.

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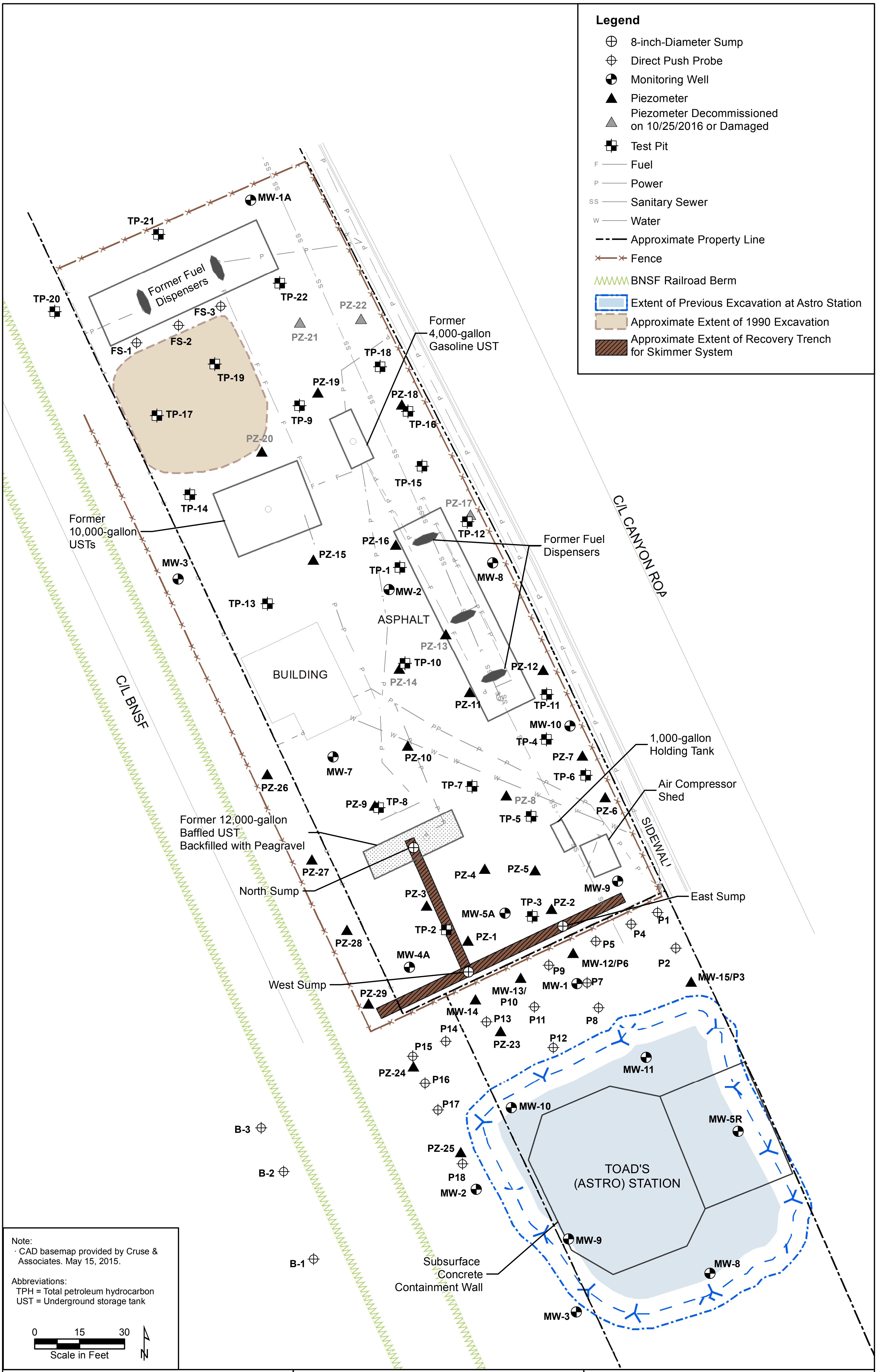
Big B Mini Mart
Ellensburg, Washington

Figure 2.1
Property Map

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS 2017\Figure 2.1 Property Map.mxd
5/8/2018



Note:
· CAD basemap provided by Cruse & Associates. May 15, 2015.

Abbreviations:
TPH = Total petroleum hydrocarbon
UST = Underground storage tank

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Big B Mini Mart
Ellensburg, Washington

Figure 2.2
Site Map

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS 2017\Figure 2.2 Site Map.mxd
5/8/2018

Note:
* Groundwater elevation corrected for the presence of LNAPL.
· All vertical datum units are in feet.
· Orthoimage provided by Google Earth, 2015.

Abbreviations:
LNAPL = Light non-aqueous phase liquid
NAVD 88 = North American Vertical Datum of 1988
UST = Underground storage tank

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Feasibility Study
Big B Mini Mart
Ellensburg, Washington

Figure 4.1
Groundwater Elevation
and Contour Map
May 7, 2015

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS\Figure 4.1 Groundwater Elevation and Contour Map May 7, 2015.mxd
5/5/2016

Notes:

* Groundwater elevation corrected for the presence of LNAPL.

· All vertical datum units are in feet.

· Orthoimage provided by Google Earth, 2015.

Abbreviations:

LNAPL = Light non-aqueous phase liquid

NAVD 88 = North American Vertical Datum of 1988

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Big B Mini Mart
Ellensburg, Washington

Figure 4.2
Groundwater Elevation and Contour Map
July 16, 2015

Legend

1484.^{32} MW-1 ●	Monitoring Well Location and Groundwater Elevation in NAVD 88
1484.^{5} - -	Groundwater Contour (0.1-Foot Interval, NAVD 88) Dashed where Inferred
➡	Approximate Groundwater Flow Direction

Notes:
* Groundwater elevation corrected for the presence of LNAPL.
· Orthoimage provided by Google Earth, 2015.

Abbreviations:
LNAPL = Light non-aqueous phase liquid
NAVD 88 = North American Vertical Datum of 1988

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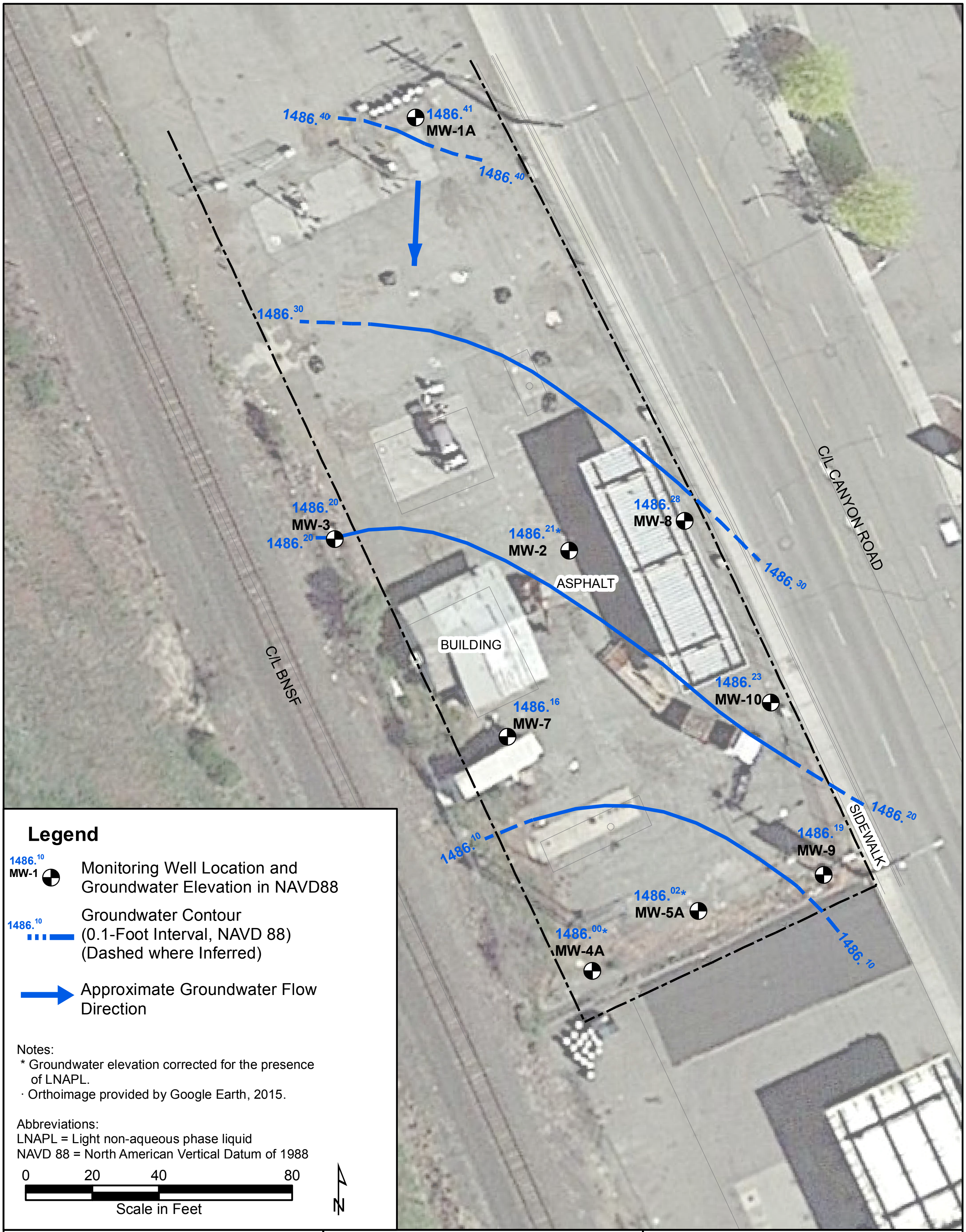
Big B Mini Mart
Ellensburg, Washington

Figure 4.3
Groundwater Elevation and Contour Map
October 20, 2015

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS\Figure 4.3 Groundwater Elevation and Contour Map October 20, 2015.mxd
5/5/2016



Notes:
- * Groundwater elevation corrected for the presence of LNAPL.
- · Orthoimage provided by Google Earth, 2015.

Abbreviations:
LNAPL = Light non-aqueous phase liquid
NAVD 88 = North American Vertical Datum of 1988

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**Remedial Investigation/
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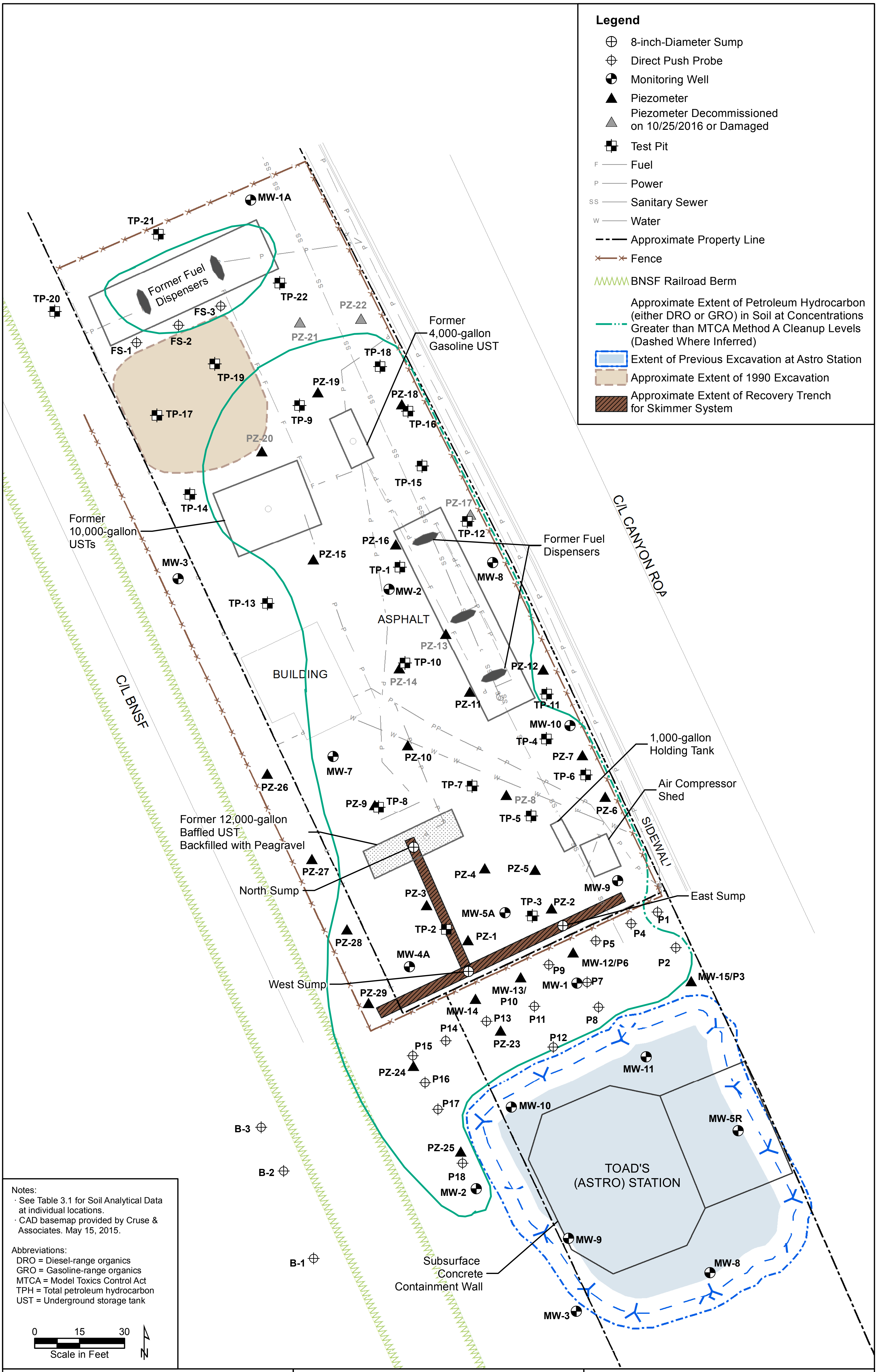
Big B Mini Mart
Ellensburg, Washington**

Figure 4.4
Groundwater Elevation
and Contour Map
March 23, 2016

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS\Figure 4.4 Groundwater Elevation and Contour Map March 23, 2016.mxd
5/8/2018



Notes:
- See Table 3.1 for Soil Analytical Data at individual locations.
- CAD basemap provided by Cruse & Associates. May 15, 2015.

Abbreviations:

DRO = Diesel-range organics
GRO = Gasoline-range organics
MTCA = Model Toxics Control Act
TPH = Total petroleum hydrocarbon
UST = Underground storage tank

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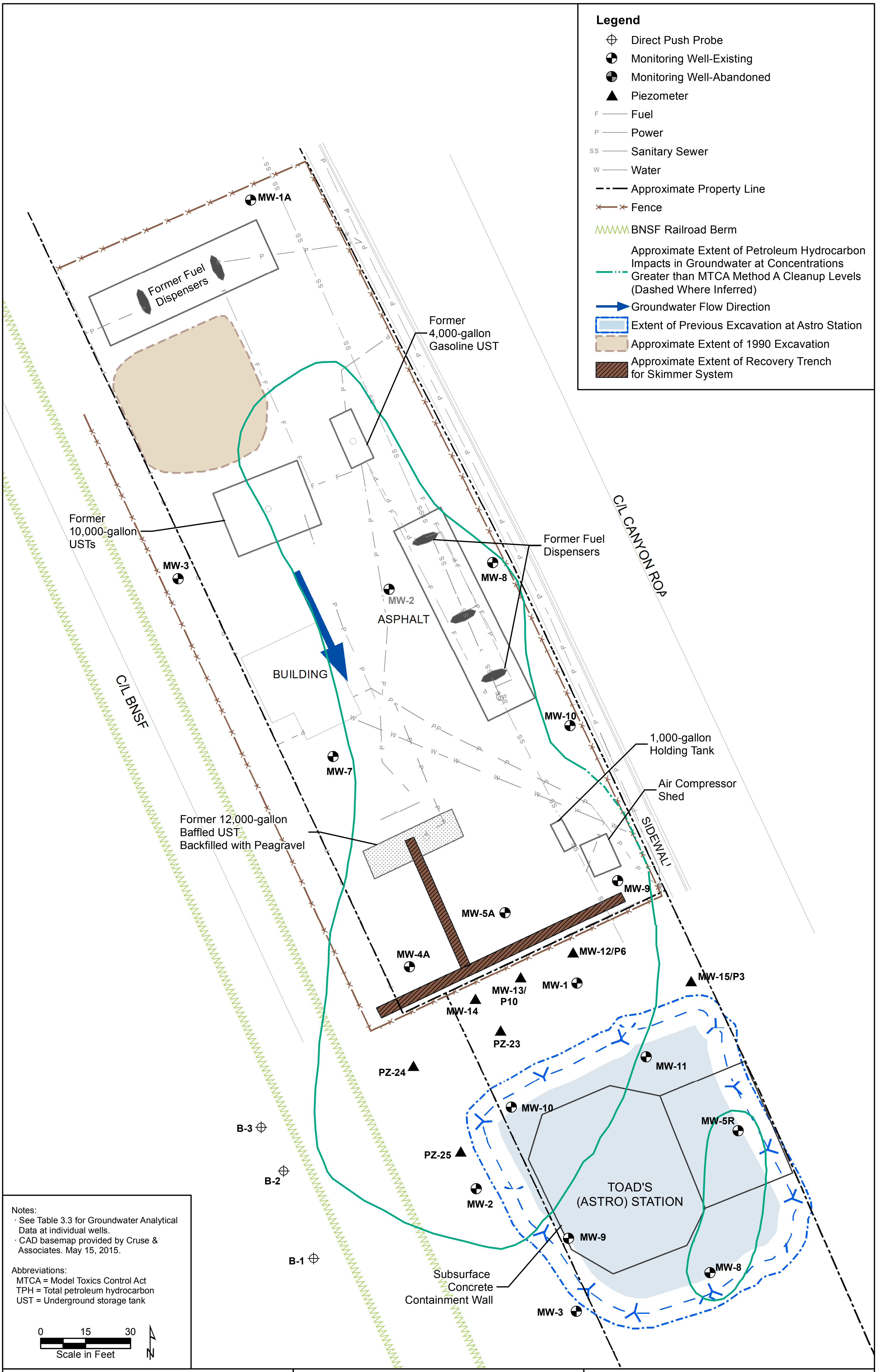
Ellensburg, Washington

Figure 5.1
Approximate Extent of Petroleum Hydrocarbon Impacts in Soil

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS 2017\Figure 5.1 Approximate Extent of Petroleum Hydrocarbons Impacts in Soil.mxd
5/8/2018



Notes:
- See Table 3.3 for Groundwater Analytical Data at individual wells.
- CAD basemap provided by Cruse & Associates. May 15, 2015.

Abbreviations:
MTCA = Model Toxics Control Act
TPH = Total petroleum hydrocarbon
UST = Underground storage tank

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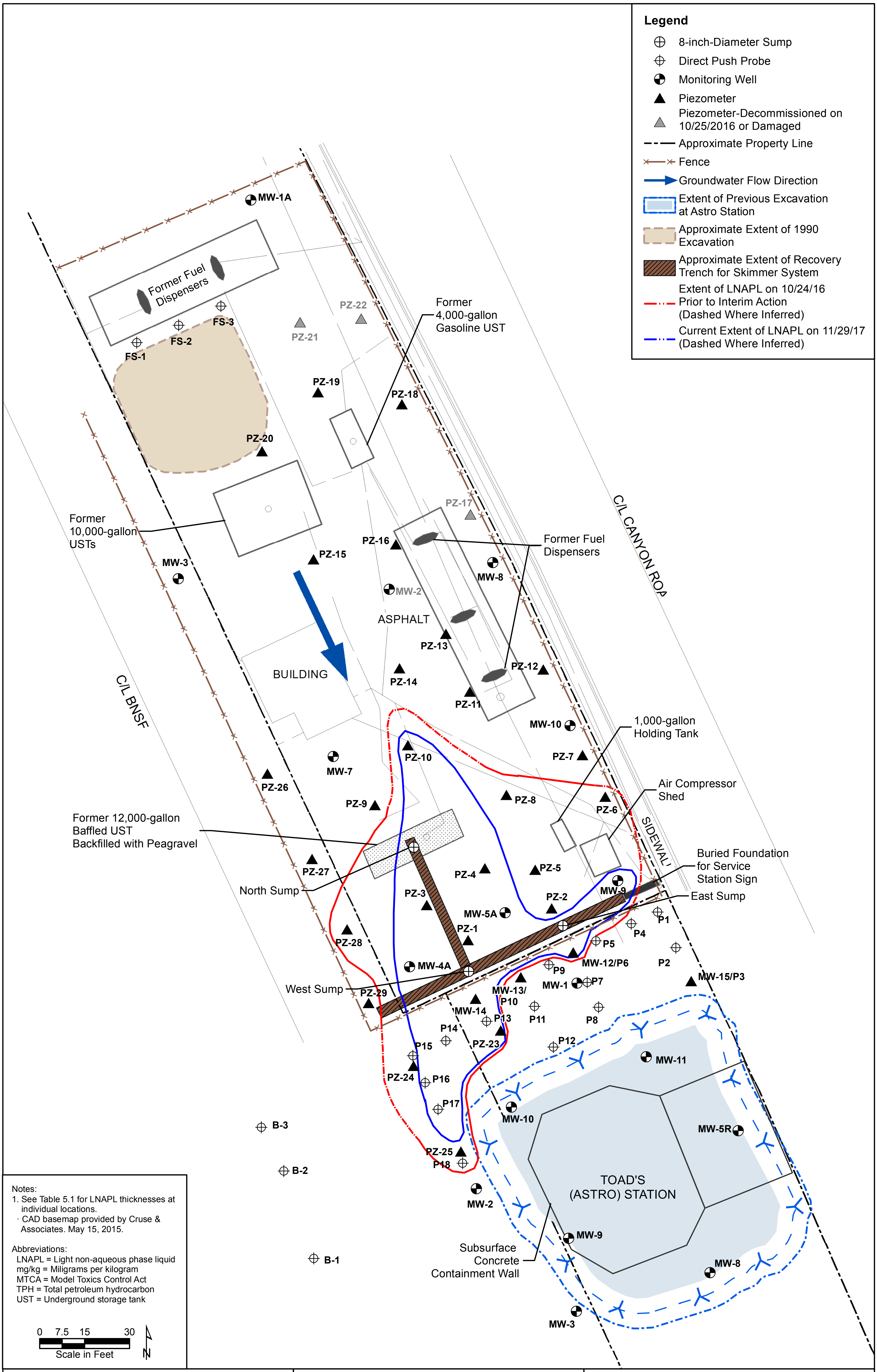
Big B Mini Mart
Ellensburg, Washington

Figure 5.2
Approximate Extent of Petroleum Hydrocarbon Impacts in Groundwater

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS 2017\Figure 5.2 Approximate Extent of Petroleum Hydrocarbon Impacts in Groundwater.mxd
3/26/2018



Notes:
1. See Table 5.1 for LNAPL thicknesses at individual locations.
· CAD basemap provided by Cruse & Associates. May 15, 2015.

Abbreviations:
LNAPL = Light non-aqueous phase liquid
mg/kg = Miligrams per kilogram
MTCA = Model Toxics Control Act
TPH = Total petroleum hydrocarbon
UST = Underground storage tank

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Big B Mini Mart
Ellensburg, Washington

Figure 5.3
LNAPL Extent

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS 2017\Figure 5.3 LNAPL Extent.mxd
3/26/2018

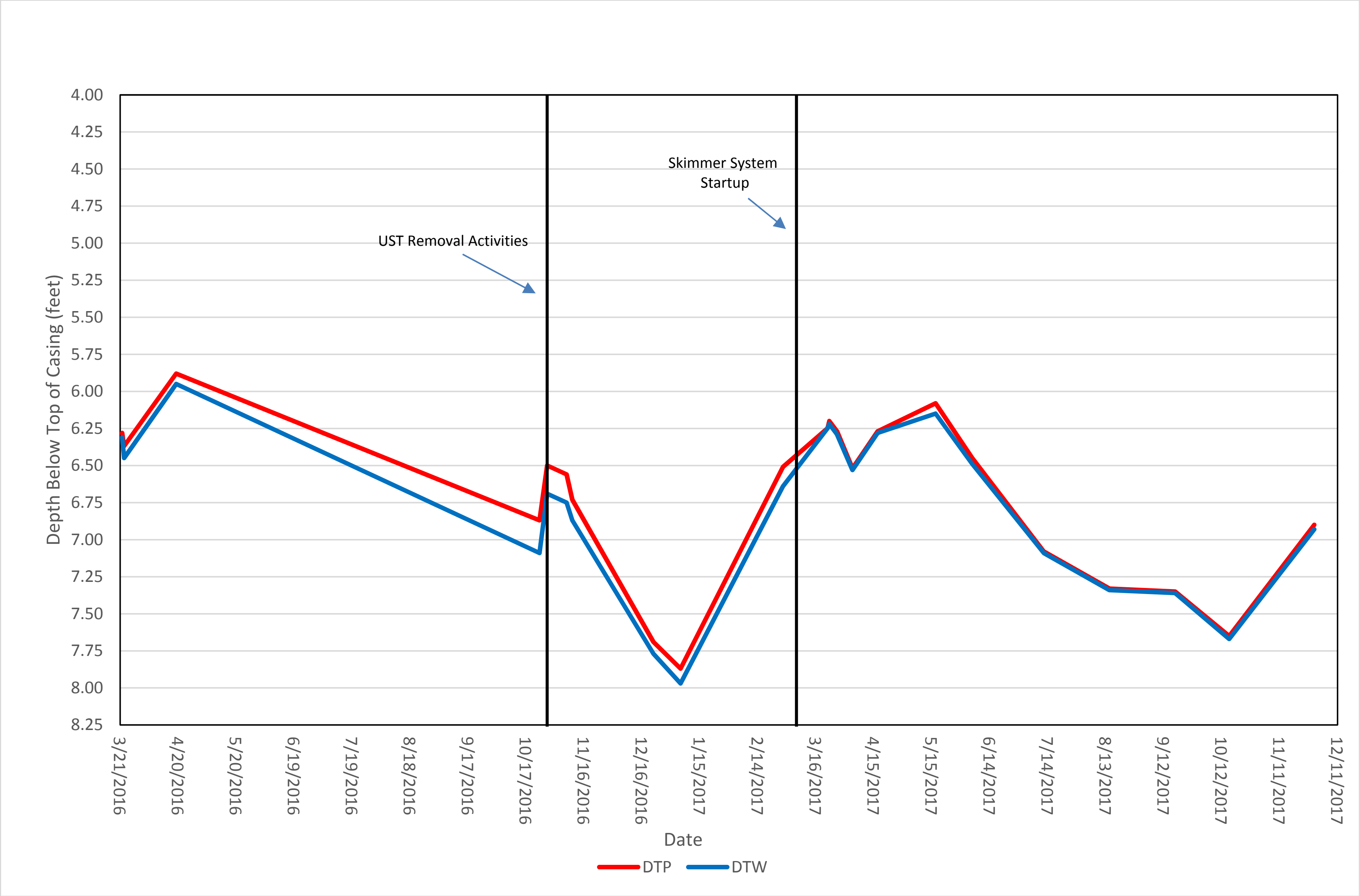

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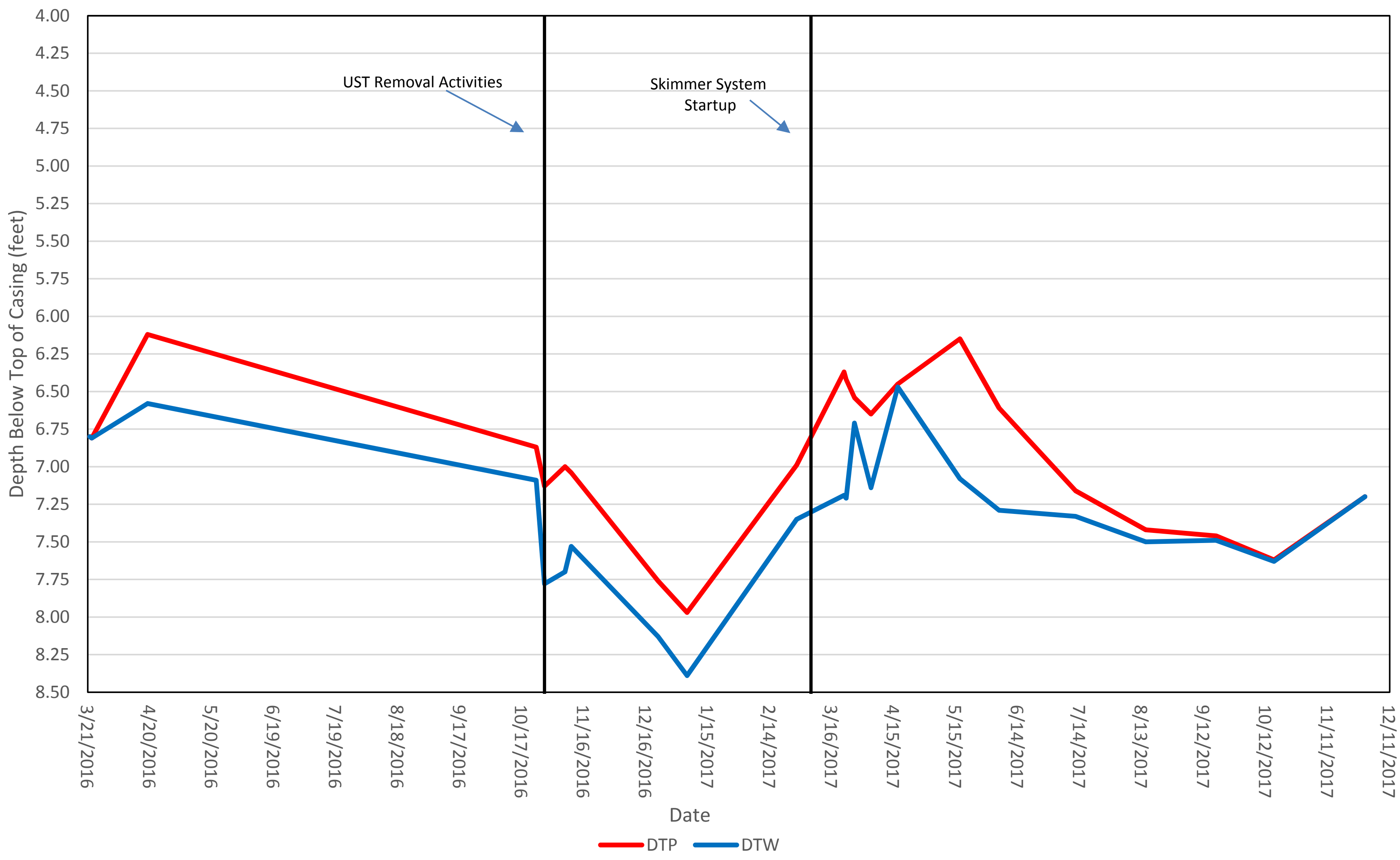
Figure 5.4
PZ-1 Depth to Water and Depth to Product

F:\projects\CL-Ellensburg\RIFS\03 Figures\Figure 5.4 PZ-1.docx
12/3/2017



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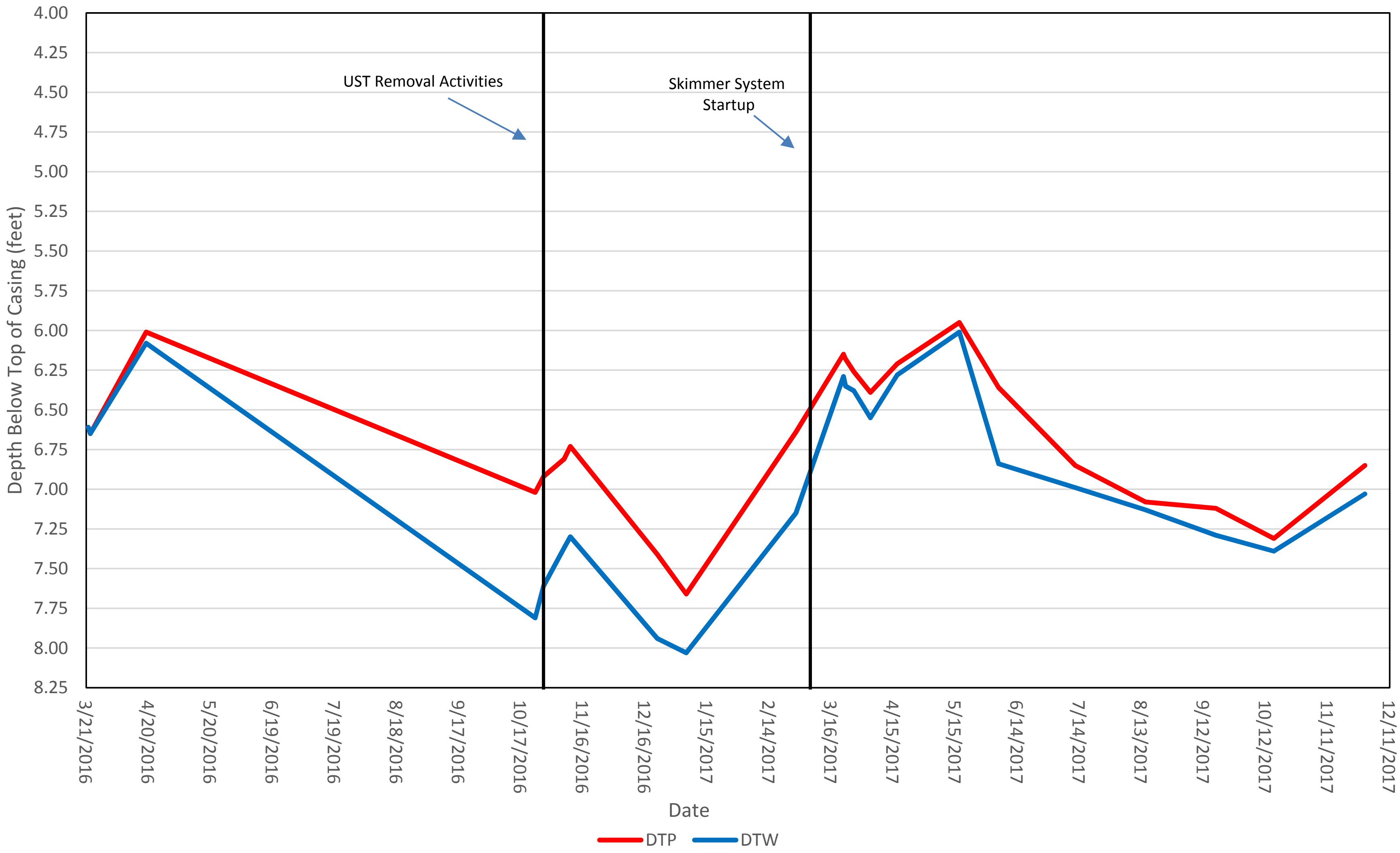
Ellensburg, Washington

Figure 5.5
PZ-2 Depth to Water and Depth to Product

F:\projects\CL-Ellensburg\RIFS\03 Figures\Figure 5.5 PZ-2.docx
12/3/2017



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Big B Mini Mart
Ellensburg, Washington

Figure 5.6
PZ-3 Depth to Water and Depth to Product

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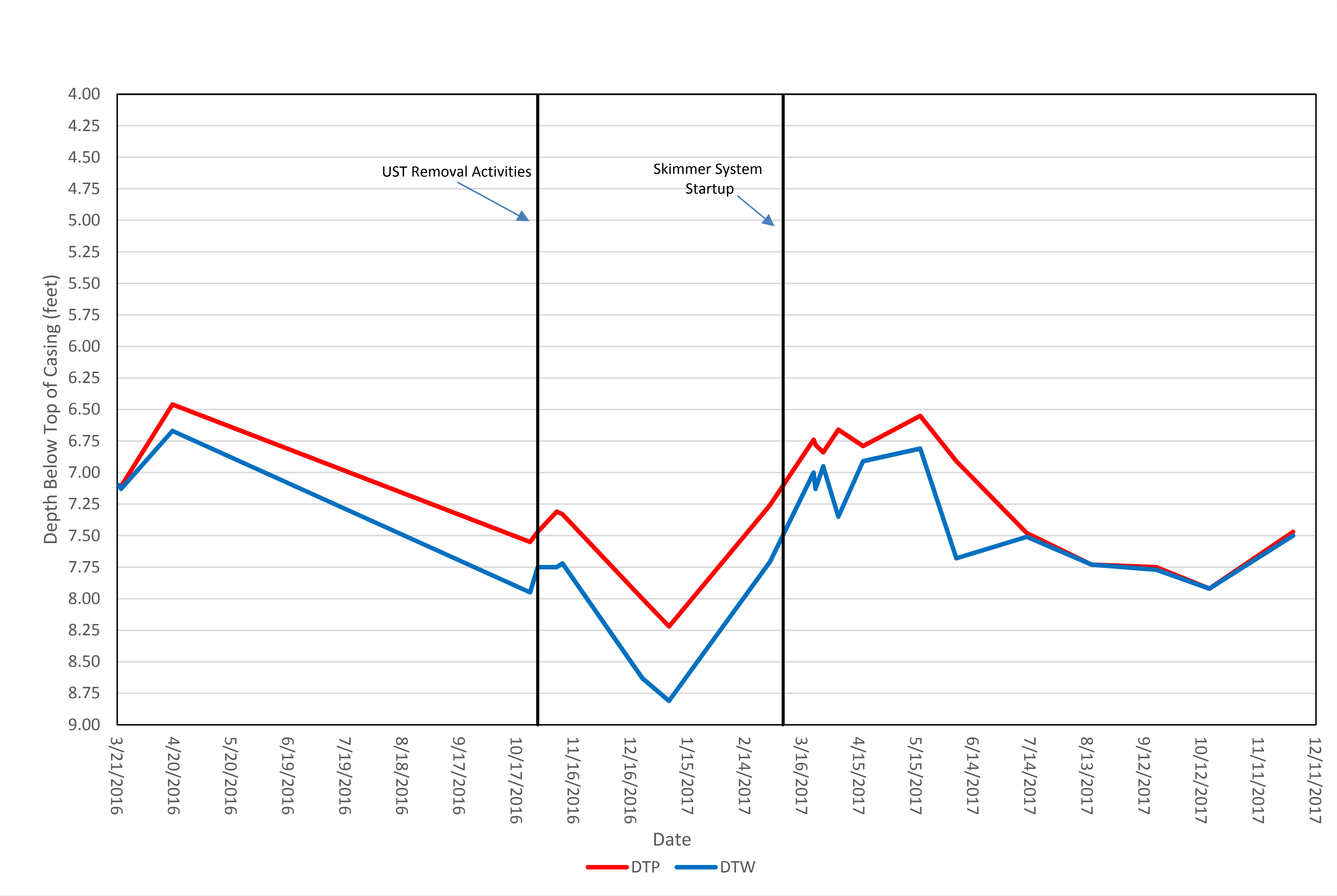
12/3/2017



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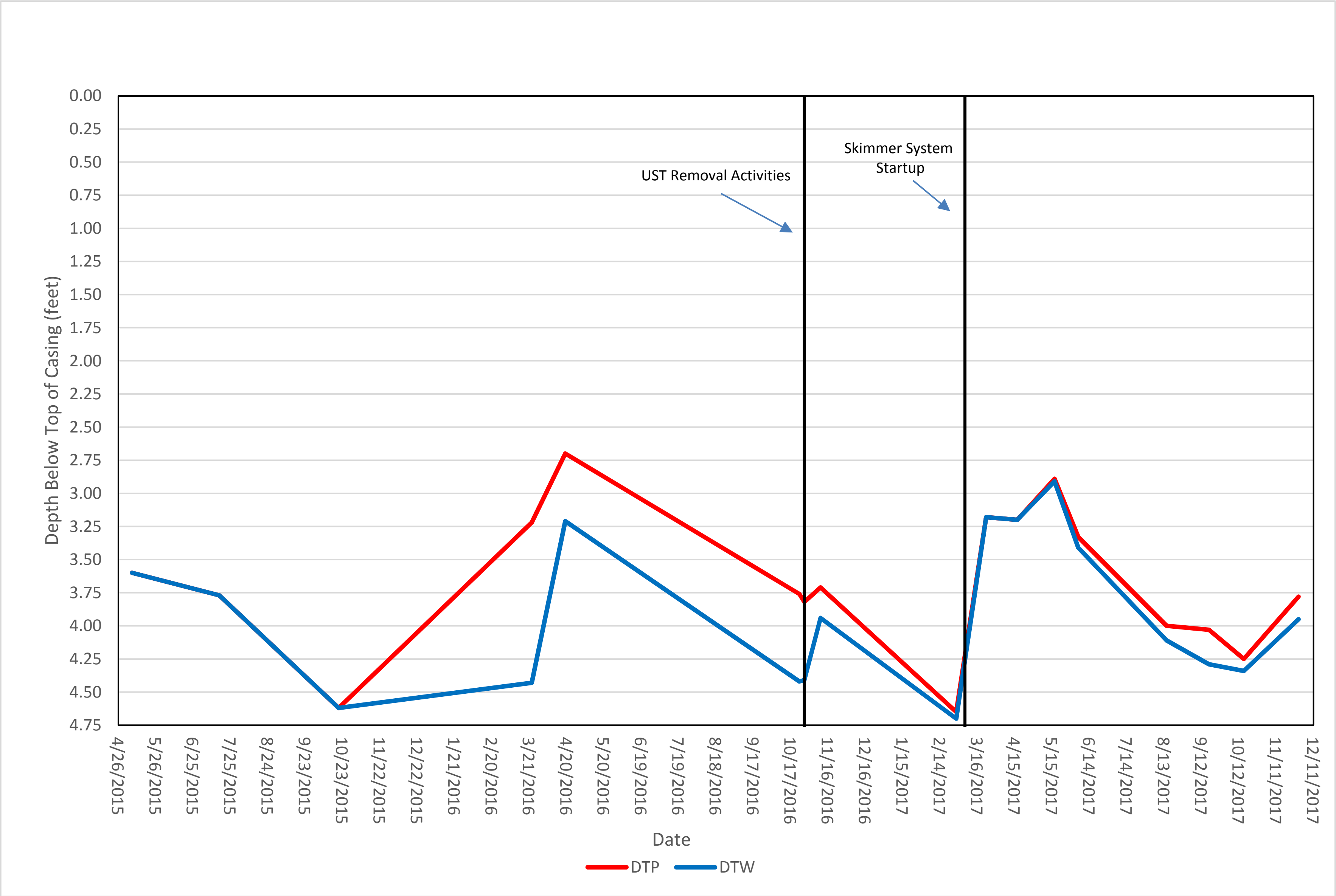
Big B Mini Mart
Ellensburg, Washington

Figure 5.7
PZ-4 Depth to Water and Depth to Product



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Big B Mini Mart
Ellensburg, Washington

Figure 5.8
MW-4A Depth to Water and
Depth to Product

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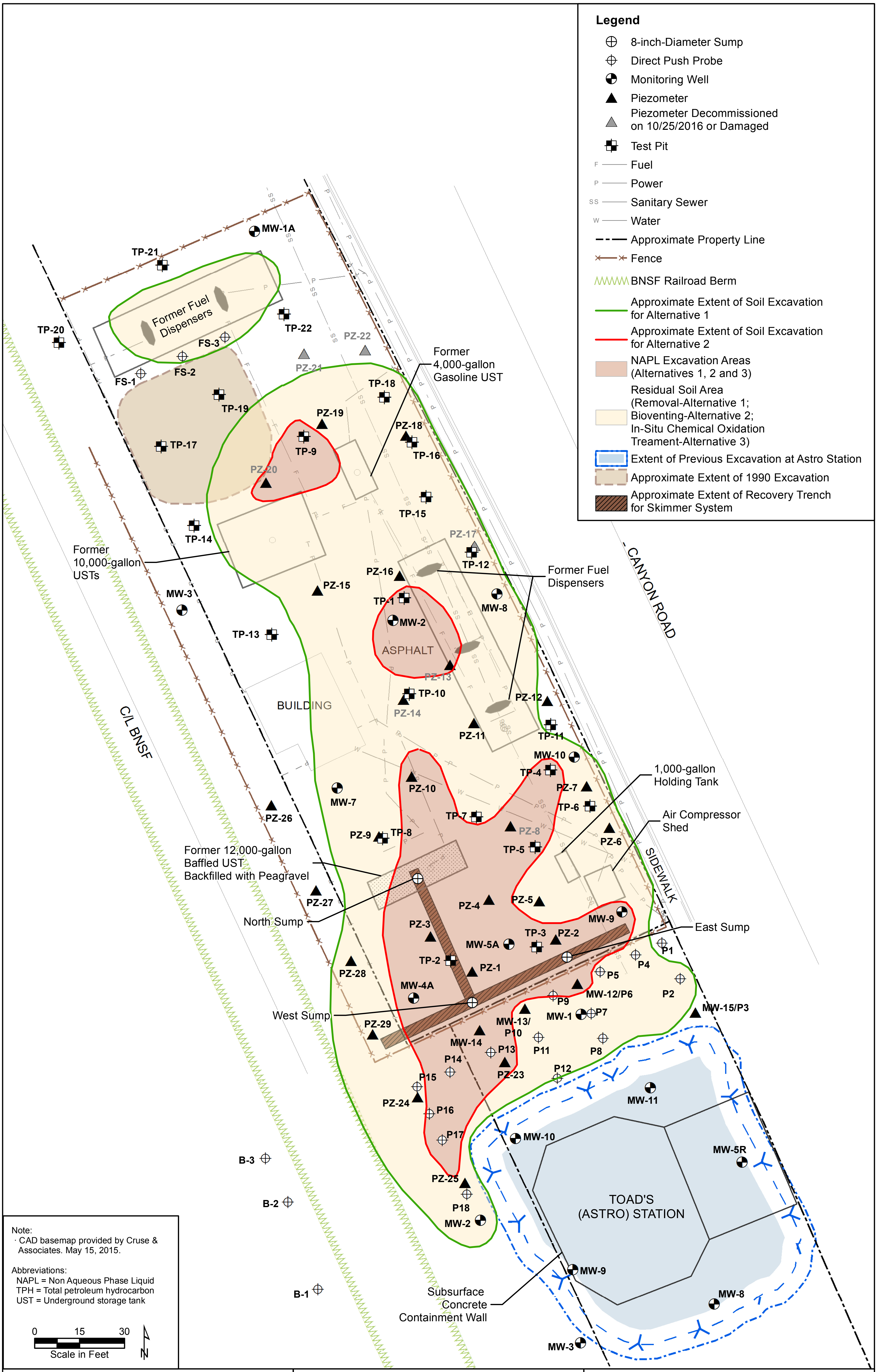
Remedial Investigation/Feasibility Study
Big B Mini Mart
Ellensburg, Washington

Figure 5.9
MW-5A Depth to Water and
Depth to Product



Note:
- CAD basemap provided by Cruse & Associates. May 15, 2015.

Abbreviations:
NAPL = Non Aqueous Phase Liquid
TPH = Total petroleum hydrocarbon
UST = Underground storage tank

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Remedial Investigation/Feasibility Study
Big B Mini Mart
Ellensburg, Washington

Figure 9.1
Approximate Extent of Soil Excavation for Alternatives 1, 2, and 3

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS 2017\Figure 9.1 Approximate Extent of Soil Excavation Alternatives 1, 2, and 3.mxd
5/8/2018

Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Appendix A
Boring and Test Pit Logs

PUBLIC REVIEW DRAFT

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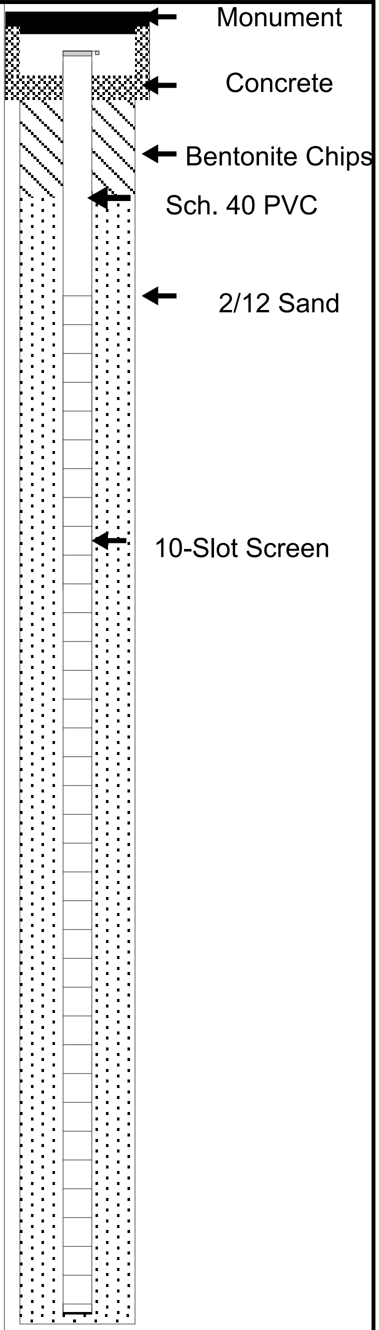
	PROJECT: CL-Ellensburg	LOCATION: 1611 S Canyon Rd Ellensburg, WA	WELL ID: MW-1A
	LOGGED BY: J. Pracht	DRILL DATE: 5/5/2015	ECOLOGY WELL ID: RJA-772
DRILLED BY: James Goble, Cascade	BORING DIAMETER: 2"	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING EQUIPMENT: Full Size Hollow-Stem Auger, CME75	SCREENED INTERVAL: 4-14	NORTHING: 599552.24	EASTING: 1629569.59
DRILLING METHOD: Hollow-Stem Auger		GROUND SURFACE ELEV.: 1490.76	TOC ELEVATION: 1490.76
SAMPLING METHOD: Split Spoon, 1.5', 300lb Hammer		TOTAL DEPTH (ft bgs): 14	DEPTH TO WATER (ft bgs): 6

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0	AS	Asphalt top 6 inches.				
1 2 3 4 5	SP	Dark brown, medium to coarse **SAND** with trace silt and small to medium gravel. No odor. No sheen.		6 7 9	1.8	
6 7	GP	Dark gray, moist, well graded **GRAVEL** with trace medium sand. No odor. No sheen. Moist.		10 10 11	0	
8 9	SP	Brownish-gray, fine to medium **SAND** with 30% large gravels. No odor. No sheen. Wet. No split spoons collected past 9'.		26 21 29	0.4	
10 11 12 13 14		Well drilled to 14'.				

Well Construction



ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:

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PROJECT: CL-Ellensburg

LOCATION: 1611 S Canyon Rd Ellensburg, WA

WELL ID: MW-4A

LOGGED BY: J. Pracht

DRILL DATE: 5/5/2015

ECOLOGY WELL ID: RJA-774

DRILLED BY: James Goble, Cascade

BORING DIAMETER: 2"

COORDINATE SYSTEM: NAD 83 WA SP S

DRILLING EQUIPMENT: Full Size Hollow-Stem Auger, CME75

SCREENED INTERVAL: 4-14

NORTHING: 599296.18

EASTING: 1629622.63

DRILLING METHOD: Hollow-Stem Auger

GROUND SURFACE ELEV.: 1489.46

TOC ELEVATION: 1489.73

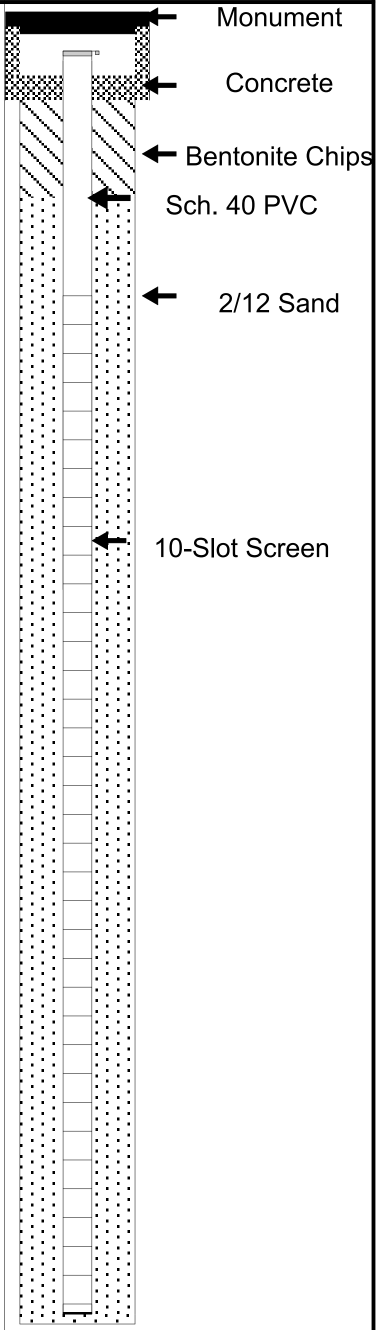
SAMPLING METHOD: Split Spoon, 1.5', 300lb Hammer

TOTAL DEPTH (ft bgs): 14

DEPTH TO WATER (ft bgs): 5

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0	TS	Topsoil and grass top 6 inches.				
3	SP	Brown, fine to medium **SAND** with some small gravel. No odor. No sheen.		6 7 10	761	
4		Dark gray, medium to coarse **SAND** with small to medium gravel. Moderate odor. Moderate sheen. Moist.				
5		Same as above, heavy sheen, wet.		8 9 8	1055 1248	MW-4A-6-6.5 @1415
8		Same as above, slight sheen.		7 7 11	257 67.2	
9		No split spoons collected past 9'.				
10		Well drilled to 14'.				
14						

Well Construction



ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:

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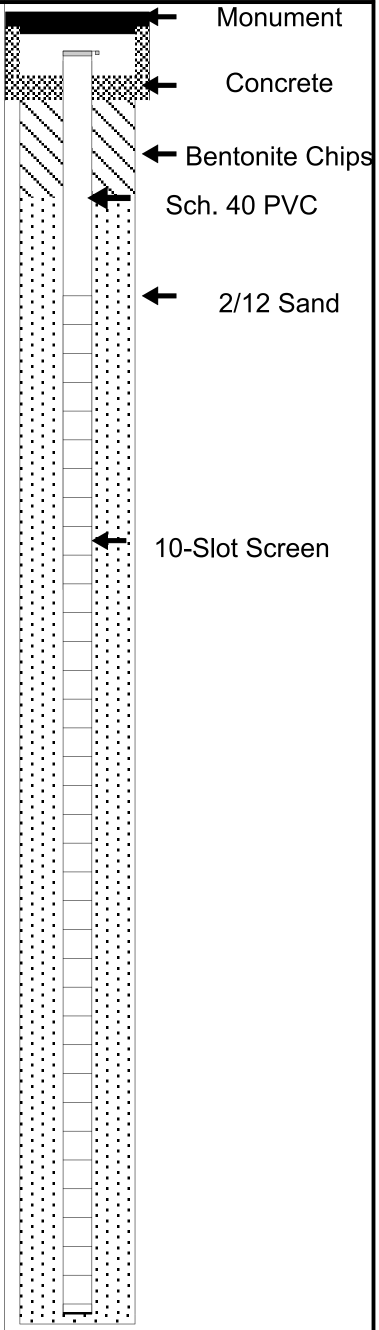
PROJECT: CL-Ellensburg
LOCATION: 1611 S Canyon Rd Ellensburg, WA
WELL ID: MW-5A
LOGGED BY: J. Pracht
DRILL DATE: 5/5/2015
ECOLOGY WELL ID: RJA-775
DRILLED BY: James Goble, Cascade
BORING DIAMETER: 2"
COORDINATE SYSTEM: NAD 83 WA SP S
DRILLING EQUIPMENT: Full Size Hollow-Stem Auger, CME75
SCREENED INTERVAL: 4-14
NORTHING: 599314.19
EASTING: 1629654.48
DRILLING METHOD: Hollow-Stem Auger
GROUND SURFACE ELEV.: 1489.95
TOC ELEVATION: 1490.34
SAMPLING METHOD: Split Spoon, 1.5', 300lb Hammer
TOTAL DEPTH (ft bgs): 14
DEPTH TO WATER (ft bgs): 6

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0	AS	Asphalt top 6 inches.				
1 2 3 4	SP	Brown, medium to coarse **SAND** with well graded gravel. No odor. No sheen. Dark gray, fine to medium, silty **SAND** with some small gravel. Slight odor. Slight sheen. Moist. Dark brown, medium to coarse **SAND** with well graded gravel. Strong odor. Heavy sheen. Moist.		9 14 14	607 398	
5 6	GP	Dark brown, well graded **GRAVEL** with medium to coarse sand. Stong odor. Heavy sheen. Wet.		10 11 14	1223	MW-5A-6-6.5 @1545
7 8	SP	Dark gray, medium to coarse **SAND** with medium gravel. Moderate odor. Slight sheen. Wet.		10 10 14	224 67	
9	GP	Dark gray, well graded **GRAVEL** with medium to coarse sand. Moderate odor. Wet. No split spoons collected past 9'.				
10 11 12 13 14		Well drilled to 14'.				

Well Construction



ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:

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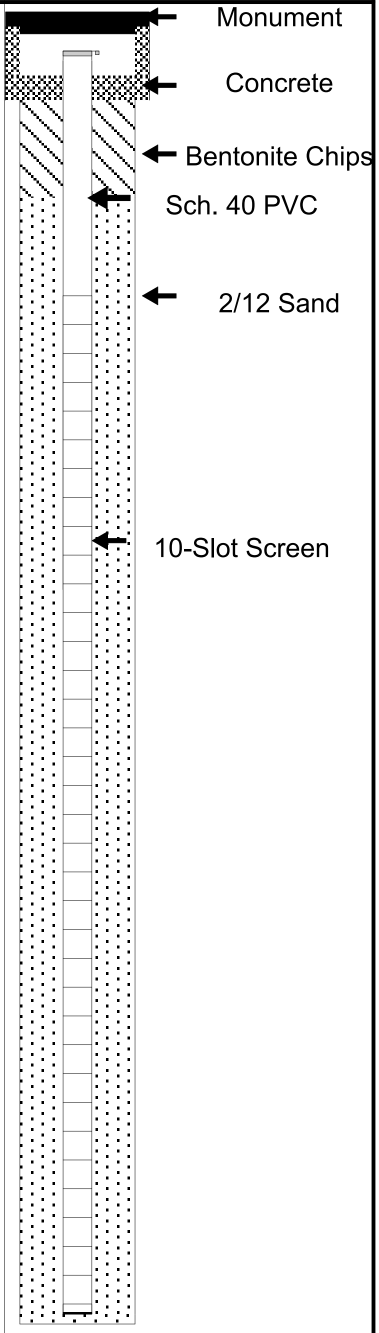
PROJECT: CL-Ellensburg
LOGGED BY: J. Pracht
LOCATION: 1611 S Canyon Rd Ellensburg, WA
DRILL DATE: 5/5/2015
WELL ID: MW-7
ECOLOGY WELL ID: RJA-773
DRILLED BY: James Goble, Cascade
BORING DIAMETER: 2"
COORDINATE SYSTEM: NAD 83 WA SP S
DRILLING EQUIPMENT: Full Size Hollow-Stem Auger, CME75
SCREENED INTERVAL: 4-14
NORTHING: 599366.38
EASTING: 1629597.15
DRILLING METHOD: Hollow-Stem Auger
GROUND SURFACE ELEV.: 1490.72
TOC ELEVATION: 1491.11
SAMPLING METHOD: Split Spoon, 1.5', 300lb Hammer
TOTAL DEPTH (ft bgs): 14
DEPTH TO WATER (ft bgs): 6

Depth (feet)	USCS Symbol	Description	# of Blows	PID (ppm)	Sample ID
0	AS	Asphalt top 6 inches.			
1					
2	SP	Brown, medium to coarse **SAND** with small to medium gravel. No odor. No sheen.			
3			1		
			2	815	
4	ML	Dark gray, sandy **SILT** with trace medium gravel. Slight odor; slight sheen.	2		
5		Same as above, heavy sheen.	4	1059	MW-7-5-5.5 @1220
6	SP	Dark gray, medium to coarse **SAND**. Slight odor. Slight sheen. Moist. Light brown, medium to coarse **SAND** with some small gravel. Slight odor. Slight sheen. Wet.	3 4	42	
7					
8	SP	Same as above.	10	19.8	
			12		
9		Dark gray, medium to coarse **SAND** with medium gravel. No odor. Slight sheen. No split spoons collected past 9'.	13	10	
10		Well drilled to 14".			
11					
12					
13					
14					

Well Construction



ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:

Log of Soil Boring and Well Installation X

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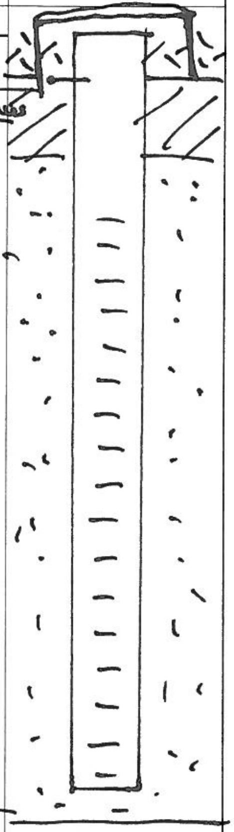
Floyd Snider
Boring MW-8 Date 3/22/16 Sheet 1 of 1
Job CC-Ellensburg Job No.
Logged By G. Cisneros Weather Cloudy
Drilled By ESN
Drill Type/Method Hollow-Stem Auger
Sampling Method Split Spoon
Bottom of Boring 13' ATD Water Level Depth 4.8
Ground Surface Elevation

Obs. Well Install. ☒ Yes ☐ No

SAMPLE ID	Blow Count	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)	Depth	USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
N/A	N/A				0		Asphalt
					1		Road base FILL Crushed 5/8 minus
					2	SP	Brown, gravelly SAND
					3	ML	Dark brown stiff SILT w/ some organics
					5	SP	Brown, gravelly SAND w/ 30% gravel & 10% cobbles
					13		Refusal @ 13'

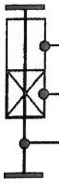


10-Slot

2/12 Monterey SAND

2" PVC

Ecology well ID
BJW715



Recovery

Subsample for Analysis

Driven Interval

▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Log of Soil Boring and Well Installation X

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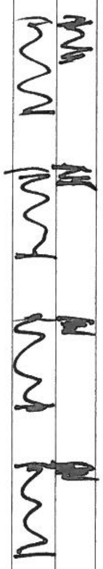
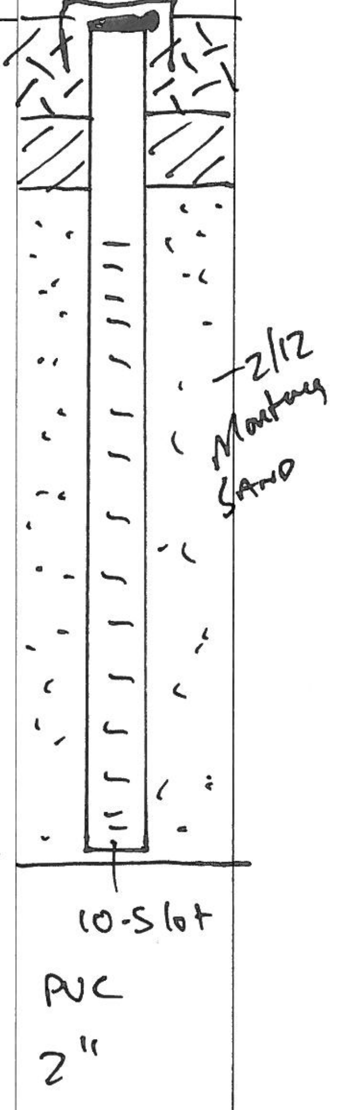
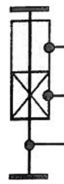
Floyd Snider
Boring MW-9 Date 3/22/16 Sheet 1 of 1
Job CC- Ellensburg Job No.
Logged By G. Cisneros Weather Cloudy
Drilled By ESN
Drill Type/Method HSA
Sampling Method SS
Bottom of Boring 14' ATD Water Level Depth 4.5
Ground Surface Elevation

Obs. Well Install. ☒ Yes ☐ No

SAMPLE ID	Blow Count	DEPTH		SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
		From	To				
N/A	N/A	N/A			0	AS	Asphalt
						SW	Roadbase Fill
					1		
					2	SP	Brown, gravelly, SAND
					3		
					4	ML	Dark brown, SILT w/ some organics
					5		
					6		
					7	SP	Brown to gray, gravelly SAND w/ 30% gravel & 10% cobbles
					8		
					9		
					10		
					11		
					12		
					13		
					14		
					15		
					16		Ecology Well ID BJW717
					17		
					18		
					19		
					20		







▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Log of Soil Boring and Well Installation X

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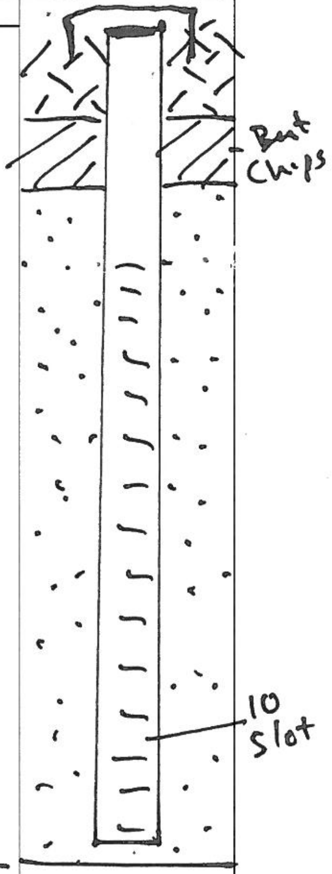
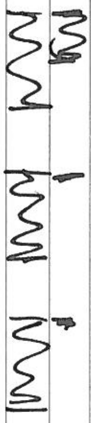
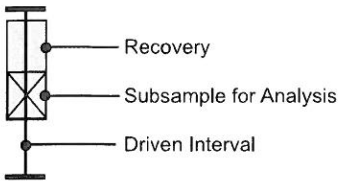
Floyd Snider
Boring MW-10 Date 3/22/16 Sheet 1 of 1
Job CL-Ellensburg Job No.
Logged By G. Cisneros Weather Cloudy
Drilled By ESN
Drill Type/Method HSA
Sampling Method SS
Bottom of Boring 14 ATD Water Level Depth 4.8
Ground Surface Elevation

Obs. Well Install. ☒ Yes ☐ No

SAMPLE ID	Blow Count	DEPTH		SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.	
		From	To					
					0		Asphalt	
					1		Roadbase Fill	
					2	SP	Brown, gravelly SAND	
					3			
					4	ML	Dark brown SILT w/ organics	
					5		Gray, olive	
N/A	N/A				6		~~Brown~~, gravelly SAND	
					7		w/ 30% gravel & 10% cobbles	
					8	SP		
					9			
					10			
					11			
					12			
					13			
					14		Bottom @ 14'	
					15			2/12 Monterey SAND
					16			
					17			
					18			
					19		Ecology Well ID	Total 13.48
					20		BJW 716	



▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Attachment 1
Test Pit Soil Logs

Test Pit TP-1

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–2	FILL	Brown and 5/8 minus fill: angular crushed rock and sand.	--	--	--	
2–3	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	2–2.5	0.8	Moist	
3–3.75	ML	Dark brown, stiff SILT with organic debris; slight odor; slight sheen.	3.5–4	357	Moist	
3.75–4.5		Olive gray, stiff, sandy SILT with some organics; strong odor; heavy sheen.	4–4.5	4,474	Moist to Wet	TP1-4-4.5
4.5–5.5	SP	Olive gray, medium dense, gravelly SAND with 15% gravel; strong odor; medium sheen.	5–5.5	3,780	Saturated	
5.5–6.5	GP	Gray, medium dense, sandy GRAVEL with 20% sand; strong odor; medium sheen.	--	--	Saturated	
6.5–7	SP	Gray, medium dense, gravelly, coarse SAND with 30% gravel; strong odor; medium sheen.	6.5–7	2,360	Saturated	TP1-6.5-7

Test Pit TP-1 completed to 7 feet on 05/06/2015.

Groundwater encountered at 5.25 feet bgs.

Test Pit TP-2

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	1.5–2	0.8	Moist	
3–4.5	ML	Olive gray to dark brown, stiff SILT with organic debris; organic odor; no sheen.	3–3.5	26.4	Moist	
4.5–5.75	SP	Gray, medium dense, gravelly, medium to coarse SAND with 40% gravel; strong odor; moderate to heavy sheen.	5–5.5	1,073	Wet	TP2-5-5.5
5.75–6.5	GP	Gray, medium dense, sandy GRAVEL with coarse sand; moderate odor; moderate sheen.	6–6.5	630	Saturated	

Test Pit TP-2 completed to 6.5 feet on 05/06/2015.

Groundwater encountered at 5.5 feet bgs.

Test Pit TP-3

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP	Light brown to brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	--	
3.5–5	ML	Dark brown, stiff SILT with organics; organic odor; no sheen.	4–4.5	153	Moist	
5–5.25	SP	Gray, medium SAND lens; strong odor; moderate sheen.	5–5.5	1,335	Wet	TP3-5-5.5
5.25–6.25	ML	Dark brown to gray, stiff, SILT with organics; moderate odor; slight sheen.	--	--	--	
6.25–7	GP	Gray, dense, sandy GRAVEL; moderate odor; slight sheen.	6.5–7	335	Saturated	

Test Pit TP-3 completed to 7 feet on 05/06/2015.

Groundwater encountered at 5.5 feet bgs.

Attachment 1
Test Pit Soil Logs

Test Pit TP-4						
Depth (feet)	**USCS Symbol**	**Description**	**Sample Depth (feet)**	**PID (ppm)**	**Moisture**	**Sample ID**
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3.5	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	--	
3.5–5	ML	Dark brown to olive gray, stiff SILT with abundant organic material; organic odor; no sheen.	3.5–4	8.1	--	
5–6	SP	Gray, medium SAND lens; strong odor; moderate sheen.	5–5.5	601	Wet	
6–7.25		Same as above; strong odor; heavy sheen.	6–6.5	1,470	Wet to Saturated	TP4-6-6.5
7.25–7.75	OL	Dark brown to gray, stiff, organic SILT; no odor; no sheen.	7.25–7.75	340	Saturated	

Test Pit TP-4 completed to 7.75 feet on 05/06/2015.
Groundwater encountered at 6.5 feet bgs.

Test Pit TP-5						
Depth (feet)	**USCS Symbol**	**Description**	**Sample Depth (feet)**	**PID (ppm)**	**Moisture**	**Sample ID**
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3.5	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	--	
3.5–5.25	ML	Dark brown to olive gray, stiff SILT with abundant organic debris; slight organic odor; no sheen.	4–4.5	113	Moist	
5–6	SP	Olive gray, medium dense, gravelly, medium to coarse SAND with 40% gravel; strong odor; moderate sheen.	5–5.5	603	Wet	
6–6.5		Same as above; strong odor; heavy sheen.	6–6.5	2,528	Wet	TP5-6-6.5
6.5–7		Same as above.	--	--	Saturated	

Test Pit TP-5 completed to 7 feet on 05/06/2015.
Groundwater encountered at 6.5 feet bgs.

Test Pit TP-6						
Depth (feet)	**USCS Symbol**	**Description**	**Sample Depth (feet)**	**PID (ppm)**	**Moisture**	**Sample ID**
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	--	
3–5	ML	Olive gray, stiff SILT with organic debris; organic odor; no sheen.	3–3.5	61	Moist	
5–6	SP	Olive gray, medium dense, gravelly SAND; strong odor; heavy sheen.	5–5.5	1,790	Wet	TP6-5-5.5
6–6.5		Same as above.	6–6.5	1,283	Wet	
6.5–7.25	GP	Gray, medium dense, sandy GRAVEL; strong odor; moderate sheen.	6.5–7	408	Saturated	

Test Pit TP-6 completed to 7.25 feet on 05/06/2015.
Groundwater encountered at 7 feet bgs.

Attachment 1
Test Pit Soil Logs

Test Pit TP-7

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	--	
3–4.75	ML	Dark brown, stiff SILT with organic debris; organic odor; slight sheen.	3–3.5	96	Moist	
4.75–6	SP	Gray, medium dense, fine to medium SAND; strong odor; heavy sheen.	4.75–5.25	767	Moist to Wet	TP7-5-5.5
6–7	GP/SP	Gray, medium dense, sandy GRAVEL/gravelly coarse SAND; moderate odor; moderate sheen.	6–6.5	516	Saturated	

Test Pit TP-7 completed to 7 feet on 05/06/2015.
Groundwater encountered at 6.5 feet bgs.

Test Pit TP-8

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3.5	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	3–3.5	33	--	
3.5–5.25	ML	Dark brown, stiff SILT with organic debris; organic odor; no sheen.	4–4.5	42	Moist	
5.25–6	SP	Olive gray, medium dense, fine to medium SAND; strong odor; moderate sheen.	5.75–6.25	1,087	Wet	TP8-6-6.5
6–7.5	GP	Olive gray, medium dense, medium to coarse, sandy GRAVEL with 40% sand; strong odor; heavy sheen.	--	--	Wet to Saturated	

Test Pit TP-8 completed to 7.5 feet on 05/06/2015.
Groundwater encountered at 6.75 feet bgs.

Test Pit TP-9

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–2.75	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	1.5–2	0.3	Moist	
2.75–3.5	ML	Dark brown, stiff SILT with organic debris; organic odor; no sheen.	3–3.5	33	--	
3.5–4.5	SP	Olive gray, medium dense, fine to medium SAND with 15% gravel; moderate odor; moderate sheen.	--	--	Moist to Wet	
4.5–5	GP	Olive gray, medium dense, sandy GRAVEL with 40% sand; strong odor; strong sheen.	4.5–5	1,311	Wet	
5–5.5			5–5.5	1,817	Wet	TP9-5-5.5
5.5–6.5		Same as above.	6–6.5	--	Saturated	

Test Pit TP-9 completed to 6.5 feet on 05/06/2015.
Groundwater encountered at 5.5 feet bgs.

Attachment 1
Test Pit Soil Logs

Test Pit TP-10

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–4	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	Moist	
4–5	ML	Olive gray, stiff SILT with organic debris; slight odor; no sheen.	4–4.5	230	--	
5–5.5		Same as above; moderate odor; slight sheen.	5–5.5	906	--	
5.5–6.5	SP	Gray, medium dense, fine to medium SAND with 10% gravel; strong odor; heavy sheen.	6–6.5	4,409	Wet	TP10-6-6.5
6.5–7.5		Same as above; strong odor; moderate sheen.	7–7.5	2,485	Saturated	

Test Pit TP-10 completed to 7.5 feet on 05/06/2015.
Groundwater encountered at 7 feet bgs.
Encountered damaged metal conduit leading to dispensers. Moved south 3 feet.

Test Pit TP-11

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	Moist	
3–4.5	ML	Dark brown, stiff SILT with organics; organic odor; no sheen.	3–3.5	0.8	Moist	
4.5–4.75		Same as above.	4.5–5	1.5	Moist	
4.75–6	SP	Olive gray, medium dense, gravelly, medium to coarse SAND; moderate odor; moderate sheen.	5–5.5	231	Wet	TP11-5-5.5
6–6.5		Same as above.	6–6.5	70	Saturated	
6.5–7	ML	Gray to dark brown, stiff SILT; slight odor, no sheen.	--	--	Wet	

Test Pit TP-11 completed to 7 feet on 05/06/2015.
Groundwater encountered at 6.5 feet bgs.

Test Pit TP-12

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP/GP	Brown, medium dense, gravelly SAND/sandy GRAVEL with medium to coarse SAND; no odor; no sheen.	--	--	Moist	
3–3.5	ML	Olive gray, stiff organic SILT with 30% sand; organic odor; no sheen.	3–3.5	7.1	--	
3.5–4.25	SP	Gray, medium dense, medium SAND with 20% gravel; no odor; no sheen.	4–4.5	4.2	Moist	
4.25–5.25	ML	Olive gray, stiff, sandy SILT; no odor; no sheen.	--	--	Moist	
5.25–6	SP	Gray, medium dense, fine to medium SAND with 10% gravel and 5% silt; slight odor; slight sheen.	5–5.5	318	Wet	
6–7		Same as above.	6–6.5	1,733	Saturated	TP12-6-6.5

Test Pit TP-12 completed to 7 feet on 05/06/2015.
Groundwater encountered at 6.5 feet bgs.

Attachment 1
Test Pit Soil Logs

Test Pit TP-13

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP/GP	Brown, medium dense, gravelly SAND/sandy GRAVEL with medium to coarse SAND and large cobbles; no odor; no sheen.	--	--	Moist	
3–5	ML	Brown, hard, sandy SILT with low plasticity; no odor; no sheen.	3–3.5	0.8	Moist	
5–6.5		Same as above; no odor; no sheen.	5–5.5	1.8	Wet	TP13-5.5-6

Test Pit TP-13 completed to 6.5 feet on 05/05/2015.
Groundwater encountered at 6.3 feet bgs.

Test Pit TP-14

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–2.25	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	1.5–2	0.8	Moist	
2.25–2.75	SP/GP	Sandy GRAVEL/gravelly SAND.	2.5–3	2.9	Moist	
2.75–4	SP	Gray, medium dense, gravelly, cobbly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	--	
4–5		Same as above; brown SAND; no odor; no sheen.	4–4.5	3.1	--	
5–5.5		Same as above; gray, gravelly cobbly, medium to coarse SAND; slight odor; slight sheen.	5–5.5	215	Wet	TP14-5-5.5
5.5–6	GP	Grades to sandy GRAVEL.	--	--	Saturated	

Test Pit TP-14 completed to 6.0 feet on 05/05/2015.
Groundwater encountered at 5.5 feet bgs.

Test Pit TP-15

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	Moist	
3–4		Same as above; gray gravelly SAND; strong odor; slight sheen.	3–3.5	692	Moist	
4–5		Same as above; strong odor; moderate sheen.	4–4.5	781	Moist to Wet	
5–6.5		Same as above; strong odor; heavy sheen.	5–5.5	1,352	Wet to Saturated	TP15-5-5.5

Test Pit TP-15 completed to 6.5 feet on 05/06/2015.
Groundwater encountered at 5.75 feet bgs.

Attachment 1
Test Pit Soil Logs

Test Pit TP-16

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–2.5	SP/GP	Brown, medium dense, gravelly, medium to coarse SAND/sandy GRAVEL with 30% cobbles; no odor; no sheen.	--	--	--	
2.5–3	SM/ML	Gray to black, silty SAND/sandy SILT with organic debris; organic odor; no sheen.	2.5–3	307	Moist	
3–4	SP/GP	Brown, medium dense, gravelly, medium to coarse SAND/sandy GRAVEL with 30% cobbles; no odor; no sheen.	--	--	--	
4–5	ML	Black organic SILT with fine SAND and low plasticity; no odor; no sheen.	4–4.5	21.8	Wet	
5–6		Olive gray, medium dense, gravelly, cobbly, medium to coarse SAND; strong odor; heavy sheen.	5–5.5	1,696	Wet to Saturated	TP16-5-5.5

Test Pit TP-16 completed to 6 feet on 05/05/2015.
Groundwater encountered at 5.25 feet bgs.

Test Pit TP-17

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SM	Brown, medium dense, silty, gravelly, fine to coarse SAND with 30% gravel and cobbles and 15% silt; no odor; no sheen. (FILL?)	--	--	Moist	
3–4		Same as above; no odor; no sheen. (FILL?)	3.5–4	0.5	Moist	
4–5		Same as above; no odor; no sheen.	4.5–5	0.9	Moist	
5–6	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% gravel and cobble; slight odor; slight sheen.	5.5–6	236	Wet	TP17-5.5-6

Test Pit TP-17 completed to 6 feet on 05/05/2015.
Groundwater encountered at 5.8 feet bgs.

Test Pit TP-18

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP	Brown, medium dense, gravelly, cobbly, medium to coarse SAND with 40% gravel and cobbles; no odor; no sheen.	--	--	Moist	
3–5		Bluish-gray, medium dense, gravelly, cobbly, medium to coarse SAND with 40% gravel and cobble; slight odor; slight sheen.	3–3.5	425	Moist	
5–5.75		Same as above; strong odor; heavy sheen.	5–5.5	2,577	Wet	TP18-5-5.5

Test Pit TP-18 completed to 5.75 feet on 05/05/2015.
Groundwater encountered at 5.75 feet bgs.

Attachment 1
Test Pit Soil Logs

Test Pit TP-19

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SM	Dark brown, medium dense, silty, gravelly, cobbly, medium to coarse SAND; no odor; no sheen. (FILL?)	--	--	Moist	
3–4		Same as above; no odor. (Previous Excavation FILL?)	--	--	--	
4–5.5		Same as above; no odor; no sheen. (FILL?)	--	--	--	
5.5–6.75	SP	Gray, medium dense, gravelly SAND; moderate odor; moderate sheen.	6–6.5	74	Wet	TP19-6-6.5

Test Pit TP-19 completed to 6.75 feet on 05/05/2015.
Groundwater encountered at 6.25 feet bgs.

Test Pit TP-20

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–2.5	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	Moist	
2.5–4		Same as above; no odor; no sheen.	--	--	Moist	
4–4.25		Same as above; no odor; no sheen.	4–4.5	0.8	Wet	TP20-4-4.5
4.25–5	SP/GP	Gravelly SAND/sandy GRAVEL; no odor; no sheen.	--	--	Saturated	

Test Pit TP-20 completed to 5 feet on 05/05/2015.
Groundwater encountered at 4.8 feet bgs.

Test Pit TP-21

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	--	--	Moist	
3–4.5	ML	Dark brown, stiff, SILT with organic debris; no odor; no sheen.	--	--	Moist	
4.5–5	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen.	4.5–5	66	Wet	TP21-4.5-5
5–5.5	GP	Brown to gray, medium dense, sandy GRAVEL; no odor; no sheen.	--	--	Saturated	

Test Pit TP-21 completed to 5.5 feet on 05/06/2015.
Groundwater encountered at 5 feet bgs.

Test Pit TP-22

Depth (feet)	USCS Symbol	Description	Sample Depth (feet)	PID (ppm)	Moisture	Sample ID
0–0.5	AS	Asphalt and road base fill.	--	--	--	
0.5–3.5	SP	Brown, medium dense, gravelly, medium to coarse SAND with 40% rounded gravel and cobbles; no odor; no sheen.	2–2.5	1.9	Moist	
3.5–4.5	ML	Dark brown, stiff SILT with organic debris; no odor; no sheen.	4–4.5	2.5	Moist	
4.5–5.5		Same as above; no odor; no sheen.	--	--	Moist	
5.5–6.5	ML/SM	Dark brown, medium dense, silty SAND/sandy SILT with some organic debris; no odor; no sheen.	5.5–6	3.3	Wet to Saturated	TP22-5.5-6

Test Pit TP-22 completed to 6.5 feet on 05/06/2015.
Groundwater encountered at 6 feet bgs.

Log of Soil Boring and Well Installation X

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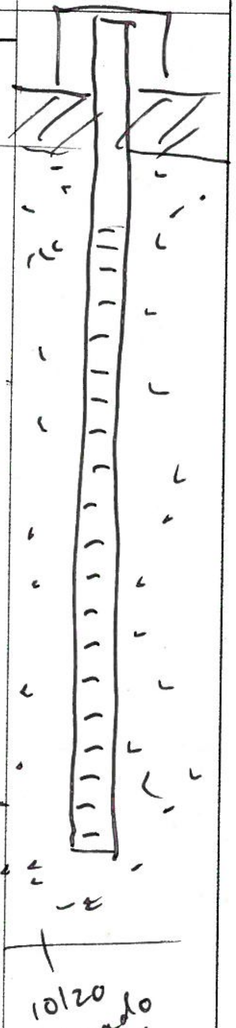
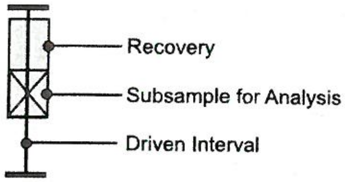
Floyd Snider
Boring PZ23 Date 10/27/16 Sheet 1 of 1
Job CL-Ellensburg Job No. Ellens
Logged By G.C. Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe/ HSA
Sampling Method cont. 5' liners
Bottom of Boring 15' ATD Water Level Depth 6'
Ground Surface Elevation

Obs. Well Install. ☒ Yes ☐ No

PID ~~SAMPLE ID~~	Blow Count	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
					0		
1.3	N/A				1	Fill	Gravelly sandy roadbase FILL
2.5					2		
					3	ML	Brown, stiff, sandy SILT w/low plasticity; slight odor; no sheen moist
195					4		
301					5	SM	Brown to gray, silty SAND; slight odor, slight sheen; moist
432	PZ-23-6-7 @0940		∇		6		
					7	SP	Gray, gravelly, med to coarse SAND; strong odor, medium sheen; saturated
294					8		
					9		
46					10		
					11	GP	Gray, coarse sandy, fine to large gravel & cobbles; moderate odor; slight sheen.
9.3					12		
					13		
0.1					14		SAA; no odor; no sheen
					15		
					16		
					17		2" well
					18		Screen 3-13'
					19		
					20		



10/20 Colorado sand



∇ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Ecology ID BJR-519

Log of Soil Boring and Well Installation X

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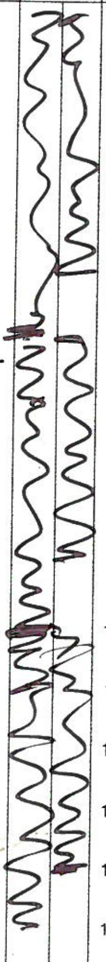
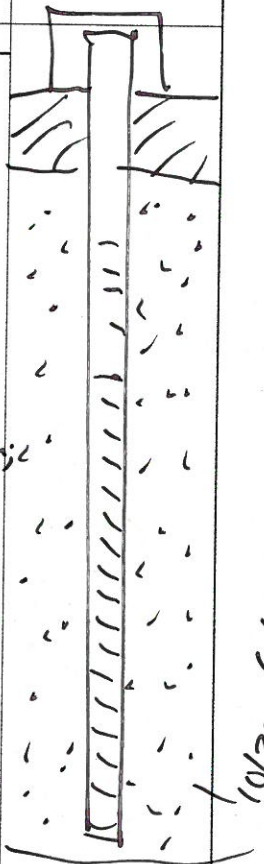
Floyd Snider
Boring PZ-24 Date 10/27 Sheet 1 of 1
Job Ellensburg Job No.
Logged By GL Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe / HSA combo
Sampling Method 5'-liners Cont.
Bottom of Boring 15' ATD Water Level Depth 5.5'
Ground Surface Elevation

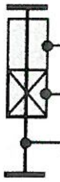
Obs. Well Install. ☒ Yes ☐ No

SAMPLE ID	~~Blow Count~~ PID	DEPTH From	DEPTH To		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
				0		
	5.1			1	FILL	Roadbase, gravelly, sandy FILL
	47.1			2 3	ML	Brown, sandy SILT w/ low plasticity; no odor, no sheen; moist
	218			4 5	SM	Dark brown to gray, silty, SAND slight odor, slight sheen; moist
PZ-24-5-6 @ 1045	251		▽	6	SP	Gray, fine to coarse, gravelly SAND; strong odor; moderate sheen; saturated
	121 6.5			7 8 9	GP	Gray, coarse sandy, fine to large gravel; moderate odor, slight sheen; saturated
	6.2			10 11		SAA; slight odor, slight sheen; saturated
				12		SAA; no odor; no sheen
	2.5			13 14		SAA; NO odor; no sheen
				15 16 17 18		
				19		Screen 3-13'
				20		

SAMPLE RECOVERY (FT)







▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

To ad property when Ecology ID BJR-520

Log of Soil Boring and Well Installation X

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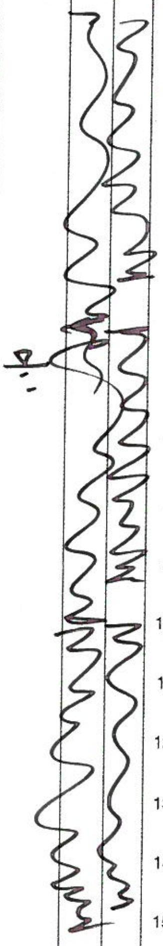
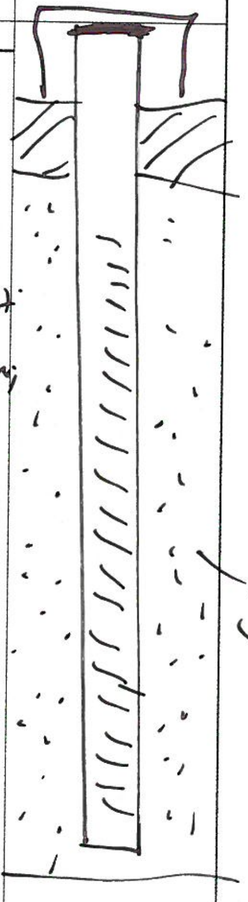
Floyd Snider
Boring PZ-25 Date 10/27 Sheet 1 of 1
Job Ellensburg Job No.
Logged By GL Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe / HSA Combo
Sampling Method 5'-liners continuous
Bottom of Boring 15' ATD Water Level Depth 5.5'
Ground Surface Elevation

Obs. Well Install. ☒ Yes ☐ No

SAMPLE ID	~~Blow Count~~ PID	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
					0		
	1.3				1	Fill	Roadbase, sandy gravelly Fill; No odor, no sheen
					2	ML	Brown, sandy SILT w/ low plasticity; no odor; no sheen; moist
	3.3				3		
					4	SM	Brown to gray, silty, fine SAND Slight odor; slight sheen; moist
PZ-25-5-6' @ 1120	299		▽		5		SAA, strong odor; strong sheen; wet
					6		
	217				7	SP	Gray, gravelly, med to coarse SAND; strong odor, moderate sheen; saturated
					8		
	47				9		
					10	GP	Gray, sandy, fine to large GRAVEL; slight odor; slight sheen; saturated
	216				11		
					12		
	3.7				13		
					14		SAA; no odor, no sheen; saturated
					15		
					16		
					17		
					18		
					19		
					20		





Recovery
Subsample for Analysis
Driven Interval

▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Ecology ID BJR-521

Log of Soil Boring and Well Installation X

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Floyd Snider
Boring FS-1 Date 10/27 Sheet 1 of 1
Job Ellensburg Job No.
Logged By GC Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe / HSA
Sampling Method Continuous 5' liners
Bottom of Boring 7.5' ATD Water Level Depth 6'
Ground Surface Elevation

Obs. Well Install. ~~Yes~~ No

SAMPLE ID	~~Blow Count~~ PID	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.	
					0		Asphalt	
	4				1	Fill	Gravelly, sandy FILL	
					2			
					3	SP	Gray, gravelly, fine to coarse sandy; no odor, no sheen; moist	
					4			
	3.3				5			
			▽		6		SAA, no odor, no sheen; saturated	
					7	GP	Gray, sandy, fine to large gravel; no odor, no sheen; saturated	
					8			
					9			
					10			N/A
					11			
					12			
					13			
					14			
					15		Located between former excavation & northern fuel island. Western most.	
					16			
					17			
					18			
					19			
					20			

Recovery
Subsample for Analysis
Driven Interval

▽ Groundwater Observed At Time of Drilling
▨ Potentially Contaminated Soil

Log of Soil Boring and Well Installation X

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Floyd Snider
Boring FS-2 Date 10/27/16 Sheet 1 of
Job Ellensburg Job No.
Logged By GC Weather Cloudy
Drilled By ESN
Drill Type/Method GeoProb
Sampling Method 5'-liners Cont.
Bottom of Boring 7' ATD Water Level Depth 6'
Ground Surface Elevation

Obs. Well Install. ~~Yes~~ No

SAMPLE ID	~~Blow Count~~ PID	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.	
					0		Asphalt	N/A
					1	FM	Sandy gravelly FILL	
	Ø				2			
					3		Brown to gray, gravelly, med to coarse SAND; no odor, no sheen; moist	
					4	SP		
					5		SAA, slight odor; moderate sheen	
FS-2-6-7' @1322	25.8 ▨		▽		6			
					7	GP	Gray, sandy, fine to coarse GRAVEL; strong odor, heavy sheen.	
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

Recovery
Subsample for Analysis
Driven Interval

▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Log of Soil Boring and Well Installation X

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strategy • science • engineering

Floyd Snider
Boring FS-3 Date 10/27/16 Sheet 1 of 1
Job Ellensburg, WA Job No.
Logged By G-C Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe
Sampling Method Cnt 5'
Bottom of Boring 7' ATD Water Level Depth
Ground Surface Elevation

Obs. Well Install. ~~Yes~~ No

SAMPLE ID	Blow Count	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.	
					0			N/A
	0					As	Asphalt to 6 inches	
					1	Fill	Sandy, gravelly FILL	
					2	SP	Brown to gray, gravelly, fine to coarse SAND; no odor, no sheen;	
					3			
	21.0				4		SAA; slight odor; slight sheen; moist	
					5		SAA; moderate odor, moderate sheen, wet	
FS-3-6-7' @ 1340	57.1		▽		6			
					7	GP	Gray, sandy GRAVEL; strong odor; strong sheen; saturated	
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

Recovery
Subsample for Analysis
Driven Interval

▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

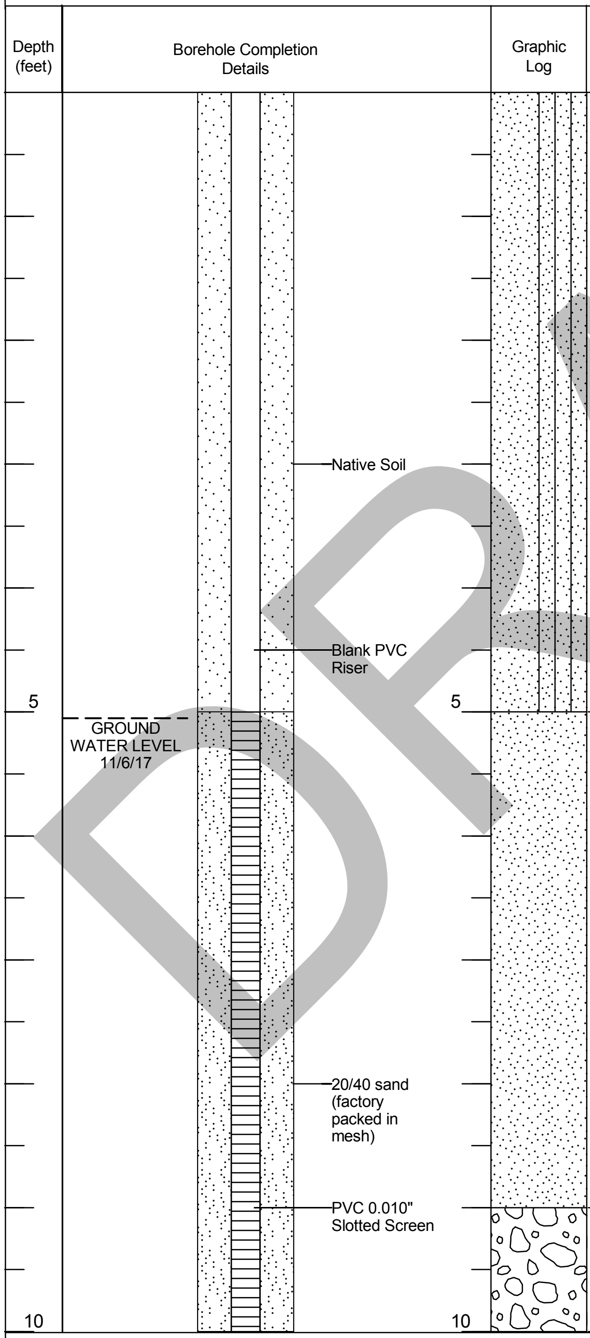
TRC Environmental
19874 141st Place NE
Woodinville, WA 98072
(425) 489-1938

Page **1** of **1**

SOIL BORING LOG

BOREHOLE NUMBER **B-1**	
PROJECT NUMBER / NAME **284832 / BNSF ROW Big B Mini Mart Field Investigation**	LOCATION **ROW West of 1611 Canyon Road** **Ellensburg, WA**
APPROVED BY **Amanda Meugniot**	
DRILLING CONTRACTOR / DRILLER **Cascade Drilling, L.P. / Reggie Castro**	LOGGED BY **K. Newman**
DRILLING EQUIPMENT / METHOD **GeoProbe / Direct Push**	BIT SIZE / BIT TYPE **2.25" / GeoProbe**
SAMPLING METHOD **Continuous**	START-FINISH DATE **11/6/17 - 11/6/17**

REMARKS:
Grab groundwater sample collected from temporary well.
Temporary well removed after sampling and borehole backfilled with hydrated bentonite chips up to ground surface.



USCS	Visual Description	Depth (feet)	Sample Number	Core Recovery (feet/feet)	PID Reading (ppm)
SM	SILTY SAND, brown, moist, poorly sorted, fine- to medium-grained, some silty fines, loose, no odors or staining. @ 2 feet: small roots, becomes dark brown to dark gray. @ 3 feet: becomes dark gray, increasing fines, medium dense.			4.5/5.0	0.0 0.2
SW	SAND, gray, wet, poorly sorted, medium- to coarse-grained, trace fines, loose, no odors or staining.	5	B-1, B-1W	5.0/5.0	0.1 0.2 0.1
GW	GRAVEL, gray, wet, poorly sorted, fine to coarse, sub-round to angular, little coarse-grained sand, no odors or staining.				0.1
	Bottom of borehole at 10 feet.	10			

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(425) 489-1938

Page **1** of **1**

BOREHOLE NUMBER
B-2

SOIL BORING LOG

PROJECT NUMBER / NAME
284832 / BNSF ROW Big B Mini Mart Field Investigation

LOCATION
ROW West of 1611 Canyon Road
Ellensburg, WA

APPROVED BY
Amanda Meugniot

DRILLING CONTRACTOR / DRILLER
Cascade Drilling, L.P. / Reggie Castro

LOGGED BY
K. Newman

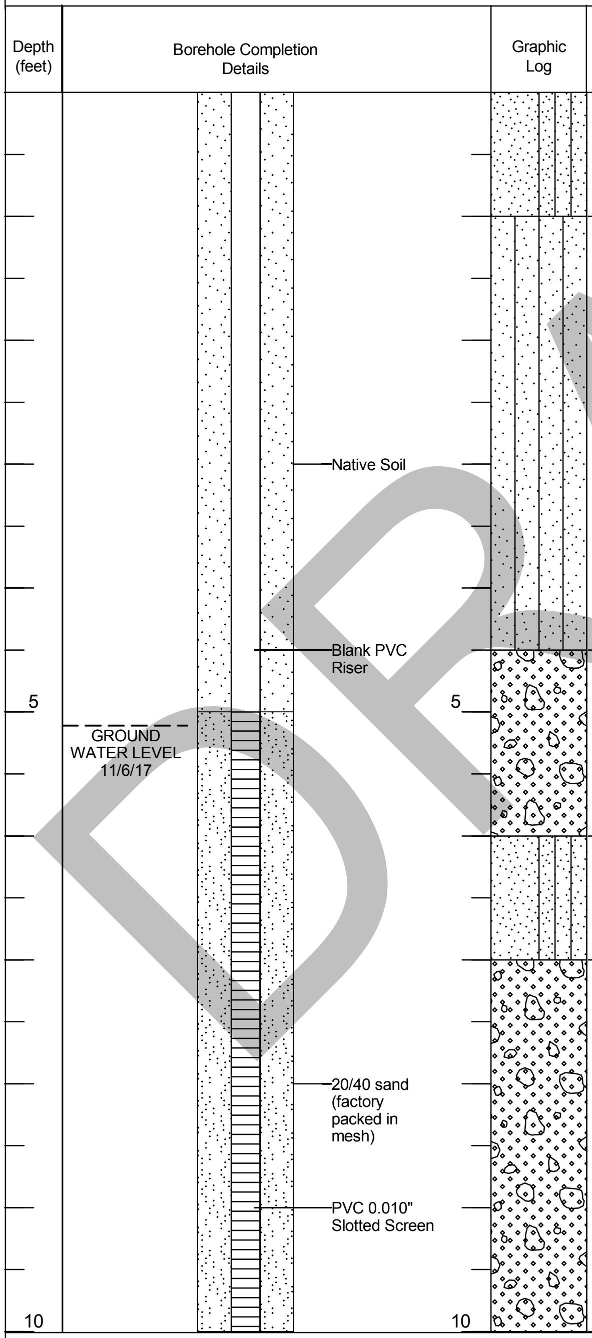
DRILLING EQUIPMENT / METHOD
GeoProbe / Direct Push

BIT SIZE / BIT TYPE
2.25" / GeoProbe

SAMPLING METHOD
Continuous

START-FINISH DATE
11/6/17 - 11/6/17

REMARKS:
Grab groundwater sample collected from temporary well.
Temporary well removed after sampling and borehole backfilled with hydrated bentonite chips up to ground surface.



Depth (feet)	USCS	Visual Description	Sample Number	Core Recovery (feet/feet)	PID Reading (ppm)
	SM	SILTY SAND, brown, moist, poorly sorted, fine- to medium-grained, some silty fines, loose, no odors or staining.		4.0/5.0	
	ML	SANDY SILT, gray to brown, moist, some fine- to medium-grained sand, medium dense, no odors or staining.			0.2 0.2
5	SP	GRAVELLY SAND, gray to brown, moist, well sorted, coarse-grained, some fine to coarse gravel, loose, no odors or staining. @ 5 feet: becomes wet.	B-2, B-2W	5.0/5.0	0.2
	SM	SILTY SAND, gray, wet, poorly sorted, fine- to coarse-grained, some silty fines, medium dense, no odors or staining.			
10	SP	SAND, gray, wet, well sorted, coarse-grained, little fine gravel, loose, no odors or staining.			0.2 0.2

Bottom of borehole at 10 feet.

TRC Environmental
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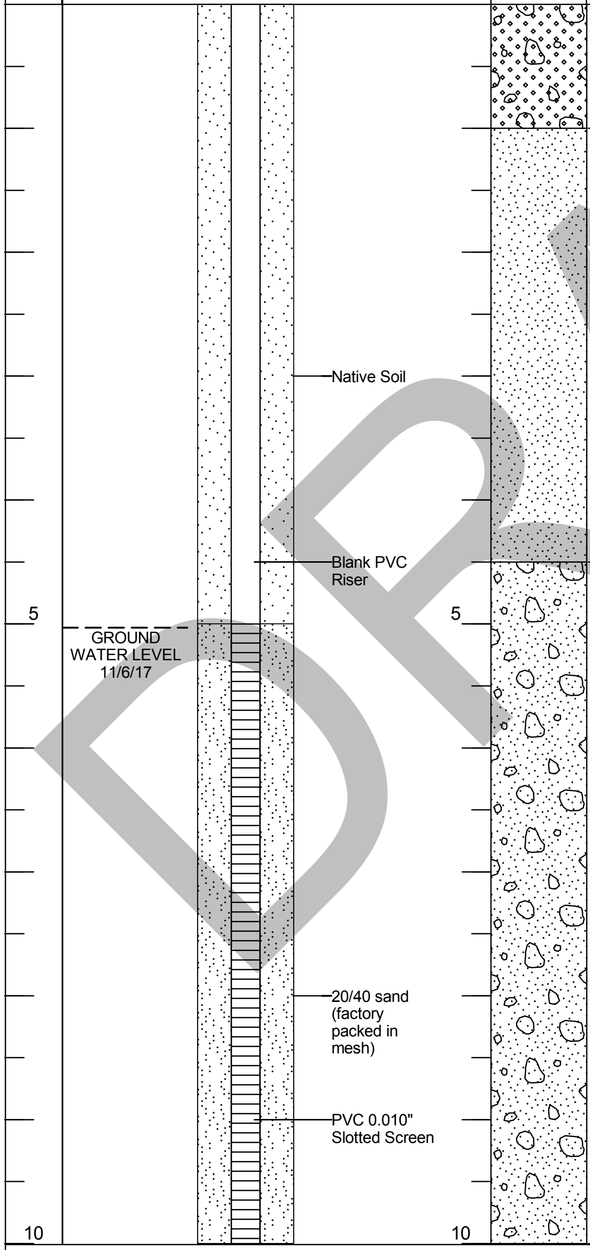
SOIL BORING LOG

BOREHOLE NUMBER **B-3**	
PROJECT NUMBER / NAME **284832 / BNSF ROW Big B Mini Mart Field Investigation**	LOCATION **ROW West of 1611 Canyon Road** **Ellensburg, WA**
APPROVED BY **Amanda Meugniot**	
DRILLING CONTRACTOR / DRILLER **Cascade Drilling, L.P. / Reggie Castro**	LOGGED BY **K. Newman**

DRILLING EQUIPMENT / METHOD	BIT SIZE / BIT TYPE	SAMPLING METHOD	START-FINISH DATE
GeoProbe / Direct Push	**2.25" / GeoProbe**	**Continuous**	**11/6/17 - 11/6/17**

REMARKS:
Grab groundwater sample collected from temporary well.
Temporary well removed after sampling and borehole backfilled with hydrated bentonite chips up to ground surface.



Depth (feet)	USCS	Visual Description	Sample Number	Core Recovery (feet/feet)	PID Reading (ppm)
	SP	GRAVELLY SAND, gray to brown, moist, well sorted, coarse-grained, some fine gravel, few silty fines, loose, no odors or staining.		3.0/5.0	
	SW	SAND, dark gray, moist, poorly sorted, fine- to medium-grained, little silty fines, few roots, medium dense, no odors or staining.			0.2 0.1
5 10	SW	GRAVELLY SAND, gray, moist, well sorted, coarse-grained, some fine gravel, loose, no odors or staining. @ 5 feet: becomes wet. @ 7.5 feet: some fine to coarse gravel.	B-3, B-3W	5.0/5.0	0.1 0.1 0.2
		Bottom of borehole at 10 feet.			0.1

Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Appendix B
Laboratory Analytical Reports

PUBLIC REVIEW DRAFT

ANALYTICAL REPORT

November 10, 2017

TRC - BNSF Region 1

Sample Delivery Group:	L948735
Samples Received:	11/07/2017
Project Number:	
Description:	Big B Mini Mart
Site:	ELLENSBURG
Report To:	Keith Woodburne 19874 141st Place NE Woodinville, WA 98072

Entire Report Reviewed By:

Mark W. Beasley
Technical Service Representative

TABLE OF CONTENTS

B-1 L948735-01 Solid

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 10:15	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1039914	1	11/07/17 11:40	11/07/17 11:55	KDW
Volatile Organic Compounds (GC) by Method NWTPHGX	WG1039982	1	11/06/17 10:15	11/07/17 23:38	LRL
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1039909	1	11/06/17 10:15	11/07/17 21:39	ACG
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT	WG1039977	1	11/07/17 15:30	11/08/17 10:44	ACM

B-1W L948735-02 GW

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 11:35	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method NWTPHGX	WG1040147	1	11/07/17 19:38	11/07/17 19:38	BMB
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1039917	1	11/07/17 18:58	11/07/17 18:58	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1040042	1	11/07/17 17:09	11/08/17 12:44	LM
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT	WG1039652	1	11/07/17 17:09	11/08/17 13:33	LM

B-2 L948735-03 Solid

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 12:00	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1039914	1	11/07/17 11:40	11/07/17 11:55	KDW
Volatile Organic Compounds (GC) by Method NWTPHGX	WG1039982	1	11/06/17 12:00	11/08/17 00:01	LRL
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1039909	1	11/06/17 12:00	11/07/17 21:58	ACG
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT	WG1039977	1	11/07/17 15:30	11/08/17 10:58	ACM

B-2W L948735-04 GW

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 12:10	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method NWTPHGX	WG1040147	1	11/07/17 20:00	11/07/17 20:00	BMB
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1039917	1	11/07/17 19:18	11/07/17 19:18	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1040042	1	11/07/17 17:09	11/08/17 13:01	LM
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT	WG1039652	1	11/07/17 17:09	11/08/17 13:49	LM

B-3 L948735-05 Solid

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 12:50	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1039914	1	11/07/17 11:40	11/07/17 11:55	KDW
Volatile Organic Compounds (GC) by Method NWTPHGX	WG1039982	1	11/06/17 12:50	11/08/17 00:24	LRL
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1039909	1	11/06/17 12:50	11/07/17 22:17	ACG
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT	WG1039977	1	11/07/17 15:30	11/08/17 12:32	ACM

B-3W L948735-06 GW

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 13:00	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method NWTPHGX	WG1040147	1	11/07/17 20:22	11/07/17 20:22	BMB
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1039917	1	11/07/17 19:38	11/07/17 19:38	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1040042	1	11/07/17 17:09	11/08/17 13:17	LM
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT	WG1039652	1	11/07/17 17:09	11/08/17 14:05	LM

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 13:30	11/07/17 08:45

SOIL COMPOSITE L948735-07 Waste

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Preparation by Method 1311	WG1039961	1	11/07/17 12:42	11/07/17 12:42	TM
Mercury by Method 7470A	WG1040252	1	11/08/17 08:11	11/08/17 12:17	RDS
Metals (ICP) by Method 6010C	WG1040285	1	11/08/17 08:51	11/08/17 11:32	TRB

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 00:00	11/07/17 08:45

TRIP BLANK L948735-08 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1039917	1	11/07/17 13:40	11/07/17 13:40	ACG

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Mark W. Beasley
Technical Service Representative

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.1		1	11/07/2017 11:55	WG1039914

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.122	1	11/07/2017 23:38	WG1039982
(S) a,a,a-Trifluorotoluene(FID)	*98.0*		*77.0-120*		*11/07/2017 23:38*	WG1039982

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00305	1	11/07/2017 21:39	WG1039909
Toluene	ND		0.00609	1	11/07/2017 21:39	WG1039909
Ethylbenzene	ND		0.00305	1	11/07/2017 21:39	WG1039909
Total Xylenes	ND		0.00914	1	11/07/2017 21:39	WG1039909
(S) Toluene-d8	*108*		*80.0-120*		*11/07/2017 21:39*	WG1039909
(S) Dibromofluoromethane	*88.3*		*74.0-131*		*11/07/2017 21:39*	WG1039909
(S) a,a,a-Trifluorotoluene	*104*		*80.0-120*		*11/07/2017 21:39*	WG1039909
(S) 4-Bromofluorobenzene	*102*		*64.0-132*		*11/07/2017 21:39*	WG1039909

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.87	1	11/08/2017 10:44	WG1039977
Residual Range Organics (RRO)	ND		12.2	1	11/08/2017 10:44	WG1039977
(S) o-Terphenyl	*75.1*		*18.0-148*		*11/08/2017 10:44*	WG1039977

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		100	1	11/07/2017 19:38	WG1040147
(S) a,a,a-Trifluorotoluene(FID)	*95.0*		*77.0-122*		*11/07/2017 19:38*	WG1040147

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	11/07/2017 18:58	WG1039917
Toluene	ND		1.00	1	11/07/2017 18:58	WG1039917
Ethylbenzene	ND		1.00	1	11/07/2017 18:58	WG1039917
Total Xylenes	ND		3.00	1	11/07/2017 18:58	WG1039917
(S) Toluene-d8	*109*		*80.0-120*		*11/07/2017 18:58*	WG1039917
(S) Dibromofluoromethane	*101*		*76.0-123*		*11/07/2017 18:58*	WG1039917
(S) a,a,a-Trifluorotoluene	*111*		*80.0-120*		*11/07/2017 18:58*	WG1039917
(S) 4-Bromofluorobenzene	*100*		*80.0-120*		*11/07/2017 18:58*	WG1039917

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	411		200	1	11/08/2017 12:44	WG1040042
Residual Range Organics (RRO)	ND		250	1	11/08/2017 12:44	WG1040042
(S) o-Terphenyl	*76.0*		*52.0-156*		*11/08/2017 12:44*	WG1040042

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	235		200	1	11/08/2017 13:33	WG1039652
Residual Range Organics (RRO)	ND		250	1	11/08/2017 13:33	WG1039652
(S) o-Terphenyl	*74.8*		*52.0-156*		*11/08/2017 13:33*	WG1039652

B-2

Collected date/time: 11/06/17 12:00

SAMPLE RESULTS - 03

L948735

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	75.1		1	11/07/2017 11:55	WG1039914

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.133	1	11/08/2017 00:01	WG1039982
(S) a,a,a-Trifluorotoluene(FID)	*97.1*		*77.0-120*		*11/08/2017 00:01*	WG1039982

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00333	1	11/07/2017 21:58	WG1039909
Toluene	ND		0.00665	1	11/07/2017 21:58	WG1039909
Ethylbenzene	ND		0.00333	1	11/07/2017 21:58	WG1039909
Total Xylenes	ND		0.00998	1	11/07/2017 21:58	WG1039909
(S) Toluene-d8	*101*		*80.0-120*		*11/07/2017 21:58*	WG1039909
(S) Dibromofluoromethane	*90.1*		*74.0-131*		*11/07/2017 21:58*	WG1039909
(S) a,a,a-Trifluorotoluene	*104*		*80.0-120*		*11/07/2017 21:58*	WG1039909
(S) 4-Bromofluorobenzene	*102*		*64.0-132*		*11/07/2017 21:58*	WG1039909

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		5.32	1	11/08/2017 10:58	WG1039977
Residual Range Organics (RRO)	ND		13.3	1	11/08/2017 10:58	WG1039977
(S) o-Terphenyl	*66.4*		*18.0-148*		*11/08/2017 10:58*	WG1039977

SAMPLE RESULTS - 04

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC) by Method NWTPHGX

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l		date / time	
Gasoline Range Organics-NWTPH	ND		100	1	11/07/2017 20:00	WG1040147
(S) a,a,a-Trifluorotoluene(FID)	*94.6*		*77.0-122*		*11/07/2017 20:00*	WG1040147

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l		date / time	
Benzene	ND		1.00	1	11/07/2017 19:18	WG1039917
Toluene	ND		1.00	1	11/07/2017 19:18	WG1039917
Ethylbenzene	ND		1.00	1	11/07/2017 19:18	WG1039917
Total Xylenes	ND		3.00	1	11/07/2017 19:18	WG1039917
(S) Toluene-d8	*107*		*80.0-120*		*11/07/2017 19:18*	WG1039917
(S) Dibromofluoromethane	*103*		*76.0-123*		*11/07/2017 19:18*	WG1039917
(S) a,a,a-Trifluorotoluene	*112*		*80.0-120*		*11/07/2017 19:18*	WG1039917
(S) 4-Bromofluorobenzene	*97.9*		*80.0-120*		*11/07/2017 19:18*	WG1039917

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	244		200	1	11/08/2017 13:01	WG1040042
Residual Range Organics (RRO)	ND		250	1	11/08/2017 13:01	WG1040042
(S) o-Terphenyl	*74.0*		*52.0-156*		*11/08/2017 13:01*	WG1040042

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l		date / time	
Diesel Range Organics (DRO)	ND		200	1	11/08/2017 13:49	WG1039652
Residual Range Organics (RRO)	ND		250	1	11/08/2017 13:49	WG1039652
(S) o-Terphenyl	*76.6*		*52.0-156*		*11/08/2017 13:49*	WG1039652

SAMPLE RESULTS - 05

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	87.8		1	11/07/2017 11:55	WG1039914

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.114	1	11/08/2017 00:24	WG1039982
(S) a,a,a-Trifluorotoluene(FID)	*97.6*		*77.0-120*		*11/08/2017 00:24*	WG1039982

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00285	1	11/07/2017 22:17	WG1039909
Toluene	ND		0.00570	1	11/07/2017 22:17	WG1039909
Ethylbenzene	0.00359		0.00285	1	11/07/2017 22:17	WG1039909
Total Xylenes	0.0164		0.00855	1	11/07/2017 22:17	WG1039909
(S) Toluene-d8	*99.0*		*80.0-120*		*11/07/2017 22:17*	WG1039909
(S) Dibromofluoromethane	*89.9*		*74.0-131*		*11/07/2017 22:17*	WG1039909
(S) a,a,a-Trifluorotoluene	*105*		*80.0-120*		*11/07/2017 22:17*	WG1039909
(S) 4-Bromofluorobenzene	*100*		*64.0-132*		*11/07/2017 22:17*	WG1039909

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.56	1	11/08/2017 12:32	WG1039977
Residual Range Organics (RRO)	ND		11.4	1	11/08/2017 12:32	WG1039977
(S) o-Terphenyl	*64.9*		*18.0-148*		*11/08/2017 12:32*	WG1039977

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		100	1	11/07/2017 20:22	WG1040147
(S) a,a,a-Trifluorotoluene(FID)	*94.7*		*77.0-122*		*11/07/2017 20:22*	WG1040147

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	11/07/2017 19:38	WG1039917
Toluene	ND		1.00	1	11/07/2017 19:38	WG1039917
Ethylbenzene	ND		1.00	1	11/07/2017 19:38	WG1039917
Total Xylenes	ND		3.00	1	11/07/2017 19:38	WG1039917
(S) Toluene-d8	*107*		*80.0-120*		*11/07/2017 19:38*	WG1039917
(S) Dibromofluoromethane	*101*		*76.0-123*		*11/07/2017 19:38*	WG1039917
(S) a,a,a-Trifluorotoluene	*110*		*80.0-120*		*11/07/2017 19:38*	WG1039917
(S) 4-Bromofluorobenzene	*99.0*		*80.0-120*		*11/07/2017 19:38*	WG1039917

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		200	1	11/08/2017 13:17	WG1040042
Residual Range Organics (RRO)	ND		250	1	11/08/2017 13:17	WG1040042
(S) o-Terphenyl	*78.7*		*52.0-156*		*11/08/2017 13:17*	WG1040042

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-SGT

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		200	1	11/08/2017 14:05	WG1039652
Residual Range Organics (RRO)	ND		250	1	11/08/2017 14:05	WG1039652
(S) o-Terphenyl	*75.8*		*52.0-156*		*11/08/2017 14:05*	WG1039652

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		11/7/2017 12:42:16 PM	WG1039961
Fluid	1		11/7/2017 12:42:16 PM	WG1039961
Initial pH	6.39		11/7/2017 12:42:16 PM	WG1039961
Final pH	4.87		11/7/2017 12:42:16 PM	WG1039961

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.0100	0.20	1	11/08/2017 12:17	WG1040252

Metals (ICP) by Method 6010C

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.100	5	1	11/08/2017 11:32	WG1040285
Barium	0.246		0.100	100	1	11/08/2017 11:32	WG1040285
Cadmium	ND		0.100	1	1	11/08/2017 11:32	WG1040285
Chromium	ND		0.100	5	1	11/08/2017 11:32	WG1040285
Lead	ND		0.100	5	1	11/08/2017 11:32	WG1040285
Selenium	ND		0.100	1	1	11/08/2017 11:32	WG1040285
Silver	ND		0.100	5	1	11/08/2017 11:32	WG1040285

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	ND		1.00	1	11/07/2017 13:40	WG1039917
Toluene	ND		1.00	1	11/07/2017 13:40	WG1039917
Ethylbenzene	ND		1.00	1	11/07/2017 13:40	WG1039917
Total Xylenes	ND		3.00	1	11/07/2017 13:40	WG1039917
(S) Toluene-d8	*106*		*80.0-120*		*11/07/2017 13:40*	WG1039917
(S) Dibromofluoromethane	*104*		*76.0-123*		*11/07/2017 13:40*	WG1039917
(S) a,a,a-Trifluorotoluene	*116*		*80.0-120*		*11/07/2017 13:40*	WG1039917
(S) 4-Bromofluorobenzene	*99.4*		*80.0-120*		*11/07/2017 13:40*	WG1039917

Method Blank (MB)

(MB) R3263922-1 11/07/17 11:55

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.0007			

L948723-01 Original Sample (OS) • Duplicate (DUP)

(OS) L948723-01 11/07/17 11:55 • (DUP) R3263922-3 11/07/17 11:55

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	87.7	87.2	1	1		5

Laboratory Control Sample (LCS)

(LCS) R3263922-2 11/07/17 11:55

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85-115	

Method Blank (MB)

(MB) R3264070-1 11/08/17 11:31

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.00333	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264070-2 11/08/17 11:33 • (LCSD) R3264070-3 11/08/17 11:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.0300	0.0323	0.0294	108	98	80-120			9	20

L947733-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947733-01 11/08/17 11:38 • (MS) R3264070-4 11/08/17 11:40 • (MSD) R3264070-5 11/08/17 11:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.0300	0.0586	0.0845	0.0751	86	55	1	75-125		J6	12	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3263995-1 11/08/17 10:40

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Arsenic	U		0.0333	0.100
Barium	U		0.0333	0.100
Cadmium	U		0.0333	0.100
Chromium	U		0.0333	0.100
Lead	U		0.0333	0.100
Selenium	U		0.0333	0.100
Silver	U		0.0333	0.100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263995-2 11/08/17 10:42 • (LCSD) R3263995-3 11/08/17 10:45

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Arsenic	10.0	9.74	9.70	97	97	80-120			0	20
Barium	10.0	10.3	10.2	103	102	80-120			1	20
Cadmium	10.0	9.78	9.74	98	97	80-120			0	20
Chromium	10.0	9.79	9.78	98	98	80-120			0	20
Lead	10.0	9.88	9.84	99	98	80-120			0	20
Selenium	10.0	9.80	9.78	98	98	80-120			0	20
Silver	2.00	1.89	1.88	94	94	80-120			0	20

L947733-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947733-01 11/08/17 10:47 • (MS) R3263995-5 11/08/17 10:52 • (MSD) R3263995-6 11/08/17 10:55

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic	10.0	ND	10.0	10.1	100	100	1	75-125			1	20
Barium	10.0	ND	10.1	10.2	101	102	1	75-125			0	20
Cadmium	10.0	ND	9.92	9.94	99	99	1	75-125			0	20
Chromium	10.0	ND	9.68	9.77	97	98	1	75-125			1	20
Lead	10.0	ND	10.0	10.0	100	100	1	75-125			0	20
Selenium	10.0	ND	10.3	10.3	103	103	1	75-125			1	20
Silver	2.00	ND	1.90	1.91	95	95	1	75-125			1	20

Method Blank (MB)

(MB) R3263812-5 11/07/17 12:26

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Gasoline Range Organics-NWTPH	U		0.0339	0.100
(S) a,a,a-Trifluorotoluene(FID)	*101*			*77.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263812-3 11/07/17 10:53 • (LCSD) R3263812-4 11/07/17 11:16

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Gasoline Range Organics-NWTPH	5.50	5.23	5.15	95.1	93.6	70.0-133			1.62	20
(S) a,a,a-Trifluorotoluene(FID)				*98.0*	*97.9*	*77.0-120*				

L948723-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L948723-01 11/07/17 16:39 • (MS) R3263812-8 11/07/17 18:34 • (MSD) R3263812-9 11/07/17 18:57

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Gasoline Range Organics-NWTPH	6.27	0.696	2.39	3.02	27.0	37.0	1	10.0-146			23.2	30
(S) a,a,a-Trifluorotoluene(FID)					*91.7*	*74.6*		*77.0-120*		J2		

Method Blank (MB)

(MB) R3263837-3 11/07/17 17:37

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Gasoline Range Organics-NWTPH	U		31.6	100
(S) a,a,a-Trifluorotoluene(FID)	*95.9*			*77.0-122*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263837-1 11/07/17 16:30 • (LCSD) R3263837-2 11/07/17 16:52

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Gasoline Range Organics-NWTPH	5500	4370	4300	79.5	78.2	72.0-134			1.61	20
(S) a,a,a-Trifluorotoluene(FID)				*97.7*	*102*	*77.0-122*				

Method Blank (MB)

(MB) R3263714-2 11/07/17 11:25

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.00130	0.00250
Ethylbenzene	U		0.00129	0.00250
Toluene	U		0.00265	0.00500
Xylenes, Total	U		0.00125	0.00750
(S) Toluene-d8	*112*			*80.0-120*
(S) Dibromofluoromethane	*84.5*			*74.0-131*
(S) a,a,a-Trifluorotoluene	*106*			*80.0-120*
(S) 4-Bromofluorobenzene	*102*			*64.0-132*

Laboratory Control Sample (LCS)

(LCS) R3263714-1 11/07/17 10:29

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.625	0.537	85.9	72.6-120	
Ethylbenzene	0.625	0.601	96.2	78.6-124	
Toluene	0.625	0.590	94.5	76.7-116	
Xylenes, Total	1.88	1.83	97.4	78.1-123	
(S) Toluene-d8			*109*	*80.0-120*	
(S) Dibromofluoromethane			*95.4*	*74.0-131*	
(S) a,a,a-Trifluorotoluene			*107*	*80.0-120*	
(S) 4-Bromofluorobenzene			*99.7*	*64.0-132*	

Method Blank (MB)

(MB) R3263749-3 11/07/17 10:29

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	ug/l		ug/l	ug/l
Benzene	U		0.331	1.00
Ethylbenzene	U		0.384	1.00
Toluene	U		0.412	1.00
Xylenes, Total	U		1.06	3.00
(S) Toluene-d8	*108*			*80.0-120*
(S) Dibromofluoromethane	*100*			*76.0-123*
(S) a,a,a-Trifluorotoluene	*111*			*80.0-120*
(S) 4-Bromofluorobenzene	*99.7*			*80.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263749-1 11/07/17 09:30 • (LCSD) R3263749-2 11/07/17 09:49

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	ug/l	ug/l	ug/l	%	%	%			%	%
Benzene	25.0	23.9	24.4	95.4	97.5	69.0-123			2.16	20
Ethylbenzene	25.0	25.1	25.2	101	101	77.0-120			0.100	20
Toluene	25.0	23.1	23.4	92.4	93.6	77.0-120			1.20	20
Xylenes, Total	75.0	79.9	78.3	107	104	77.0-120			2.02	20
(S) Toluene-d8				*104*	*104*	*80.0-120*				
(S) Dibromofluoromethane				*106*	*105*	*76.0-123*				
(S) a,a,a-Trifluorotoluene				*110*	*107*	*80.0-120*				
(S) 4-Bromofluorobenzene				*96.2*	*99.7*	*80.0-120*				

Method Blank (MB)

(MB) R3264069-1 11/08/17 11:56

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Diesel Range Organics (DRO)	U		66.7	200
Residual Range Organics (RRO)	U		83.3	250
(S) o-Terphenyl	*77.0*			*52.0-156*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264069-2 11/08/17 12:12 • (LCSD) R3264069-3 11/08/17 12:28

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	750	821	831	109	111	50.0-150			1.20	20
Residual Range Organics (RRO)	750	778	799	104	106	50.0-150			2.63	20
(S) o-Terphenyl				*79.2*	*80.7*	*52.0-156*				

Method Blank (MB)

(MB) R3264068-1 11/08/17 11:08

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Diesel Range Organics (DRO)	U		66.7	200
Residual Range Organics (RRO)	U		83.3	250
(S) o-Terphenyl	*73.6*			*52.0-156*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264068-2 11/08/17 11:24 • (LCSD) R3264068-3 11/08/17 11:40

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	750	796	811	106	108	50.0-150			1.90	20
Residual Range Organics (RRO)	750	757	762	101	102	50.0-150			0.570	20
(S) o-Terphenyl				*76.6*	*74.1*	*52.0-156*				

Method Blank (MB)

(MB) R3263920-1 11/08/17 03:32

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Diesel Range Organics (DRO)	U		1.33	4.00
Residual Range Organics (RRO)	U		3.33	10.0
(S) o-Terphenyl	*72.8*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263920-2 11/08/17 03:46 • (LCSD) R3263920-3 11/08/17 04:01

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	30.0	27.3	25.9	91.1	86.4	50.0-150			5.25	20
Residual Range Organics (RRO)	30.0	24.8	24.4	82.7	81.2	50.0-150			1.84	20
(S) o-Terphenyl				*76.9*	*77.4*	*18.0-148*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
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Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660
Alaska	UST-080
Arizona	AZ0612
Arkansas	88-0469
California	01157CA
Colorado	TN00003
Conneticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1]	90010
Kentucky [2]	16
Louisiana	AI30792
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico	TN00003
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [2]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	221
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-07-TX
Texas [5]	LAB0152
Utah	6157585858
Vermont	VT2006
Virginia	109
Washington	C1915
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003
AIHA-LAP,LLC	100789
DOD	1461.01
USDA	S-67674

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold n/a Accreditation not applicable

Our Locations

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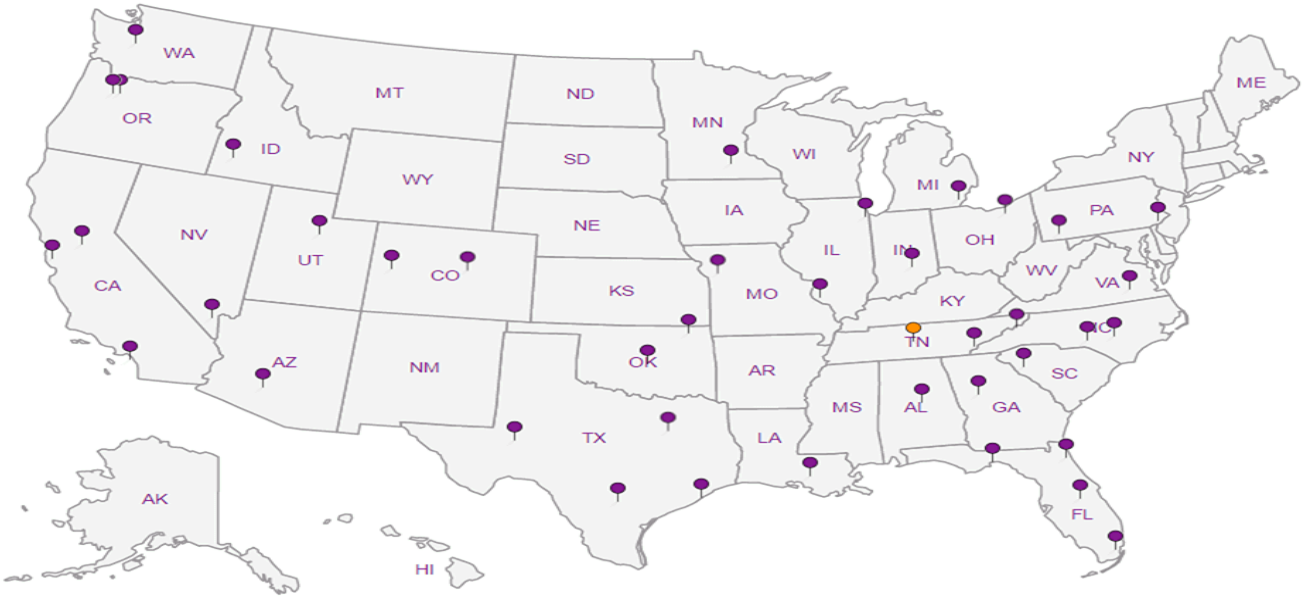

Chain of Custody Page 1 of 1

ESC
L·A·B S·C·I·E·N·C·E·S
YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L948735
Tab G070
Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Company Name/Address:
TRC-BNSF Region 1
19874 141st Pl NE
Woodinville, WA 98072

Billing Information:
Scott MacDonald
605 Puyallup Ave S
Tacoma, WA 98421

Report to: Keith Woodburne

Email To: kwoodburne@trcsolutions.com

Project Description: Big B Mini Mart

City/State Collected: Ellensburg, WA

Phone: 425-489-1938
Fax:

Client Project #

Lab Project # BNSF1TRC-Ellensburg

Collected by (print): K. Newman

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
X Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	GX, V8260BTEXC 40ml/NaHSO4/MeOH	NWTPHDx 40ml HCl (with SGC)	NWTPHDx 40ml HCl (w/o SGC)	TCLPEXT 4oz Clr (no pres) RCRA 8 Metals	BTEX by 8260						Rem./Contaminant	Sample # (lab only)
B-1	Grab	SS	5-7	11/6/17	1015	5	X	X										-01
B-1W	↓	GW	N/A	↓	1135	8	X	X	X									-02
B-2		SS	5-7		1200	5	X	X										-03
B-2W		GW	N/A		1210	8	X	X	X									-04
B-3		SS	5-7		1250	5	X	X										-05
B-3W	↓	GW	N/A		1300	8	X	X	X									-06
Soil Composite	Comp	SS	N/A	↓	1330	1				X								-07
TRIP BLANK						1					X							-08

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ________

Remarks:

7466 1466 3461

pH ________ Temp ________
Flow ________ Other ________

Hold #

Condition: (lab use only) OK

Relinquished by: (Signature)
Date: 11/6/17
Time: 1515

Received by: (Signature)

Samples returned via: ☐ UPS
☒ FedEx ☐ Courier ☐ ______

Relinquished by: (Signature)
Date:
Time:

Received by: (Signature)

Temp: 0.1 °C
Bottles Received: 40 +TB

COC Seal Intact: ___Y ___N ___NA

Relinquished by: (Signature)
Date:
Time:

Received for lab by: (Signature) Marria
859

Date: 11-07-17
Time: 08:45

pH Checked:

NCF:

ESC LAB SCIENCES

Cooler Receipt Form

SDG# L948735

Client: BNSF ITRC

Temperature: 0.1

Cooler Received/Opened On: 11/07/17

Received by : Marina Fahmy

Signature: marina fahmy

	NP	Yes	No
Receipt Check List	✓		
COC Seal Present / Intact?		✓	
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			

ESC
L·A·B S·C·I·E·N·C·E·S
a subsidiary of Pace Analytical

ANALYTICAL REPORT

November 22, 2017

myESC
REAL TIME DATA ACCESS
a subsidiary of Pace Analytical

TRC - BNSF Region 1

Sample Delivery Group: L952043

Samples Received: 11/07/2017

Project Number:

Description: Big B Mini Mart

Site: ELLENSBURG

Report To:
Keith Woodburne
19874 141st Place NE
Woodinville, WA 98072

Entire Report Reviewed By:

Mark W. Beasley
Technical Service Representative

TABLE OF CONTENTS

B-1 L952043-01 Solid

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 10:15	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1039914	1	11/07/17 11:40	11/07/17 11:55	KDW
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1044703	1	11/20/17 11:58	11/21/17 11:41	ACM

B-2 L952043-02 Solid

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 12:00	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1039914	1	11/07/17 11:40	11/07/17 11:55	KDW
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1044703	1	11/20/17 11:58	11/21/17 11:54	ACM

B-3 L952043-03 Solid

Collected by	Collected date/time	Received date/time
K. Newman	11/06/17 12:50	11/07/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1039914	1	11/07/17 11:40	11/07/17 11:55	KDW
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1044703	1	11/20/17 11:58	11/21/17 12:06	ACM

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Mark W. Beasley
Technical Service Representative

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.1		1	11/07/2017 11:55	WG1039914

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.87	1	11/21/2017 11:41	WG1044703
Residual Range Organics (RRO)	ND		12.2	1	11/21/2017 11:41	WG1044703
(S) o-Terphenyl	*74.3*		*18.0-148*		*11/21/2017 11:41*	WG1044703

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	75.1		1	11/07/2017 11:55	WG1039914

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		5.33	1	11/21/2017 11:54	WG1044703
Residual Range Organics (RRO)	ND		13.3	1	11/21/2017 11:54	WG1044703
(S) o-Terphenyl	*74.3*		*18.0-148*		*11/21/2017 11:54*	WG1044703

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	87.8		1	11/07/2017 11:55	WG1039914

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.56	1	11/21/2017 12:06	WG1044703
Residual Range Organics (RRO)	ND		11.4	1	11/21/2017 12:06	WG1044703
(S) o-Terphenyl	*57.6*		*18.0-148*		*11/21/2017 12:06*	WG1044703

Method Blank (MB)

(MB) R3263922-1 11/07/17 11:55

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.0007			

L948723-01 Original Sample (OS) • Duplicate (DUP)

(OS) L948723-01 11/07/17 11:55 • (DUP) R3263922-3 11/07/17 11:55

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	87.7	87.2	1	1		5

Laboratory Control Sample (LCS)

(LCS) R3263922-2 11/07/17 11:55

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85-115	

WG1044703 QUALITY CONTROL SUMMARY

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT L952043-01,02,03

Method Blank (MB)

(MB) R3267373-1 11/21/17 10:14

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Diesel Range Organics (DRO)	U		1.33	4.00
Residual Range Organics (RRO)	U		3.33	10.0
(S) o-Terphenyl	*70.0*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3267373-2 11/21/17 10:26 • (LCSD) R3267373-3 11/21/17 10:38

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	30.0	26.0	23.6	86.7	78.7	50.0-150			9.58	20
Residual Range Organics (RRO)	30.0	25.5	23.3	84.9	77.6	50.0-150			8.97	20
(S) o-Terphenyl				*67.3*	*64.2*	*18.0-148*				

L952033-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L952033-01 11/21/17 14:36 • (MS) R3267373-4 11/21/17 14:48 • (MSD) R3267373-5 11/21/17 15:01

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	35.2	8.59	41.9	44.6	94.7	102	1	50.0-150			6.23	20
Residual Range Organics (RRO)	35.2	57.6	116	130	167	207	1	50.0-150	J5	J5	11.4	20
(S) o-Terphenyl					*59.0*	*60.9*		*18.0-148*				

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Qualifier	Description
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.

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California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
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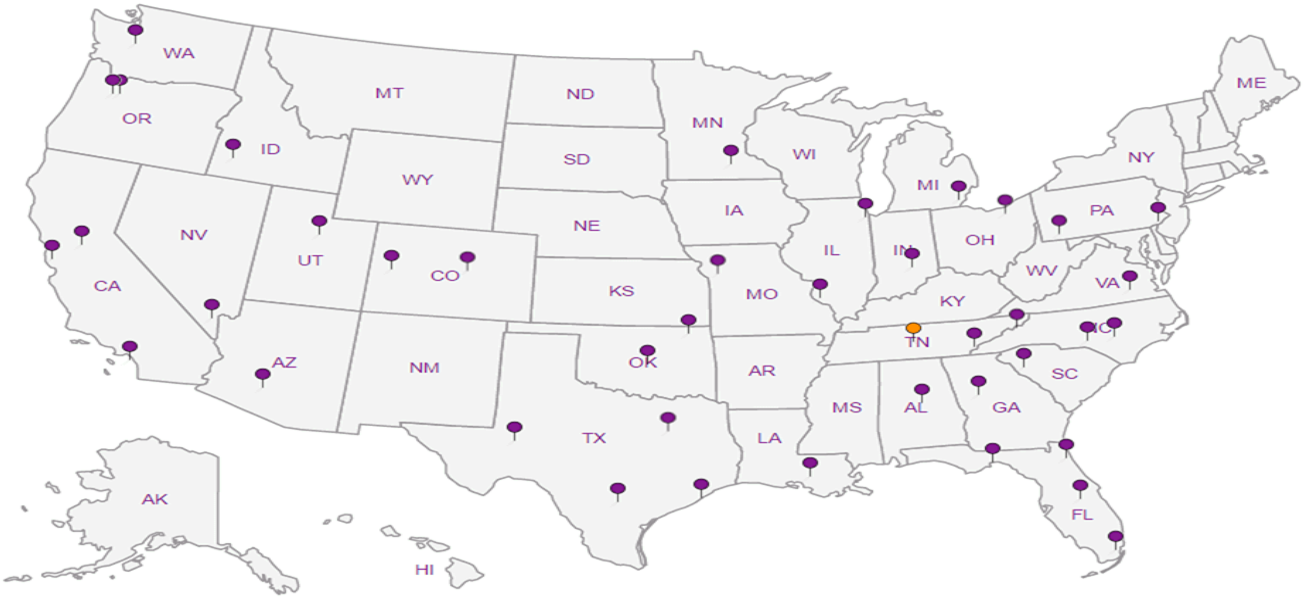


Chain of Custody Page 1 of 1

ESC
L·A·B S·C·I·E·N·C·E·S
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# ~~L948755~~ N 11/7/17
Tal G070 L952043
Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Company Name/Address:
TRC - BNSF Region 1
19874 141st Pl NE
Woodinville, WA 98072

Billing Information:
Scott MacDonald
605 Puyallup Ave S
Tacoma, WA 98421

Report to: Keith Woodburne

Email To: Kwoodburne@trcsolutions.com

Project Description: Big B Mini Mart

City/State Collected: Ellensburg, WA

Phone: 425-489-1938
Fax:

Client Project #:

Lab Project #: BNSF-TRC-Ellensburg

Collected by (print): K. Newman

Site/Facility ID #:

P.O. #:

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
X Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	6X, V8260BTEXC 40ml/NaHSO4/MeOH	NWTPHDx 40ml HCl (with SGC)	NWTPHDx 40ml HCl (w/o SGC)	TCLPEXT 4oz Clr (no pres) RCRA 8 Metals	BTEX by 8260	Rem./Contaminant	Sample # (lab only)
B-1	Grab	SS	5-7	11/6/17	1015	5	X	X				-01	~~-01~~
B-1W	↓	GW	N/A	↓	1135	8	X	X	X				~~-02~~
B-2		SS	5-7		1200	5	X	X				-02	~~-03~~
B-2W		GW	N/A		1210	8	X	X	X				~~-04~~
B-3		SS	5-7		1250	5	X	X				-03	~~-05~~
B-3W		GW	N/A		1300	8	X	X	X				~~-06~~
Soil Composite	Comp	SS	N/A		1330	1				X			~~-07~~
TRIP BLANK						1					X		~~-08~~

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ______

Remarks:

pH ______ Temp ______
Flow ______ Other ______

7466 1466 3461

Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐ ______

Hold #:

Condition: (lab use only) OK

Relinquished by: (Signature)	Date: 11/6/17	Time: 1515	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) Marria

Temp: 0.1°C °C Bottles Received: 40 +TB HCl

859

Date: 11-07-17 Time: 08:45

COC Seal Intact: ___Y ✓N ___NA

pH Checked:

NCF:

Andy Vann

From: Mark Beasley
Sent: Friday, November 17, 2017 5:08 PM
To: Login; Sample Storage
Subject: L948735 *BNSF1TRC* relog

Relog L948735-01, -03, & -05 for NWTPHDXNOSGT. Transfer TS. Log as R5 due 11/24.

Thanks
Mark

From: Meugniot, Amanda [mailto:AMeugniot@trcsolutions.com]
Sent: Friday, November 17, 2017 4:49 PM
To: Mark Beasley
Cc: Woodburne, Keith
Subject: RE: ESC Lab Sciences Report & EDD for Big B Mini Mart L948735

Hi Mark,

Please run samples B-1, B-2, and B-3 for NWTPH-Dx without SGC.

Thank you,
Amanda

Amanda Meugniot, TRC, 425-219-5751 (cell)

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

Gabe Cisneros, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Mr. Cisneros:

Included are the results from the testing of material submitted on May 7, 2015 from the CL-Ellensburg, F&BI 505103 project. There are 71 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
FDS0519R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on May 7, 2015 by Friedman & Bruya, Inc. from the Floyd-Snider CL-Ellensburg, F&BI 505103 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
505103 -01	TP21-4.5-5
505103 -02	TP9-5-5.5
505103 -03	TP1-4-4.5
505103 -04	TP1-6.5-7
505103 -05	TP10-6-6.5B
505103 -06	TP10-6-6.5
505103 -07	TP22-5.5-6
505103 -08	TP22-6.5-6B
505103 -09	TP15-5-5.5
505103 -10	TP12-6-6.5
505103 -11	TP11-5-5.5
505103 -12	TP4-6-6.5
505103 -13	TP5-6-6.5
505103 -14	TP3-5-5.5
505103 -15	TP6-5-5.5
505103 -16	TP2-5-5.5
505103 -17	TP8-6-6.5
505103 -18	TP7-5-5.5
505103 -19	TP20-4-4.5
505103 -20	TP17-5.5-6.0
505103 -21	TP14-5-5.5
505103 -22	MW7-5-5.5
505103 -23	TP13-5.5-6
505103 -24	MW4A-6-6.5
505103 -25	TP19-6-6.5
505103 -26	MW5A-6-6.5
505103 -27	TP18-5-5.5
505103 -28	TP16-5-5.5
505103 -29	MW2-4-14 LNAPL
505103 -30	MW5A-4-14 LNAPL
505103 -31	MW4A-4-14
505103 -32	MW1A-4-14
505103 -33	MW7-4-14
505103 -34	MW3-4-14
505103 -35	MW1A-4-14B

CASE NARRATIVE (continued)

Laboratory ID	Floyd-Snider
505103 -36	Purge Water Waste-050715
505103 -37	Trip Blank

An EDB 8260C direct sparge internal standard failed the acceptance criteria in samples MW4A-6-6.5, MW5A-6-6.5, and TP18-5-5.5 due to matrix interferences. The data were flagged accordingly.

All other quality control requirements were acceptable.

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15
Date Analyzed: 05/08/15

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

Sample ID Laboratory ID	Gasoline	Diesel	Heavy Oil	Surrogate (% Recovery) (Limit 56-165)
TP21-4.5-5 505103-01	ND	ND	ND	97
TP9-5-5.5 505103-02	D	D	ND	78
TP1-6.5-7 505103-04	D	D	ND	105
TP10-6-6.5B 505103-05	ND	ND	ND	101
TP22-5.5-6 505103-07	ND	ND	ND	97
TP22-6.5-6B 505103-08	ND	ND	ND	92
TP15-5-5.5 505103-09	D	D	ND	89
TP12-6-6.5 505103-10	D	D	ND	103
TP11-5-5.5 505103-11	ND	D	ND	99
TP4-6-6.5 505103-12	D	D	ND	94
TP5-6-6.5 505103-13	D	D	ND	ip
TP3-5-5.5 505103-14	ND	D	ND	121

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

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15
Date Analyzed: 05/08/15

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

Sample ID Laboratory ID	Gasoline	Diesel	Heavy Oil	Surrogate (% Recovery) (Limit 56-165)
TP6-5-5.5 505103-15	D	D	ND	110
TP2-5-5.5 505103-16	D	D	ND	131
TP8-6-6.5 505103-17	D	D	ND	ip
TP7-5-5.5 505103-18	D	D	ND	ip
TP20-4-4.5 505103-19	ND	ND	ND	96
TP17-5.5-6.0 505103-20	ND	D	ND	95
TP14-5-5.5 505103-21	ND	ND	ND	93
MW7-5-5.5 505103-22	D	D	ND	ip
TP13-5.5-6 505103-23	ND	ND	ND	100
TP19-6-6.5 505103-25	ND	D	ND	106

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

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15
Date Analyzed: 05/08/15

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

Sample ID Laboratory ID	Gasoline	Diesel	Heavy Oil	Surrogate (% Recovery) (Limit 56-165)
TP16-5-5.5 505103-28	D	D	ND	114
Method Blank 05-930 MB	ND	ND	ND	99
Method Blank 05-944 MB	ND	ND	ND	93

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

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15
Date Analyzed: 05/08/15 and 05/11/15

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
TP1-4-4.5 505103-03 1/20	670	111
TP10-6-6.5 505103-06	200	145
MW4A-6-6.5 505103-24 1/50	890	117
MW5A-6-6.5 505103-26 1/50	2,600	138
TP18-5-5.5 505103-27 1/20	960	119
Method Blank 05-0933 MB	<2	104

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/13/15
Date Analyzed: 05/13/15 and 05/14/15

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)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
TP9-5-5.5 505103-02 1/10	<0.2	11	12	33	2,900	ip
TP1-6.5-7 505103-04 1/5	0.70	8.8	12	13	1,200	ip
TP15-5-5.5 505103-09	0.28	1.6	2.3	5.7	460	102
TP12-6-6.5 505103-10	1.1	3.9	4.0	6.7	780	130
TP4-6-6.5 505103-12 1/10	<0.2	4.1	15	20	2,500	143
TP5-6-6.5 505103-13 1/10	<0.2	1.3	6.8	19	1,900	128
TP6-5-5.5 505103-15 1/5	<0.02 j	1.1	3.8	9.4	1,100	124
TP2-5-5.5 505103-16 1/10	0.31	0.89	10	47	3,700	ip
TP8-6-6.5 505103-17 1/5	0.02 j	<0.1	2.5	14	1,100	117
TP7-5-5.5 505103-18 1/10	<0.2	<0.2	0.97	6.9	890	94

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/13/15
Date Analyzed: 05/13/15 and 05/14/15

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)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
MW7-5-5.5 505103-22 1/5	<0.02 j	<0.1	1.4	4.4	740	96
TP16-5-5.5 505103-28 1/5	<0.02 j	4.0	4.9	14	1,400	107
Method Blank 05-0938 MB2	<0.02	<0.02	<0.02	<0.06	<2	91

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15
Date Analyzed: 05/08/15

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 51-134)
MW4A-4-14 505103-31	740	111
MW1A-4-14 505103-32	<100	99
MW7-4-14 505103-33	<100	98
MW3-4-14 505103-34	<100	95
MW1A-4-14B 505103-35	<100	97
Purge Water Waste-050715 505103-36	1,100	121
Method Blank 05-913 MB	<100	94

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15
Date Analyzed: 05/08/15

RESULTS FROM THE ANALYSIS OF SOIL/PRODUCT SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
MW2-4-14 LNAPL 505103-29 1/5000	150,000	122
MW5A-4-14 LNAPL 505103-30 1/5000	61,000	94
Method Blank 05-0933 MB	<2	104

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15 and 05/12/15
Date Analyzed: 05/08/15 and 05/12/15

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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 48-168)
TP9-5-5.5 505103-02	14,000	280 x	112
TP1-4-4.5 505103-03	250 x	<250	101
TP1-6.5-7 505103-04	8,200	<250	100
TP10-6-6.5 505103-06	<50	<250	99
TP15-5-5.5 505103-09	660	<250	90
TP12-6-6.5 505103-10	1,000	<250	90
TP11-5-5.5 505103-11	93	<250	87
TP4-6-6.5 505103-12	13,000	<250	105
TP5-6-6.5 505103-13	24,000	410 x	95
TP3-5-5.5 505103-14	6,500	<250	112

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15 and 05/12/15
Date Analyzed: 05/08/15 and 05/12/15

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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 48-168)
TP6-5-5.5 505103-15	4,400	<250	95
TP2-5-5.5 505103-16	11,000	<250	89
TP8-6-6.5 505103-17	6,500	<250	80
TP7-5-5.5 505103-18	12,000	<250	111
TP17-5.5-6.0 505103-20	1,300	<250	90
MW7-5-5.5 505103-22	7,200	<250	101
MW4A-6-6.5 505103-24	15,000	<250	113
TP19-6-6.5 505103-25	440	<250	94
MW5A-6-6.5 505103-26	21,000	330 x	95
TP18-5-5.5 505103-27	3,900	<250	99

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15 and 05/12/15
Date Analyzed: 05/08/15 and 05/12/15

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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 48-168)
TP16-5-5.5 505103-28	4,100	<250	91
Method Blank 05-945 MB	<50	<250	103
Method Blank 05-956 MB	<50	<250	107

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/08/15
Date Analyzed: 05/08/15

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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 51-134)
MW4A-4-14 505103-31	2,400	<250	77
MW1A-4-14 505103-32	88 x	<250	96
MW7-4-14 505103-33	240	<250	92
MW3-4-14 505103-34	250 x	<250	91
MW1A-4-14B 505103-35	90 x	<250	97
Purge Water Waste-050715 505103-36	3,300	<250	86
Method Blank 05-931 MB	<50	<250	84

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/11/15
Date Analyzed: 05/11/15

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

Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 48-168)
MW2-4-14 LNAPL 505103-29 1/200	900,000	<50,000	101
MW5A-4-14 LNAPL 505103-30 1/200	870,000	<50,000	ip
Method Blank 05-949 MB	<50	<250	96

Analysis For Total Metals By EPA Method 6020A

Client ID:	TP1-4-4.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-03
Date Analyzed:	05/12/15	Data File:	505103-03.044
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	103	70	130

Analyte:	Concentration mg/kg (ppm)
Lead	12.0

Analysis For Total Metals By EPA Method 6020A

Client ID:	TP10-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-06
Date Analyzed:	05/12/15	Data File:	505103-06.045
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	106	70	130

Analyte:	Concentration mg/kg (ppm)
Lead	3.31

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW4A-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-24
Date Analyzed:	05/12/15	Data File:	505103-24.054
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	103	70	130

Analyte:	Concentration mg/kg (ppm)
Lead	2.08

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW5A-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-26
Date Analyzed:	05/12/15	Data File:	505103-26.055
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	104	70	130

Analyte:	Concentration mg/kg (ppm)
Lead	4.28

Analysis For Total Metals By EPA Method 6020A

Client ID:	TP18-5-5.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-27
Date Analyzed:	05/12/15	Data File:	505103-27.056
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	104	70	130

Analyte:	Concentration mg/kg (ppm)
Lead	5.23

Analysis For Total Metals By EPA Method 6020A

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	I5-296 mb
Date Analyzed:	05/12/15	Data File:	I5-296 mb.042
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	103	70	130

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

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW4A-4-14	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-31
Date Analyzed:	05/12/15	Data File:	505103-31.016
Matrix:	Water	Instrument:	ICPMS1
Units:	ug/L (ppb)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	95	70	130

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW1A-4-14	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-32
Date Analyzed:	05/12/15	Data File:	505103-32.019
Matrix:	Water	Instrument:	ICPMS1
Units:	ug/L (ppb)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	96	70	130

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW7-4-14	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-33
Date Analyzed:	05/12/15	Data File:	505103-33.020
Matrix:	Water	Instrument:	ICPMS1
Units:	ug/L (ppb)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	94	70	130

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW3-4-14	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-34
Date Analyzed:	05/12/15	Data File:	505103-34.021
Matrix:	Water	Instrument:	ICPMS1
Units:	ug/L (ppb)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	94	70	130

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW1A-4-14B	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-35
Date Analyzed:	05/12/15	Data File:	505103-35.022
Matrix:	Water	Instrument:	ICPMS1
Units:	ug/L (ppb)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	95	70	130

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020A

Client ID:	Purge Water Waste-050715	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-36
Date Analyzed:	05/12/15	Data File:	505103-36.023
Matrix:	Water	Instrument:	ICPMS1
Units:	ug/L (ppb)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	98	70	130

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020A

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	I5-295 mb
Date Analyzed:	05/12/15	Data File:	I5-295 mb.014
Matrix:	Water	Instrument:	ICPMS1
Units:	ug/L (ppb)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	95	70	130

Analyte:	Concentration ug/L (ppb)
Lead	<1

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW2-4-14 LNAPL	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-29
Date Analyzed:	05/12/15	Data File:	505103-29.057
Matrix:	Soil/Product	Instrument:	ICPMS1
Units:	mg/kg (ppm)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	102	70	130

Analyte:	Concentration mg/kg (ppm)
Lead	27.5

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW5A-4-14 LNAPL	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-30
Date Analyzed:	05/12/15	Data File:	505103-30.058
Matrix:	Soil/Product	Instrument:	ICPMS1
Units:	mg/kg (ppm)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	105	70	130

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

Analysis For Total Metals By EPA Method 6020A

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	I5-296 mb
Date Analyzed:	05/12/15	Data File:	I5-296 mb.042
Matrix:	Soil/Product	Instrument:	ICPMS1
Units:	mg/kg (ppm)	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Holmium	103	70	130

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

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP1-4-4.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-03
Date Analyzed:	05/13/15	Data File:	051240.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	89	113
Toluene-d8	109	64	137
4-Bromofluorobenzene	108	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<50
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	0.048
Toluene	<0.05
Ethylbenzene	1.4
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	6.9
Hexane	0.45

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP10-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/13/15	Lab ID:	505103-06
Date Analyzed:	05/13/15	Data File:	051309.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	101	64	137
4-Bromofluorobenzene	103	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<50
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	0.16
Toluene	<0.05
Ethylbenzene	1.8
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	2.9
Hexane	0.66

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW4A-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-24
Date Analyzed:	05/13/15	Data File:	051242.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	89	113
Toluene-d8	103	64	137
4-Bromofluorobenzene	101	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<50
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	0.13
Toluene	<0.05
Ethylbenzene	3.8
m,p-Xylene	8.9
o-Xylene	0.14
Naphthalene	2.7
Hexane	<0.25

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW5A-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-26
Date Analyzed:	05/13/15	Data File:	051243.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	107	89	113
Toluene-d8	108	64	137
4-Bromofluorobenzene	100	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<50
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	0.067
Toluene	<0.05
Ethylbenzene	3.9
m,p-Xylene	13
o-Xylene	0.40
Naphthalene	3.8
Hexane	<0.25

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP18-5-5.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	505103-27
Date Analyzed:	05/13/15	Data File:	051241.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	89	113
Toluene-d8	110	64	137
4-Bromofluorobenzene	93	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<50
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	0.097
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	<0.05
Hexane	0.69

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/12/15	Lab ID:	05-0907 mb
Date Analyzed:	05/12/15	Data File:	051221.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	89	113
Toluene-d8	99	64	137
4-Bromofluorobenzene	101	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<50
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	<0.05
Hexane	<0.25

Analysis For Volatile Compounds By EPA Method 8260C Direct Sparge

Client Sample ID:	TP1-4-4.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/11/15	Lab ID:	505103-03
Date Analyzed:	05/11/15	Data File:	051119.D
Matrix:	Soil	Instrument:	GCMS7
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	122	50	150
Toluene-d8	392 ip	50	150
4-Bromofluorobenzene	247 ip	50	150

Compounds:	Concentration mg/kg (ppm)
1,2-Dibromoethane (EDB)	<0.005

Analysis For Volatile Compounds By EPA Method 8260C Direct Sparge

Client Sample ID:	TP10-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/11/15	Lab ID:	505103-06
Date Analyzed:	05/11/15	Data File:	051115.D
Matrix:	Soil	Instrument:	GCMS7
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	191 ip	50	150
4-Bromofluorobenzene	130	50	150

Compounds:	Concentration mg/kg (ppm)
1,2-Dibromoethane (EDB)	<0.005

Analysis For Volatile Compounds By EPA Method 8260C Direct Sparge

Client Sample ID:	MW4A-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/11/15	Lab ID:	505103-24
Date Analyzed:	05/11/15	Data File:	051121.D
Matrix:	Soil	Instrument:	GCMS7
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	133	50	150
Toluene-d8	825 ip	50	150
4-Bromofluorobenzene	1424 ip J	50	150

Compounds:	Concentration mg/kg (ppm)
1,2-Dibromoethane (EDB)	<0.005 J

Analysis For Volatile Compounds By EPA Method 8260C Direct Sparge

Client Sample ID:	MW5A-6-6.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/11/15	Lab ID:	505103-26
Date Analyzed:	05/11/15	Data File:	051122.D
Matrix:	Soil	Instrument:	GCMS7
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	142	50	150
Toluene-d8	1022 ip	50	150
4-Bromofluorobenzene	1293 ip J	50	150

Compounds:	Concentration mg/kg (ppm)
1,2-Dibromoethane (EDB)	<0.005 J

Analysis For Volatile Compounds By EPA Method 8260C Direct Sparge

Client Sample ID:	TP18-5-5.5	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/11/15	Lab ID:	505103-27
Date Analyzed:	05/11/15	Data File:	051120.D
Matrix:	Soil	Instrument:	GCMS7
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	138	50	150
Toluene-d8	668 vo J	50	150
4-Bromofluorobenzene	2042 vo J	50	150

Compounds:	Concentration mg/kg (ppm) Dry Weight
1,2-Dibromoethane (EDB)	<0.005 J

Analysis For Volatile Compounds By EPA Method 8260C Direct Sparge

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/11/15	Lab ID:	05-0905 mb
Date Analyzed:	05/11/15	Data File:	051112.D
Matrix:	Soil	Instrument:	GCMS7
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	103	50	150

Compounds:	Concentration mg/kg (ppm)
1,2-Dibromoethane (EDB)	<0.005

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW2-4-14 LNAPL	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	505103-29 1/2000
Date Analyzed:	05/08/15	Data File:	050818.D
Matrix:	Soil/Product	Instrument:	GCMS9
Units:	mg/kg (ppm)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	89	113
Toluene-d8	100	64	137
4-Bromofluorobenzene	104	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<100,000
Methyl t-butyl ether (MTBE)	<100
1,2-Dichloroethane (EDC)	<100
1,2-Dibromoethane (EDB)	<100
Benzene	<60
Toluene	<100
Ethylbenzene	660
m,p-Xylene	220
o-Xylene	<100
Naphthalene	690
Hexane	<500
Butane	<1,000 L
Isooctane	4,600 L

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW5A-4-14 LNAPL	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	505103-30 1/2000
Date Analyzed:	05/08/15	Data File:	050817.D
Matrix:	Soil/Product	Instrument:	GCMS9
Units:	mg/kg (ppm)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	89	113
Toluene-d8	98	64	137
4-Bromofluorobenzene	101	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<100,000
Methyl t-butyl ether (MTBE)	<100
1,2-Dichloroethane (EDC)	<100
1,2-Dibromoethane (EDB)	<100
Benzene	<60
Toluene	<100
Ethylbenzene	210
m,p-Xylene	630
o-Xylene	<100
Naphthalene	210
Hexane	<500
Butane	<1,000 L
Isooctane	<1,000 L

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	05-0901 mb
Date Analyzed:	05/08/15	Data File:	050805.D
Matrix:	Soil/Product	Instrument:	GCMS9
Units:	mg/kg (ppm)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	89	113
Toluene-d8	98	64	137
4-Bromofluorobenzene	102	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<50
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
1,2-Dibromoethane (EDB)	<0.05
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	<0.05
Hexane	<0.25
Butane	<0.5 L
Isooctane	<0.5 L

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW4A-4-14	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	505103-31
Date Analyzed:	05/08/15	Data File:	050815.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	97	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Ethanol	<1,000
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
1,2-Dibromoethane (EDB)	<1
Benzene	1.1
Toluene	<1
Ethylbenzene	6.8
m,p-Xylene	11
o-Xylene	<1
Naphthalene	4.2
Hexane	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW1A-4-14	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	505103-32
Date Analyzed:	05/08/15	Data File:	050816.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	99	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Ethanol	<1,000
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1
Hexane	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: MW7-4-14
Date Received: 05/07/15
Date Extracted: 05/08/15
Date Analyzed: 05/08/15
Matrix: Water
Units: ug/L (ppb)

Client: Floyd-Snider
Project: CL-Ellensburg, F&BI 505103
Lab ID: 505103-33
Data File: 050817.D
Instrument: GCMS4
Operator: JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	98	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Ethanol	<1,000
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1
Hexane	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW3-4-14	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	505103-34
Date Analyzed:	05/08/15	Data File:	050818.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	98	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Ethanol	<1,000
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1
Hexane	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW1A-4-14B	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	505103-35
Date Analyzed:	05/08/15	Data File:	050819.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	98	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Ethanol	<1,000
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1
Hexane	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Purge Water Waste-050715	Client:	Floyd-Snider
Date Received:	05/07/15	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	505103-36
Date Analyzed:	05/08/15	Data File:	050820.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	98	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Ethanol	<1,000
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	2.9
Toluene	2.2
Ethylbenzene	19
m,p-Xylene	31
o-Xylene	2.6
Naphthalene	11
Hexane	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 505103
Date Extracted:	05/08/15	Lab ID:	05-0902 mb
Date Analyzed:	05/08/15	Data File:	050807.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	98	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Ethanol	<1,000
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1
Hexane	<1

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103
Date Extracted: 05/11/15
Date Analyzed: 05/11/15

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR 1,2-DIBROMOETHANE BY EPA METHOD 8011 MODIFIED

Results Reported as µg/L (ppb)

Sample ID Laboratory ID	EDB
MW4A-4-14 505103-31	<0.01
MW1A-4-14 505103-32	<0.01
MW7-4-14 505103-33	<0.01
MW3-4-14 505103-34	<0.01
MW1A-4-14B 505103-35	<0.01
Purge Water Waste-050715 505103-36	<0.01
Method Blank	<0.01

EDB	1,2-Dibromoethane

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-Gx

Laboratory Code: 504473-03 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: 505103-06 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	mg/kg (ppm)	20	139	118 b	187 b	50-150	45 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	100	71-131

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TPH AS GASOLINE USING METHOD NWTPH-Gx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	103	102	69-134	1

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/PRODUCT SAMPLES FOR TPH AS GASOLINE USING METHOD NWTPH-Gx

Laboratory Code: 504473-03 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: 505103-06 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	mg/kg (ppm)	20	139	118 b	187 b	50-150	45 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	100	71-131

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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: 505195-14 (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	86	66-121
Toluene	mg/kg (ppm)	0.5	86	72-128
Ethylbenzene	mg/kg (ppm)	0.5	87	69-132
Xylenes	mg/kg (ppm)	1.5	87	69-131
Gasoline	mg/kg (ppm)	20	85	61-153

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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

Laboratory Code: 505103-06 (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	93	104	73-135	11

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	91	74-139

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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

Laboratory Code: 505160-09 (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	104	106	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	99	58-147

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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	90	92	58-134	2

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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

Laboratory Code: 505139-01 (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	88	95	73-135	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	100	74-139

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/PRODUCT SAMPLES FOR TOTAL METALS USING EPA METHOD 6020A

Laboratory Code: 505103-06 (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	2.75	99	99	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	mg/kg (ppm)	50	104	80-120

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/PRODUCT SAMPLES FOR TOTAL METALS USING EPA METHOD 6020A

Laboratory Code: 505103-06 (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	2.75	99	99	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	mg/kg (ppm)	50	104	80-120

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020A

Laboratory Code: 505103-31 (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	<1	95	94	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	ug/L (ppb)	10	100	80-120

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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

Laboratory Code: 505103-06 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
1,2-Dibromoethane (EDB)	mg/kg (ppm)	0.05	<0.005	93	89	50-150	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
1,2-Dibromoethane (EDB)	mg/kg (ppm)	0.05	105	107	70-130	2

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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

Laboratory Code: 505103-06 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet wt)	Duplicate Result (Wet wt)	RPD (Limit 20)
Ethanol	mg/kg (ppm)	<50	<50	nm
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	<0.05	<0.05	nm
1,2-Dichloroethane (EDC)	mg/kg (ppm)	<0.05	<0.05	nm
Benzene	mg/kg (ppm)	0.13	0.18	32 a
Toluene	mg/kg (ppm)	<0.05	<0.05	nm
Ethylbenzene	mg/kg (ppm)	1.5	1.7	12
m,p-Xylene	mg/kg (ppm)	<0.1	<0.1	nm
o-Xylene	mg/kg (ppm)	<0.05	<0.05	nm
Naphthalene	mg/kg (ppm)	2.4	2.6	8
Hexane	mg/kg (ppm)	0.55	0.37	39 a

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Ethanol	mg/kg (ppm)	125	118	102	51-164	15
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	98	97	72-122	1
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	96	93	73-111	3
Benzene	mg/kg (ppm)	2.5	97	96	72-106	1
Toluene	mg/kg (ppm)	2.5	96	97	74-111	1
Ethylbenzene	mg/kg (ppm)	2.5	99	98	75-112	1
m,p-Xylene	mg/kg (ppm)	5	103	103	77-115	0
o-Xylene	mg/kg (ppm)	2.5	104	103	76-115	1
Naphthalene	mg/kg (ppm)	2.5	102	102	73-122	0
Hexane	mg/kg (ppm)	2.5	93	93	55-107	0

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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

Laboratory Code: 505022-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Ethanol	mg/kg (ppm)	125	<50	104	88	27-130	17
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	78	75	17-134	4
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	70	69	22-124	1
Benzene	mg/kg (ppm)	2.5	<0.03	63	62	26-114	2
Toluene	mg/kg (ppm)	2.5	<0.05	63	64	34-112	2
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	73	73	32-126	0
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	64	63	34-115	2
m,p-Xylene	mg/kg (ppm)	5	0.081	65	64	25-125	2
o-Xylene	mg/kg (ppm)	2.5	<0.05	68	67	27-126	1
Naphthalene	mg/kg (ppm)	2.5	<0.05	89	83	24-139	7
Hexane	mg/kg (ppm)	2.5	<0.25	32	32	10-95	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Ethanol	mg/kg (ppm)	125	110	51-164
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	92	72-122
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	85	73-111
Benzene	mg/kg (ppm)	2.5	89	72-106
Toluene	mg/kg (ppm)	2.5	90	74-111
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	92	77-117
Ethylbenzene	mg/kg (ppm)	2.5	92	75-112
m,p-Xylene	mg/kg (ppm)	5	95	77-115
o-Xylene	mg/kg (ppm)	2.5	98	76-115
Naphthalene	mg/kg (ppm)	2.5	105	73-122
Hexane	mg/kg (ppm)	2.5	88	55-107

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

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

Laboratory Code: 505113-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Ethanol	ug/L (ppb)	2,500	<1,000	101	14-163
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	<1	98	74-127
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	96	69-133
Benzene	ug/L (ppb)	50	<0.35	96	76-125
Toluene	ug/L (ppb)	50	<1	96	76-122
Ethylbenzene	ug/L (ppb)	50	<1	96	69-135
m,p-Xylene	ug/L (ppb)	100	<2	97	69-135
o-Xylene	ug/L (ppb)	50	<1	98	60-140
Naphthalene	ug/L (ppb)	50	<1	108	44-164
Hexane	ug/L (ppb)	50	<1	105	52-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Ethanol	ug/L (ppb)	2,500	116	104	28-187	11
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	101	99	64-147	2
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	98	96	73-132	2
Benzene	ug/L (ppb)	50	97	96	69-134	1
Toluene	ug/L (ppb)	50	98	97	72-122	1
Ethylbenzene	ug/L (ppb)	50	98	98	77-124	0
m,p-Xylene	ug/L (ppb)	100	100	99	83-125	1
o-Xylene	ug/L (ppb)	50	101	100	81-121	1
Naphthalene	ug/L (ppb)	50	111	107	64-133	4
Hexane	ug/L (ppb)	50	113	112	57-137	1

Date of Report: 05/19/15
Date Received: 05/07/15
Project: CL-Ellensburg, F&BI 505103

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR 1,2-DIBROMOETHANE BY EPA METHOD 8011 MODIFIED

Laboratory Code: 505103-31 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 10)
1,2-Dibromoethane	ug/L (ppb)	<0.01	<0.01	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
1,2-Dibromoethane	ug/L (ppb)	0.10	94	70-130

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.

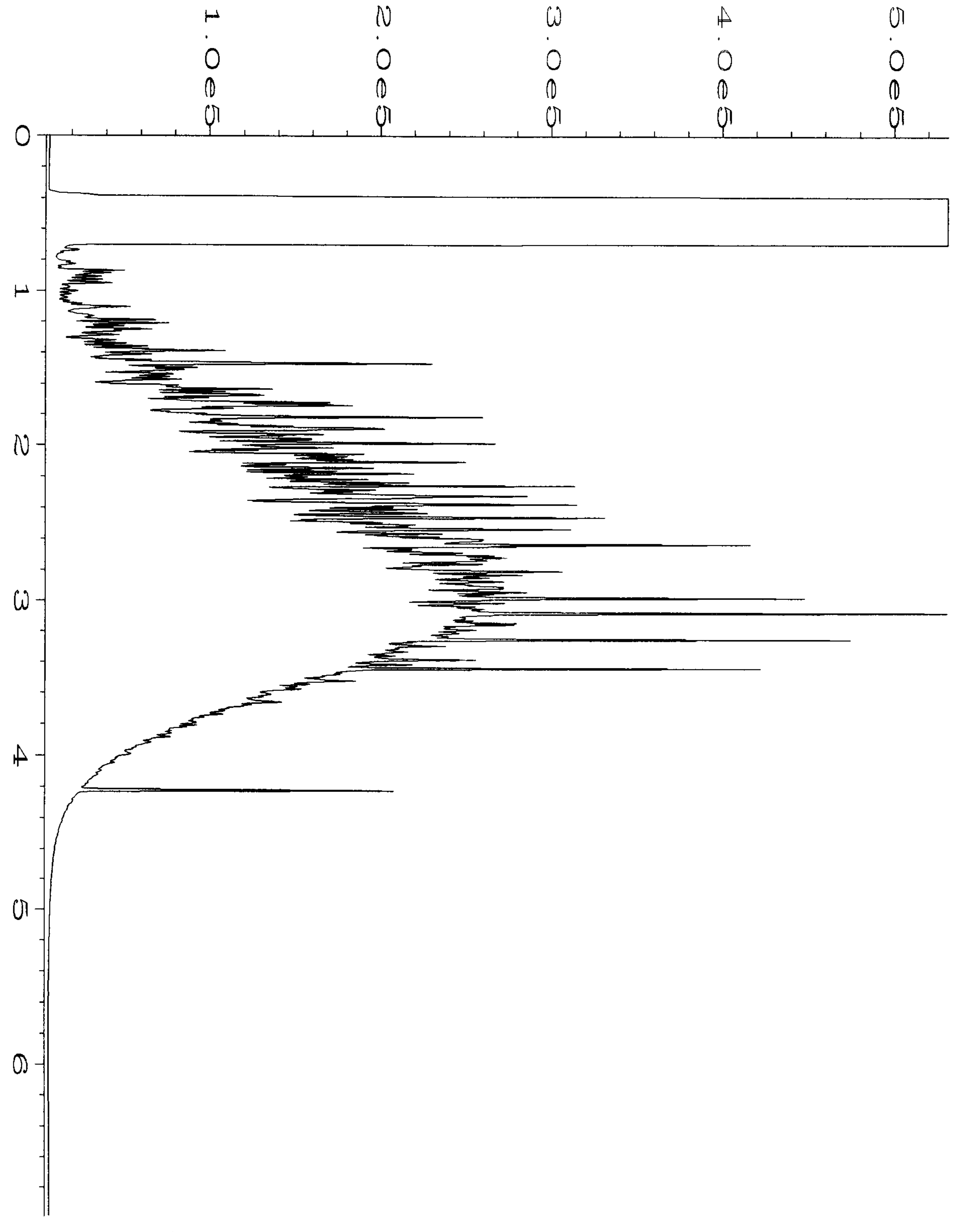
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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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Instrument        : GC #6                         Vial Number       : 23
Sample Name       : 505103-02                     Injection Number  : 1
Run Time Bar Code:                                Sequence Line     : 7
Acquired on       : 12 May 15  04:39 PM           Instrument Method: DX.MTH
Report Created on: 13 May 15  10:05 AM            Analysis Method   : BAKEOUT.MTH
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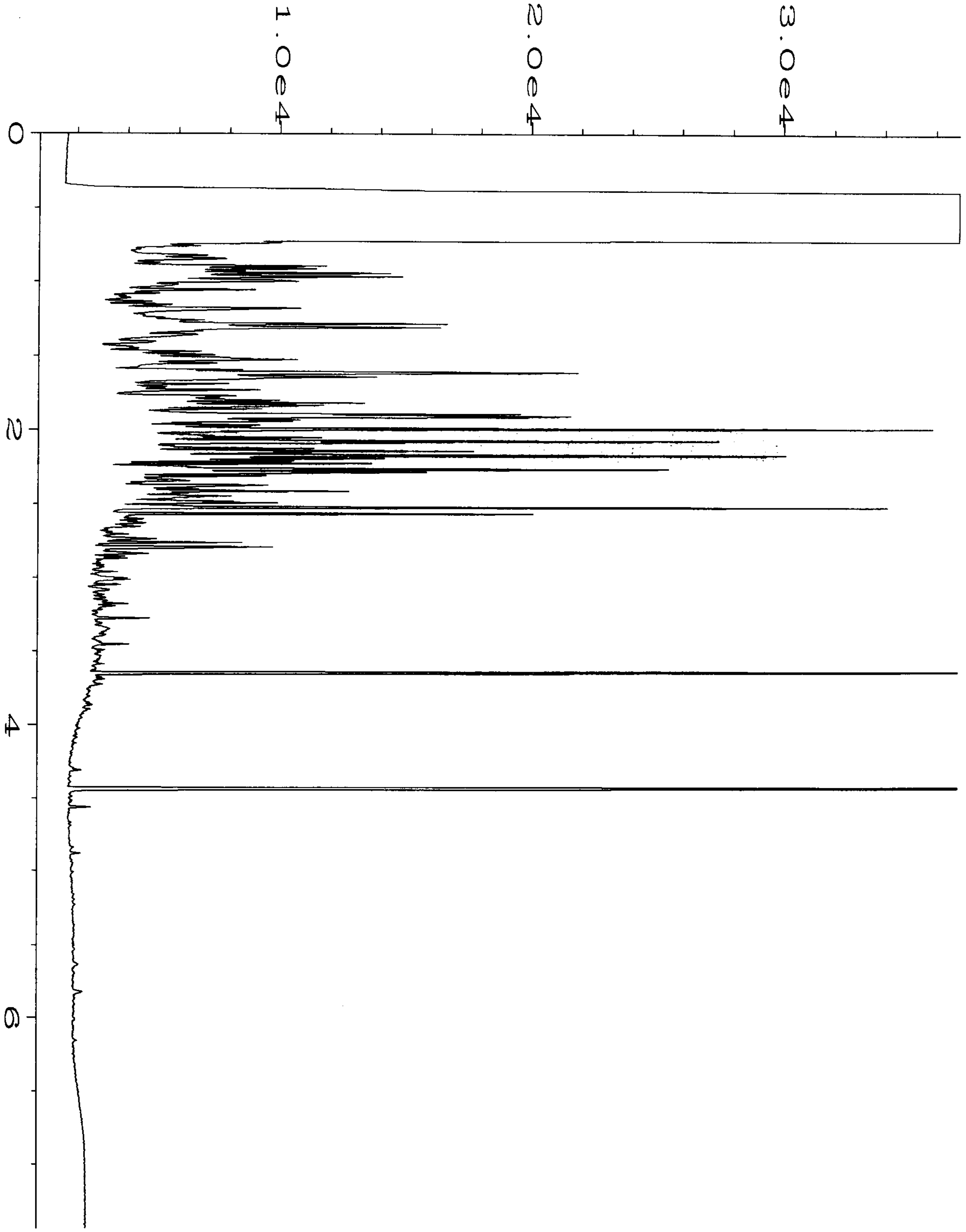

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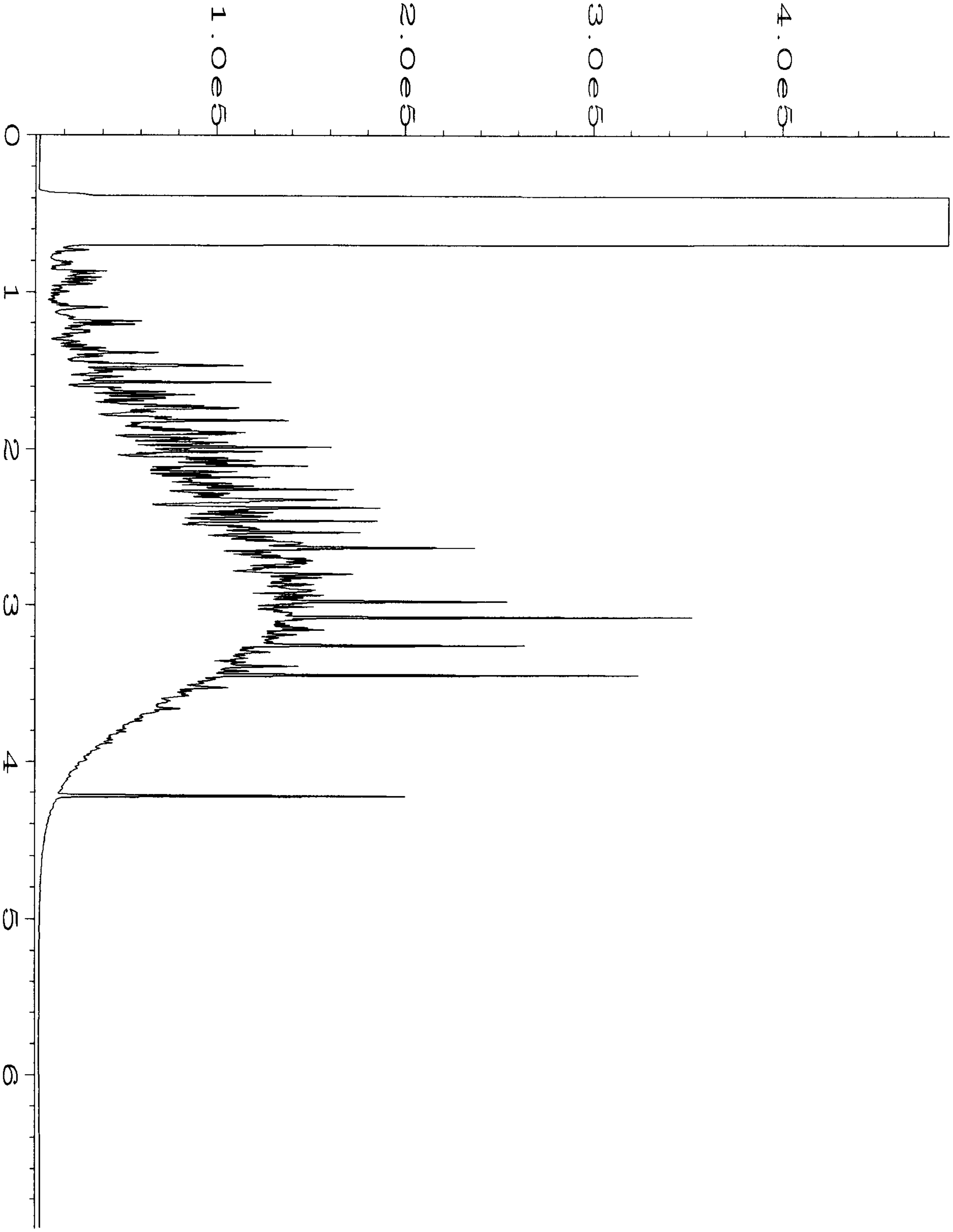
Sample Name	: 505103-03	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 6
Acquired on	: 08 May 15 03:45 PM	Instrument Method:	DX.MTH
Report Created on:	11 May 15 10:30 AM	Analysis Method	: DX.MTH



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Sample Name       : 505103-04                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 7
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Report Created on: 13 May 15  10:05 AM            Analysis Method  : BAKEOUT.MTH
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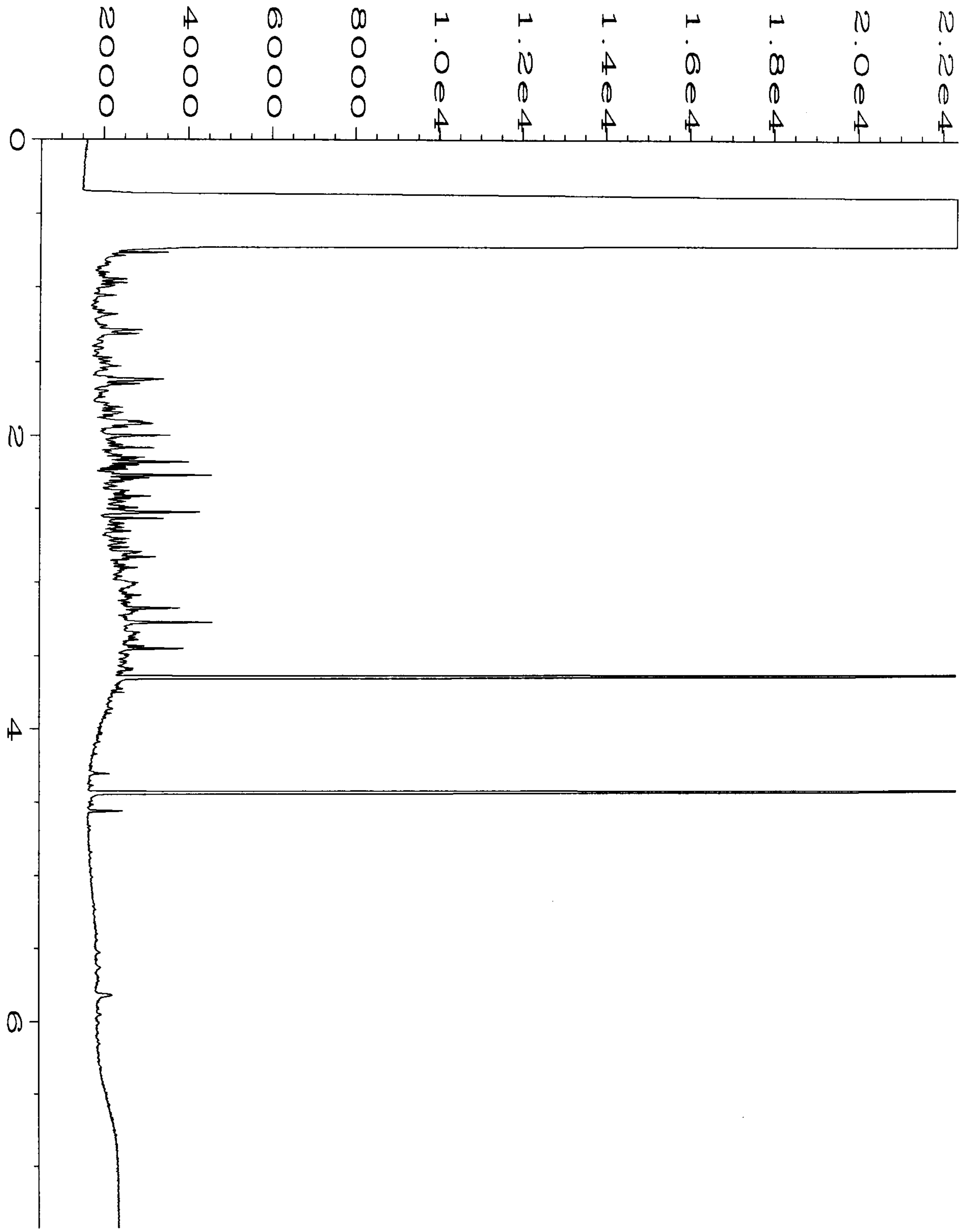

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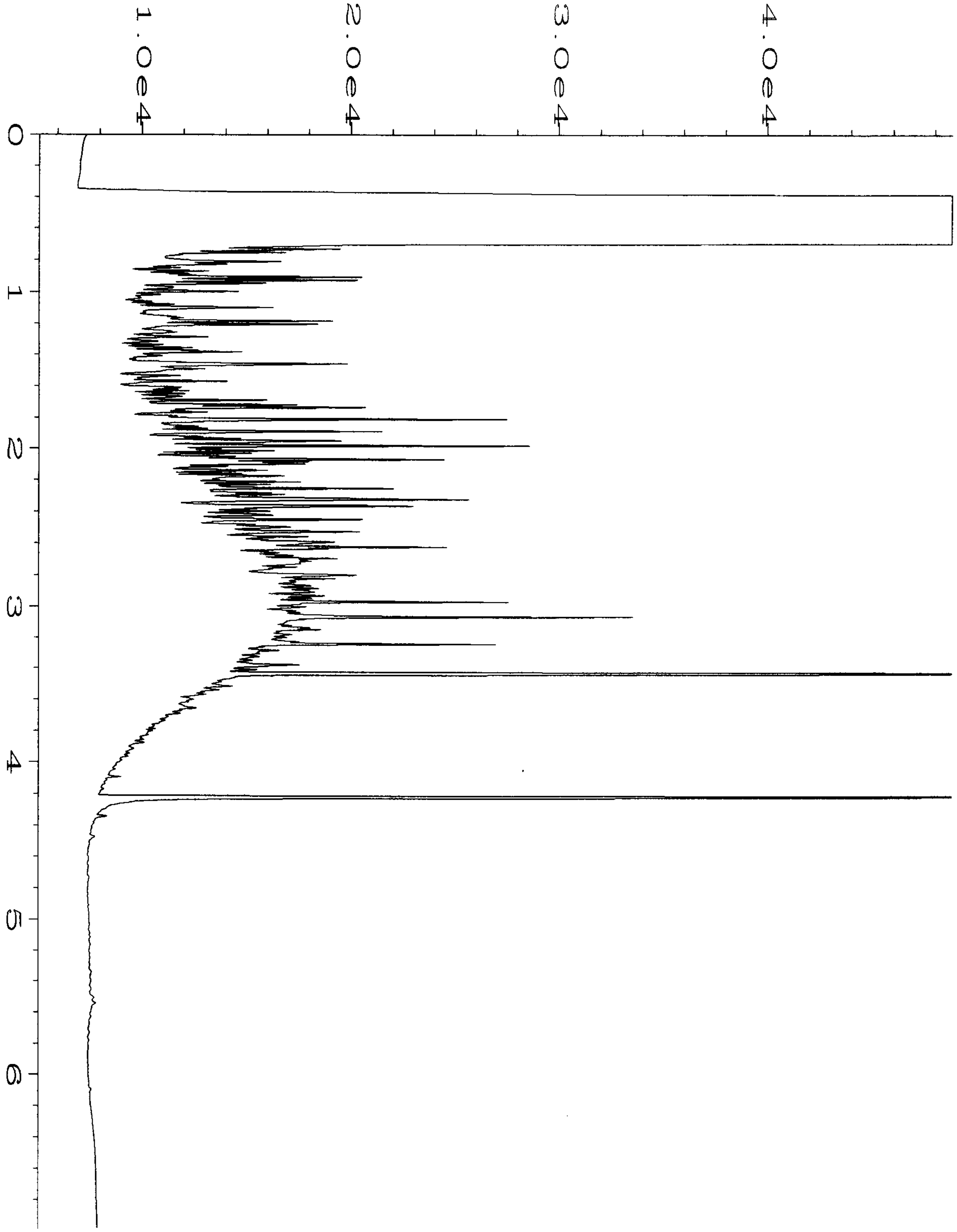
Instrument : GC#4
Sample Name : 505103-06
Run Time Bar Code:
Acquired on : 08 May 15 03:57 PM
Report Created on: 11 May 15 10:30 AM

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DX.MTH



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Operator   : mwdl
Instrument   : GC #6
Sample Name   : 505103-09
Run Time Bar Code:
Acquired on   : 12 May 15   05:01 PM
Report Created on: 13 May 15   10:05 AM

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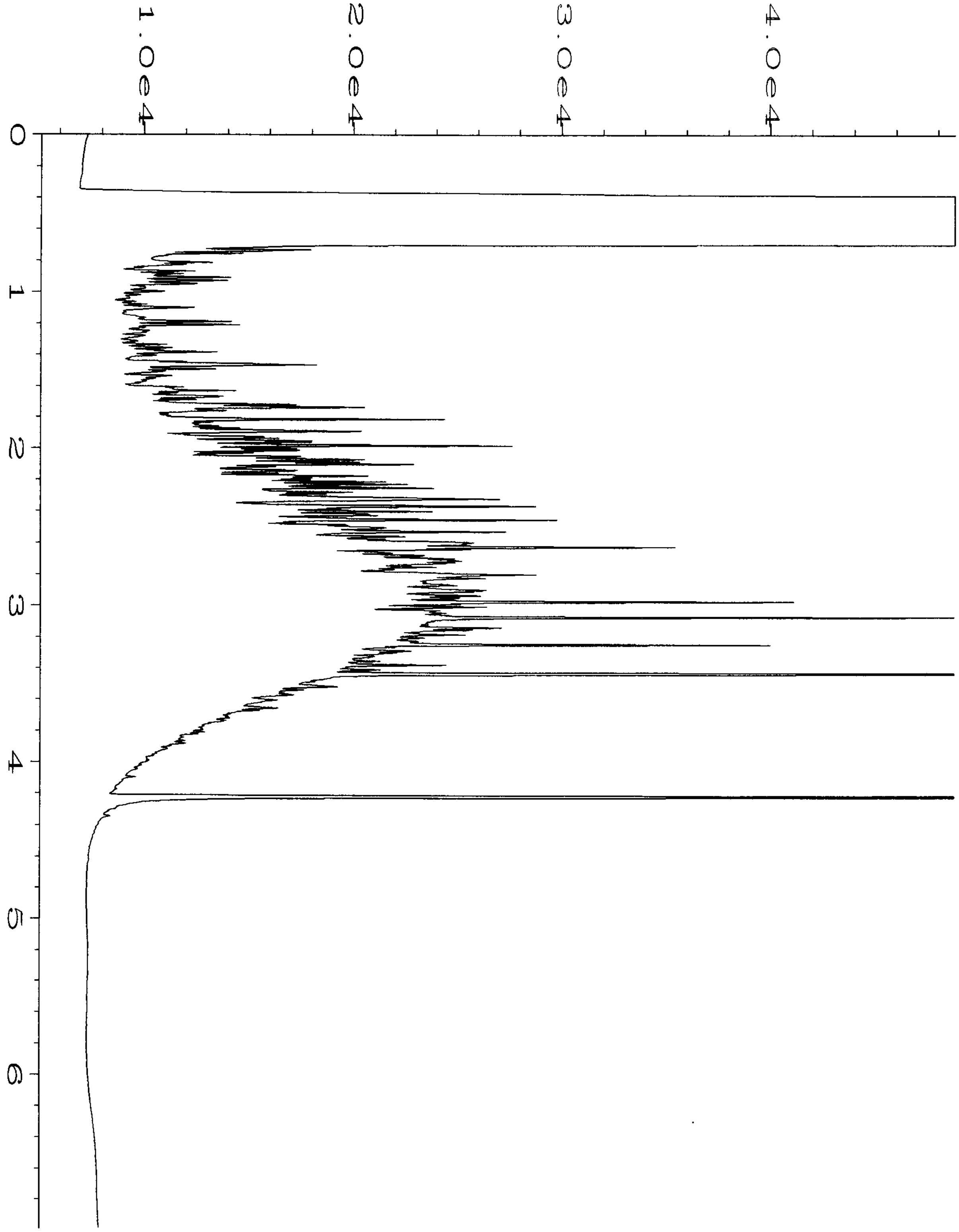
Vial Number   : 25
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : BAKEOUT.MTH



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Instrument   : GC #6
Sample Name   : 505103-10
Run Time Bar Code:
Acquired on   : 12 May 15 05:12 PM
Report Created on: 13 May 15 10:05 AM

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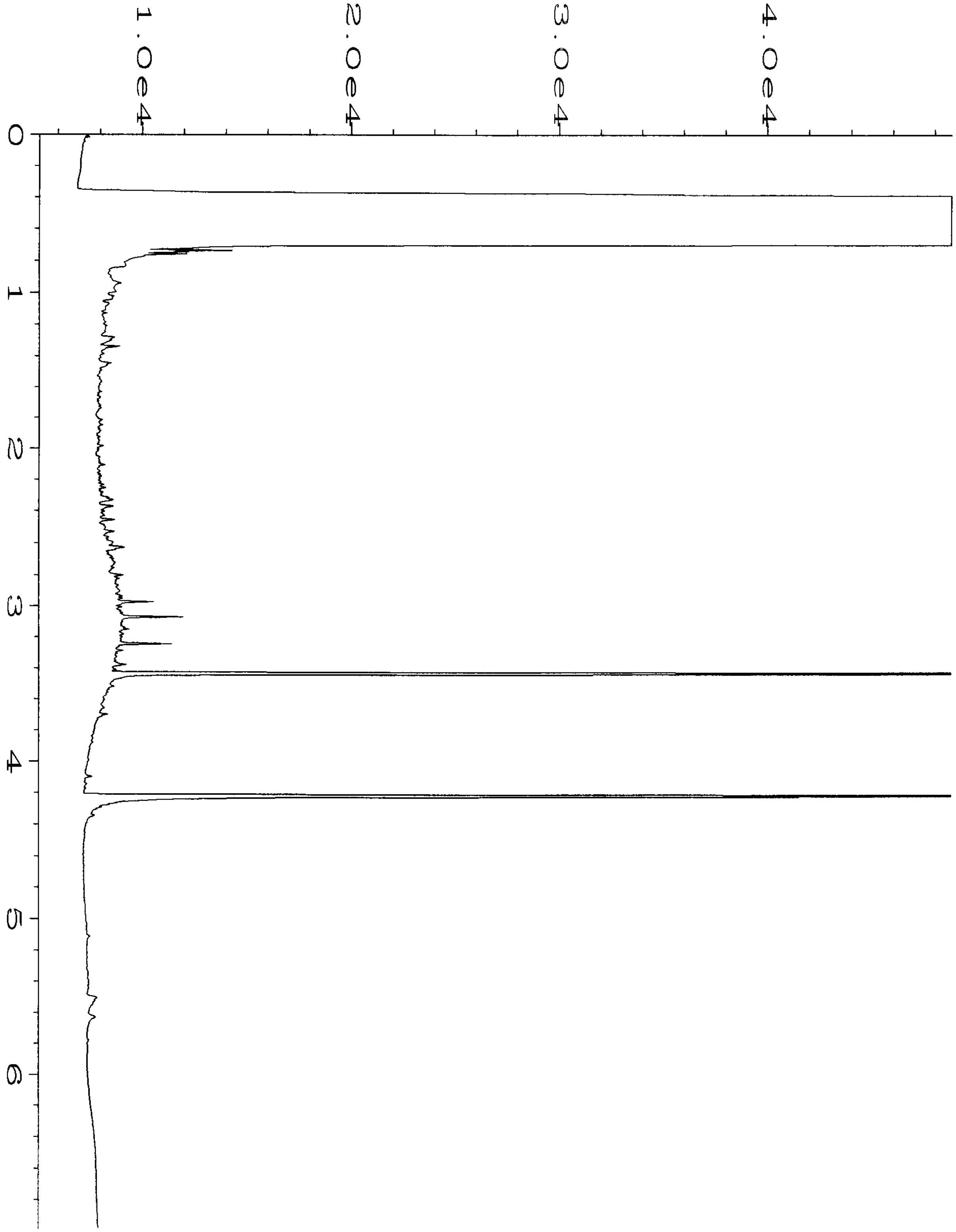
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : BAKEOUT.MTH



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Instrument        : GC #6                         Vial Number       : 27
Sample Name       : 505103-11                     Injection Number : 1
Run Time Bar Code:                                Sequence Line     : 7
Acquired on       : 12 May 15  05:23 PM           Instrument Method: DX.MTH
Report Created on: 13 May 15  10:06 AM            Analysis Method   : BAKEOUT.MTH
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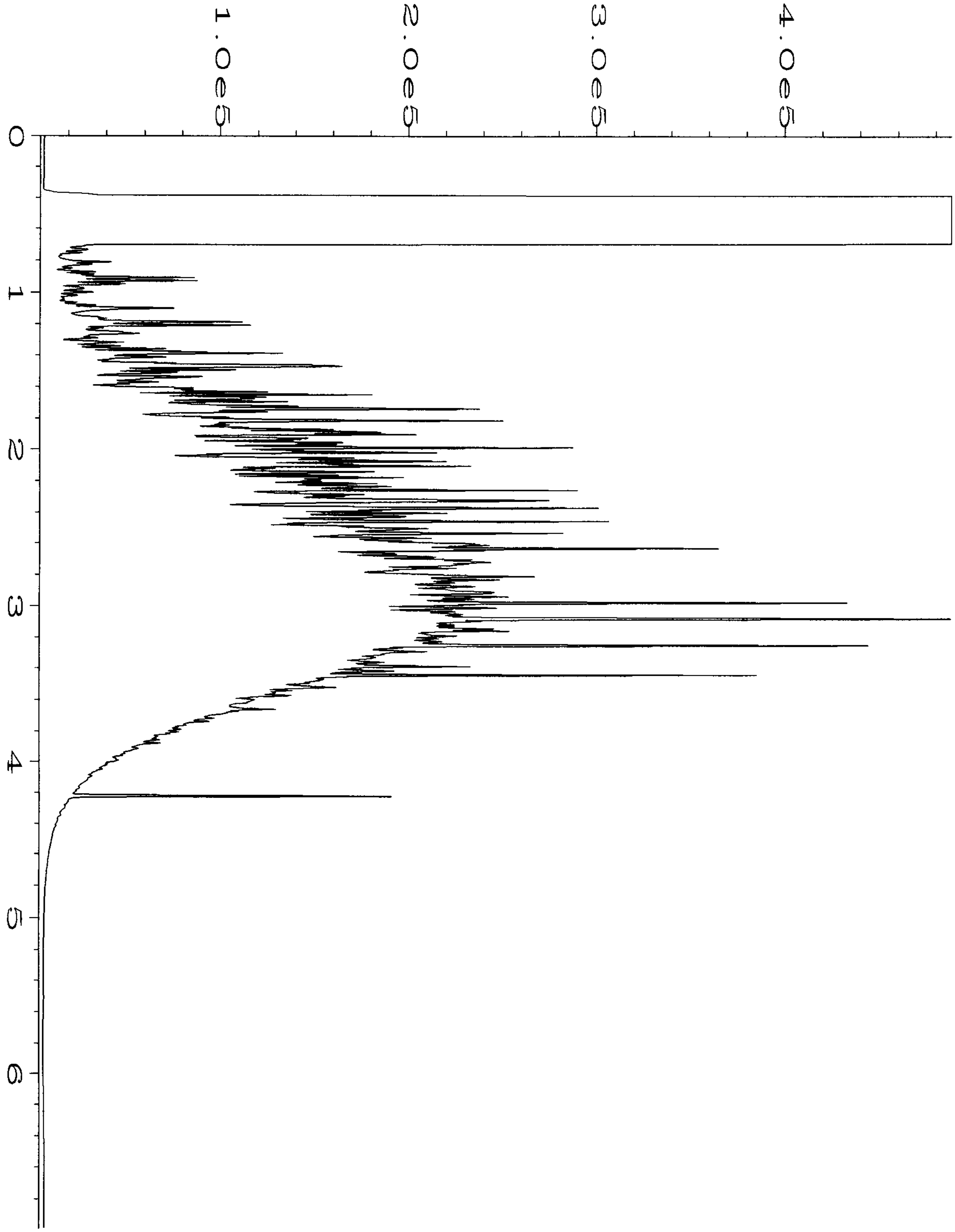

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Instrument        : GC #6                       Vial Number       : 28
Sample Name       : 505103-12                   Injection Number  : 1
Run Time Bar Code:                              Sequence Line     : 7
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Report Created on: 13 May 15  10:06 AM          Analysis Method   : BAKEOUT.MTH
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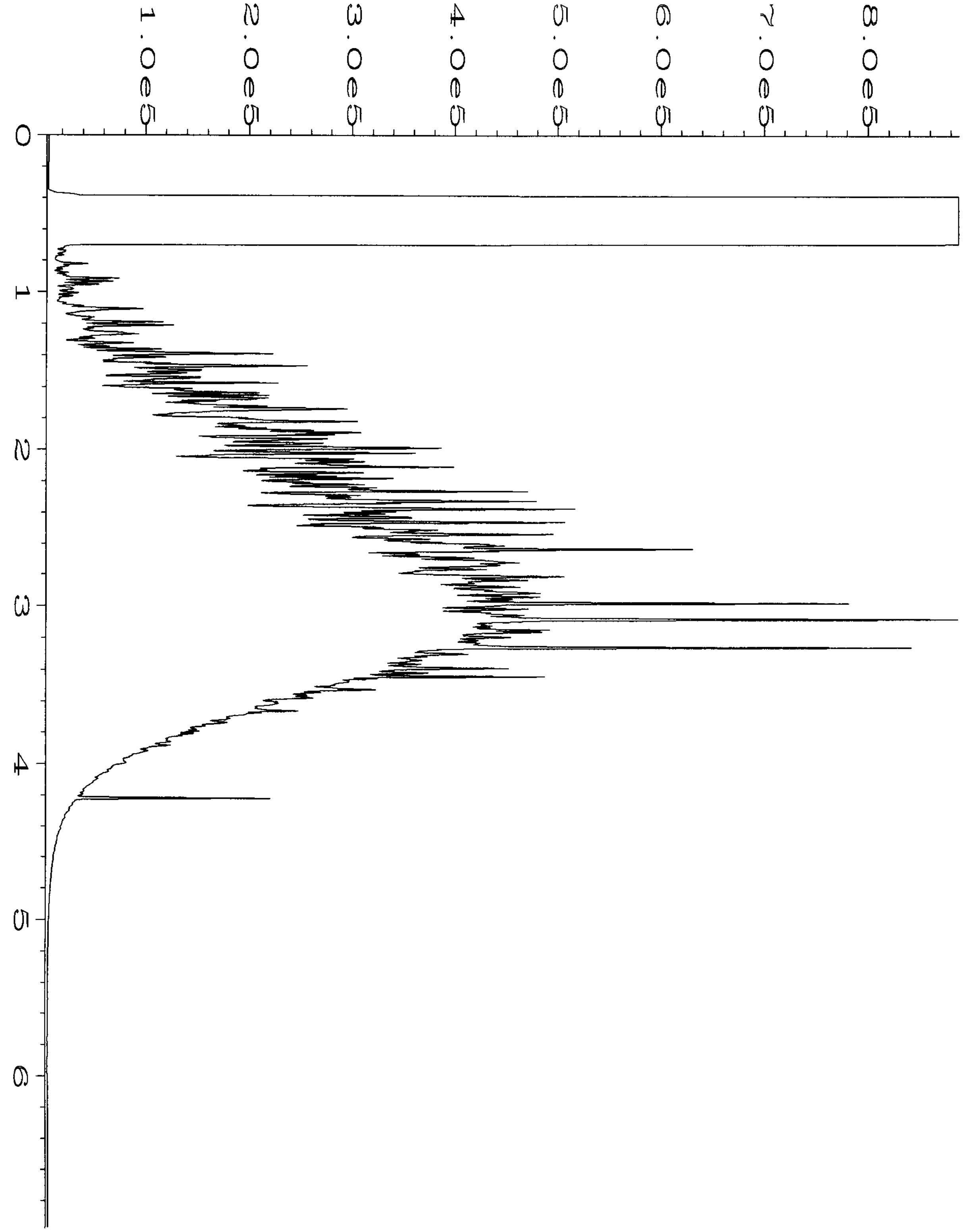

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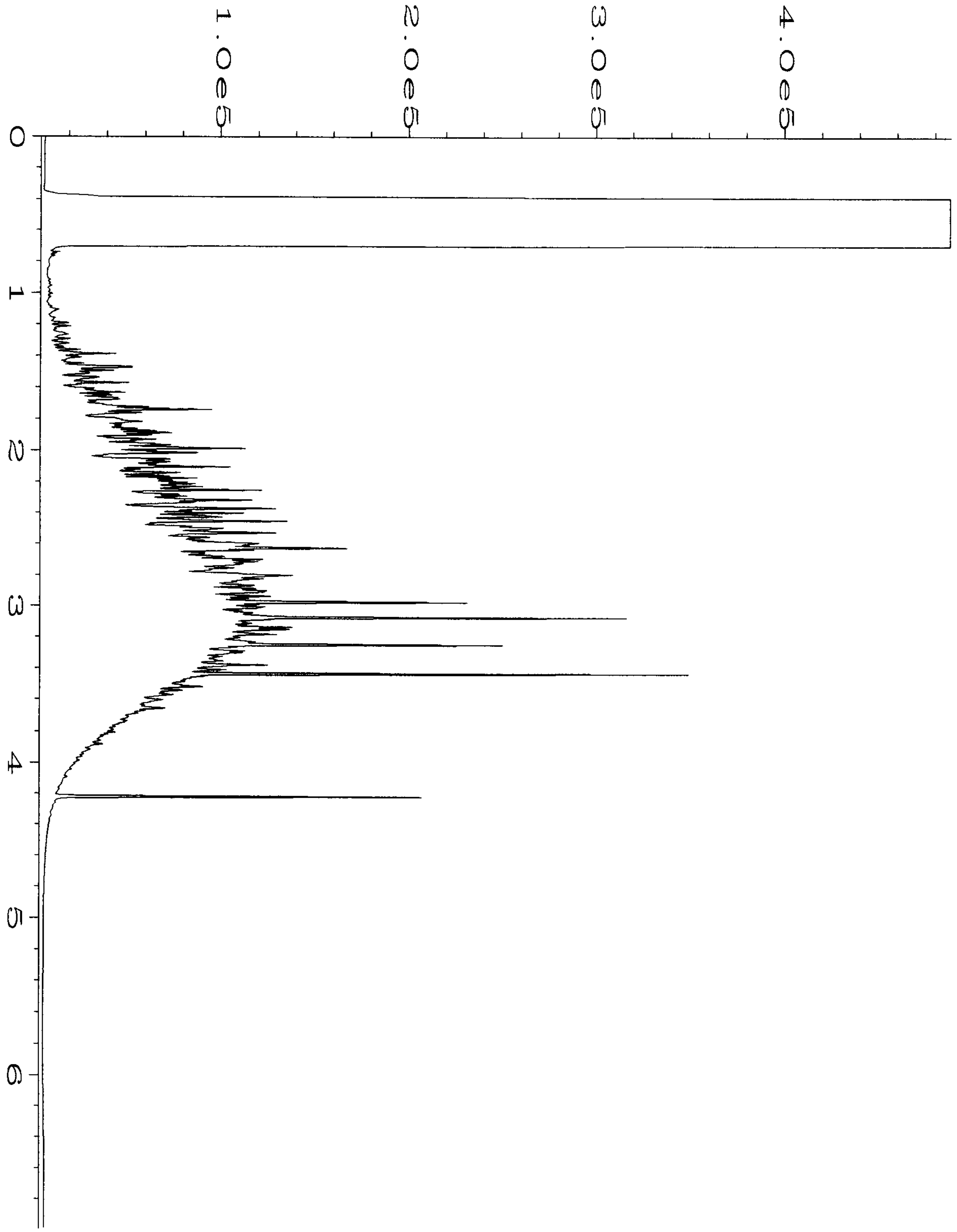
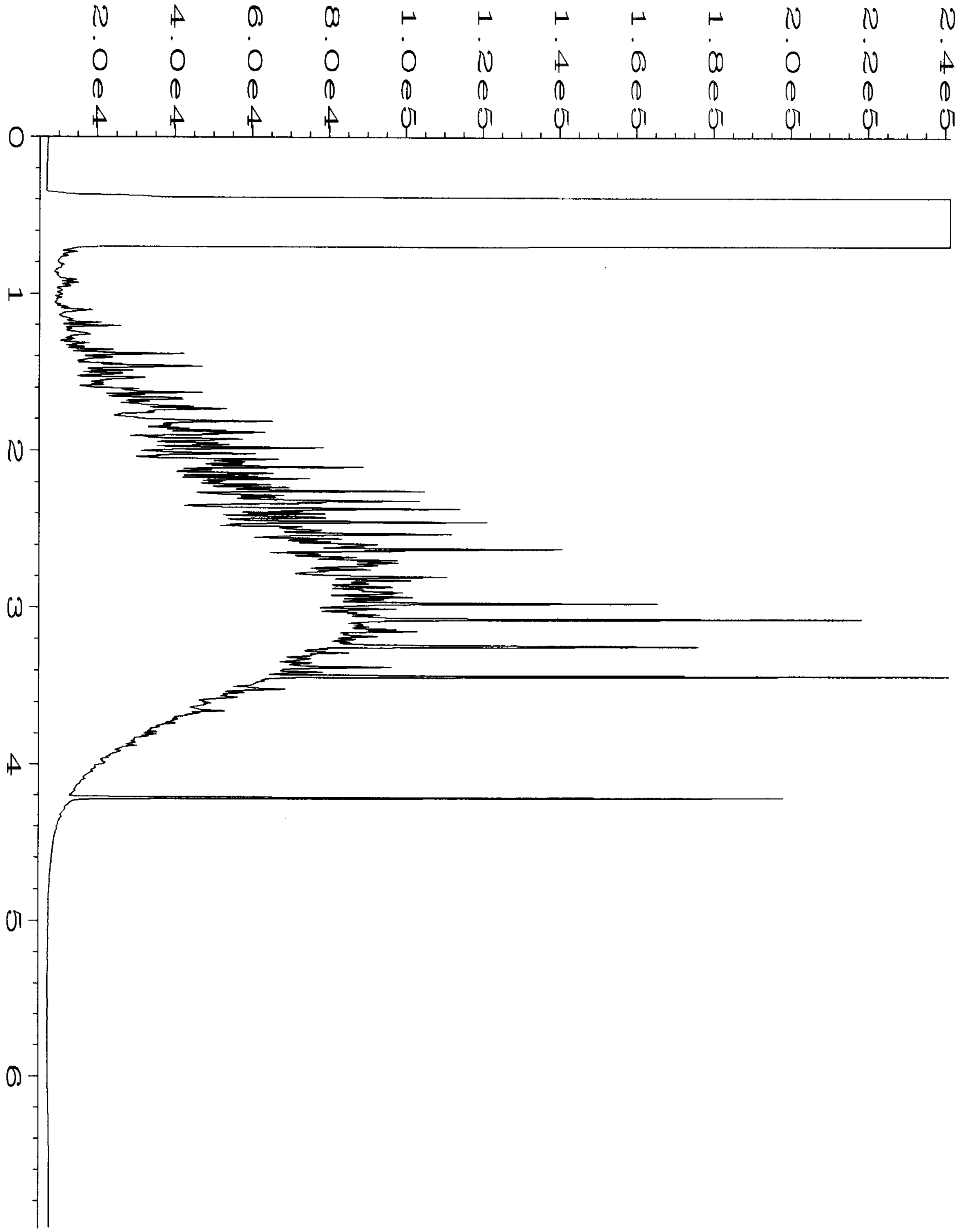
Instrument        : GC #6                             Vial Number       : 29
Sample Name       : 505103-13                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line     : 7
Acquired on       : 12 May 15  05:45 PM               Instrument Method: DX.MTH
Report Created on: 13 May 15  10:06 AM                Analysis Method   : BAKEOUT.MTH
```

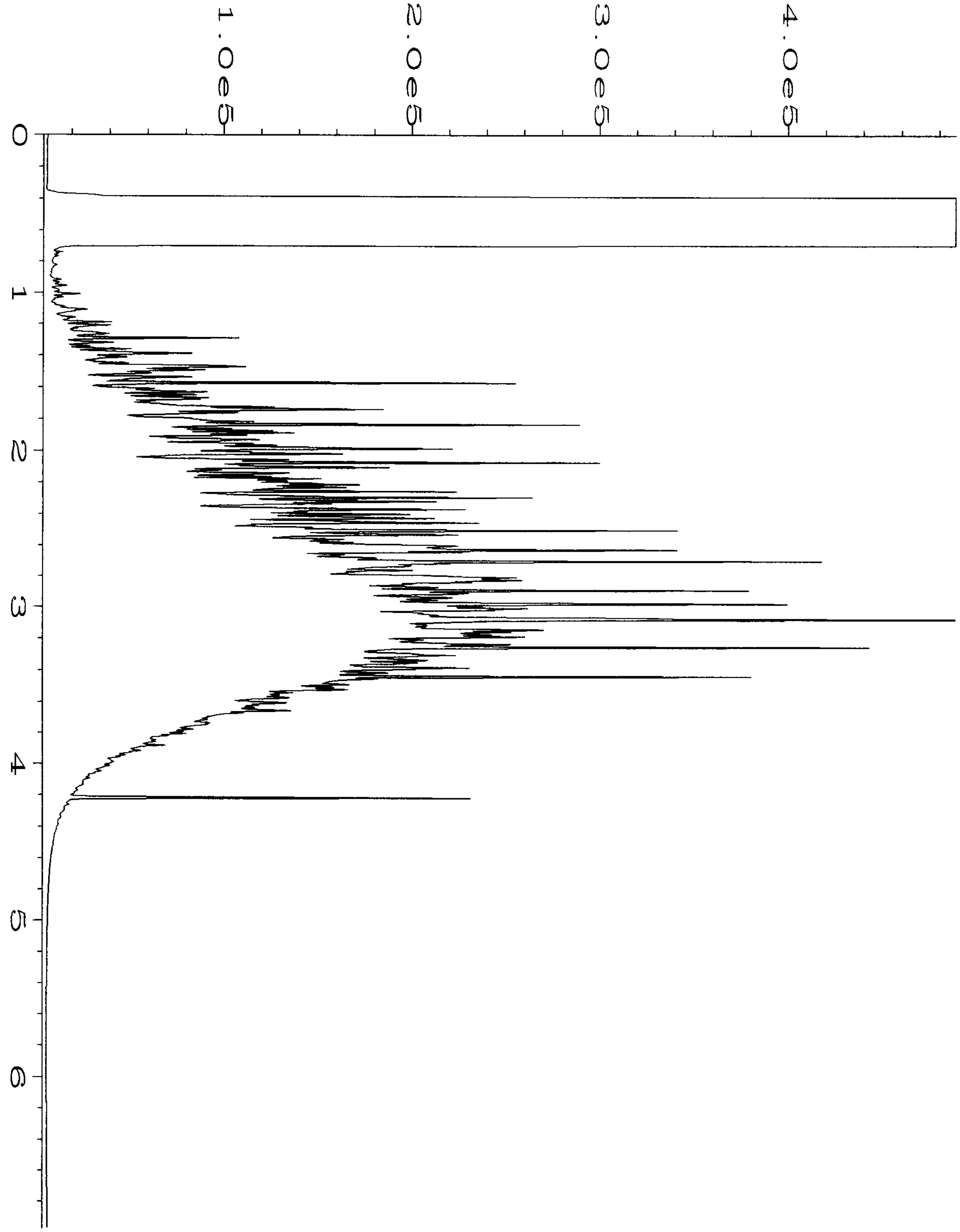


```
Data File Name    : C:\HPCHEM\6\DATA\05-12-15\030F0701.D
Operator          : mwdl                        Page Number       : 1
Instrument        : GC #6                       Vial Number       : 30
Sample Name       : 505103-14                   Injection Number  : 1
Run Time Bar Code:                              Sequence Line     : 7
Acquired on       : 12 May 15   05:56 PM        Instrument Method: DX.MTH
Report Created on: 13 May 15   10:06 AM         Analysis Method   : BAKEOUT.MTH
```



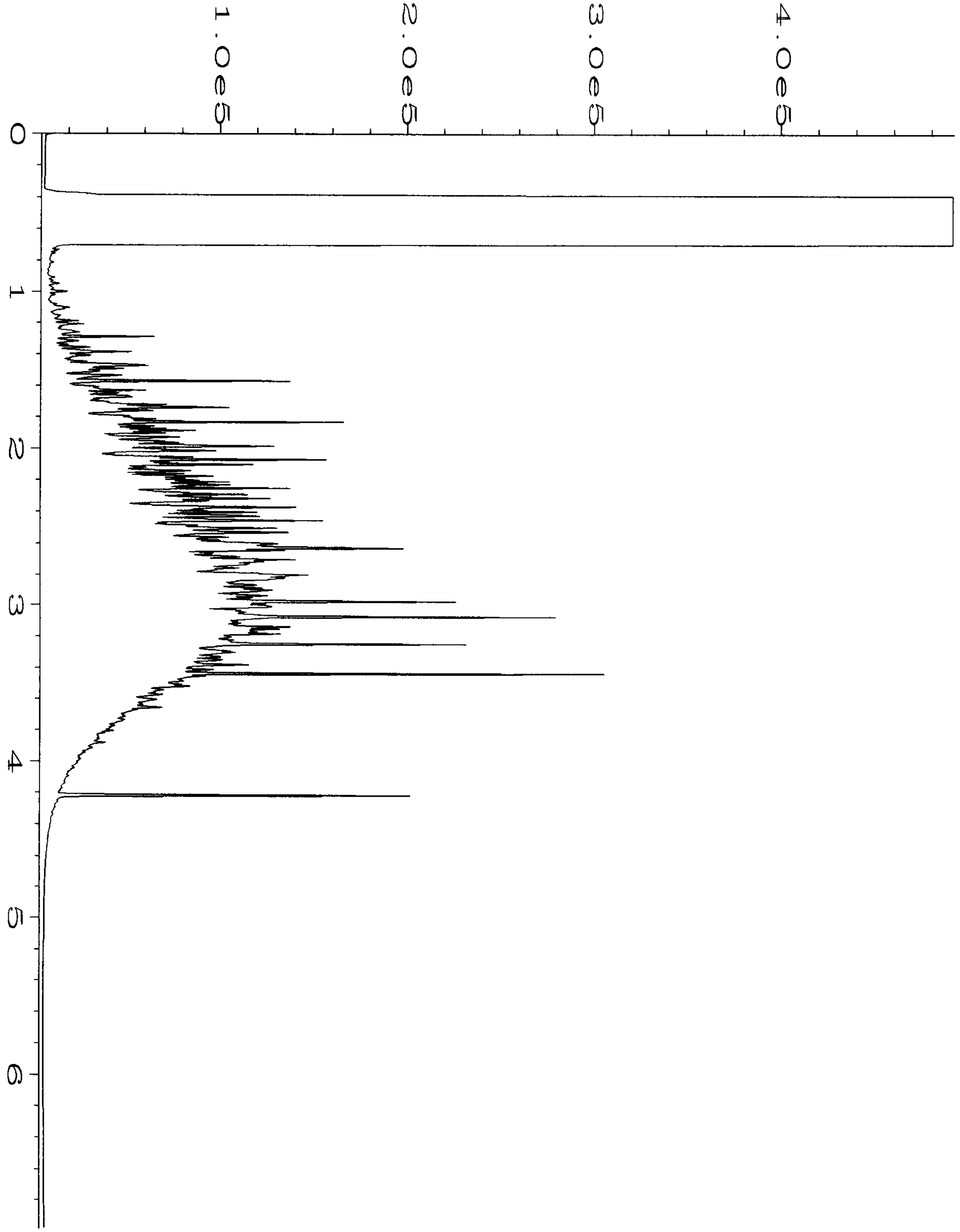
Data File Name : C:\HPCHEM\6\DATA\05-12-15\031F0901.D
Operator : mwdl
Instrument : GC #6
Sample Name : 505103-15
Run Time Bar Code:
Acquired on : 12 May 15 06:29 PM
Report Created on: 13 May 15 10:06 AM

Page Number : 1
Vial Number : 31
Injection Number : 1
Sequence Line : 9
Instrument Method: DX.MTH
Analysis Method : BAKEOUT.MTH

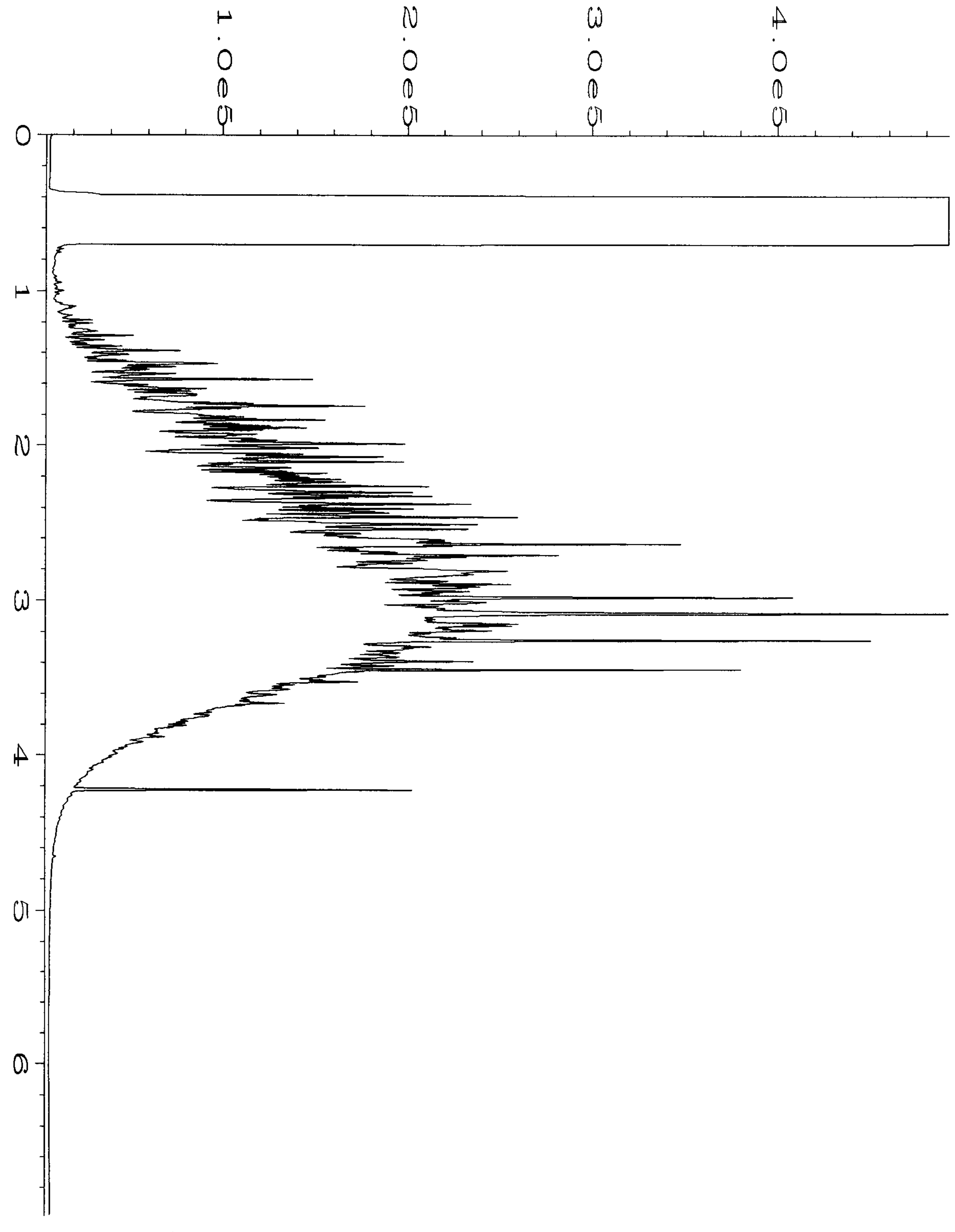


Data File Name : C:\HPCHEM\6\DATA\05-12-15\032F0901.D
Operator : mwdl
Instrument : GC #6
Sample Name : 505103-16
Run Time Bar Code:
Acquired on : 12 May 15 06:40 PM
Report Created on: 13 May 15 10:06 AM

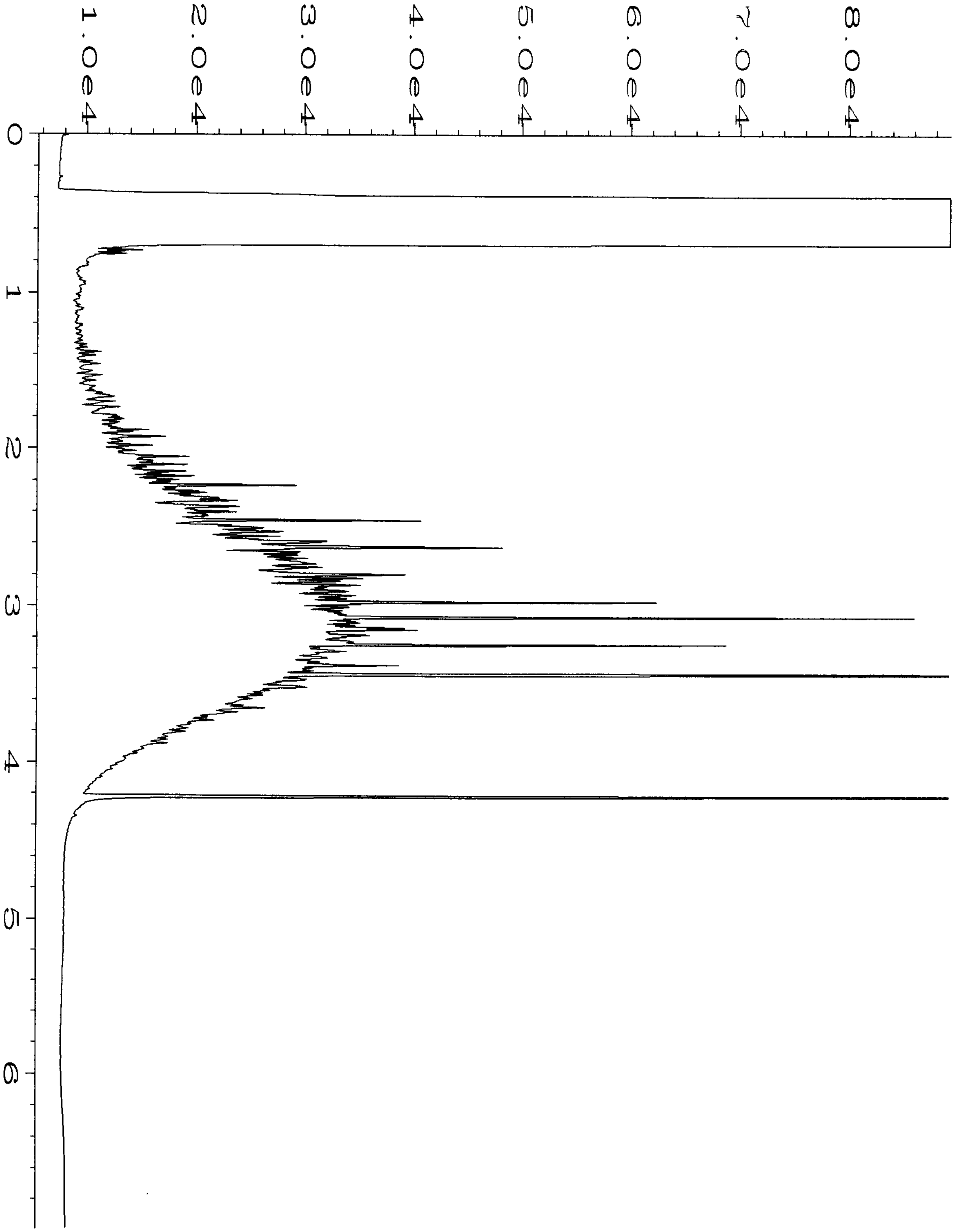
Page Number : 1
Vial Number : 32
Injection Number : 1
Sequence Line : 9
Instrument Method: DX.MTH
Analysis Method : BAKEOUT.MTH



```
Data File Name    : C:\HPCHEM\6\DATA\05-12-15\033F0901.D
Operator          : mwdl                        Page Number      : 1
Instrument        : GC #6                       Vial Number      : 33
Sample Name       : 505103-17                   Injection Number : 1
Run Time Bar Code:                              Sequence Line    : 9
Acquired on       : 12 May 15  06:51 PM         Instrument Method: DX.MTH
Report Created on: 13 May 15  10:06 AM          Analysis Method  : BAKEOUT.MTH
```

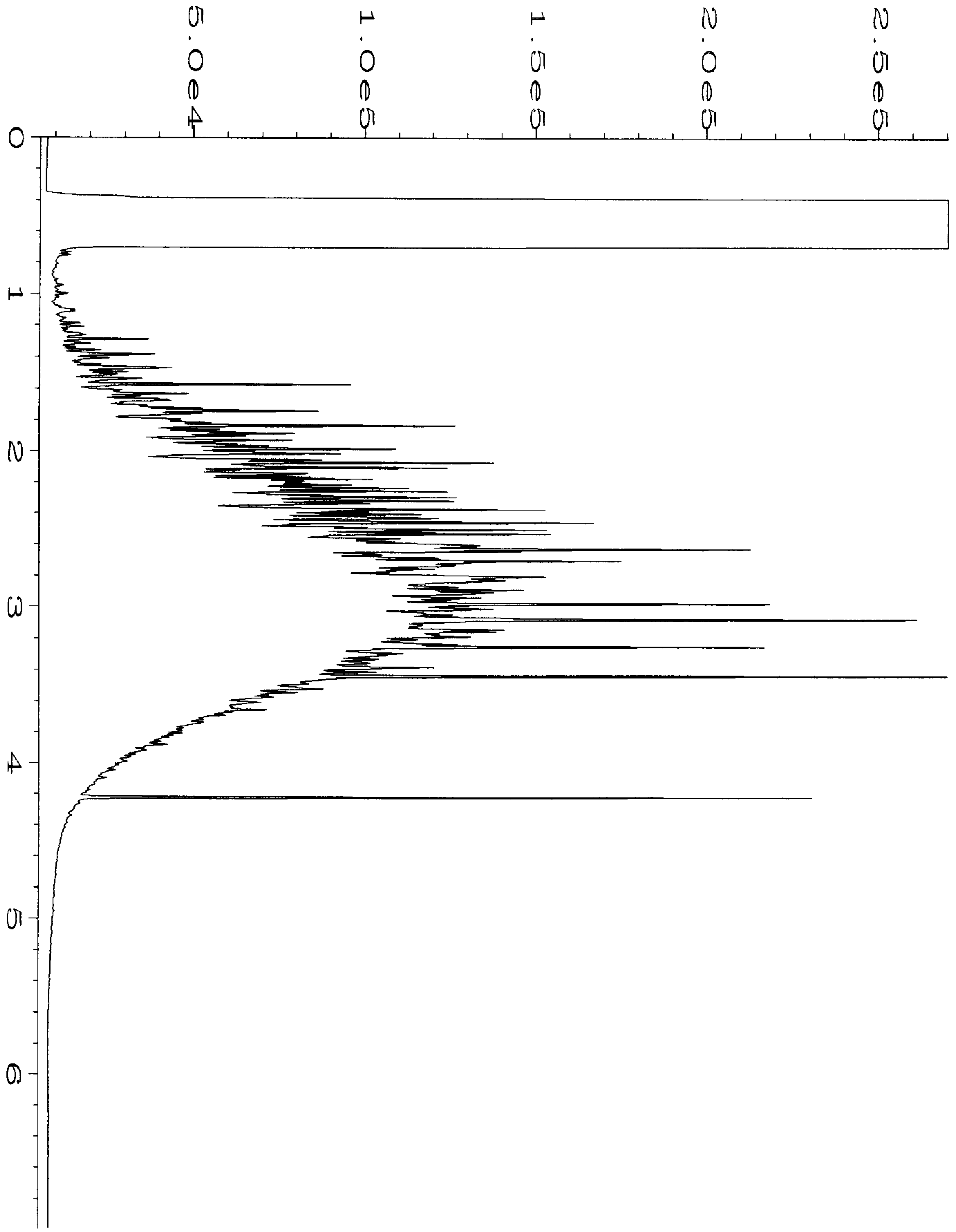


```
Data File Name    : C:\HPCHEM\6\DATA\05-12-15\034F0901.D
Operator          : mwdl                          Page Number      : 1
Instrument        : GC #6                         Vial Number      : 34
Sample Name       : 505103-18                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 9
Acquired on       : 12 May 15  07:02 PM           Instrument Method: DX.MTH
Report Created on: 13 May 15  10:07 AM            Analysis Method  : BAKEOUT.MTH
```



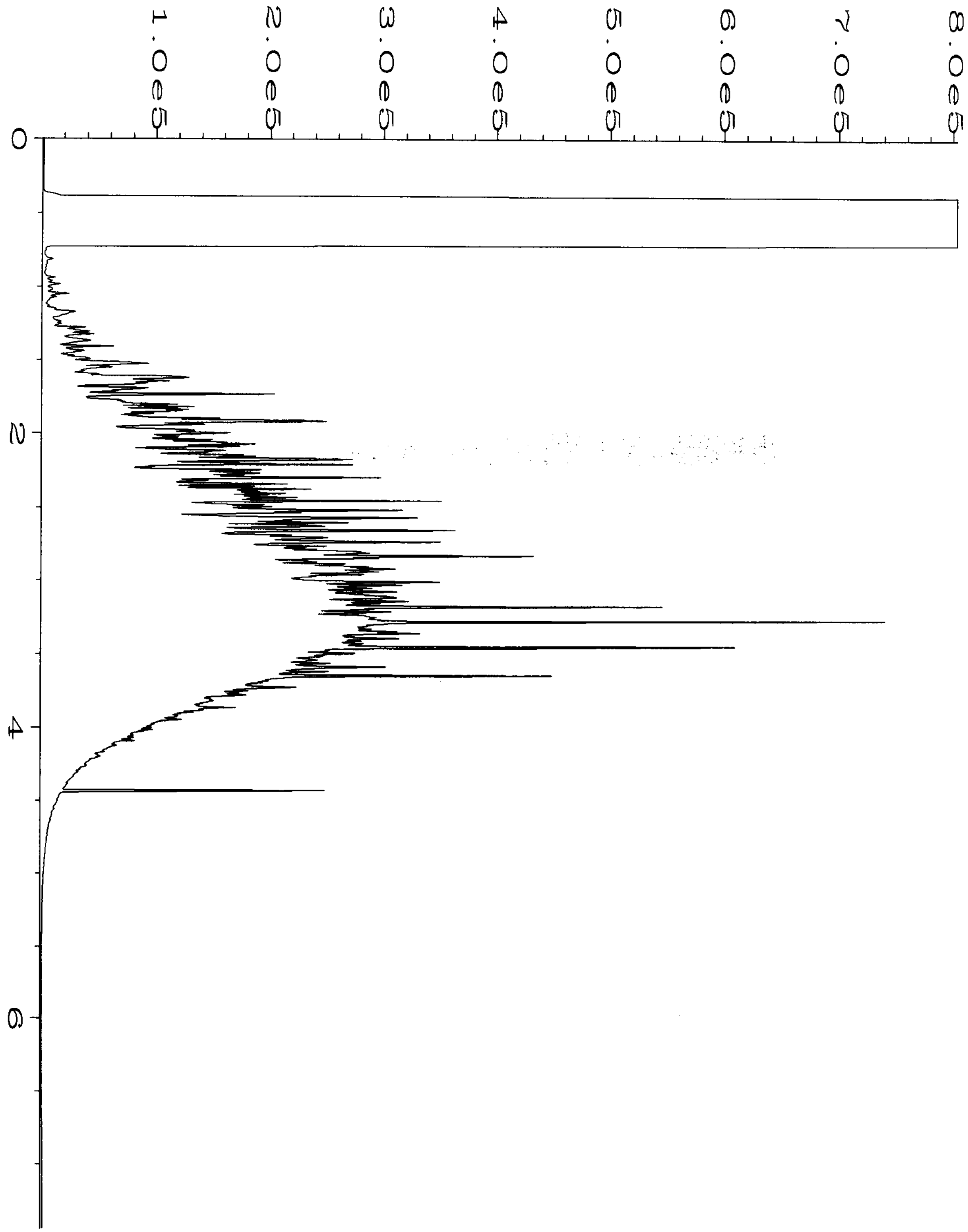
Data File Name : C:\HPCHEM\6\DATA\05-12-15\035F0901.D
Operator : mwdl
Instrument : GC #6
Sample Name : 505103-20
Run Time Bar Code:
Acquired on : 12 May 15 07:13 PM
Report Created on: 13 May 15 10:07 AM

Page Number : 1
Vial Number : 35
Injection Number : 1
Sequence Line : 9
Instrument Method: DX.MTH
Analysis Method : BAKEOUT.MTH

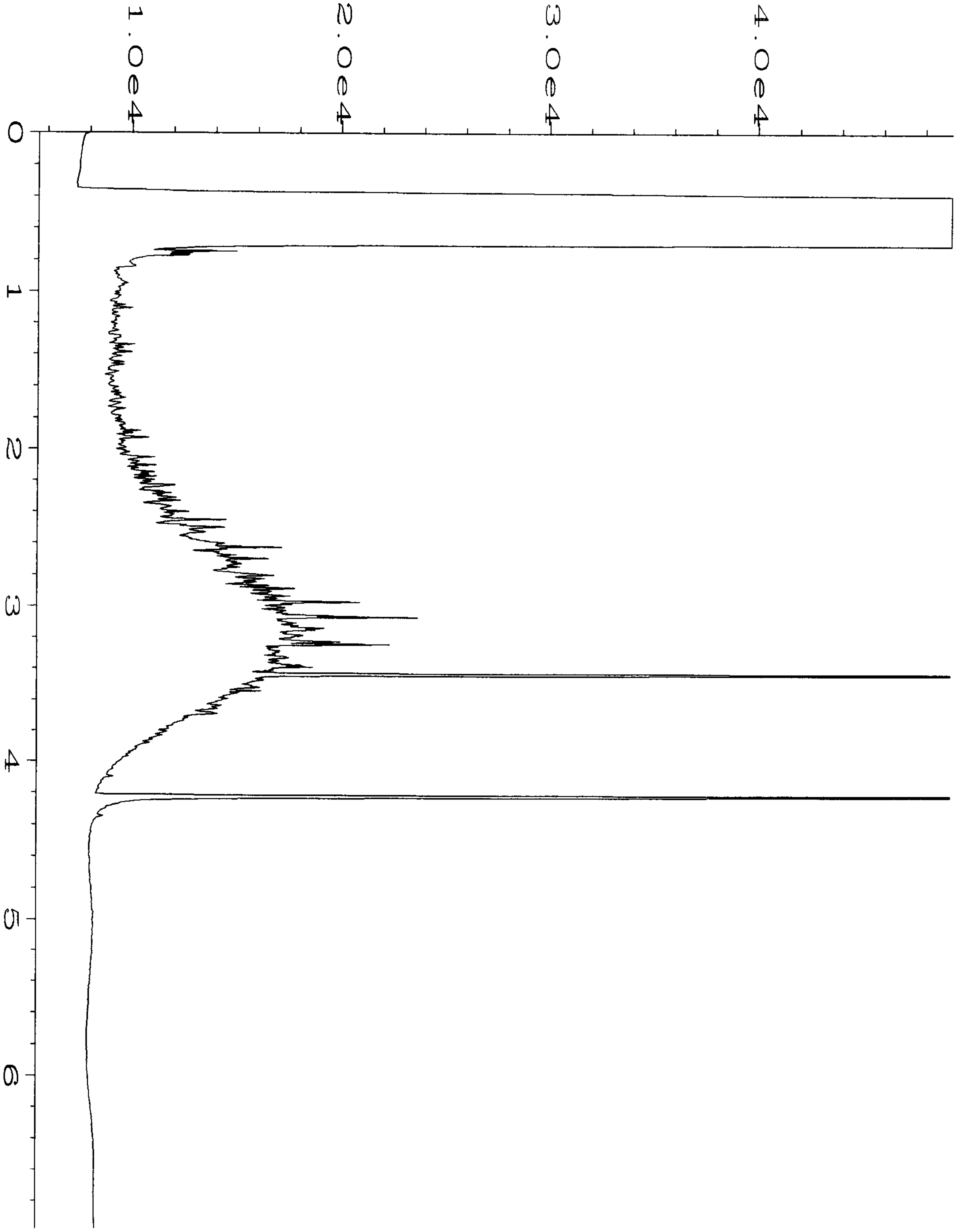


Data File Name : C:\HPCHEM\6\DATA\05-12-15\036F0901.D
Operator : mwdl
Instrument : GC #6
Sample Name : 505103-22
Run Time Bar Code:
Acquired on : 12 May 15 07:24 PM
Report Created on: 13 May 15 10:07 AM

Page Number : 1
Vial Number : 36
Injection Number : 1
Sequence Line : 9
Instrument Method: DX.MTH
Analysis Method : BAKEOUT.MTH

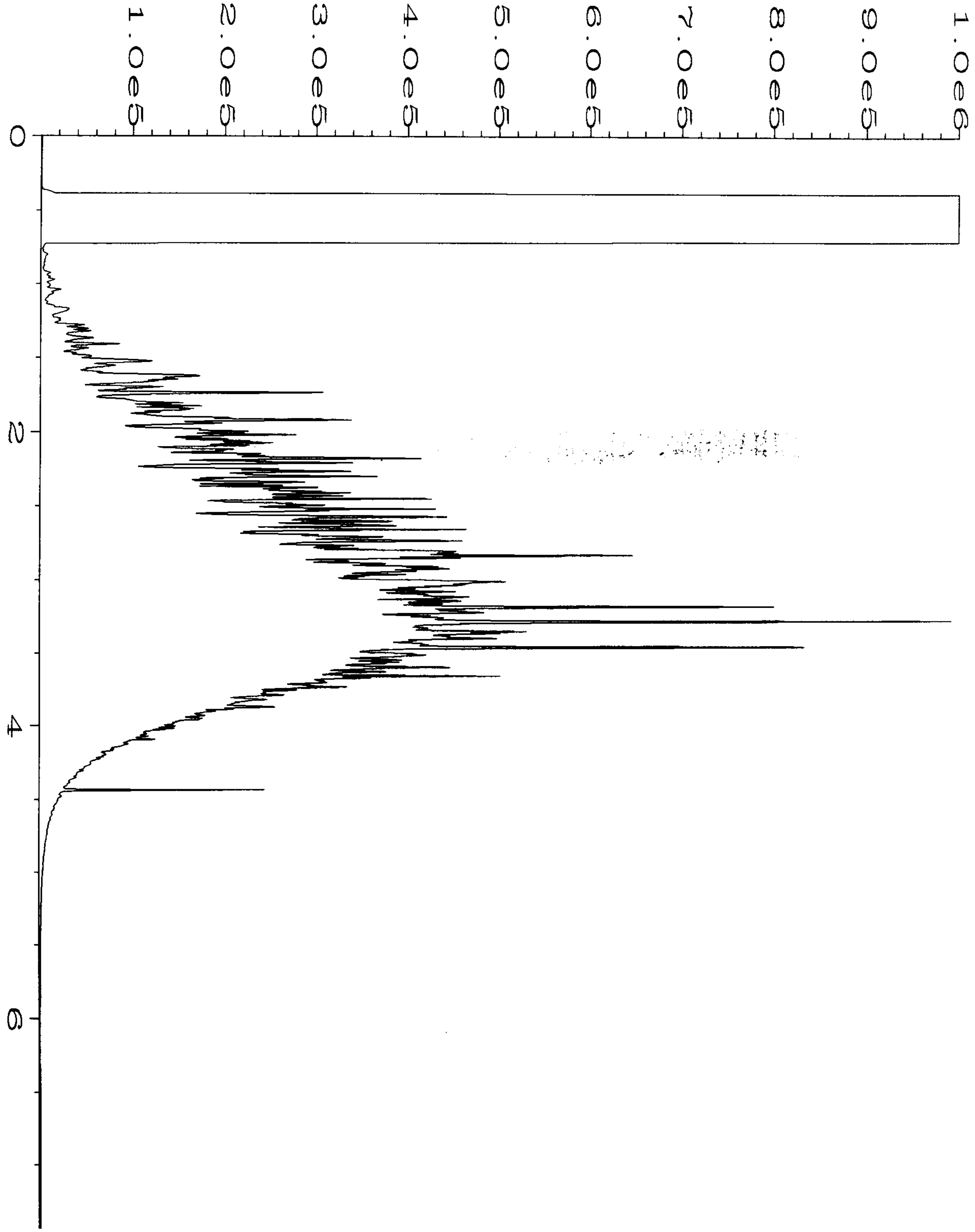


```
Data File Name    : C:\HPCHEM\4\DATA\05-08-15\023F0601.D
Operator          : mwdl                             Page Number       : 1
Instrument        : GC#4                             Vial Number       : 23
Sample Name       : 505103-24                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 6
Acquired on       : 08 May 15  04:09 PM              Instrument Method: DX.MTH
Report Created on: 11 May 15  10:30 AM               Analysis Method   : DX.MTH
```

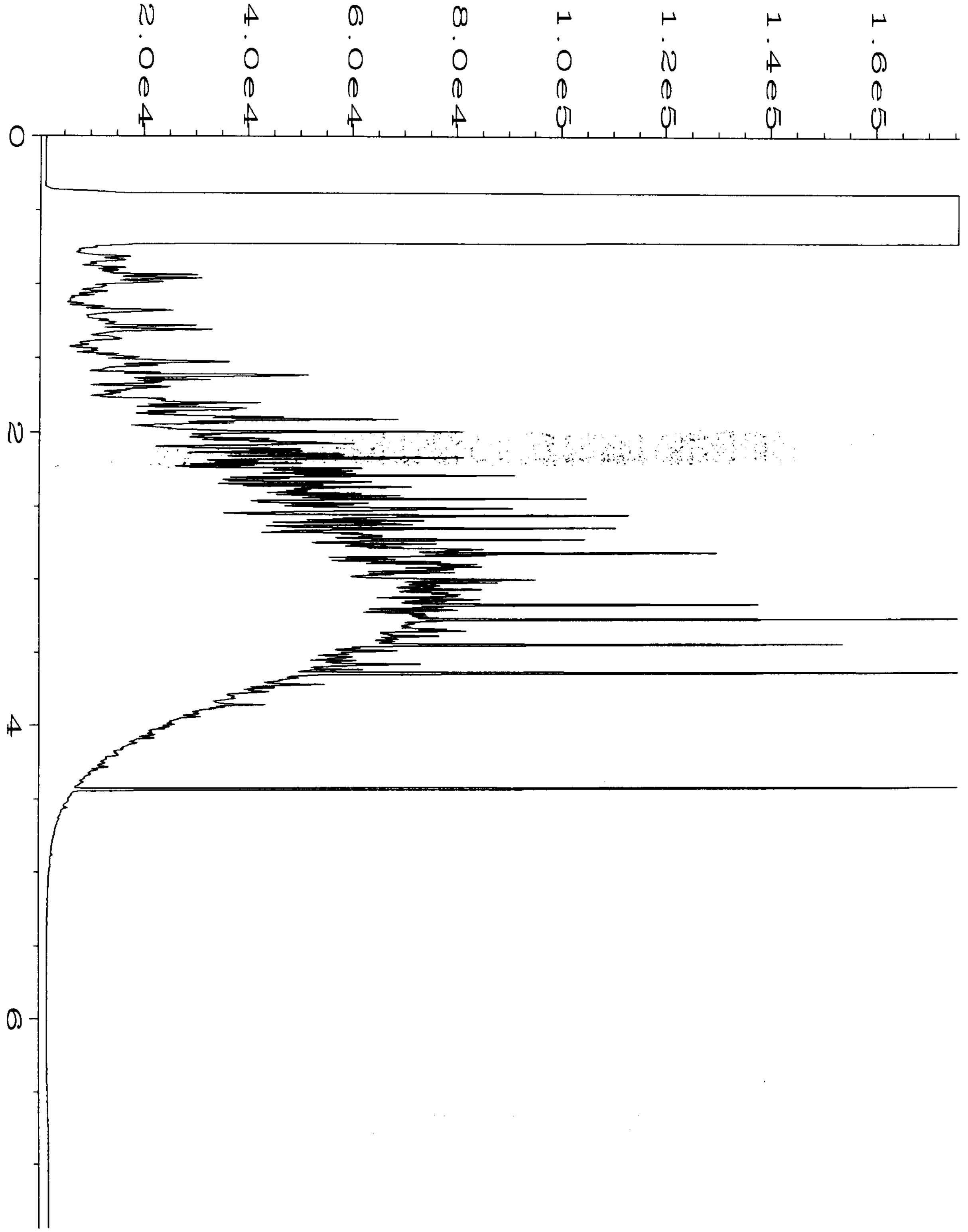


Data File Name : C:\HPCHEM\6\DATA\05-12-15\037F0901.D
Operator : mwdl
Instrument : GC #6
Sample Name : 505103-25
Run Time Bar Code:
Acquired on : 12 May 15 07:34 PM
Report Created on: 13 May 15 10:07 AM

Page Number : 1
Vial Number : 37
Injection Number : 1
Sequence Line : 9
Instrument Method: DX.MTH
Analysis Method : BAKEOUT.MTH

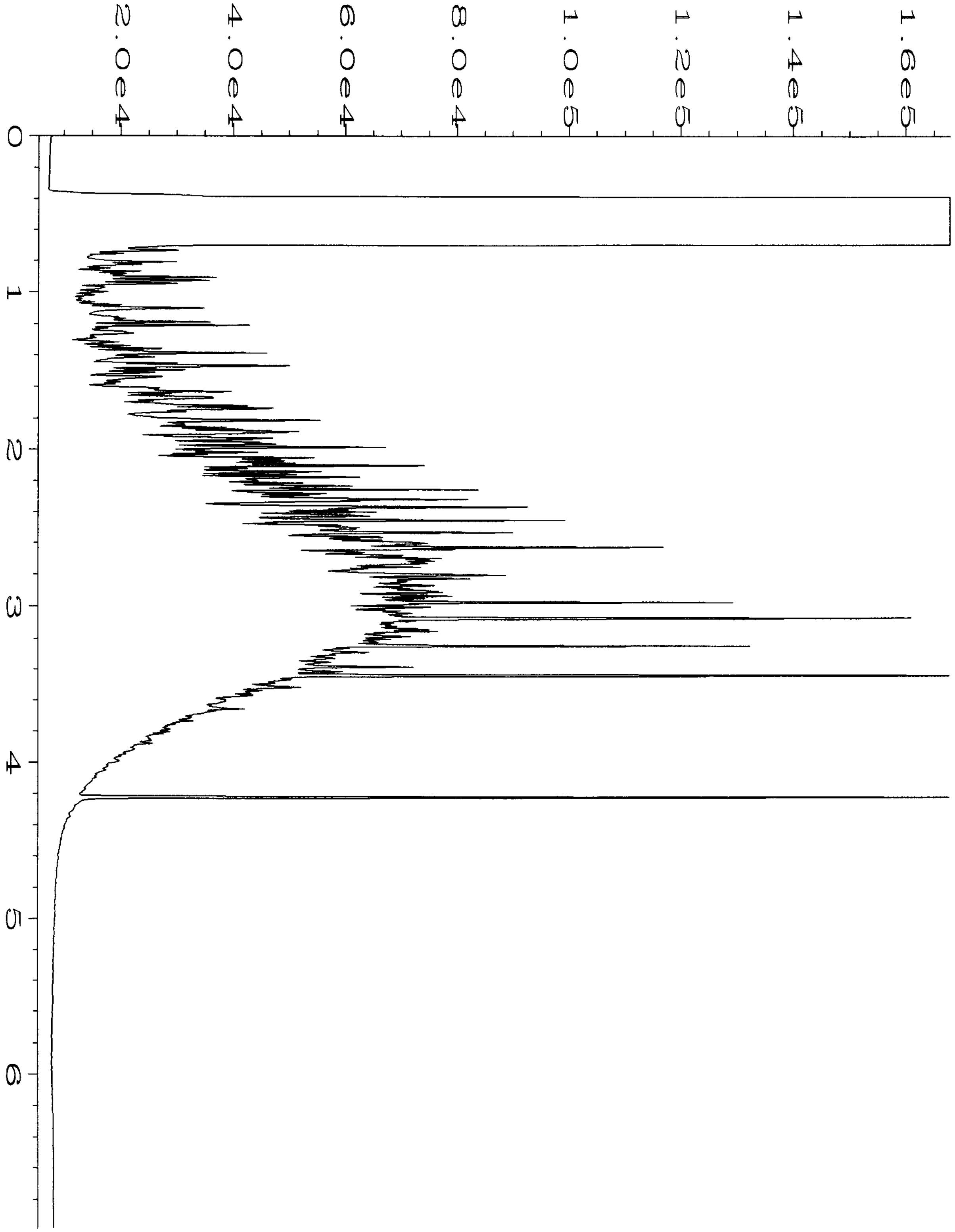


```
Data File Name    : C:\HPCHEM\4\DATA\05-08-15\024F0601.D
Operator          : mwdl                          Page Number       : 1
Instrument        : GC#4                          Vial Number       : 24
Sample Name       : 505103-26                     Injection Number  : 1
Run Time Bar Code:                                Sequence Line     : 6
Acquired on       : 08 May 15  04:21 PM           Instrument Method: DX.MTH
Report Created on: 11 May 15  10:31 AM            Analysis Method   : DX.MTH
```



Data File Name   : C:\HPCHEM\4\DATA\05-08-15\025F0601.D
Operator   : mwdl
Instrument   : GC#4
Sample Name   : 505103-27
Run Time Bar Code:
Acquired on   : 08 May 15 04:32 PM
Report Created on: 11 May 15 10:31 AM

Page Number   : 1
Vial Number   : 25
Injection Number : 1
Sequence Line   : 6
Instrument Method: DX.MTH
Analysis Method   : DX.MTH



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Data File Name    : C:\HPCHEM\6\DATA\05-12-15\038F0901.D
Operator          : mwdl                          Page Number       : 1
Instrument        : GC #6                         Vial Number       : 38
Sample Name       : 505103-28                     Injection Number : 1
Run Time Bar Code:                                Sequence Line     : 9
Acquired on       : 12 May 15  07:45 PM           Instrument Method: DX.MTH
Report Created on: 13 May 15  10:07 AM            Analysis Method   : BAKEOUT.MTH
```
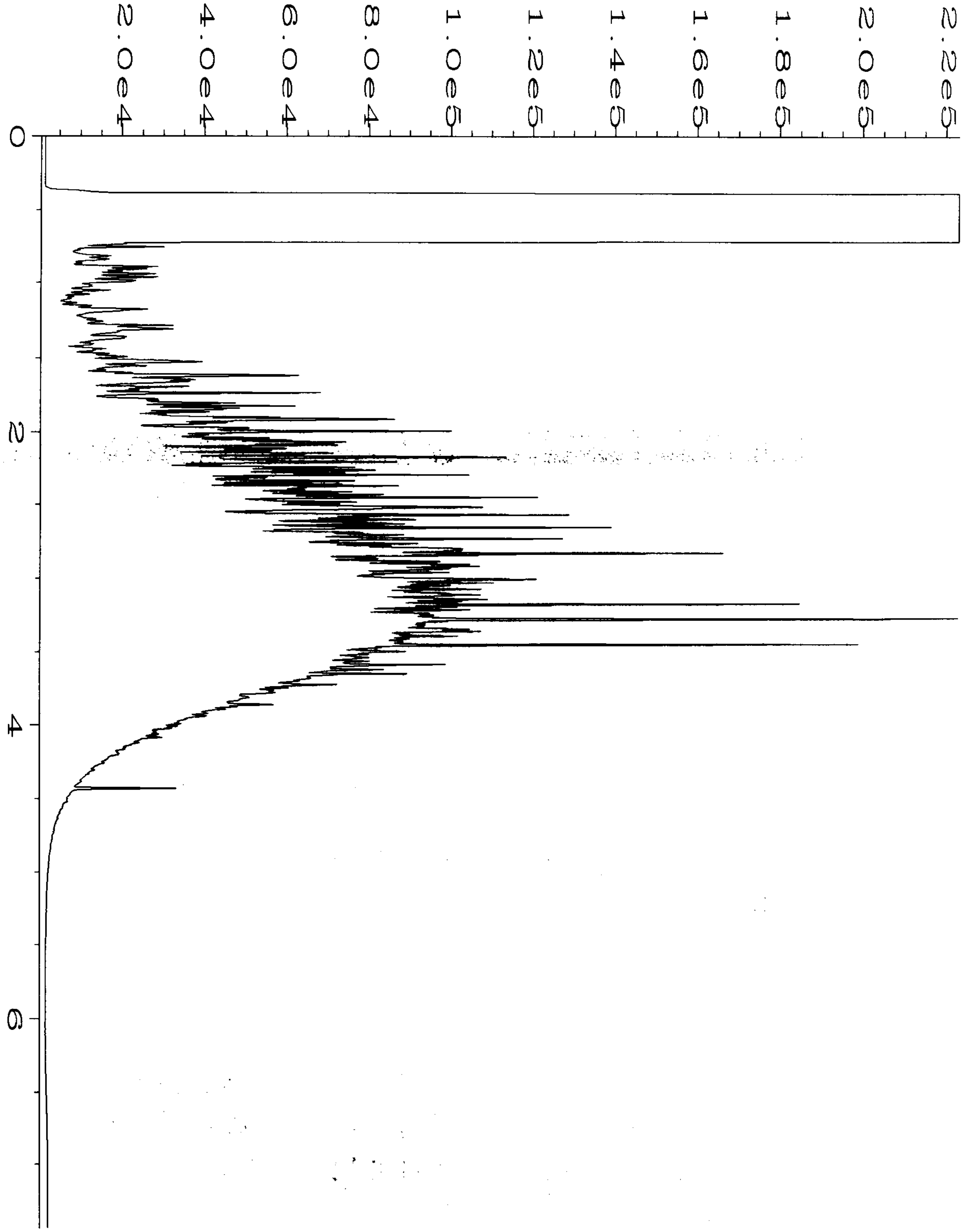
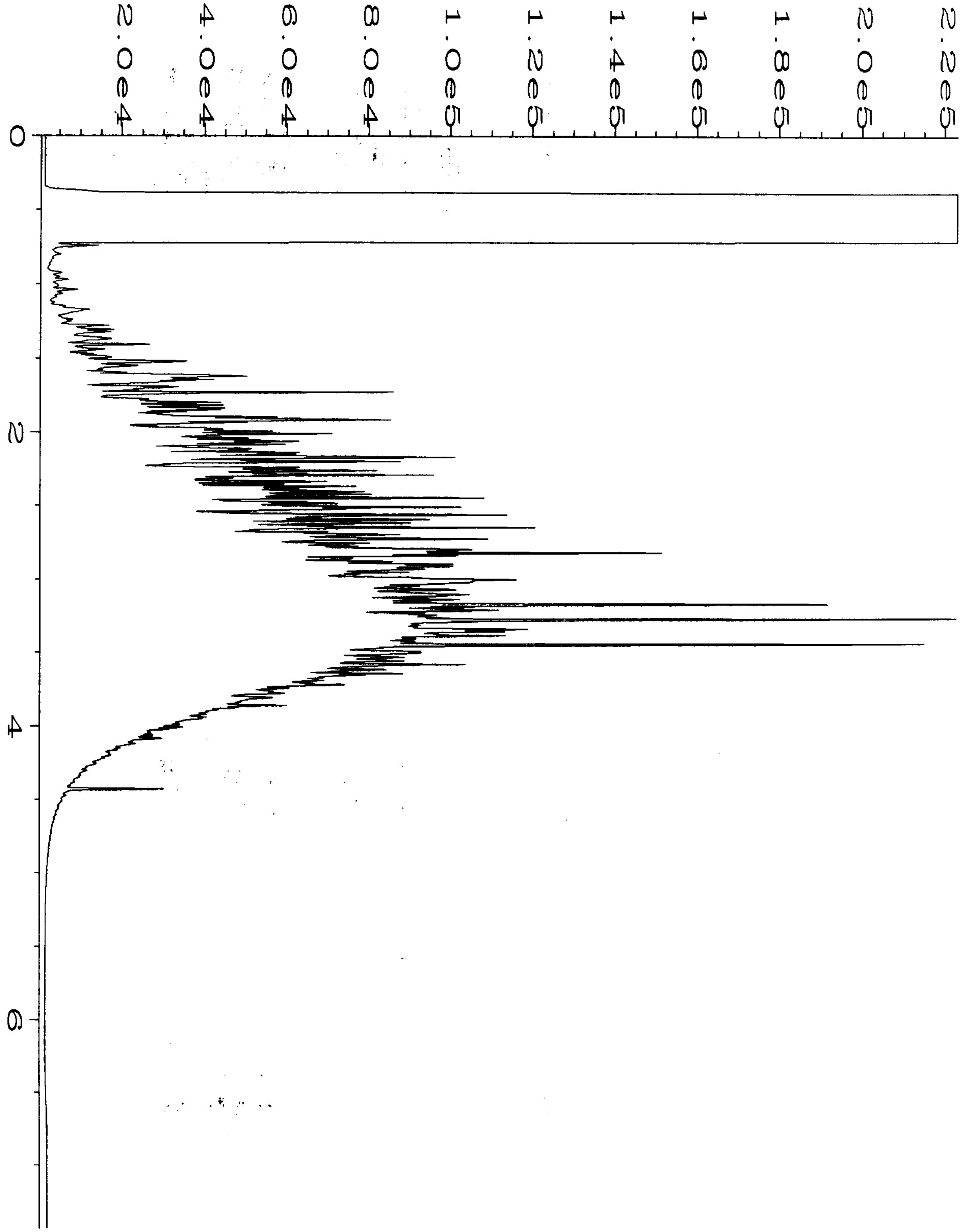
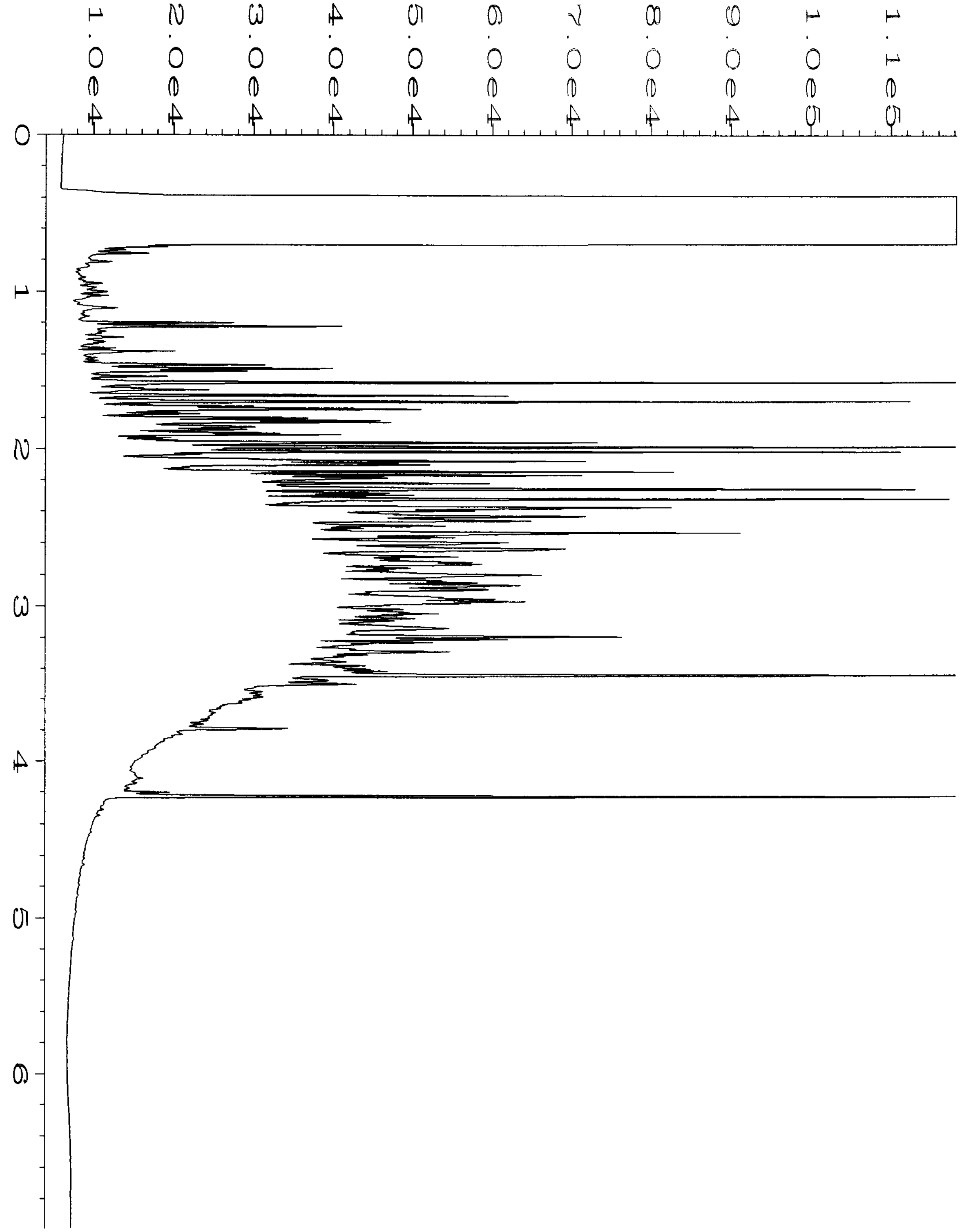



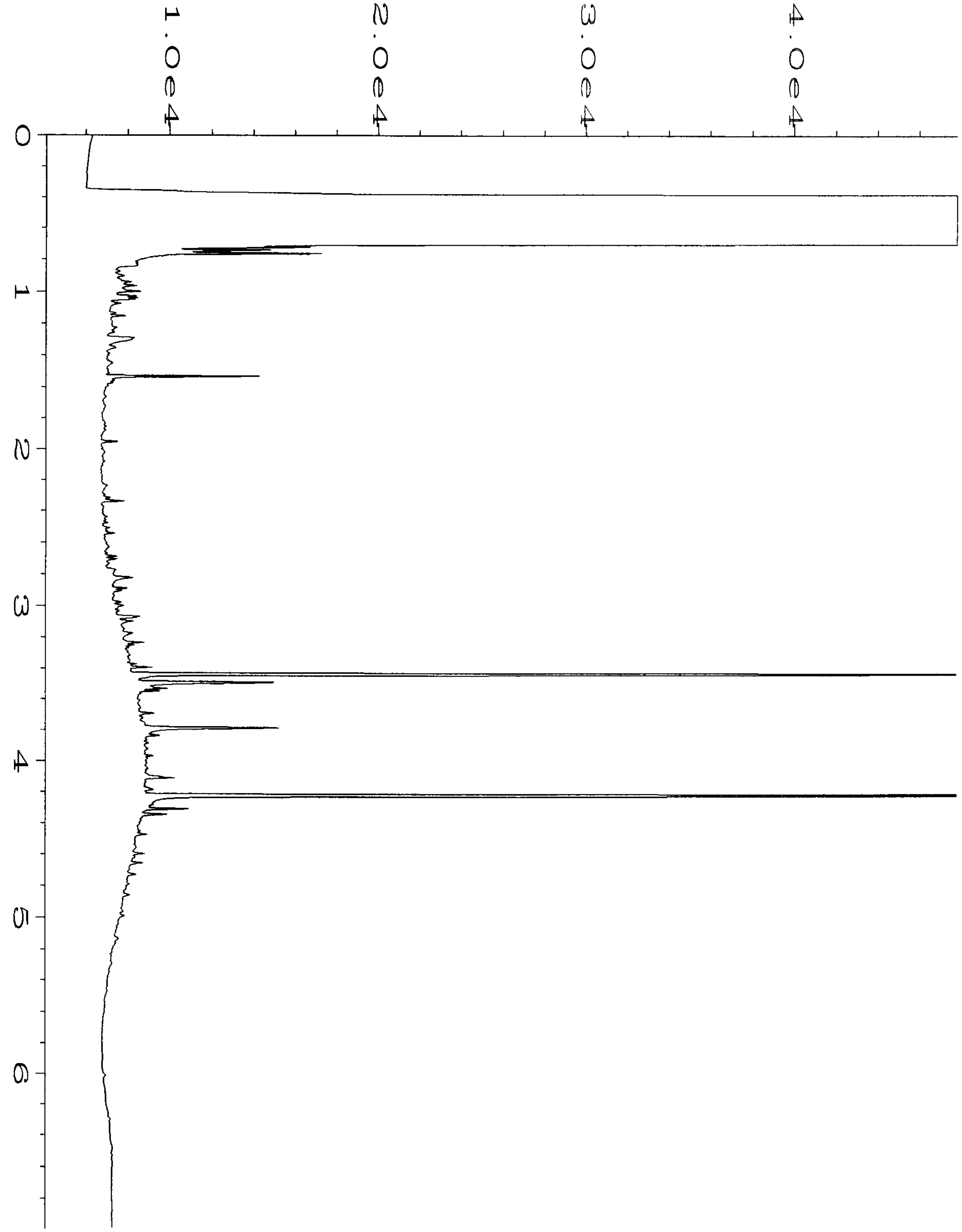
```
Data File Name    : C:\HPCHEM\4\DATA\05-11-15\037F0901.D
Operator          : mwdl                             Page Number       : 1
Instrument        : GC#4                             Vial Number       : 37
Sample Name       : 505103-29 1/10                   Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 9
Acquired on       : 11 May 15  09:27 PM              Instrument Method: DX.MTH
Report Created on: 12 May 15  09:12 AM               Analysis Method   : DX.MTH
```



Data File Name   : C:\HPCHEM\4\DATA\05-11-15\038F0901.D
Operator   : mwdl   Page Number   : 1
Instrument   : GC#4   Vial Number   : 38
Sample Name   : 505103-30 1/10   Injection Number : 1
Run Time Bar Code: Sequence Line   : 9
Acquired on   : 11 May 15   09:38 PM   Instrument Method: DX.MTH
Report Created on: 12 May 15   09:12 AM   Analysis Method : DX.MTH

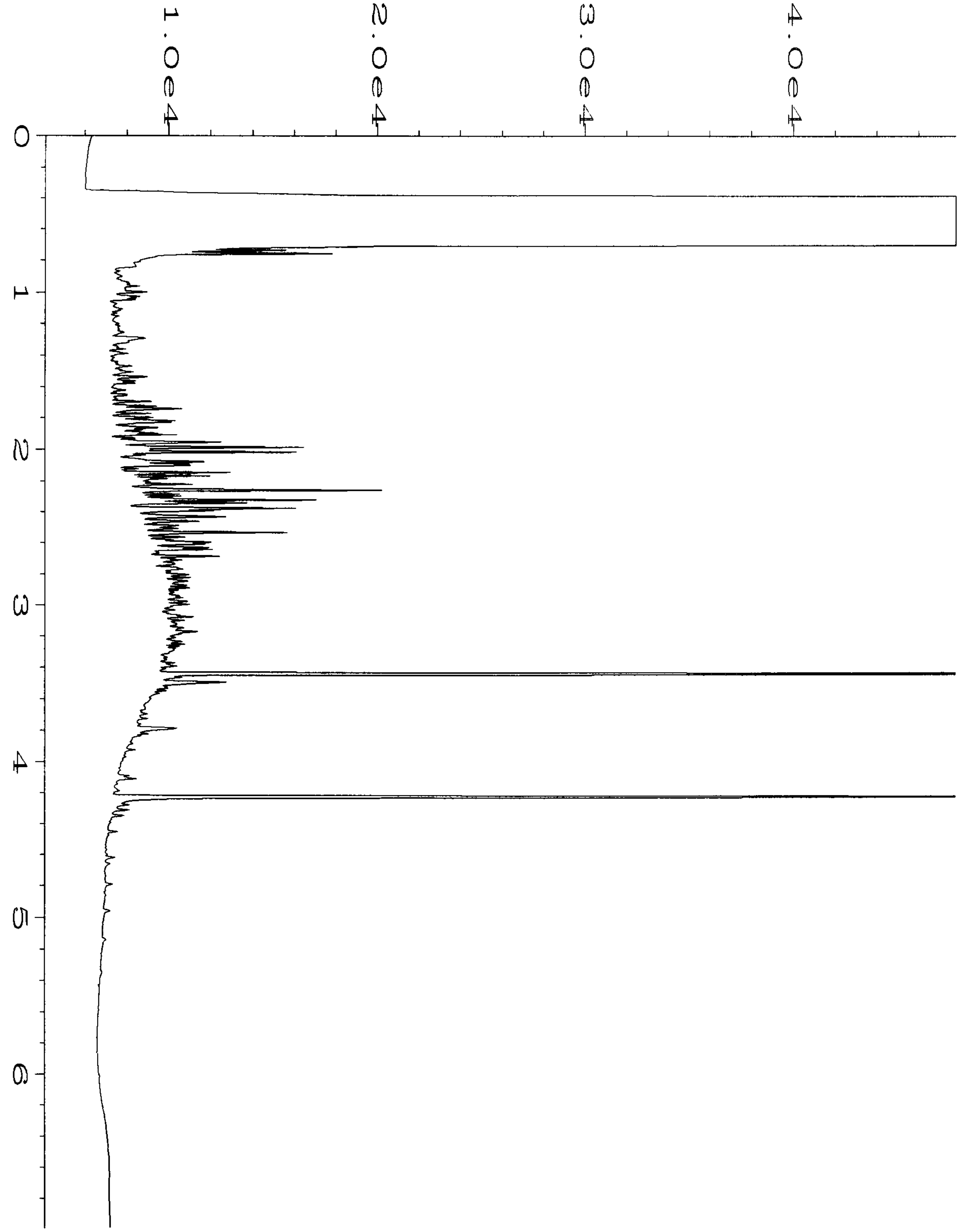


```
Data File Name    : C:\HPCHEM\6\DATA\05-08-15\045F0701.D
Operator          : mwdl                              Page Number      : 1
Instrument        : GC #6                             Vial Number      : 45
Sample Name       : 505103-31                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line    : 7
Acquired on       : 08 May 15   07:16 PM              Instrument Method: DX.MTH
Report Created on: 11 May 15   09:09 AM              Analysis Method  : BAKEOUT.MTH
```



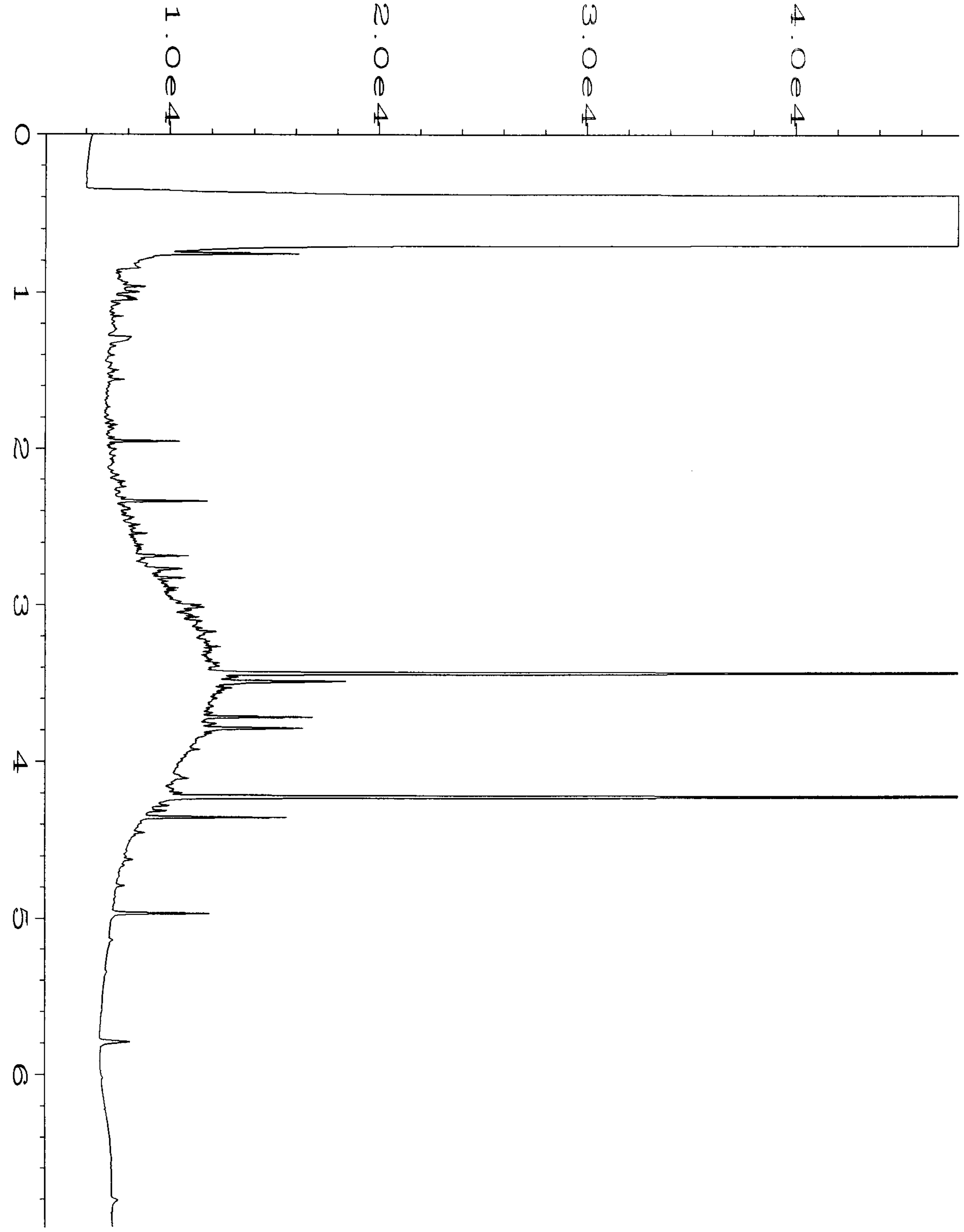
Data File Name : C:\HPCHEM\6\DATA\05-08-15\046F0901.D
Operator : mwdl
Instrument : GC #6
Sample Name : 505103-32
Run Time Bar Code:
Acquired on : 08 May 15 07:49 PM
Report Created on: 11 May 15 09:09 AM

Page Number : 1
Vial Number : 46
Injection Number : 1
Sequence Line : 9
Instrument Method: DX.MTH
Analysis Method : BAKEOUT.MTH

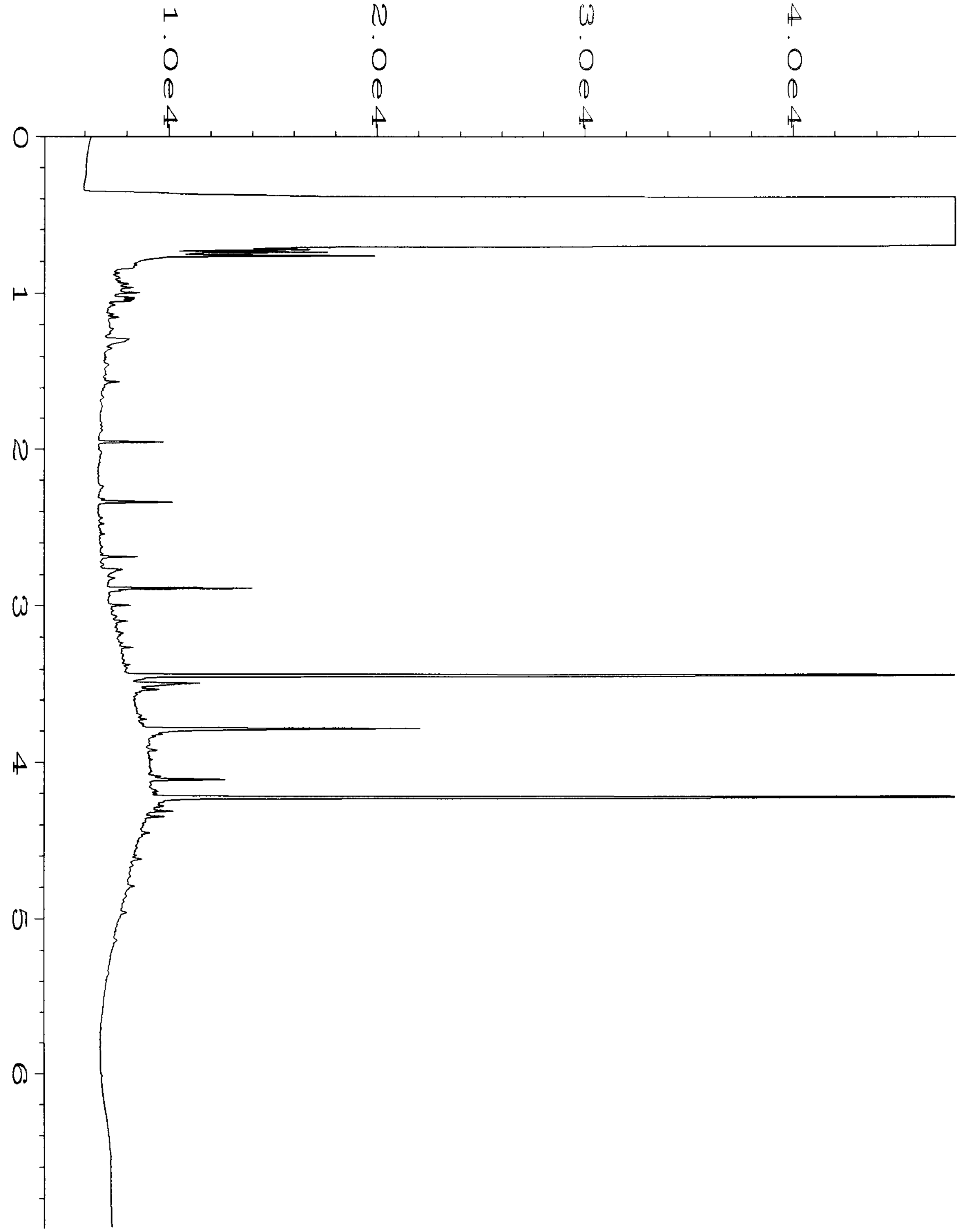


Data File Name : C:\HPCHEM\6\DATA\05-08-15\047F0901.D
Operator : mwdl
Instrument : GC #6
Sample Name : 505103-33
Run Time Bar Code:
Acquired on : 08 May 15 08:00 PM
Report Created on: 11 May 15 09:09 AM

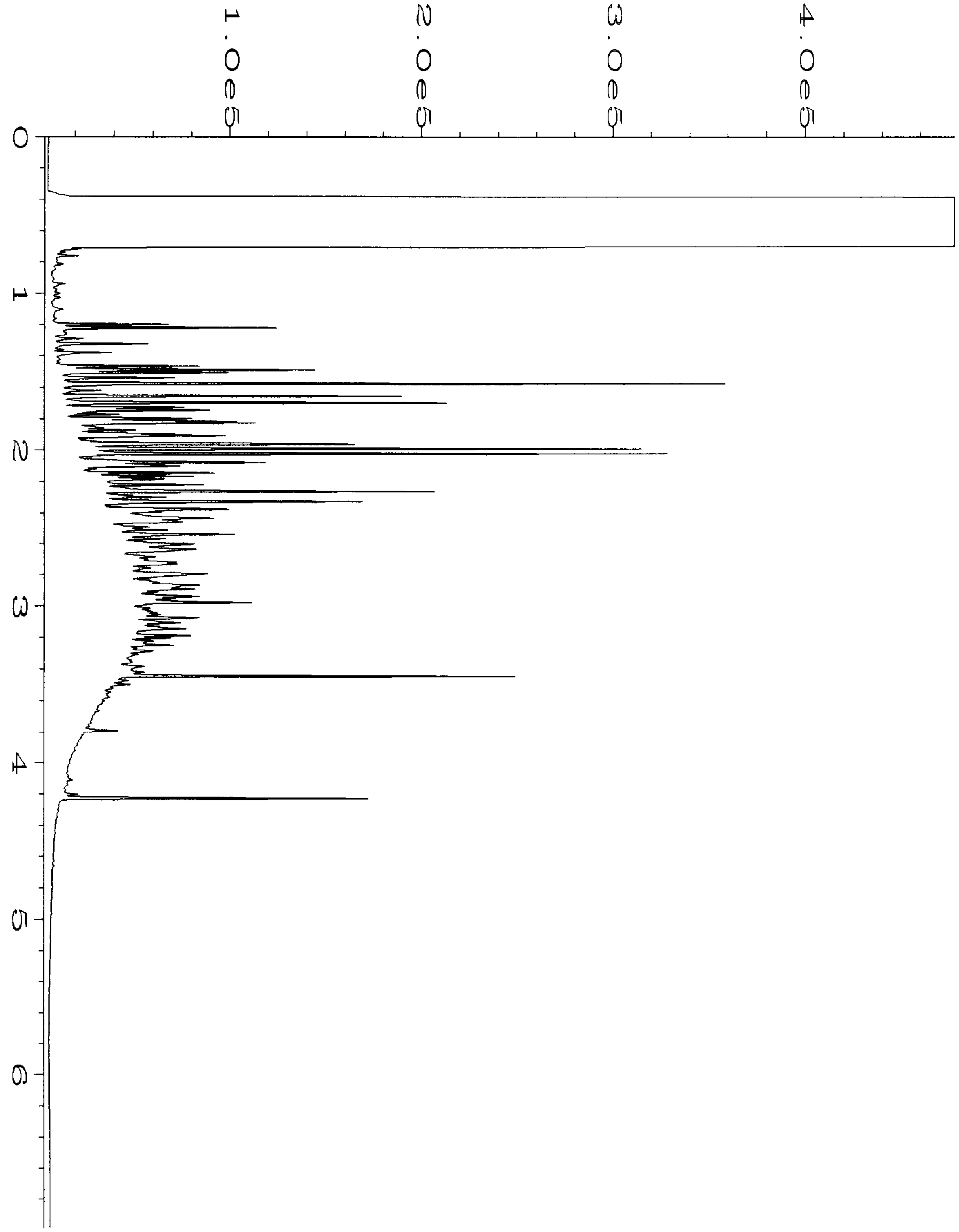
Page Number : 1
Vial Number : 47
Injection Number : 1
Sequence Line : 9
Instrument Method: DX.MTH
Analysis Method : BAKEOUT.MTH



```
Data File Name    : C:\HPCHEM\6\DATA\05-08-15\048F0901.D
Operator          : mwdl                          Page Number      : 1
Instrument        : GC #6                         Vial Number      : 48
Sample Name       : 505103-34                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 9
Acquired on       : 08 May 15  08:11 PM           Instrument Method: DX.MTH
Report Created on: 11 May 15  09:09 AM            Analysis Method  : BAKEOUT.MTH
```



```
Data File Name    : C:\HPCHEM\6\DATA\05-08-15\049F0901.D
Operator          : mwdl                           Page Number       : 1
Instrument        : GC #6                          Vial Number       : 49
Sample Name       : 505103-35                      Injection Number : 1
Run Time Bar Code:                                 Sequence Line     : 9
Acquired on       : 08 May 15   08:22 PM           Instrument Method: DX.MTH
Report Created on: 11 May 15   09:09 AM            Analysis Method   : BAKEOUT.MTH
```



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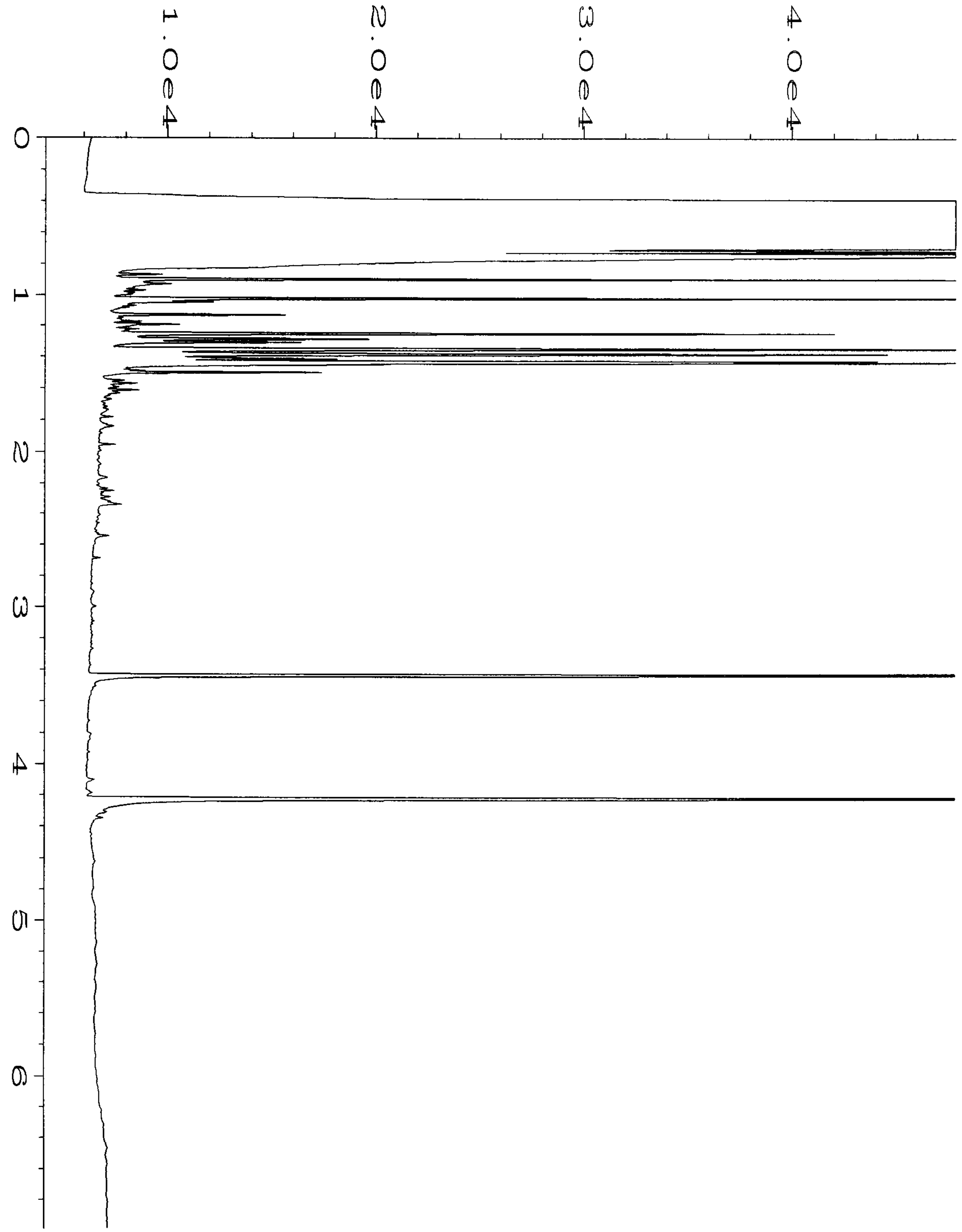
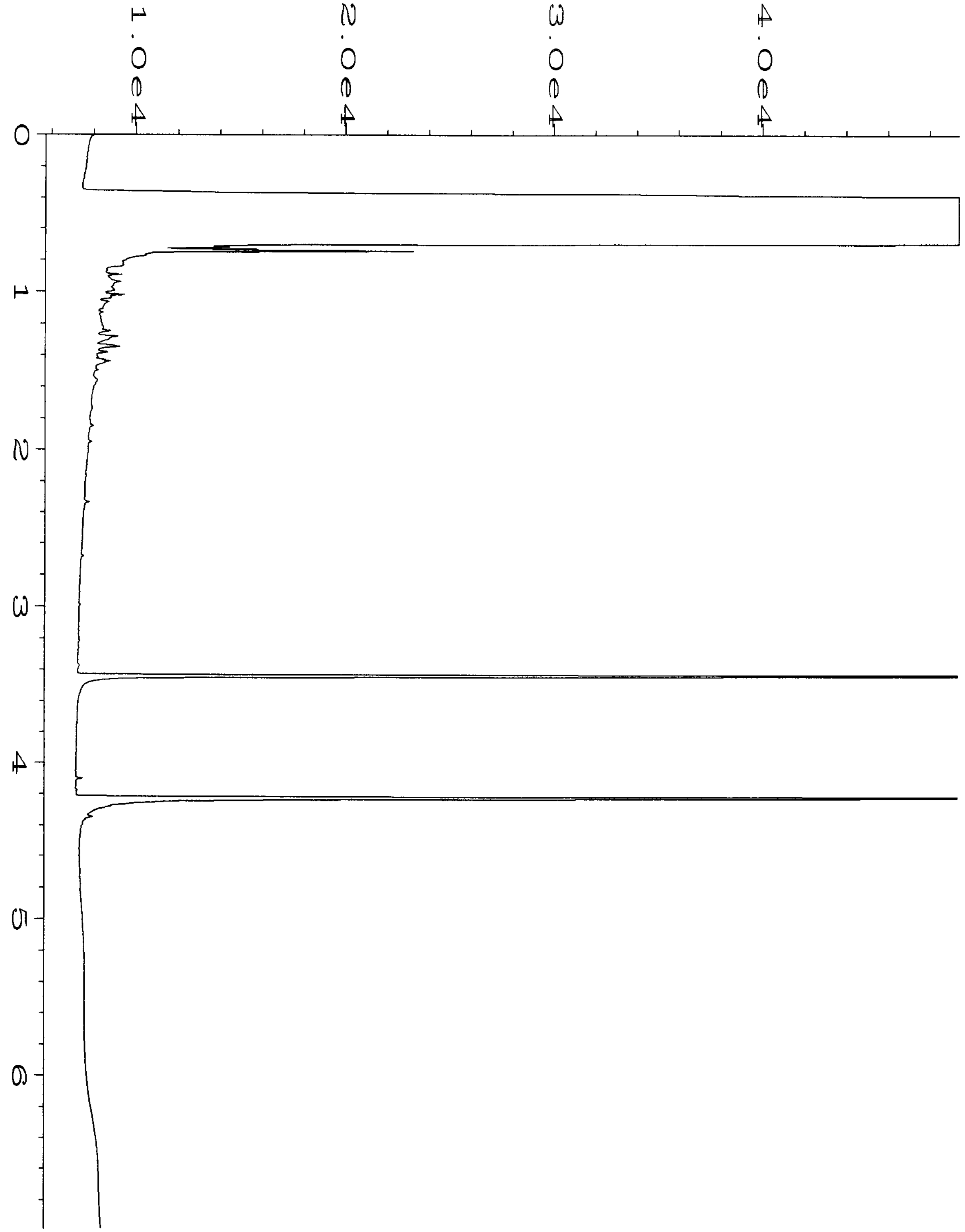
Data File Name    : C:\HPCHEM\6\DATA\05-08-15\050F0901.D
Operator          : mwdl                          Page Number      : 1
Instrument        : GC #6                         Vial Number      : 50
Sample Name       : 505103-36                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 9
Acquired on       : 08 May 15  08:33 PM           Instrument Method: DX.MTH
Report Created on: 11 May 15  09:09 AM            Analysis Method  : BAKEOUT.MTH
```



Data File Name   : C:\HPCHEM\6\DATA\05-08-15\035F0701.D
Operator   : mwdl
Instrument   : GC #6
Sample Name   : 05-931 mb
Run Time Bar Code:
Acquired on   : 08 May 15   05:27 PM
Report Created on: 11 May 15   09:09 AM

Page Number   : 1
Vial Number   : 35
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : BAKEOUT.MTH



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Data File Name    : C:\HPCHEM\6\DATA\05-12-15\016F0701.D
Operator          : mwdl                             Page Number      : 1
Instrument        : GC #6                            Vial Number      : 16
Sample Name       : 05-956 mb                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 7
Acquired on       : 12 May 15  03:23 PM              Instrument Method: DX.MTH
Report Created on: 13 May 15  10:07 AM               Analysis Method  : BAKEOUT.MTH
```

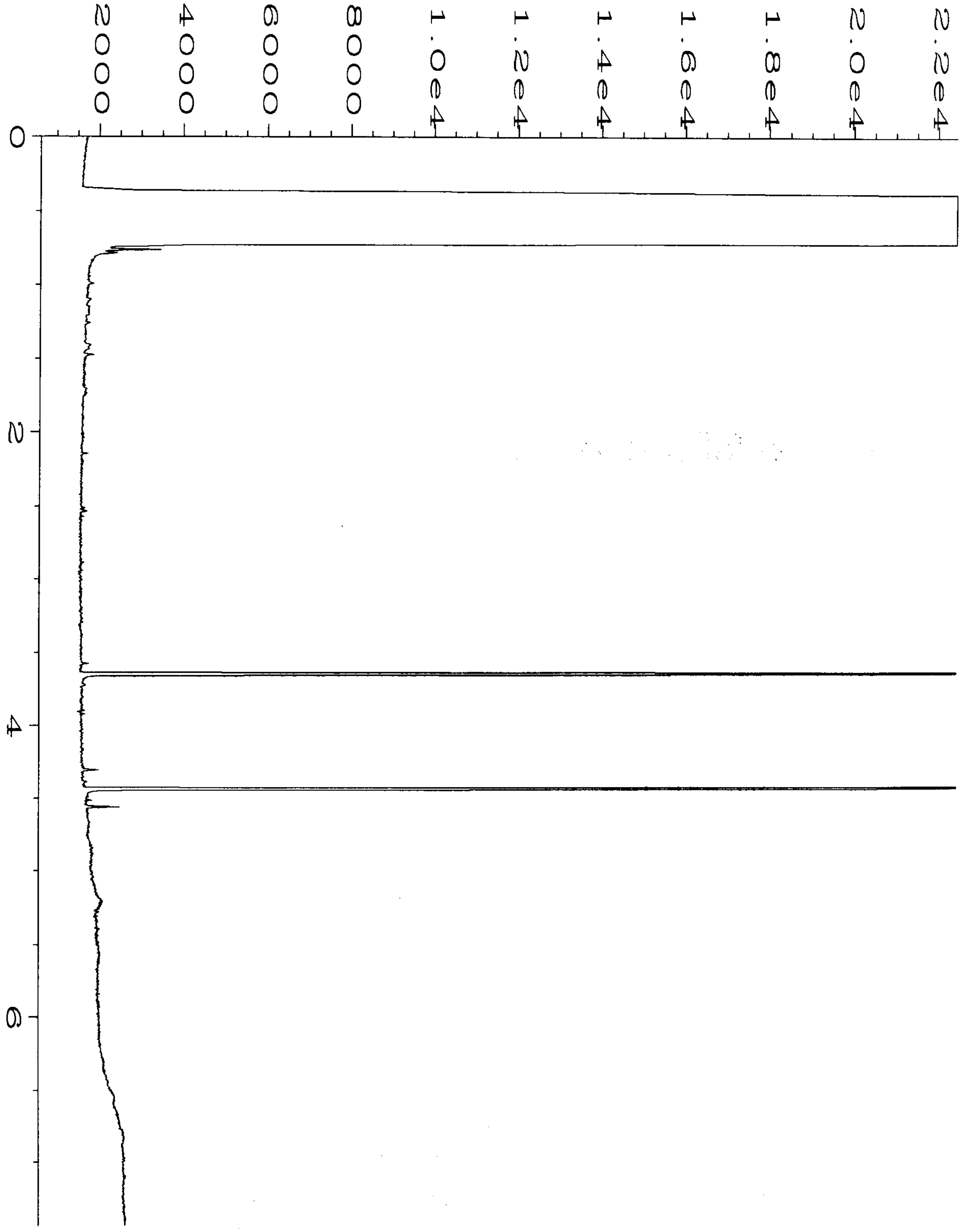

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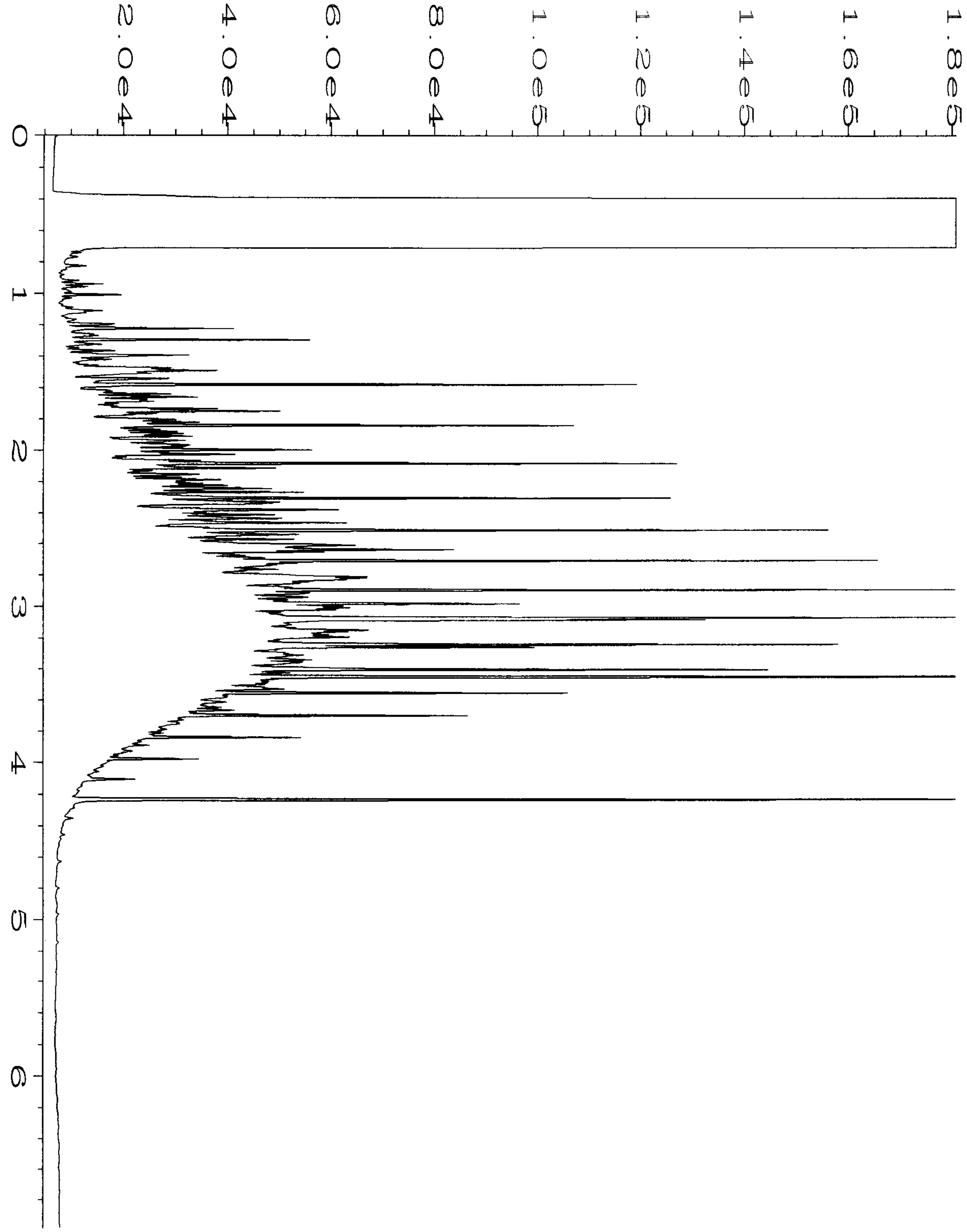
Data File Name    : C:\HPCHEM\4\DATA\05-08-15\017F0601.D
Operator          : mwdl                              Page Number        : 1
Instrument        : GC#4                              Vial Number        : 17
Sample Name       : 05-945 mb                         Injection Number   : 1
Run Time Bar Code:                                    Sequence Line      : 6
Acquired on       : 08 May 15   02:58 PM              Instrument Method: DX.MTH
Report Created on: 11 May 15   10:31 AM              Analysis Method    : DX.MTH
```



Data File Name   : C:\HPCHEM\6\DATA\05-08-15\003F0201.D
Operator   : mwdl
Instrument   : GC #6
Sample Name   : 500 Dx 44-94C
Run Time Bar Code:
Acquired on   : 08 May 15   09:22 AM
Report Created on: 11 May 15   09:10 AM

Page Number   : 1
Vial Number   : 3
Injection Number : 1
Sequence Line   : 2
Instrument Method: DX.MTH
Analysis Method   : BAKEOUT.MTH

505103

SAMPLE CHAIN OF CUSTODY

ME 05/07/15

VS2/VS/E03/ AIS / CE2

Page # 1 of 4

Send Report To Gabe Cisneros

Company Floyd | Snider

Address 601 Union St. Suite 600

City, State, ZIP Seattle, WA 98101

Phone # 206-292-2078 Fax #

SAMPLERS (signature)

PROJECT NAME/NO. CL-Ellensburg

PO#

REMARKS: Run HCID First. If Dx, Gx, or both exceed reporting limits then run appropriate analytical Method. 8260 B Short List for Soil includes: BTEX, MTBE, EDB, EDC, n-hexane, ethanol, naphthalene

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

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

■ -Followup per COC ME 5/11/15

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	Soil Short List VOCs by 8260	SVOCs by 8270	HFS	HCID	Total Lead by 6020					Notes
5/6/15 ~~ME~~ TP21-4.5-5 ~~TP21-4.5-5~~	01 A-E	5/6/15	1410	Soil	5	X	X	X				X						See Remarks
TP9-5-5.5	02	5/6/15	1430	Soil	5	■	■	■				X						
TP1-4-4.5	03	5/6/15	1455	Soil	5	X	X		X				X					
TP1-6.5-7	04	5/6/15	1500	Soil	5	■	■	■				X						
TP10-6-6.5B	05	5/6/15	1600	Soil	5	X	X	X				X						
TP10-6-6.5	06 A-N	5/6/15	1545	Soil	15	X	X		X				X					ms/msD
TP22-5.5-6	07 A-E	5/6/15	1610	Soil	5	X	X	X				X						
TP22-5.5-6B	08	5/6/15	1615	Soil	5	X	X	X				X						Dup

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabriel Cisneros	Floyd/Snider	5/7/15	1700
Received by:	Eric Young	F-B	5/7/15	17:00
Relinquished by:				
Received by:		Samples received at 4 °C		

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505103

SAMPLE CHAIN OF CUSTODY

ME 05/07/15

JS2/VS/E03/AI5/CI2

Page # 2 of 4

Send Report To Gabe Cisneros
Company Floyd | Snider
Address 601 Union Street, Ste. 600
City, State, ZIP Seattle, WA 98101
Phone # 206-292-2078 Fax #

SAMPLERS (signature)

PROJECT NAME/NO.
CL-Ellensburg

PO#

REMARKS Run HCID First; IF Dx, Gx, or both exceed reporting limits then run appropriate Analytical Method 8260B ShortList for soil: BTEX, MTBE, EDB, EDC, n-hexane, ethanol & naphthalene

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	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	Soil Short List VOCs by8260	SVOCs by 8270	HFS	HCID	EDB by 8011	Total Lead by 6020				Notes
TP15-5-5.5	09 A-E	5/6/15	0830	Soil	5	[redacted]	[redacted]	[redacted]				X						See Remarks
TP12-6-6.5	10	5/6/15	0850	Soil	5	[redacted]	[redacted]	[redacted]				X						
TP11-5-5.5	11	5/6/15	0930	Soil	5	[redacted]	X	X				X						
TP4-6-6.5	12	5/6/15	1000	Soil	5	[redacted]	[redacted]	[redacted]				X						
TP5-6-6.5	13	5/6/15	1020	Soil	5	[redacted]	[redacted]	[redacted]				X						
TP3-5-5.5	14	5/6/15	1055	Soil	5	[redacted]	X	X				X						
TP6-5-5.5	15	5/6/15	1150	Soil	5	[redacted]	[redacted]	[redacted]				X						
TP2-5-5.5	16	5/6/15	1215	Soil	5	[redacted]	[redacted]	[redacted]				X						
TP8-6-6.5	17	5/6/15	1230	Soil	5	[redacted]	[redacted]	[redacted]				X						
TP7-5-5.5	18	5/6/15	1345	Soil	5	[redacted]	[redacted]	[redacted]				X						

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabriel Cisneros	Floyd/Snider	5/7/15	1700
Received by:		FB	5/7/15	1700
Relinquished by:				
Received by:		Samples received at 4 °C		

FORMS\COC\COC.DOC

505103

SAMPLE CHAIN OF CUSTODY

ME 05/07/15 VS2/ E03/ AL5/ V5/

Send Report To Gabe Cisneros
Company Floyd\Snider
Address 601 Union Street, Suite 600
City, State, ZIP Seattle, WA 98101
Phone # 206-292-2078 Fax #

SAMPLERS (signature)

PROJECT NAME/~~NO.~~ CL-Ellensburg

PO#

REMARKS: Run HCID First; If Dx or Gx or both exceed reporting Limits, then run appropriate analytical Method. 8260 short list for soil Includes: BTEX, MTBE, EDB, EDC, n-hexane, ethanol, naphthalene.

Page # 3 of 4

TURNAROUND TIME
☒ Standard (2 Weeks)
☐ RUSH
Rush charges authorized by

GI 2

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

						ANALYSES REQUESTED													
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	Soil Short List VOCs by8260	SVOCs by 8270	HFS	HCID	Total Lead by 6020						Notes
TP20-4-4.5	19 A-E	5/5/15	1015	Soil	5	X	X	X				X							See Remarks
TP17-5.5-6.0	20	5/5/15	1100	Soil	5	[redacted]	X	X				X							
~~TP14~~ TP14-5-5.5	21		1155	Soil	5	X	X	X				X							
MW7 ~~3.0-4.0~~ 5-5.5	22		1220	Soil	5	[redacted]	[redacted]	[redacted]				X							
TP13-5.5-6	23		1250	Soil	5	X	X	X				X							
MW4A-6-6.5	24		1415	Soil	5	X	X		X				X						
TP19-6-6.5	25		1500	Soil	5	[redacted]	X	X				X							
MW5A-6-6.5	26		1545	Soil	5	X	X		X				X						
TP18-5-5.5	27		1610	Soil	5	X	X		X				X						
TP16-5-5.5	28		1645	Soil	5	[redacted]	[redacted]	[redacted]				X							

3C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabriel Cisneros	Floyd/Snider	5/7/15	1700
Received by:	Eric [illegible]	F&B	5/7/15	[illegible]
Relinquished by:				
Received by:		Samples received at 4 °C		

FORMS\COC\COC.DOC

505103

SAMPLE CHAIN OF CUSTODY

ME 05/07/15

VS2/VS/EB/ADS/CD2

Send Report To Gabriel Cisneros

Company Floyd|Snider

Address 601 Union St. Suite 600

City, State, ZIP Seattle, WA 98101

Phone # 206-292-2078 Fax # ______

SAMPLERS (signature)

PROJECT NAME/NO. CL-Ellensburg

PO#

REMARKS 8260 VOCs ~~include~~ for GW samples include: BTEX, MTBE, EDC, Naphthalene & ethanol. Product (LNAPL) Short List 8260 include: Ethanol, BTEX, MTBE, napthalene, n-hexane, EDC, butane

Page # 4 of 4

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	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	GW Short List VOCs by 8260	SVOCs by 8270	HFS	Total Lead by 6020	EDB by Method 8011		Product 8260 Short List	HCID		Notes
MW2-4-14 LNAPL	29	5/7/15	0850	LNAPL	1	X	X					X	X		X			
MW5A-4-14 LNAPL	30	5/7/15	0900	LNAPL	1	X	X					X	X		X			
MW4A-4-14	31 A-J	5/7/15	0949	GW	10	X	X		X			X	X					
MW1A-4-14	32 A-E	5/7/15	~~1015~~ 1005	GW	5	X	X		X			X	X					
MW7-4-14	33	5/7/15	1035	GW	5	X	X		X			X	X					
MW3-4-14	34	5/7/15	1110	GW	5	X	X		X			X	X					
MW1A-4-14 B	35	5/7/15	1010	GW	5	X	X		X			X	X					
PurgeWaterWaste-050715	36	5/7/15	1103	GW	5	X	X		X			X						
Trip Blank	37 A-C	—	—	water	3													(ND) 5/7/15 Added @ lab

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabriel Cisneros	Floyd/Snider	5/7/15	1700
Received by:	Eric [illegible]	F&BI	5/7/15	[illegible]
Relinquished by:				
Received by:		Samples received at 4 °C		

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

July 27, 2015

Gabriel Cisneros, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Mr. Cisneros:

Included are the results from the testing of material submitted on July 17, 2015 from the CL-Ellensburg, F&BI 507270 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
FDS0727R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on July 17, 2015 by Friedman & Bruya, Inc. from the Floyd-Snider CL-Ellensburg, F&BI 507270 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
507270 -01	MW1A-4-14
507270 -02	MW3-4-14
507270 -03	MW1A-4-14B
507270 -04	MW7-4-14
507270 -05	MW4A-4-14
507270 -06	Trip Blank

All quality control requirements were acceptable.

Date of Report: 07/27/15
Date Received: 07/17/15
Project: CL-Ellensburg, F&BI 507270
Date Extracted: 07/20/15
Date Analyzed: 07/20/15

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 51-134)
MW1A-4-14 507270-01	<100	86
MW3-4-14 507270-02	<100	87
MW1A-4-14B 507270-03	<100	86
MW7-4-14 507270-04	<100	87
MW4A-4-14 507270-05	140	91
Method Blank 05-1344 MB	<100	86

Date of Report: 07/27/15
Date Received: 07/17/15
Project: CL-Ellensburg, F&BI 507270
Date Extracted: 07/20/15
Date Analyzed: 07/20/15

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)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
Trip Blank 507270-06	<1	<1	<1	<3	<100	87
Method Blank 05-1344 MB	<1	<1	<1	<3	<100	83

Date of Report: 07/27/15
Date Received: 07/17/15
Project: CL-Ellensburg, F&BI 507270
Date Extracted: 07/21/15
Date Analyzed: 07/21/15

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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 51-134)
MW1A-4-14 507270-01	<50	<250	97
MW3-4-14 507270-02	180	<250	114
MW1A-4-14B 507270-03	<50	<250	109
MW7-4-14 507270-04	100	<250	93
MW4A-4-14 507270-05	1,600	<250	127
Method Blank 05-1478 MB	<50	<250	112

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW1A-4-14	Client:	Floyd-Snider
Date Received:	07/17/15	Project:	CL-Ellensburg, F&BI 507270
Date Extracted:	07/20/15	Lab ID:	507270-01
Date Analyzed:	07/21/15	Data File:	072118.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	85	117
Toluene-d8	104	91	108
4-Bromofluorobenzene	99	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW3-4-14	Client:	Floyd-Snider
Date Received:	07/17/15	Project:	CL-Ellensburg, F&BI 507270
Date Extracted:	07/20/15	Lab ID:	507270-02
Date Analyzed:	07/20/15	Data File:	072024.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	101	91	108
4-Bromofluorobenzene	100	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW1A-4-14B	Client:	Floyd-Snider
Date Received:	07/17/15	Project:	CL-Ellensburg, F&BI 507270
Date Extracted:	07/20/15	Lab ID:	507270-03
Date Analyzed:	07/20/15	Data File:	072025.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	85	117
Toluene-d8	100	91	108
4-Bromofluorobenzene	101	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW7-4-14	Client:	Floyd-Snider
Date Received:	07/17/15	Project:	CL-Ellensburg, F&BI 507270
Date Extracted:	07/20/15	Lab ID:	507270-04
Date Analyzed:	07/20/15	Data File:	072026.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	85	117
Toluene-d8	101	91	108
4-Bromofluorobenzene	103	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW4A-4-14	Client:	Floyd-Snider
Date Received:	07/17/15	Project:	CL-Ellensburg, F&BI 507270
Date Extracted:	07/20/15	Lab ID:	507270-05
Date Analyzed:	07/20/15	Data File:	072027.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	85	117
Toluene-d8	100	91	108
4-Bromofluorobenzene	100	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 507270
Date Extracted:	07/20/15	Lab ID:	05-1454 mb
Date Analyzed:	07/20/15	Data File:	072007.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	85	117
Toluene-d8	101	91	108
4-Bromofluorobenzene	100	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Date of Report: 07/27/15
Date Received: 07/17/15
Project: CL-Ellensburg, F&BI 507270

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: 507276-03 (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	102	72-122
Ethylbenzene	ug/L (ppb)	50	107	73-126
Xylenes	ug/L (ppb)	150	102	74-118
Gasoline	ug/L (ppb)	1,000	91	69-134

Date of Report: 07/27/15
Date Received: 07/17/15
Project: CL-Ellensburg, F&BI 507270

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

Laboratory Code: 507270-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	<250	118	124	52-149	5

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	95	58-134	2

Date of Report: 07/27/15
Date Received: 07/17/15
Project: CL-Ellensburg, F&BI 507270

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

Laboratory Code: 507270-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	50	<0.35	95	97	78-108	2
Toluene	ug/L (ppb)	50	<1	91	92	73-117	1
Ethylbenzene	ug/L (ppb)	50	<1	93	96	71-120	3
m,p-Xylene	ug/L (ppb)	100	<2	95	97	63-128	2
o-Xylene	ug/L (ppb)	50	<1	102	103	64-129	1
Naphthalene	ug/L (ppb)	50	<1	118	112	62-140	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	50	95	96	81-108	1
Toluene	ug/L (ppb)	50	93	93	83-108	0
Ethylbenzene	ug/L (ppb)	50	95	95	83-111	0
m,p-Xylene	ug/L (ppb)	100	98	98	84-112	0
o-Xylene	ug/L (ppb)	50	102	101	81-117	1
Naphthalene	ug/L (ppb)	50	105	112	72-131	6

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.

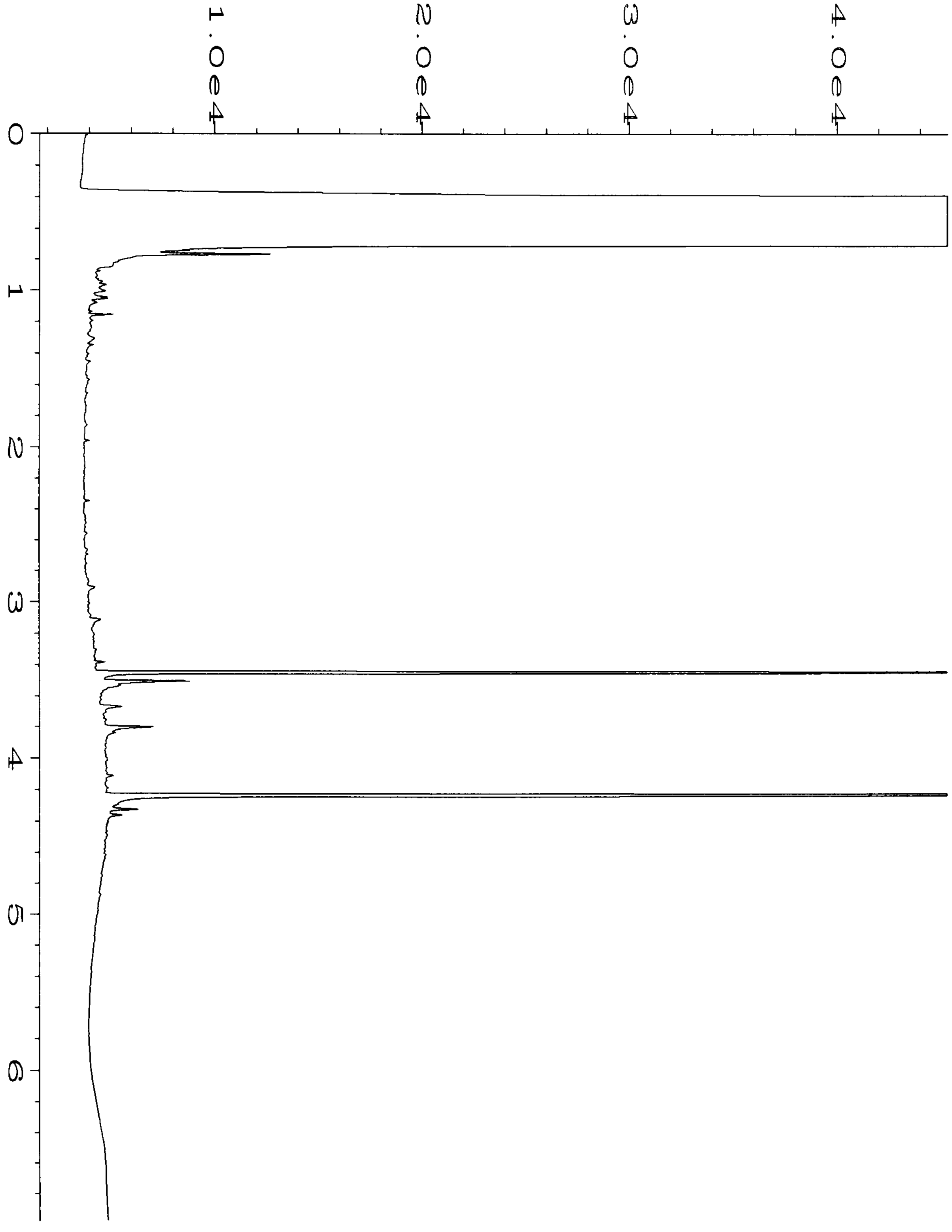
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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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Data File Name    : C:\HPCHEM\6\DATA\07-21-15\027F0501.D
Operator          : mwdl                            Page Number      : 1
Instrument        : GC #6                           Vial Number      : 27
Sample Name       : 507270-01                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 5
Acquired on       : 21 Jul 15  03:58 PM             Instrument Method: DX.MTH
Report Created on: 22 Jul 15  08:33 AM              Analysis Method  : DX.MTH
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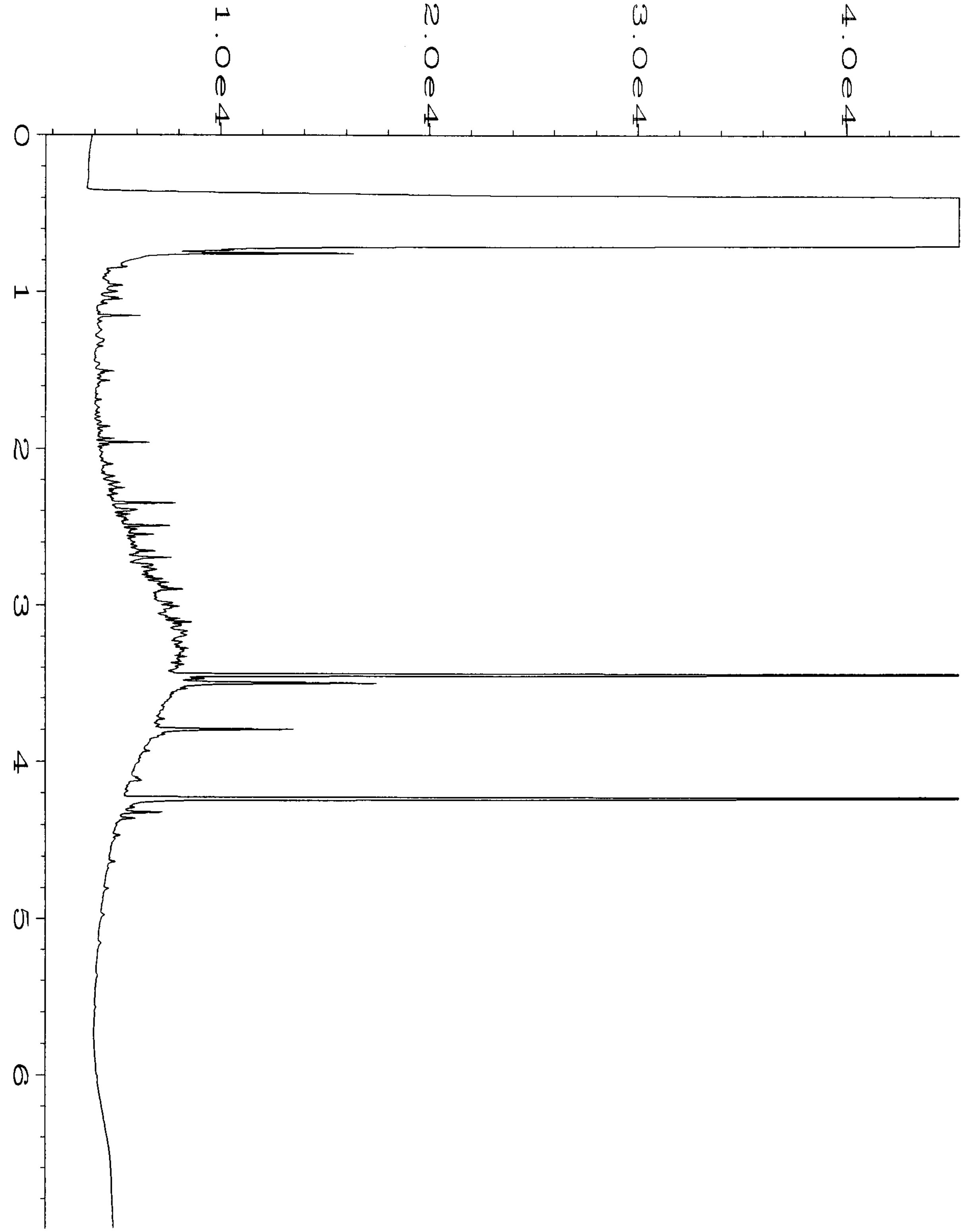

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Operator          : mwdl                           Page Number       : 1
Instrument        : GC #6                          Vial Number       : 28
Sample Name       : 507270-02                      Injection Number : 1
Run Time Bar Code:                                 Sequence Line     : 5
Acquired on       : 21 Jul 15  04:10 PM            Instrument Method: DX.MTH
Report Created on: 22 Jul 15  08:33 AM             Analysis Method   : DX.MTH
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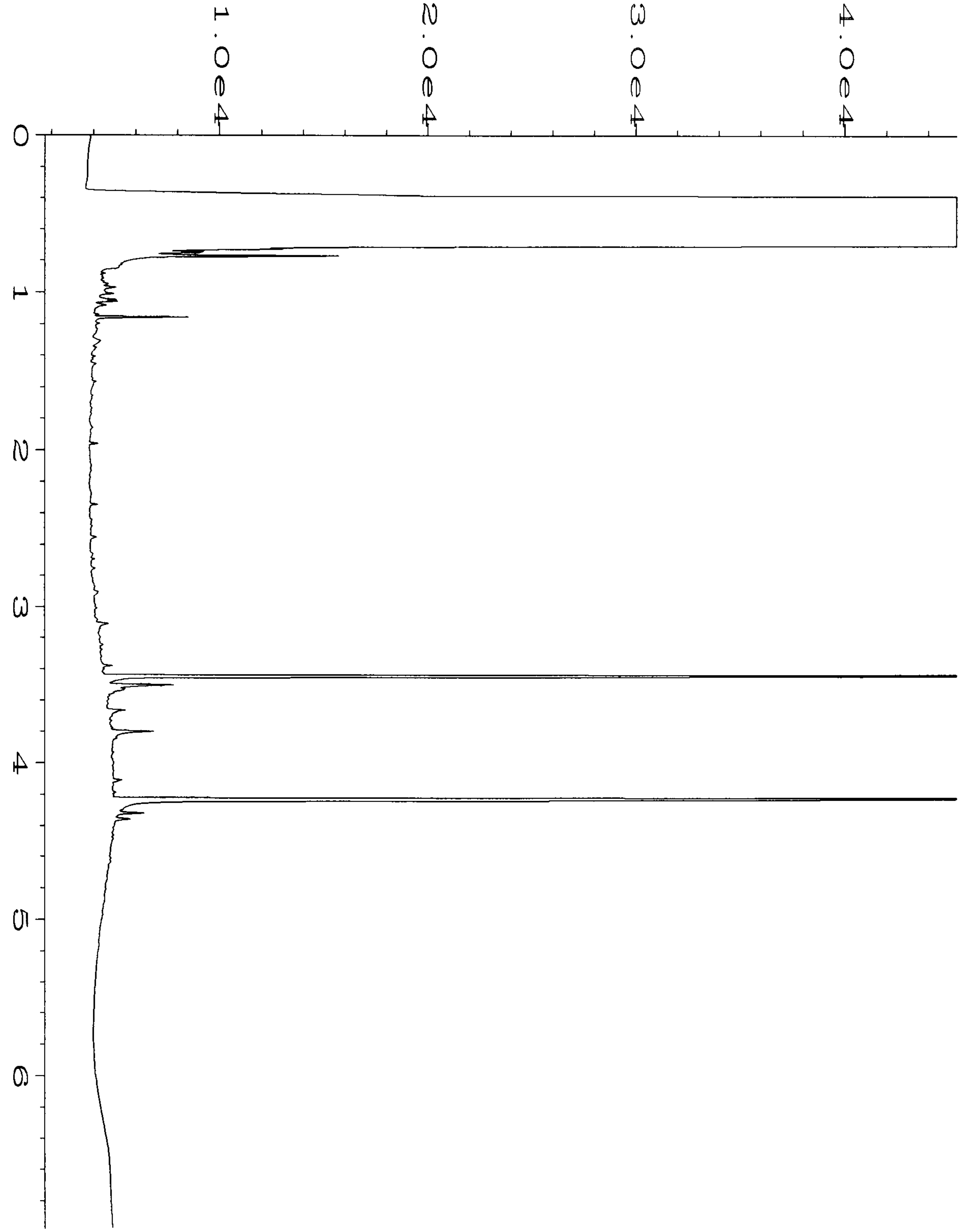

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Operator          : mwdl                          Page Number      : 1
Instrument        : GC #6                         Vial Number      : 31
Sample Name       : 507270-03                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 5
Acquired on       : 21 Jul 15   04:41 PM          Instrument Method: DX.MTH
Report Created on: 22 Jul 15   08:33 AM           Analysis Method  : DX.MTH
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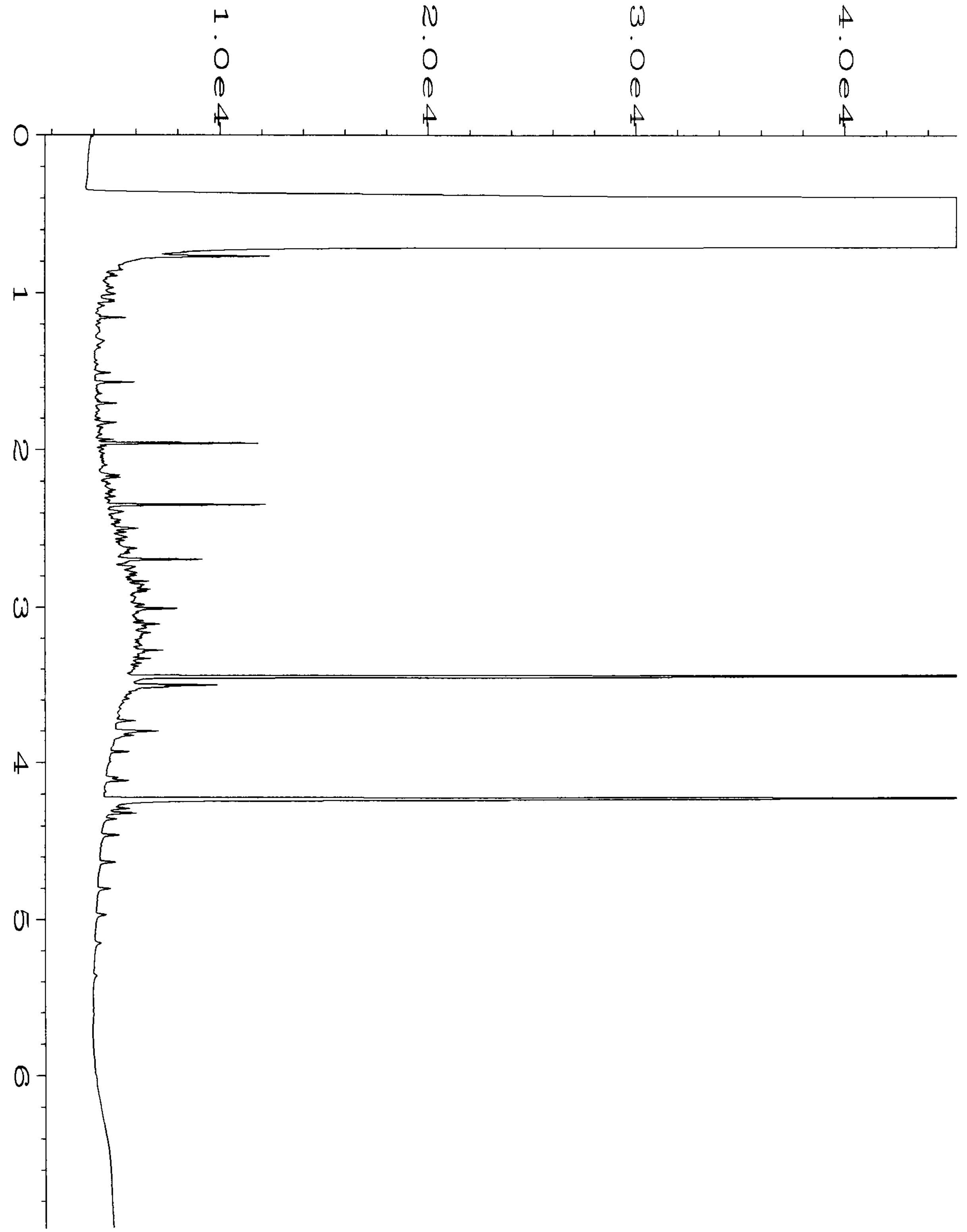

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Operator          : mwdl                           Page Number      : 1
Instrument        : GC #6                          Vial Number      : 32
Sample Name       : 507270-04                      Injection Number : 1
Run Time Bar Code:                                 Sequence Line    : 5
Acquired on       : 21 Jul 15  04:52 PM            Instrument Method: DX.MTH
Report Created on: 22 Jul 15  08:33 AM             Analysis Method  : DX.MTH
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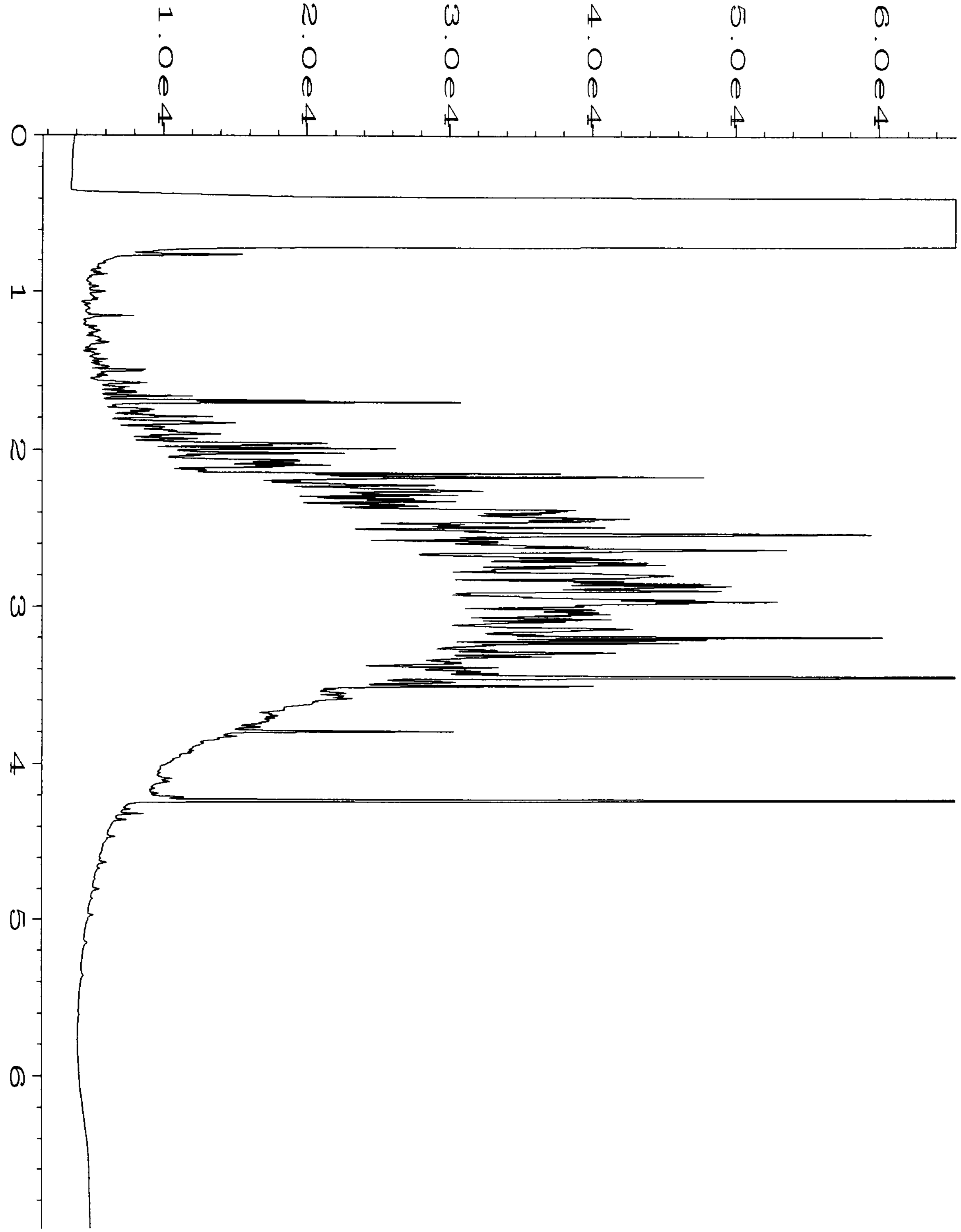
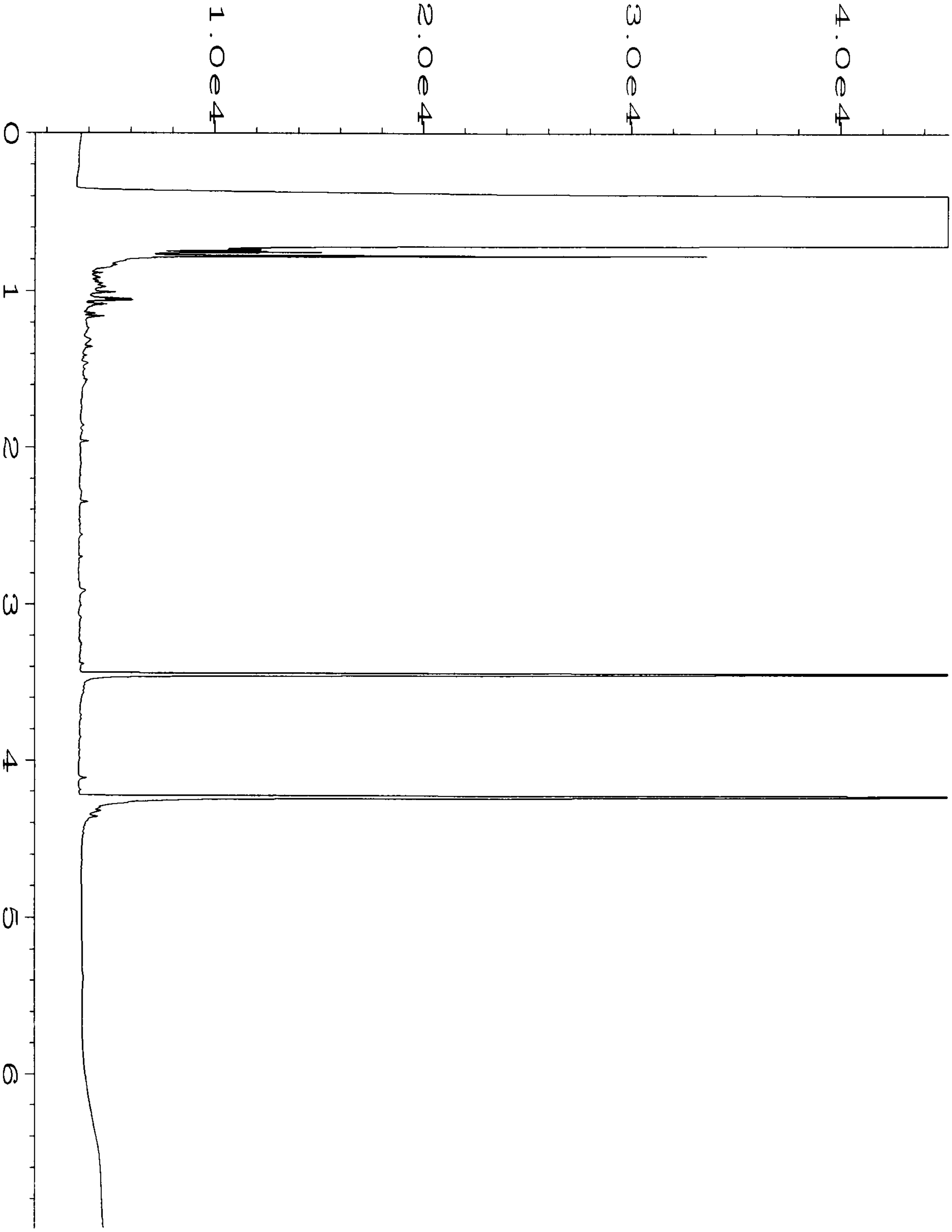


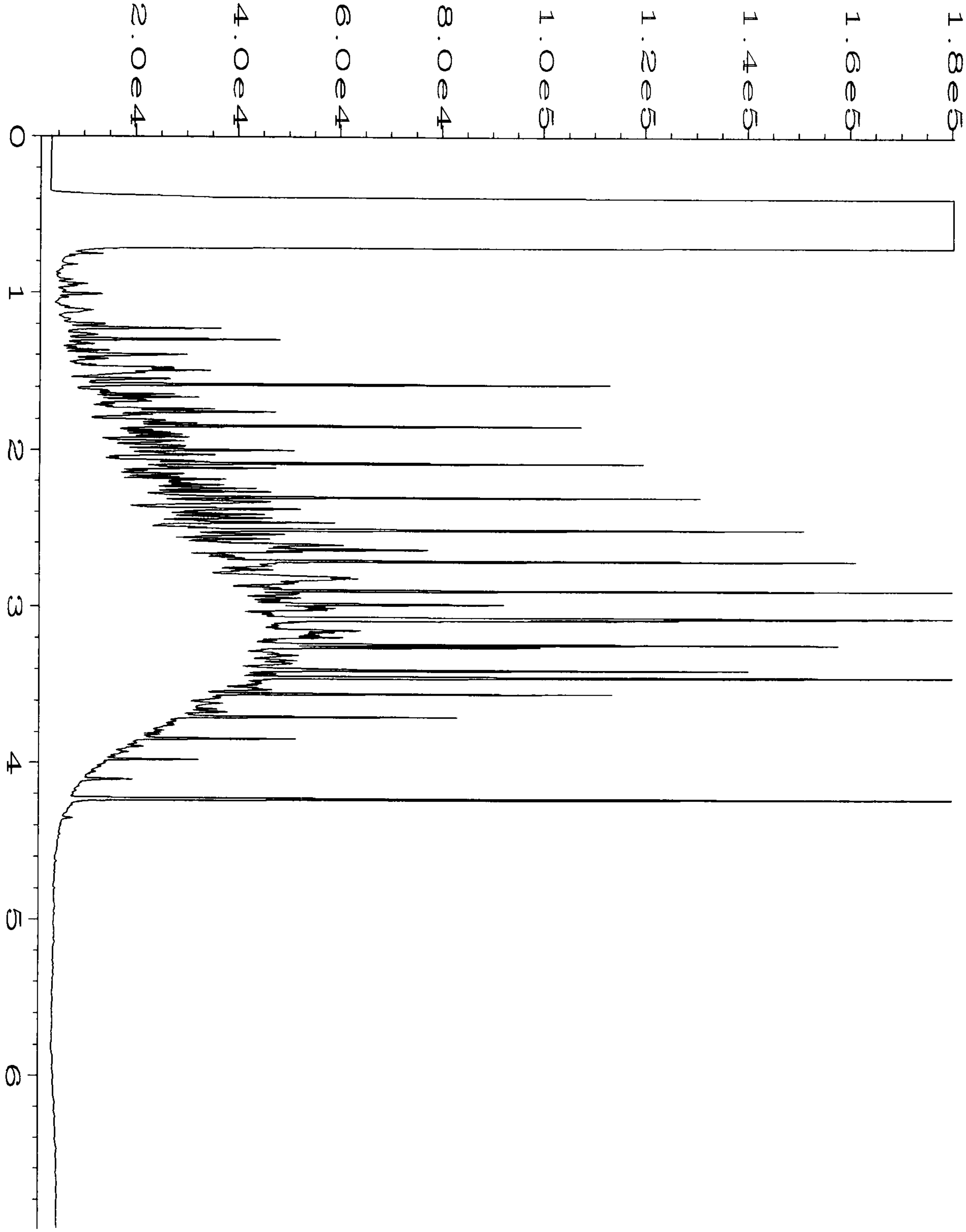
Data File Name : C:\HPCHEM\6\DATA\07-21-15\033F0501.D
Operator : mwdl
Instrument : GC #6
Sample Name : 507270-05
Run Time Bar Code:
Acquired on : 21 Jul 15 05:03 PM
Report Created on: 22 Jul 15 08:33 AM

Page Number : 1
Vial Number : 33
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DX.MTH



Data File Name : C:\HPCHEM\6\DATA\07-21-15\024F0301.D
Operator : mwdl
Instrument : GC #6 8 dg7/22
Sample Name : 05-147~~2~~ mb
Run Time Bar Code:
Acquired on : 21 Jul 15 01:18 PM
Report Created on: 22 Jul 15 08:32 AM

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH



Data File Name : C:\HPCHEM\6\DATA\07-21-15\003F0201.D
Operator : mwdl
Instrument : GC #6
Sample Name : 500 Dx 44-94C
Run Time Bar Code:
Acquired on : 21 Jul 15 09:05 AM
Report Created on: 22 Jul 15 08:32 AM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DX.MTH

507270

SAMPLE CHAIN OF CUSTODY

ME 07-17-15

D04 / V.4

Send Report To Gabriel Cisneros
Company Floyd|Snider
Address 601 Union Street, Suite 600
City, State, ZIP Seattle, WA 98101
Phone # 206-292-2078 Fax #

SAMPLERS (*signature*)
PROJECT NAME/NO. CL-Ellensburg
PO#
REMARKS

Page # 1 of 1

TURNAROUND TIME
☒ Standard (2 Weeks)
☐ RUSH
Rush charges authorized by

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED												Notes
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by8260	SVOCs by 8270	HFS							
MW1A-4-14	01 A-H	07/16	1100	W	8	X	X		X									VOCs include only BTEX & Naphthalene
mw3-4-14	02 A-Q	↓	1015	↓	17	X	X		X									Include MS/MSD
MW1A-4-14B	03 A-H		1110		8	X	X		X									8260B BTEX VOCs include Naphth
mw7-4-14	04		1145		8	X	X		X									↓
mw4A-4-14	05		1240		8	X	X		X									
Trip Blank	06 A-B	—	—	W	2		X	X										

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabriel Cisneros	Floyd/Snider	7/17/15	0933
Received by:	Eric Young	F&B	7/17/15	0933
Relinquished by:				
Received by:				

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

October 27, 2015

Gabriel Cisneros, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Mr. Cisneros:

Included are the results from the testing of material submitted on October 20, 2015 from the CL-Ellensburg, F&BI 510306 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
FDS1027R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 20, 2015 by Friedman & Bruya, Inc. from the Floyd-Snider CL-Ellensburg, F&BI 510306 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
510306 -01	MW1A-4-14
510306 -02	MW1A-4-14B
510306 -03	MW3-4-14
510306 -04	MW4A-4-14
510306 -05	MW7-4-14
510306 -06	Trip Blank

All quality control requirements were acceptable.

Date of Report: 10/27/15
Date Received: 10/20/15
Project: CL-Ellensburg, F&BI 510306
Date Extracted: 10/21/15
Date Analyzed: 10/21/15

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 51-134)
MW1A-4-14 510306-01	<100	90
MW1A-4-14B 510306-02	<100	88
MW3-4-14 510306-03	<100	89
MW4A-4-14 510306-04	120	93
MW7-4-14 510306-05	<100	90
Method Blank 05-2135 MB	<100	93

Date of Report: 10/27/15
Date Received: 10/20/15
Project: CL-Ellensburg, F&BI 510306
Date Extracted: 10/21/15
Date Analyzed: 10/21/15

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)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
Trip Blank 510306-06	<1	<1	<1	<3	<100	90
Method Blank 05-2135 MB	<1	<1	<1	<3	<100	88

Date of Report: 10/27/15
Date Received: 10/20/15
Project: CL-Ellensburg, F&BI 510306
Date Extracted: 10/22/15
Date Analyzed: 10/22/15

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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
MW1A-4-14 510306-01	100 x	<250	92
MW1A-4-14B 510306-02 1/1.1	110 x	<280	94
MW3-4-14 510306-03	200 x	<250	102
MW4A-4-14 510306-04	1,200	<250	105
MW7-4-14 510306-05	<50	<250	82
Method Blank 05-2181 MB	<50	<250	99

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW1A-4-14	Client:	Floyd-Snider
Date Received:	10/20/15	Project:	CL-Ellensburg, F&BI 510306
Date Extracted:	10/22/15	Lab ID:	510306-01
Date Analyzed:	10/22/15	Data File:	102236.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	95	63	127
4-Bromofluorobenzene	97	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW1A-4-14B	Client:	Floyd-Snider
Date Received:	10/20/15	Project:	CL-Ellensburg, F&BI 510306
Date Extracted:	10/22/15	Lab ID:	510306-02
Date Analyzed:	10/22/15	Data File:	102237.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	95	63	127
4-Bromofluorobenzene	97	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW3-4-14	Client:	Floyd-Snider
Date Received:	10/20/15	Project:	CL-Ellensburg, F&BI 510306
Date Extracted:	10/22/15	Lab ID:	510306-03
Date Analyzed:	10/23/15	Data File:	102238.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	95	63	127
4-Bromofluorobenzene	97	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW4A-4-14	Client:	Floyd-Snider
Date Received:	10/20/15	Project:	CL-Ellensburg, F&BI 510306
Date Extracted:	10/22/15	Lab ID:	510306-04
Date Analyzed:	10/23/15	Data File:	102239.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	94	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW7-4-14	Client:	Floyd-Snider
Date Received:	10/20/15	Project:	CL-Ellensburg, F&BI 510306
Date Extracted:	10/22/15	Lab ID:	510306-05
Date Analyzed:	10/23/15	Data File:	102240.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	95	63	127
4-Bromofluorobenzene	99	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 510306
Date Extracted:	10/22/15	Lab ID:	05-2154 mb
Date Analyzed:	10/22/15	Data File:	102222.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	95	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Date of Report: 10/27/15
Date Received: 10/20/15
Project: CL-Ellensburg, F&BI 510306

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: 510306-01 (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: 510306-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	<100	99	98	53-117	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	91	65-118
Toluene	ug/L (ppb)	50	89	72-122
Ethylbenzene	ug/L (ppb)	50	91	73-126
Xylenes	ug/L (ppb)	150	90	74-118
Gasoline	ug/L (ppb)	1,000	99	69-134

Date of Report: 10/27/15
Date Received: 10/20/15
Project: CL-Ellensburg, F&BI 510306

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

Laboratory Code: 510306-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	<50	110	108	50-150	2

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	103	105	63-142	2

Date of Report: 10/27/15
Date Received: 10/20/15
Project: CL-Ellensburg, F&BI 510306

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

Laboratory Code: 510306-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	50	<0.35	88	87	76-125	1
Toluene	ug/L (ppb)	50	<1	93	93	76-122	0
Ethylbenzene	ug/L (ppb)	50	<1	95	94	69-135	1
m,p-Xylene	ug/L (ppb)	100	<2	97	96	69-135	1
o-Xylene	ug/L (ppb)	50	<1	99	99	60-140	0
Naphthalene	ug/L (ppb)	50	<1	100	100	44-164	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	87	69-134
Toluene	ug/L (ppb)	50	93	72-122
Ethylbenzene	ug/L (ppb)	50	94	77-124
m,p-Xylene	ug/L (ppb)	100	96	83-125
o-Xylene	ug/L (ppb)	50	97	81-121
Naphthalene	ug/L (ppb)	50	96	64-133

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.

SAMPLE CHAIN OF CUSTODY

ME 10/20/15

Page # 1 of 1 VW/AOS

510306

Send Re~~port To~~ Gabriel Cisneros
Company Floyd | Snider
Address 601 Union Street Ste. 600
City, State, ZIP
Phone # Fax #

SAMPLERS (*signature*)

PROJECT NAME/NO. CL-Ellensburg

PO#

REMARKS VOCs include only BTEX ~~& Naphthalenes~~
Naphthalene per GC 10/21/15 ME

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	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by8260	SVOCs by 8270	HFS							Notes
MW1A-4-14	01 A-H	10/20	1000	W	8	X	X		X									
mw1A-4-14B	02		1030		8	X	X		X									
mw3-4-14	03 A-		1045		17	X	X		X									MS/MSD
mw4A-4-14	04 A-H		1300		8	X	X		X									
mw7-4-14	05		1200		8	X	X		X									
TripBlank	06 AB		—				X	X										

Samples received at 4 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabriel Cisneros	Floyd|Snider	10/20/15	1615
Received by:	Eric Young	FB	10/20/15	1615
Relinquished by:				
Received by:				

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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April 1, 2016

Gabriel Cisneros, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Mr. Cisneros:

Included are the results from the testing of material submitted on March 24, 2016 from the CL-Ellensburg, F&BI 603435 project. There are 39 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
FDS0401R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 24, 2016 by Friedman & Bruya, Inc. from the Floyd-Snider CL-Ellensburg, F&BI 603435 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
603435 -01	MW-8-3-13
603435 -02	MW-10-4-14
603435 -03	MW-9-4-14
603435 -04	MW-10-4-14 D
603435 -05	MW-5A-14'
603435 -06	MW-5A-7'
603435 -07	MW-4A-14'
603435 -08	MW-4A-7'
603435 -09	MW-4A-LNAPL
603435 -10	MW-2-14
603435 -11	MW-2-7'
603435 -12	Stockpile-032316
603435 -13	Trip Blank

All quality control requirements were acceptable.

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435
Date Extracted: 03/24/16
Date Analyzed: 03/24/16

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 51-134)
MW-8-3-13 603435-01	2,400	98
MW-10-4-14 603435-02	230	103
MW-9-4-14 603435-03	1,800	102
MW-10-4-14 D 603435-04	250	101
MW-5A-14’ 603435-05	800	115
MW-5A-7’ 603435-06	670	113
MW-4A-14’ 603435-07	440	106
MW-4A-7’ 603435-08	480	103
MW-2-14 603435-10	2,300	96
MW-2-7’ 603435-11	2,400	102

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435
Date Extracted: 03/24/16
Date Analyzed: 03/24/16

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 51-134)
Trip Blank 603435-13	<100	98
Method Blank 06-566 MB	<100	103

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435
Date Extracted: 03/24/16
Date Analyzed: 03/24/16

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
Stockpile-032316 603435-12 1/10	910	ip
Method Blank 06-556 MB	<2	114

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435
Date Extracted: 03/24/16
Date Analyzed: 03/24/16

RESULTS FROM THE ANALYSIS OF SOIL/PRODUCT SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
MW-4A-LNAPL 603435-09 1/5,000	110,000	145
Method Blank 06-556 MB	<10,000	114

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435
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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 53-144)
Stockpile-032316 603435-12	11,000	<250	98
Method Blank 06-570 MB	<50	<250	99

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435
Date Extracted: 03/25/16
Date Analyzed: 03/25/16

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

Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 53-144)
MW-4A-LNAPL 603435-09 1/200	930,000	<50,000	111
Method Blank 06-539 MB	<50	<250	93

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435
Date Extracted: 03/25/16
Date Analyzed: 03/25/16

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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
MW-8-3-13 603435-01	1,000 x	<250	78
MW-10-4-14 603435-02	270 x	<250	83
MW-9-4-14 603435-03	3,200	<250	93
MW-10-4-14 D 603435-04	260 x	<250	78
MW-5A-14’ 603435-05	2,600	<250	88
MW-5A-7’ 603435-06	2,000	<250	82
MW-4A-14’ 603435-07	2,400	<250	82
MW-4A-7’ 603435-08	3,400	<250	95
MW-2-14 603435-10	1,300	<250	84
MW-2-7’ 603435-11	1,400	<250	87
Method Blank 06-583 MB	<50	<250	86

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW-4A-LNAPL	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	04/01/16	Lab ID:	603435-09
Date Analyzed:	04/01/16 11:32:11	Data File:	603435-09.037
Matrix:	Soil/Product	Instrument:	ICPMS1
Units:	mg/kg (ppm)	Operator:	AP

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

Analysis For Total Metals By EPA Method 6020A

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	04/01/16	Lab ID:	I6-185 mb
Date Analyzed:	04/01/16 11:18:22	Data File:	I6-185 mb.034
Matrix:	Soil/Product	Instrument:	ICPMS1
Units:	mg/kg (ppm)	Operator:	AP

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

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-8-3-13	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-01
Date Analyzed:	03/25/16	Data File:	032514.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	85	117
Toluene-d8	101	91	108
4-Bromofluorobenzene	102	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	8.4
Toluene	<1
Ethylbenzene	84
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	45

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-10-4-14	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-02
Date Analyzed:	03/30/16	Data File:	033008.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	102	91	108
4-Bromofluorobenzene	101	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	0.41
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-9-4-14	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-03
Date Analyzed:	03/25/16	Data File:	032516.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	85	117
Toluene-d8	99	91	108
4-Bromofluorobenzene	101	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	2.2
Toluene	1.3
Ethylbenzene	63
m,p-Xylene	67
o-Xylene	11
Naphthalene	28

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-10-4-14 D	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-04
Date Analyzed:	03/30/16	Data File:	033009.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	85	117
Toluene-d8	99	91	108
4-Bromofluorobenzene	100	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	0.47
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-5A-14'	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-05
Date Analyzed:	03/25/16	Data File:	032518.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	107	85	117
Toluene-d8	98	91	108
4-Bromofluorobenzene	98	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	4.6
Toluene	<1
Ethylbenzene	1.7
m,p-Xylene	9.6
o-Xylene	<1
Naphthalene	3.2

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-5A-7'	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-06
Date Analyzed:	03/25/16	Data File:	032541.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	98	91	108
4-Bromofluorobenzene	103	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	2.6
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	5.6
o-Xylene	<1
Naphthalene	1.5

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-4A-14'	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-07
Date Analyzed:	03/26/16	Data File:	032542.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	98	91	108
4-Bromofluorobenzene	101	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	0.67
Toluene	<1
Ethylbenzene	1.6
m,p-Xylene	4.5
o-Xylene	1.5
Naphthalene	2.0

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-4A-7’	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-08
Date Analyzed:	03/26/16	Data File:	032543.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	98	91	108
4-Bromofluorobenzene	99	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	0.86
Toluene	<1
Ethylbenzene	1.0
m,p-Xylene	3.6
o-Xylene	1.3
Naphthalene	1.6

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-2-14	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-10
Date Analyzed:	03/26/16	Data File:	032544.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	99	91	108
4-Bromofluorobenzene	104	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	230 ve
Toluene	3.1
Ethylbenzene	5.9
m,p-Xylene	2.3
o-Xylene	<1
Naphthalene	3.4

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-2-14	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-10 1/10
Date Analyzed:	03/28/16	Data File:	032820.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	100	91	108
4-Bromofluorobenzene	100	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	270
Toluene	<10
Ethylbenzene	25
m,p-Xylene	<20
o-Xylene	<10
Naphthalene	<10

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-2-7'	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-11
Date Analyzed:	03/29/16	Data File:	032925.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	99	91	108
4-Bromofluorobenzene	101	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	240 ve
Toluene	3.1
Ethylbenzene	4.2
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	3.2

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-2-7'	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-11 1/10
Date Analyzed:	03/28/16	Data File:	032821.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	85	117
Toluene-d8	99	91	108
4-Bromofluorobenzene	99	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	260
Toluene	<10
Ethylbenzene	24
m,p-Xylene	<20
o-Xylene	<10
Naphthalene	<10

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Trip Blank	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	603435-13
Date Analyzed:	03/25/16	Data File:	032513.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	85	117
Toluene-d8	99	91	108
4-Bromofluorobenzene	100	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/25/16	Lab ID:	06-0574 mb
Date Analyzed:	03/25/16	Data File:	032511.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	85	117
Toluene-d8	99	91	108
4-Bromofluorobenzene	100	76	126

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-4A-LNAPL	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/24/16	Lab ID:	603435-09 1/2000
Date Analyzed:	03/25/16	Data File:	032454.D
Matrix:	Soil/Product	Instrument:	GCMS9
Units:	mg/kg (ppm)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	89	113
Toluene-d8	98	64	137
4-Bromofluorobenzene	97	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<100,000
Hexane	<500
Methyl t-butyl ether (MTBE)	<100
1,2-Dichloroethane (EDC)	<100
Benzene	<60
Toluene	<100
1,2-Dibromoethane (EDB)	<100
Ethylbenzene	220
m,p-Xylene	360
o-Xylene	100
Naphthalene	180
Butane	<1,000 L
Isooctane	<1,000 L

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/24/16	Lab ID:	06-0572 mb
Date Analyzed:	03/24/16	Data File:	032430.D
Matrix:	Soil/Product	Instrument:	GCMS9
Units:	mg/kg (ppm)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	89	113
Toluene-d8	100	64	137
4-Bromofluorobenzene	101	81	119

Compounds:	Concentration mg/kg (ppm)
Ethanol	<50
Hexane	<0.25
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	<0.03
Toluene	<0.05
1,2-Dibromoethane (EDB)	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	<0.05
Butane	<0.5 L
Isooctane	<0.5 L

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Stockpile-032316	Client:	Floyd-Snider
Date Received:	03/24/16	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/24/16	Lab ID:	603435-12
Date Analyzed:	03/25/16	Data File:	032453.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	89	113
Toluene-d8	98	64	137
4-Bromofluorobenzene	102	81	119

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	0.34
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	0.88

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 603435
Date Extracted:	03/24/16	Lab ID:	06-0572 mb
Date Analyzed:	03/24/16	Data File:	032430.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	89	113
Toluene-d8	100	64	137
4-Bromofluorobenzene	101	81	119

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	<0.05

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TPH AS GASOLINE USING METHOD NWTPH-Gx

Laboratory Code: 603435-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	2,400	102 b	88 b	53-117	15 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	102	97	69-134	5

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-Gx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	mg/kg (ppm)	20	95	100	71-131	5

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/PRODUCT SAMPLES FOR TPH AS GASOLINE USING METHOD NWTPH-Gx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	mg/kg (ppm)	20	95	100	71-131	5

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

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

Laboratory Code: 603427-02 (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	99	109	64-133	10

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	108	58-147

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

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

Laboratory Code: 603464-06 (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	101	95	63-146	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	107	79-144

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

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

Laboratory Code: 603435-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	1,000	116	108	50-150	7

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	95	98	63-142	3

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL/PRODUCT SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020A

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Lead	mg/kg (ppm)	50	107	109	80-120	2

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

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

Laboratory Code: 603435-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	50	8.4	93	92	78-108	1
Toluene	ug/L (ppb)	50	<1	91	90	73-117	1
Ethylbenzene	ug/L (ppb)	50	84	84 b	80 b	71-120	5 b
m,p-Xylene	ug/L (ppb)	100	<2	96	94	63-128	2
o-Xylene	ug/L (ppb)	50	<1	96	97	64-129	1
Naphthalene	ug/L (ppb)	50	45	95 b	94 b	62-140	1 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	93	81-108
Toluene	ug/L (ppb)	50	92	83-108
Ethylbenzene	ug/L (ppb)	50	93	83-111
m,p-Xylene	ug/L (ppb)	100	96	84-112
o-Xylene	ug/L (ppb)	50	97	81-117
Naphthalene	ug/L (ppb)	50	96	72-131

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

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

Laboratory Code: 603344-09 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Ethanol	mg/kg (ppm)	125	<50	93	93	27-130	0
Hexane	mg/kg (ppm)	2.5	<0.25	59	61	10-95	3
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	87	87	17-134	0
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	93	97	22-124	4
Benzene	mg/kg (ppm)	2.5	<0.03	84	86	26-114	2
Toluene	mg/kg (ppm)	2.5	<0.05	78	79	34-112	1
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	85	85	32-126	0
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	80	82	34-115	2
m,p-Xylene	mg/kg (ppm)	5	<0.1	81	82	25-125	1
o-Xylene	mg/kg (ppm)	2.5	<0.05	82	83	27-126	1
Naphthalene	mg/kg (ppm)	2.5	<0.05	75	80	24-139	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Ethanol	mg/kg (ppm)	125	110	51-164
Hexane	mg/kg (ppm)	2.5	89	55-107
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	100	72-122
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	103	73-111
Benzene	mg/kg (ppm)	2.5	94	72-106
Toluene	mg/kg (ppm)	2.5	97	74-111
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	103	77-117
Ethylbenzene	mg/kg (ppm)	2.5	96	75-112
m,p-Xylene	mg/kg (ppm)	5	99	77-115
o-Xylene	mg/kg (ppm)	2.5	102	76-115
Naphthalene	mg/kg (ppm)	2.5	104	73-122

Date of Report: 04/01/16
Date Received: 03/24/16
Project: CL-Ellensburg, F&BI 603435

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

Laboratory Code: 603344-09 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	mg/kg (ppm)	2.5	<0.03	84	86	26-114	2
Toluene	mg/kg (ppm)	2.5	<0.05	78	79	34-112	1
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	80	82	34-115	2
m,p-Xylene	mg/kg (ppm)	5	<0.1	81	82	25-125	1
o-Xylene	mg/kg (ppm)	2.5	<0.05	82	83	27-126	1
Naphthalene	mg/kg (ppm)	2.5	<0.05	75	80	24-139	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	2.5	94	72-106
Toluene	mg/kg (ppm)	2.5	97	74-111
Ethylbenzene	mg/kg (ppm)	2.5	96	75-112
m,p-Xylene	mg/kg (ppm)	5	99	77-115
o-Xylene	mg/kg (ppm)	2.5	102	76-115
Naphthalene	mg/kg (ppm)	2.5	104	73-122

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.

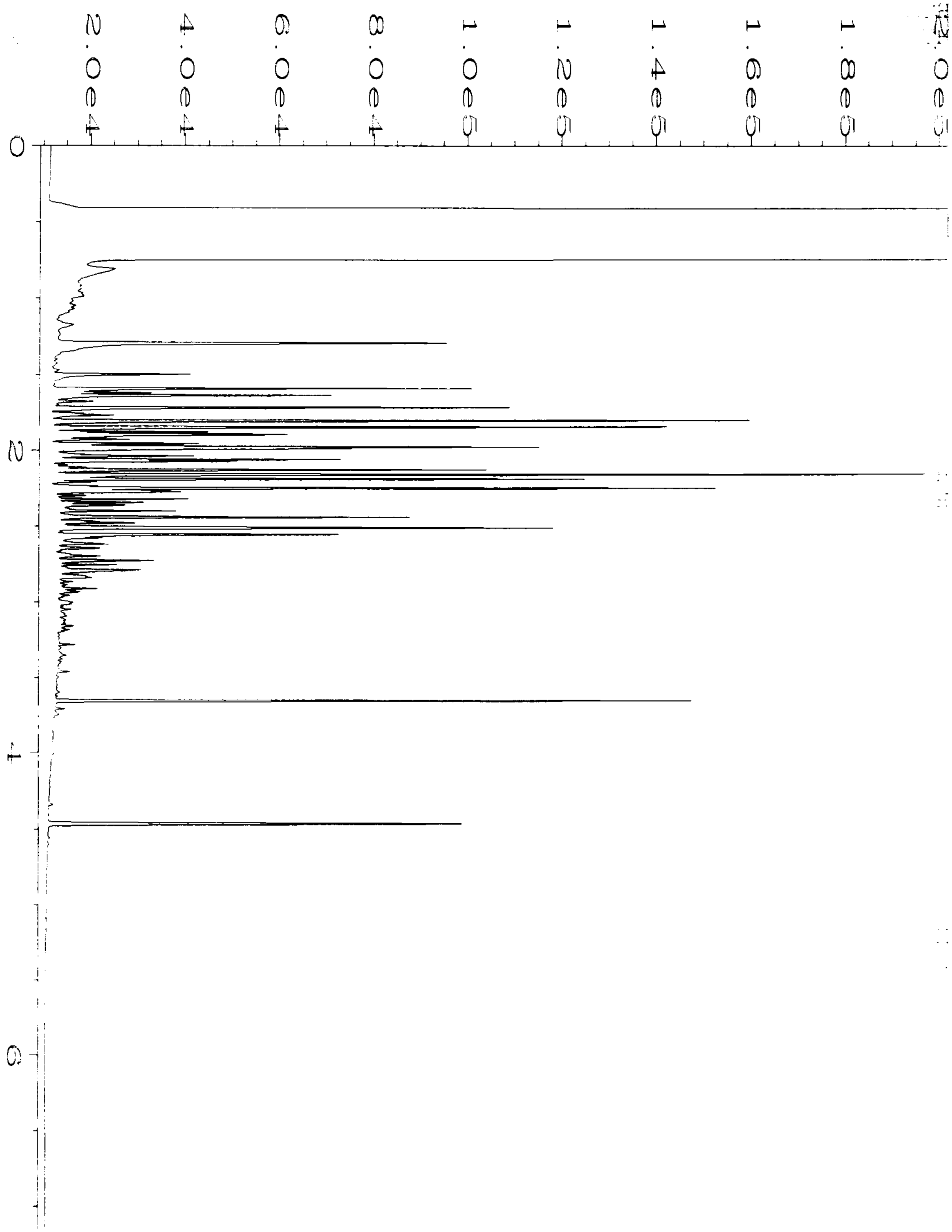
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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.

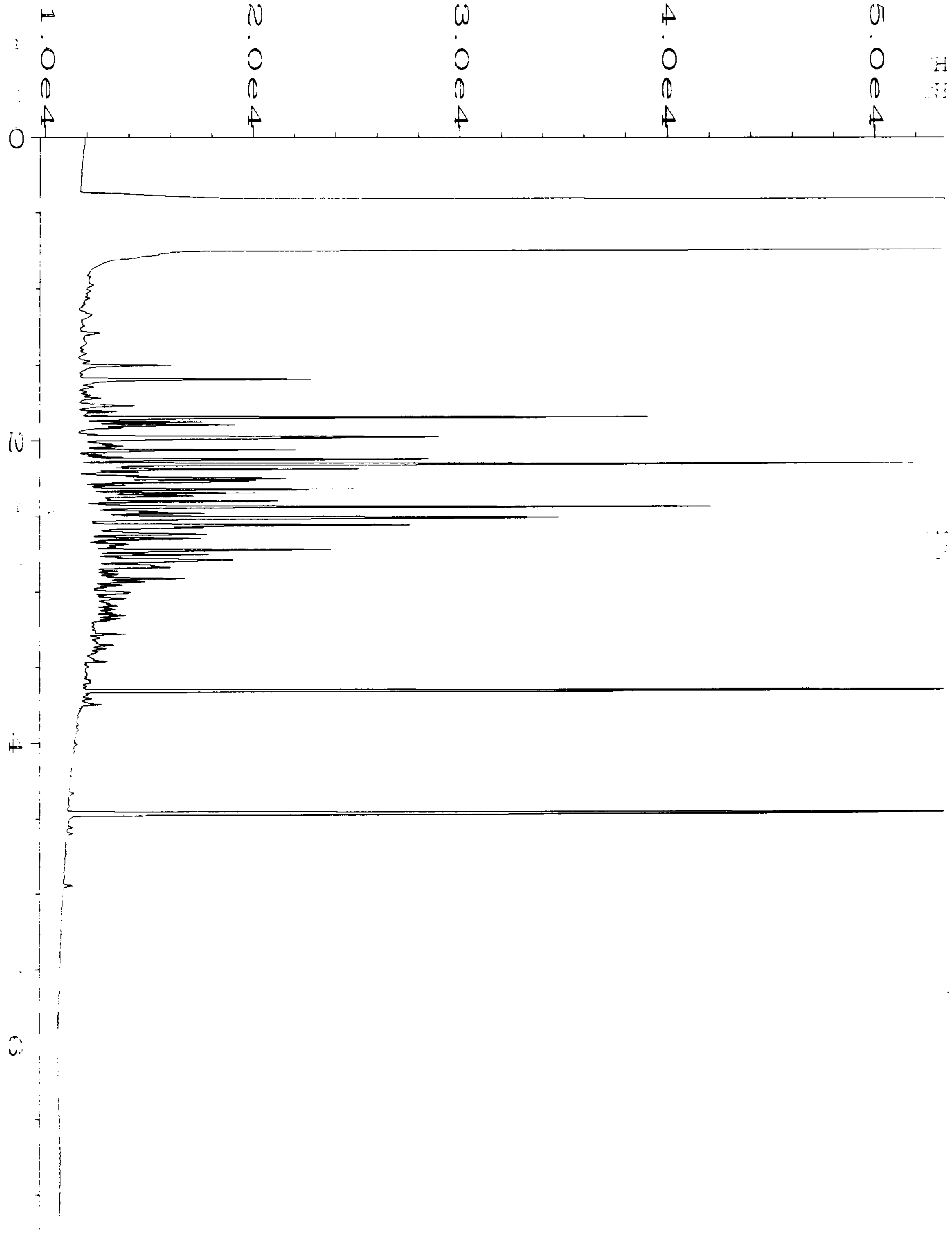
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

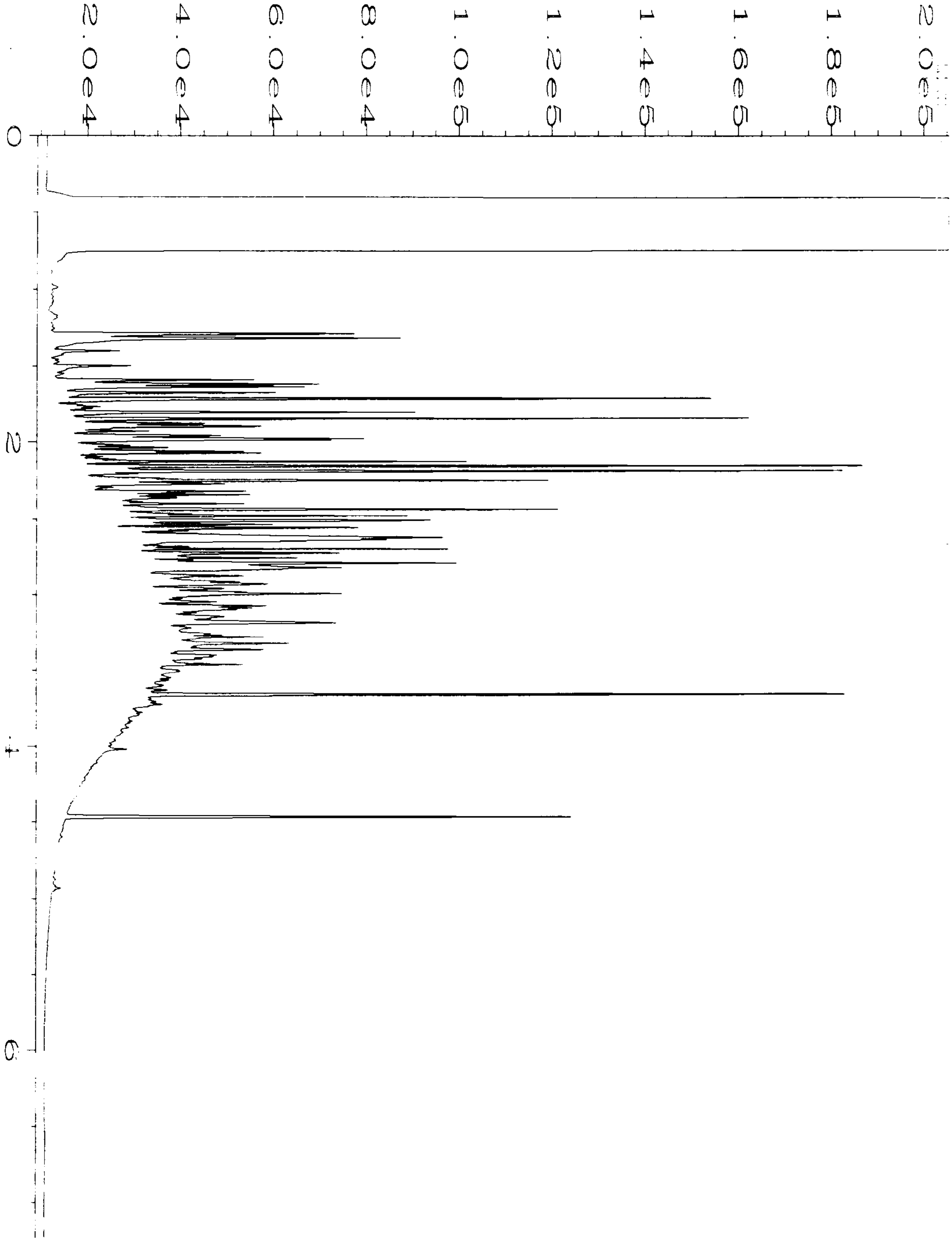


Data File Name	:	C:\HPCHEM\1\DATA\03-25-16\027F0301.D			
Operator	:	mwdl	Page Number	:	1
Instrument	:	GC1	Vial Number	:	27
Sample Name	:	603435-01	Injection Number	:	1
Run Time Bar Code	:		Sequence Line	:	3
Acquired on	:	25 Mar 16 01:54 PM	Instrument Method	:	DX.MTH
Report Created on	:	28 Mar 16 09:56 AM	Analysis Method	:	DX.MTH

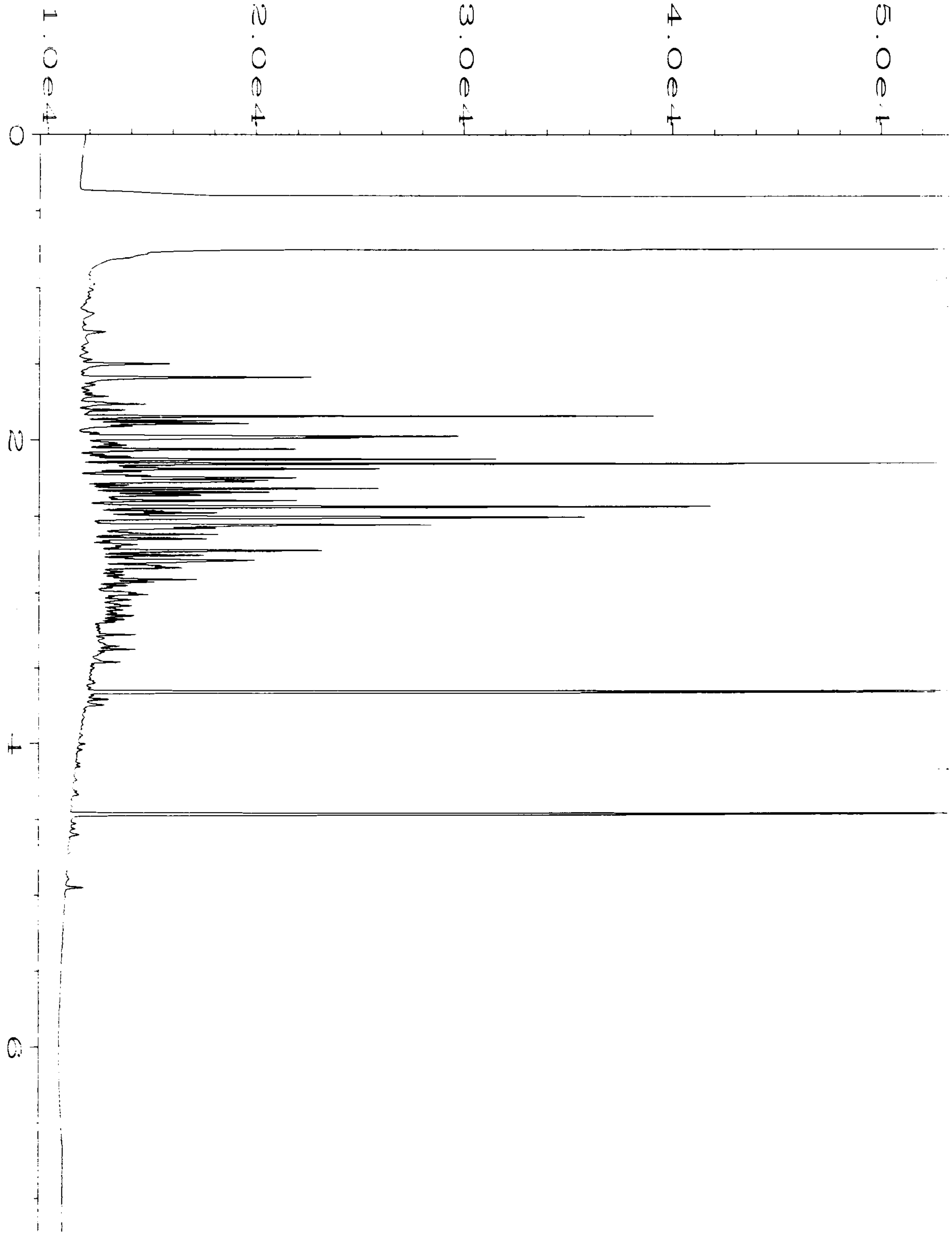


Data File Name : C:\HPCHEM\1\DATA\03-25-16\030F0301.D
Operator : mwdl
Instrument : GC1
Sample Name : 603435-02
Run Time Bar Code:
Acquired on : 25 Mar 16 02:27 PM
Report Created on: 28 Mar 16 09:56 AM

Page Number : 1
Vial Number : 30
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH



Data File Name   : C:\HPCHEM\1\DATA\03-25-16\031F0301.D
Operator   : mwdl   Page Number   : 1
Instrument   : GC1   Vial Number   : 31
Sample Name   : 603435-03   Injection Number : 1
Run Time Bar Code: Sequence Line   : 3
Acquired on   : 25 Mar 16 02:38 PM   Instrument Method: DX.MTH
Report Created on: 28 Mar 16 09:57 AM   Analysis Method   : DX.MTH



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Data File Name    : C:\HPCHEM\1\DATA\03-25-16\032F0301.D
Operator          : mwdl                        Page Number       : 1
Instrument        : GC1                         Vial Number       : 32
Sample Name       : 603435-04                   Injection Number : 1
Run Time Bar Code:                              Sequence Line     : 3
Acquired on       : 25 Mar 16   02:49 PM        Instrument Method: DX.MTH
Report Created on: 28 Mar 16   09:57 AM         Analysis Method   : DX.MTH
```

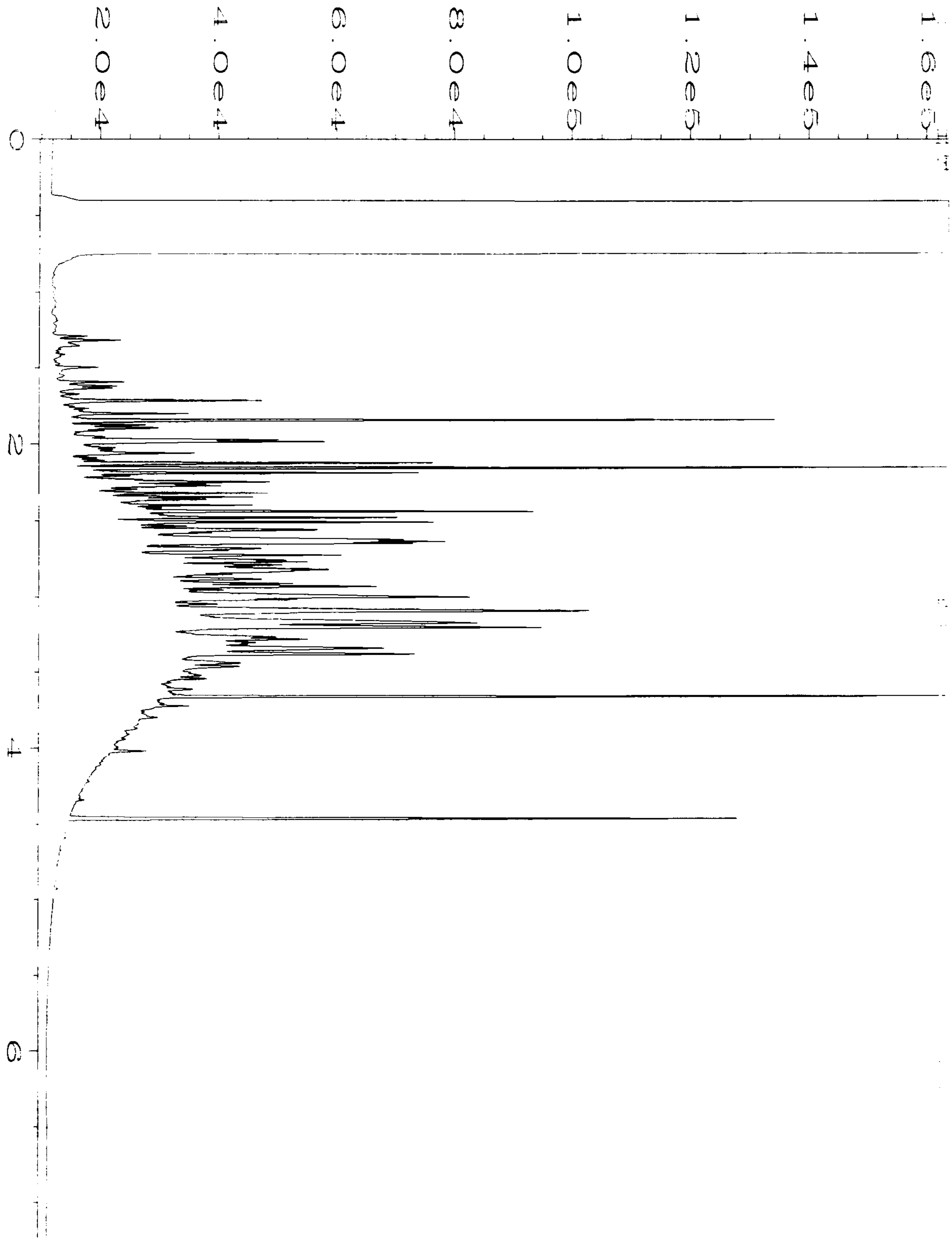

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Operator          : mwdl                         Page Number       : 1
Instrument        : GC1                          Vial Number       : 33
Sample Name       : 603435-05                    Injection Number : 1
Run Time Bar Code:                               Sequence Line     : 5
Acquired on       : 25 Mar 16   03:23 PM         Instrument Method: DX.MTH
Report Created on: 28 Mar 16   09:57 AM          Analysis Method   : DX.MTH
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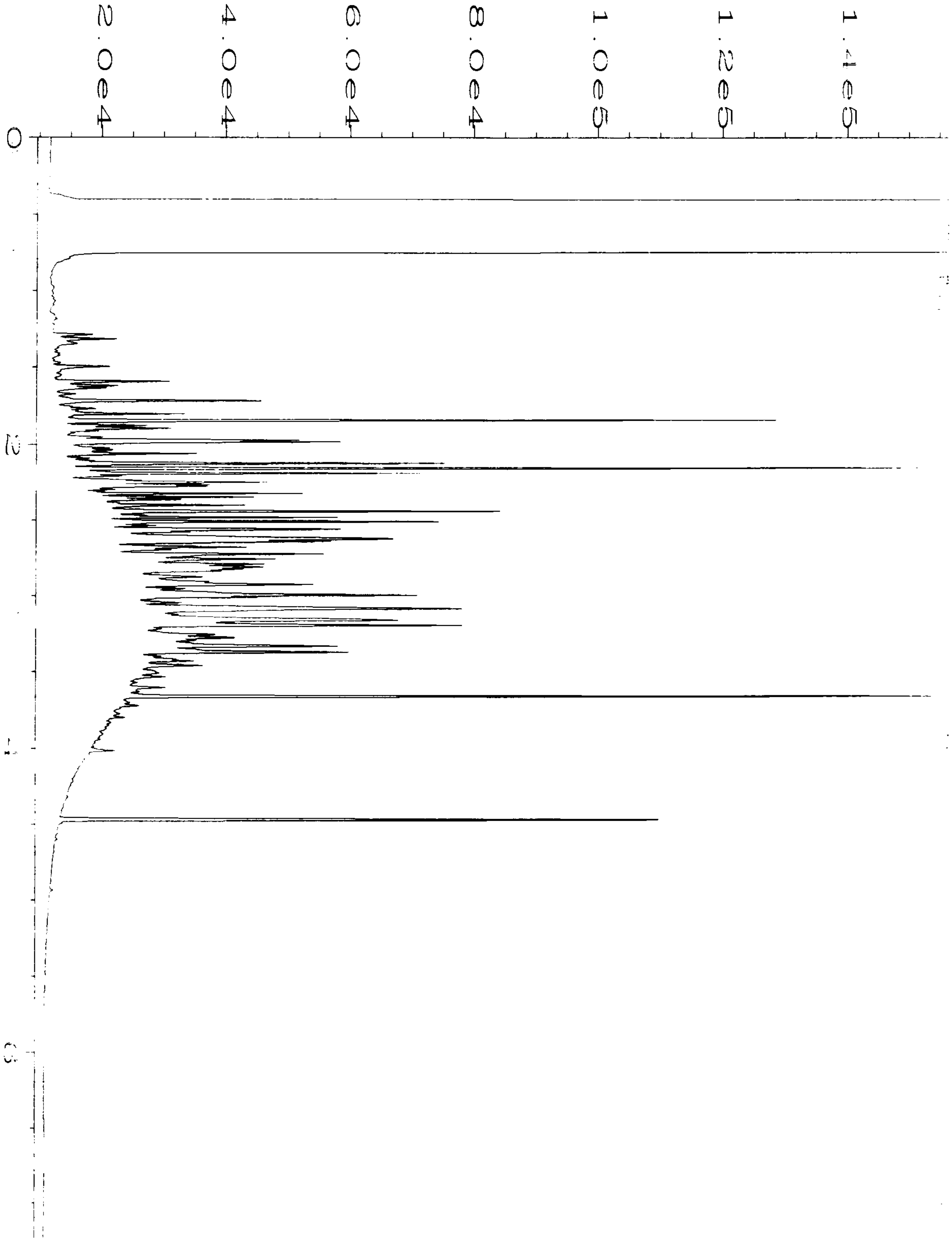
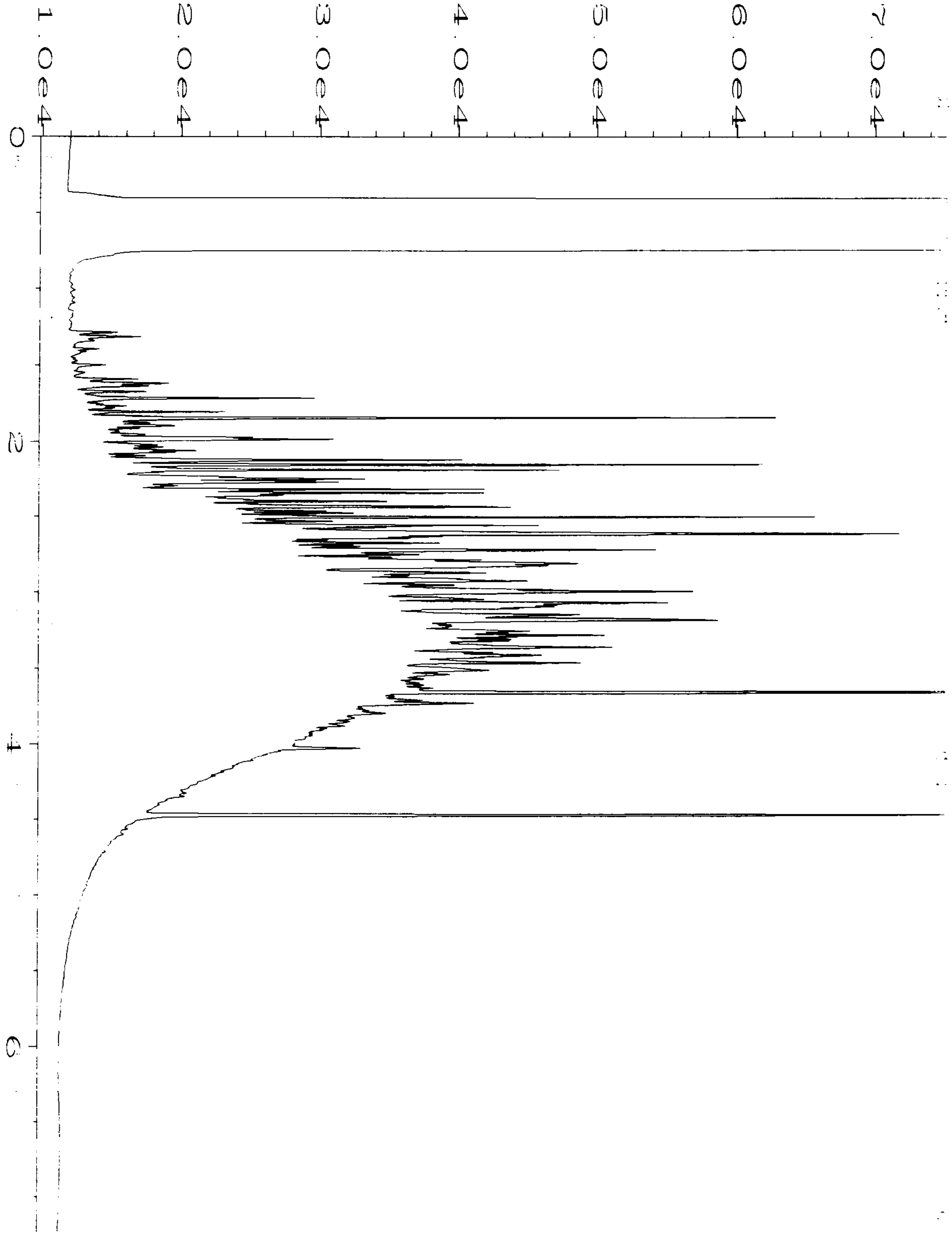
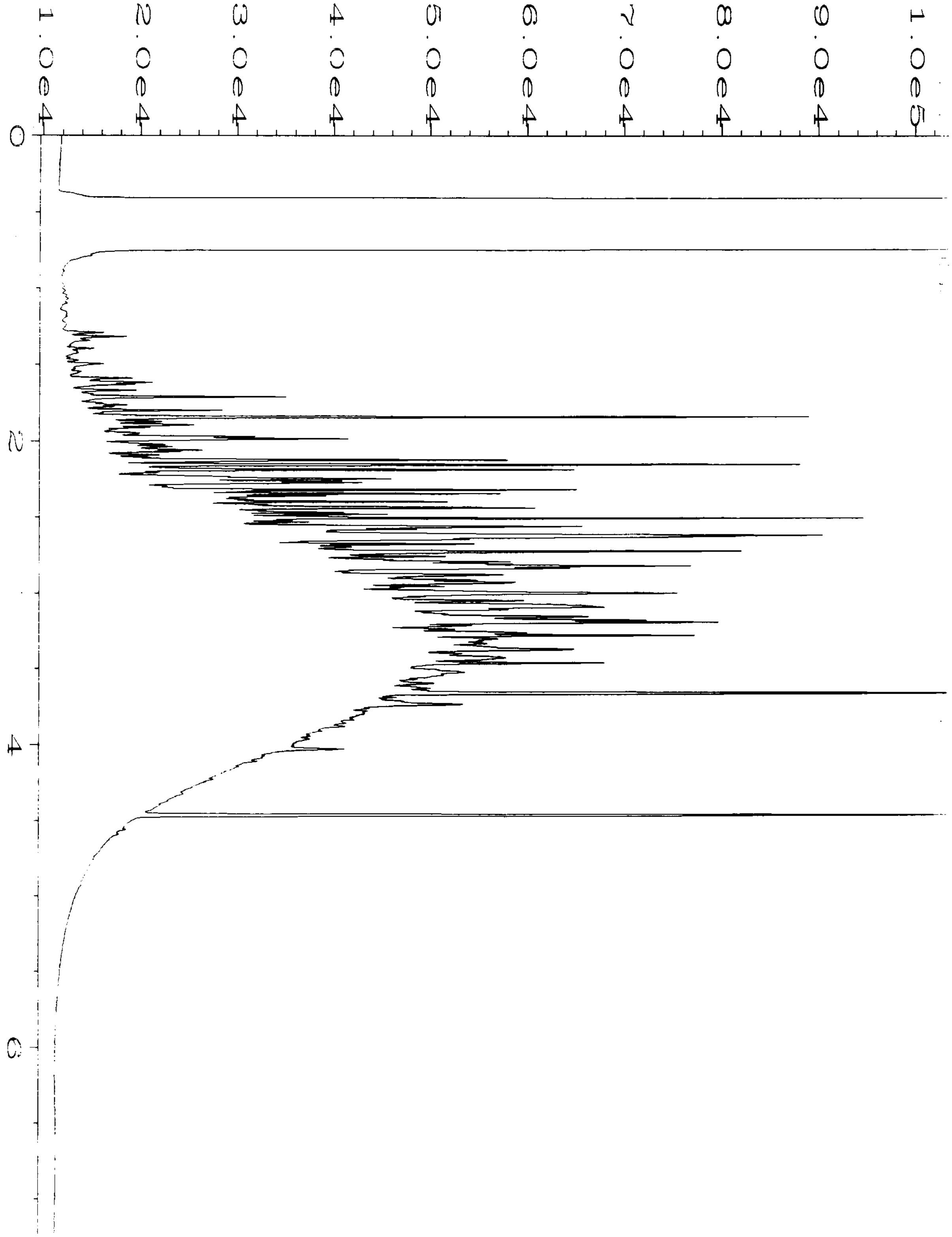


Data File Name : C:\HPCHEM\1\DATA\03-25-16\034F0501.D
Operator : mwd1
Instrument : GC1
Sample Name : 603435-06
Run Time Bar Code:
Acquired on : 25 Mar 16 03:34 PM
Report Created on: 28 Mar 16 09:58 AM

Page Number : 1
Vial Number : 34
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DX.MTH



Data File Name   : C:\HPCHEM\1\DATA\03-25-16\035F0501.D
Operator   : mwdl   Page Number   : 1
Instrument   : GC1   Vial Number   : 35
Sample Name   : 603435-07   Injection Number : 1
Run Time Bar Code: Sequence Line   : 5
Acquired on   : 25 Mar 16   03:45 PM   Instrument Method: DX.MTH
Report Created on: 28 Mar 16   09:58 AM   Analysis Method   : DX.MTH



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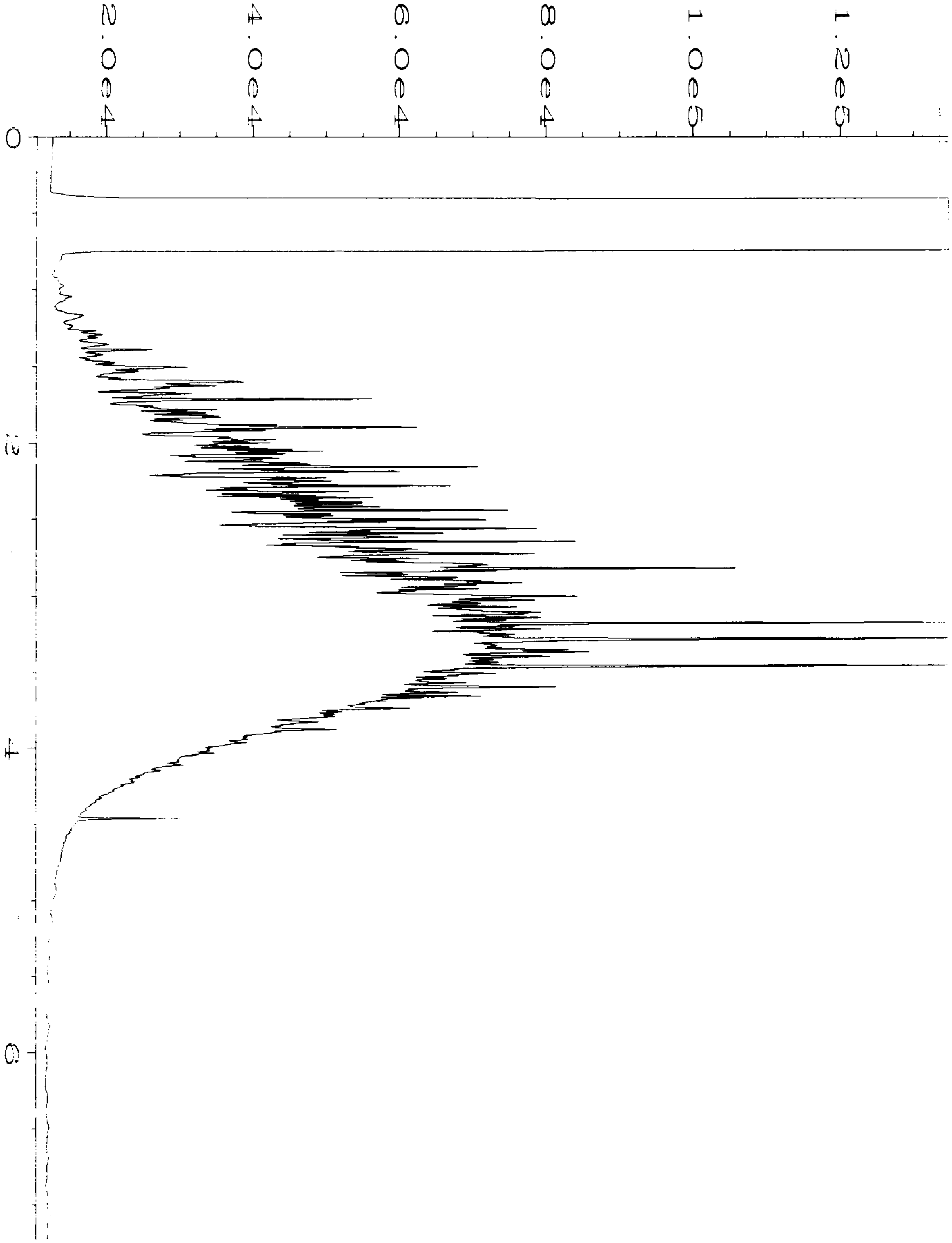
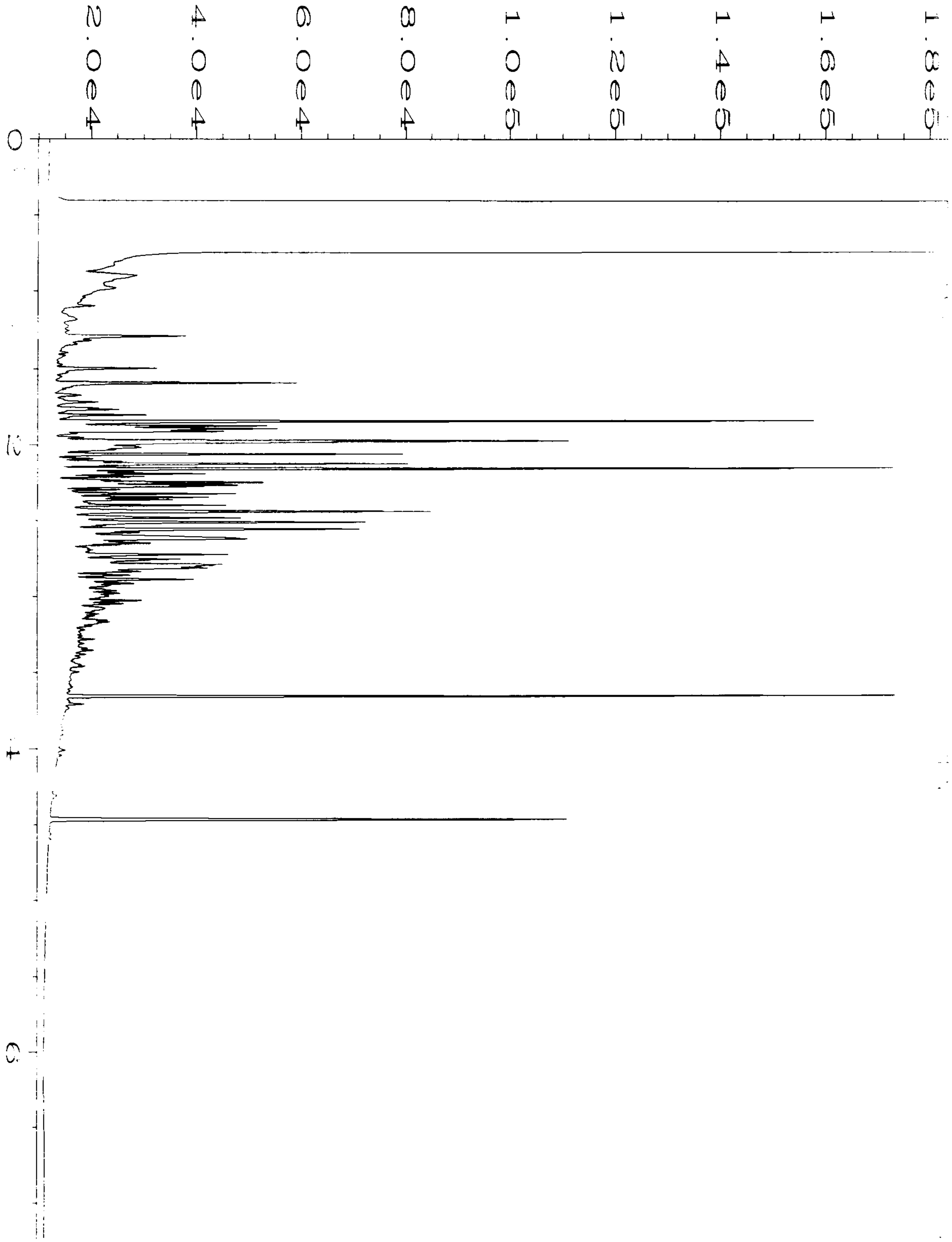
Operator          : mwdl                                Page Number      : 1
Instrument        : GC1                                 Vial Number      : 36
Sample Name       : 603435-08                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 5
Acquired on       : 25 Mar 16   03:56 PM                Instrument Method: DX.MTH
Report Created on: 28 Mar 16   09:58 AM                 Analysis Method  : DX.MTH
```



Data File Name   : C:\HPCHEM\1\DATA\03-25-16\054F0801.D
Operator   : mwdl
Instrument   : GC1
Sample Name   : 603435-09 1/10
Run Time Bar Code:
Acquired on   : 25 Mar 16   08:01 PM
Report Created on: 28 Mar 16   10:08 AM

Page Number   : 1
Vial Number   : 54
Injection Number : 1
Sequence Line   : 8
Instrument Method: DX.MTH
Analysis Method   : DX.MTH



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Operator          : mwdl                               Page Number       : 1
Instrument        : GC1                                Vial Number       : 37
Sample Name       : 603435-10                          Injection Number  : 1
Run Time Bar Code:                                     Sequence Line     : 5
Acquired on       : 25 Mar 16   04:07 PM               Instrument Method: DX.MTH
Report Created on: 28 Mar 16   09:59 AM                Analysis Method   : DX.MTH
```

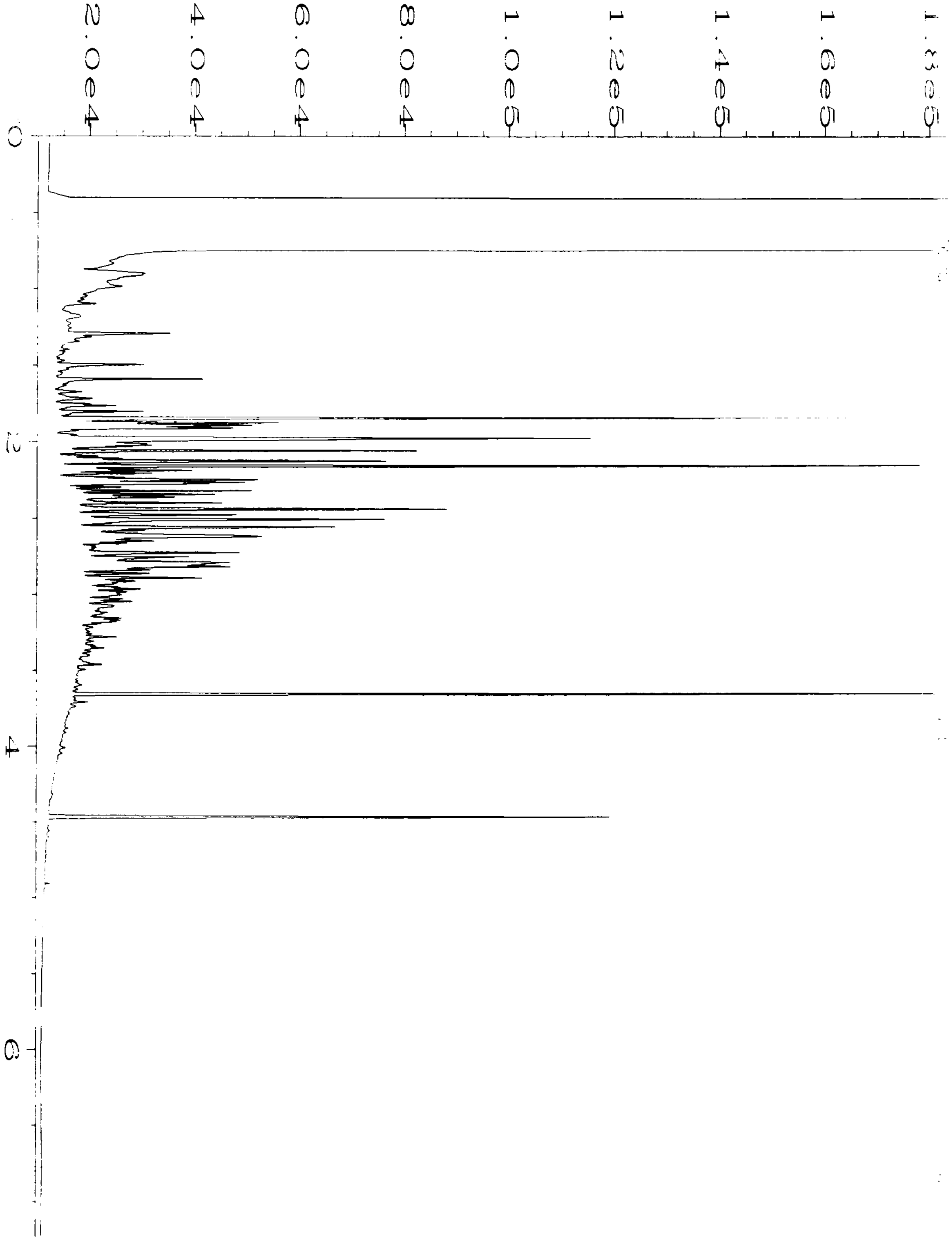

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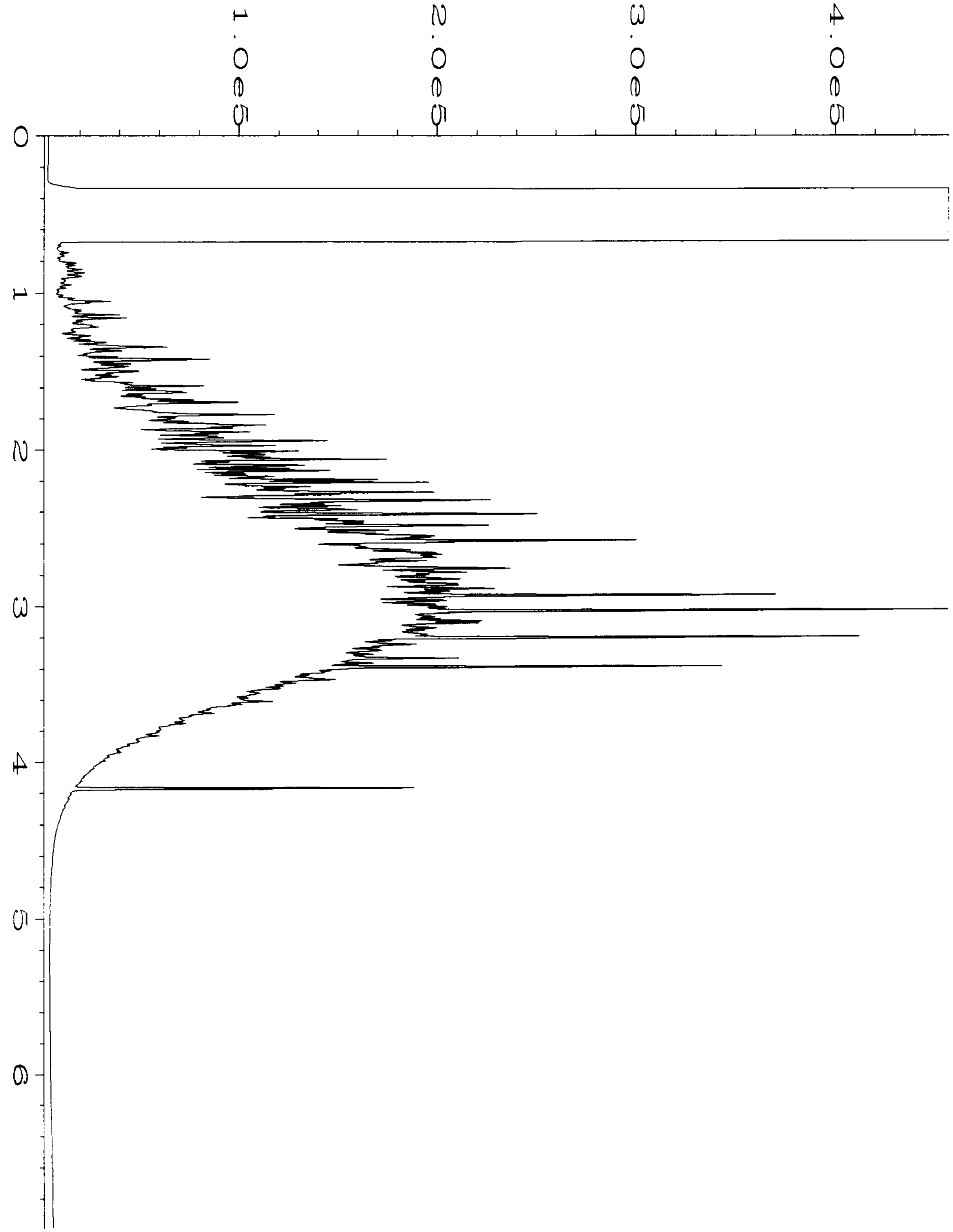
Operator : mwdl
Instrument : GC1
Sample Name : 603435-11
Run Time Bar Code:
Acquired on : 25 Mar 16 04:18 PM
Report Created on: 28 Mar 16 09:59 AM

Page Number : 1
Vial Number : 38
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DX.MTH



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Data File Name    : C:\HPCHEM\6\DATA\03-24-16\040F0601.D
Operator          : mwdl                             Page Number       : 1
Instrument        : GC #6                            Vial Number       : 40
Sample Name       : 603435-12                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 6
Acquired on       : 24 Mar 16   05:48 PM             Instrument Method: DX.MTH
Report Created on: 25 Mar 16   09:19 AM             Analysis Method   : DX.MTH
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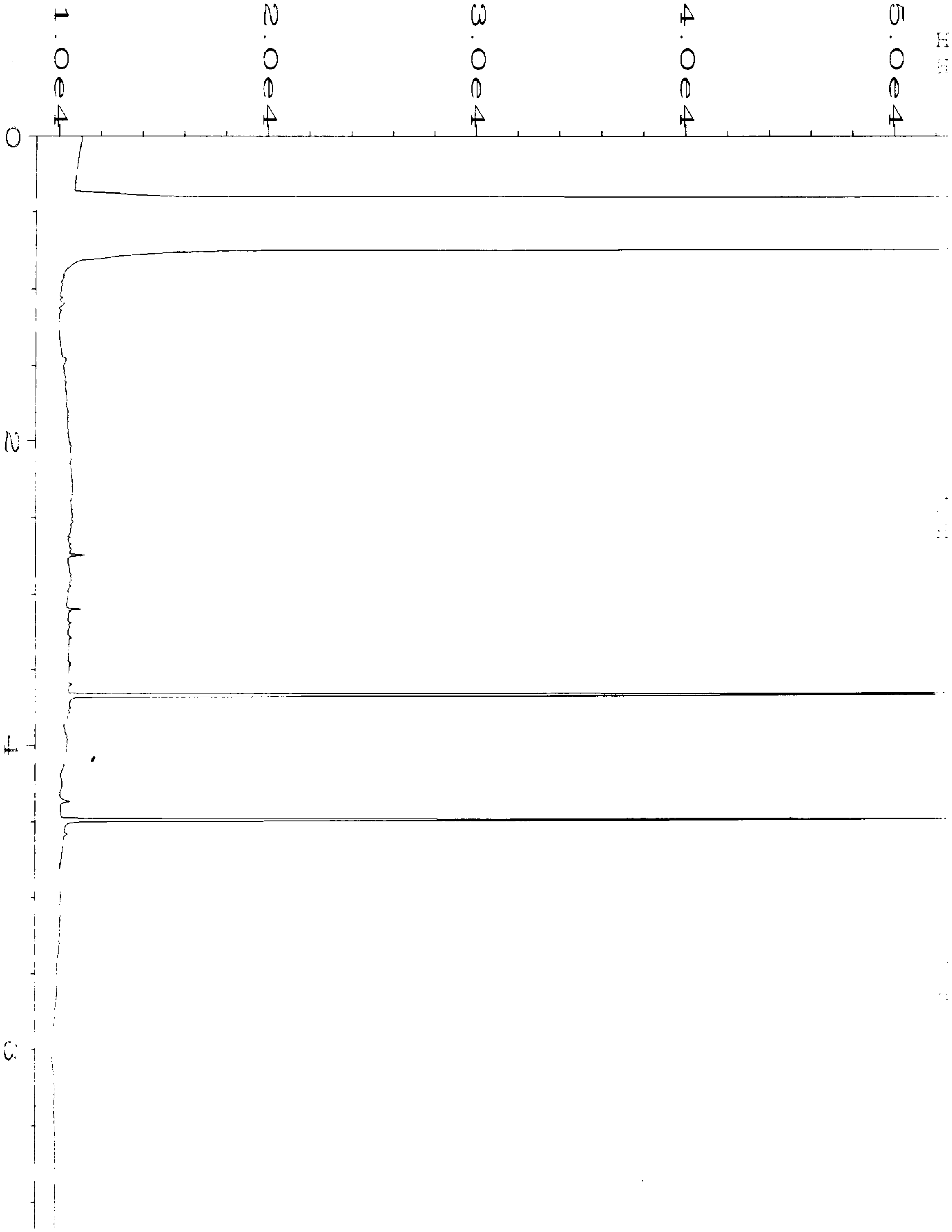
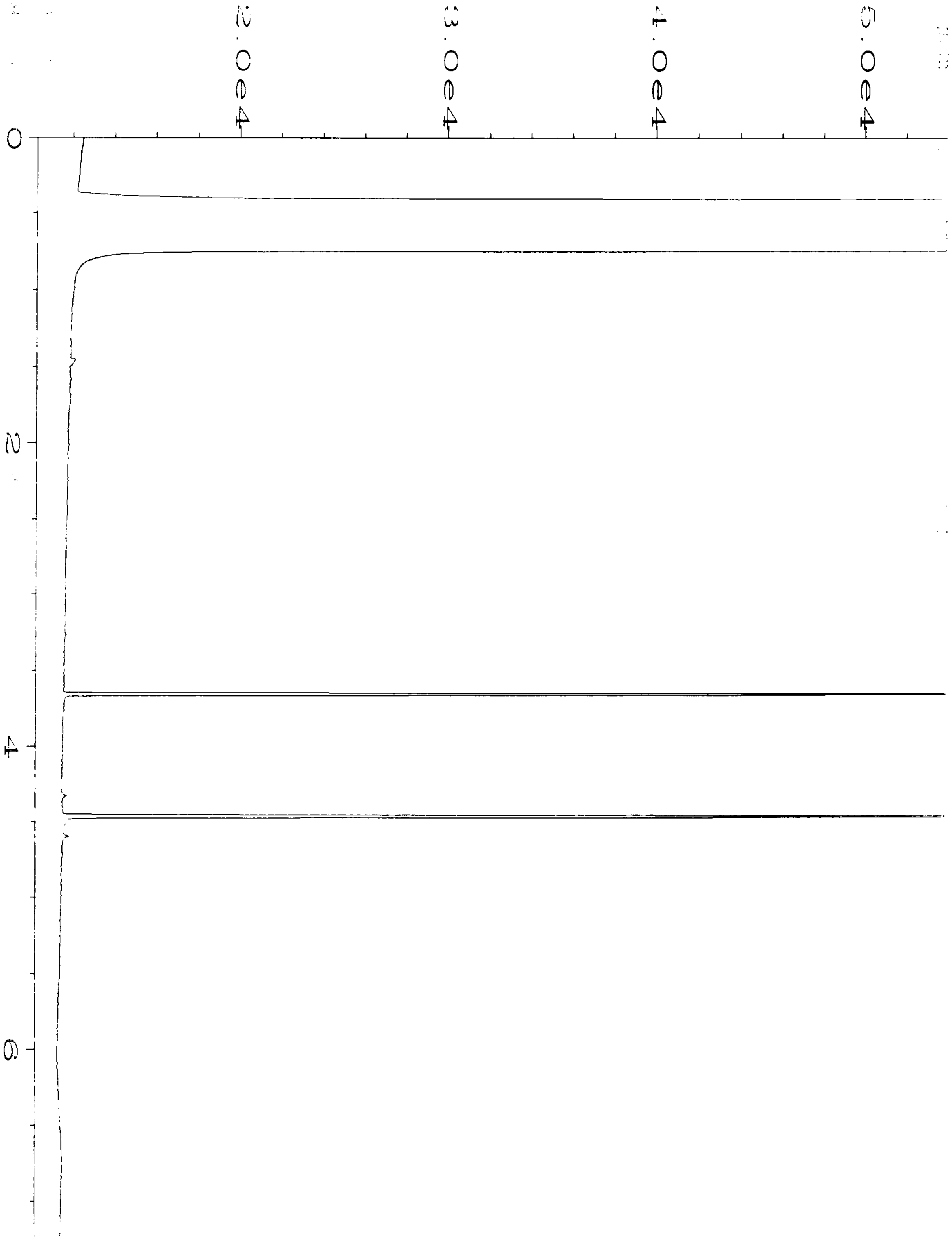


Data File Name : C:\HPCHEM\1\DATA\03-25-16\019F0301.D
Operator : mwdl
Instrument : GC1
Sample Name : 06-583 mb
Run Time Bar Code:
Acquired on : 25 Mar 16 12:29 PM
Report Created on: 28 Mar 16 09:59 AM

Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH



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Data File Name    : C:\HPCHEM\1\DATA\03-25-16\043F0801.D
Operator          : mwdl                       Page Number       : 1
Instrument        : GC1                        Vial Number       : 43
Sample Name       : 06-539 mb                  Injection Number  : 1
Run Time Bar Code:                             Sequence Line     : 8
Acquired on       : 25 Mar 16   05:58 PM       Instrument Method: DX.MTH
Report Created on: 28 Mar 16   10:08 AM        Analysis Method   : DX.MTH
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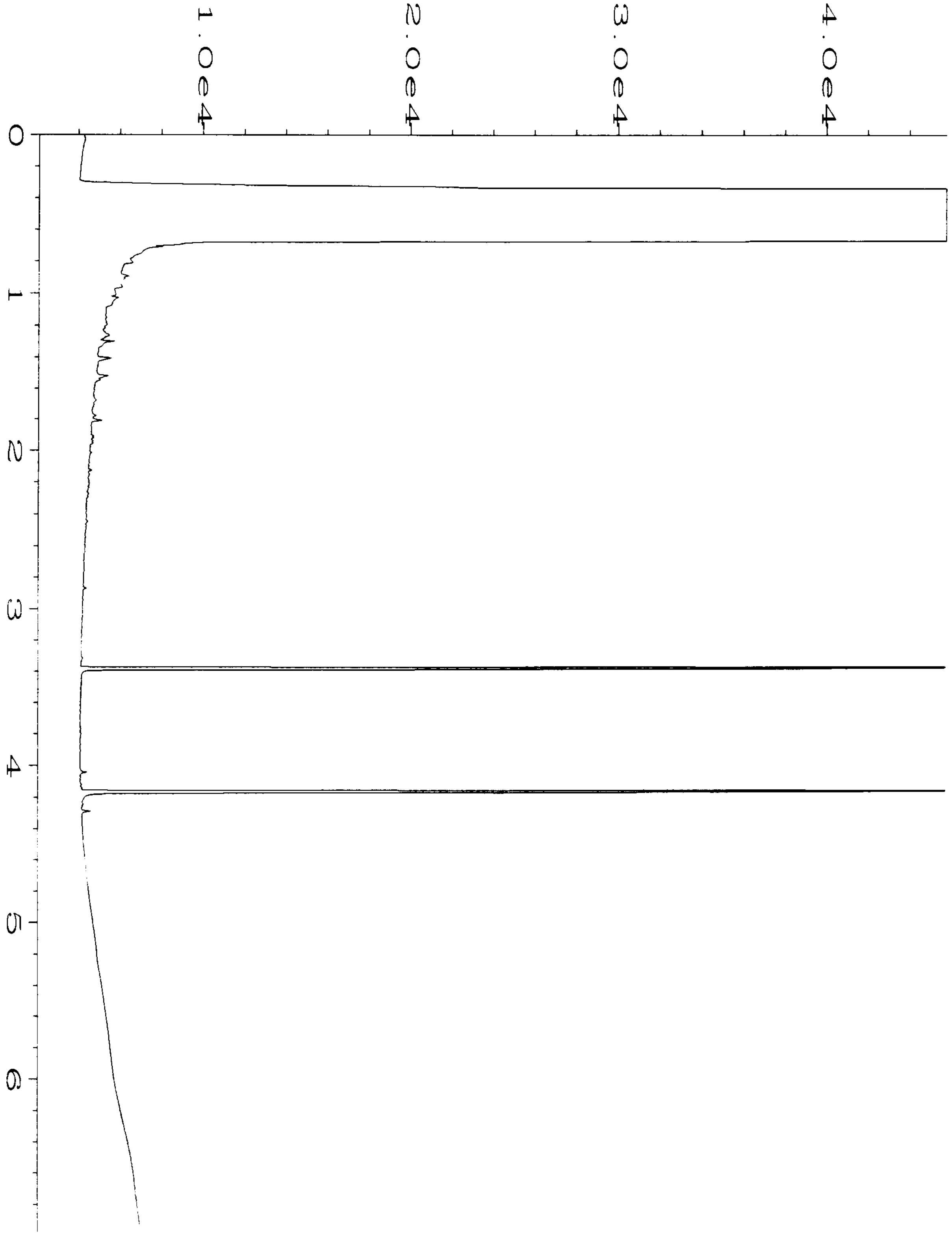

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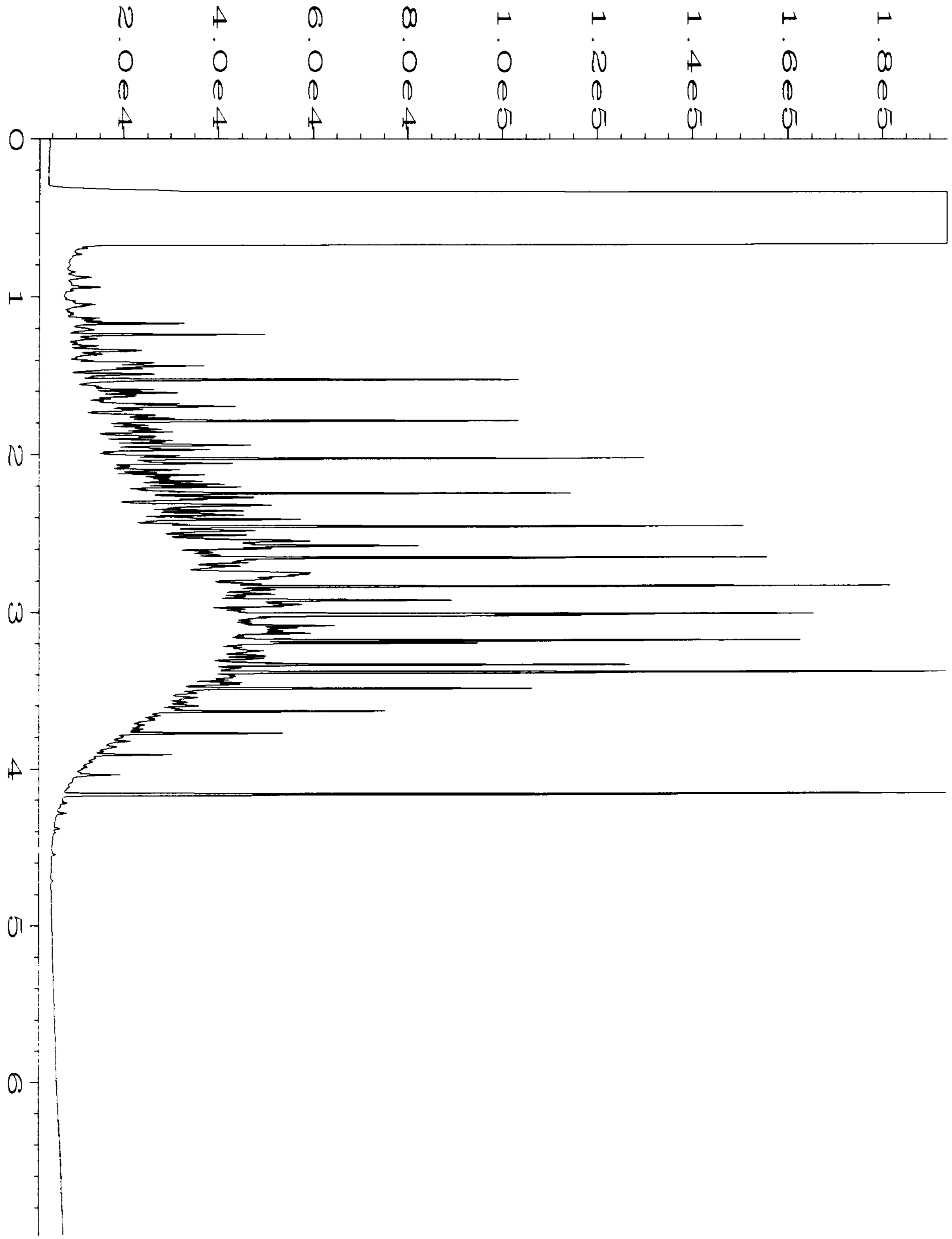
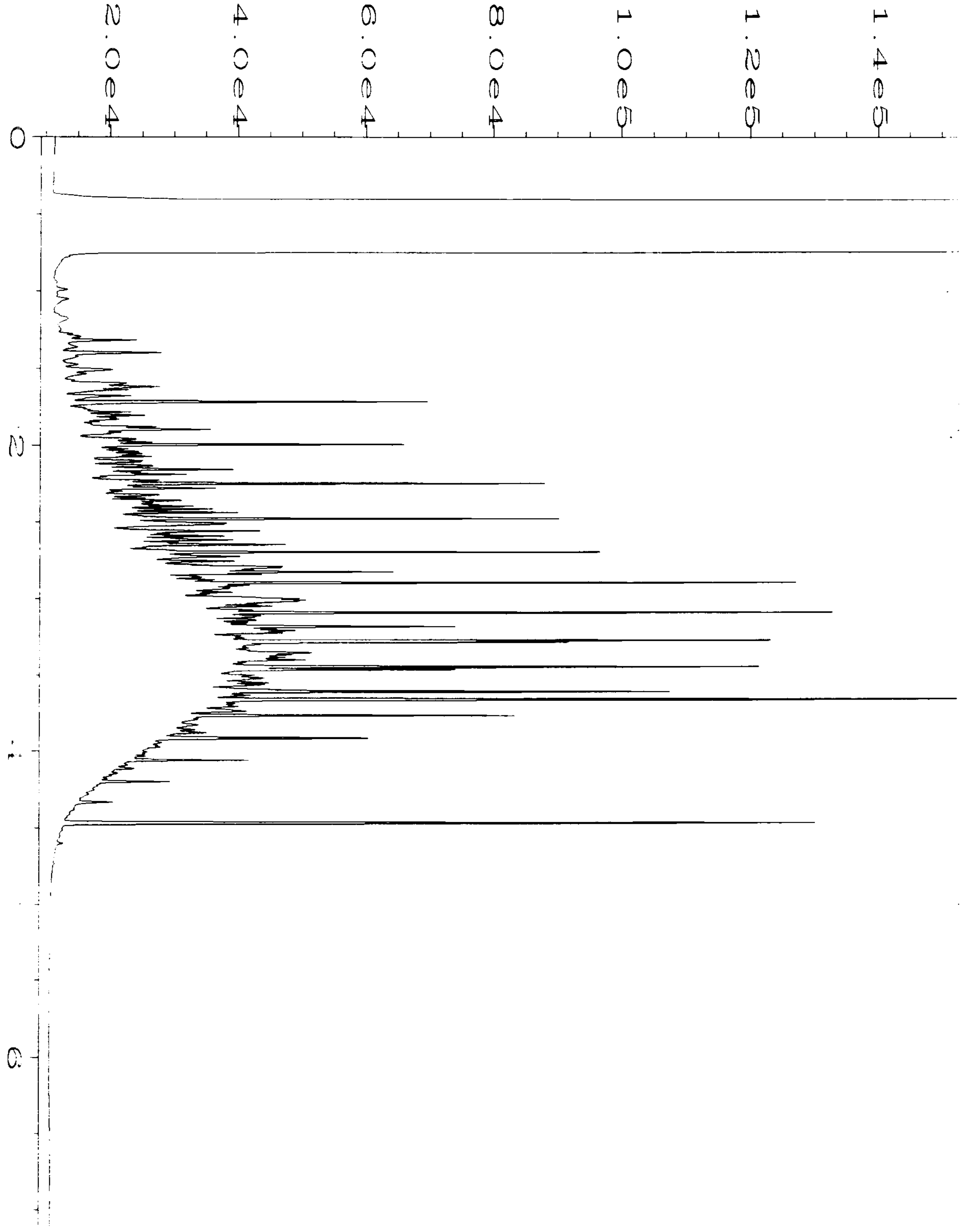
Data File Name    : C:\HPCHEM\6\DATA\03-24-16\026F0401.D
Operator          : mwdl                                Page Number      : 1
Instrument        : GC #6                               Vial Number      : 26
Sample Name       : 06-570 mb                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 4
Acquired on       : 24 Mar 16  02:28 PM                 Instrument Method: DX.MTH
Report Created on: 25 Mar 16  09:19 AM                  Analysis Method  : DX.MTH
```



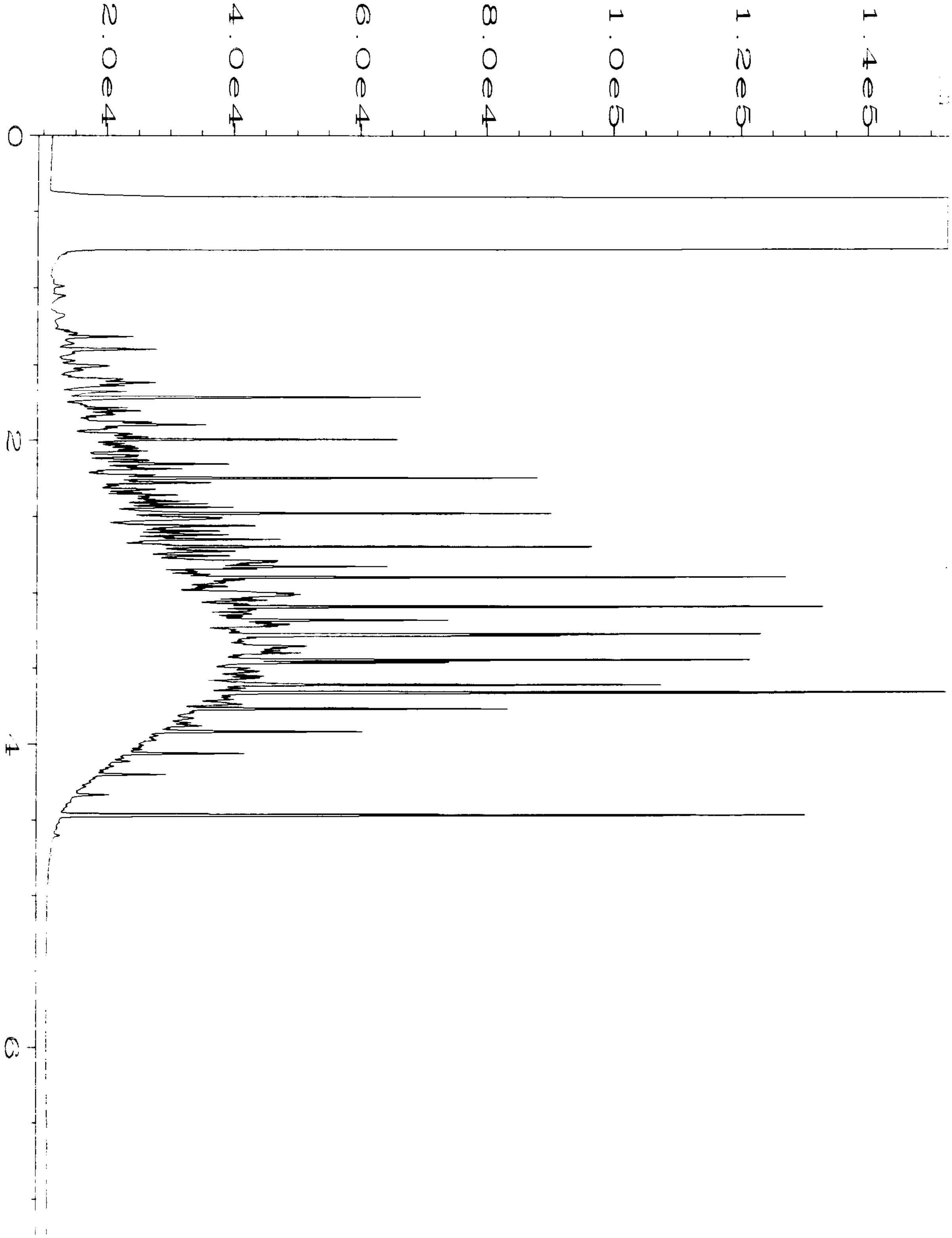
Data File Name	: C:\HPCHEM\6\DATA\03-24-16\003F0201.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 3
Sample Name	: 500 Dx 45-182D	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 24 Mar 16 07:43 AM	Instrument Method:	DX.MTH
Report Created on:	25 Mar 16 09:19 AM	Analysis Method	: DX.MTH

Sample N
Run Time
Acquired :
Report C



Data File Name : C:\HPCHEM\1\DATA\03-25-16\003F0201.D
Operator : mwdl
Instrument : GC1
Sample Name : 500 Dx 45-182D
Run Time Bar Code:
Acquired on : 25 Mar 16 07:26 AM
Report Created on: 28 Mar 16 10:00 AM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DX.MTH



Data File Name : C:\HPCHEM\1\DATA\03-25-16\003F0201.D
Operator : mwdl
Instrument : GC1
Sample Name : 500 Dx 45-182D
Run Time Bar Code:
Acquired on : 25 Mar 16 07:26 AM
Report Created on: 28 Mar 16 10:08 AM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DX.MTH

603435

SAMPLE CHAIN OF CUSTODY

ME 03-24-16 E03/V4/V51

Page # 1 of 2

Send Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union Street Ste 600
City, State, ZIP Seattle, WA 98101
Phone # 206-292-2078 Fax #

SAMPLERS (signature)

PROJECT NAME/NO. CL-Ellensburg

PO#

REMARKS
LNAPL (Product) Shortlist 8260 includes: Ethanol, BTEX, MTBE, napthalene, n-hexane, EDC, Butane isooctane

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	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8260 ~~8021B~~	VOCs by8260	SVOCs by 8270	HFS	8260 Naphthalene	Total Lead 6020	EDB by 8011	Product 8260 Short List			Notes
MW-8-3-13	01A-Q	3/23	0938	W	8CW 17 ~~16~~ 18	X	X	X				X						MS/MSD
MW-10-4-14	02A-H		1030	W	8	X	X	X				X						
MW-9-4-14	03		1130	W	8	X	X	X				X						
MW-10-4-14D	04		1040	W	8	X	X	X				X						Duplicate
MW-5A-14'	05		1200	W	8	X	X	X				X						
MW-5A-7'	06		1240	W	8	X	X	X				X						
MW-4A-14'	07		1320	W	8	X	X	X				X						
MW-4A-7'	08		1400	W	8	X	X	X				X						
MW-4A-LNAPL	09A-B		1410	LNAPL	2	X	X						X	X	X			Samples received at 4 °C
MW-7-14	10A-H		1525	W	8	X	X	X				X						

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Terry Duncan	Terry Duncan	Floyd Snider	3/24/16	11:10
Received by:	D Banis	Fedex SDC	3/24	11:16A
Relinquished by:				
Received by:				

FORMS\COC\COC.DOC

603435

SAMPLE CHAIN OF CUSTODY

ME 03-24-16 E03 / V4 / VS1

Page # 2 of 2

Send Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union Street Ste. 600
City, State, ZIP Seattle, WA
Phone # 206-212-2078 Fax #

SAMPLERS (*signature*)
PROJECT NAME/NO. CL-Ellensburg
PO#
REMARKS

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	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by ~~8021B~~ 8260	VOCs by8260	SVOCs by 8270	HFS	Naphth 8260						Notes
~~MW-2-7~~ 18C		~~3/23/16~~		~~W~~	~~8~~													
MW-2-7'	11 A-H	3/23/16	1605	W	8	X	X	X				X						
Stockpile-032316	12 A-E	11	1730	Soil	5	X	X	X				X						
Trip Blank	13 A-B						X	X										

Samples received at 4 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Terry Duncan	Floyd Snider	3/24	11:16
Received by:	D Sours	Fedex SOC	3/24	11:16A
Relinquished by:				
Received by:				

FORMS\COC\COC.DOC

Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Appendix C
LNAPL Transmissivity Results

PUBLIC REVIEW DRAFT

API LNAPL Transmissivity Workbook

Calculation of LNAPL Transmissivity from Baildown Test Data

STEP 1: RESET OUTPUT SUMMARY

STEP 2: ENTER DATA & VIEW FIGURES

STEP 3: CHOOSE WELL CONDITIONS

STEP 4: LNAPL TRANSMISSIVITY SUMMARY

Mean LNAPL Transmissivity (ft^2/d)

1.56

Standard Deviation (ft^2/d)

0.90

Coefficient of Variation

0.58

Well Designation:	MW-5A	
Date:	19-Apr-16	

Ground Surface Elev (ft msl)	1490.3	Enter These Data	**Drawdown Adjustment (ft)**
Top of Casing Elev (ft msl)	1490.0		0
Well Casing Radius, r_c (ft):	0.083	r_{e1}	
Well Radius, r_w (ft):	0.343		
LNAPL Specific Yield, S_y:	0.161		
LNAPL Density Ratio, ρ_r:	0.878		
Top of Screen (ft bgs):	3.6		
Bottom of Screen (ft bgs):	14.0		
LNAPL Baildown Vol. (gal.):	0.2		
Effective Radius, r_{e3} (ft):	0.157	Calculated Parameters	
Effective Radius, r_{e2} (ft):	0.149		
Initial Casing LNAPL Vol. (gal.):	0.16		
Initial Filter LNAPL Vol. (gal.):	0.38		

Enter Data Here

	Time (min)	DTP (ft btoc)	DTW (ft btoc)	DTP (ft bgs)	DTW (ft bgs)	Water Table Depth (ft)	LNAPL Drawdown s_n (ft)	Average Time (min)	LNAPL Discharge Q_n (ft^3/d)	s_n (ft)	b_n (ft)	r_e (ft)	DTP (ft bgs)	DTW (ft bgs)	LNAPL Volume (gallons)	Ave. r_e (ft)
Initial Fluid Levels:	0	3.10	4.11	3.49	4.5	3.61					1.01					
Enter Test Data:	1.0	3.21	3.22	3.60	3.61	3.60	0.16				0.01				0	0.149
	2.0	3.21	3.22	3.60	3.61	3.60	0.16	1.5	0.000	0.16	0.01	0.149	3.60	3.61	0.00	0
	3.0	3.21	3.22	3.60	3.61	3.60	0.16	2.5	0.000	0.16	0.01	0.149	3.60	3.61	0.00	0.149
	4.0	3.21	3.24	3.60	3.63	3.60	0.15	3.5	2.013	0.16	0.03	0.149	3.60	3.62	0.01	0.298
	20.0	3.21	3.28	3.60	3.67	3.61	0.15	12.0	0.252	0.15	0.07	0.149	3.60	3.65	0.03	1.566
	30.0	3.21	3.31	3.60	3.70	3.61	0.14	25.0	0.302	0.14	0.10	0.149	3.60	3.68	0.05	3.506
	45.0	3.21	3.37	3.60	3.76	3.62	0.13	37.5	0.403	0.14	0.16	0.149	3.60	3.73	0.08	5.370
	54.00	3.20	3.41	3.59	3.80	3.62	0.12	49.5	0.559	0.13	0.21	0.149	3.59	3.78	0.10	7.160
	63.0	3.20	3.45	3.59	3.84	3.62	0.12	58.5	0.447	0.12	0.25	0.149	3.59	3.82	0.13	8.503
	74.00	3.19	3.51	3.58	3.90	3.62	0.11	68.5	0.641	0.11	0.32	0.149	3.58	3.87	0.16	9.995
	87.0	3.18	3.58	3.57	3.97	3.62	0.09	80.5	0.620	0.10	0.40	0.149	3.57	3.93	0.20	11.785
	102.00	3.17	3.62	3.56	4.01	3.61	0.09	94.5	0.336	0.09	0.45	0.149	3.56	3.99	0.23	13.873
	117.0	3.16	3.68	3.55	4.07	3.61	0.08	109.5	0.470	0.08	0.52	0.149	3.55	4.04	0.27	16.111
	132.00	3.15	3.70	3.54	4.09	3.61	0.07	124.5	0.201	0.07	0.55	0.149	3.54	4.08	0.28	18.349
	147.0	3.15	3.75	3.54	4.14	3.61	0.06	139.5	0.336	0.07	0.60	0.149	3.54	4.11	0.31	20.586
	167.00	3.14	3.82	3.53	4.21	3.61	0.05	157.0	0.403	0.06	0.68	0.149	3.53	4.17	0.35	23.197
	177.00	3.13	3.90	3.52	4.29	3.61	0.04	172.0	0.906	0.04	0.77	0.149	3.52	4.25	0.40	25.434
	187.0	3.12	3.95	3.51	4.34	3.61	0.03	182.0	0.604	0.03	0.83	0.149	3.51	4.31	0.43	26.926
	192.0	3.11	3.97	3.50	4.36	3.60	0.02	189.5	0.604	0.03	0.86	0.149	3.50	4.35	0.44	28.045
	202.0	3.11	4.03	3.50	4.42	3.61	0.01	197.0	0.604	0.02	0.92	0.149	3.50	4.39	0.48	29.164
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
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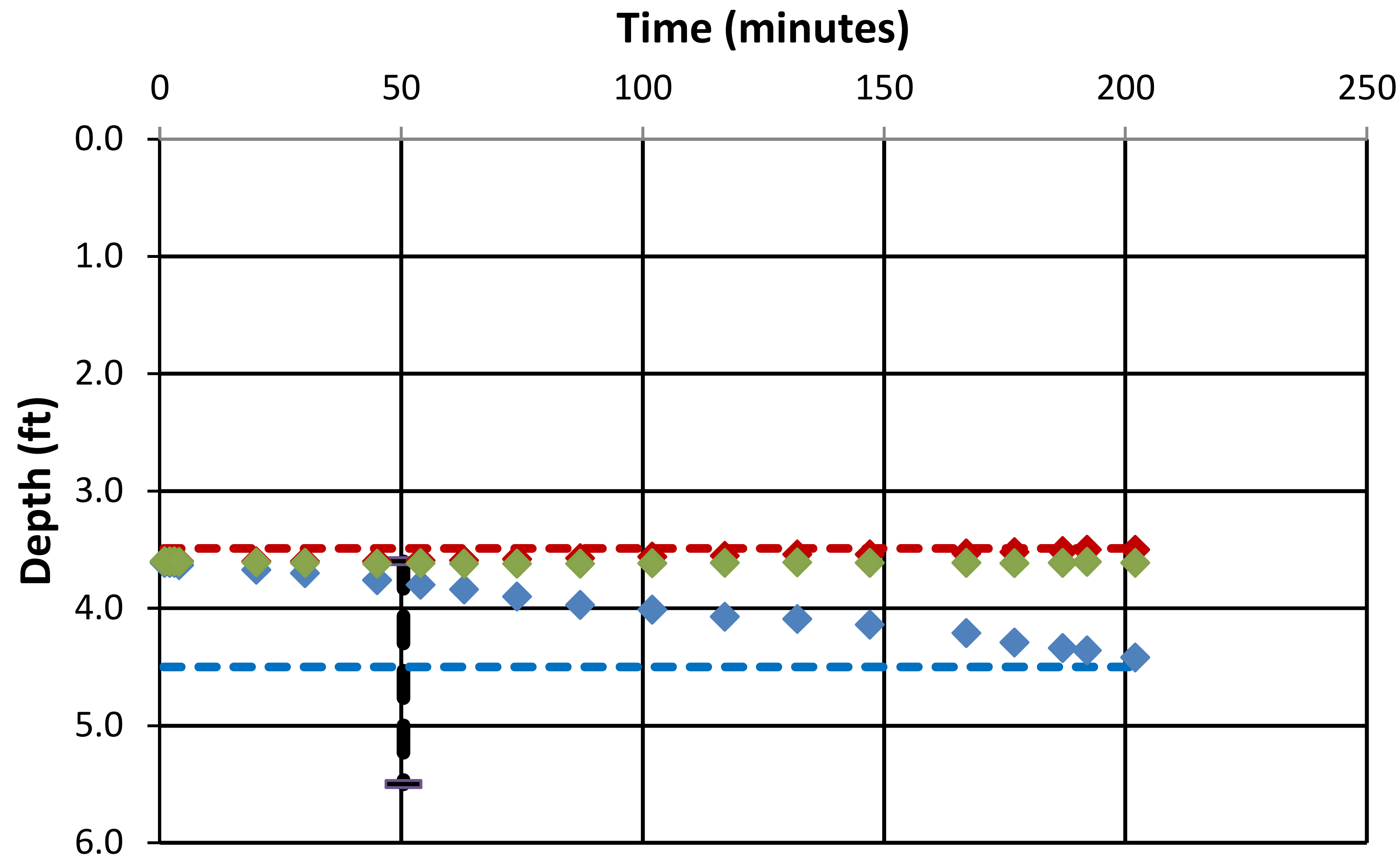
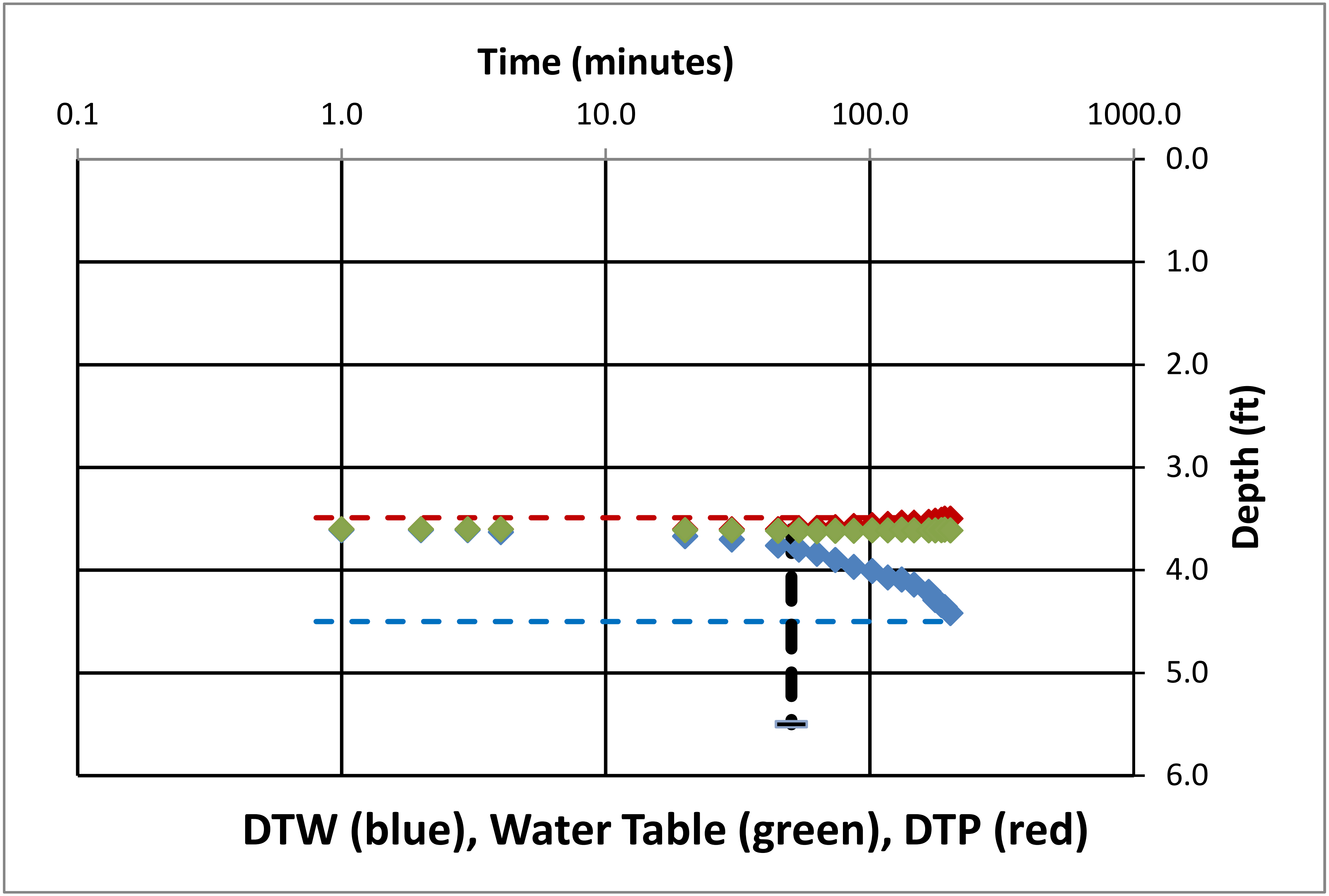
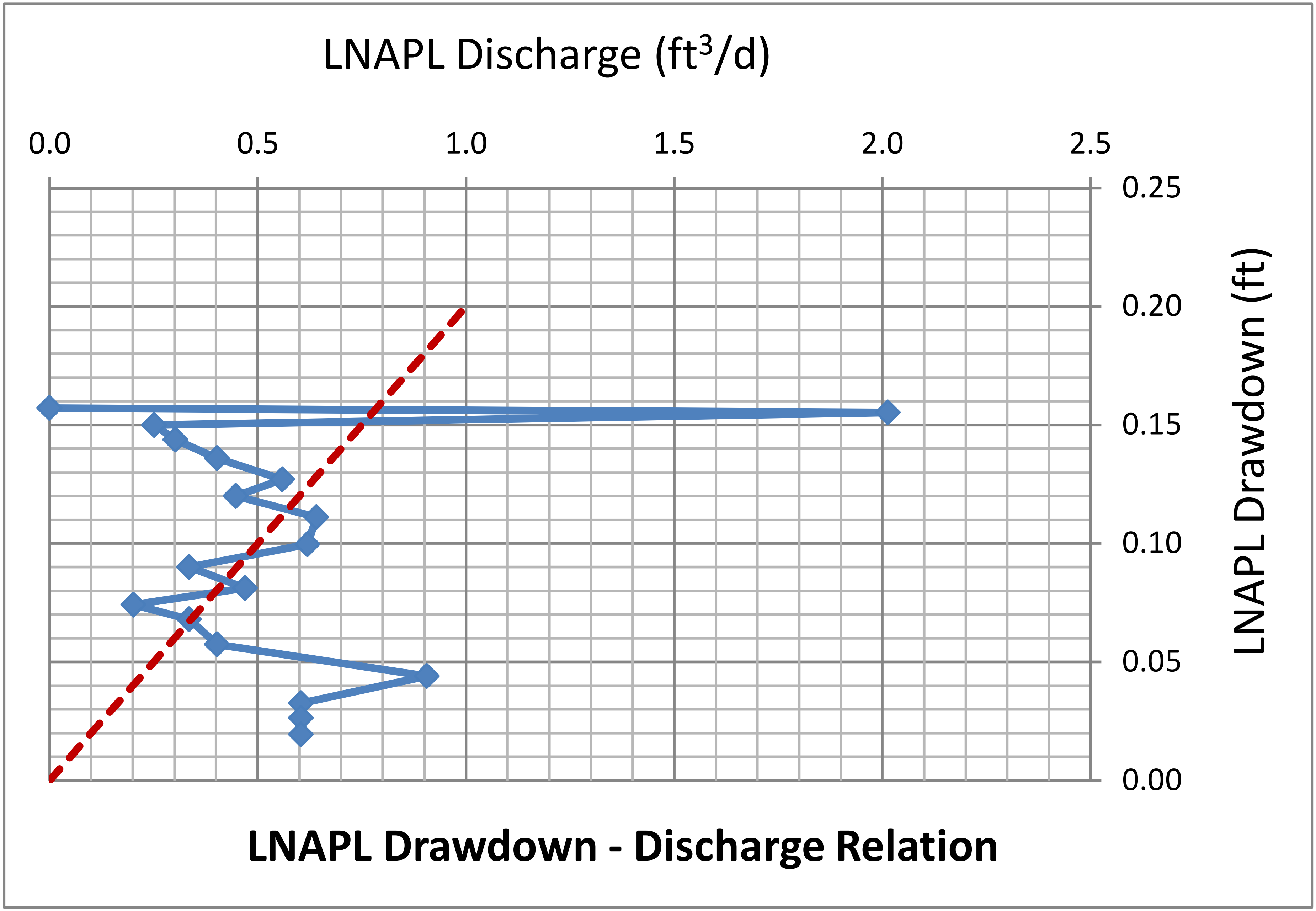
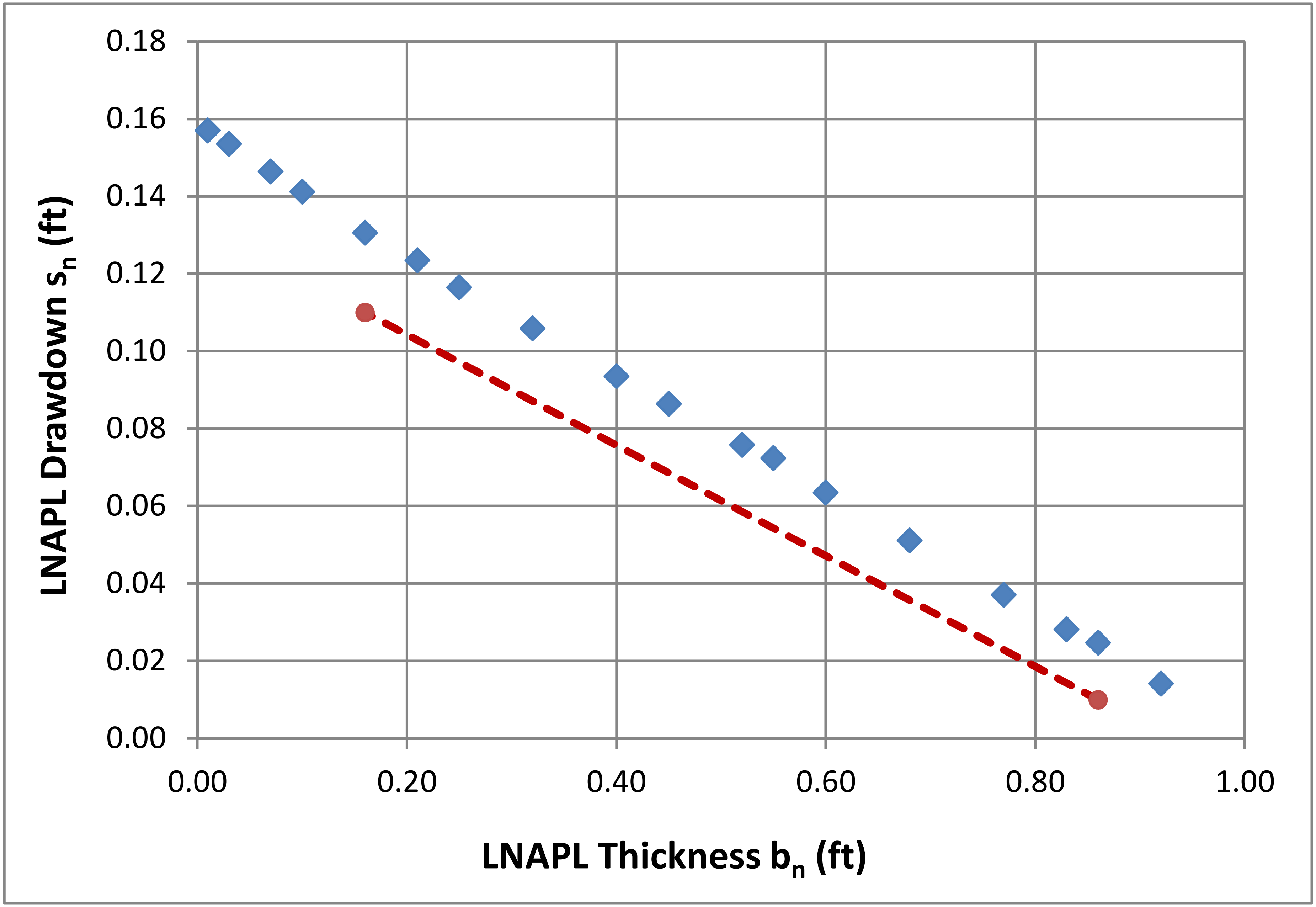
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
				#N/A	#N/A	#N/A	#N/A	0.0	#N/A	#N/A	#N/A	0.000	#N/A	#N/A	#N/A	0.000
												0.049				



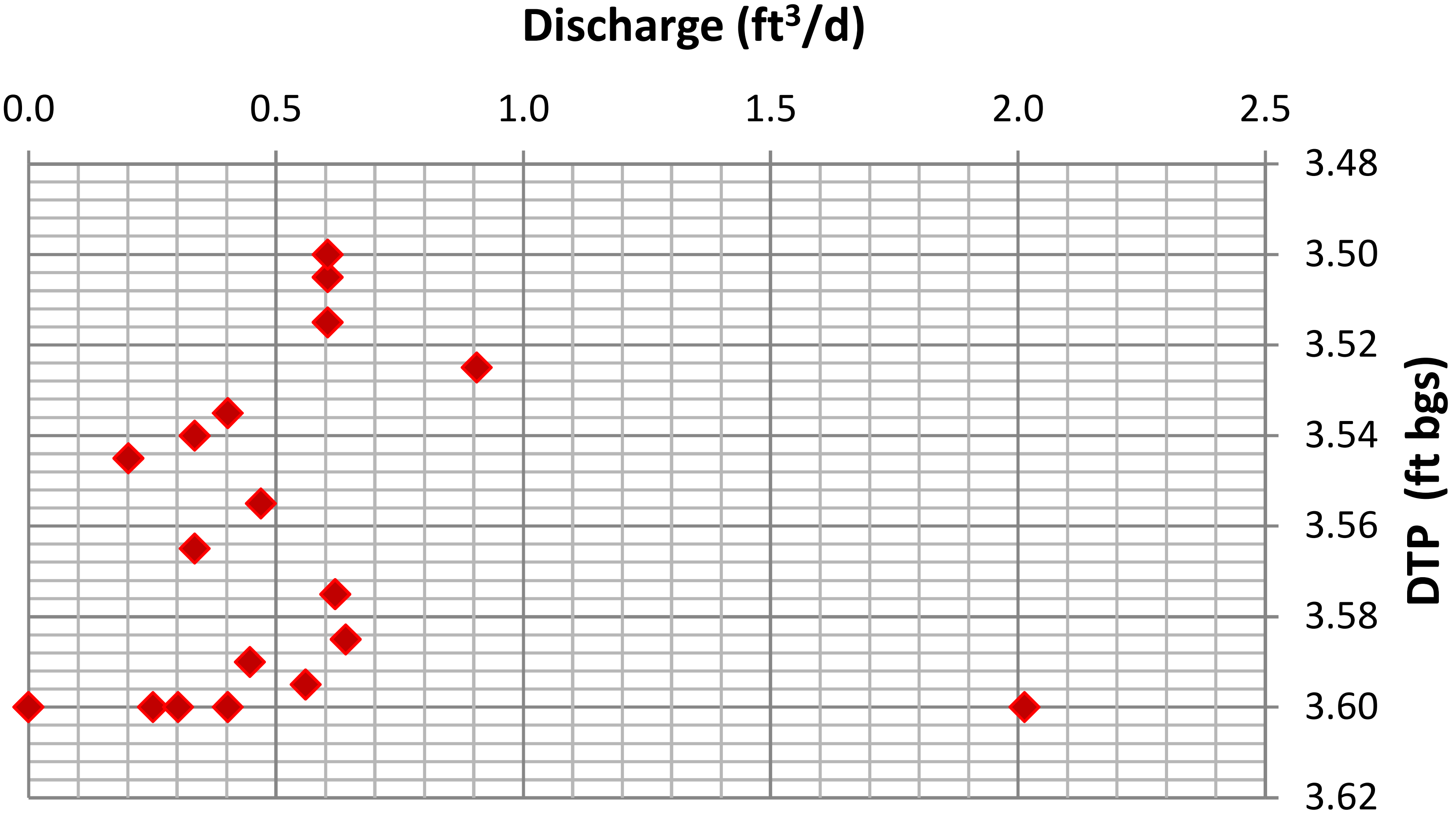
DTW (blue), Water Table (green), DTP (red)


Time (minutes)
0.1
1.0
10.0
100.0
1000.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Depth (ft)
DTW (blue), Water Table (green), DTP (red)

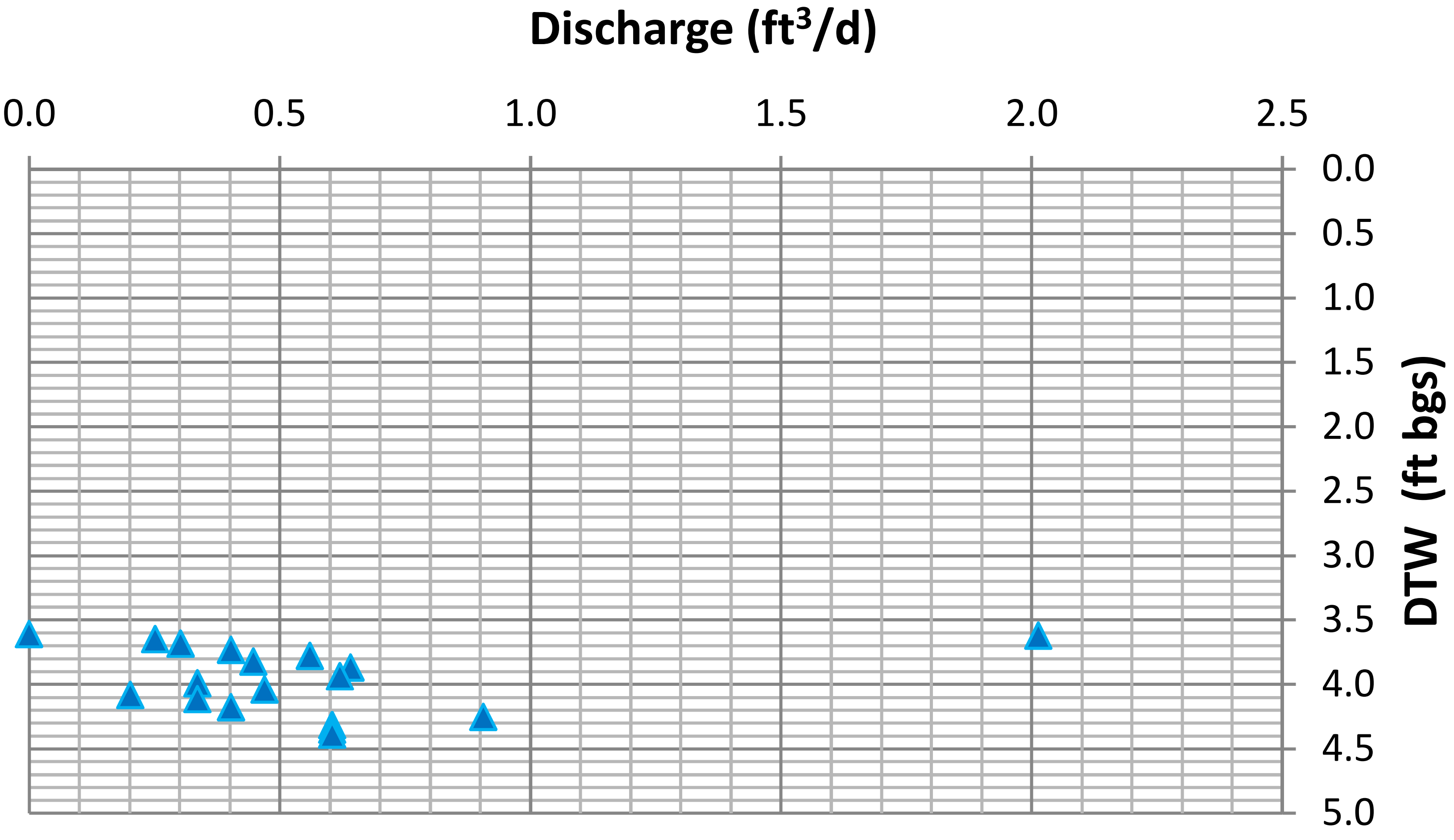

LNAPL Discharge (ft^3/d)
0.0
0.5
1.0
1.5
2.0
2.5
LNAPL Drawdown (ft)
0.25
0.20
0.15
0.10
0.05
0.00
LNAPL Drawdown - Discharge Relation



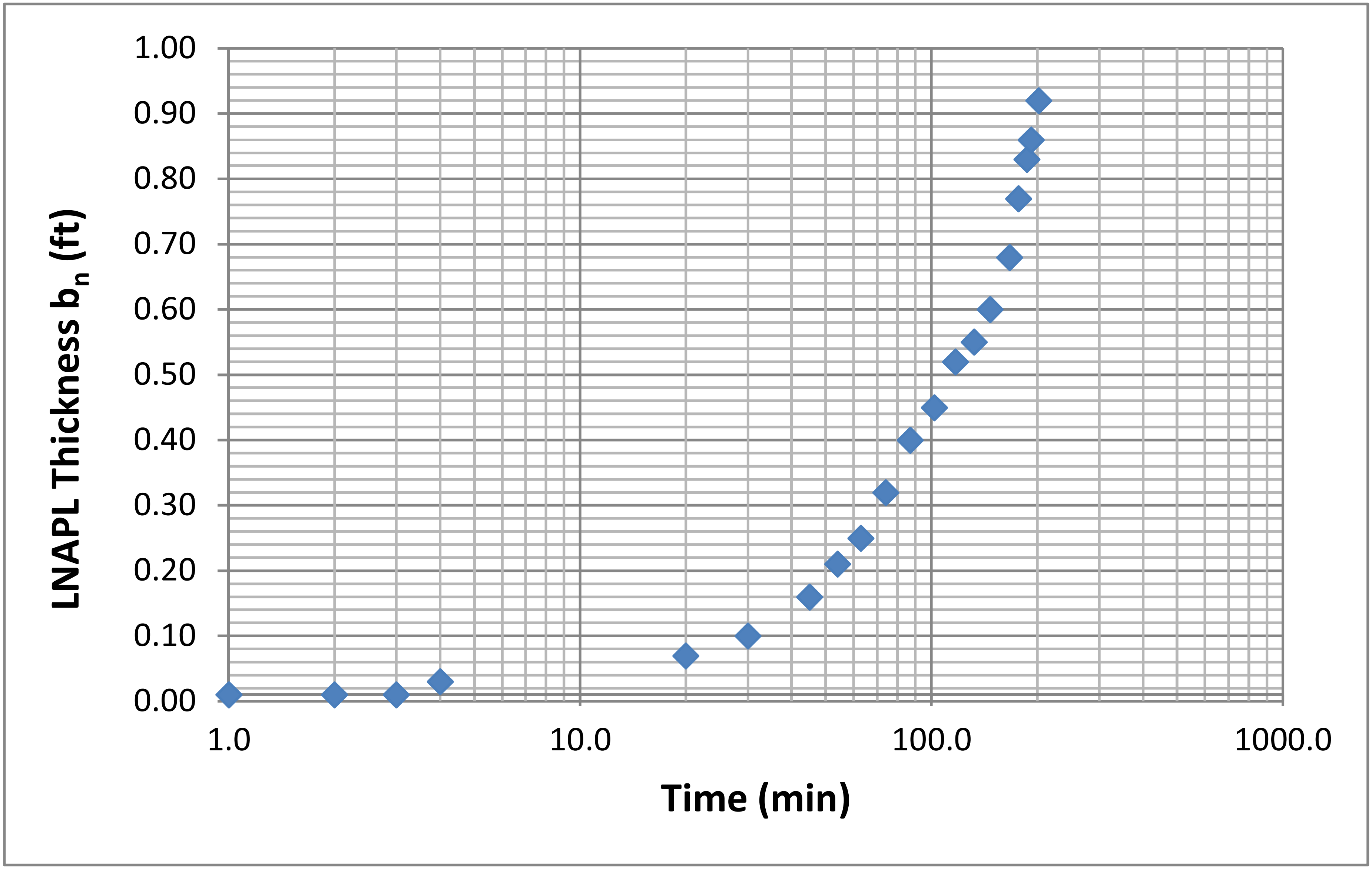
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.20
0.40
0.60
0.80
1.00
LNAPL Drawdown s_n (ft)
LNAPL Thickness b_n (ft)

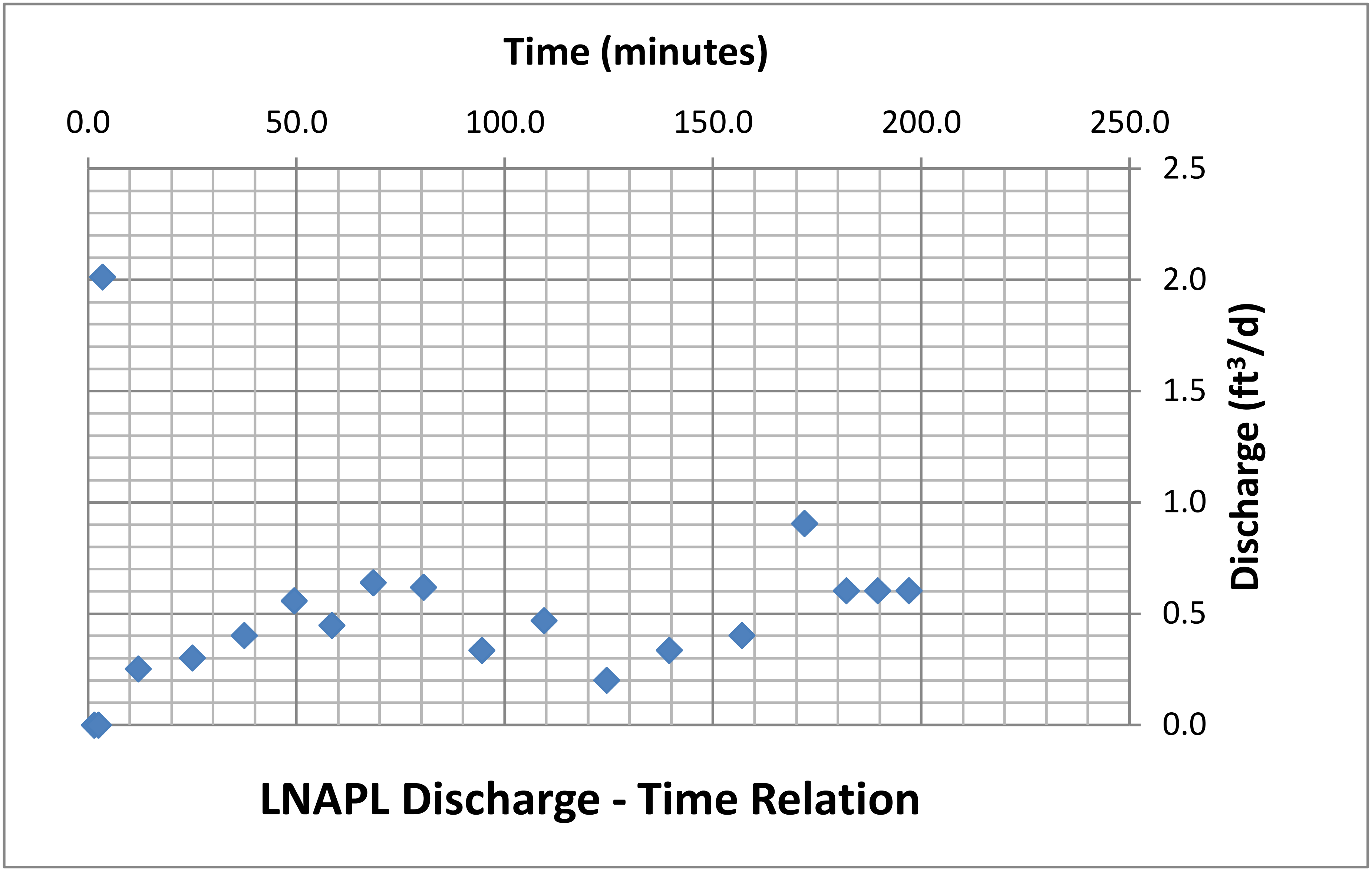


Depth to Product vs. LNAPL Discharge

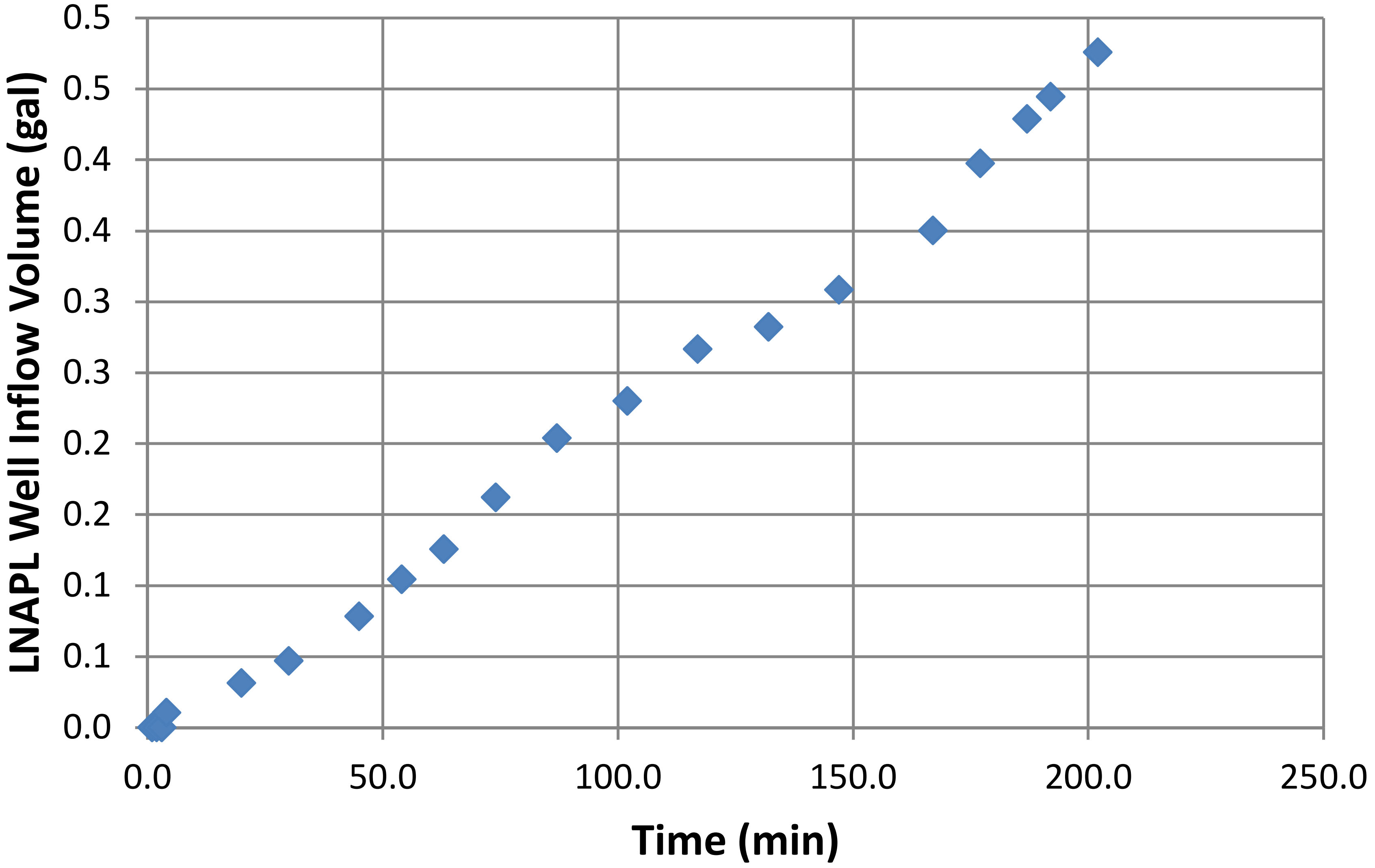


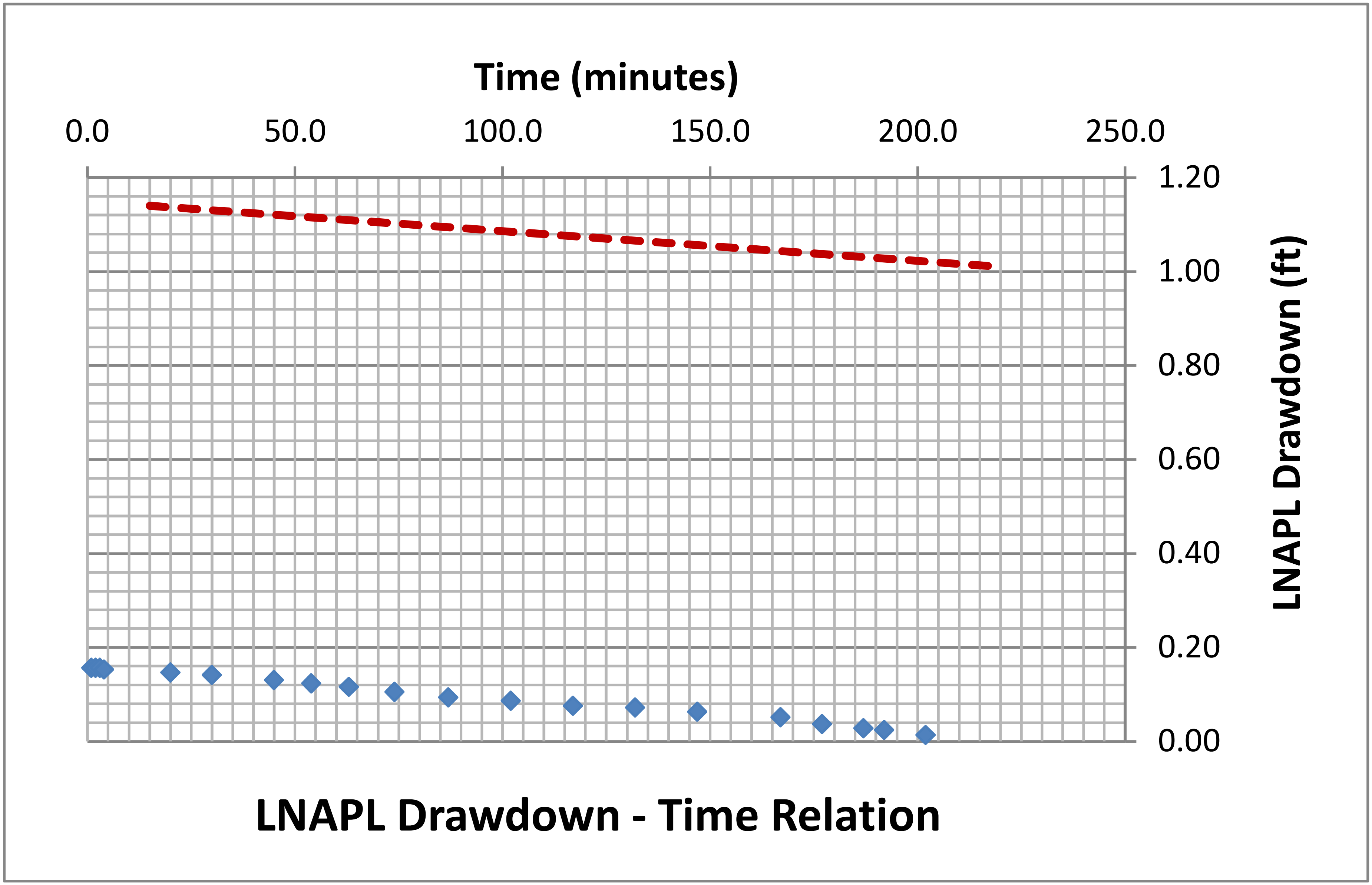
Depth to Water vs. LNAPL Discharge


1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1.0
10.0
100.0
1000.0
LNAPL Thickness b_n (ft)
Time (min)



Time (minutes)
0.0
50.0
100.0
150.0
200.0
250.0
2.5
2.0
1.5
1.0
0.5
0.0
Discharge (ft³/d)
LNAPL Discharge - Time Relation


LNAPL Well Inflow Volume (gal)
0.5
0.5
0.4
0.4
0.3
0.3
0.2
0.2
0.1
0.1
0.0
0.0
50.0
100.0
150.0
200.0
250.0
Time (min)



LNAPL Drawdown - Time Relation

Generalized Bouwer and Rice (1976)

Well Designation:	MW-5A
Date:	19-Apr-16

$$T_n = \frac{r_e^{\,2} \ln\left(R/r_e\right)\ln\left(s_n\left(t_1\right)/s_n\left(t\right)\right)}{2\left(-J\right)\left(t-t_1\right)}$$

L_e/r_e
5.7
C
1.02
R/r_e
3.44

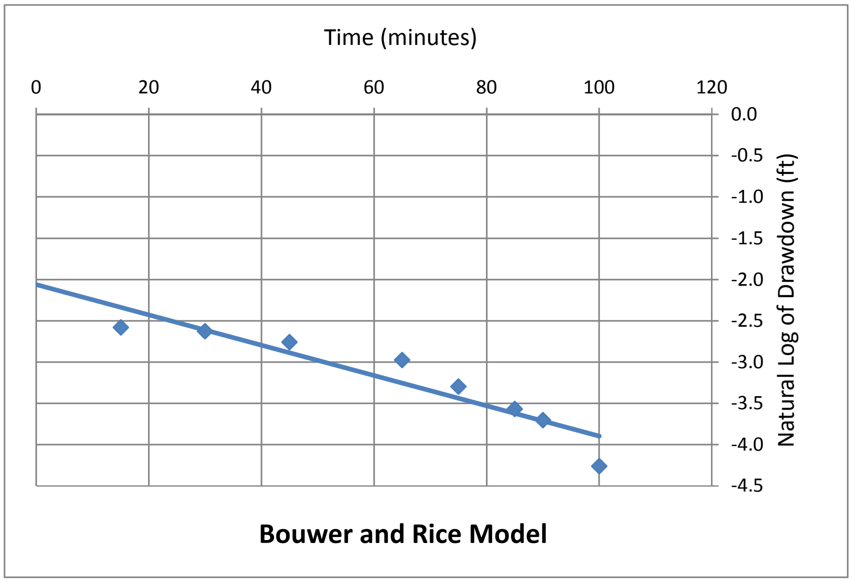
J-Ratio
-0.143

Enter early time cut-off for least-squares model fit

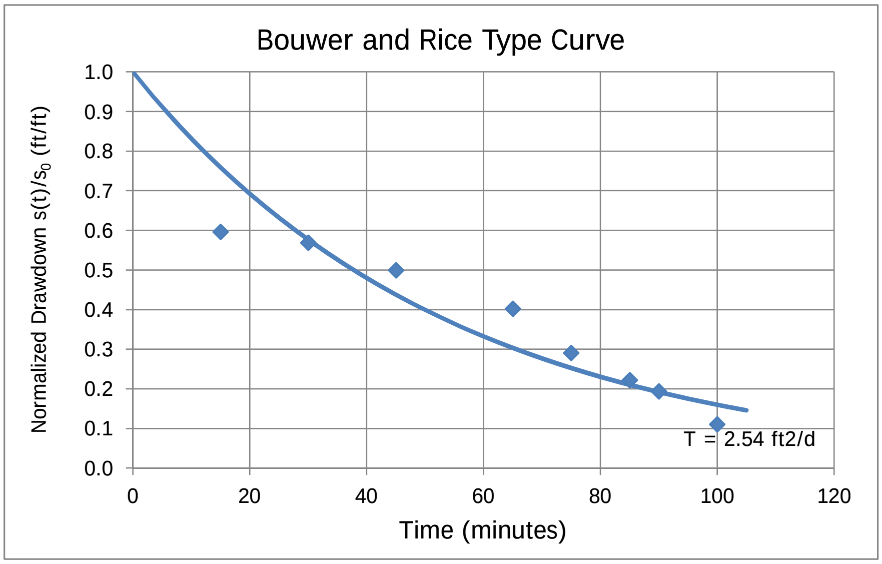
Time_{cut}	102	<- Enter or change value here

Model Results: T_n (ft^2/d) = 2.54 +/- 0.39 ft^2/d

Coef. Of Variation
0.15



C coefficient calculated from Eq. 6.5(c) of Butler, The Design, Performance, and Analysis of Slug Tests, CRC Press, 2000.



Cooper and Jacob (1946)

Well Designation:	MW-5A
Date:	19-Apr-16

$$V_n\left(t_i\right) = \sum_j^i \frac{4\pi T_n s_j}{\ln\left(\frac{2.25 T_n t_j}{r_e^{\,2} S_n}\right)} \Delta t_j$$

Enter early time cut-off for least-squares model fit

Time_{cut} (min):	102	<- Enter or change values here
Time Adjustment (min):	1	

Trial S_n: d <-- Enter d for default or enter S_n value

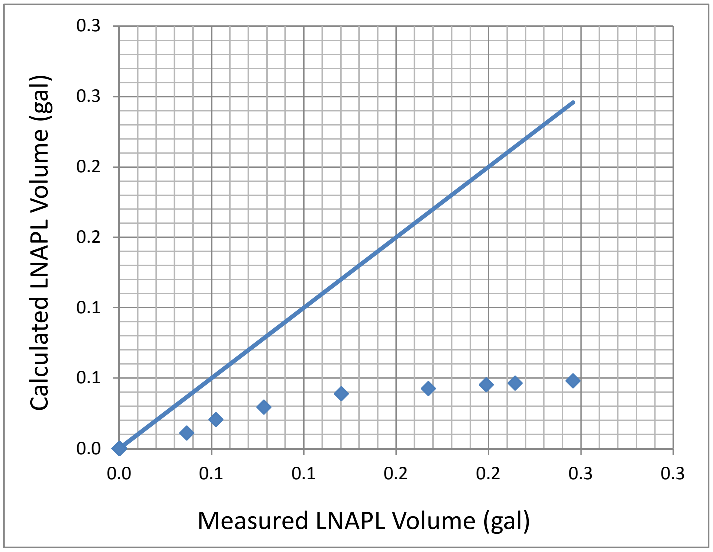
Root-Mean-Square Error: 0.342 <-- Minimize this using "Solver"

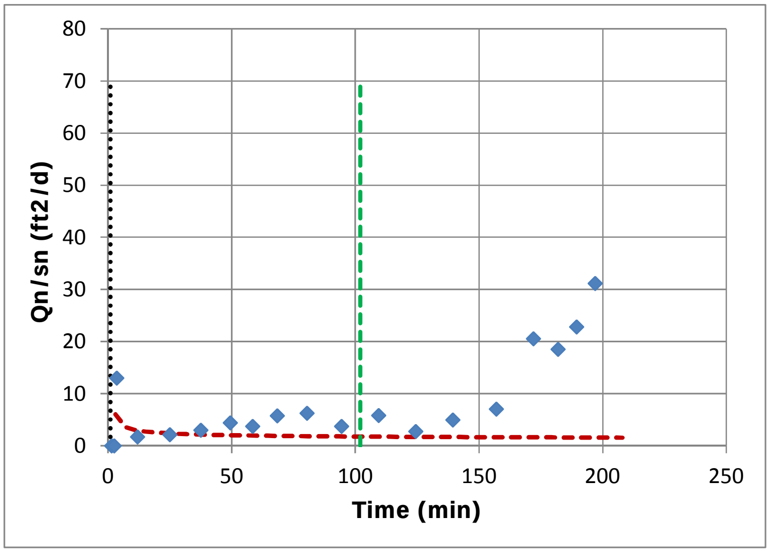
0.022 <-- Working S_n

Trial T_n (ft^2/d): 0.767 <-- By changing T_n through "Solver"

Add constraint $T_n > 0.00001$

Model Result: T_n (ft^2/d) = **0.77**





Height

70

Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Appendix D
Interim Action Report

PUBLIC REVIEW DRAFT

FLOYD | SNIDER
strategy ▪ science ▪ engineering

Two Union Square
601 Union Street, Suite 600
Seattle, WA 98101
tel: 206.292.2078 fax: 206.682.7867

April 27, 2017

Mr. John Mefford
Washington State Department of Ecology
1250 West Alder Street
Union Gap, WA 98903-0009

SUBJECT: INTERIM ACTION REPORT AND OFF-PROPERTY INVESTIGATION SUMMARY
Big B Mini Mart
1611 Canyon Road
Ellensburg, Washington

Dear Mr. Mefford:

Floyd|Snider has prepared this Interim Action Report and Off-Property Investigation Summary to document the interim action (IA) activities and summarize the results from the off-property investigation that were conducted at the Big B Mini Mart Site (Site) located in Ellensburg, Washington. The IA and off-property investigation activities coincided with the decommissioning and removal of the four underground storage tanks (USTs). The objective of the IA activities was to remove light non-aqueous phase liquids (LNAPLs), as stated in the Washington State Department of Ecology's (Ecology's) June 9, 2016, letter, "to reduce or remove the LNAPL mass and stop LNAPL migration or mobility" (Ecology 2016) The objective of the off-property investigation activities was to further delineate the extent of contaminated soil and LNAPL. The IA activities were performed in accordance with the approved IA Work Plan dated September 1, 2016 (Floyd|Snider 2016a), and the approved Off-Site Investigation Work Plan dated September 28, 2016 (Floyd|Snider 2016b).

OFF-PROPERTY INVESTIGATION ACTIVITIES

Off-property investigation activities were performed to delineate the lateral extent of soil contamination and/or LNAPL that may have migrated beyond the property boundary onto the adjacent Astro service station property or into the BNSF Railway line right-of-way.

Piezometer Installation and Soil Borings

On October 27, 2016, three piezometers (PZ-23, PZ-24, and PZ-25) were installed on the Astro service station and BNSF railway properties using a direct-push/hollow-stem auger combination drill rig, and four piezometers (PZ-26 through PZ-29) were installed along the property border between the Big B and the BNSF Railway line in test pits using a backhoe (Figure 1). In addition, three direct-push borings (FS-1, FS-2, and FS-3) were advanced between the northern fuel dispenser island and the former 1990 excavation (Figure 1). Ecology was on-site during the direct-push activities and approved of the boring locations. Soil was logged by a licensed geologist and soil borings are included at Attachment 1. Samples were collected from the most representative contaminated interval for the following constituents:

- Gasoline-range organics (GRO) by NWTPH-Gx
- Diesel-range organics (DRO) and oil-range organics (ORO) by NWTPH-Dx
- Total lead by USEPA Method 6020
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260

Soil sampling and field activities were conducted according to the Sampling and Analysis Plan and Quality Assurance Project Plan, which was provided as Appendix B to the *Site Investigation Work Plan*, submitted by Floyd|Snider in December 2014 (Floyd|Snider 2014). In addition to collecting soil samples, field screening tests for assessing LNAPL presence were conducted using OilScreenSoil (Sudan IV)® dye test field kits.

The piezometers were constructed of 2-inch-diameter Schedule 40 PVC with 0.020-inch slotted screen, and were installed to a maximum depth of 8 feet below ground surface (bgs) in test pits and 13 feet bgs in borings advanced with a direct-push drill rig. Five-foot-long screens were placed between 3 and 8 feet bgs in the piezometers installed using the backhoe. Piezometers installed using a direct-push drill rig were completed with 10-foot-deep well screens placed between 3 and 13 feet bgs. This depth was chosen so that, if LNAPL is not observed within the direct-push installed piezometers, the locations can be also be used as monitoring wells. All well screens have 0.020-inch factory cut slots. The three piezometers/wells installed on and adjacent to the Astro service station property were completed with a flush-mounted, traffic grade, steel monument, and the wells were secured by a lockable gasket cap. The piezometers on the BNSF Railway right-of-way were left as a “stickup” above ground in a temporary fashion, similar to the on-property piezometers installed in March 2016.

Survey

The top-of-casing elevations for piezometers PZ-23 through PZ-25 were surveyed and tied into the existing station well elevations at the Big B and Astro service station properties. Elevations were reported relative to the North American Vertical Datum of 1988 to an accuracy of 0.01 feet.

DESCRIPTION OF INTERIM ACTIVITIES PERFORMED

The IA consisted of two activities: the removal of any LNAPL observed in the tank pits following UST decommissioning and installation of a LNAPL recovery trench along the southern property boundary as shown in Figure 1. The LNAPL recovery trench design was amended, with Ecology’s approval, to include an additional segment placed perpendicular to the original trench design along the southern property boundary so that it intersected the location of the former 12,000-gallon baffled UST that was removed (Figure 1). An 8-inch-diameter sump (North Sump) was placed at the northern end of the additional segment.

Piezometer Removal/Monitoring Well Decommissioning

Ecology approved a request to remove piezometers PZ-17, PZ-21, and PZ-22. These three piezometer casings were re-used for the new piezometers installed at locations PZ-26, PZ-27, and PZ-29 (Figure 1). In addition to the removal of the three piezometers, monitoring well MW-2 was decommissioned by a licensed driller by backfilling the casing with bentonite chips. Ecology approved the decommissioning of monitoring well MW-2 in advance of potential soil removal within the vicinity of MW-2.

UNDERGROUND STORAGE TANK REMOVAL ACTIVITIES

On October 25, 2016, Northern Environmental Services Inc. (NES) removed the 4,000-gallon gasoline UST and the 12,000-gallon baffled UST, and transported both off-site for disposal. The 4,000-gallon UST was located just north of the western fuel dispensers and to the northeast of the station building. The 12,000-gallon baffled UST was located in the southwestern portion of the property, south of the station building. The fuel lines were inerted and emptied by flushing the lines with atmospheric air using a blower and pushing any residual liquids into the USTs. All fuel lines were cut along the excavation sidewalls, capped at the excavations and at the former fuel dispensers, and left in place for future removal. NES emptied the USTs of residual liquids and properly inerted both prior to removal. Upon removal, the 4,000-gallon UST appeared to be in good condition with no signs of leaks, cracks, pitting, or pinholes. Groundwater was encountered at approximately 5 feet bgs and did not contain LNAPL or sheen. Native soil, not pea gravel, surrounded the 4,000-gallon UST, and all four sidewalls appeared to be stained via petroleum hydrocarbon contamination. No soil samples were collected because soil analytical data from adjacent test pits indicated that soil contamination extended beyond the 4,000-gallon UST pit. The 12,000-gallon baffled UST appeared to be in excellent condition with no signs of cracks, pitting, or pinholes on the tank coating. Upon removal of the 12,000-gallon UST, LNAPL was present on the groundwater within the tank pit and accumulated to a thickness of 0.3 feet by the end of the day. During removal, the pea gravel that was surrounding the UST was placed on plastic sheeting and the LNAPL in the pea gravel allowed to drain back into the UST pit.

On October 27, 2016, NES removed the two 10,000-gallon USTs, located in the northern portion of the property, and transported both off-site for disposal. Pea gravel was not encountered within the tank basin. Upon removal, both USTs appeared to be in good condition with minor rusting but no signs of pitting, cracks, or pinholes. Groundwater was encountered at approximately 5 feet bgs and contained a heavy sheen and a thin layer of LNAPL in some areas within the UST basin. The UST basin was left open to pump and remove the LNAPL. Photographs of all four USTs are included in Attachment 2.

LNAPL samples were collected from the northern and southern UST pits using a disposable bailer and analyzed for the following constituents:

- DRO and ORO by NWTPH-Dx
- Total lead by USEPA Method 6020

- BTEX, methyl t-butyl ether, naphthalene, n-hexane, 1,2-dibromoethane, and 1,2-dichloroethane by USEPA Method 8260

TRENCH EXCAVATION AND BACKFILL ACTIVITIES AND SUMP/SKIMMER INSTALLATION

The trench was excavated using a backhoe with a 26-inch-wide bucket along the southern property boundary from the southeast corner of the property to the southwest corner. The trench measures approximately 90 feet in length and 3 feet in width. Two 8-inch-diameter sumps (East Sump and West Sump) were installed along the southern trench boundary approximately 35 feet apart. Due to the amount of LNAPL that accumulated within the southern UST pit, a third sump (North Sump) was installed within the former 12,000-gallon baffled UST pit. The North Sump was connected to the trench along the southern property boundary at the West Sump location with a perpendicular trench (Figure 1). The North Sump is located approximately 44 feet north of the West Sump. This variance was approved by Ecology while in the field.

The trench was excavated to a depth of 7 feet. The upper 3 feet of soil consisted of clean overburden and was stockpiled for later reuse. Petroleum-contaminated soil excavated from the smear zone, between 3 and 7 feet bgs was stockpiled on and covered with plastic in the northern portion of the property for later disposal. Attempts were made to install the 8-inch-diameter sumps at a depth of 8 feet bgs; however, due to caving and slumping, the sumps were install at depths of approximately 7.5 feet. The trench was backfilled with pea gravel from 3 to 7 feet bgs, and then to grade with the clean overburden.

The trench is located close to the southern extent of the main LNAPL mass on the property and acts to passively intercept any further LNAPL migration occurring along the southern property boundary. The trench was not designed to recover all LNAPL released at the Site.

SKIMMING EQUIPMENT

Four-inch-diameter specific-gravity floating product skimmers were placed within the East and West Sumps. Each skimmer is equipped with a ¼-inch inside diameter flexible coiled tubing and a 24-inch-long sliding body that automatically adjusts to the changing product/water level elevation in the sumps. The skimmers are connected to a pneumatically operated bladder pump that will induce a vacuum within the skimmer, which will cause LNAPL to be drawn from the skimmer into the bladder. After a set amount of cycle time, typically 30 seconds, the pump will change cycles and the bladder will be filled with compressed air forcing the LNAPL into a LNAPL discharge line connected to a vented, double-walled, fiberglass, 1,000-gallon holding tank. The holding tank was formerly used to store waste oil but was pumped and cleaned prior to use at the property. The holding tank is equipped with a Tank Full Shut-Off (TFSO) monitor, which will cut off compressed air to the bladder pump if tripped by a high tank fluid level. The TFSO is tested on a monthly basis to confirm that it is functioning properly. The compressor and TFSO are located inside a locked shed that is adjacent to the 1,000-gallon tank and are both located in the southeastern corner of the property (Figure 1 and Attachment 2). Power and light was hooked up to the shed by a licensed electrician.

INVESTIGATION FINDINGS

Soil Results

All nine soil samples that were collected contained petroleum hydrocarbons at concentrations that exceed their respective Model Toxics Control Act (MTCA) Method A cleanup level. The primary constituents detected in soil samples are GRO and DRO. GRO was detected at concentrations up to 3,000 milligrams per kilograms (mg/kg) at location PZ-29. However, based on the diesel standard and chromatograms, the GRO concentrations are likely a results of overlap from the DRO range. The contamination in these locations is also associated with the diesel release in the southern UST pit. DRO was detected at concentrations up to 13,000 mg/kg at locations PZ-23 and PZ-28. Benzene was detected in one sample at a concentration that exceeds the MTCA Method A cleanup level at location PZ-29 at a depth of 6 to 7 feet bgs. All other constituents that were analyzed for were either less than their respective MTCA Method A cleanup levels or less than laboratory detection limits. Soil analytical data are presented in Table 1, and laboratory reports are included as Attachment 3. The approximate extent of petroleum hydrocarbon impacts in soil at concentrations that exceed their respective MTCA Method A cleanup levels is shown on Figure 1.

Sudan IV dye field kits were used to identify the presence of LNAPL (either residually trapped or mobile) in select soil samples after the sample had been shaken in water. According to Cheiron's description of the field kit in their catalogue, the red dye stains petroleum products and provides a visual contrast for the presence of LNAPL in soil samples. In addition, concentrations between 500 parts per million (ppm) and 2,500 ppm can be observed by the bead, in the field kits, turning pink. Sudan IV field kit results indicated a distinct LNAPL layer in locations PZ-23, PZ-24, PZ-28, and PZ-29, which are all locations with DRO concentrations between 12,000 to 13,000 mg/kg. Photographs of the Sudan IV field kit results are included in Attachment 2.

Light Non-Aqueous Phase Liquid Results

During UST removal activities, LNAPL samples were collected from both the southern UST pit and northern UST pit. Analytical data indicate that LNAPL in both UST pits is mainly diesel LNAPL. Analytical data are presented in Table 2, and the laboratory report is included as Attachment 3.

LIGHT NON-AQUEOUS PHASE LIQUID RECOVERY

Underground Storage Tank Pits

Prior to trench system installation and start up, LNAPL was skimmed off the top of the southern UST pit using a pump and transferred into a 1,000-gallon holding tank. The sheen and thin LNAPL present within the northern UST pit, which contained the two 10,000-gallon USTs, were pump skimmed into the 1,000-gallon holding tanks as well. Approximately 260 gallons of LNAPL mixed with 250 gallons of water were removed from the southern UST pit between October 25, 2016, and March 22, 2017. Only a minimal amount of LNAPL was skimmed from the northern UST pit, as it never accumulated to a measurable thickness.

Trench Recovery System

The skimmers operate more effectively when LNAPL thickness is at least 0.15 feet therefore a period of time was needed to accumulate a sufficient LNAPL thickness to start the system. However, excessively cold winter weather delayed the start up after that thickness had been reached. The skimmer system was eventually started and tested on February 28, 2017. After 3.5 hours of running, approximately 1.25 gallons of LNAPL was pumped from the East Sump. The second skimmer in the West Sump was tested but not left on because LNAPL was not present; that skimmer was moved from the West Sump to the North Sump and started skimming on March 23, 2017. As of April 17, 2017, approximately 42 gallons of LNAPL have been removed by the passive skimmer system.

Since the start of the remediation activities in late October, a total of approximately 325 gallons of LNAPL have been removed and are stored in the 1,000-gallon holding tank. The volume in the holding tank is checked on a weekly basis, and the TFSO is tested on a monthly basis. In addition, LNAPL observations are regularly recorded in the sumps and piezometers.

As a demonstration of effectiveness, it would be expected that LNAPL thicknesses in surrounding piezometers or wells would show a measurable decrease. Multiple LNAPL measurements in the wells, piezometers, and sumps have been recorded prior to and after ongoing remedial activities (Table 3). The latest round of data collected for LNAPL thicknesses in wells, piezometers, and sumps indicate that thicknesses have generally decreased when compared to pre-remedial measurements conducted on October 24, 2016 (Figure 2). Overall, LNAPL thicknesses in piezometers PZ-1, PZ-2, PZ-3, and PZ-4 have decreased by 0.21 feet, 0.20 feet, 0.72 feet, and 0.28 feet, respectively. LNAPL in monitoring wells MW-4A and MW-9 was not observed during the latest round of monitoring, and LNAPL thickness in MW-5A decreased from 0.35 feet (pre-remedial measurement) to 0.02 feet. The significant decrease in LNAPL thickness, from 0.79 feet to 0.07 feet, in piezometer PZ-3 and absence in MW-4A and MW-9 is likely due to their close proximity to the trench and southern UST pit. However, piezometers PZ-5, PZ-6, and PZ-8 show little change in LNAPL thickness. Overall, piezometers and monitoring wells closest to the trench and southern UST pit have shown the greatest decrease in LNAPL thickness. Piezometers farther away from the trench and southern UST pit show little to no change in LNAPL thickness.

Figures 3 through 8 show the change in LNAPL thickness over time with groundwater fluctuations and include pre- and post-remedial activities and trench skimmer system startup for PZ-1 through PZ-4, MW-4A, and MW-5. Generally, these figures indicate a reduction in LNAPL over time since the start of the remedial activities, irrespective of groundwater fluctuations, which can result in exaggerated well thickness due to well bore drainage effects

PERFORMANCE ASSESSMENT

The total amount of LNAPL (both recoverable and residual) in the southern part of the Site was previously estimated, in the Interim Action Work Plan, to be approximately 500 to 1,000 gallons (Floyd|Snider 2016a). Using the more conservative estimate of 1,000 gallons of product released, the 300 gallons recovered to date of LNAPL indicate that 30 percent of the total LNAPL volume released has been recovered. However, not all the LNAPL at the Site is mobile, and therefore potentially recoverable by hydraulic capture. A significant fraction of the LNAPL is trapped in the soil pore space and unrecoverable. This is evident in the soil boring observations using the Sudan IV field kits. For example, LNAPL was not observed in the soil cores for borings PZ-23, PZ-24, PZ-28, and PZ-29; however, LNAPL was observed as a separate layer in the Sudan IV field kits for these locations after being shaken, which liberated the residual LNAPL.

The Sudan IV field kit results, soil analytical data, and field observations suggest that LNAPL is present as a free phase in wells or piezometers when DRO concentrations exceed approximately 12,000 mg/kg. The greatest total petroleum hydrocarbon concentrations observed at the Site are around 24,000 mg/kg. Therefore, approximately half of the LNAPL may be recoverable. If an optimistic goal of recovering 50 percent of the total release of 1,000 gallons is set, approximately 200 gallons more LNAPL must be recovered before the Site approaches residual saturation.

OFF-PROPERTY LIGHT NON-AQUEOUS PHASE LIQUID EXTENT

The piezometers along the western property boundary, PZ-26 through PZ-29, have not had recordable LNAPL thicknesses to date. However, during the February 27, 2017, monitoring event, LNAPL was observed in piezometers PZ-23 and MW-14, which are located close to each other on the Astro service station property. Thicknesses were measured at 0.13 feet for PZ-23 and 0.43 feet for MW-14. LNAPL had not been observed at measurable thicknesses prior to this event in MW-14 but is likely based on the proximity to the trench and the elevated soil concentrations in the soil samples collected from this area during the Astro service station property investigation of May 2016.

DISPOSAL OF WASTES

Approximately 70 cubic yards of petroleum-contaminated soil was generated during the UST removal and trench installation activities. The contaminated soil generated during UST removal activities and excavation of the trench, as well as the soil in the five existing drums from the previous investigation activities, were loaded on trucks and transported off-site in March 2017 to the Anderson Rock & Demolition Pits (Anderson) landfill in Yakima, Washington. A total of 119.17 tons of contaminated soil was delivered to Anderson, where it will be land-farmed and used as gravel base and backfill for their mining operations after it receives approval from Yakima County Health District. All emptied drums were crushed and recycled. Trucking tickets are included as Attachment 4.

The only remaining waste on the Site is the LNAPL and contaminated water stored within the 1,000-gallon and 600-gallon holding tanks. The LNAPL/waste water mix will be properly disposed of when the tanks are close to being filled.

NEXT STEPS

As stated in the 2016 IA Work Plan, the performance of the recovery trench will be assessed over a 6-month period. We recommend that the skimmer system, which has only been in operation for approximately 1 month, continue to operate for 5 more months as planned, or less if weekly measurements indicate that the trench system is no longer effective. At that point, potential changes regarding the system enhancements or other remedial options to remove LNAPL to the extent practicable can be considered either as additional IAs or as part of the final cleanup following issuance of the Cleanup Action Plan.

SCHEDULE

If the trench system continues to recover a sufficient volume of product to justify its operation over the next 5 months, the IA will end in in September 2017. However, if monitoring data indicate that the system is no longer effective in removing product, the operation of the system may end sooner.

The draft RI/FS will be submitted within 60 days after the trench system is turned off. A draft Cleanup Action Plan will be prepared and submitted within 30 days of Ecology's approval of the final RI/FS.

Sincerely,
FLOYD | SNIDER

State of Washington
2357
Licensed Geologist
Gabriel Cisneros

4/27/2017

Thomas Colligan

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Encl.: Table 1 – Soil Analytical Data
Table 2 – LNAPL Analytical Data
Table 3 – On-Property LNAPL Thicknesses
Figure 1 – Site Plan and Soil Analytical Results
Figure 2 – LNAPL Extent and Thicknesses On-Property Pre- Vs. Post-Ongoing Remedial Activities
Figure 3 – PZ-1 Depth to Water and Depth to Product
Figure 4 – PZ-2 Depth to Water and Depth to Product
Figure 5 – PZ-3 Depth to Water and Depth to Product
Figure 6 – PZ-4 Depth to Water and Depth to Product
Figure 7 – MW-4A Depth to Water and Depth to Product
Figure 8 – MW-5A Depth to Water and Depth to Product
Attachment 1 – Boring Logs
Attachment 2 – Photographs
Attachment 3 – Laboratory Report
Attachment 4 – Trucking Tickets

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Tables

Table 1
Soil Analytical Data

Analysis Method	USEPA 8260C				NWTPH-Gx	NWTPH-Dx		USEPA 6020A
Analyte	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene (total)**	**Gasoline-Range Organics**	**Diesel-Range Organics**	**Oil-Range Organics**	**Lead**
Units	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
MTCA Method A Cleanup Level	**0.03**	**7**	**6**	**9**	**30/100[1]**	**2,000**	**2,000**	**250**
Sample Date	**10/27/16**	**10/27/16**	**10/27/16**	**10/27/16**	**10/27/16**	**10/27/16**	**10/27/16**	**10/27/16**
Sample ID								
PZ-23-6'-7'	0.03 U	0.05 U	0.97	0.1 U	**1,800**	**13,000**	250 U	2.11
PZ-24-5'-6'	0.03 U	0.05 U	1.9	2.6	**1,100**	**12,000**	250 U	5.89
PZ-25-5'-6'	0.03 U	0.05 U	0.24	0.25	**1,300**	**2,500**	250 U	9.44
PZ-26-6'-7'	0.03 U	0.05 U	0.05 U	0.1 U	**220**	720	250 U	2.47
PZ-27-6'-7'	0.03 U	0.05 U	0.05 U	0.1 U	**110**	360	250 U	1.88
PZ-28-6'-7'	0.03 U	0.05 U	2.5	3.19	**1,100**	**13,000**	250 U	2.34
PZ-29-6'-7'	**0.039**	0.05 U	2.8	3.453	**3,000**	**12,000**	250 U	2.56
FS-2-6'-7'	0.03 U	0.05 U	0.05 U	0.1 U	**270**	**3,000**	290 JM	3.25
FS-3-6'-7'	0.03 U	0.05 U	0.05 U	0.1 U	**300**	990	250 U	4.73

Notes:

--	Not analyzed.
BOLD	Detected at a concentration that exceeds the MTCA Method A cleanup level.
Italic	Non-detect with a reporting limit that exceeds criteria.
1	Criterion is for Benzene Present/No Detectable Benzene.

Abbreviations:

mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act

Qualifiers:

JM	Concentration is considered an estimate, the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
U	Analyte was not detected at the given reporting limit.

Table 2
LNAPL Analytical Data

	Location	Southern UST Pit	Northern UST Pit
	Sample ID	Baffeld UST-LNAPL	N.Diesel-UST-LNAPL
	Sample Date	10/25/2016	10/27/2016
Analyte	**Units**		
Metals by USEPA 6020A			
Lead	mg/kg	1 U	11.1
Volatile Organic Compounds by USEPA 8260C			
Benzene	mg/kg	60 U	60 U
Toluene	mg/kg	100 U	100 U
Ethylbenzene	mg/kg	100 U	100 U
Total Xylenes	mg/kg	200 U	200 U
1,2-Dibromoethane	mg/kg	100 U	100 U
1,2-Dichloroethane	mg/kg	100 U	100 U
Methyl Tert-Butyl Ether	mg/kg	100 U	100 U
Naphthalene	mg/kg	100 U	100 U
Hexane	mg/kg	500 U	500 U
Total Petroleum Hydrocarbons by NWTPH-Dx			
Diesel-Range Organics	mg/kg	890,000	900,000
Oil-Range Organics	mg/kg	50,000 U	50,000 U

Abbreviations:

LNAPL	Light non-aqueous phase liquid
mg/kg	Milligrams per kilogram
UST	Undeground storage tank

Qualifiers:

U	Analyte was not detected at the given reporting limit.

Table 3
On-Property LNAPL Thickness

Piezometer/ Well	Date	Depth to LNAPL	Depth to Water	LNAPL Thickness	Change From Previous Event	Thickness Change Since Start
PZ-1	10/24/2016	6.87	7.09	0.22	NA	-0.21
	10/28/2016[1]	6.50	6.69	0.19	-0.03	
	11/7/2016	6.56	6.75	0.19	0.00	
	11/10/2016	6.73	6.87	0.14	-0.05	
	12/22/2016	7.69	7.77	0.08	-0.06	
	1/5/2017	7.87	7.97	0.10	0.02	
	2/27/2017[2]	6.51	6.64	0.13	0.03	
	3/22/2017	6.25	6.25	0.00	-0.13	
	3/23//2017	6.20	6.22	0.02	0.02	
	3/27/2017	6.27	6.29	0.02	0.00	
	4/4/2017	6.52	6.53	0.01	-0.01	
	4/17/2017	6.27	6.28	0.01	0.00	
PZ-2	10/24/2016	6.87	7.09	0.22	NA	-0.20
	10/28/2016[1]	7.13	7.78	0.65	0.43	
	11/7/2016	7.00	7.70	0.70	0.05	
	11/10/2016	7.04	7.53	0.49	-0.21	
	12/22/2016	7.76	8.13	0.37	-0.12	
	1/5/2017	7.97	8.39	0.42	0.05	
	2/27/2017[2]	6.99	7.35	0.36	-0.06	
	3/22/2017	6.37	7.19	0.82	0.46	
	3/23/2017	6.42	7.21	0.79	-0.03	
	3/27/2017	6.54	6.71	0.17	-0.62	
	4/4/2017	6.65	7.14	0.49	0.32	
	4/17/2017	6.45	6.47	0.02	-0.47	
PZ-3	10/24/2016	7.02	7.81	0.79	NA	-0.72
	10/28/2016[1]	6.92	7.61	0.69	-0.1	
	11/7/2016	6.81	7.37	0.56	-0.13	
	11/10/2016	6.73	7.30	0.57	0.01	
	12/22/2016	7.41	7.94	0.53	-0.04	
	1/5/2017	7.66	8.03	0.37	-0.16	
	2/27/2017	6.64	7.15	0.51	0.14	
	3/22/2017	6.15	6.29	0.14	-0.37	
	3/23/2017	6.18	6.35	0.17	0.03	
	3/27/2017	6.26	6.38	0.12	-0.05	
	4/4/2017	6.39	6.55	0.16	0.04	
	4/17/2017	6.21	6.28	0.07	-0.09	

Table 3
On-Property LNAPL Thickness

Piezometer/ Well	Date	Depth to LNAPL	Depth to Water	LNAPL Thickness	Change From Previous Event	Thickness Change Since Start
PZ-4	10/24/2016	7.55	7.95	0.40	NA	-0.28
	10/28/2016[1]	7.47	7.75	0.28	-0.12	
	11/7/2016	7.31	7.75	0.44	0.16	
	11/10/2016	7.33	7.72	0.39	-0.05	
	12/22/2016	8.00	8.63	0.63	0.24	
	1/5/2017	8.22	8.81	0.59	-0.04	
	2/27/2017[2]	7.26	7.71	0.45	-0.14	
	3/22/2017	6.74	7.00	0.26	-0.19	
	3/23/2017	6.78	7.13	0.35	0.09	
	3/27/2017	6.84	6.95	0.11	-0.24	
	4/4/2017	6.66	7.35	0.69	0.58	
	4/17/2017	6.79	6.91	0.12	-0.57	
PZ-5	10/24/2016	7.58	7.60	0.02	NA	-0.01
	10/28/2016[1]	--	7.47	0.00	-0.02	
	11/10/2016	--	7.13	0.00	0.00	
	12/22/2016	7.81	7.83	0.02	0.02	
	1/5/2017	8.05	8.06	0.01	-0.01	
	2/27/2017[2]	7.02	7.02	0.00	-0.01	
	3/22/2017	6.51	6.52	0.01	0.01	
	3/23/2017	6.55	6.57	0.02	0.01	
	3/27/2017	6.61	6.62	0.01	-0.01	
	4/4/2017	6.74	6.75	0.01	0.00	
	4/17/2017	6.56	6.57	0.01	0.00	
PZ-6	10/24/2016	7.92	7.97	0.05	NA	-0.04
	10/28/2016[1]	7.82	7.91	0.09	0.04	
	11/10/2016	7.69	7.78	0.09	0.00	
	12/22/2016	7.39	7.46	0.07	-0.02	
	1/5/2017	8.63	8.69	0.06	-0.01	
	2/27/2017[2]	7.61	7.70	0.09	0.03	
	3/23/2017	7.07	7.11	0.04	-0.05	
	4/17/2017	7.11	7.12	0.01	-0.03	
PZ-7	10/24/2016	--	7.67	0.00	NA	0
	11/10/2016	--	7.45	0.00	NA	
	2/27/2017[2]	--	7.35	0.00	NA	

Table 3
On-Property LNAPL Thickness

Piezometer/ Well	Date	Depth to LNAPL	Depth to Water	LNAPL Thickness	Change From Previous Event	Thickness Change Since Start
PZ-8	10/24/2016	8.5	8.65	0.15	NA	-0.09
	10/28/2016[1]	8.41	8.51	0.10	-0.05	
	11/10/2016	7.21	7.35	0.14	0.04	
	12/22/2016	7.88	8.16	0.28	0.14	
	1/5/2017	8.09	8.39	0.30	0.02	
	2/27/2017[2]	7.11	7.14	0.03	-0.27	
	3/23/2017	6.62	6.67	0.05	0.02	
	4/17/2017	6.63	6.69	0.06	0.01	
PZ-9	12/22/2016	--	NA	NA	NA	0
	1/5/2017	--	NA	NA	NA	
	2/27/2017	--	7.51	0.00	NA	
PZ-10	3/23/2016	--	6.92	0	NA	0.04
	4/19/2016	6.28	6.36	0.08	0.08	
	10/24/2016	5.15	5.80	0.65	0.57	
	4/17/2016	4.47	4.51	0.04	-0.61	
MW-4A	10/20/2015	--	4.62	0.00	NA	-1.21
	3/23/2016	3.22	4.43	1.21	1.21	
	4/19/2016	2.70	3.21	0.51	-0.70	
	10/24/2016	3.76	4.42	0.66	0.15	
	10/28/2016[1]	3.82	4.41	0.59	-0.07	
	11/10/2016	3.71	3.94	0.23	-0.36	
	2/27/2017[2]	4.65	4.7	0.05	-0.18	
	3/23/2017	--	3.18	0.00	-0.05	
	4/17/2017	--	3.20	0.00	0.00	
MW-5A	10/20/2015	5.01	6.04	1.03	NA	-1.01
	3/23/2016	3.80	4.44	0.64	-0.39	
	4/19/2016	3.10	4.11	1.01	0.37	
	10/24/2016	4.32	4.67	0.35	-0.66	
	10/28/2016[1]	4.20	4.71	0.51	0.16	
	11/10/2016	4.10	4.5	0.40	-0.11	
	2/27/2017[2]	4.02	4.37	0.35	-0.05	
	3/23/2017	3.52	4.01	0.49	0.14	
	4/4/2017	3.75	3.89	0.14	-0.35	
	4/17/2017	3.59	3.61	0.02	-0.12	

Table 3
On-Property LNAPL Thickness

Piezometer/ Well	Date	Depth to LNAPL	Depth to Water	LNAPL Thickness	Change From Previous Event	Thickness Change Since Start
MW-9	10/24/2016	4.73	4.84	0.11	NA	-0.11
	10/28/2016[1]	4.65	4.66	0.01	-0.10	
	11/10/2016	--	4.51	0.00	-0.01	
	2/27/2017[2]	--	4.43	0.00	0.00	
	3/23/2017	--	3.91	0.00	0.00	
	4/17/2017	--	3.98	0.00	0.00	
East Sump	11/23/2016	8.16	8.26	0.10	NA	-0.07
	12/5/2016	8.32	8.39	0.07	-0.03	
	1/5/2017	8.91	9.01	0.10	0.03	
	2/1/2017	8.91	9.00	0.09	-0.01	
	2/27/2017[2]	7.90	8.02	0.12	0.03	
	3/22/2017	7.36	7.41	0.05	-0.07	
	3/23/2017	7.40	7.51	0.11	0.06	
	3/27/2017	7.47	7.50	0.03	-0.08	
	4/4/2017	7.59	7.69	0.10	0.07	
	4/17/2017	7.41	7.44	0.03	-0.07	
West Sump	11/23/2016	7.61	7.73	0.12	NA	-0.11
	12/5/2016	7.85	7.97	0.12	0.00	
	1/5/2017	8.44	8.47	0.03	-0.09	
	2/1/2017	8.43	8.45	0.02	-0.01	
	2/27/2017[2]	7.42	7.42	0.00	-0.02	
	3/22/2017	6.90	6.93	0.03	0.03	
	3/23/2017	6.95	6.99	0.04	0.01	
	3/27/2017	6.69	6.70	0.01	-0.03	
	4/4/2017	6.82	6.83	0.01	0.00	
	4/17/2017	6.64	6.65	0.01	0.00	
North Sump	11/23/2016	8.21	8.33	0.12	NA	-0.09
	12/5/2016	8.44	8.48	0.04	-0.08	
	1/5/2017	9.03	9.11	0.08	0.04	
	2/1/2017	9.03	9.08	0.05	-0.03	
	2/27/2017[2]	8.03	8.14	0.11	0.06	
	3/22/2017	7.51	7.93	0.42	0.31	
	3/23/2017	7.55	7.67	0.12	-0.30	
	3/27/2017	7.94	7.95	0.01	-0.11	
	4/4/2017	8.06	8.07	0.01	0.00	
	4/17/2017	7.88	7.91	0.03	0.02	

Notes:

-- Not present

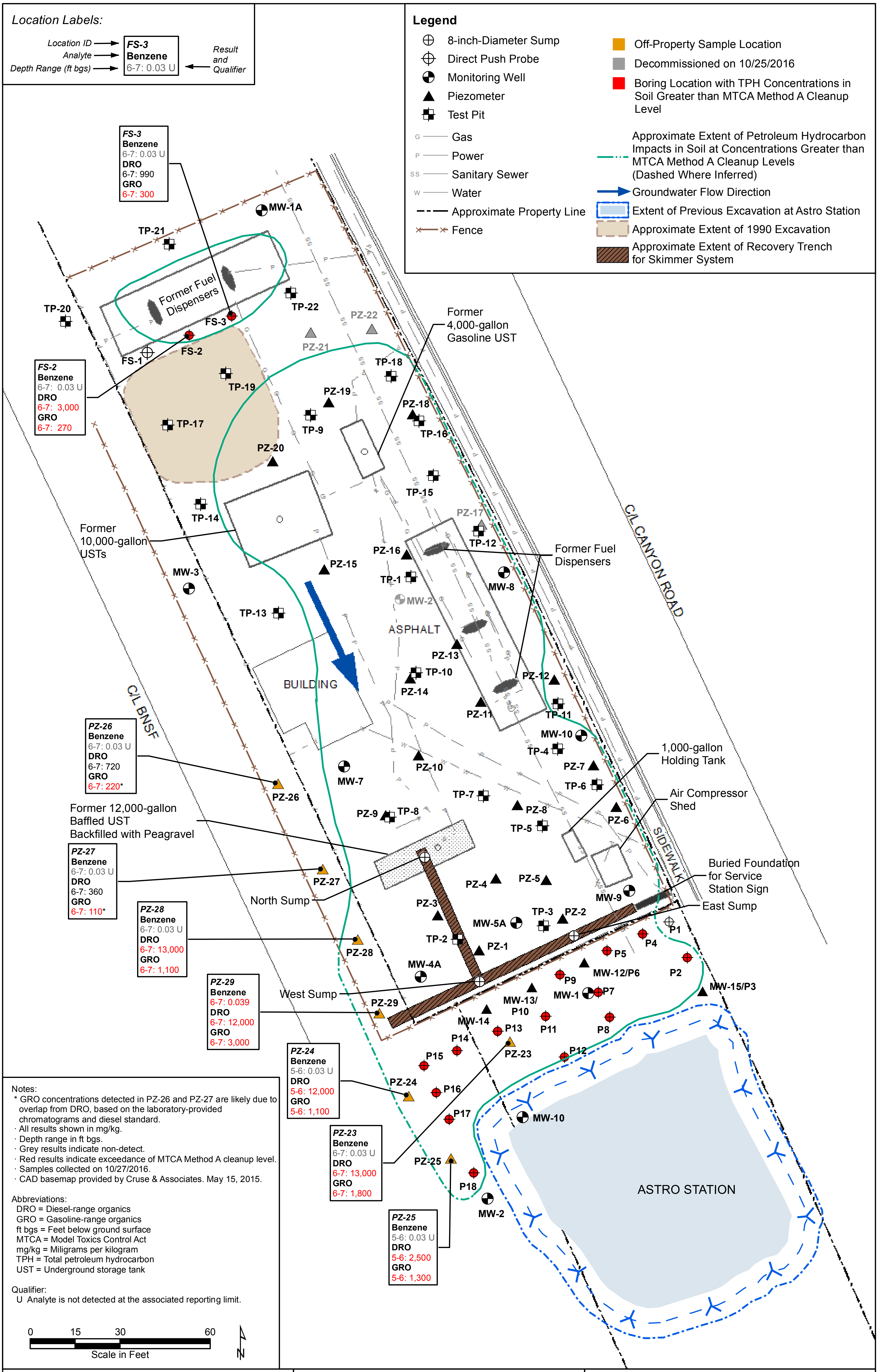
1 Started pumping LNAPL from open UST pits.

2 Started the trench recovery system and skimmers.

Abbreviations:

LNAPL	Light non-aqueous phase liquid
NA	Not applicable
UST	Underground storage tank

Figures



Notes:

- * GRO concentrations detected in PZ-26 and PZ-27 are likely due to overlap from DRO, based on the laboratory-provided chromatograms and diesel standard.
- All results shown in mg/kg.
- Depth range in ft bgs.
- Grey results indicate non-detect.
- Red results indicate exceedance of MTCA Method A cleanup level.
- Samples collected on 10/27/2016.
- CAD basemap provided by Cruse & Associates. May 15, 2015.

Abbreviations:
DRO = Diesel-range organics
GRO = Gasoline-range organics
ft bgs = Feet below ground surface
MTCA = Model Toxics Control Act
mg/kg = Miligrams per kilogram
TPH = Total petroleum hydrocarbon
UST = Underground storage tank

Qualifier:
U Analyte is not detected at the associated reporting limit.

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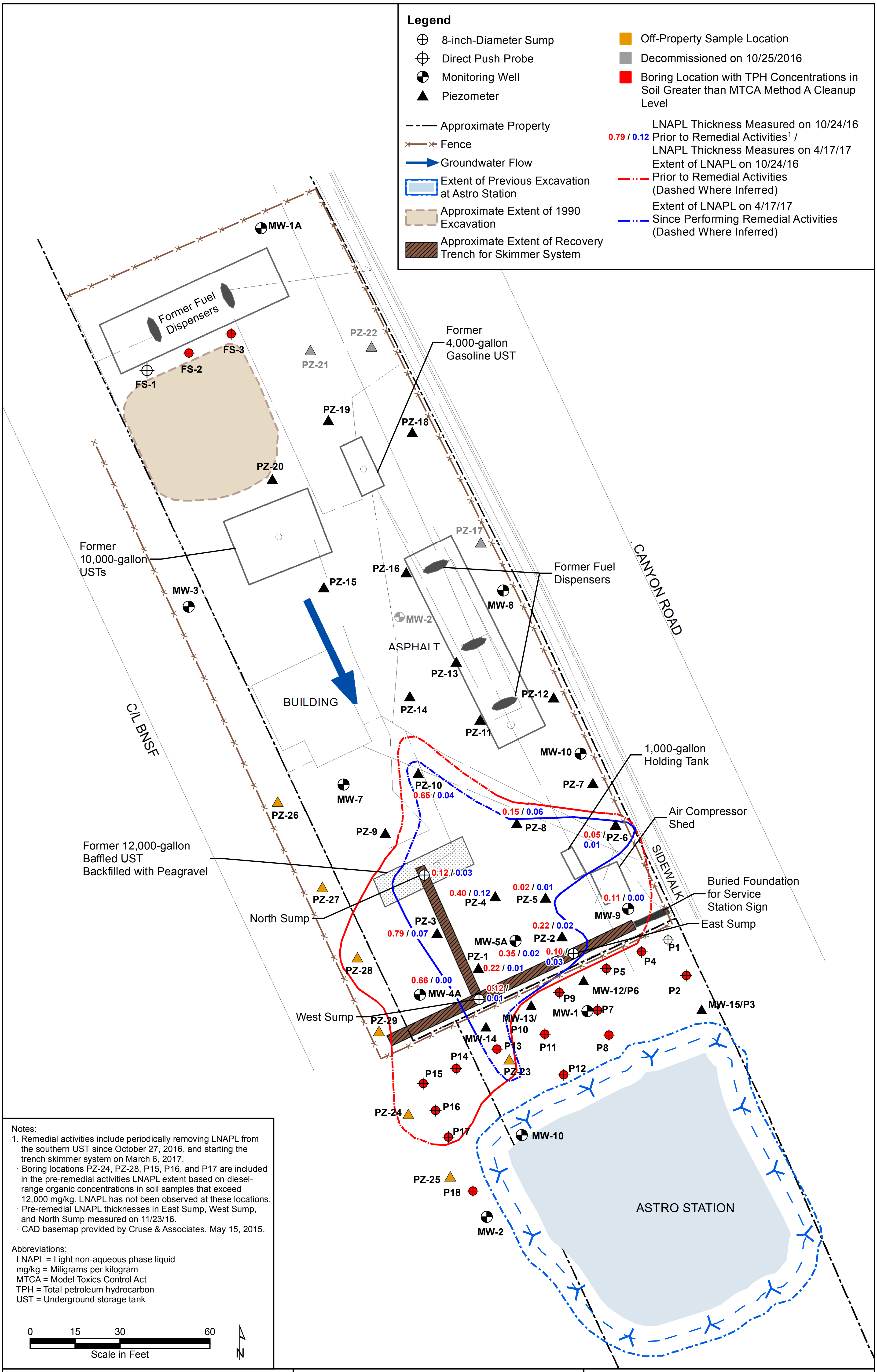
Interim Action Report and Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 1
Site Plan and Soil Analytical Results

I:\GIS\Projects\CL-Ellensburg\MXD\IA Report and Off-Property Investigation Summary\Figure 1 Site Plan and Soil Analytical Results.mxd
4/21/2017



Legend

⊕ 8-inch-Diameter Sump
⊕ Direct Push Probe
◐ Monitoring Well
▲ Piezometer
— · — Approximate Property
×—× Fence
→ Groundwater Flow
▭ Extent of Previous Excavation at Astro Station
▭ Approximate Extent of 1990 Excavation
▨ Approximate Extent of Recovery Trench for Skimmer System
🟧 Off-Property Sample Location
◼ Decommissioned on 10/25/2016
🟥 Boring Location with TPH Concentrations in Soil Greater than MTCA Method A Cleanup Level
0.79 / 0.12 LNAPL Thickness Measured on 10/24/16 Prior to Remedial Activities[1] / LNAPL Thickness Measures on 4/17/17
— · · — Extent of LNAPL on 10/24/16 Prior to Remedial Activities (Dashed Where Inferred)
— · · — Extent of LNAPL on 4/17/17 Since Performing Remedial Activities (Dashed Where Inferred)

Notes:

1. Remedial activities include periodically removing LNAPL from the southern UST since October 27, 2016, and starting the trench skimmer system on March 6, 2017.

- Boring locations PZ-24, PZ-28, P15, P16, and P17 are included in the pre-remedial activities LNAPL extent based on diesel-range organic concentrations in soil samples that exceed 12,000 mg/kg. LNAPL has not been observed at these locations.
- Pre-remedial LNAPL thicknesses in East Sump, West Sump, and North Sump measured on 11/23/16.
- CAD basemap provided by Cruse & Associates. May 15, 2015.

Abbreviations:

LNAPL = Light non-aqueous phase liquid
mg/kg = Miligrams per kilogram
MTCA = Model Toxics Control Act
TPH = Total petroleum hydrocarbon
UST = Underground storage tank

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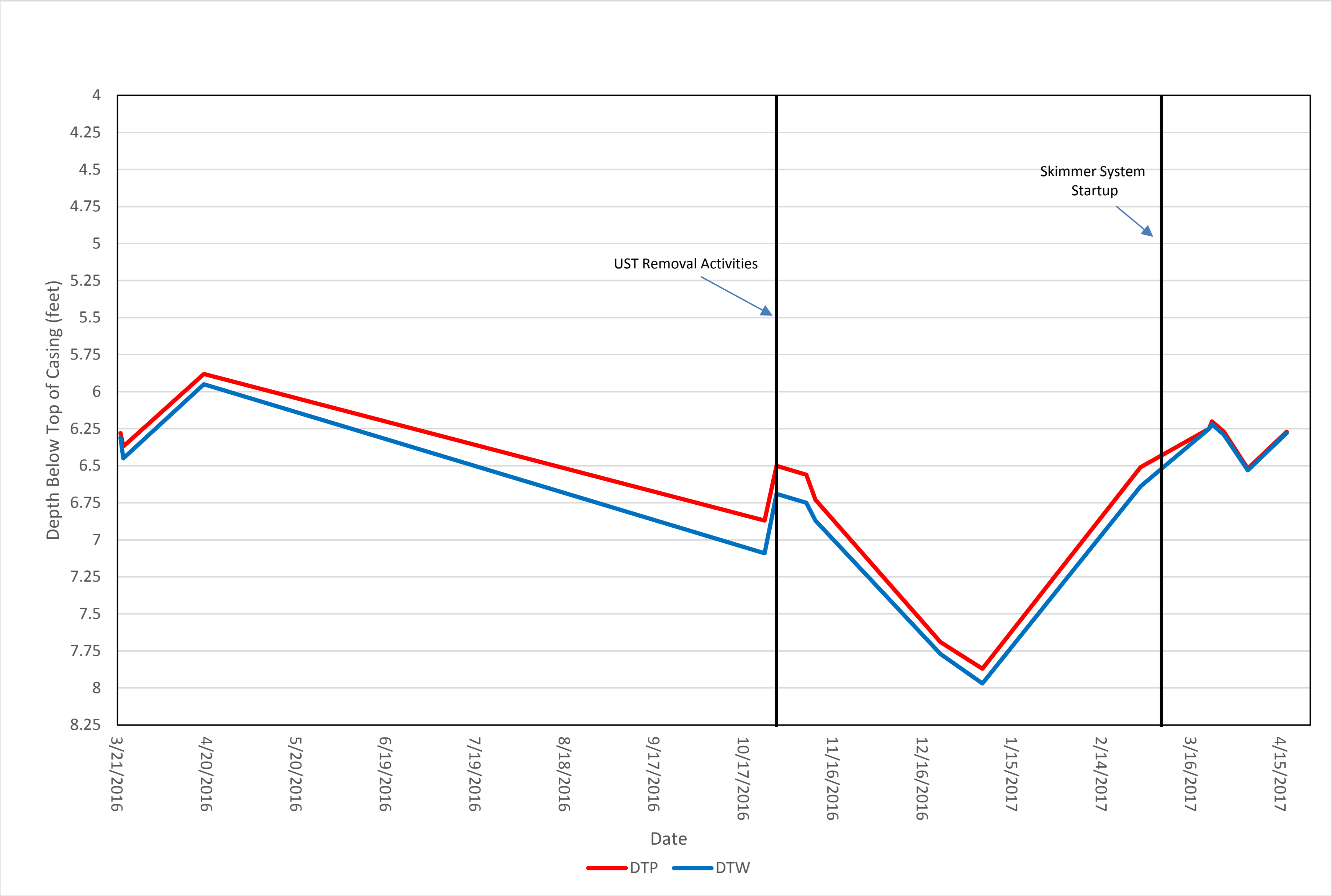
Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 2
LNAPL Extent and Thickness On-Property
Pre- Vs. Post-Ongoing Remedial Activities

I:\GIS\Projects\CL-Ellensburg\MXD\IA Report and Off-Property Investigation Summary\Figure 2 LNAPL Extent and Thickness Pre- Versus Post-Ongoing Remedial Activity.mxd
4/26/2017



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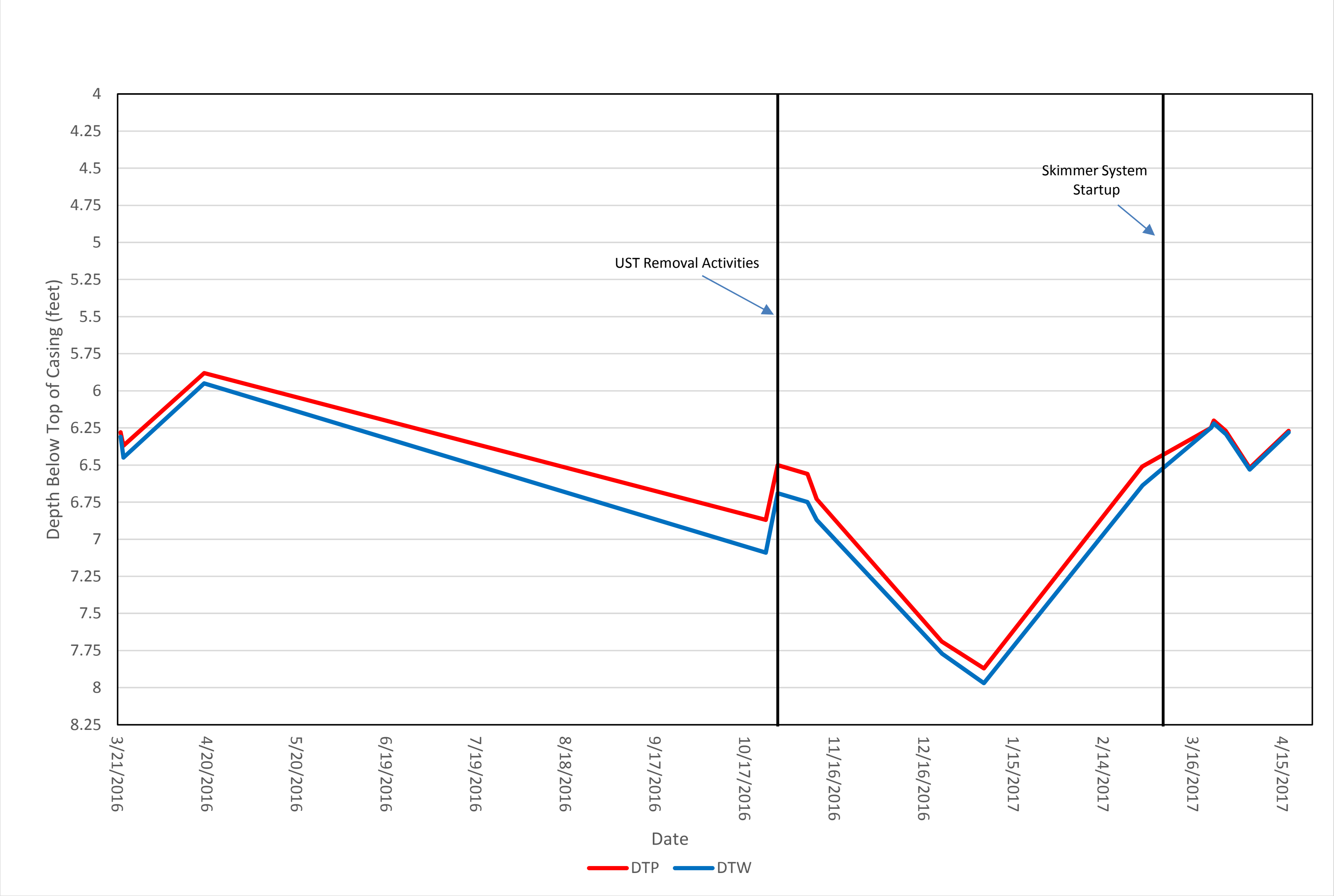
Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 3
PZ-1 Depth to Water and Depth to Product



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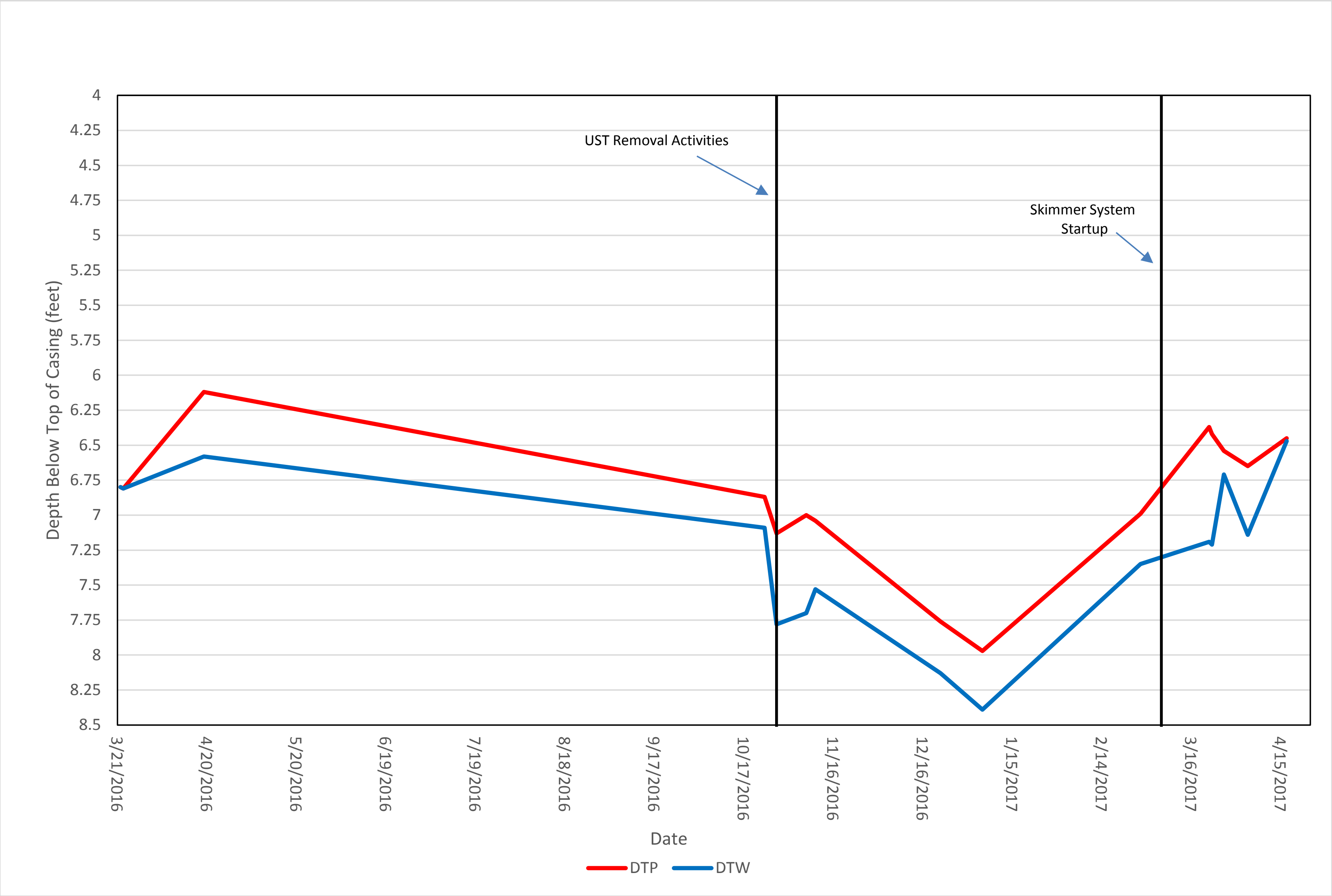
Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 3
PZ-1 Depth to Water and Depth to Product



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Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 4
PZ-2 Depth to Water and Depth to Product

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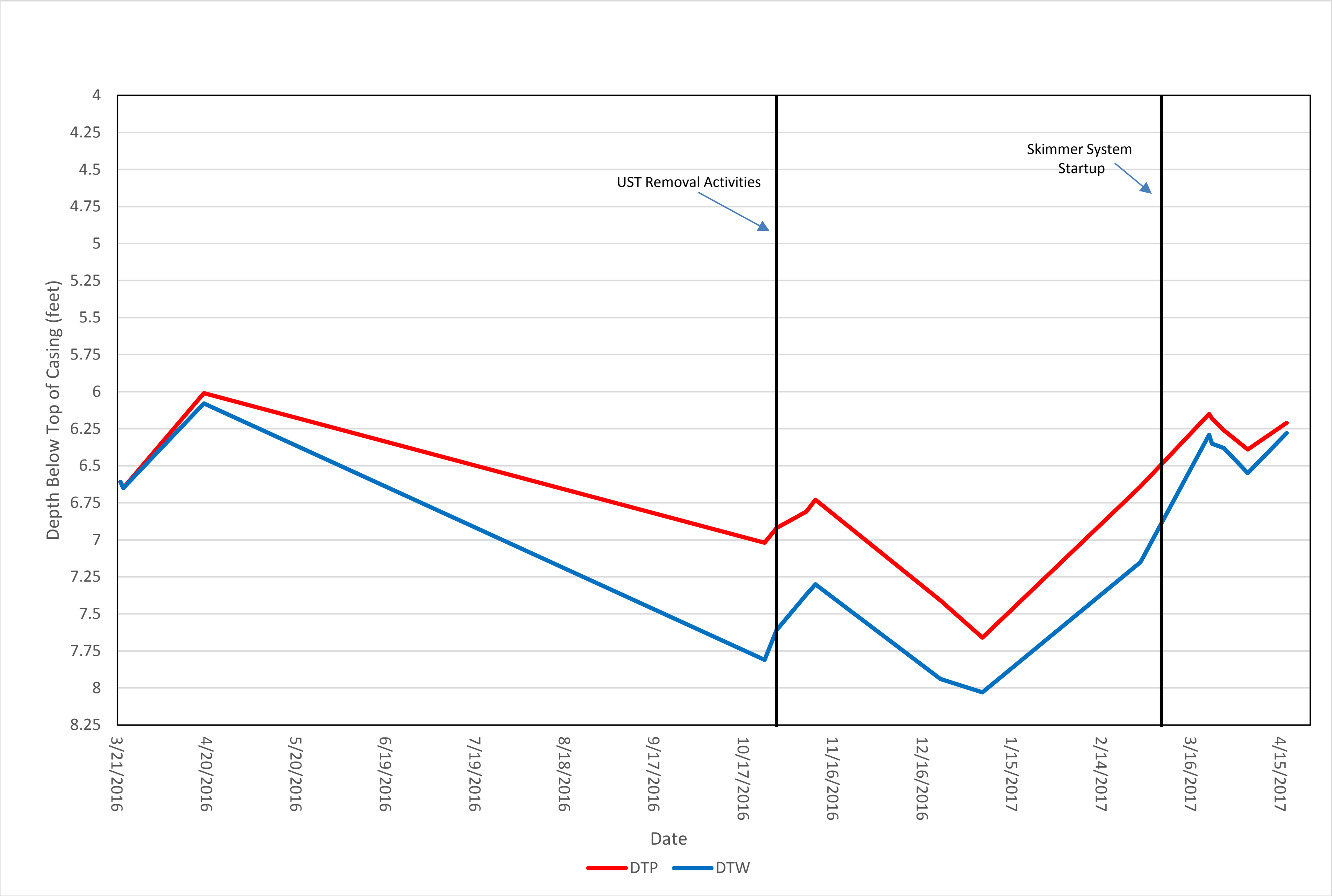
4/26/2017



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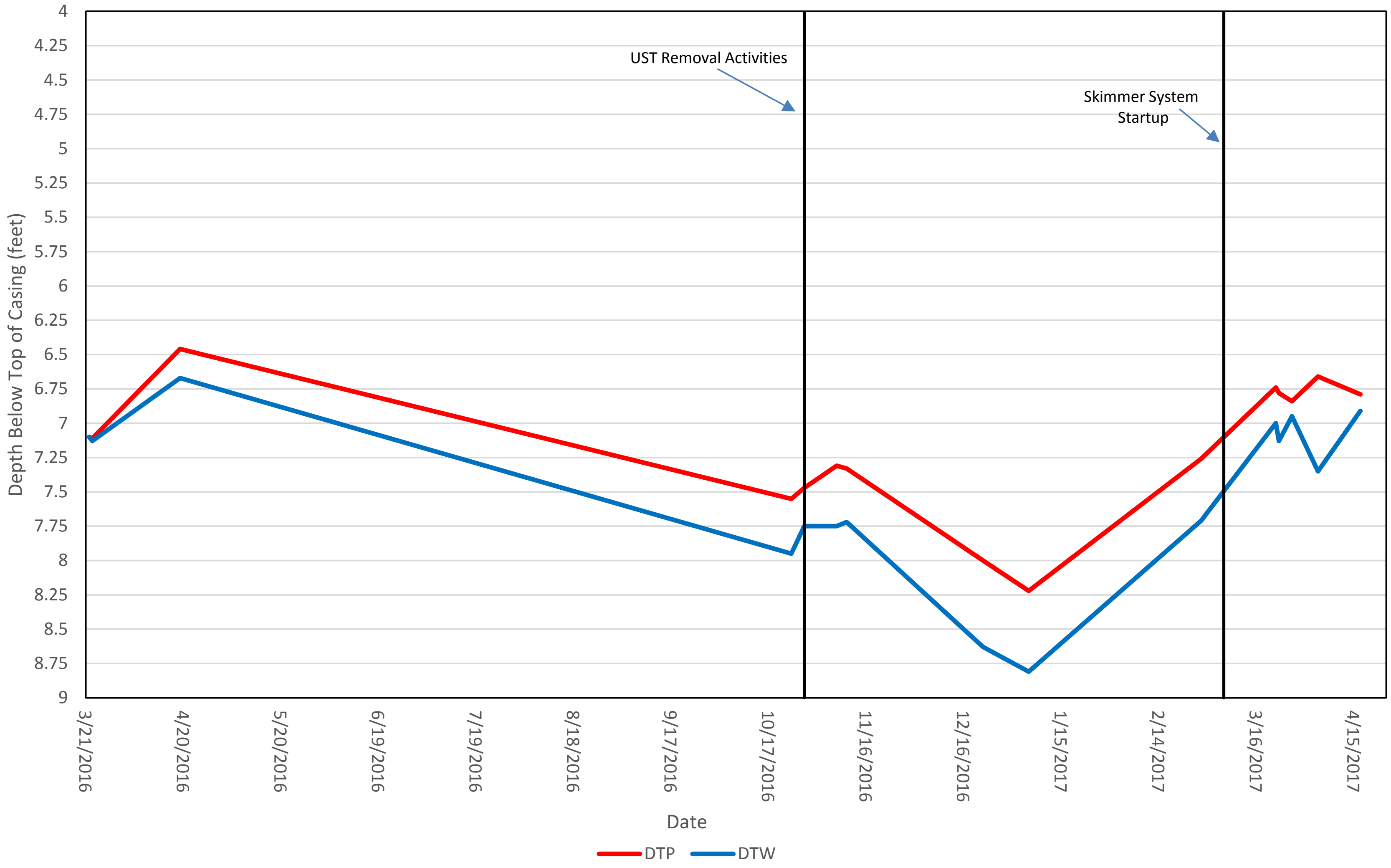
Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 5
PZ-3 Depth to Water and Depth to Product



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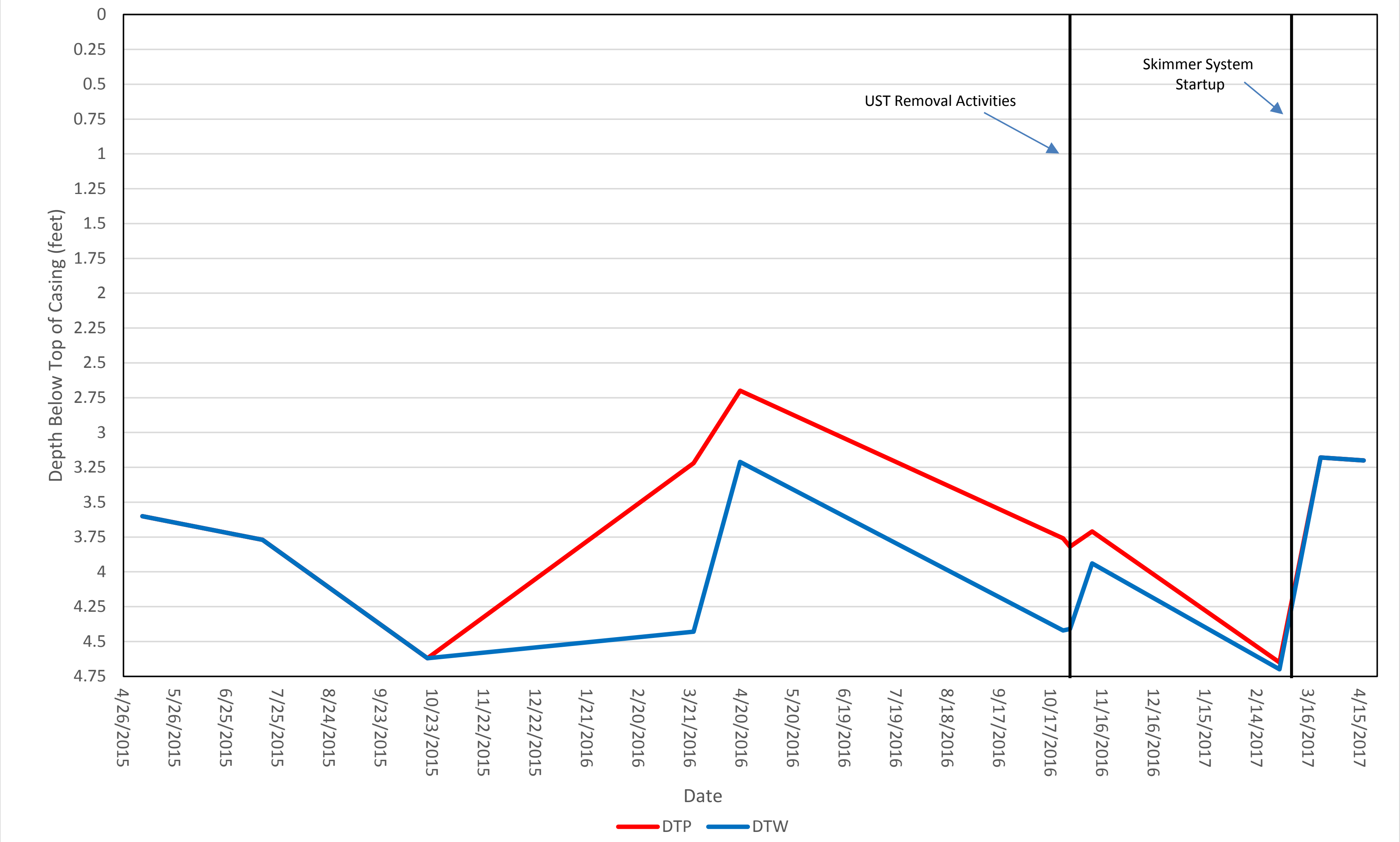
Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 6
PZ-4 Depth to Water and Depth to Product

F:\projects\CL-Ellensburg\Interim Action\Interim Action Report\02 Figures\Figure 6 PZ-4.docx
4/26/2017



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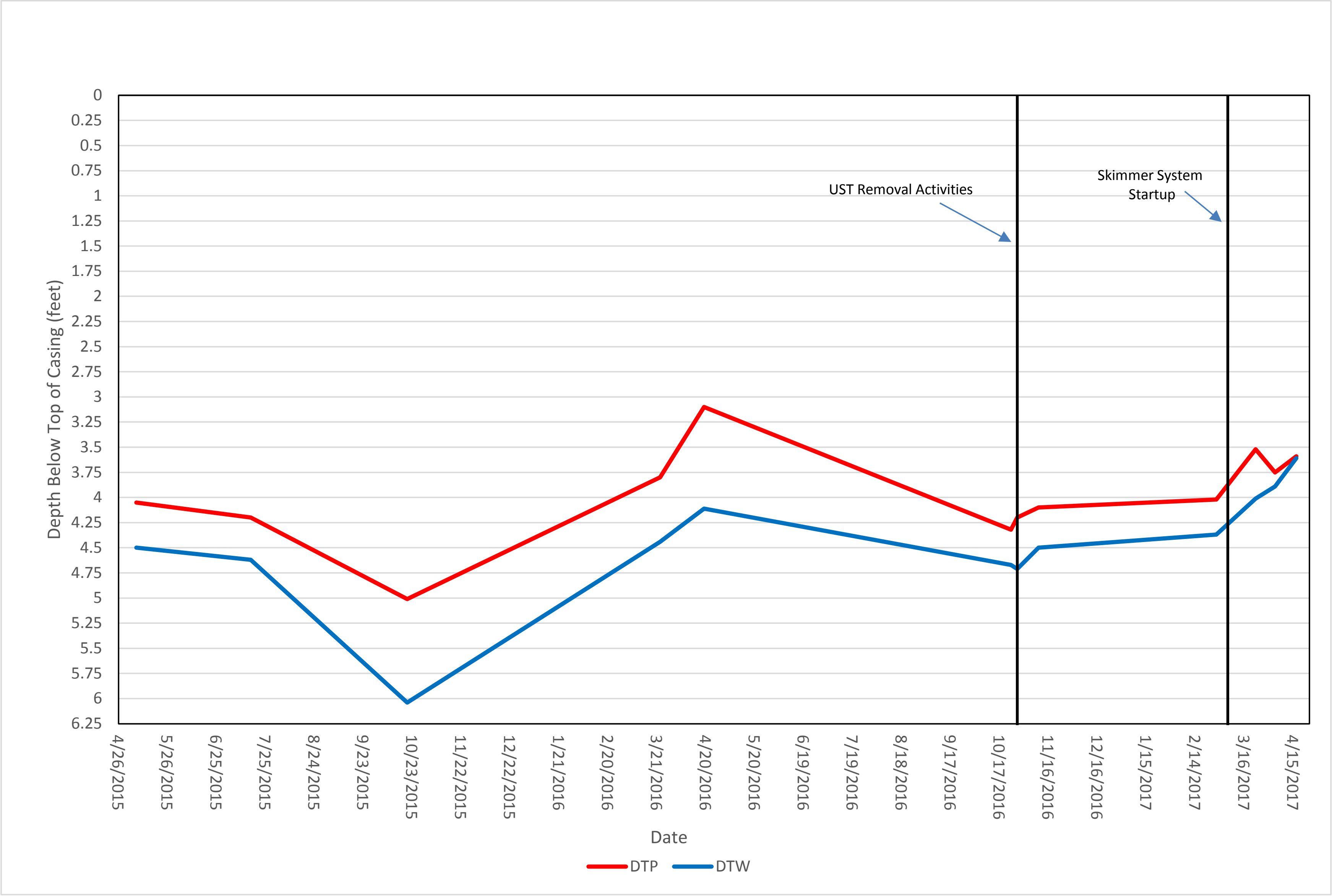
Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 7
MW-4A Depth to Water and
Depth to Product



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Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Figure 8
MW-5A Depth to Water and Depth to Product

Attachment 1
Boring Logs

Log of Soil Boring and Well Installation X

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Floyd Snider

Boring PZ23 Date 10/27/16 Sheet 1 of 1
Job CL-Ellensburg Job No. Ellens
Logged By G.C. Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe/ HSA
Sampling Method cont. 5' liners
Bottom of Boring 15' ATD Water Level Depth 6'
Ground Surface Elevation

Obs. Well Install. ☒ Yes ☐ No

~~SAMPLE ID~~ PID	Blow Count	USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
1.3	N/A	Fill	Gravelly sandy roadbase FILL
2.5		ML	Brown, stiff, sandy SILT w/low plasticity; slight odor; no sheen moist
195			
301	PZ-23-6-7 @0940	SM	Brown to gray, silty SAND; slight odor, slight sheen; moist
432			
294		SP	Gray, gravelly, med to coarse SAND; strong odor, medium sheen; saturated
46			
9.3		GP	Gray; coarse sandy, fine to large gravel & cobbles; moderate odor; slight sheen.
0.1			SAA; no odor; no sheen

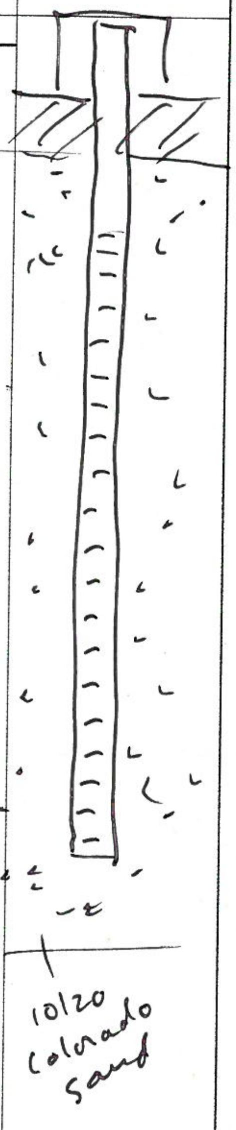
DEPTH From To

SAMPLE RECOVERY (FT)

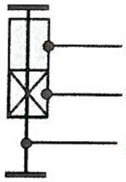
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

2" well

Screen 3-13'



10/20 Colorado sand



▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Ecology ID BJR-519

Log of Soil Boring and Well Installation X

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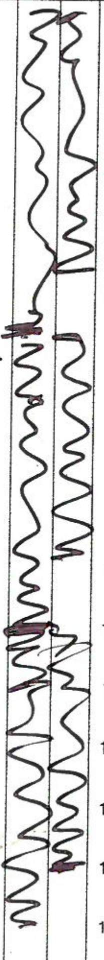
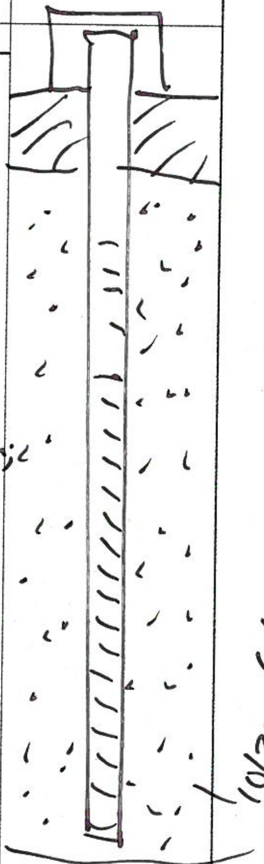
Floyd Snider
Boring PZ-24 Date 10/27 Sheet 1 of 1
Job Ellensburg Job No.
Logged By GL Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe / HSA combo
Sampling Method 5'-liners Cont.
Bottom of Boring 15' ATD Water Level Depth 5.5'
Ground Surface Elevation

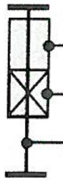
Obs. Well Install. ☒ ~~Yes~~ ☐ No

SAMPLE ID	~~Blow Count~~ PID	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)	Depth	USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
					0		
	5.1				1	FILL	Roadbase, gravelly, sandy FILL
	47.1				2–3	ML	Brown, sandy SILT w/ low plasticity; no odor, no sheen; moist
	218				4	SM	Dark brown to gray, silty, SAND slight odor, slight sheen; moist
PZ-24-5-6 @ 1045	251	▽			5–6	SP	Gray, fine to coarse, gravelly SAND; strong odor; moderate sheen; saturated
	121				7	GP	Gray, coarse sandy, fine to large gravel; moderate odor, slight sheen; saturated
	6.5				8–9		
	6.2				10–11		SAA; slight odor, slight sheen; saturated
					12		SAA; no odor; no sheen
	2.5				13–14		SAA; no odor; no sheen
					15–18		
					19		Screen 3-13'
					20		





Colorado SAND
10/20



Recovery
Subsample for Analysis
Driven Interval

▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

To ad property when Ecology ID BJR-520

Log of Soil Boring and Well Installation X

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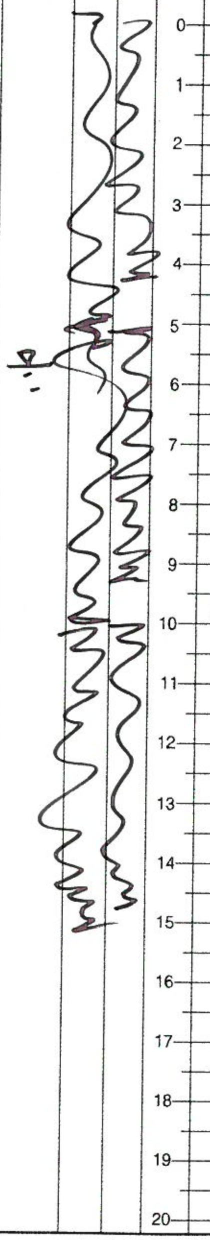
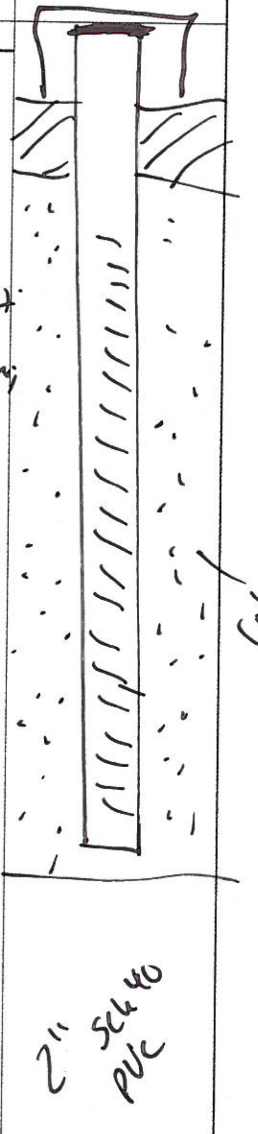
Floyd Snider
Boring PZ-25 Date 10/27 Sheet 1 of 1
Job Ellensburg Job No.
Logged By GL Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe / HSA Combo
Sampling Method 5'-liners continuous
Bottom of Boring 15' ATD Water Level Depth 5.5'
Ground Surface Elevation

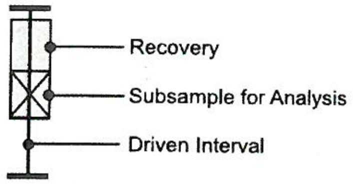
Obs. Well Install. ☒ Yes ☐ No

SAMPLE ID	~~Blow Count~~ PID	DEPTH From	DEPTH To	USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
	1.3			Fill	Roadbase, sandy gravelly Fill; No odor, no sheen
	3.3			ML	Brown, sandy SILT w/ low plasticity; no odor; no sheen; moist
				SM	Brown to gray, silty, fine SAND Slight odor; slight sheen; moist
PZ-25-5-6' @1120	299				SAA, strong odor; strong sheen; wet
	217 47			SP	Gray, gravelly, med to coarse SAND; strong odor, moderate sheen; saturated
	216 3.[illegible]			GP	Gray, sandy, fine to large GRAVEL; slight odor; slight sheen; saturated
					SAA, no odor, no sheen; saturated

SAMPLE RECOVERY (FT)







∇ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Ecology ID
BJR-521

Log of Soil Boring and Well Installation X

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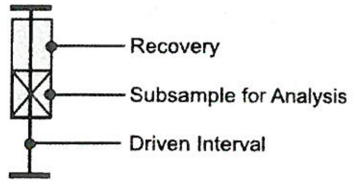
Floyd Snider
Boring FS-1 Date 10/27 Sheet 1 of 1
Job Ellensburg Job No.
Logged By GC Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe / HSA
Sampling Method Continuous 5'-liners
Bottom of Boring 7.5' ATD Water Level Depth 6'
Ground Surface Elevation

Obs. Well Install. ☒ ~~Yes~~ ☐ No

SAMPLE ID	~~Blow Count~~ PID	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.	
					0		Asphalt	N/A
	4				1	FILL	Gravelly, sandy FILL	
					2			
					3	SP	Gray, gravelly, fine to coarse sandy; no odor, no sheen; moist	
					4			
	3.3				5			
			∇		6		SAA, no odor, no sheen; saturated	
					7	GP	Gray, sandy, fine to large gravel; no odor, no sheen; saturated	
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15		Located between former excavation & northern fuel island. Western most.	
					16			
					17			
					18			
					19			
					20			



∇ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Log of Soil Boring and Well Installation X

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Floyd Snider
Boring FS-2 Date 10/27/16 Sheet 1 of
Job Ellensburg Job No.
Logged By GC Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprob
Sampling Method 5'-liners Cont.
Bottom of Boring 7' ATD Water Level Depth 6'
Ground Surface Elevation

Obs. Well Install. ☒ Yes ☐ No

SAMPLE ID	~~Blow Count~~ PID	DEPTH From	DEPTH To	SAMPLE RECOVERY (FT)		USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.	
					0		Asphalt	N/A
					1	FM	Sandy gravelly FILL	
	0				2			
					3		Brown to gray, gravelly, med to coarse SAND; no odor, no sheen; moist	
					4	SP		
					5		SAA, slight odor; moderate sheen	
FS-2-6-7' @1322	25.8 ▨		▽		6			
					7	GP	Gray, sandy, fine to coarse GRAVEL; strong odor, heavy sheen.	
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

Recovery
Subsample for Analysis
Driven Interval

▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Log of Soil Boring and Well Installation X

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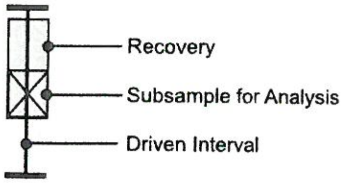
Floyd Snider
Boring FS-3 Date 10/27/16 Sheet 1 of 1
Job Ellensburg, WA Job No.
Logged By G.C Weather Cloudy
Drilled By ESN
Drill Type/Method Geoprobe
Sampling Method Cont 5'
Bottom of Boring 7' ATD Water Level Depth
Ground Surface Elevation

Obs. Well Install. ~~Yes~~ No

SAMPLE ID	Blow Count	DEPTH		SAMPLE RECOVERY (FT)			USCS Symbol	DESCRIPTION: color, texture, moisture MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.	
		From	To						
	0				0		As	Asphalt to 6 inches	N/A
					1		Fill	Sandy, gravelly FILL	
					2				
					3		SP	Brown to gray, gravelly, fine to coarse SAND; no odor; no sheen;	
	21.0				4			SAA; slight odor; slight sheen; moist	
					5				
FS-3-6-7' @ 1340	57.1		▽		6			SAA; moderate odor; moderate sheen, wet	
					7		GP	Gray, sandy GRAVEL; strong odor; strong sheen; saturated	
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				



▽ Groundwater Observed At Time of Drilling

▨ Potentially Contaminated Soil

Attachment 2
Photographs

Photograph 1. 4,000-gallon gasoline UST.

Photograph 2. 12,000-gallon baffled UST.

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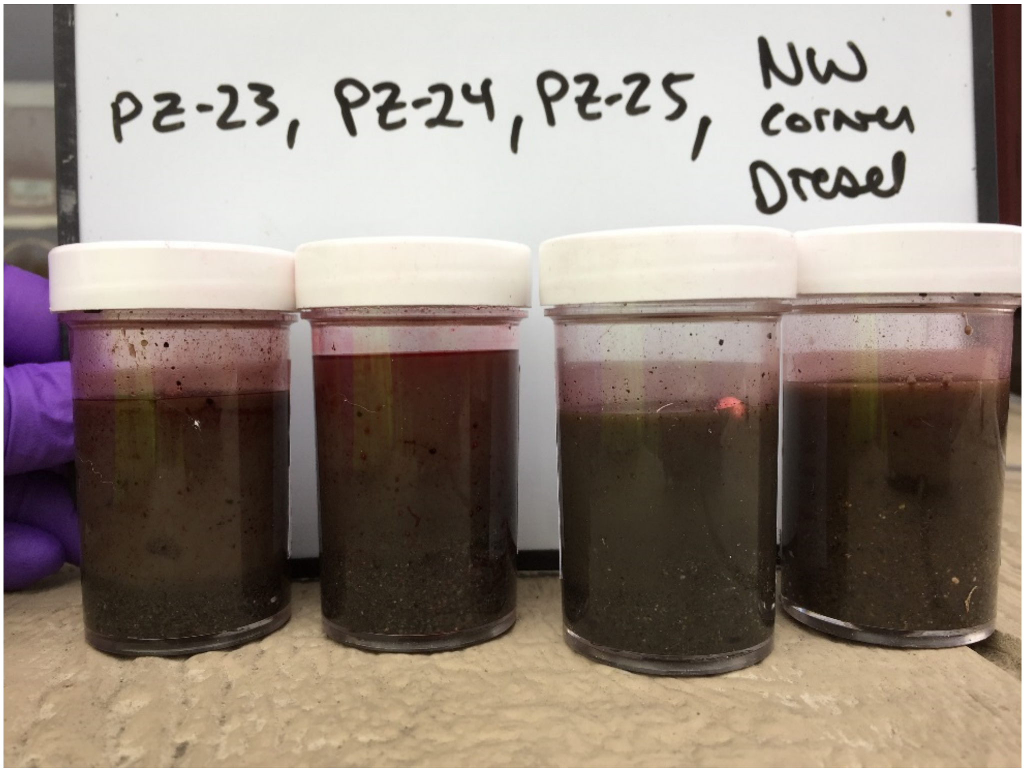
Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

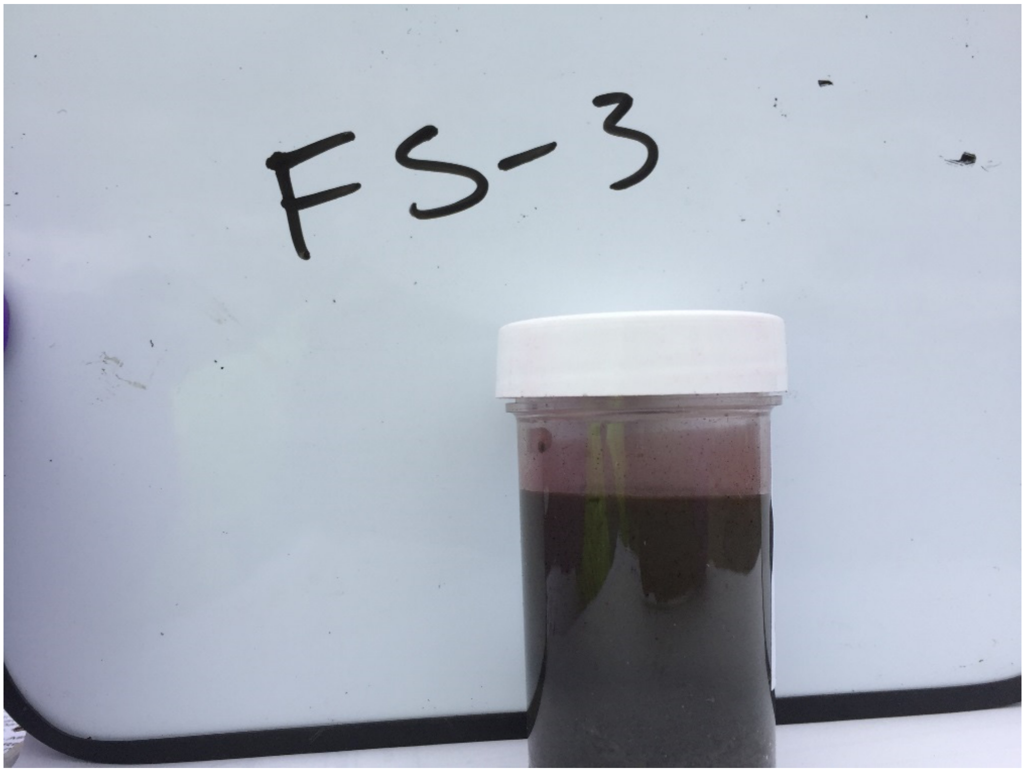
Attachment 2
Photographs 1 and 2

Photograph 3. Northern 10,000-gallon diesel UST removed from the northern UST pit.

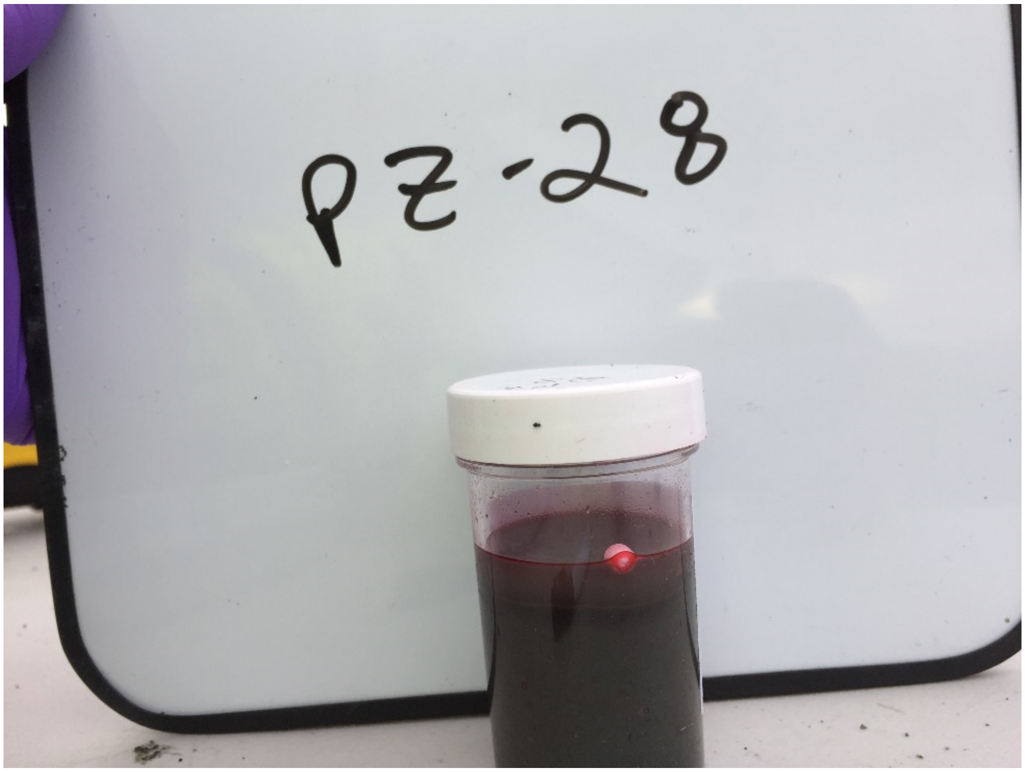
Photograph 4. Southern 10,000-gallon diesel UST removed from the northern UST pit.



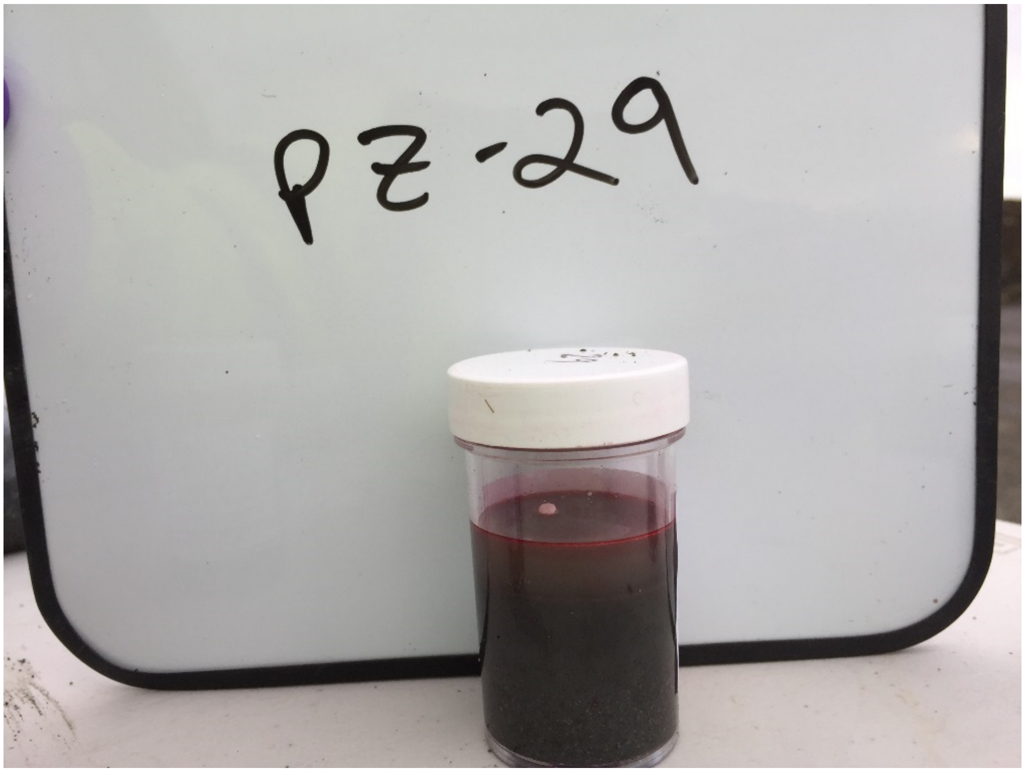
Photograph 5. Sudan IV field kit results for piezometers PZ-23 through PZ-25 and from the northwest corner of the two 10,000-gallon UST pit (northern UST basin).



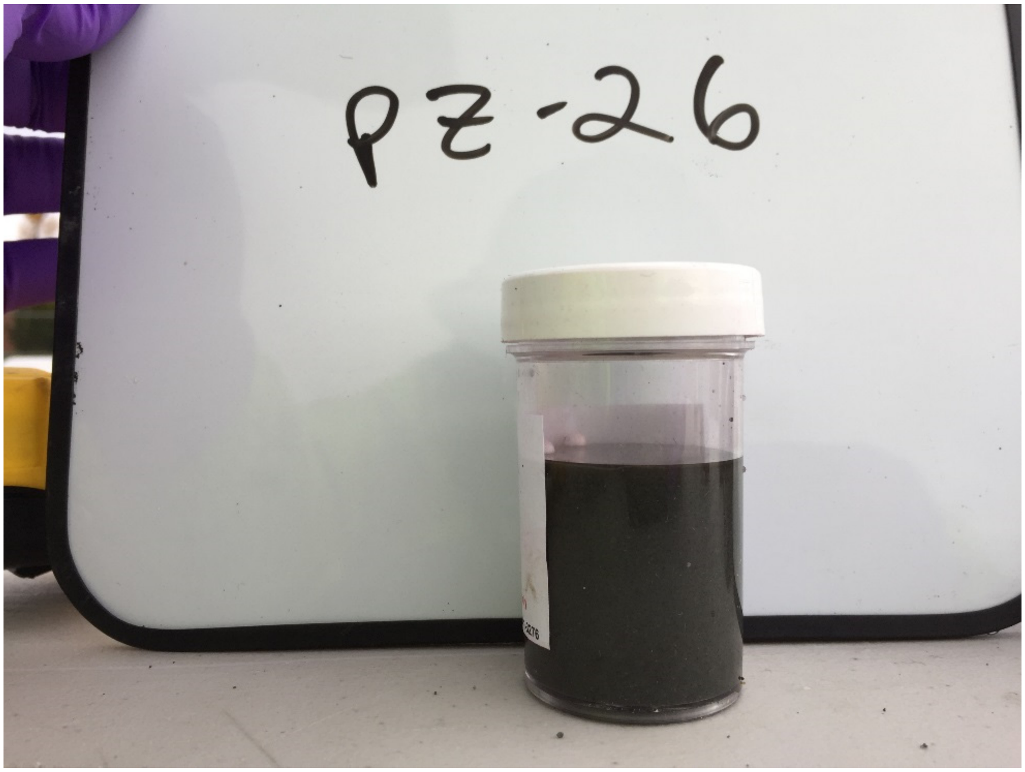
Photograph 6. Sudan IV field kit result for soil boring FS-3.



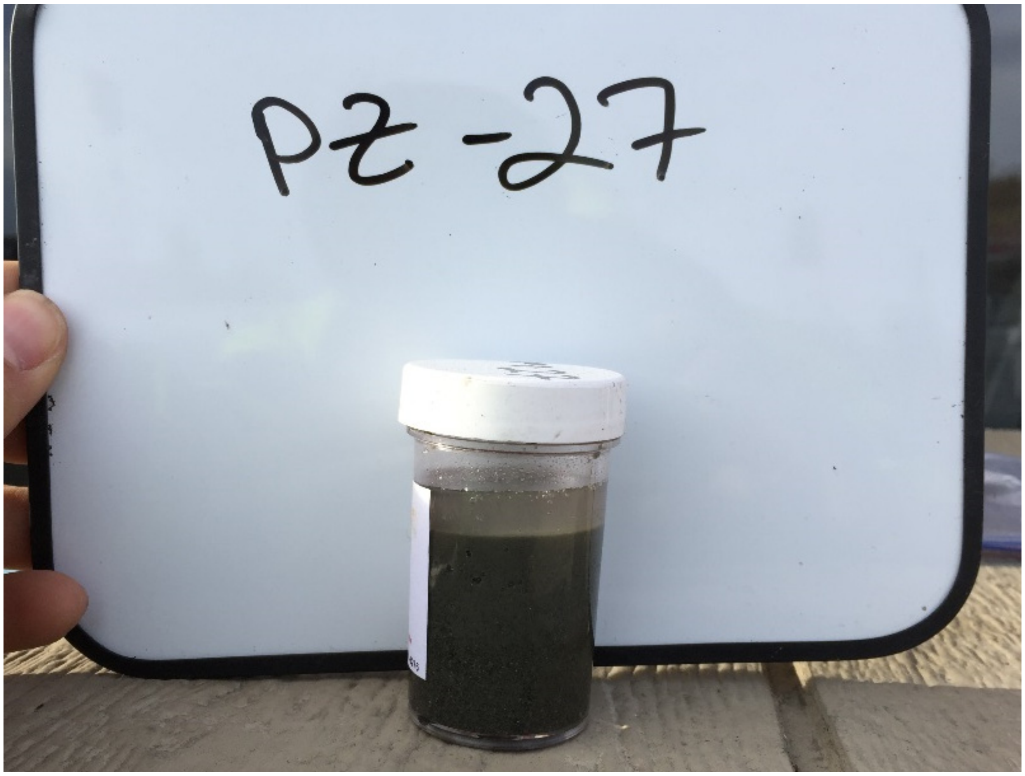
Photograph 7. Sudan IV field kit result for piezometer PZ-28.



Photograph 8. Sudan IV field kit result for piezometer PZ-29



Photograph 9. Sudan IV field kit result for piezometer PZ-26.



Photograph 10. Sudan IV field kit result for piezometer PZ-27.

Photograph 11. Trench recovery system, sumps, 1,000-gallon holding tank, and compressor shed.

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Interim Action Report and
Off-Property Investigation Summary
Big B Mini Mart
Ellensburg, Washington

Attachment 2
Photograph 11

Photograph 12. Southern UST pit and LNAPL, pre-remedial activities (October 28, 2016).

Photograph 13. Southern UST pit and LNAPL, post-system startup (April 4, 2017).

Attachment 3
Laboratory Reports

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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Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

November 7, 2016

Gabriel Cisneros, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Mr Cisneros:

Included are the results from the testing of material submitted on October 28, 2016 from the CL-Ellensburg, F&BI 610440 project. There are 37 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
FDS1107R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 28, 2016 by Friedman & Bruya, Inc. from the Floyd-Snider CL-Ellensburg, F&BI 610440 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
610440 -01	Bottled UST-LNAPL
610440 -02	PZ-23-6'-7'
610440 -03	PZ-24-5'-6'
610440 -04	PZ-25-5'-6'
610440 -05	FS-2-6'-7'
610440 -06	FS-3-6'-7'
610440 -07	PZ-27-6'-7'
610440 -08	PZ-26-6'-7'
610440 -09	PZ-28-6'-7'
610440 -10	PZ-29-6'-7'
610440 -11	N. Diesel-UST-LNAPL
610440 -12	Trip Blank

8011 is a method for analysis of water samples, therefore EDB in product was analyzed by method 8260C.

All quality control requirements were acceptable.

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440
Date Extracted: 11/01/16 and 11/02/16
Date Analyzed: 11/01/16 and 11/02/16

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
PZ-23-6'-7' 610440-02 1/5	1,800	ip
PZ-24-5'-6' 610440-03 1/20	1,100	107
PZ-25-5'-6' 610440-04 1/5	1,300	ip
FS-2-6'-7' 610440-05 1/5	270	105
FS-3-6'-7' 610440-06	300	ip
PZ-27-6'-7' 610440-07	110	114
PZ-26-6'-7' 610440-08	220	ip
PZ-28-6'-7' 610440-09 1/5	1,100	ip
PZ-29-6'-7' 610440-10 1/10	3,000	ip
Method Blank 06-2261 MB	<2	99

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440
Date Extracted: 10/31/16
Date Analyzed: 10/31/16

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)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 56-165)
PZ-23-6’-7’ 610440-02	13,000	<250	109
PZ-24-5’-6’ 610440-03	12,000	<250	130
PZ-25-5’-6’ 610440-04	2,500	<250	121
FS-2-6’-7’ 610440-05	3,000	290 x	128
FS-3-6’-7’ 610440-06	990	<250	111
PZ-27-6’-7’ 610440-07	360	<250	111
PZ-26-6’-7’ 610440-08	720	<250	119
PZ-28-6’-7’ 610440-09	13,000	<250	133
PZ-29-6’-7’ 610440-10	12,000	<250	121
Method Blank 06-2254 MB	<50	<250	126

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440
Date Extracted: 10/31/16
Date Analyzed: 10/31/16

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

Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 56-165)
Bottled UST-LNAPL 610440-01 1/200	890,000	<50,000	ip
N. Diesel-UST-LNAPL 610440-11 1/200	900,000	<50,000	122
Method Blank 06-2254 MB	<10,000	<50,000	126

Analysis For Total Metals By EPA Method 6020A

Client ID:	Bottled UST-LNAPL	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/03/16	Lab ID:	610440-01
Date Analyzed:	11/04/16	Data File:	610440-01.030
Matrix:	Soil/Product	Instrument:	ICPMS2
Units:	mg/kg (ppm)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020A

Client ID:	N. Diesel-UST-LNAPL	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/03/16	Lab ID:	610440-11
Date Analyzed:	11/04/16	Data File:	610440-11.031
Matrix:	Soil/Product	Instrument:	ICPMS2
Units:	mg/kg (ppm)	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	11.1

Analysis For Total Metals By EPA Method 6020A

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/03/16	Lab ID:	I6-730 mb
Date Analyzed:	11/04/16	Data File:	I6-730 mb.027
Matrix:	Soil/Product	Instrument:	ICPMS2
Units:	mg/kg (ppm)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020A

Client ID:	PZ-23-6’-7’	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-02
Date Analyzed:	11/02/16	Data File:	610440-02.103
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2.11

Analysis For Total Metals By EPA Method 6020A

Client ID:	PZ-24-5'-6'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-03
Date Analyzed:	11/02/16	Data File:	610440-03.104
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	5.89

Analysis For Total Metals By EPA Method 6020A

Client ID:	PZ-25-5'-6'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-04
Date Analyzed:	11/02/16	Data File:	610440-04.105
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	9.44

Analysis For Total Metals By EPA Method 6020A

Client ID:	FS-2-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-05
Date Analyzed:	11/02/16	Data File:	610440-05.106
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	3.25

Analysis For Total Metals By EPA Method 6020A

Client ID:	FS-3-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-06
Date Analyzed:	11/02/16	Data File:	610440-06.107
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	4.73

Analysis For Total Metals By EPA Method 6020A

Client ID:	PZ-27-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-07
Date Analyzed:	11/02/16	Data File:	610440-07.108
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.88

Analysis For Total Metals By EPA Method 6020A

Client ID:	PZ-26-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-08
Date Analyzed:	11/02/16	Data File:	610440-08.109
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2.47

Analysis For Total Metals By EPA Method 6020A

Client ID:	PZ-28-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-09
Date Analyzed:	11/02/16	Data File:	610440-09.110
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2.34

Analysis For Total Metals By EPA Method 6020A

Client ID:	PZ-29-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	610440-10
Date Analyzed:	11/02/16	Data File:	610440-10.111
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2.56

Analysis For Total Metals By EPA Method 6020A

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	11/01/16	Lab ID:	I6-720 mb
Date Analyzed:	11/02/16	Data File:	I6-720 mb.053
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

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

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	PZ-23-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-02
Date Analyzed:	10/31/16	Data File:	103112.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	62	142
Toluene-d8	101	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	0.97
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	PZ-24-5’-6’	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-03
Date Analyzed:	10/31/16	Data File:	103119.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	62	142
Toluene-d8	104	55	145
4-Bromofluorobenzene	95	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	1.9
m,p-Xylene	2.6
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	PZ-25-5'-6'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-04
Date Analyzed:	10/31/16	Data File:	103113.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	62	142
Toluene-d8	103	55	145
4-Bromofluorobenzene	93	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	0.24
m,p-Xylene	0.25
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	FS-2-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-05
Date Analyzed:	10/31/16	Data File:	103114.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	62	142
Toluene-d8	102	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	FS-3-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-06
Date Analyzed:	10/31/16	Data File:	103115.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	142
Toluene-d8	101	55	145
4-Bromofluorobenzene	100	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	PZ-27-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-07
Date Analyzed:	10/31/16	Data File:	103116.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	142
Toluene-d8	101	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	PZ-26-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-08
Date Analyzed:	10/31/16	Data File:	103117.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	142
Toluene-d8	101	55	145
4-Bromofluorobenzene	99	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	PZ-28-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-09
Date Analyzed:	10/31/16	Data File:	103121.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	62	142
Toluene-d8	104	55	145
4-Bromofluorobenzene	89	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	2.5
m,p-Xylene	3.0
o-Xylene	0.19

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	PZ-29-6'-7'	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-10
Date Analyzed:	10/31/16	Data File:	103118.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	62	142
Toluene-d8	104	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	0.039
Toluene	<0.05
Ethylbenzene	2.8
m,p-Xylene	3.4
o-Xylene	0.053

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	06-2238 mb
Date Analyzed:	10/31/16	Data File:	103109.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	142
Toluene-d8	102	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Bottled UST-LNAPL	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-01 1/2000
Date Analyzed:	10/31/16	Data File:	103125.D
Matrix:	Soil/Product	Instrument:	GCMS4
Units:	mg/kg (ppm)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	142
Toluene-d8	102	55	145
4-Bromofluorobenzene	99	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	<500
Methyl t-butyl ether (MTBE)	<100
1,2-Dichloroethane (EDC)	<100
Benzene	<60
Toluene	<100
1,2-Dibromoethane (EDB)	<100
Ethylbenzene	<100
m,p-Xylene	<200
o-Xylene	<100
Naphthalene	<100

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	N. Diesel-UST-LNAPL	Client:	Floyd-Snider
Date Received:	10/28/16	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	610440-11 1/2000
Date Analyzed:	10/31/16	Data File:	103124.D
Matrix:	Soil/Product	Instrument:	GCMS4
Units:	mg/kg (ppm)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	142
Toluene-d8	102	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	<500
Methyl t-butyl ether (MTBE)	<100
1,2-Dichloroethane (EDC)	<100
Benzene	<60
Toluene	<100
1,2-Dibromoethane (EDB)	<100
Ethylbenzene	<100
m,p-Xylene	<200
o-Xylene	<100
Naphthalene	<100

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	CL-Ellensburg, F&BI 610440
Date Extracted:	10/31/16	Lab ID:	06-2238 mb
Date Analyzed:	10/31/16	Data File:	103109.D
Matrix:	Soil/Product	Instrument:	GCMS4
Units:	mg/kg (ppm)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	142
Toluene-d8	102	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	<0.25
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	<0.03
Toluene	<0.05
1,2-Dibromoethane (EDB)	<0.05
Ethylbenzene	<0.05
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	<0.05

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TPH AS GASOLINE USING METHOD NWTPH-Gx

Laboratory Code: 610440-07 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	110	88	22 hr

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	90	61-153

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440

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

Laboratory Code: 610440-08 (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	550	99	87	63-146	13

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	89	79-144

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/PRODUCT SAMPLES FOR TOTAL METALS USING EPA METHOD 6020A

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Lead	mg/kg (ppm)	50	107	110	80-120	3

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440

QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020A

Laboratory Code: 610446-09 (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	1.80	80	77	75-125	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	mg/kg (ppm)	50	100	80-120

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440

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

Laboratory Code: 610440-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Benzene	mg/kg (ppm)	2.5	<0.03	61	29-129
Toluene	mg/kg (ppm)	2.5	<0.05	56	35-130
Ethylbenzene	mg/kg (ppm)	2.5	0.82	57 b	32-137
m,p-Xylene	mg/kg (ppm)	5	<0.1	52	34-136
o-Xylene	mg/kg (ppm)	2.5	<0.05	53	33-134

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)	2.5	93	87	68-114	7
Toluene	mg/kg (ppm)	2.5	96	91	66-126	5
Ethylbenzene	mg/kg (ppm)	2.5	100	94	64-123	6
m,p-Xylene	mg/kg (ppm)	5	102	96	78-122	6
o-Xylene	mg/kg (ppm)	2.5	104	97	77-124	7

Date of Report: 11/07/16
Date Received: 10/28/16
Project: CL-Ellensburg, F&BI 610440

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

Laboratory Code: 610440-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Hexane	mg/kg (ppm)	2.5	<0.25	25	10-137
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	69	21-145
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	64	12-160
Benzene	mg/kg (ppm)	2.5	<0.03	61	29-129
Toluene	mg/kg (ppm)	2.5	<0.05	56	35-130
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	66	28-142
Ethylbenzene	mg/kg (ppm)	2.5	0.82	57 b	32-137
m,p-Xylene	mg/kg (ppm)	5	<0.1	52	34-136
o-Xylene	mg/kg (ppm)	2.5	<0.05	53	33-134
Naphthalene	mg/kg (ppm)	2.5	0.93	62 b	14-157

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Hexane	mg/kg (ppm)	2.5	83	74	43-142	11
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	91	85	60-123	7
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	90	86	56-135	5
Benzene	mg/kg (ppm)	2.5	93	87	68-114	7
Toluene	mg/kg (ppm)	2.5	96	91	66-126	5
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	105	99	74-132	6
Ethylbenzene	mg/kg (ppm)	2.5	100	94	64-123	6
m,p-Xylene	mg/kg (ppm)	5	102	96	78-122	6
o-Xylene	mg/kg (ppm)	2.5	104	97	77-124	7
Naphthalene	mg/kg (ppm)	2.5	101	97	63-140	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.

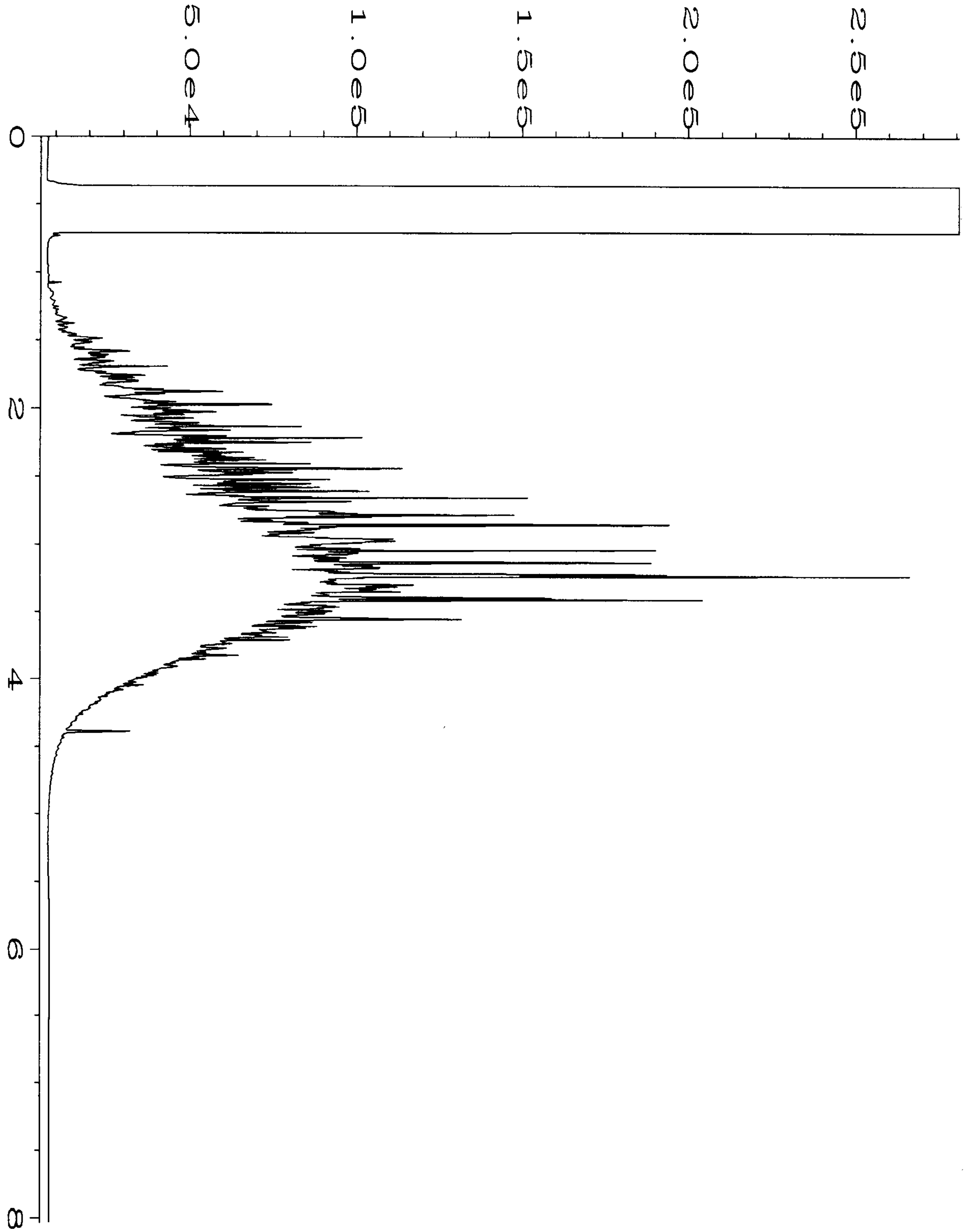
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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.

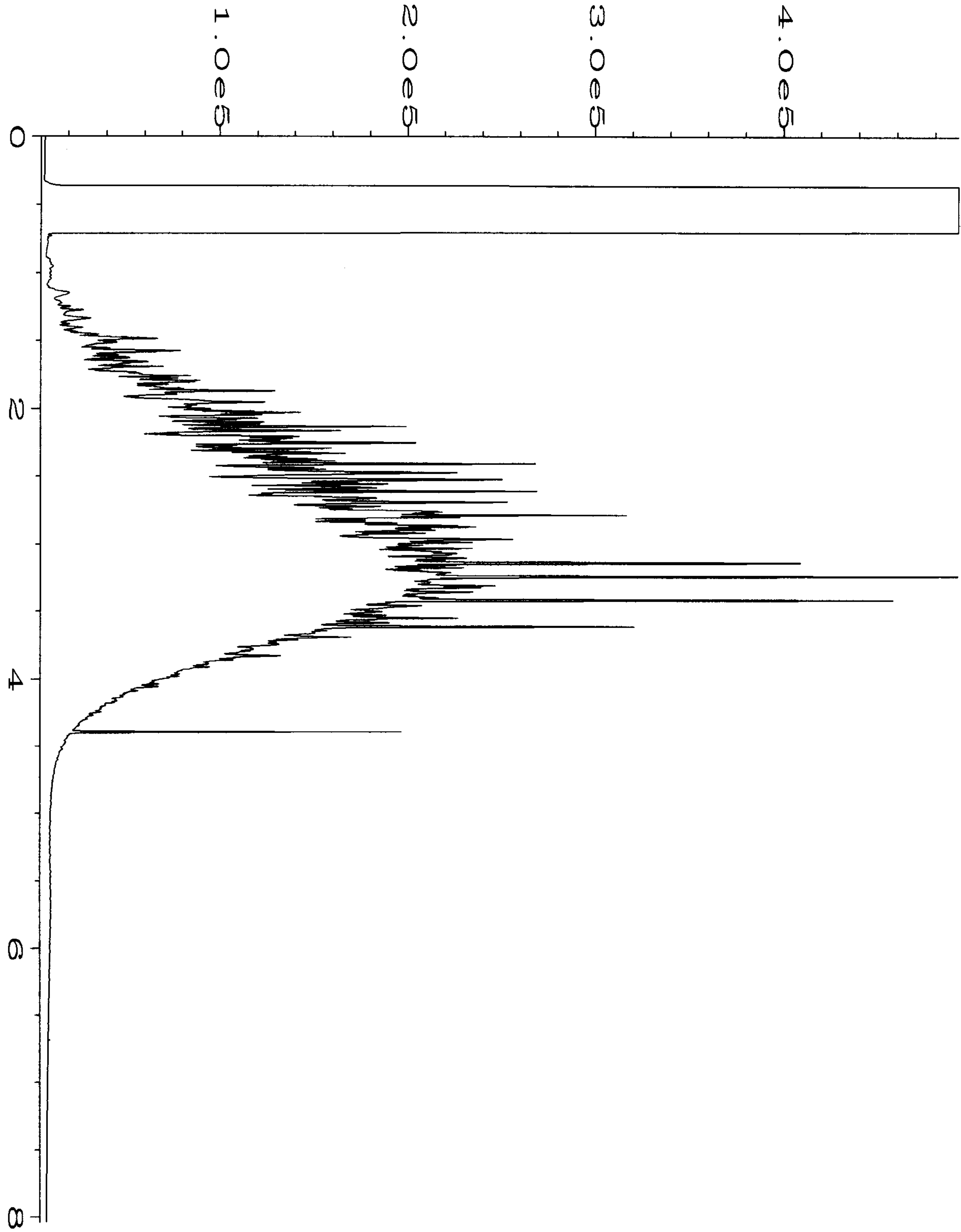
vo - The value reported fell outside the control limits established for this analyte.

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



Data File Name : C:\HPCHEM\1\DATA\10-31-16\039F0801.D
Operator : mwdl
Instrument : GC1
Sample Name : 610440-01 1/10
Run Time Bar Code:
Acquired on : 31 Oct 16 04:20 PM
Report Created on: 01 Nov 16 09:35 AM

Page Number : 1
Vial Number : 39
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DX.MTH



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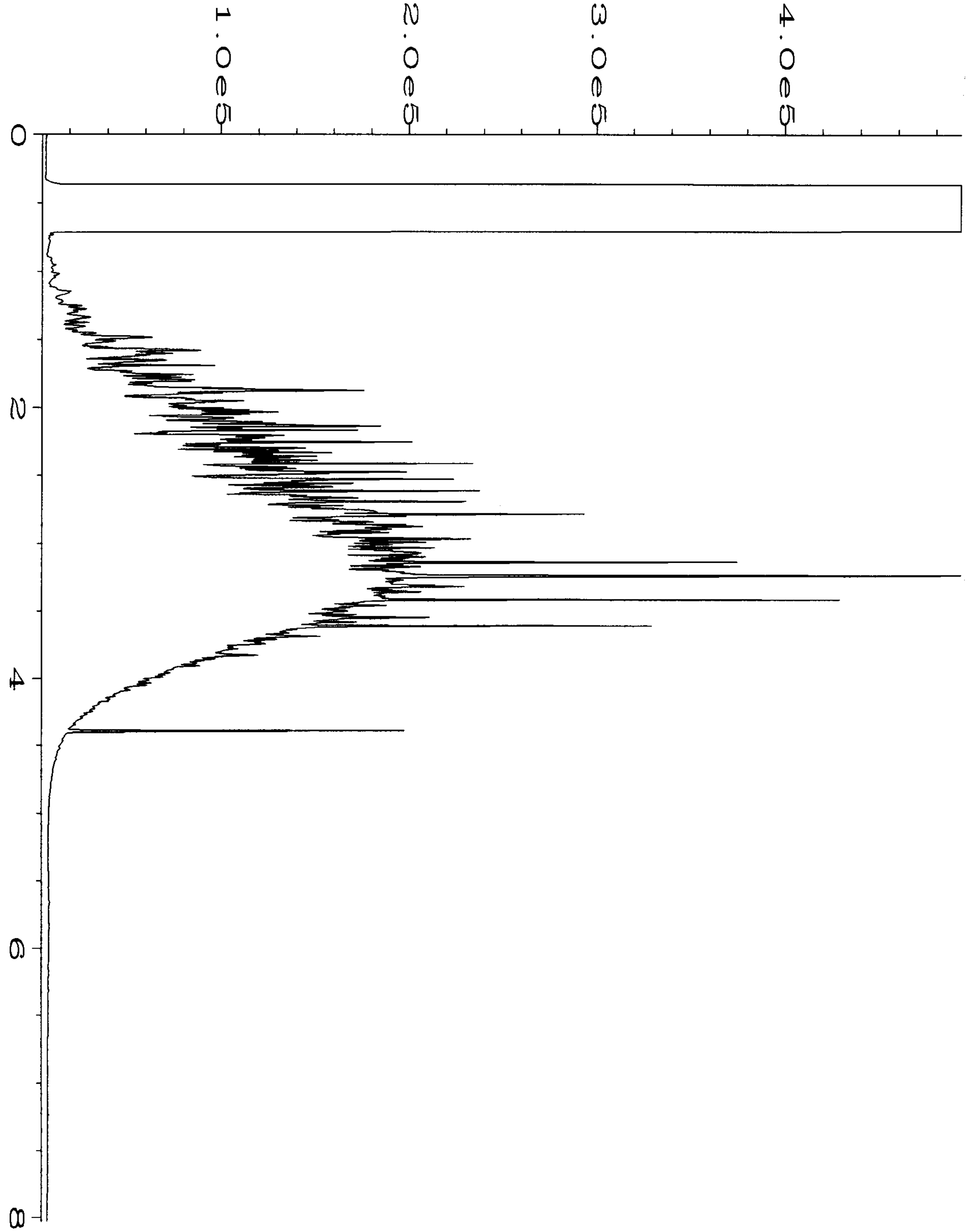
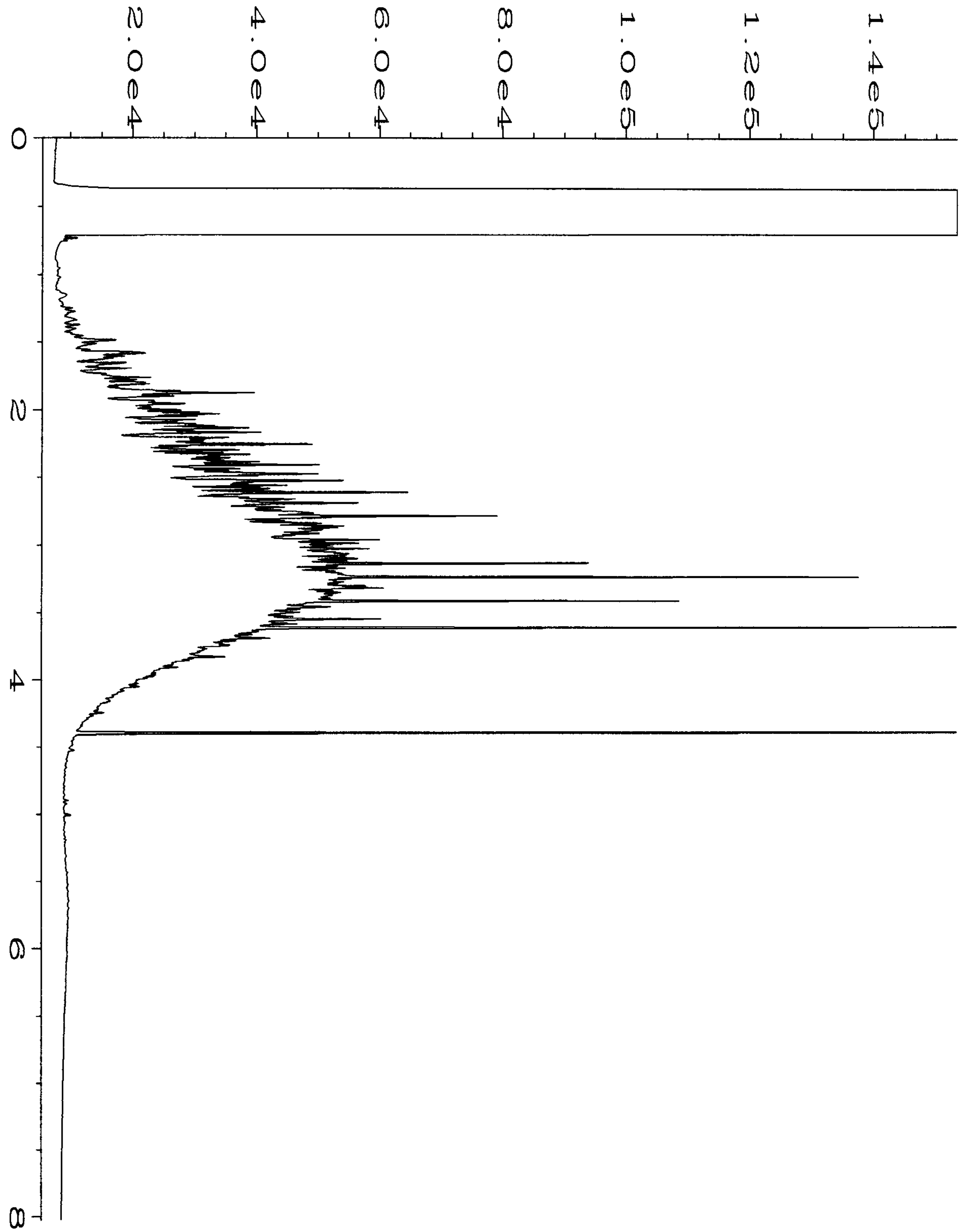
Operator : mwdl
Page Number : 1
Instrument : GC1
Vial Number : 21
Sample Name : 610440-02
Injection Number : 1
Run Time Bar Code:
Sequence Line : 6
Acquired on : 31 Oct 16 11:55 AM
Instrument Method: DX.MTH
Report Created on: 01 Nov 16 09:33 AM
Analysis Method : DX.MTH



Data File Name : C:\HPCHEM\1\DATA\10-31-16\022F0601.D

Operator	: mwdl	Page Number	: 1
Instrument	: GC1	Vial Number	: 22
Sample Name	: 610440-03	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 6
Acquired on	: 31 Oct 16 12:06 PM	Instrument Method:	DX.MTH
Report Created on:	01 Nov 16 09:34 AM	Analysis Method	: DX.MTH



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Operator          : mwdl                        Page Number       : 1
Instrument        : GC1                         Vial Number       : 23
Sample Name       : 610440-04                   Injection Number : 1
Run Time Bar Code:                              Sequence Line     : 6
Acquired on       : 31 Oct 16   12:18 PM        Instrument Method: DX.MTH
Report Created on: 01 Nov 16   09:34 AM         Analysis Method   : DX.MTH
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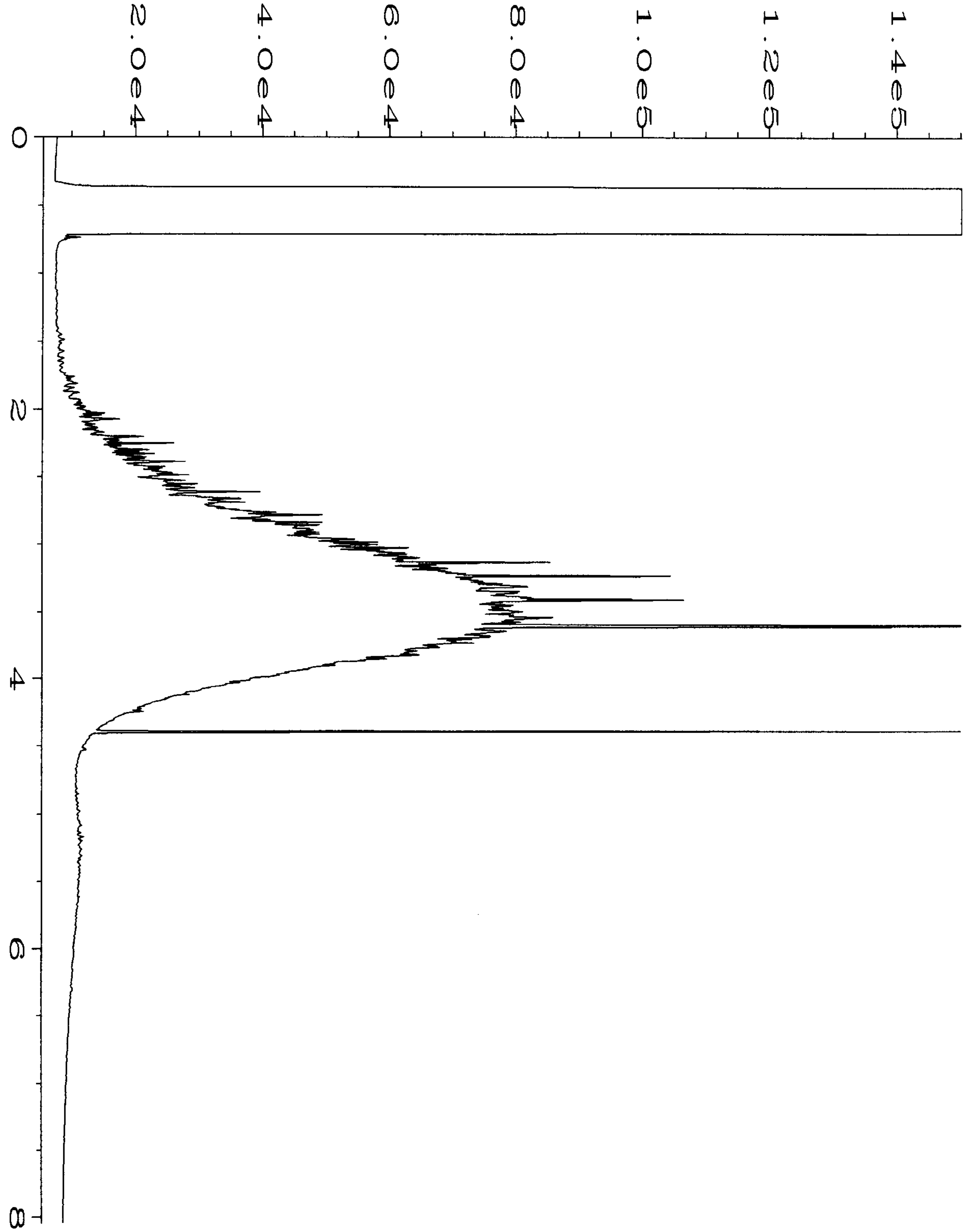
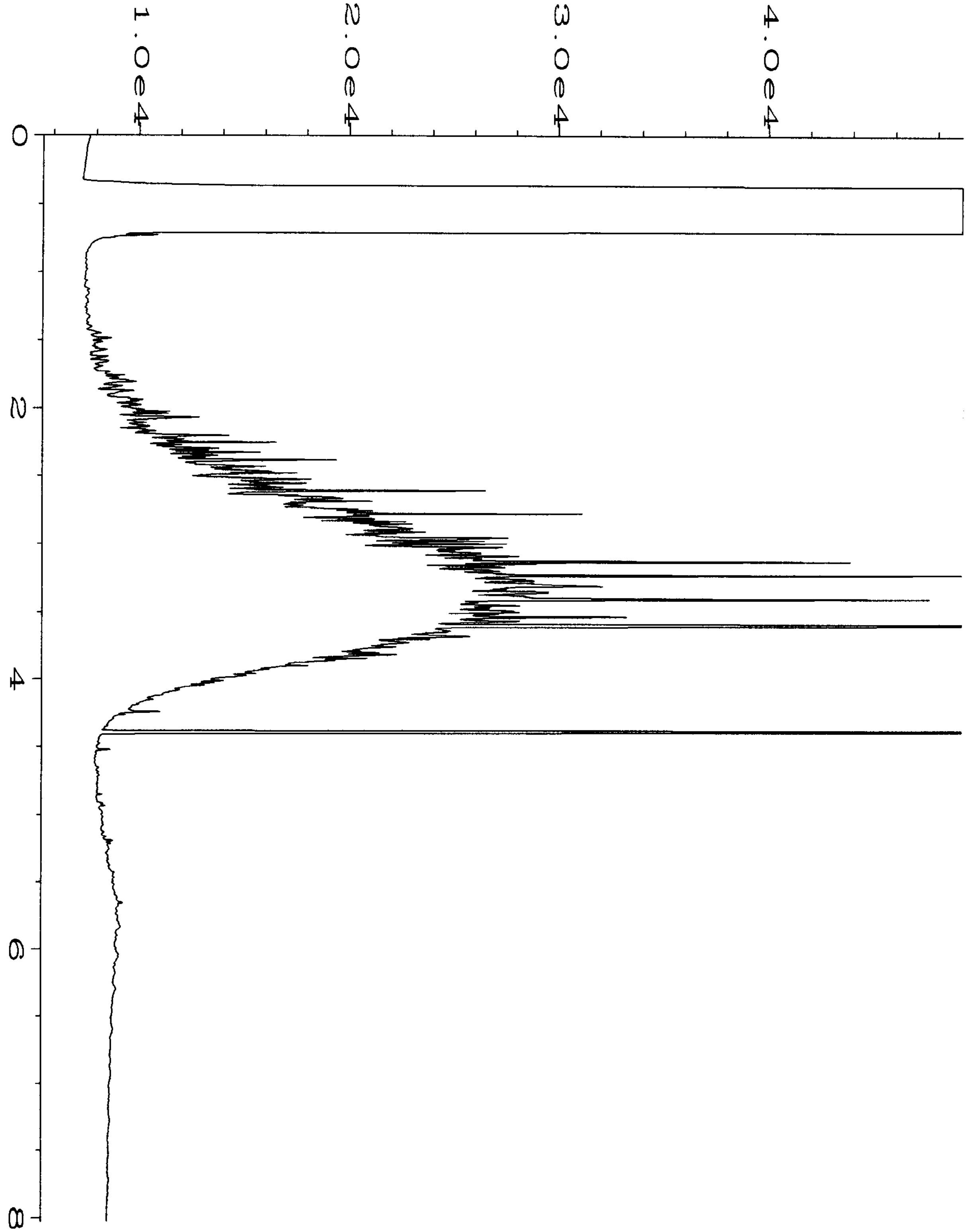


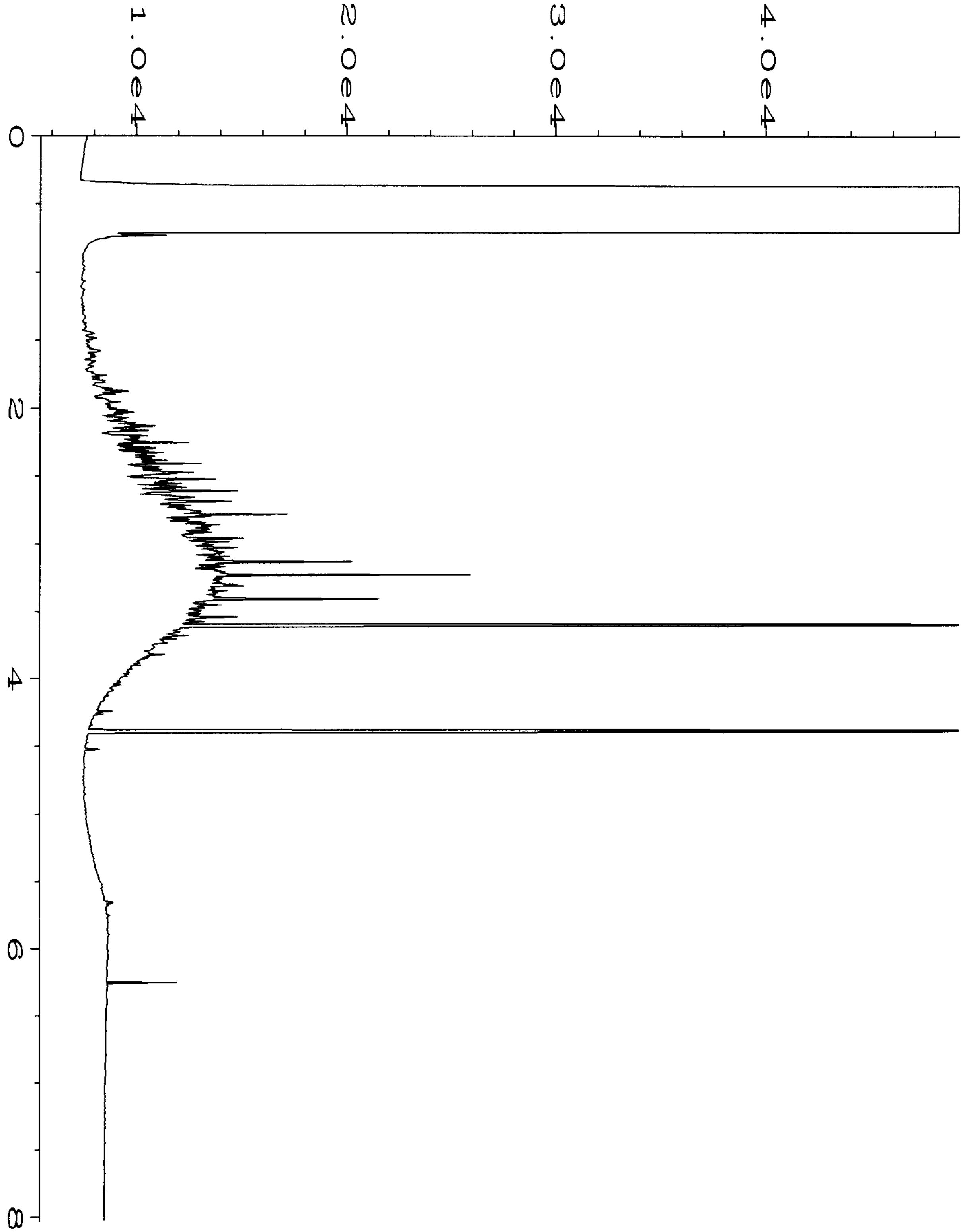
Data File Name : C:\HPCHEM\1\DATA\10-31-16\024F0601.D
Operator : mwdl
Instrument : GC1
Sample Name : 610440-05
Run Time Bar Code:
Acquired on : 31 Oct 16 12:30 PM
Report Created on: 01 Nov 16 09:34 AM

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DX.MTH



Data File Name : C:\HPCHEM\1\DATA\10-31-16\025F0601.D
Operator : mwdl
Instrument : GC1
Sample Name : 610440-06
Run Time Bar Code:
Acquired on : 31 Oct 16 12:42 PM
Report Created on: 01 Nov 16 09:34 AM

Page Number : 1
Vial Number : 25
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DX.MTH



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Data File Name    : C:\HPCHEM\1\DATA\10-31-16\026F0601.D
Operator          : mwdl                               Page Number       : 1
Instrument        : GC1                                Vial Number       : 26
Sample Name       : 610440-07                          Injection Number  : 1
Run Time Bar Code:                                     Sequence Line     : 6
Acquired on       : 31 Oct 16   12:54 PM               Instrument Method: DX.MTH
Report Created on: 01 Nov 16   09:34 AM                Analysis Method   : DX.MTH
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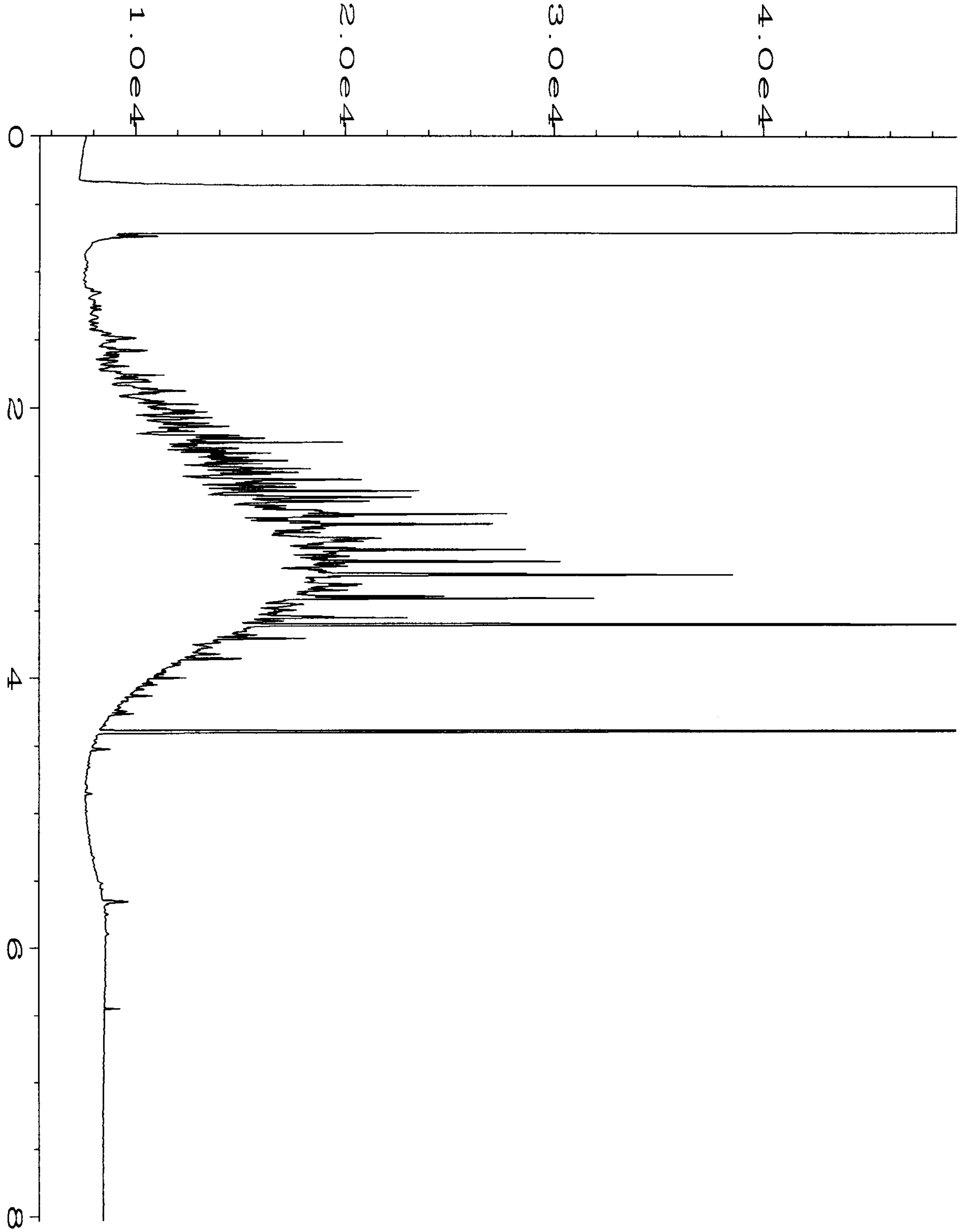

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Operator          : mwdl                            Page Number       : 1
Instrument        : GC1                             Vial Number       : 27
Sample Name       : 610440-08                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 6
Acquired on       : 31 Oct 16   01:06 PM            Instrument Method: DX.MTH
Report Created on: 01 Nov 16   09:34 AM             Analysis Method   : DX.MTH
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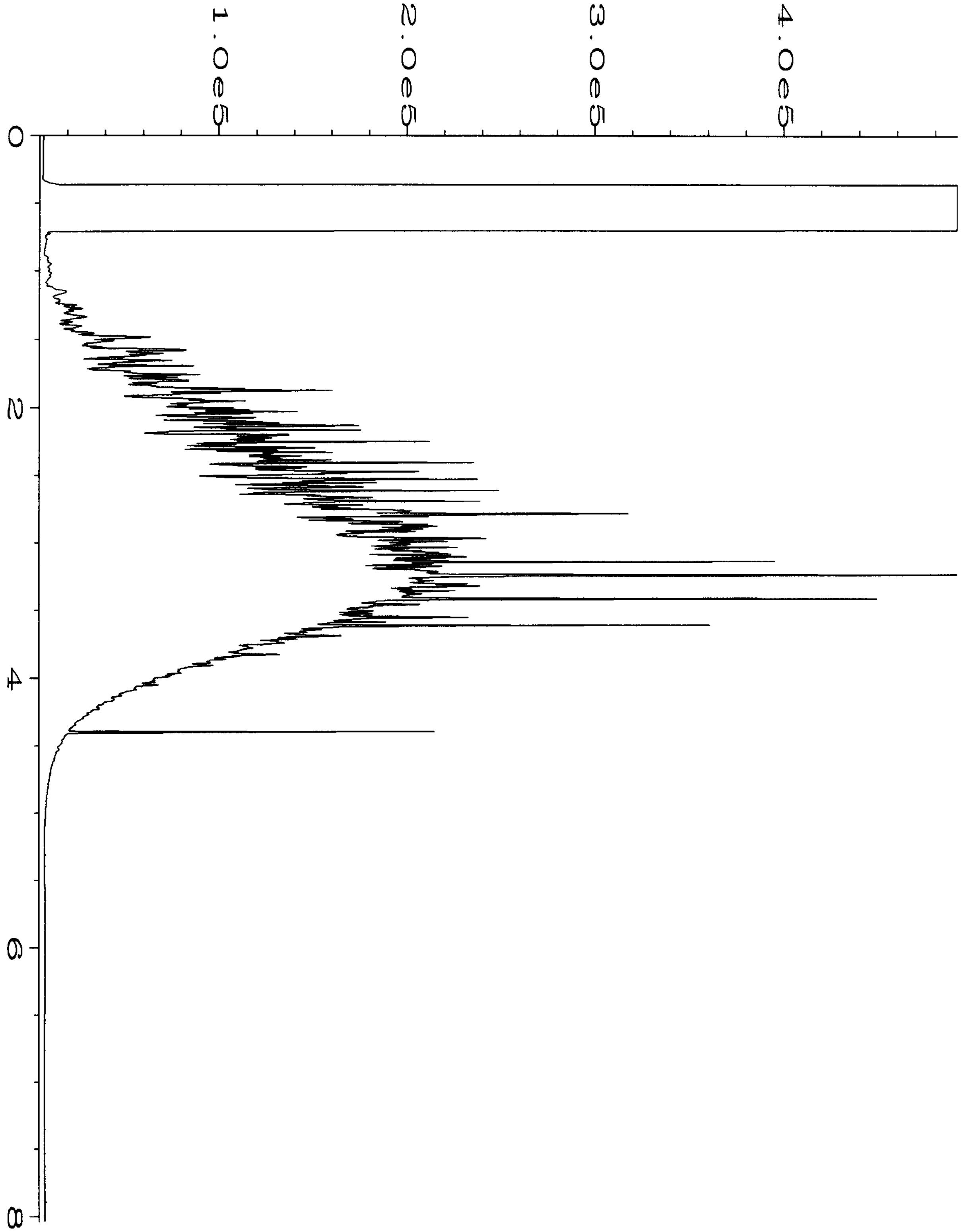

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Operator          : mwdl                          Page Number       : 1
Instrument        : GC1                           Vial Number       : 28
Sample Name       : 610440-09                     Injection Number  : 1
Run Time Bar Code:                                Sequence Line     : 6
Acquired on       : 31 Oct 16   01:18 PM          Instrument Method: DX.MTH
Report Created on: 01 Nov 16   09:34 AM           Analysis Method   : DX.MTH
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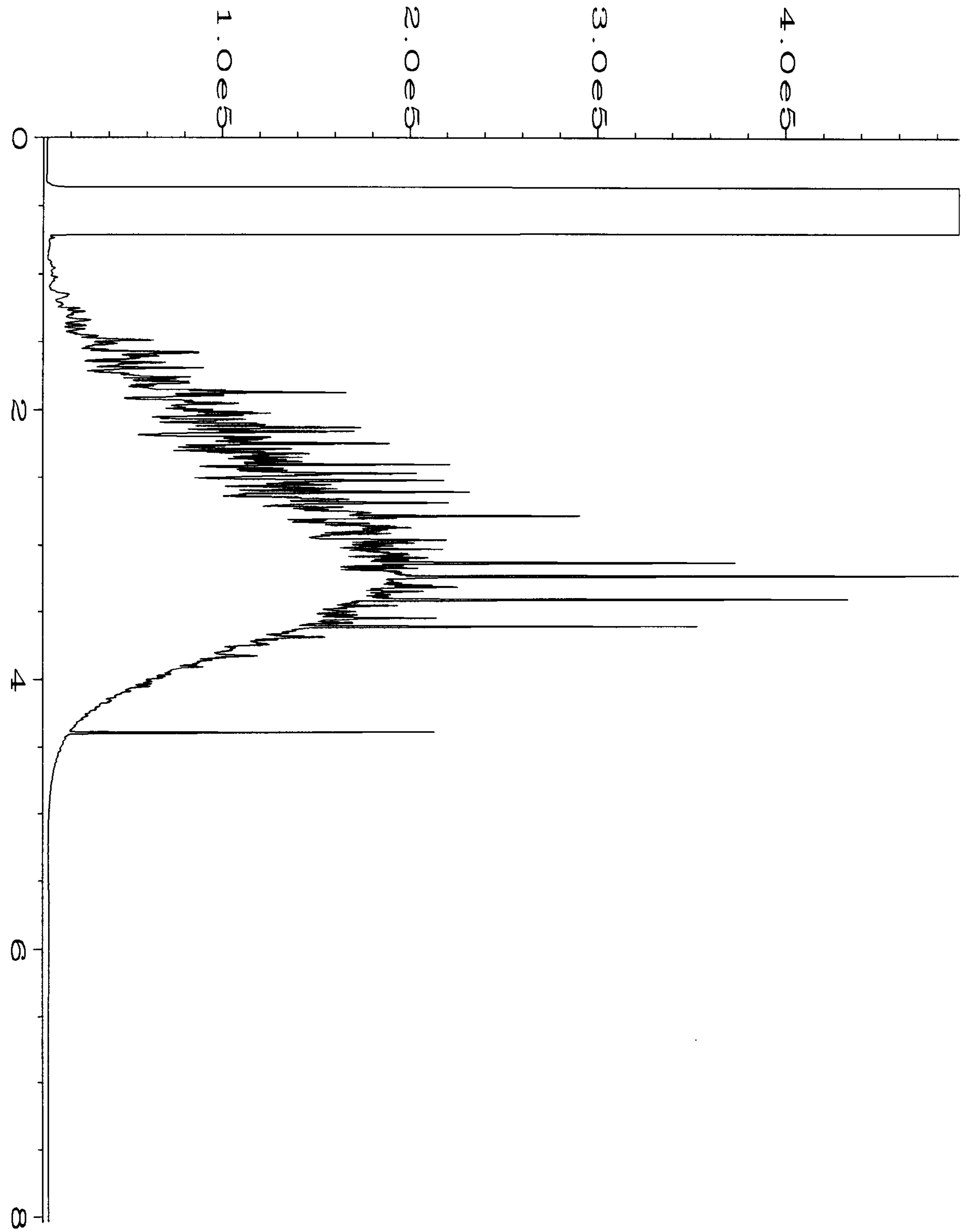

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Operator          : mwdl                             Page Number      : 1
Instrument        : GC1                              Vial Number      : 29
Sample Name       : 610440-10                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 6
Acquired on       : 31 Oct 16  01:30 PM              Instrument Method: DX.MTH
Report Created on: 01 Nov 16  09:34 AM               Analysis Method  : DX.MTH
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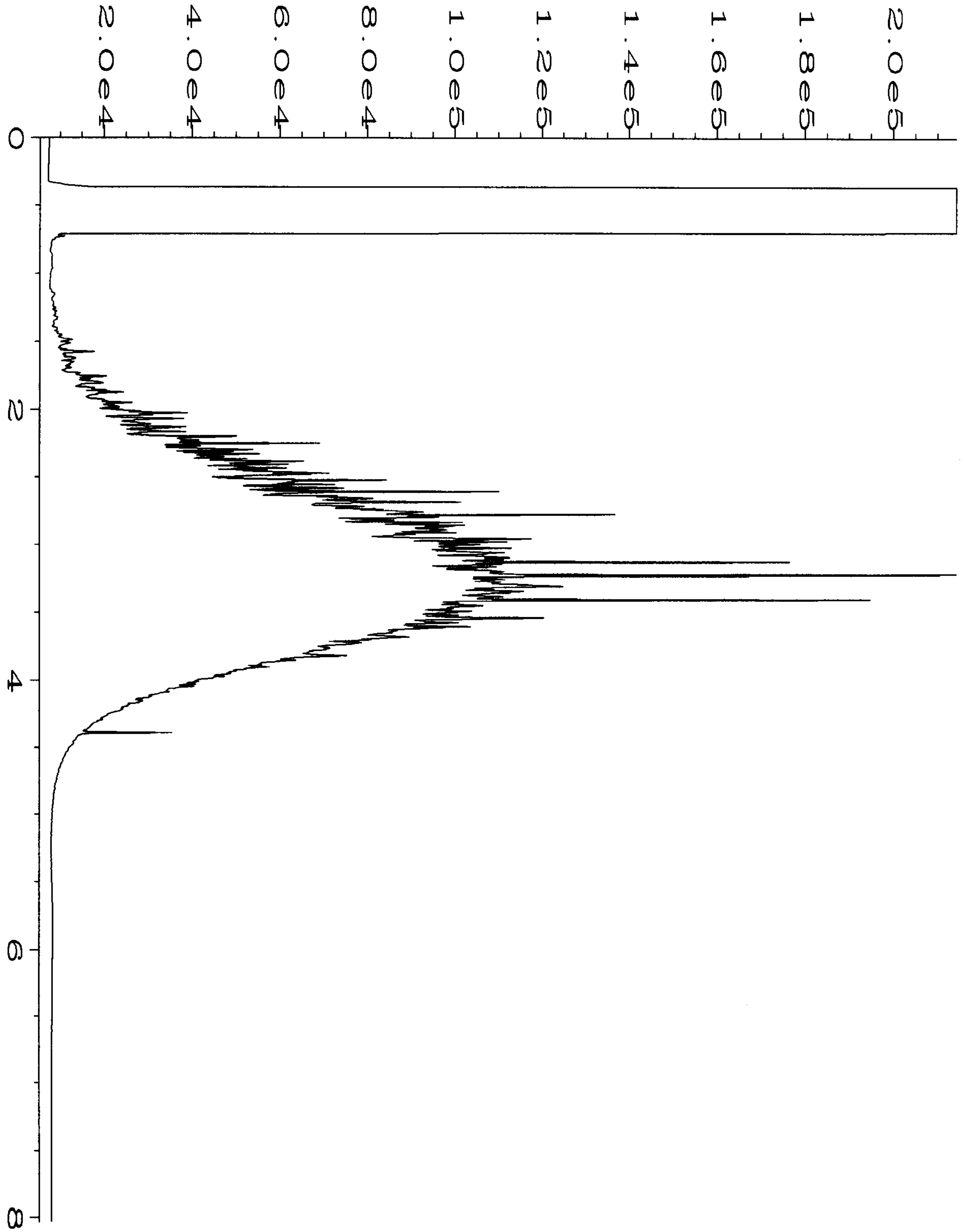

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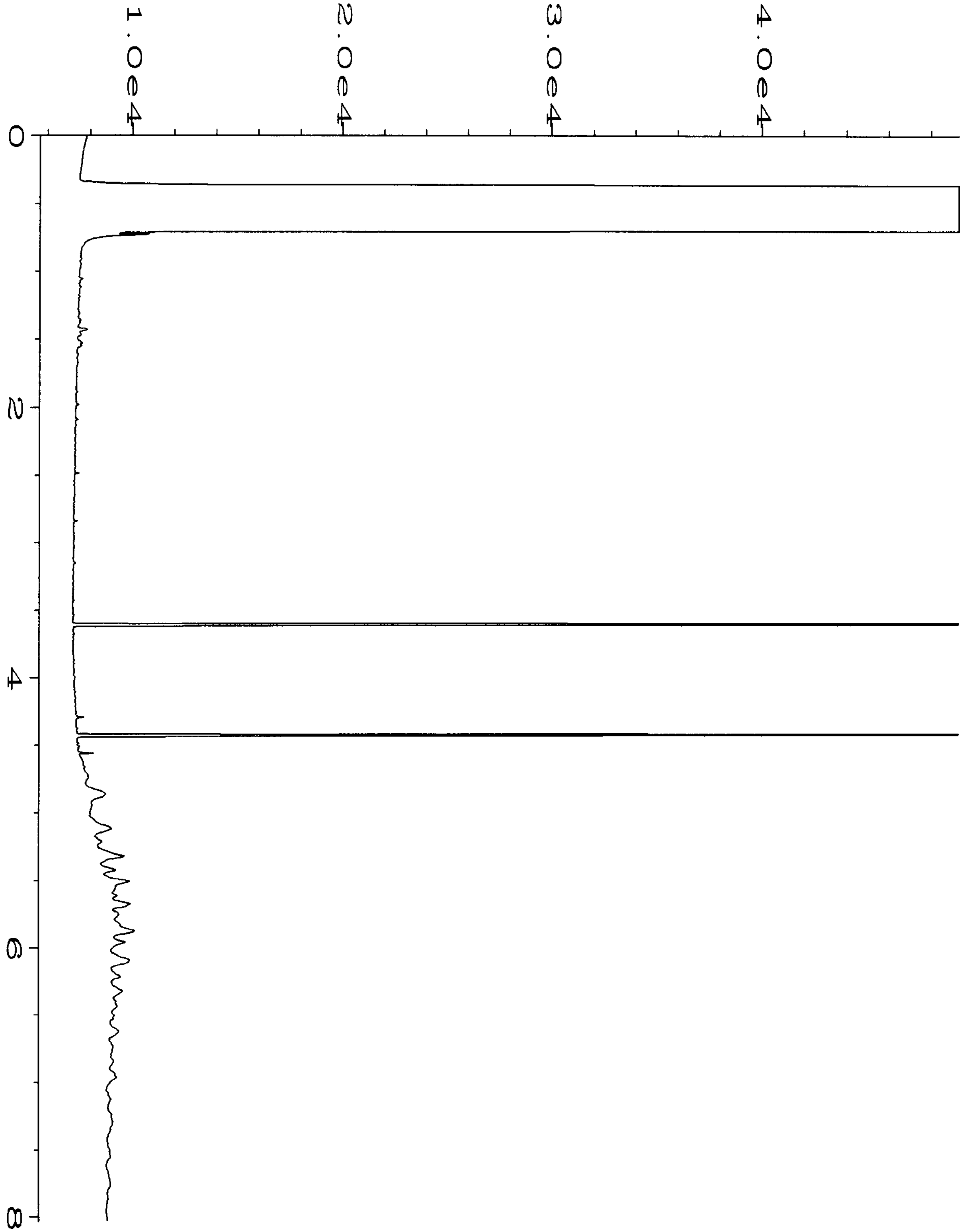
Operator	:	mwdl	Page Number	:	1
Instrument	:	GC1	Vial Number	:	40
Sample Name	:	610440-11 1/10	Injection Number	:	1
Run Time Bar Code	:		Sequence Line	:	8
Acquired on	:	31 Oct 16 04:32 PM	Instrument Method	:	DX.MTH
Report Created on	:	01 Nov 16 09:35 AM	Analysis Method	:	DX.MTH



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Operator          : mwdl                          Page Number       : 1
Instrument        : GC1                           Vial Number       : 17
Sample Name       : 06-2254 mb                    Injection Number : 1
Run Time Bar Code:                                Sequence Line     : 6
Acquired on       : 31 Oct 16   11:09 AM          Instrument Method: DX.MTH
Report Created on: 01 Nov 16   09:35 AM           Analysis Method   : DX.MTH
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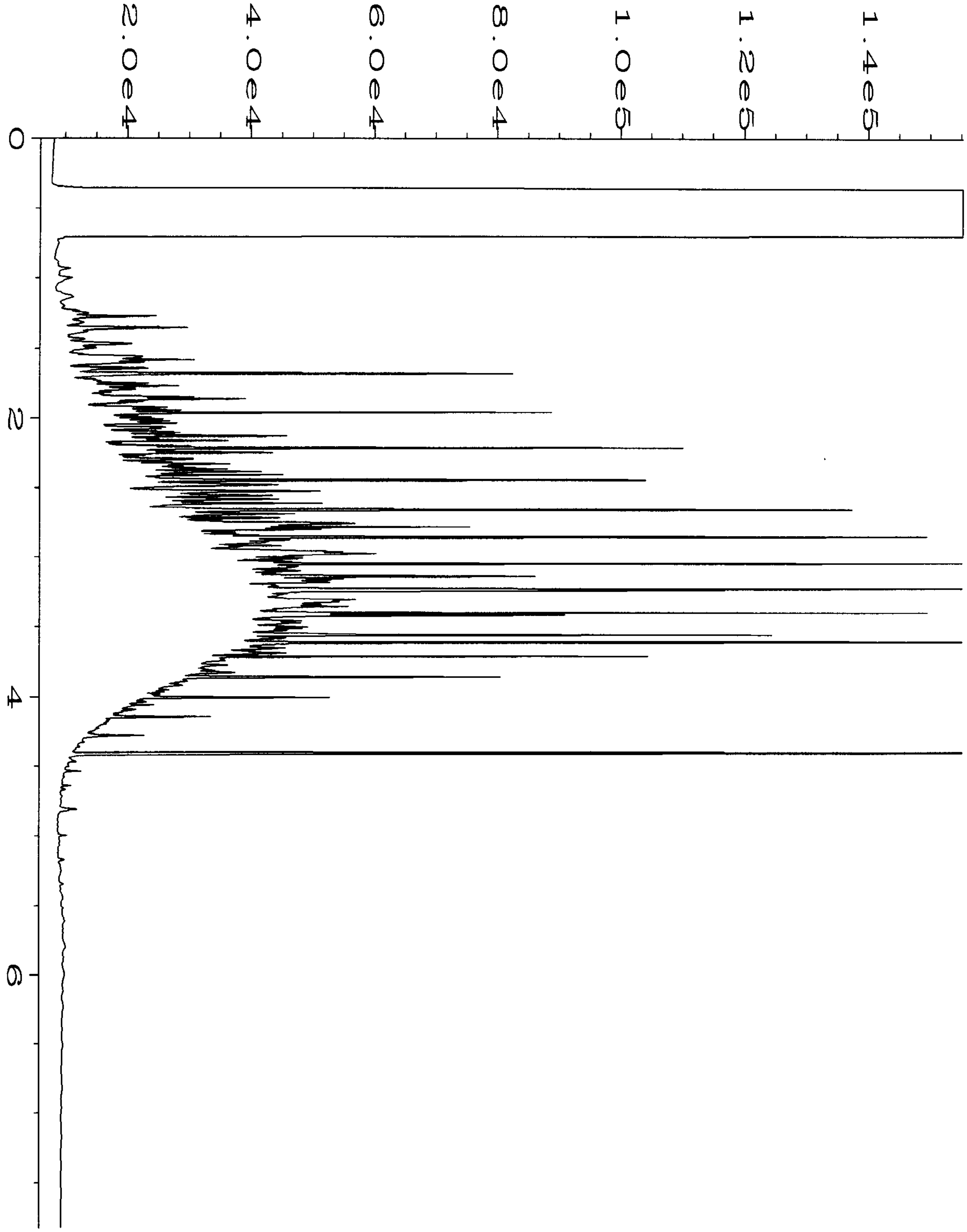

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Operator          : mwdl                             Page Number      : 1
Instrument        : GC1                              Vial Number      : 3
Sample Name       : 500 Dx 48-20B                    Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 2
Acquired on       : 31 Oct 16  06:35 AM              Instrument Method: DX.MTH
Report Created on: 01 Nov 16  09:35 AM               Analysis Method  : DX.MTH
```

610440

SAMPLE CHAIN OF CUSTODY

ME 10/28/16 V1/AE2/VS2

Page # 1 of 2

Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union St. Ste 600
City, State, ZIP Seattle, WA 98101
Phone 206-292-2078 Email

SAMPLERS (*signature*)

PROJECT NAME CL-Ellensburg

PO #

REMARKS

INVOICE TO

TURNAROUND TIME
☒ Standard Turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Dispose after 30 days
☐ Archive Samples
☐ Other

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by ~~8021B~~ 8260	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Total Lead by 6020	EDB by 8011	Product by 8260 Short List		Notes ~~X~~ canceled
Baffled UST-LNAPL	01	10/25	1605	Product	1		X	~~X~~					X	X	X		per GC
PZ-23-6'-7'	02 A-E	10/27	0946	Soil	5		X	X	X				X				11/4/16
PZ-24-5'-6'	03	10/27	1045		5		X	X	X				X				EY
PZ25-5'-6'	04	10/27	1120		5		X	X	X				X				
FS-2-6'-7'	05	10/27	1322		5		X	X	X				X				
FS-3-6'-7'	06	10/27	1340		5		X	X	X				X				
PZ-27-6'-7'	07		1605		5		X	X	X				X				
PZ-26-6'-7'	08		1615		5		X	X	X				X				
PZ-28-6'-7'	09		1625		5		X	X	X				X				
PZ-29-6'-7	10 ↓	↓	1635	↓	5		X	X	X				X				

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabe Cisneros	Floyd|Snider	10/28/16	1340
Received by:	Nhan Phan	FeBT	10/28/16	1340
Relinquished by:				
Received by:		Samples received at 3 °C		

610440

SAMPLE CHAIN OF CUSTODY

ME 10/28/16 V1/ AI2/ VS2

Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union Street, Ste. 600
City, State, ZIP Seattle, WA
Phone 206-292-2078 Email gabe.cisneros@floydsnider.com

SAMPLERS (signature) G. Cisneros	
PROJECT NAME CL-Ellensburg	PO #
REMARKS	INVOICE TO

Page # 2 of 2

TURNAROUND TIME
☒ Standard Turnaround
☐ RUSH
Rush charges authorized by:

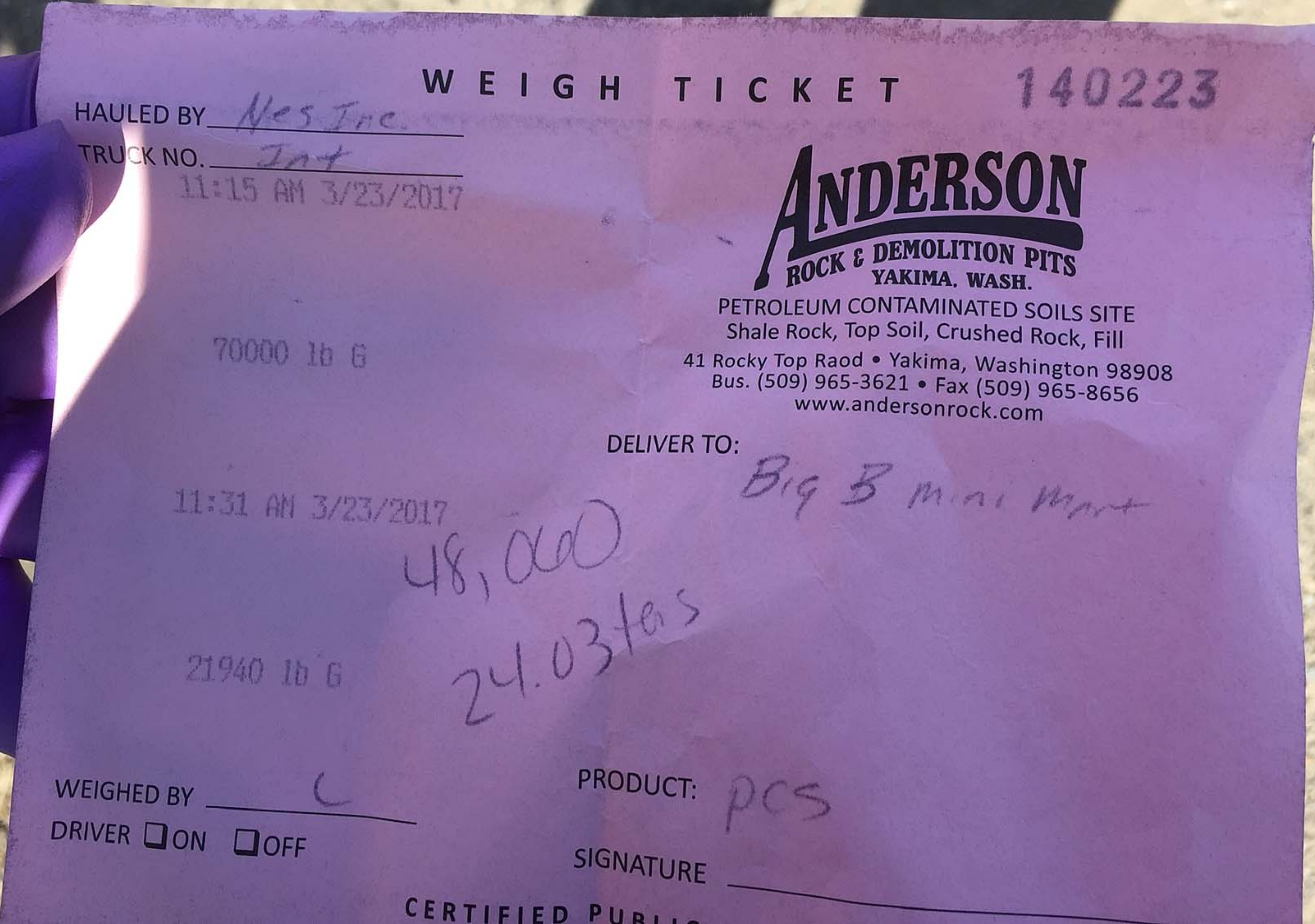
SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Archive Samples
☐ Other

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	no TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Total Lead by 6020	EDB by 8011	Product 8260 shortList		Notes
N. Diesel-UST-LNAPL	~~#A~~ (ND) -11	10/27/16	1730	Product	1	~~X~~	X	X					X	X	X		
Trip Blank	12 A-B	—	—	water	2											*	added at lab (NP) 10/28/16

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabe Cisneros	Floyd|Snider	10/28/16	1340
Received by:	Nhan Phan	FeBI	10/28/16	1340
Relinquished by:				
Received by:		Samples received at 3 °C		

Attachment 4
Trucking Tickets



WEIGH TICKET 140223

HAULED BY Nes Inc.

TRUCK NO. Int

11:15 AM 3/23/2017

ANDERSON
ROCK & DEMOLITION PITS
YAKIMA, WASH.

PETROLEUM CONTAMINATED SOILS SITE
Shale Rock, Top Soil, Crushed Rock, Fill
41 Rocky Top Raod • Yakima, Washington 98908
Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

70000 lb G

DELIVER TO: Big B Mini Mart

11:31 AM 3/23/2017

48,000

21940 lb G

24.03 tns

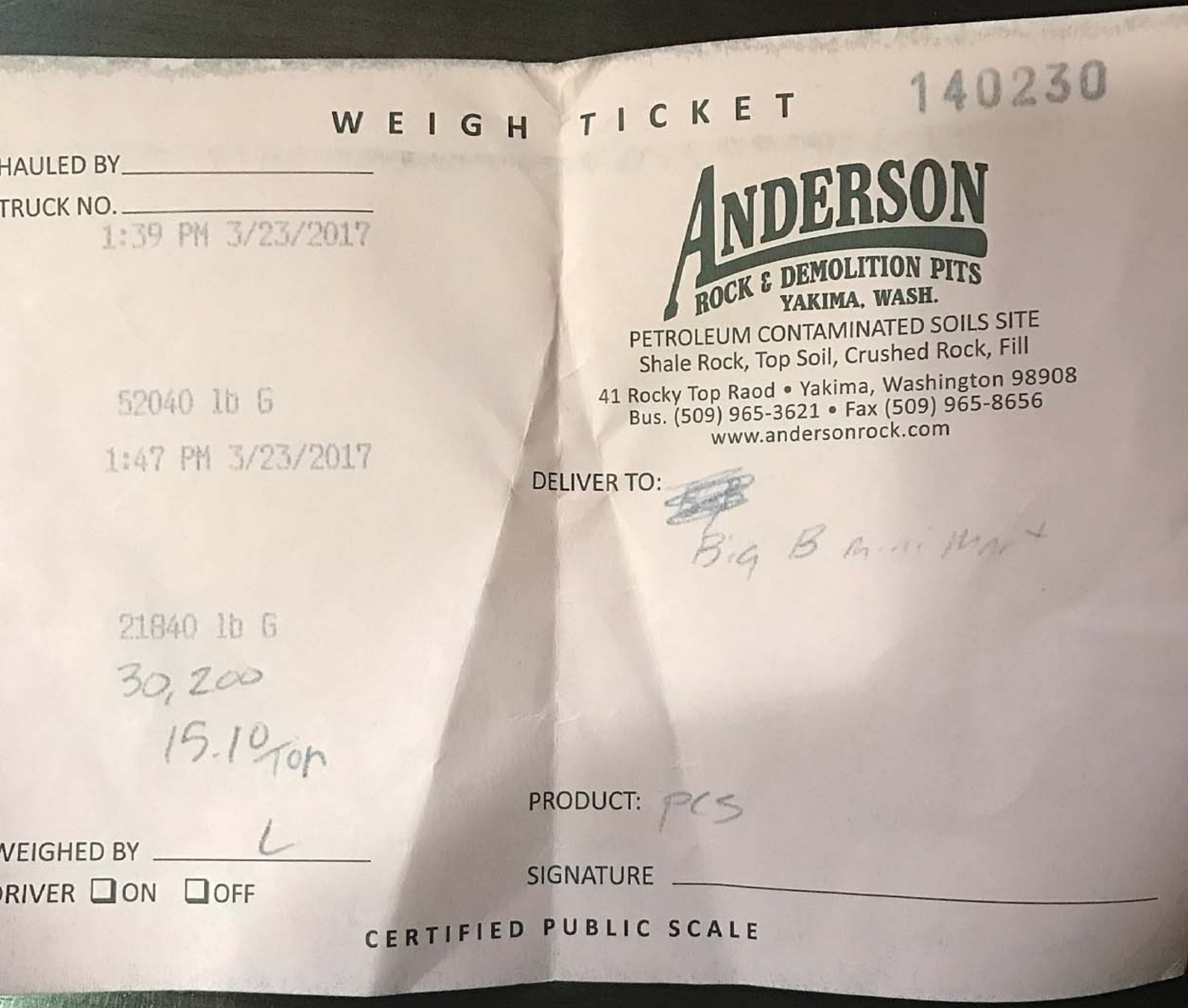
WEIGHED BY C

DRIVER ☐ ON ☐ OFF

PRODUCT: PCS

SIGNATURE

CERTIFIED PUBLI



WEIGH TICKET

140230

HAULED BY____________________

TRUCK NO.____________________

1:39 PM 3/23/2017

52040 lb G

1:47 PM 3/23/2017

21840 lb G

30,200

15.10 Ton

VEIGHED BY L

RIVER ☐ON ☐OFF

ANDERSON

ROCK & DEMOLITION PITS

YAKIMA, WASH.

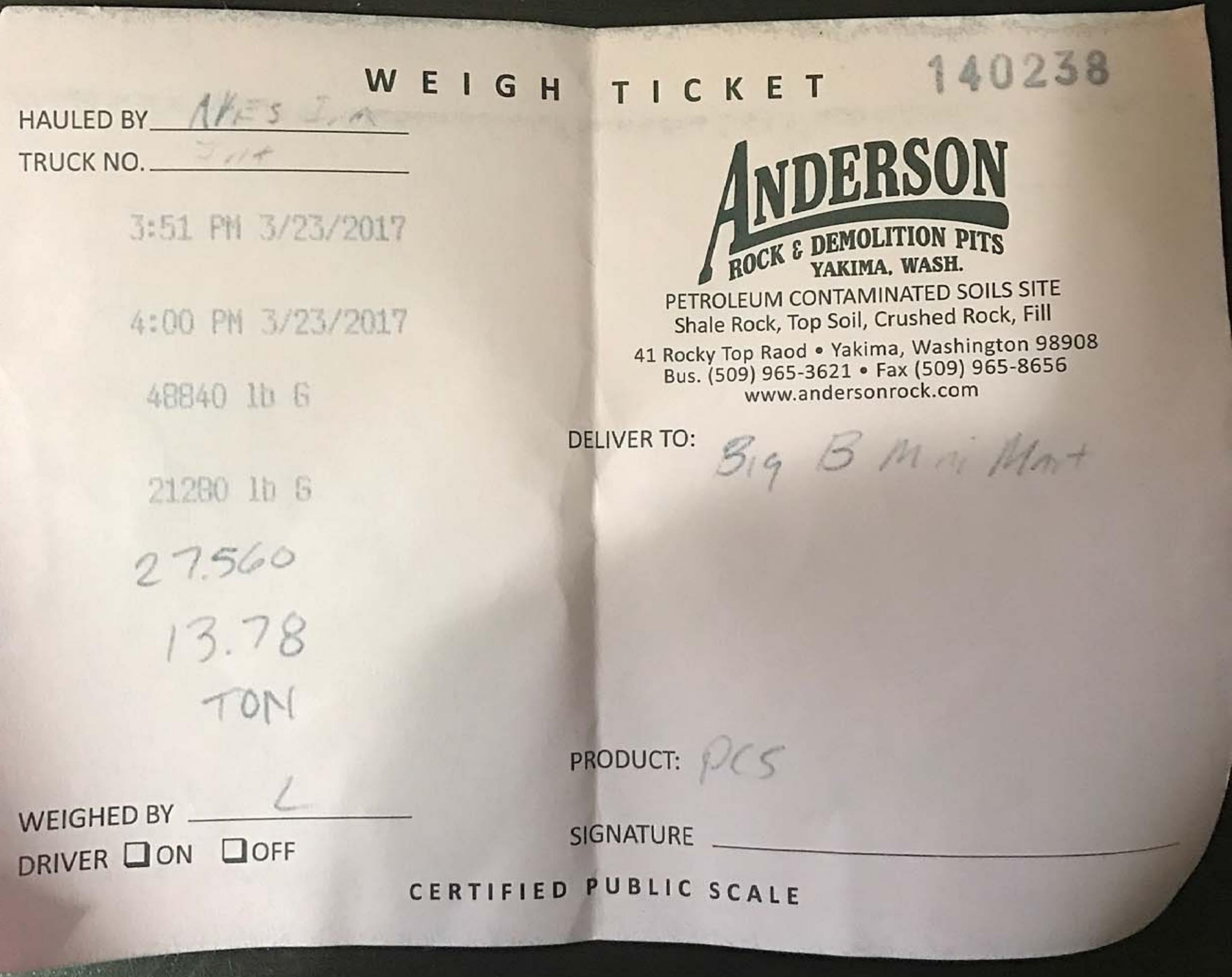
PETROLEUM CONTAMINATED SOILS SITE
Shale Rock, Top Soil, Crushed Rock, Fill
41 Rocky Top Raod • Yakima, Washington 98908
Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

DELIVER TO: Big B Mini Mart

PRODUCT: PCS

SIGNATURE ____________________

CERTIFIED PUBLIC SCALE



WEIGH TICKET

140238

HAULED BY Akes Inc

TRUCK NO. [illegible]

3:51 PM 3/23/2017

4:00 PM 3/23/2017

48840 lb G

21280 lb G

27.560

13.78

TON

WEIGHED BY L

DRIVER ☐ ON ☐ OFF

ANDERSON
ROCK & DEMOLITION PITS
YAKIMA, WASH.

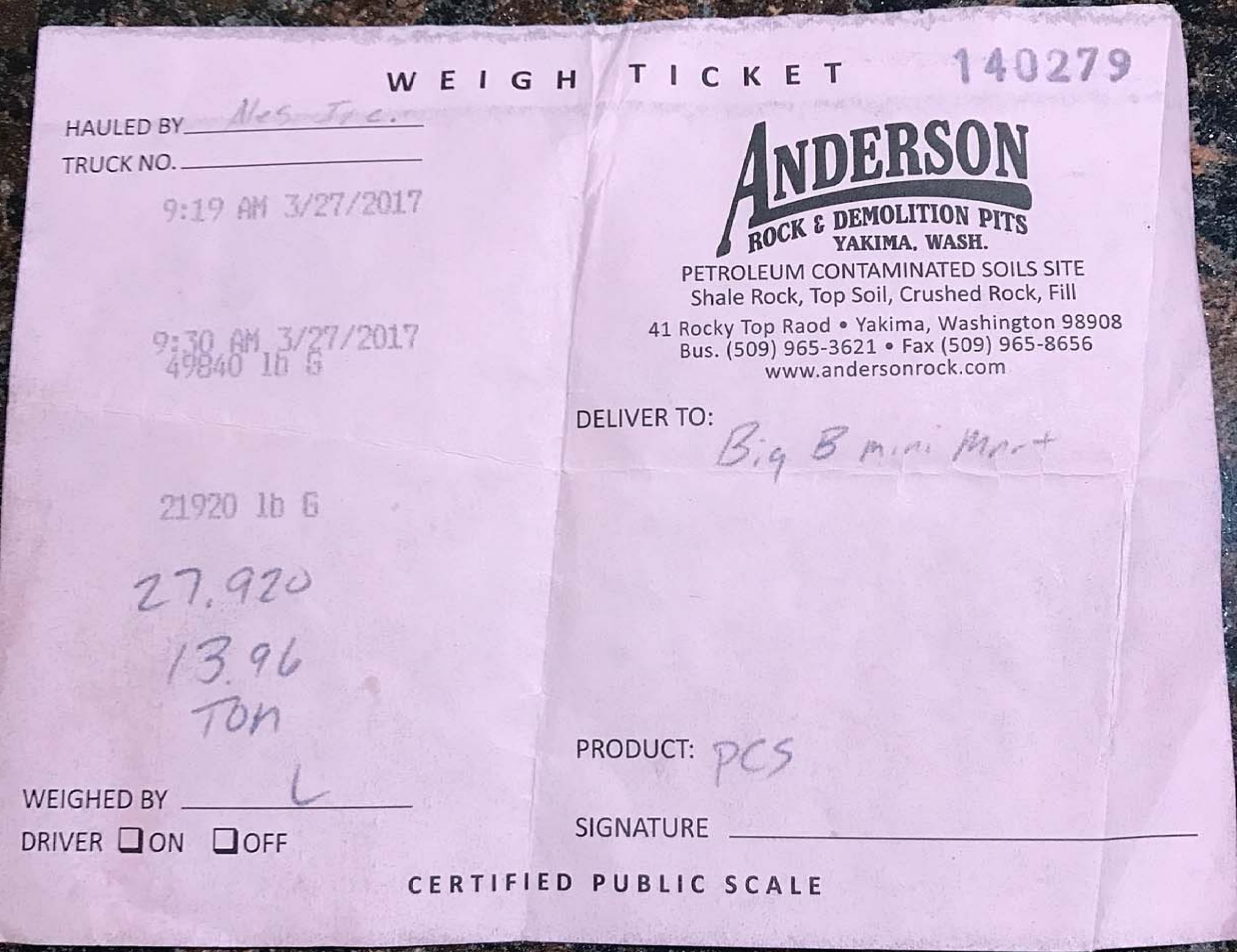
PETROLEUM CONTAMINATED SOILS SITE
Shale Rock, Top Soil, Crushed Rock, Fill
41 Rocky Top Raod • Yakima, Washington 98908
Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

DELIVER TO: Big B Mini Mart

PRODUCT: PCS

SIGNATURE

CERTIFIED PUBLIC SCALE



W E I G H T I C K E T 140279

HAULED BY Ales Inc.

TRUCK NO. ______

9:19 AM 3/27/2017

9:30 AM 3/27/2017
49840 lb G

21920 lb G

27,920

13.96

Ton

WEIGHED BY L

DRIVER ☐ ON ☐ OFF

ANDERSON
ROCK & DEMOLITION PITS
YAKIMA, WASH.

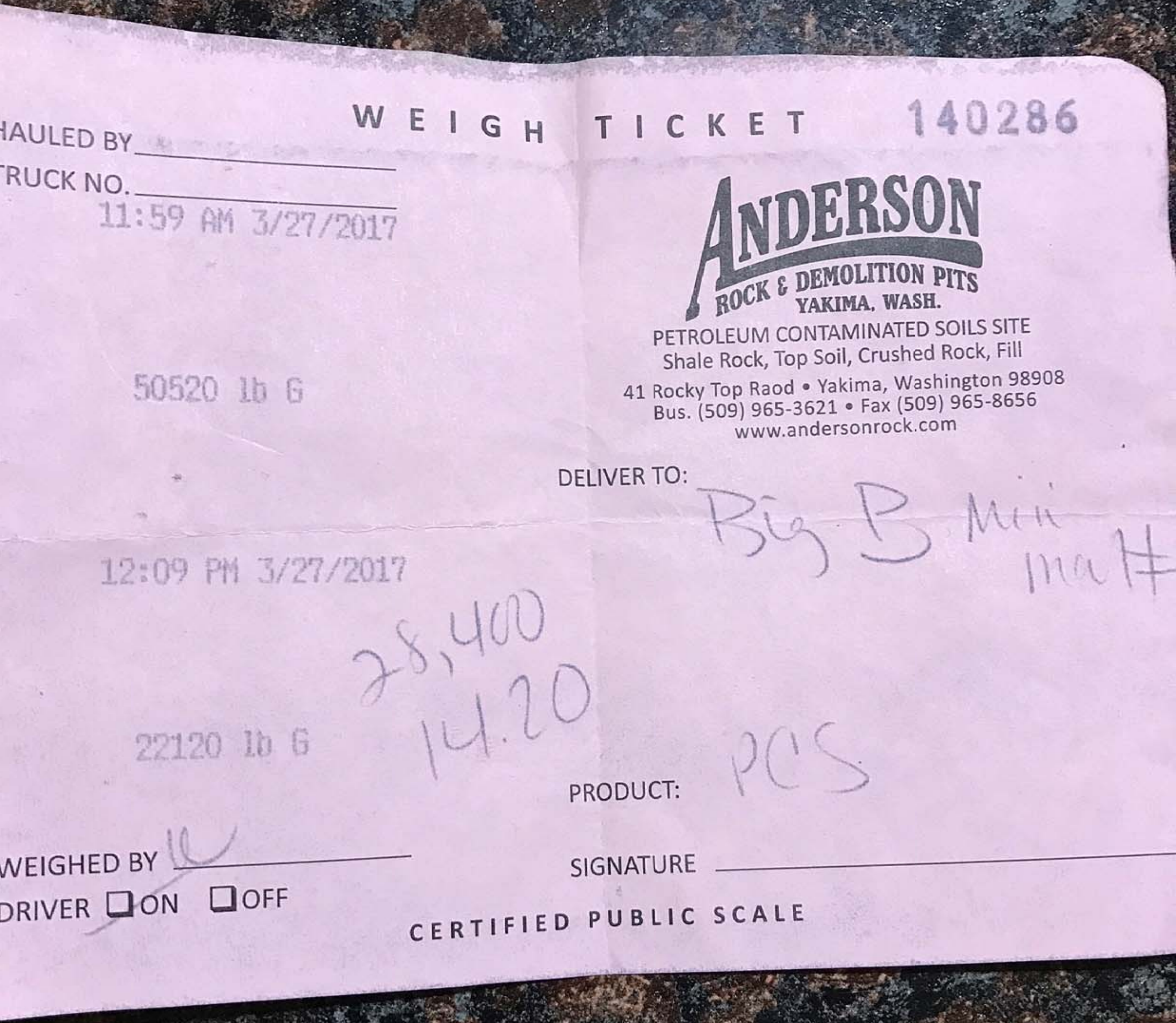
PETROLEUM CONTAMINATED SOILS SITE
Shale Rock, Top Soil, Crushed Rock, Fill
41 Rocky Top Raod • Yakima, Washington 98908
Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

DELIVER TO: Big B mini Mart

PRODUCT: PCS

SIGNATURE ______

CERTIFIED PUBLIC SCALE



WEIGH TICKET **140286**

HAULED BY ____________________

RUCK NO. ____________________

11:59 AM 3/27/2017

50520 lb G

12:09 PM 3/27/2017

28,400
14.20

22120 lb G

WEIGHED BY ____________________

DRIVER ☐ON ☐OFF

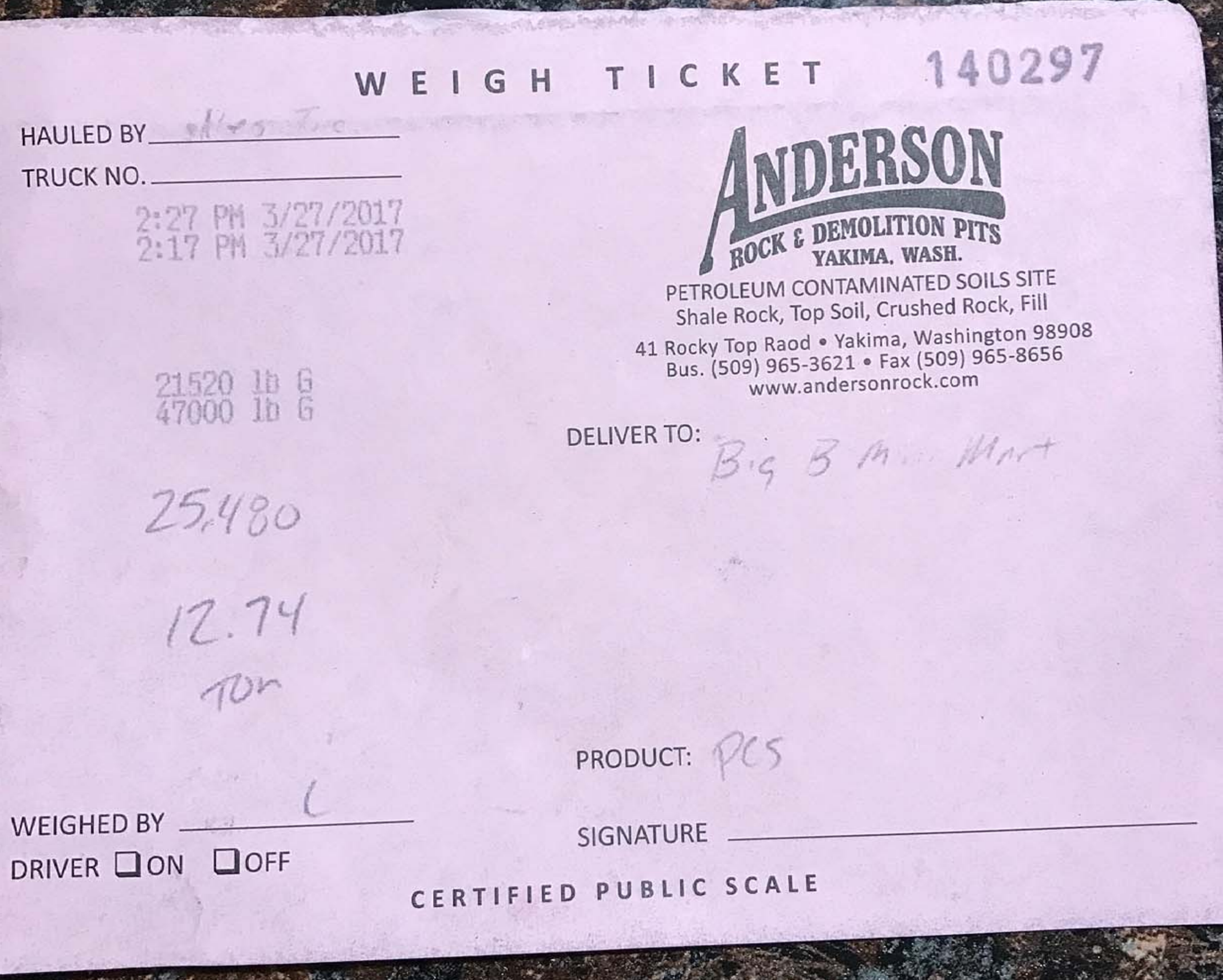
ANDERSON
ROCK & DEMOLITION PITS
YAKIMA, WASH.
PETROLEUM CONTAMINATED SOILS SITE
Shale Rock, Top Soil, Crushed Rock, Fill
41 Rocky Top Raod • Yakima, Washington 98908
Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

DELIVER TO: Big B Mini mart

PRODUCT: PCS

SIGNATURE ____________________

CERTIFIED PUBLIC SCALE



WEIGH TICKET

140297

HAULED BY [illegible]

TRUCK NO.

2:27 PM 3/27/2017
2:17 PM 3/27/2017

21520 lb G
47000 lb G

25,480

12.74
Ton

ANDERSON
ROCK & DEMOLITION PITS
YAKIMA, WASH.
PETROLEUM CONTAMINATED SOILS SITE
Shale Rock, Top Soil, Crushed Rock, Fill
41 Rocky Top Raod • Yakima, Washington 98908
Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

DELIVER TO: Big B Mini Mart

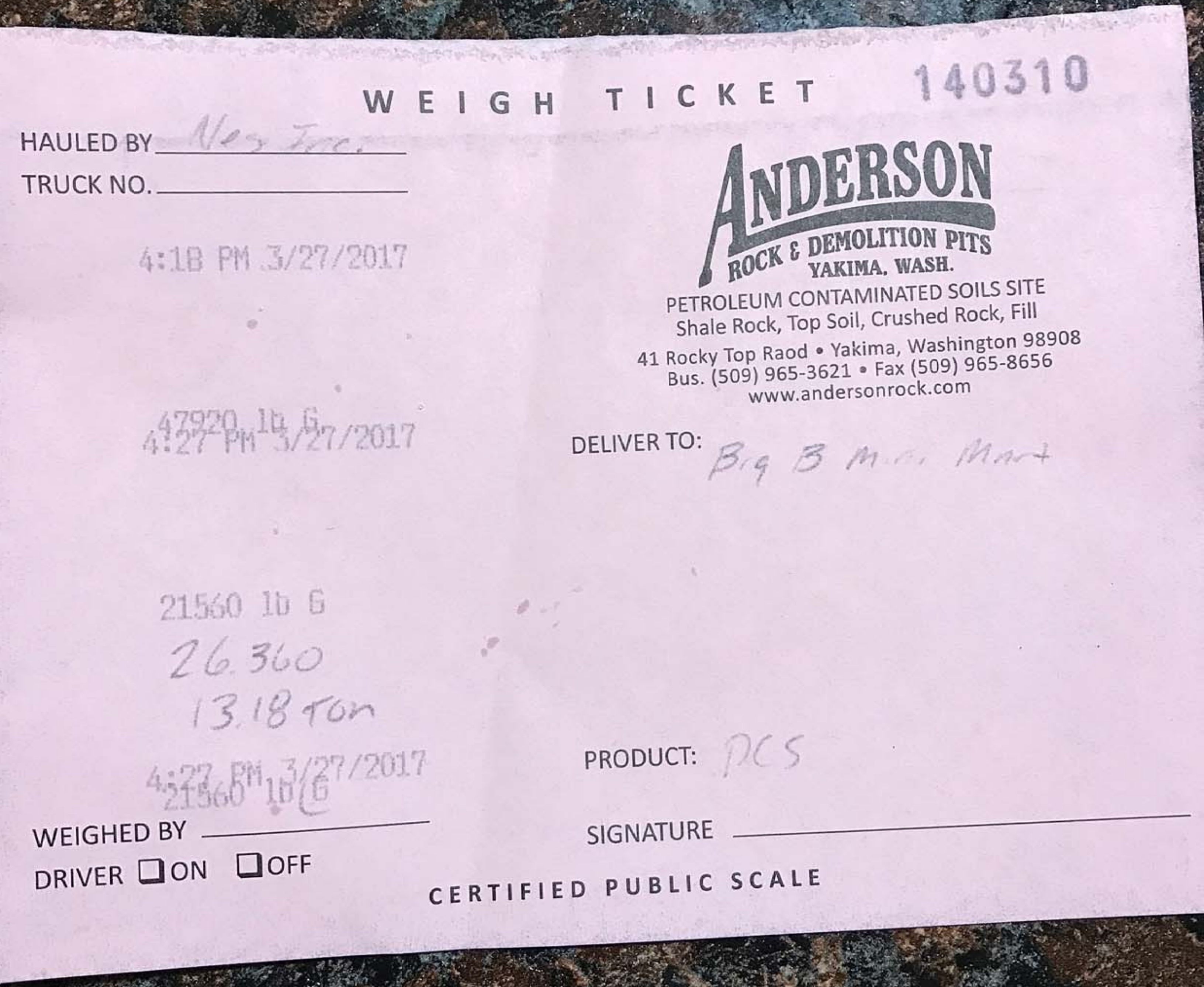
PRODUCT: PCS

WEIGHED BY L

SIGNATURE

DRIVER ☐ ON ☐ OFF

CERTIFIED PUBLIC SCALE



WEIGH TICKET

140310

HAULED BY Nes Inc.

TRUCK NO.

ANDERSON
ROCK & DEMOLITION PITS
YAKIMA, WASH.

PETROLEUM CONTAMINATED SOILS SITE
Shale Rock, Top Soil, Crushed Rock, Fill
41 Rocky Top Raod • Yakima, Washington 98908
Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

4:18 PM 3/27/2017

47920 lb G
4:27 PM 3/27/2017

DELIVER TO: Big B Mini Mart

21560 lb G

26.360

13.18 Ton

4:27 PM 3/27/2017
21560 lb G

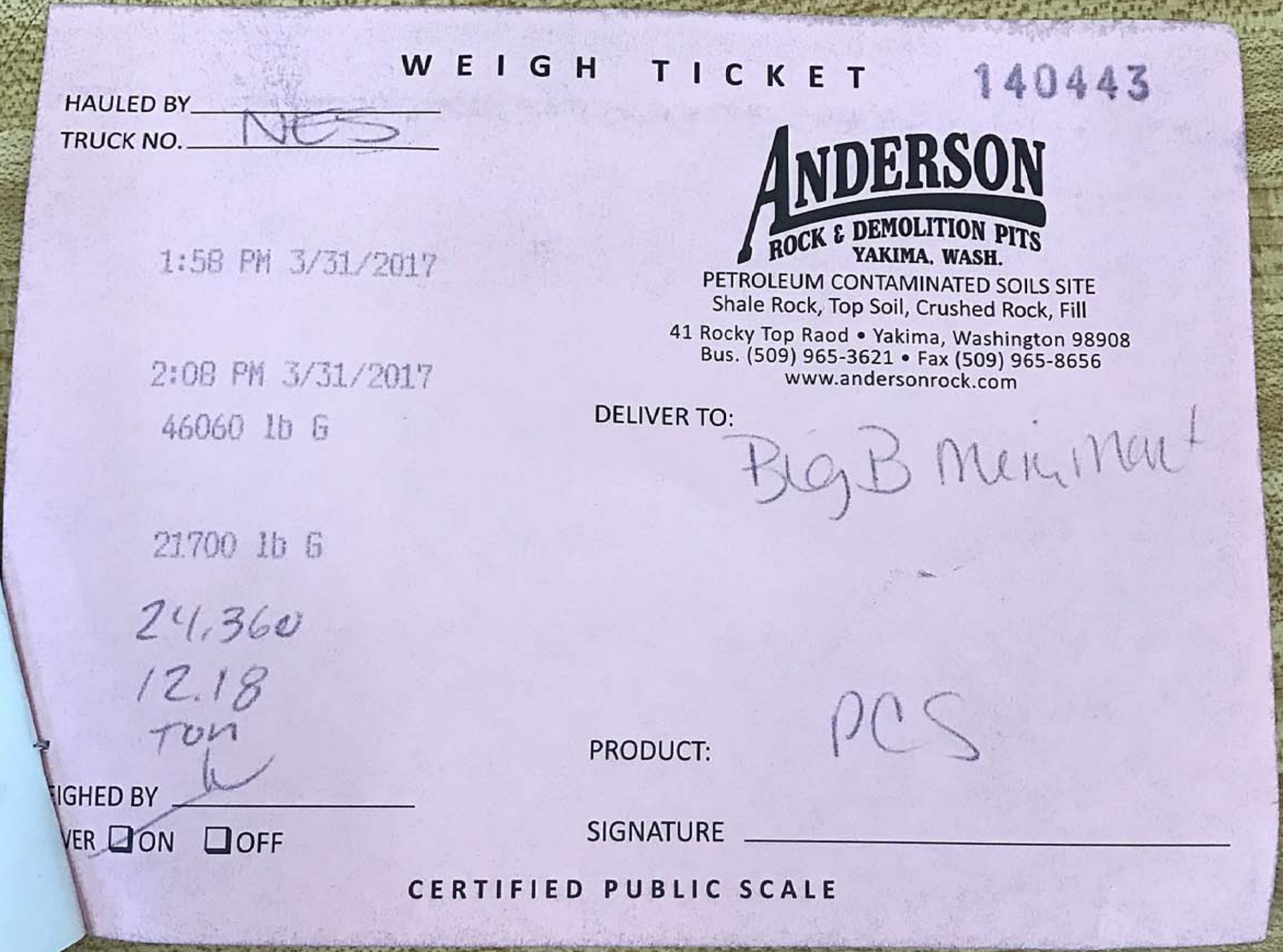
PRODUCT: PCS

WEIGHED BY

SIGNATURE

DRIVER ☐ ON ☐ OFF

CERTIFIED PUBLIC SCALE



WEIGH TICKET 140443

HAULED BY NES
TRUCK NO.

ANDERSON
ROCK & DEMOLITION PITS
YAKIMA, WASH.
PETROLEUM CONTAMINATED SOILS SITE
Shale Rock, Top Soil, Crushed Rock, Fill
41 Rocky Top Raod • Yakima, Washington 98908
Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

1:58 PM 3/31/2017

2:08 PM 3/31/2017
46060 lb G

DELIVER TO: Big B Mini Mart

21700 lb G

24,360
12.18
ton

PRODUCT: PCS

IGHED BY
VER ☑ON ☐OFF

SIGNATURE

CERTIFIED PUBLIC SCALE

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

October 17, 2016

Mr. Surjit Singh
C/O Big B, LLC
P.O. Box 1994
Oroville, WA 98844

RE: Big B Minimart, 1611 Canyon Road, Ellensburg, WA: Petroleum Contaminated Soil

Mr. Surjit Singh,

This office has reviewed the data on the above-mentioned project. The data submitted indicates that the contaminants which require remediation are gasoline and 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 the 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:	Big B, LLC
PROJECT NAME:	Big B Minimart 1611 Canyon Road Ellensburg, WA
PRE-TREATMENT AUTHORIZATION:	(Based on time spent prior to soil delivery to the site at $141/hour)
TONNAGE FEE AT $2.53 PER TON:	To be determined after delivery
BALANCE OWED:	To be billed after delivery

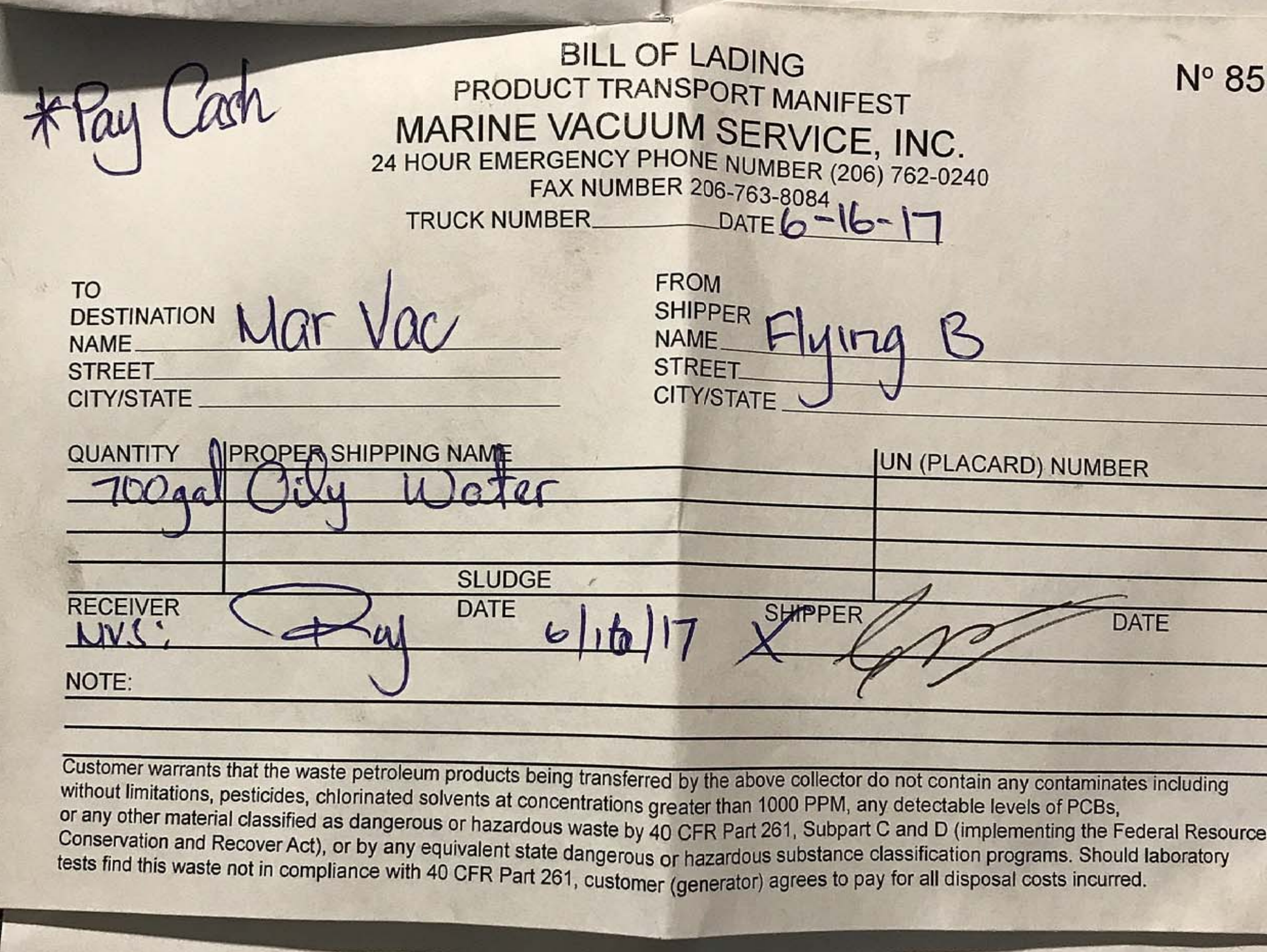
If you have any questions regarding this letter please contact me at (509) 249-6562.

Sincerely,

Ted Silvestri

Ted Silvestri, RS
Environmental Health Specialist

cc: Anderson PCS Facility



*Pay Cash

BILL OF LADING

PRODUCT TRANSPORT MANIFEST

MARINE VACUUM SERVICE, INC.

24 HOUR EMERGENCY PHONE NUMBER (206) 762-0240
FAX NUMBER 206-763-8084

Nº 85

TRUCK NUMBER ______ DATE 6-16-17

TO
DESTINATION NAME Mar Vac
STREET
CITY/STATE

FROM
SHIPPER NAME Flying B
STREET
CITY/STATE

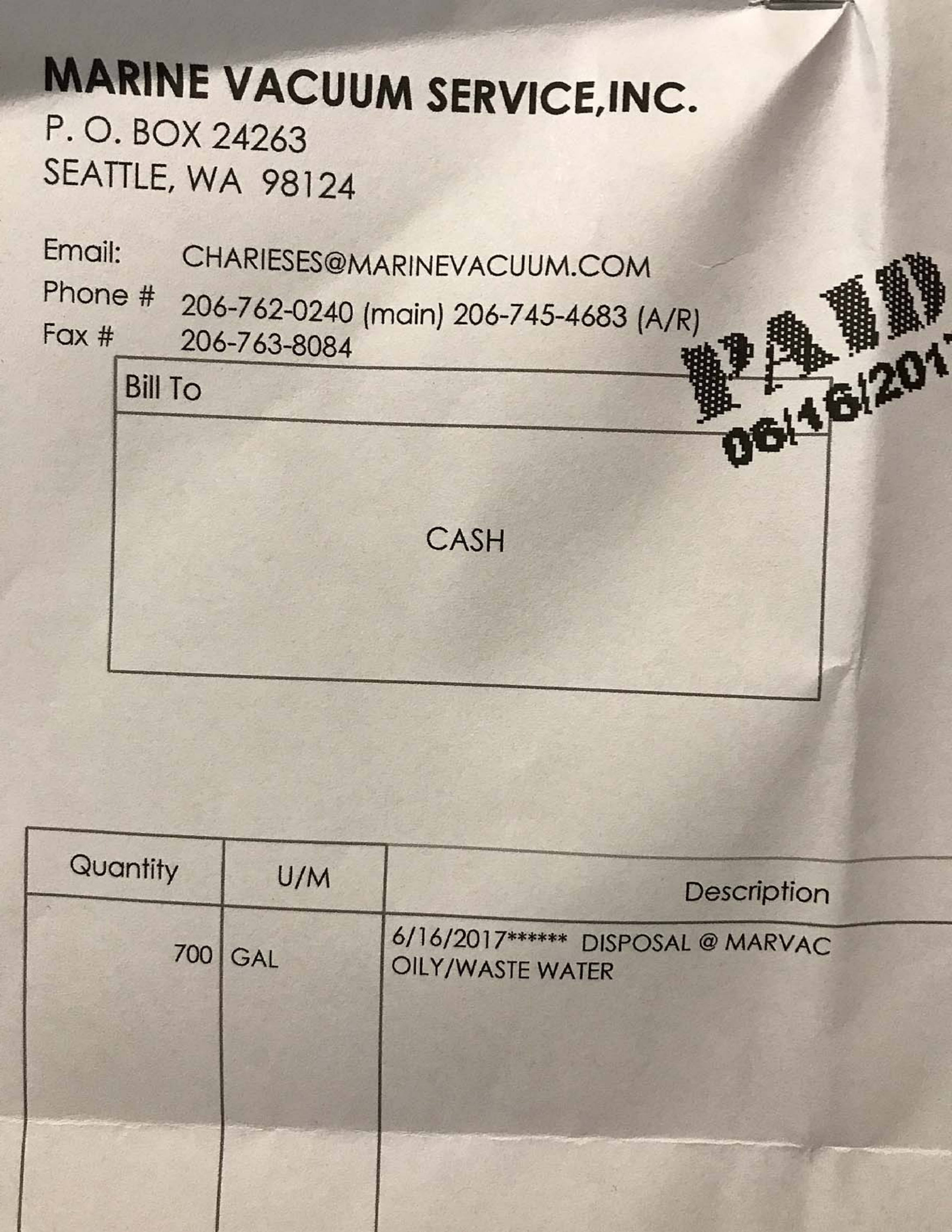
QUANTITY	PROPER SHIPPING NAME	UN (PLACARD) NUMBER
700gal	Oily Water	
	SLUDGE	

RECEIVER NVS: Ray DATE 6/16/17

X SHIPPER DATE

NOTE:

Customer warrants that the waste petroleum products being transferred by the above collector do not contain any contaminates including without limitations, pesticides, chlorinated solvents at concentrations greater than 1000 PPM, any detectable levels of PCBs, or any other material classified as dangerous or hazardous waste by 40 CFR Part 261, Subpart C and D (implementing the Federal Resource Conservation and Recover Act), or by any equivalent state dangerous or hazardous substance classification programs. Should laboratory tests find this waste not in compliance with 40 CFR Part 261, customer (generator) agrees to pay for all disposal costs incurred.



MARINE VACUUM SERVICE,INC.

P. O. BOX 24263
SEATTLE, WA 98124

Email: CHARIESES@MARINEVACUUM.COM
Phone # 206-762-0240 (main) 206-745-4683 (A/R)
Fax # 206-763-8084

PAID
06/16/201

Bill To

CASH

Quantity	U/M	Description
700	GAL	6/16/2017****** DISPOSAL @ MARVAC OILY/WASTE WATER

Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Appendix E
Simplified Terrestrial Ecological Evaluation

PUBLIC REVIEW DRAFT

Appendix E
Simplified Terrestrial Ecological Evaluation

<table>
<tr><td colspan="2">Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest ½ acre (1/4 acre if the area is less than 0.5 acre).</td></tr>
<tr><td>1) From the table below, find the number of points corresponding to the area and enter this number in the field to the right.
<table>
<tr><th>Area (acres)</th><th>Points</th></tr>
<tr><td>0.25 or less</td><td>4</td></tr>
<tr><td>0.5</td><td>5</td></tr>
<tr><td>1.0</td><td>6</td></tr>
<tr><td>1.5</td><td>7</td></tr>
<tr><td>2.0</td><td>8</td></tr>
<tr><td>2.5</td><td>9</td></tr>
<tr><td>3.0</td><td>10</td></tr>
<tr><td>3.5</td><td>11</td></tr>
<tr><td>4.0 or more</td><td>12</td></tr>
</table></td><td>12</td></tr>
<tr><td>2) Is this an industrial or commercial property? If yes, enter a score of 3. If no, enter a score of 1.</td><td>3</td></tr>
<tr><td>3) Enter a score in the box to the right for the habitat quality of the site, using the following rating system. High=1, Intermediate=2, Low=3</td><td>3</td></tr>
<tr><td>4) Is the undeveloped land likely to attract wildlife? If yes, enter a score of 1 in the box to the right. If no, enter a score of 2.</td><td>2</td></tr>
<tr><td>5) Are there any of the following soil contaminants present: Chlorinated dioxins/furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4.</td><td>4</td></tr>
<tr><td>6) Add the numbers in the boxes on lines 2-5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified evaluation may be ended.</td><td>12</td></tr>
</table>

Abbreviations:

DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
PCB	Polychlorinated biphenyl

Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Appendix F
Mass Calculations

PUBLIC REVIEW DRAFT

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strategy ▪ science ▪ engineering

Two Union Square
601 Union Street, Suite 600
Seattle, WA 98101
tel: 206.292.2078
fax: 206.682.7867

☑ Calculation
☐ Meeting Notes
☐ Phone Call Notes
☐ Memorandum

Page 1 of 1

Date: 8/1/2018
Project No.: CL-Ellensburg
Created by: G. Cisneros
Reviewed by:
Subject: Mass Calculation Estimate

Using Figure 9.1 - Approx. Extent of Soil Excavation for Alt. 1, 2, & 3 and using soil data, Mass Calcs were estimated by dividing into different areas.

3 Areas are located within the LNAPL extent and 7 areas are located outside the LNAPL extent but within residual contamination.

The Average concentration (Diesel) was calculated for each area in mg/kg, which was then converted into g/kg.

The Kilograms of Affect soil was calculated for each area.

The kg of Affected soil was multiplied by the Ave. g/kg for each area to estimate the grams of TPH for each area. (See Table in this Appendix)

Approximately 10,854,505 grams of TPH exist within the LNAPL plumes, and 4,048,366 grams of TPH exist outside the LNAPL plumes & within residual contamination extent.

72.8% of the mass is within the LNAPL plume

27.2% of the mass is outside the plume.

* These calculations do not take into account the 364 gallons of LNAPL the skimmer/Trench system has removed, since these calcs are based on pre-skimmer soil data.

Mass Calculation Estimates

Area 1								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of LNAPL Saturated Soil	Average Concentration in g/kg	Grams of Diesel LNAPL
Ave. Conc. =	13,188.46	5,573.0	2.5	516.0	774.0	702,186.4	13.188	9,260,758.192
Area 2								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of LNAPL Saturated Soil	Average Concentration in g/kg	Grams of Diesel LNAPL
Ave. Conc. =	9,000.00	665.0	2.5	61.6	92.4	83,788.6	9.000	754,097.531
Area 3								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of LNAPL Saturated Soil	Average Concentration in g/kg	Grams of Diesel LNAPL
Ave. Conc. =	14,000.00	476.0	2.5	44.1	66.1	59,975.0	14.000	839,650.117
Outside LNAPL Area 4								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of LNAPL Saturated Soil	Average Concentration in g/kg	Grams of Diesel
Discrete Concentrations	3,900	--	--	--	1.5 tons per cubic yards	1 ton = 907.185 kg	Convert mg to g	Multiply Average Concentration by Kilograms of Diesel in Soil
	4,100							
Ave. Conc. =	4,000.00	1,540.0	1.0	57.0	85.6	77,614.7	4.000	310,458.867
Outside LNAPL Area 5								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of Diesel in Soil	Average Concentration in g/kg	Grams of Diesel
Discrete Concentrations	450	--	--	--	1.5 tons per cubic yards	1 ton = 907.185 kg	Convert mg to g	Multiply Average Concentration by Kilograms of Diesel in Soil
	1,000							
	200							
Ave. Conc. =	550.00	6,200.0	1.0	229.6	344.4	312,474.8	0.550	171,861.158
Outside LNAPL Area 6								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of Diesel in Soil	Average Concentration in g/kg	Grams of Diesel
Discrete Concentrations	7,200	--	--	--	1.5 tons per cubic yards	1 ton = 907.185 kg	Convert mg to g	Multiply Average Concentration by Kilograms of Diesel in Soil
	6,500							
Ave. Conc. =	6,850.00	1,286.0	1.0	47.6	71.4	64,813.3	6.850	443,971.299
Outside LNAPL Area 7								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of Diesel in Soil	Average Concentration in g/kg	Grams of Diesel
Discrete Concentrations	13,000	--	--	--	1.5 tons per cubic yards	1 ton = 907.185 kg	Convert mg to g	Multiply Average Concentration by Kilograms of Diesel in Soil
	12,000							
	12,000							
Ave. Conc. =	12,333.33	1,729.0	2.0	128.1	192.1	174,280.3	12.333	2,149,457.259
Outside LNAPL Area 8								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of Diesel in Soil	Average Concentration in g/kg	Grams of Diesel
Ave. Conc. =	4,583.27	2,400.0	1.0	88.9	133.3	120,958.0	4.583	554,383.503
Outside LNAPL Area 9								
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of Diesel in Soil	Average Concentration in g/kg	Grams of Diesel
Discrete Concentrations	4,400	--	--	--	1.5 tons per cubic yards	1 ton = 907.185 kg	Convert mg to g	Multiply Average Concentration by Kilograms of Diesel in Soil
Ave. Conc. =	4,400.00	1,599.0	1.0	59.2	88.8	80,588.3	4.400	354,588.377

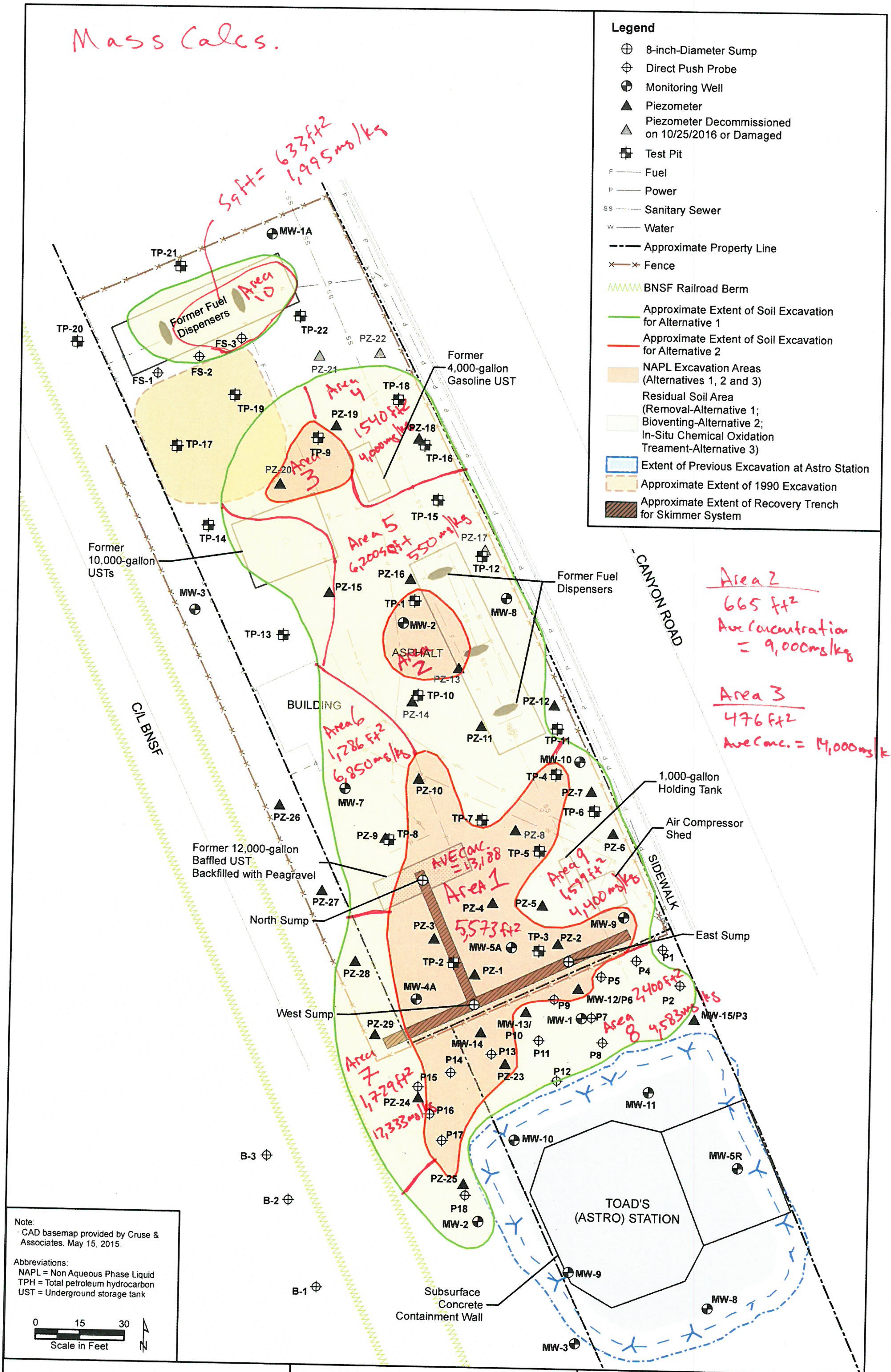
Mass Calculation Estimates

Outside LNAPL Area 10									
Average Concentration in mg/kg		Square Feet	Thickness in Feet	Cubic Yards	Tons	Kilograms of Diesel in Soil	Average Concentration in g/kg	Grams of Diesel
Discrete Concentrations	990	--	--	--	1.5 tons per cubic yards	1 ton = 907.185 kg	Convert mg to g	Multiply Average Concentration by Kilograms of Diesel in Soil
	3,000							
Ave. Conc. =	1,995.00	633.0	1.0	23.4	35.2	31,902.7	1.995	63,645.832

Total Mass in LNAPL area in grams	Percentage of total area
10,854,505.84	72.8

Total Mass outside LNAPL area in grams	Percentage of total area
4,048,366.29	27.2

Mass Calcs.



Sqft = 633 ft2
1,995 mg/kg
Area 10

Area 4
1540 ft2
4,000 mg/kg

Area 3

Area 5
6,200 sqft
550 mg/kg

Area 2

Area 6
1,286 ft2
6,850 mg/kg

Ave Conc.
= 13,188
Area 1
5,573 ft2

Area 9
1,591 ft2
4,400 mg/kg

2400 ft2
Area 8
4,583 mg/kg

Area 7
1,729 ft2
17,333 mg/kg

Area 2
665 ft2
Ave Concentration
= 9,000 mg/kg

Area 3
476 ft2
Ave Conc. = 14,000 mg/kg

Note:
CAD basemap provided by Cruse & Associates. May 15, 2015.

Abbreviations:
NAPL = Non Aqueous Phase Liquid
TPH = Total petroleum hydrocarbon
UST = Underground storage tank

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strategy • science • engineering

Remedial Investigation/Feasibility Study
Big B Mini Mart
Ellensburg, Washington

Figure 9.1
Approximate Extent of Soil Excavation for Alternatives 1, 2, and 3

I:\GIS\Projects\CL-Ellensburg\MXD\RIFS 2017\Figure 9.1 Approximate Extent of Soil Excavation Alternatives 1, 2, and 3.mxd
5/8/2018

Big B Mini Mart Site

Remedial Investigation/Feasibility Study

Appendix G
Cost Estimates

PUBLIC REVIEW DRAFT

Alternative 1: Cost Estimate for Full MTCA Method A Excavation

Task	Quantity	Unit	Cost per Unit	Total Cost	Notes
Full Excavation					
Mob/Demob	1	ls	$ 10,000.00	$ 10,000.00	Based on IO Quote
Removing asphalt/concrete and disposal	22,000	sf	$ 2.00	$ 44,000.00	Assumes that the building will be demolished
Utilities: relocation/cap/reconnect	1	ls	$ 1,500.00	$ 1,500.00	Assumes that the contractor will coordinate this.
Big B Property Removal of Clean overburden excavation	2,144.444	cy	$ -	$ -	Assumes a conservative 1:1 slope given the lithology and close proximity to the property boundary. Contamination extent on Big B property is approximately 19300 square feet; and the upper 3 feet is clean. These assumptions are based on the data we have; this area may be larger or smaller.
Big B Property Removal of Impacted soil	2,859.259	cy	$ -	$ -	Assumes a conservative 1:1 slope, and that soil impacts are between 3 and 7 feet bgs. These assumptions are based on the data we have; this area may be larger or smaller.
Toad's Property Removal of Clean Overburden	417.55556	cy			Assumes a conservative 1:1 slope given the lithology and close proximity to the property boundary. Contamination extent on Toad's (ASTRO) property is approximately 3,758 square feet; and the upper 3 feet is clean. These assumptions are based on the data we have; this area may be larger or smaller.
Toad's Property Removal of Impacted soil	556.74074	cy			Assumes a conservative 1:1 slope, and that soil impacts are between 3 and 7 feet bgs. These assumptions are based on the data we have; this area may be larger or smaller.
Draining excavated soil into pit, stockpiling, and segregation of clean soil and PCS	5978	cy	$ 360.00	$ 11,520.00	All soil from test pit activities will be placed in PCS stockpile. Assumes 4 days of digging (91 cy per hr) and hauling onsite to stockpiles with two trucks and two drivers; A total of 32 hrs of digging. $70/hr for each driver and $105/hr for each truck.
Loading PCS	50	hr	$ 150.00	$ 7,500.00	Assumes a total of 24 hrs of loading time: $70/hr for operator and $80/hr for excavator
Transportation of PCS	728.74667	hr	$ 120.00	$ 87,449.60	Assumes material transported by truck and trailer (30 tons for each truck and trailer to Yakima; 3-hr RT and 1-hr load/unload, $120/hr).
Disposal of PCS	5,465.6	ton	$ 30.00	$ 163,968.00	Assumes a tipping fee of $30/ton; and that 1.6 tons = 1 cy: Anderson Pit quoted $30 a ton for tipping fee.
Dewatering system		gallons	$ 25,000.00	$ 25,000.00	Estimate is around $25,000 (based on IO quote)
LNAPL Skimming and disposal	1,000	gallons	$ 3,500.00	$ 3,500.00	Assumes that a sub will be hired to skim LNAPL from baker tanks and transport LNAPL offsite for disposal. Estimate at $3,500 for every 4,000 gallons. IO quote
Import quarry spalls for backfill	584	tons	$ 15.00	$ 8,760.00	Anderson Pit quote = $15 per ton; Approx. 1.4 ton per CY; Quarry Spalls needed for Toad's property.
Import clean backfill to site	5,465.6	tons	$ 5.00	$ 27,328.00	Assumes that 6510 cy will be needed: Anderson Pit Quote = $5 per ton; Truck and trailer time is already included in PCS disposal; Assumes that each truck and trailer will bring back clean backfill and leave with a load of PCS
Use clean overburden as backfill	2562	cy	$ -	$ -	Assumes that clean overburden will be generated to be used as backfill for the top 3 feet.
Re-paving	3758	sq ft	$ 5.00	$ 18,790.00	Only includes ASTRO paving; rough estimate.
Compact road base 5/8 minus	400	cy	$ 9.25	$ 3,700.00	Anderson Pit Quote = $9.25 per ton; Truck and trailer time is already included in PCS disposal; Assumes that each truck and trailer will bring back clean backfill and leave with a load of PCS
Yakima County Health District Fee	5,465.6	tons	$ 2.53	$ 13,827.97	Ted Sylvestry at Yakima Health quoted a fee of $2.53 a ton and $50 of his time on top of that.
TESC, permitting, air monitoring, temp facility	1	ls	$ 15,000.00	$ 15,000.00	Based on IO Quote
			SUBTOTAL CAPITAL COSTS	**$ 441,843.57**	
Capital Indirect Costs					
Project Management	5	%	DC	$ 22,092.18	
Supplemental RI/FS and EDR	1	ls	$ 15,000.00	$ 15,000.00	Engineering and Design Report
Contractor Coordination and Preparation	1	ls	$ 3,500.00	$ 3,500.00	Assumes that F|S will coordinate with all subcontractors
Travel and Per Diem	10	days	$ 300.00	$ 3,000.00	Assumes ten days of travel and per diem for two Floyd Snider Employees
Confirmation sampling	60	each	$ 90.00	$ 5,400.00	
Analyze stockpile samples to be used as backfill	12	each	$ 90.00	$ 1,080.00	3 samples (0-100 yds); 5 samp. (101-500 yds); 7 samp. (501-1000 yds); 10 samp. (1001-2000 yds); 10+1 samp each additional 500 yds.
Construction Mgmt	5	%	DC	$ 22,092.18	
Construction Completion Report	1	ls	$ 15,000.00	$ 15,000.00	
Clearing and grading permit and SWPPP; regulatory compliance	1	ls	$ 1,500.00	$ 1,500.00	Assumes that these permits will be needed and not any other permits are required.
Long Term Monitoring	1	ls	$ 140,000.00	$ 140,000.00	10 years of semi-annual monitoring and summary reports
Ecology oversight	3	%	DC	$ 13,255.31	
Contractor Sales Tax	9	%	DC	$ 39,765.92	
30% Contingency added to remedial activities	30	%	DC	$ 132,553.07	
			Total	**$ 856,082.22**	

Alternative 2: Cost Estimate for LNAPL Excavation

Task	Quantity	Unit	Cost per Unit	Total Cost	Notes
LNAPL Excavation					
Mob/Demob	1	ls	$ 10,000.00	$ 10,000.00	Based on IO Quote
Removing asphalt/concrete and disposal	16,000	sf	$ 2.00	$ 32,000.00	Assumes that the building will be demolished
Utilities: relocation/cap/reconnect	1	ls	$ 1,500.00	$ 1,500.00	Assumes that the contractor will coordinate this.
Big B, BN, and Toads Property Removal of Clean overburden excavation	725.3	cy	$ -	$ -	Assumes a conservative 1:1 slope given the lithology and close proximity to the property boundary. LNAPL extent on Big B property is approximately 6528 square feet; and the upper 3 feet is clean. These assumptions are based on the data we have; this area may be larger or smaller.
Big B, BN, and Toads, Property Removal of Impacted soil	1,208.89	cy	$ -	$ -	Assumes a conservative 1:1 slope, and that soil impacts are between 3 and 7 feet bgs. These assumptions are based on the data we have; this area may be larger or smaller.
Toad's Property Removal of Clean Overburden		cy			Assumes a conservative 1:1 slope given the lithology and close proximity to the property boundary. A conservation estimate of the LNAPL extent on Toad's (ASTRO) property is approximately 2,110 square feet; and the upper 3 feet is clean. These assumptions are based on the data we have; this area may be larger or smaller.
Toad's Property Removal of Impacted soil		cy			Assumes a conservative 1:1 slope, and that soil impacts are between 3 and 7 feet bgs. These assumptions are based on the data we have; this area may be larger or smaller.
Draining excavated soil into pit, stockpiling, and segregation of clean soil and PCS	1,934.2	cy	$ 360.00	$ 7,651.87	All soil from test pit activities will be placed in PCS stockpile. Assumes 4 days of digging (91 cy per hr) and hauling onsite to stockpiles with two trucks and two drivers; A total of 32 hrs of digging. $70/hr for each driver and $105/hr for each truck.
Loading PCS	30	hr	$ 150.00	$ 4,500.00	Assumes a total of 30 hrs of loading time: $70/hr for operator and $80/hr for excavator
Transportation of PCS	42.7	hr	$ 120.00	$ 5,120.00	Assumes that 200 CY of PCS will be transported offsite for disposal where USTs will be located. Assumes material transported by truck and trailer (30 tons for each truck and trailer to Yakima; 3-hr RT and 1-hr load/unload, $120/hr).
Disposal of PCS	320	ton	$ 30.00	$ 9,600.00	Assumes a 20,000-gallon and 8,000-gallon tanks will be placed in the contaminated area that roughly equals to 320 CY of soil to be disposed off-site. Assumes a tipping fee of $30/ton; and that 1.6 tons = 1 cy: Anderson Pit quoted $30 a ton for tipping fee.
Dewatering system		gallons	$ 25,000.00		Placeholder: Estimate is around $25,000 (based on IO quote)
LNAPL Skimming and disposal	1,000	gallons	$ 3,500.00	$ 3,500.00	Assumes that a sub will be hired to skim LNAPL from baker tanks and transport LNAPL offsite for disposal. Estimate at $3,500 for every 4,000 gallons. IO quote
Import quarry spalls for backfill	584	tons	$ 15.00	$ 8,760.00	Anderson Pit quote = $15 per ton; Approx. 1.4 ton per CY; Quarry Spalls needed for Toad's property.
Import clean backfill to site	100	tons	$ 5.00	$ 500.00	Assumes that 100 tons of clean backfill will be needed around the USTs: Anderson Pit Quote = $5 per ton; Truck and trailer time is already included in PCS disposal; Assumes that each truck and trailer will bring back clean backfill and leave with a load of PCS
Use clean overburden as backfill	725	cy	$ -	$ -	Assumes that clean overburden will be generated to be used as backfill for the top 3 feet.
Re-paving of Astro Property	2,593	sq ft	$ 5.00	$ 12,965.00	Only includes ASTRO paving; rough estimate.
Compact road base 5/8 minus	0	cy	$ 9.25	$ -	Placeholder in case we need this below the asphalt when regrading: Anderson Pit Quote = $9.25 per ton; Truck and trailer time is already included in PCS disposal; Assumes that each truck and trailer will bring back clean backfill and leave with a load of PCS
Yakima County Health District Fee	320	tons	$ 2.53	$ 809.60	Ted Sylvestry at Yakima Health quoted a fee of $2.53 a ton and $50 of his time on top of that.
Installation of Bioventing	1	ls	$ 20,000.00	$ 20,000.00	
TESC, permitting, air monitoring, treatment area	1	ls	$ 17,500.00	$ 17,500.00	Based on IO Quote
SUBTOTAL CAPITAL COSTS				**$134,406.47**	
Capital Indirect Costs					
Project Management	5	%	DC	$ 6,720.32	
Supplemental RI/FS and EDR	1	ls	$ 15,000.00	$ 15,000.00	Engineering and Design Report
Contractor Coordination and Preparation	1	ls	$ 2,000.00	$ 2,000.00	Assumes that F|S will coordinate with all subcontractors
Travel and Per Diem	9	days	$ 150.00	$ 1,350.00	Assumes nine days of travel and per diem for one Floyd Snider Employee
Confirmation sampling	40	each	$ 90.00	$ 3,600.00	
Analyze stockpile samples to be used as backfill	11	each	$ 90.00	$ 990.00	3 samples (0-100 yds); 5 samp. (101-500 yds); 7 samp. (501-1000 yds); 10 samp. (1001-2000 yds); 10+1 samp each additional 500 yds.
Construction Mgmt	5	%	DC	$ 6,720.32	
Construction Completion Report	1	ls	$ 10,000.00	$ 10,000.00	
Clearing and grading permit and SWPPP; regulatory compliance	1	ls	$ 1,500.00	$ 1,500.00	Assumes that these permits will be needed and not any other permits are required.
Long Term Monitoring GW	1	ls	$ 140,000.00	$ 140,000.00	10 years of semi-annual monitoring and summary reports
Biopile Monitoring	1	ls	$ 16,800.00	$ 16,800.00	Estimate based on IO Quote
Ecology oversight	3	%	DC	$ 4,032.19	
Contractor Sales Tax	9	%	DC	$ 12,096.58	
30% Contingency added to remedial activities	30	%	DC	$ 40,321.94	
Total				**$395,537.83**	

Alternative 3: Cost Estimate for LNAPL Excavation and Chemical Oxidation Treatment

Task	Quantity	Unit	Cost per Unit	Total Cost	Notes
LNAPL Excavation and Chemical Oxidation Treatment					
Mob/Demob	1	ls	$ 10,000.00	$ 10,000.00	Based on IO Quote
Removing asphalt/concrete and disposal	16,000	sf	$ 2.00	$ 32,000.00	Assumes that the building will be demolished
Utilities: relocation/cap/reconnect	1	ls	$ 1,500.00	$ 1,500.00	Assumes that the contractor will coordinate this.
Big B, BN, and Toads Property Removal of Clean overburden excavation	725.3333	cy	$ -	$ -	Assumes a conservative 1:1 slope given the lithology and close proximity to the property boundary. LNAPL extent on Big B property is approximately 6528 square feet; and the upper 3 feet is clean. These assumptions are based on the data we have; this area may be larger or smaller.
Big B, BN, and Toads, Property Removal of Impacted soil	1,208.89	cy	$ -	$ -	Assumes a conservative 1:1 slope, and that soil impacts are between 3 and 7 feet bgs. These assumptions are based on the data we have; this area may be larger or smaller.
Toad's Property Removal of Clean Overburden		cy			Assumes a conservative 1:1 slope given the lithology and close proximity to the property boundary. A conservation estimate of the LNAPL extent on Toad's (ASTRO) property is approximately 2,110 square feet; and the upper 3 feet is clean. These assumptions are based on the data we have; this area may be larger or smaller.
Toad's Property Removal of Impacted soil		cy			Assumes a conservative 1:1 slope, and that soil impacts are between 3 and 7 feet bgs. These assumptions are based on the data we have; this area may be larger or smaller.
Draining excavated soil into pit, stockpiling, and segregation of clean soil and PCS	1,934.22	cy	$ 360.00	$ 7,651.87	All soil from test pit activities will be placed in PCS stockpile. Assumes 4 days of digging (91 cy per hr) and hauling onsite to stockpiles with two trucks and two drivers; A total of 32 hrs of digging. $70/hr for each driver and $105/hr for each truck.
Loading PCS	30	hr	$ 150.00	$ 4,500.00	Assumes a total of 30 hrs of loading time: $70/hr for operator and $80/hr for excavator
Transportation of PCS	42.66667	hr	$ 120.00	$ 5,120.00	Assumes that 200 CY of PCS will be transported offsite for disposal where USTs will be located. Assumes material transported by truck and trailer (30 tons for each truck and trailer to Yakima; 3-hr RT and 1-hr load/unload, $120/hr).
Disposal of PCS	320	ton	$ 30.00	$ 9,600.00	Assumes a 20,000-gallon and 8,000-gallon tanks will be placed in the contaminated area that roughly equals to 320 CY of soil to be disposed off-site. Assumes a tipping fee of $30/ton; and that 1.6 tons = 1 cy: Anderson Pit quoted $30 a ton for tipping fee.
Dewatering system		gallons	$ 25,000.00		Placeholder: Estimate is around $25,000 (based on IO quote)
LNAPL Skimming and disposal	1,000	gallons	$ 3,500.00	$ 3,500.00	Assumes that a sub will be hired to skim LNAPL from baker tanks and transport LNAPL offsite for disposal. Estimate at $3,500 for every 4,000 gallons. IO quote
Soil to be mixed with Chem Ox					
Removal of Clean overburden excavation prior to Chem Ox	1,419.11	cy	$ -	$ -	Assumes a conservative 1:1 slope given the lithology and close proximity to the property boundary. LNAPL extent on Big B property is approximately 6,528 square feet and the full extent of impacted soil exceeding Method A is 19,300 square feet; therefore an area of 12,772 square feet will be mixed with Chem Ox. The upper 3 feet is clean and 3-8 feet will be mixed with chem ox. These assumptions are based on the data we have; this area may be larger or smaller.
Removal of Impacted Soil to be mixed with Chem Ox	2,365.19	cy	$ -	$ -	Assumes a conservative 1:1 slope, and that soil impacts are between 3 and 7 feet bgs. These assumptions are based on the data we have; this area may be larger or smaller.
Time spent mixing PCS with Chem Ox	3,784.30	cy	$ 300.00	$ 28,382.22	All soil will be placed in PCS stockpile. Assumes 8 days of digging (40 cy per hr); $70/hr for operator and $80/hr for excavator; Using two operators and excavators; A total of 90 hrs of digging.
Backfilling with clean overburden soil	1,419.11	cy	$ 150.00	$ 3,547.78	Placing clean overburden into excavation. Assumes 5 days or 60 hrs of digging (63 cy per hr); $70/hr for each driver and $105/hr for each truck.
Chem Ox price	7,095.56	lbs	$ 9.00	$ 63,860.00	Assumes that 2 lbs will be mixed per ton; assumes 1.5 tons per CY.

Alternative 3: Cost Estimate for LNAPL Excavation and Chemical Oxidation Treatment

Task	Quantity	Unit	Cost per Unit	Total Cost	Notes
Backfilling and Restoration					
Import quarry spalls for backfill	584	tons	$ 15.00	$ 8,760.00	Anderson Pit quote = $15 per ton; Approx. 1.4 ton per CY; Quarry Spalls needed for Toad's property.
Import clean backfill to site	100	tons	$ 5.00	$ 500.00	Assumes that 100 tons of clean backfill will be needed around the USTs: Anderson Pit Quote = $5 per ton; Truck and trailer time is already included in PCS disposal; Assumes that each truck and trailer will bring back clean backfill and leave with a load of PCS
Use clean overburden as backfill	2,144	cy	$ -	$ -	Assumes that clean overburden will be generated to be used as backfill for the top 3 feet.
Re-paving of Astro Property	2,593	sq ft	$ 5.00	$ 12,965.00	Only includes ASTRO paving; rough estimate.
Compact road base 5/8 minus	0	cy	$ 9.25	$ -	Placeholder in case we need this below the asphalt when regrading: Anderson Pit Quote = $9.25 per ton; Truck and trailer time is already included in PCS disposal; Assumes that each truck and trailer will bring back clean backfill and leave with a load of PCS
Yakima County Health District Fee	320	tons	$ 2.53	$ 809.60	Ted Sylvestry at Yakima Health quoted a fee of $2.53 a ton and $50 of his time on top of that.
Installation of Bioventing		ls	$ 15,000.00	$ 15,000.00	
TESC, permitting, air monitoring, treatment area	1	ls	$ 17,500.00	$ 17,500.00	Based on IO Quote
			SUBTOTAL CAPITAL COSTS	**$ 225,196.47**	
Capital Indirect Costs					
Project Management	5	%	DC	$ 11,259.82	
Supplemental RI/FS and EDR	1	ls	$ 15,000.00	$ 15,000.00	Engineering and Design Report
Contractor Coordination and Preparation	1	ls	$ 2,000.00	$ 2,000.00	Assumes that F|S will coordinate with all subcontractors
Travel and Per Diem	9	days	$ 150.00	$ 1,350.00	Assumes nine days of travel and per diem for one Floyd Snider Employee
Confirmation sampling	40	each	$ 90.00	$ 3,600.00	
Analyze stockpile samples to be used as backfill	11	each	$ 90.00	$ 990.00	3 samples (0-100 yds); 5 samp. (101-500 yds); 7 samp. (501-1000 yds); 10 samp. (1001-2000 yds); 10+1 samp each additional 500 yds.
Construction Mgmt	5	%	DC	$ 11,259.82	
Construction Completion Report	1	ls	$ 10,000.00	$ 10,000.00	
Clearing and grading permit and SWPPP; regulatory compliance	1	ls	$ 1,500.00	$ 1,500.00	Assumes that these permits will be needed and not any other permits are required.
Long Term Monitoring GW	1	ls	$ 140,000.00	$ 140,000.00	10 years of semi-annual monitoring and summary reports
Biopile Monitoring	1	ls	$ 16,800.00	$ 16,800.00	Estimate based on IO quote
Ecology oversight	3	%	DC	$ 6,755.89	
Contractor Sales Tax	9	%	DC	$ 20,267.68	
30% Contingency added to remedial activities	30	%	DC	$ 67,558.94	
			Total	**$ 533,538.63**	