Public Review Draft — Remedial Investigation/ Feasibility Study

Port of Longview TPH Site

Prepared for
Port of Longview

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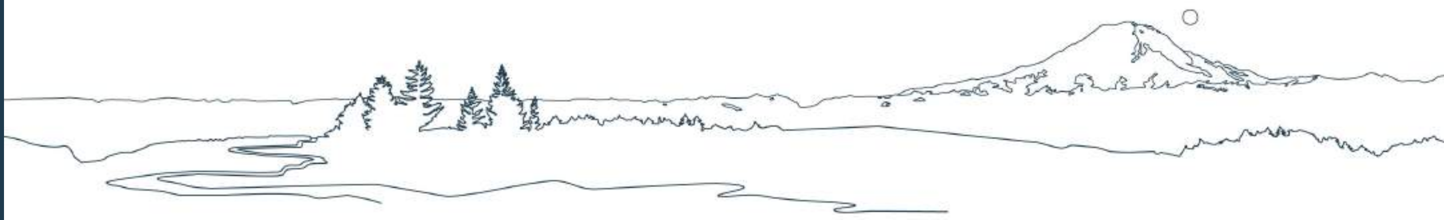

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Public Review Draft - Remedial Investigation/Feasibility Study

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Executive Summary

INTRODUCTION AND BACKGROUND

The Port of Longview (Port) Total Petroleum Hydrocarbons (TPH) Site (Site) is located in Longview, Washington, on the north side of the Columbia River, directly east of the Lewis and Clark Bridge. The Site is currently zoned as heavy industrial and is used for Port operations and marine cargo operations, which includes a rail-dependent bulk export facility. The Port has been operating at its location on the Columbia River since the early 1900s and the Site contains a ship berth, active railyard, and associated warehouse and transit shed buildings to accommodate the marine cargo (refer to Section 1.0 of this Remedial Investigation [RI]/Feasibility Report [FS]).

Since the early 1900s, the Port and other entities (and their predecessors), including Chevron U.S.A. Inc. (Chevron),[1] Georgia-Pacific LLC (Georgia-Pacific),[2] Wilson Oil, Inc. (Wilson),[3] and WestRock Longview LLC (WestRock),[4] operated facilities at the Site. These facilities included the following:

- A set of pipelines referred to as the Standard Pipelines[5] were installed on the Site in 1926 and decommissioned by 1986. The Standard Pipelines run parallel to Port Way beneath the rail lines and historically transferred petroleum products between a bulk plant located to the northeast of the Site and the shipping berths along the Columbia River.
- An 80,000-barrel aboveground storage tank (AST) was used for storage of Bunker C fuel, ballast seawater, and diesel. The AST was constructed by Longview Fibre in approximately 1935 and the tank was removed in 1996.
- A fuel loading station and a pipeline, referred to as the Longview Pipeline,[6] was located between the loading station and a wharf on the Columbia River at what is now Berth 2. The Longview Pipeline was operated from 1935 to 1973 primarily to transfer and store Bunker C fuel from tanker ships for use as fuel. The fuel loading station was reportedly used to load fuel, including Bunker C fuel, from ships and the AST into railroad tank cars for transport to the Longview Fibre Facility.

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[1] Standard Oil Company of California is Chevron U.S.A. Inc.'s predecessor. Chevron Environmental Management Company manages environmental matters for the Chevron family of companies.

[2] James River Corporation and Crown Zellerbach are corporate predecessors of Georgia-Pacific.

[3] Wilson is doing business as Wilcox & Flegel Oil Company.

[4] Longview Fibre Paper and Packaging, Inc., Longview Fibre Company, and KapStone Kraft Paper Corporation are predecessors to WestRock.

[5] Many of the named facilities were owned or operated by multiple potentially liable parties. References to these facilities by name (e.g., Standard Pipelines or Longview Pipeline) are not intended to suggest that those entities, their predecessors, or their successors are liable or otherwise responsible for possible releases from them described in the Agreed Order or in this report.

[6] Refer to note 5.

- Several other pipelines constructed between 1926 and 1973 were used to transport a variety of petroleum products from ships berthed on the Columbia River to the Site. By 1986, the former Standard Pipelines beneath the Port property were reportedly cleaned, decommissioned, and abandoned in place (refer to Section 2.2 of this RI/FS).
- Several underground storage tanks (USTs) including the following:
  - A 675-gallon gasoline UST that was installed in the former Calloway Ross Parcel sometime prior to 1960 and removed in 1991.
  - A 4,000-gallon UST and an 8,000-gallon gasoline UST, operated by the Port, located in the former maintenance/mechanic's shop and removed in 1993.
  - A 2,800-gallon heating oil UST located adjacent to the former U.S. Army Reserve building to supply fuel for the building's steam boiler. The UST was installed in approximately 1949 and reportedly cleaned out in the 1970s.

SITE DESCRIPTION

The Site is designated Ecology Facility Site ID No. 42978181 and is officially referred to as the Port of Longview TPH Site. The Site is almost entirely paved, except for areas of rail track infrastructure and a material storage area north of the former Warehouse 9 building footprint. The Site is expected to have similar land use in the future. A log export facility owned by Weyerhaeuser NR Company and an active bulk fuel facility owned by Wilson are located northwest- and northeast-adjacent to the Site, respectively. The Columbia River and Port property border the Site to the southwest and southeast, respectively. The rail lines are operated by the Port and owned by either the Port and/or BNSF Railway Company.

CONCEPTUAL SITE MODEL

The Site sits on a broad, flat alluvial floodplain consisting of unconsolidated and consolidated sediments (refer to Section 5.0 of the RI/FS). Soils across the Site generally consist of a sandy fill layer underlain by native alluvial sediments, which consist of varying mixtures of sand and silt, including some laterally extensive silt lenses in the central portion of the Site. The silt lenses separate the two sandy water-bearing units at the Site: the perched water-bearing zone (perched zone) and alluvial aquifer. Hydrogeologic data indicate that the perched zone and alluvial aquifer are distinct water-bearing units with limited hydraulic connection and that interaction between the units resembles slow leakage through a low-permeability, non-continuous aquitard.

Groundwater is typically encountered at elevations between 7 and 19 feet North American Vertical Datum of 1988 (perched zone), and groundwater elevation measurements indicate that the primary directions of groundwater flow in both water-bearing units are to the north and northwest, away from the Columbia River. Hydrogeologic data from the Site indicate that groundwater flow away from the Columbia River is maintained by the nearby pumps associated with the Consolidated Diking Improvement District #1, which maintain shallow Site groundwater at a head lower than the Columbia River.

RI sampling and analysis, as well as historical environmental investigations, indicate that soil and groundwater beneath the Site have been impacted by incidental releases and leaks from historical sources associated with the storage and transfer of petroleum fuels on the Site, including gasoline, diesel, Bunker C fuel, and PS300 fuel (refer to Section 9.0 of this RI/FS). These results of extensive investigations over the past 30 years indicate that the two media of concern at the Site are soil and groundwater.

Areas of residual TPH soil impacts, which include contaminants of concern, such as gasoline-range organics (GRO), total diesel-range organics (DRO) and oil-range organics (ORO), and benzene, are present throughout the Site but concentrated primarily on the former Calloway Ross Parcel, in the area of the former loading racks, and along and around the subsurface Standard and Longview Pipelines beneath the rail lines, and near the former 80,000-barrel AST. TPH-impacted soil in the central and northern parts of the Site is concentrated between approximately 8 and 17 feet below ground surface (bgs), which is below the estimated depth of the pipelines (3 to 4 feet bgs). In the southern portion, TPH-impacted soil is concentrated deeper, between approximately 13 and 24 feet bgs, which corresponds to the area where the pipelines are buried more deeply.

Groundwater impacts currently exist in both the perched zone and alluvial aquifer. The perched zone is hydrologically isolated from the alluvial aquifer by a low-permeability silt aquitard at its base. In the perched zone, total DRO and ORO groundwater impacts are approximately centered around MW-09 and MW-28 and include areas beyond the edge of the Port's property: MW-04 is downgradient of the source area around MW-09, and MW-30 is downgradient from the source area around MW-28. Data gaps pertaining to the dissolved-phase extent within the perched zone and alluvial aquifer will be filled during a predesign investigation prior to submittal of the Engineering Design Report. A smaller dissolved-phase GRO and benzene plume in the perched zone is centered around MW-09 beneath the railroad tracks. It is correlated to areas with elevated GRO and benzene soil concentrations, which are located just west of the rail lines and northwest of the former loading racks. In the alluvial aquifer, dissolved-phase plumes of total DRO and ORO are present in three main areas underlying the rail tracks, former fuel loading rack area, and the former Standard and Longview Pipelines. These plumes are associated with areas of greatest total DRO and ORO concentrations in soil. Measurable light non-aqueous phase liquid (LNAPL) is present only within the alluvial aquifer at MW-09. There is no pathway to surface water at the Site.

Groundwater cleanup standards were developed to be protective of human health via drinking water exposure, and soil cleanup standards are protective of human exposure and groundwater via the direct contact and leaching pathways. Ecological receptors are not exposed to soil contamination at levels of concern, and there is no pathway to surface water. Site environmental investigations indicate that the primary historical sources of petroleum impacts to soil and groundwater include the following:

- Former Standard Pipelines
- Former 80,000-barrel AST

- Former Longview Pipeline
- Former fuel loading racks
- Former Calloway UST

Impacts likely resulted from discharges of petroleum products to the surface and subsurface by leaks or spills during fuel handling and storage activities, which include historically known leaking USTs and an AST, which have been removed. From each point source, impacts may have migrated downward by infiltration and gravity drainage through vadose zone soil and reached both water-bearing units. In some instances, petroleum fuels accumulated as LNAPL on the groundwater surface and as soluble constituents dissolved into shallow groundwater.

In 2021, Ecology confirmed that the Site was adequately characterized (Ecology 2021a); the horizontal and vertical extent of soil and groundwater impacts have been delineated, and the risks of soil vapor to indoor air and groundwater discharge to surface water have been precluded.

IDENTIFICATION OF COCS AND DEVELOPMENT OF CLEANUP STANDARDS

Based on historical information and data from Site environmental investigations, GRO, total DRO and ORO, and benzene were identified as contaminants of concern (COCs). Groundwater and soil proposed COCs and their proposed cleanup standards are summarized in the following table.

Summary of Proposed Site COCs and Proposed Cleanup Standards

Proposed COC	Proposed Cleanup Level (1)		Point of Compliance
	Value	Basis	
Groundwater			
GRO	800 µg/L	Protection of drinking water	Site-wide
Total DRO and ORO	500 µg/L	Protection of drinking water	Site-wide
Benzene	5.0 µg/L	Protection of drinking water	Site-wide
Soil			
GRO	30 mg/kg	Protection of groundwater (2)	Site-wide
Total DRO and ORO	2,000 mg/kg	Protection of groundwater (2)	Site-wide
Benzene	0.030 mg/kg	Protection of groundwater	Site-wide

Notes:

1 Proposed CULs are based on MTCA Method A protection of groundwater (Tables 720-1 and 740-1).

2 The CULs for protection of leaching to groundwater and protection of direct contact are equivalent for TPH including GRO and total DRO and ORO. CULs based on leaching for benzene are also protective of the direct contact pathway.

Abbreviations:

CUL	Cleanup Level	mg/kg	Milligrams per kilogram
µg/L	Micrograms per liter	MTCA	Model Toxics Control Act

Soil COCs at concentrations greater than proposed CULs are concentrated primarily in the source areas impacted by historical site uses. Groundwater COCs at concentrations greater than proposed CULs exist in both the perched zone and alluvial aquifer, in most cases being immediately downgradient of areas of impacted soil (refer to Section 9.2 of this RI/FS). The dissolved-phase groundwater plumes also include areas beyond the edge of Port property. Data from off-property wells MW-04 and MW-30 installed in 1991 and 1998 show that the dissolved-phase plume is stable or degrading. These off-property wells contain low concentrations of COCs or intermittent proposed CUL exceedances.

DEVELOPMENT AND EVALUATION OF REMEDIAL ALTERNATIVES

Multiple remedial technologies, including passive, in situ, ex situ, and LNAPL removal technologies, were considered to address the soil and groundwater impacts in two Cleanup Action Areas (CAAs): impacts outside of the active rail lines (CAA-1) and impacts within the active rail lines (CAA-2). Following a preliminary screening process, the retained technologies were aggregated into five remedial alternatives, which include combinations of the following:

- Surfactant injection and extraction
- Sorption and biodegradation
- In situ soil and groundwater remediation by in situ chemical oxidation (ISCO) injections
- Targeted excavation and disposal of soil with concentrations of COCs greater than proposed CULs
- Institutional controls (ICs), which include a Soil Management Plan (SMP)
- MNA of groundwater

The five alternatives were evaluated within the disproportionate cost analysis (DCA) framework required under the Model Toxics Control Act (MTCA; WAC 173-340-360(5)(c)(iv)). The DCA evaluates remedial alternatives to identify the cleanup action that uses permanent solutions to the maximum extent practicable, while also achieving cleanup standards within a reasonable restoration time frame. In making this determination, each remedial alternative was assessed using MTCA comparative evaluation criteria, including protectiveness, permanence, effectiveness over the long-term, management of short-term risks, technical and administrative implementability, and consideration of public concerns. The final step in evaluating alternatives is identifying the protective alternative that is permanent to the maximum extent practicable. This requires weighing incremental costs and benefits of protective remedial alternatives. Costs are considered disproportionate to benefits when the incremental costs of an alternative exceed the incremental benefits compared to alternatives that are lower cost but still protective.

PREFERRED REMEDIAL ALTERNATIVE

The Preferred Remedial Alternative (Preferred Alternative) was identified by selecting the alternative with the greatest benefit per unit cost score. Alternative 3 was selected as the

Preferred Alternative because it is permanent to the maximum extent practicable and will treat approximately 77% of the hydrocarbon mass; the remaining 23% will be located in isolated areas on the Port property and protective of the public and environment.

The Preferred Alternative is a comprehensive remedy that complies with all the applicable remedy selection requirements under MTCA and provides the greatest environmental benefit for the associated cost based on the DCA. This remedy includes the following components:

- Targeted ISCO injections on Washington State Department of Transportation property in the vicinities of MW-04 and MW-30
- Surfactant injection and LNAPL extraction activities within the vicinity of MW-09 (former fuel rack loading area)
- Targeted ISCO injections within accessible areas where soil impacts exceed proposed CULs (CAA-1)
- Targeted ISCO injections along the rail lines where soil concentrations exceed remediation levels (CAA-2)
- Installation of additional monitoring wells along the northwestern and northern Port property boundary
- Inspection of the former Longview Pipeline contents
- Long-term groundwater monitoring for assessment of MNA
- Implementation of ICs and an SMP to protect human health and the environment from exposure to a hazardous substance at the Site

The Preferred Alternative for soil and groundwater meets the minimum requirements for selection of a cleanup action under MTCA (WAC 173-340-360(3)) because it is protective of human health and the environment, complies with cleanup standards, complies with applicable or relevant and appropriate requirements, and provides for compliance monitoring. The predicted restoration time frame for the Preferred Alternative to meet groundwater CULs at the downgradient property boundary for this alternative is estimated to be approximately 5 to 10 years, and the site-wide restoration is estimated to occur less than 10 years to approximately 28 years after remedy implementation is complete. The Preferred Alternative meets Site remedial action objectives and other MTCA requirements for selection of a cleanup action, including using permanent solutions to the maximum extent practicable, providing for a reasonable restoration time frame, and consideration of public concerns.

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List of Abbreviations

Abbreviation	Definition
ADEC	Alaska Department of Environmental Conservation
Agreed Order	Agreed Order # DE 15907
AOPC	Area of potential concern
ARAR	Applicable or relevant and appropriate requirement
AS	Air sparging
AST	Aboveground storage tank
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes

Abbreviation	Definition
CAA	Cleanup Action Area
CAP	Cleanup Action Plan
CDID	Consolidated Diking Improvement District
Chevron	Chevron Environmental Management Company
CMP	Compliance Monitoring Plan
COC	Contaminant of concern
Columbia Report	Columbia Technologies, LLC's High-Resolution Fluorescence/Hydraulic Profile Characterization Report
COPC	Contaminant of potential concern
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
CPOC	Conditional point of compliance
CSM	Conceptual site model
CUL	Cleanup level
DPE	Dual-phase extraction
DRO	Diesel-range organics
DTW	Depth-to-water
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EPH	Extractable petroleum hydrocarbons
FBI	Friedman & Bruya, Inc.
FOE	Frequency of exceedance
Fremont	Fremont Analytical, Inc.
FS	Feasibility Study
GAC	Granular activated carbon
Georgia-Pacific	Georgia-Pacific LLC
GMP	Groundwater Monitoring Plan
GPR	Ground-penetrating radar
GRO	Gasoline-range organics
HPT	Hydraulic profiling tool
IC	Institutional control
ISCO	In situ chemical oxidation
LNAPL	Light non-aqueous phase liquid

Abbreviation	Definition
MCL	Maximum contaminant level
µg/L	Micrograms per liter
µg/m^3	Micrograms per cubic meter
mg/kg	Milligrams per kilogram
mL/min	Milliliters per minute
MNA	Monitored natural attenuation
MPE	Multiphase extraction
MTCA	Model Toxics Control Act
NAVD 88	North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
OIP	Optical image profiler
ORC-A	Advanced Oxygen Release Compound
ORO	Oil-range organics
OSHA	Occupational Safety and Health Act
PAH	Polycyclic aromatic hydrocarbon
PCUL	Preliminary cleanup level
PDI	Predesign investigation
perched zone	Perched water-bearing zone
PLP	Potentially liable party
PLP Group	Port of Longview TPH Site PLP Group
POC	Point of compliance
Port	Port of Longview
PRB	Permeable reactive barrier
Preferred Alternative	Preferred Remedial Alternative
PSET	Portland Sediment Evaluation Team
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
RAO	Remedial action objective
REL	Remediation Level
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan

Abbreviation	Definition
ROW	Right-of-way
SAP	Sampling and Analysis Plan
SEF	Sediment Evaluation Framework
Site	Port of Longview Total Petroleum Hydrocarbons Site
SMS	Sediment Management Standards
SVE	Soil vapor extraction
TEE	Terrestrial ecological evaluation
TEQ	Toxic equivalent
TPH	Total petroleum hydrocarbons
UIC	Underground injection control
USACE	U.S. Army Corps of Engineers
UST	Underground storage tank
VI	Vapor intrusion
VOC	Volatile organic compound
VPH	Volatile petroleum hydrocarbons
WAC	Washington Administrative Code
WestRock	WestRock Longview LLC
Wilson	Wilson Oil, Inc.
WSDOT	Washington State Department of Transportation

1.0 Introduction

This document presents the Remedial Investigation (RI) and Feasibility Study (FS) for the Port of Longview (Port) Total Petroleum Hydrocarbons (TPH) Site (Site) in Longview, Washington (Figure 1.1). The RI/FS was prepared per the requirements of Agreed Order # DE 15907 (Agreed Order) between the Port, Chevron U.S.A. Inc. (Chevron),[7] Georgia-Pacific LLC (Georgia-Pacific),[8] and the Washington State Department of Ecology (Ecology). Other potentially liable parties (PLPs) include Wilson Oil, Inc. (Wilson)[9] and WestRock Longview LLC (WestRock).[10] References to a successor PLP include its predecessors, and references to a predecessor include its successors. The Port, Chevron, Georgia-Pacific, Wilson, and WestRock are collectively referred to as the Port of Longview TPH Site PLP Group (PLP Group).

The RI portion of this report describes the Site, characterizes impacts to Site media, and presents a conceptual site model (CSM). The FS portion of this report describes remedial alternatives that meet Model Toxics Control Act (MTCA) requirements and support current and future property uses.

1.1 PURPOSE AND OBJECTIVES OF REPORT

The purpose of this report is to present an RI/FS consistent with the requirements of the MTCA Cleanup Regulations (Chapter 173-340 of the Washington Administrative Code [WAC]). In particular, this report aims to meet the following objectives:

- Fully describe soil and groundwater quality at the Site using available data.
- Evaluate exposure pathways to chemicals found in soil, groundwater, and vapor.
- Present a CSM.
- Define remedial action objectives (RAOs), applicable or relevant and appropriate requirements (ARARs), and cleanup levels (CULs) appropriate to the Site contaminants of concern (COCs) and continued use of the Site for heavy industrial purpose.
- Define and evaluate remedial action alternatives for cleanup of the Site for future use for heavy industrial purpose.
- Present a preferred remedial action for the Site.

1.2 BACKGROUND

The Site is located at 10 Port Way in Longview, Washington, on the north side of the Columbia River, directly east of the Lewis and Clark Bridge. The total area of the Port's property

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[7] Standard Oil Company of California is Chevron U.S.A. Inc.'s predecessor. Chevron Environmental Management Company manages environmental matters for the Chevron family of companies.

[8] James River Corporation and Crown Zellerbach are corporate predecessors of Georgia-Pacific.

[9] Wilson is doing business as Wilcox & Flegel Oil Company.

[10] Longview Fibre Paper and Packaging, Inc., Longview Fibre Company, and KapStone Kraft Paper Corporation are predecessors to WestRock.

that comprises the Site is approximately 28.2 acres and consists of an office building, multiple buildings and transit sheds, two berths, and an active railyard (Figure 1.2). Land uses at the Site and in the surrounding area are industrial and zoned as heavy industrial.

As a result of the discovery of releases of petroleum products to soil and groundwater associated with various historical uses, the Site was included on the Ecology list of confirmed and suspected impacted sites in 1991. In the past, investigation and remediation work, as well as routine groundwater monitoring, have been accomplished cooperatively between and among members of the PLP Group.

Following the cessation of routine groundwater monitoring in 2014, the following activities occurred:

- In 2015, the Port conducted a review of data gaps and conducted an additional investigation to address priority data gaps. The results of the 2015 investigation are described in the Data Gaps Report (Floyd|Snider 2015).
- In 2016, Ecology issued PLP letters to the Port, Chevron, Georgia-Pacific, Wilson, and WestRock. The Port, Chevron, and Georgia-Pacific worked with Ecology to prepare the Agreed Order, which underwent public comment and was entered with an effective date of February 13, 2019.
- In 2019, an Ecology-approved RI Work Plan (RIWP) addressed the remaining data gaps not assessed during the 2015 investigation and provided the basis for much of the scope of the RI activities (Floyd|Snider 2019a).
- Additionally, in 2019, the Port performed interim action activities to remove exposed portions of the pipelines located beneath Berth 1 and Berth 2 (Floyd|Snider 2019b). Only a small, capped stub from each pipeline remains where the pipelines extend out of the bulkhead (refer to Section 2.3.11 for additional detail).
- In 2021, the Interim Data Report was submitted presenting the results of the initial RI and concluded that soil and groundwater impacts have been defined at the Site (Floyd|Snider 2021; Appendix A).

1.3 REPORT ORGANIZATION

The remainder of this RI/FS is organized as follows:

- **Section 2.0—Site Description and Background:** Provides information on the location, ownership, and historical and current land use at the Site. A summary of previous Site investigations and remedial actions is included.
- **Section 3.0—Remedial Investigation Activities:** Summarizes the RI activities conducted by Floyd|Snider between 2020 and 2021 in accordance with the Ecology-approved 2019 RIWP.
- **Section 4.0—Remedial Investigation Results:** Summarizes soil, groundwater, and soil vapor sample results from RI activities conducted between 2020 and 2021. Section 4.0

includes a discussion on all RI sample results but focuses on results that are not presented in the Interim Data Report, which is attached as Appendix A.

- **Section 5.0—Physical Setting:** Presents the regional and Site geology and hydrogeology, including a description of the two water-bearing zones at the Site.
- **Section 6.0—Exposure Pathway Analysis:** Presents possible exposure pathways for Site media and provides an assessment on whether these pathways should be considered complete/incomplete.
- **Section 7.0—Preliminary Cleanup Levels:** Provides a summary of the approach used to identify the preliminary cleanup levels (PCULs) for contaminants of potential concern (COPCs) and other chemicals of interest in groundwater and soil.
- **Section 8.0—Development of Contaminants of Concern and Proposed Cleanup Standards:** Identifies proposed COCs in groundwater and soil and proposes cleanup standards for the proposed COCs.
- **Section 9.0—Conceptual Site Model:** Presents the CSM for the Site, including potential release mechanisms and historical sources of proposed COCs and the nature and extent of COCs in Site media.
- **Section 10.0—Remedial Investigation Summary and Conclusions:** This section presents a summary of Site COC impacts in soil and groundwater. In addition, this section concludes that the nature and extent of contamination and the current and potential exposure pathways have been determined for the purposes of assessing and selecting remedial alternatives in the FS.

The FS sections of this document are organized as follows:

- **Section 11.0—Feasibility Study Introduction and Objectives:** Presents RAOs, points of compliance (POCs), cleanup standards, and remediation levels (RELs) for the Site.
- **Section 12.0—Identification and Screening of Remedial Technologies:** Lists and summarizes the technologies that could be applied to address COCs and identifies the technologies that are feasible for specific Site conditions. Technologies are either retained for further consideration/evaluation or rejected from consideration.
- **Section 13.0—Description of Remedial Alternatives:** Describes components of the five remedial alternatives, which are aggregations of the technologies retained in Section 12.0.
- **Section 14.0—Alternatives Evaluation and Disproportionate Cost Analysis:** Evaluates the remedial alternatives according to MTCA requirements and evaluation criteria for a cleanup action. This evaluation is then summarized in a disproportionate cost analysis (DCA).
- **Section 15.0—Preferred Remedial Alternative:** Describes in more detail the alternative recommended to Ecology for selection as the Preferred Remedial Alternative (Preferred Alternative) for the cleanup of the Site based on the results of

the alternatives evaluation and DCA, and how the Preferred Alternative meets the RAOs and complies with MTCA and ARARs.

- **Section 16.0—References:** Presents the sources cited in the RI/FS.

Documentation supporting this RI/FS are provided in the following appendices:

- **Appendix A—Interim Data Report:** Includes a summary of the field work and results associated with the RI field work.
- **Appendix B—MTCA Method B and C Calculation Workbooks:** Includes the workbook calculations for all soil sample results used for developing direct-contact CULs.
- **Appendix C—EPH/VPH Plots:** Shows the extractable petroleum hydrocarbons (EPH)/volatile petroleum hydrocarbons (VPH) data for select samples in relation to carbon ranges for gasoline, diesel, and Bunker C fuel.
- **Appendix D—Monitored Natural Attenuation at Port of Longview TPH Site:** Provides a summary and conclusions of the monitored natural attenuation (MNA) data.
- **Appendix E—Laboratory Analytical Reports:** Includes all laboratory analytical reports associated with the RI activities.
- **Appendix F—Aquifer Testing Report:** Provides a summary and conclusions of the aquifer testing conducted.
- **Appendix G—Historical Groundwater Data:** Includes historical groundwater analytical data collected prior to 2015.
- **Appendix H—Terrestrial Ecological Evaluation:** Includes the simplified terrestrial ecological evaluation (TEE) completed for the Site.
- **Appendix I—Detailed Cost Estimates:** Includes detailed cost estimates for each remedial alternative.
- **Appendix J—Boring Logs:** Includes all historical and recent borings logs.
- **Appendix K—OIP and Fluorescence Response Cross Sections:** Includes transects and cross sections across the entire Site showing the fluorescence and optical image profiler (OIP) results. The lateral and vertical extent of the proposed remedial activities for Alternatives 3 and 4 are included for a clearer understanding of the volume of mass to be targeted with these two alternatives. Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.

2.0 Site Description and Background

This section provides a description of the Site and relevant historical Site operations based on information provided in previous reports (Golder 1994, 2000; Landau 2012) and supplemented by the Agreed Order and by Floyd|Snider's review of additional Site records. This section also includes a summary of previous environmental investigations and interim actions conducted between 1991 and 2019. The general location of the Site is shown in Figure 1.1, and the Site and its surroundings, including vicinity property ownership, are show in Figure 1.2. Figure 2.1 shows locations of historical Site features.

2.1 SITE DESCRIPTION

The Site is designated Ecology Facility Site ID No. 42978181 and is officially referred to as the Port of Longview TPH Site. The Site is located at 10 Port Way in Longview, Washington, on Cowlitz County parcels 10180, 1018101, and a portion of 10171, Section 8/Township 7N/Range 2W. The total area of the Site, shown on Figure 1.1, is approximately 28.2 acres, and the mean Site elevation is approximately 25 feet North American Vertical Datum of 1988 (NAVD 88).

The Site is currently zoned as heavy industrial and is used for Port operations and marine cargo operations, which include a rail-dependent bulk export facility. Activities, uses, and structures in support of those operations include storage of cargo handling equipment, cargo storage, conveyers, rail dump pit, baghouses, ship loader, office, maintenance shop, wastewater pre-treatment plant, transit sheds, and maintenance material storage. Site buildings include the former U.S. Army Reserve building and Former Port of Longview Office. Both buildings contain office space and are occupied. The Site also has a number of unoccupied storage warehouses and sheds. The Site is almost entirely paved except for areas of rail track infrastructure and a material storage area north of the former Warehouse 9 building footprint.

The Site is expected to have similar land use in the future. A log export facility owned by Weyerhaeuser NR Company and an active bulk fuel facility owned by Wilson are located northwest- and northeast-adjacent to the Site, respectively. The Columbia River and Port property (formerly owned by International Paper Company) border the Site to the southwest and southeast, respectively. The rail lines are owned by the Port and/or BNSF Railway Company, and the Port operates the rail lines that traverse the Site (Figure 1.2).

2.2 SITE AND OPERATIONAL HISTORY

The Port has been operating at this location on the Columbia River since the early 1900s and supports a variety of regional, national, and international industries as a bulk and break bulk marine cargo facility. The Port property, which includes portions of the Site and extends beyond the Site, contains ship berths, railyard, and associated warehouse and transit shed buildings to accommodate the marine cargo. Historical Site features are shown in Figure 2.1. Many of the historical Site features were owned or operated by multiple PLPs. References to these facilities by name (e.g., Standard Pipelines or Longview Pipeline) are not intended to suggest that those entities, their predecessors, or their successors are liable or otherwise responsible for possible releases from them described in the Agreed Order or in this RI/FS. The following summary is repeated from the Agreed Order findings of fact:

> "A. The Port of Longview consists of multiple parcels along the Columbia River spanning approximately 835 acres. The parcel where the Site is primarily located is owned by the Port of Longview, and is designated as Heavy Industrial in the City of Longview's zoning code (Chapter 19.58 Longview Municipal Code) and lies approximately 31 feet above mean sea level, and is depicted in Exhibit A [of the Agreed Order] (Port Property). The investigation data to date indicate the Site is approximately 28.2 acres in size, as depicted in Exhibit A [of the Agreed Order]. The Site is almost entirely paved, except for areas of rail track infrastructure.
>
> "B. The Site is bordered in each direction by the following: The Columbia River to the southwest; Washington State Route 433 (Lewis & Clark Bridge) and an active lumber production facility owned by Weyerhaeuser NR Company to the northwest; an active bulk fuel facility (Bulk Plant) owned by Wilson and formerly owned by Chevron to the northeast; and property currently owned by the Port and formerly owned by International Paper Company to the southeast. BNSF Railway Company owns and operates rail lines that traverse the Site.
>
> "C. The area of land within the Site has been owned primarily by the Port since the early 1900s. The Port formerly operated a 4,000-gallon underground storage tank (UST) and an 8,000-gallon UST on the Port Property (Port USTs). Calloway Ross, Inc. (Calloway) operated a 675-gallon UST (Calloway UST) on the Port Property. The United States Army Reserve operated a 2,800-gallon UST on the Port Property (Army UST). Correspondence between Wilson and the Port in 1993 suggests an additional UST used to stored gasoline may have been located near the [former] Army Reserve building on the Port Property.
>
> "D. Chevron, or its predecessor, Standard Oil Company of California (Standard Oil) installed pipelines on the Site in 1926 that ran parallel to Port Way beneath the BNSF rail lines, to transfer petroleum products between the Bulk Plant and shipping berths along the Columbia River (Standard Pipelines). Standard Oil or Chevron owned the Standard Pipelines until 1986, when they were conveyed to the Port under the terms of a Termination of License Agreement (Termination Agreement). In accordance with the Termination Agreement, Chevron removed hydrocarbon liquids from the Standard Pipelines, cleaned the Standard Pipelines between the Bulk Plant and their terminus at the shipping berths, and flushed the Standard Pipelines with water and air.
>
> "E. KapStone (formerly Longview Fibre Company) constructed and began operating a pipeline (Longview Pipeline), fuel loading racks, and an

80,000 barrel aboveground storage tank (AST) on the Port Property in approximately 1935 to transfer and store petroleum products. The Longview Pipeline was positioned slightly east of the Standard Pipelines. In the 1950s, the AST was connected to the Standard Pipelines. After the connection was made, petroleum products were transferred to the AST from the Standard Pipelines. KapStone owned the Longview Pipeline, fuel loading racks, and AST until 1973, when it sold the AST to Crown Zellerbach Corporation ("Crown Zellerbach"), a corporate predecessor of Georgia-Pacific.

"F. Crown Zellerbach owned the AST from 1973 to 1983. Crown Zellerbach used the AST and Standard Pipelines to transfer and store petroleum products and ballast seawater from tanker ships.

"G. Wilson operated the Standard Pipelines on behalf of Chevron and Standard Oil between 1971 and 1985. Wilson operated the AST on behalf of Crown Zellerbach between 1974 and 1983.

"H. The Standard Pipelines, Longview Pipeline, loading racks, AST, Calloway UST, Port USTs, and Army UST have been abandoned and/or removed in various phases. No petroleum products have been stored or distributed at the Site since 1996.

"I. Petroleum contaminated soil and groundwater was first discovered in 1991 during the decommissioning and removal of the Calloway UST, located in the northwestern corner of the Site. The Port conducted several phases of subsurface investigations between 1992 and 1994 in response to this discovery. The results of the subsurface investigations are generally summarized in a *Phase IV Characterization Report – Bunker C and Diesel Fuel Investigation,* prepared by Golder Associates, dated December 7, 1994. A brief summary of each of these phases is provided below and a figure of the related areas is included in Exhibit A [of the Agreed Order].

"i. Phase 1: Gasoline, diesel fuel, and Bunker C were detected in soil and groundwater in the railyard east of [former] Warehouse 9, as well as in the area formerly leased by Calloway.

"ii. Phase 2: Petroleum contaminated soil and groundwater were detected and associated with the Calloway UST and the Standard Pipelines and Longview Pipeline.

"iii. Phase 3: Two separate zones of soil and groundwater contamination were characterized, suggesting that at least two separate and distinct leaks from pipes have occurred.

"iv. As a separate action from the investigations originating with the Calloway UST, the Port removed the Port USTs from the vicinity of the [former] mechanics shop at the time of the Phase 3 investigation. Analysis of groundwater samples near the mechanic shop indicated the presence of gasoline, diesel, and Bunker C. Because the USTs only contained gasoline, a Phase 4 investigation was conducted to investigate the mechanic shop area and the pipeline locations between the mechanics shop and the Columbia River for the source of diesel and Bunker C contamination.

"v. Phase 4: Soil and groundwater were found to contain significant concentrations of gasoline, diesel, and Bunker C throughout the investigation area. The identified impacts to soil and groundwater were generally located north of the [former] mechanics shop area along the pipeline corridor.

"J. The investigations identified petroleum products in the gasoline, diesel, and oil carbon-ranges, and other petroleum-related constituents (e.g., benzene, toluene, ethylbenzene, and xylenes) in the subsurface at concentrations exceeding MTCA Method A soil and groundwater cleanup levels for unrestricted land use. The investigations suggest the Standard Pipelines, the Longview Pipeline, the fuel loading racks, the AST, the Calloway UST, the Port USTs, the Army UST, and the practices commonly associated with the storage and transfer of fuel are likely the principal sources of subsurface contamination at the Site.

"K. Remedial activities at the Site began in the 1990s as part of an independent cleanup action. In 1992, gasoline was detected in soil at depths below the groundwater table on the southwest side of the AST, and diesel and Bunker C fuel were detected at depths between 1.5 to 8 feet below ground surface (bgs) on the east and south sides of the AST. The highest concentrations of petroleum in surface soils were located beneath the AST. In 1996, soil in the vicinity of the AST was excavated to the soil and groundwater interface at a depth of approximately six feet bgs. Confirmation samples taken from the final limits of the excavation indicated residual petroleum products in the diesel carbon-range were present at concentrations above the MTCA Method A soil cleanup level for unrestricted land use and were left in place in a localized area at the southern extent of the excavation. Further excavation was limited by high groundwater, sandy soils, and the proximity to the BNSF rail lines.

"L. In spring 1996, approximately 800 cubic yards of surface soils impacted with petroleum were removed from the parcel formerly leased by Calloway. The impacts were likely related to historical activities occurring on the parcel. This remedial action did not fully address the subsurface impacts related to the Calloway UST.

"M. In December 2013, Ecology performed a Site Hazard Assessment (SHA) of the Site. The Site was given a hazard ranking of 2 out of 5 (1 being Ecology's highest priority for cleanup).

> "N. In 2015, the Port retained Floyd|Snider to conduct a data gap analysis to further delineate the extent of soil and groundwater impacts at the Site (Floyd|Snider investigation). The Floyd|Snider investigation included 30 direct-push soil borings focused on the south and west portions of the Site, collection of 16 grab groundwater samples from those borings, and collection of a groundwater sample from an existing monitoring well. The Floyd|Snider investigation indicated that petroleum-impacted soils are primarily located beneath the BNSF rail lines and that petroleum-impacted groundwater does not extend beyond the Port Property boundary to the northwest and not extend to the Columbia River to the southwest. The Floyd|Snider investigation identified several additional tasks to aid in the development of the remedial investigation and feasibility study.
>
> "O. In February 2016, approximately 5 gallons of petroleum product were released from abandoned pipelines beneath shipping berths 1 and 2 along the Columbia River through two separate corroded areas. The Port conducted spill response actions, plugged the leaks, and reported the releases to the United States Coast Guard and Ecology."

2.3 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

The nature and extent of impacted soil and groundwater at the Site has been investigated through multiple environmental investigations, which were conducted between 1991 and 2019. Additionally, multiple interim actions, including excavation and offsite disposal of petroleum-impacted soil, capping of exposed pipelines, and removal and disposal of pipelines beneath the berths, have also been implemented during this time period. Boring logs from historical and recent investigations are compiled in Appendix J.

2.3.1 1991 Extent of Contamination Investigation

In February 1991, the Port retained Petroleum Services Unlimited, Inc., to investigate soil and possible impacts associated with a recently decommissioned 675-gallon UST on the Calloway Ross Parcel that reportedly contained gasoline hydrocarbon product (PSU 1991). Eight soil borings were advanced and multiple soil samples were collected and analyzed for TPH products. Additionally, five monitoring wells, MW-01 through MW-05, were installed in areas upgradient and downgradient of the decommissioned UST (Figure 2.2).

Results from the investigation showed subsurface soil diesel-range organics (DRO) and gasoline-range organics (GRO) impacts up to 13,000 and 1,500 milligrams per kilogram (mg/kg), respectively, north (downgradient) of the former UST. Results are summarized in the 1991 report (PSU 1991).

2.3.2 1992 Phase I Investigation

In September 1992, Golder Associates was retained to further investigate and delineate the diesel impacts identified in the 1991 Extent of Contamination Investigation.

The Phase I investigation expanded the investigation area to include the former Calloway UST area, the pipelines underlying the east-adjacent railyard, and the 80,000-barrel AST and associated fuel area (Golder 1993a). Six additional monitoring wells, MW-06 through MW-12, and one soil boring were installed within the study area, and eight test pits (2 to 15 feet deep) were excavated around the perimeter of the AST (Figure 2.2). Results showed elevated concentrations of GRO, DRO, and other (Bunker C fuel) detections in soil boring locations, and elevated concentrations of GRO (up to 3,100 micrograms per liter [µg/L]) and DRO (up to 1,650 µg/L) in groundwater samples collected from monitoring wells. Further results are summarized in the Phase 1 report (Golder 1993a).

2.3.3 1993 Phase II Investigation

In March 1993, Golder conducted a Phase II investigation, which included using ground-penetrating radar (GPR) to map locations of underground pipelines and collecting shallow soil samples to identify potential soil impacts related to the former Calloway UST, pipelines, and 80,000-barrel AST. Results confirmed three north–south target trends, parallel to and under the railroad tracks, varying from 3 to 6 feet in depth (Golder 1993b). Based on historical records, two of the north–south trends were identified as the Standard and Longview Pipelines, and the third was hypothesized as being potentially a water line. The GPR survey did not detect any additional USTs within the vicinity of the former Calloway UST or 80,000-barrel AST; however, GPR results identified four “anomalous soil areas.” Results are summarized in the Phase II report (Golder 1993b).

2.3.4 1993 Phase III Investigation

Following the Phase II investigation, Golder conducted a Phase III investigation, intending to further characterize the nature and extent of soil and groundwater impacts as well as identify potential source areas (Golder 1993c). This involved installing nine new monitoring wells, MW-13 through MW-21, located in the 80,000-barrel AST vicinity and in the railroad tracks between the Calloway Ross Parcel and the AST, and sampling existing monitoring wells (Figure 2.2). Soil samples were also collected during drilling.

Groundwater samples showed the presence of two diesel plumes: a plume between the Calloway Ross Parcel and the AST with DRO in groundwater detected at concentrations up to 250,000 µg/L, and a second, smaller plume north of the AST underneath the railroad tracks. Elevated concentrations of GRO in groundwater were also detected up to 5,800 µg/L in two areas: the vicinity of the former Calloway UST and southwest of the AST underneath the rail lines. Results from the soil investigation showed three zones of elevated DRO and TPH-other concentrations: a zone in the northern portion of the Site near the former Standard Pipelines, a zone adjacent to the AST, and an elongated zone in the central portion of the study area, stretching from the location of the former Calloway UST south underneath the rail lines. A zone of GRO impacts was identified, stretching east–west through the center of the study area. The investigation is summarized in the Phase III report (Golder 1993c).

2.3.5 1993 Underground Storage Tank Investigation

In July 1993, Golder performed a UST investigation of soil and groundwater surrounding two USTs that had recently been removed near the former mechanic's shop, in the southern portion of the study area, southeast of former Warehouse 9 and the Calloway Ross Parcel (Golder 1993d). Approximately 15 cubic yards of petroleum-contaminated soil was removed during the decommissioning of the 4,000- and 8,000-gallon gasoline USTs associated with the Port's former mechanic's shop. Three soil borings were advanced and sampled and one monitoring well was installed. Analytical results indicated that petroleum hydrocarbons were not detected in the soil samples, although groundwater from one sample point contained elevated concentrations of GRO, DRO, and TPH-other.

2.3.6 1994 Phase IV Investigation

In March and June 1994, Golder performed a Phase IV investigation, which expanded the study area of the earlier investigations to the south and provided additional detail on sources of soil impacts as identified by previous GPR surveys and on the extent of southward groundwater impacts (Golder 1994). GPR and visual inspections were used to confirm the location of the pipelines in the southern portion of the Site; the Standard Pipelines were observed to "branch" approximately 50 feet south of the former mechanic's shop, with one branch terminating underneath present-day Berth 1 and the other under Berth 2. GPR results determined that the Longview Pipeline terminated at present-day Berth 2.

Additionally, eight new monitoring wells were installed, MW-22 through MW-29, and existing monitoring wells were sampled (Figure 2.2). One soil boring was advanced, and a groundwater grab sample was collected through a temporary well point. Analytical results from the Phase IV investigation identified an additional zone of DRO soil impacts, as well as a DRO- and GRO-impacted groundwater plume, located in the area around and to the north of the former mechanic's shop.

2.3.7 1995–1996 Focused Feasibility Studies and Interim Actions

In August 1995, the 80,000-barrel AST was removed, two monitoring wells were installed, T-1 and T-2, and surface soil samples that were collected from the foundation sand immediately beneath the AST indicated TPH ranging in concentrations from 55 to 66,000 mg/kg. Soil sample results from T-1 show DRO and oil-range organics (ORO) impacts in the top 3 feet at T-1; hydrocarbons were not detected at T-2. In 1996, Golder prepared focused FSs for two areas at the Site, the soil impacts on the Calloway Ross Parcel and soil impacts associated with the 80,000-barrel AST, based on results from their previous investigations (Golder 1996b). Based on an evaluation of all proposed alternatives, biotreatment with off-site landfill was proposed for both areas containing soil impacts.

In May 1996, TPH-impacted soil was excavated from three shallow excavations on the Calloway Ross Parcel and stockpiled onsite. Initial verification samples indicated that impacted material remained in the northern part the excavation near the rail lines, and the excavation was subsequently expanded. On December 10, 1996, 800 cubic yards of stockpiled impacted soil was transported off-site for thermal treatment and disposal.

In 1996, an interim cleanup action was conducted below and around the footprint of the former 80,000-barrel AST, during which approximately 5,000 cubic yards of petroleum-impacted soil was removed and transported off-site for disposal, including material associated with the surface soil samples in 1995. Twelve compliance soil samples were collected from below the footprint of the former AST. Concentrations from all compliance samples, except one floor sample, were less than their respective MTCA Method A CULs (Golder 1996b).

2.3.8 1999–2014 Groundwater Monitoring

In June 1998, three perimeter wells, MW-30, MW-31, and MW-32, were installed and included as part of the groundwater sampling program conducted by Golder between 1999 and 2014 (Figure 2.2). The groundwater sampling program during this period included groundwater monitoring at select monitoring wells along the perimeter (MW-1, MW-4, MW-23, MW-27, MW-30, MW-31, and MW-32) and interior (MW-10 and MW-12) of the groundwater contaminant plumes identified in previous Site investigations. All wells were sampled on an annual basis, except for MW-30, which was sampled quarterly between 1999 and 2000 before being sampled annually. In 1999, absorbent socks were installed in four monitoring wells (MW-3, MW-7, MW-9, and MW-20) to absorb accumulated petroleum hydrocarbon product previously observed. Socks were monitored quarterly by Golder until 2000 when Port staff took over monitoring and annual sock replacement, which occurred until 2014.

Analytical results from annual groundwater monitoring indicated that no detectable concentrations of petroleum hydrocarbons were found in the seven perimeter monitoring wells throughout the duration of monitoring. Interior monitoring wells MW-10 and MW-12 showed detections of GRO, benzene, and 2-methylnaphthalene, as well as sporadic DRO concentrations, greater than MTCA Method A CULs. Maximum detections of GRO, benzene, 2-methylnaphthalene, and DRO at the interior wells were 5,800, 840, 99, and 3,200 µg/L, respectively (Golder 2015). Annual monitoring reports concluded that impacts underlying the railroad yard, Calloway Ross Parcel, the former 80,000-barrel AST, and loading racks had not migrated laterally away from source areas.

2.3.9 2011 and 2016 Sediment Investigations

In June 2011, the Port characterized sediments offshore of the Site in support of a maintenance dredging and berth deepening project in accordance with a U.S. Army Corps of Engineers (USACE) Regional Sediment Evaluation Team-approved Sampling and Analysis Plan (SAP; Anchor QEA 2011). The Port performed additional sediment characterization in October 2016 under a separate USACE Portland Sediment Evaluation Team (PSET)-approved SAP in support of maintenance dredging (Anchor QEA 2017). The work in both 2011 and 2016 included collection and characterization of composited sediment samples from four dredged material management units spanning between Berths 1 and 9. Chemical analysis of the sediments included DRO, ORO, and polycyclic aromatic hydrocarbons (PAHs), among other Sediment Evaluation

Framework (SEF) and Sediment Management Standards (SMS) freshwater COCs, such as metals, semivolatile organic compounds, polychlorinated biphenyls, and pesticides. The analytical results were compared to both MTCA Method A unrestricted land use and industrial land use for potential upland disposal and SEF freshwater toxicity-based screening levels for in-water disposal.

The analytical results from both 2011 and 2016 investigations indicate that no chemicals exceeded the SEF and SMS freshwater criteria or the MTCA Method A industrial criteria (Floyd|Snider 2019a). One sample collected in 2011 near Berths 6 and 7, approximately 3,000 feet east of Berth 2, exceeded the MTCA Method A unrestricted land use criterion for benzo(a)pyrene; the sample was collected from a deeper interval identified as native material, however, and the detected PAHs were determined to be likely naturally occurring. Another sample collected in 2011 near Berth 2 was noted to have a very slight hydrocarbon odor in the surface interval of the core; however, subsequent chemical analysis detected neither DRO nor ORO. In 2016, all analytical results were less than the MTCA Method A criteria for unrestricted land use. During this event, PAHs were detected only near Berth 1, at concentrations less than the SEF screening levels. The 2017 Anchor QEA Sediment Characterization Report indicated that these detections were likely due to a limited crude oil spill in February 2016 (refer to Section 2.3.11 for additional information; Anchor QEA 2017); no petroleum was detected in this area.

As such, the sediment characterization investigations in both 2011 and 2016 indicate that dredged sediments were suitable for a variety of uses including upland beneficial reuse or in-water disposal. Additionally, prior to 2011, the sediments were ranked as “low-moderate” risk for potential biological effects or elevated concentrations of contaminants as described in the Dredged Material Management Program User Manual (DMMP 2013). The 2011 report concluded that based on the chemical concentrations, the ranking should be recharacterized to “low” (Anchor QEA 2011). The investigation conducted in 2016 confirmed this site recommended ranking of “low,” which is established after lines of evidence, such as chemical analysis, indicate that depositional materials do not originate from or near impacted areas and do not contain chemical contaminants at levels of concern (Anchor QEA 2017). In addition to the detected sediment concentrations being less than the SEF (and therefore SMS) freshwater screening levels, the 2016 chemical concentrations were also compared by PSET to the Oregon Department of Environmental Quality fish-based screening level values for bioaccumulative COCs. The concentrations were also less than those values. The basis of both of those comparisons supported the determination that the dredge prism sediment is suitable for in-river unconfined aquatic disposal and is not a risk to the environmental or human health. The Port received a suitability determination for dredged berth sediments from USACE PSET in 2017 (USACE 2017). Relative to protection of human health, there is no intertidal beach area or pathway for human exposure.

These findings, as well as Site hydrological studies confirming the groundwater flow direction in the alluvial aquifer is to the north, away from the river, indicate there is no upland source of impacts to sediments.

2.3.10 2015 Data Gaps Investigation

In 2015, Floyd|Snider conducted a priority data gaps investigation to fill priority data gaps related to the extent of soil and groundwater impacts at the Site; specifically, the southern and western edges of known impacts, uninvestigated areas adjacent to the pipelines in the southern portion of the property, and along the shoreline of the Columbia River (Floyd|Snider 2015). The results from the data gaps investigation were used to identify areas of potential concern (AOPCs) that needed further investigation to fully characterize the Site.

As part of the investigation, 30 soil borings (GP-1 through GP-30) were advanced at the Site immediately following the demolition of Warehouse 9, the mechanic's shop, and the Gear Locker A buildings (Figure 2.2). Groundwater screening samples were also collected from 16 direct-push soil borings and MW-23. Groundwater samples were analyzed for DRO; GRO; and benzene, toluene, ethylbenzene, and xylenes (BTEX), and soil samples were analyzed for hydrocarbon identification, GRO, DRO, and ORO.

Soil samples collected from borings in the footprint of former Warehouse 9 indicated that concentrations of all constituents were less than either their respective MTCA Method A CULs or the laboratory quantitation limits. Groundwater data indicated that DRO concentrations exceeded the MTCA Method A CUL in locations GP-1, GP-2, and GP-6. Despite the exceedances of the CUL, the detected concentrations were concluded to be low enough to indicate the edge of the dissolved-phase plume.

Additionally, four soil borings (GP-5, GP-7, GP-8, and GP-9) were advanced adjacent to an inferred portion of the Weyerhaeuser pipeline that reportedly traverses the southern part of the Site (Figure 2.2). The concentrations of all analytes were less than their respective MTCA Method A CULs or the laboratory quantitation limits.

Groundwater samples were collected from direct-push borings adjacent to the pipelines in the southern portion of the property, including five borings adjacent to the Columbia River. The groundwater analytical results indicate that DRO, GRO, and BTEX were detected at concentrations less than their respective MTCA Method A CULs. In addition, the soil analytical data from the five borings adjacent to the Columbia River, GP-13 through GP-17, show concentrations of all constituents less than their respective MTCA Method A CULs.

The analytical results from soil samples from all but two borings adjacent to the eastern pipelines show residual hydrocarbons at concentrations less than the MTCA Method A CULs. Soil samples from those two borings (GP-18 and GP-27) resulted in detections exceeding the MTCA Method A CULs. DRO and ORO were detected in soil at concentrations exceeding their respective MTCA Method A CULs at depths ranging between 14 and 15 feet bgs in boring GP-27, which is located east of the former mechanic's shop and adjacent to the former Longview Pipeline.

Farther south in soil boring GP-18, impacted soil was encountered at depths ranging between 27 and 28 feet bgs. The impacted soil encountered in GP-18 is limited in vertical extent to a 1-foot depth interval and is geographically isolated from impacts present to the north at the Site.

Soil boring GP-18 is located in the southwestern portion of the Site, northeast of Transit Shed 2 and adjacent to the easternmost Longview and Standard Pipelines.

During the September 2015 investigation, an effort was made to delineate the extent of residual hydrocarbons in soil boring GP-18. Soil borings GP-16, GP-28, and GP-29 were advanced to the south, west, and east of GP-18, respectively (Figure 2.2). Soil analytical data from these borings show petroleum hydrocarbon concentrations less than the MTCA Method A CULs or the laboratory quantitation limits. Due to the presence of utilities and current operations in Transit Shed 2, soil borings could not be advanced along the pipeline southwest of GP-18. The data gaps investigation also included a review of boring logs and groundwater level data that resulted in a refinement of the CSM that distinguished between the shallow perched water-bearing zone (perched zone) in the central portion of the Site and an underlying alluvial aquifer. This change is reflected throughout the RI; refer to Sections 3.5, 4.5, and 5.2.

2.3.11 2016–2019 Spill Response and Interim Action

On February 17, 2016, Port personnel noticed a small petroleum sheen on the water in front of Berth 1. The cause of the sheen was found to be drippage from a corroded section of a former pipeline underneath the berth. Best management practices, including deploying hard and oil-only adsorbent booms around the drip location, were used to contain the drippage and sheen, and oil-adsorbent pads were used to collect any oil within the booms. The National Response Center, U.S. Coast Guard, and Ecology were notified within hours of discovery, as was NRC Environmental Services, the Port's spill response contractor. The Port developed an initial response plan to inspect the booms and check on the pipe and plug daily and to eventually remove the pipes. No further drips were noted after the hole was plugged.

On March 4, 2016, a second leak was discovered close to the location of the first leak but from another pipeline underneath the berths. It is suspected that the initial activity in responding to the leak caused a shift in the adjacent pipelines, resulting in the second leak. The Port responded by redeploying the hard boom on the outer perimeter and using oil-only adsorbent booms and adsorbent pads, as was done before. Due to the advanced corrosion on that section of pipe, it was not possible to cut and plug the leak. Therefore, the Port had to evacuate the product in that section of pipe and place a bucket with pads under the pipe to contain any remaining drippage. It is estimated that approximately 5 gallons of petroleum product was released from abandoned pipelines beneath shipping Berths 1 and 2.

After consultation with Ecology, it was determined that the final action to prevent future releases should be conducted under Ecology's authority via an interim action conducted under the Agreed Order with the Toxics Cleanup Program. All containments and sorbent booms remained in place and weekly inspections were conducted until interim action activities began. In April and May 2019, the interim action was completed at the Port to remove the deteriorating portions of the Standard and Longview Pipelines that were exposed under Berths 1 and 2. All activities associated with the interim action were in accordance with the Interim Action Work Plan, which is included as Exhibit C in the Agreed Order. The Final Interim Action Completion Report that documents the removal activities was submitted to Ecology in September 2019 (Floyd|Snider 2019b).

2.3.12 2019 Early Season Groundwater Sampling and Monitoring

Floyd|Snider performed groundwater monitoring and sampling activities between February 27 and March 1, 2019. The intent of the Site-wide sampling event was to collect data during winter from wells that have typically been dry at other times of year and to obtain current Site-wide groundwater data. Groundwater samples were collected from 29 of 32 monitoring wells and analyzed for GRO, DRO, and ORO (with and without silica gel cleanup) and BTEX. Prior to collecting groundwater samples, depth to groundwater, total depth, and light non-aqueous phase liquid (LNAPL) thickness measurements were collected from all existing monitoring wells on the property, except for MW-8, which could not be opened due to a damaged well box and bolts.

Groundwater analytical results, included in the Interim Data Report, were consistent with previous sampling, although typically at lower concentrations than previous efforts, that delineated impacts and indicated MTCA Method A CUL exceedances of benzene, GRO, and DRO in monitoring wells screened within the alluvial aquifer located in the central portion and northern portions of the Site (Floyd|Snider 2021; Appendix A). Additionally, MW-28, screened in the vadose zone, had detections of DRO and ORO at concentrations greater than MTCA Method A CULs. MW-09 contained LNAPL at a thickness of 0.01 feet and was not sampled (Floyd|Snider 2021; Appendix A). Absorbent socks were present in monitoring wells MW-03, MW-07, MW-09, and MW-20 and were removed and disposed of as non-hazardous waste, except for the sock in MW-09. The sock in MW-09 was raised to hang above the groundwater. The goal of removing the socks was to assess whether LNAPL thicknesses would recover.

3.0 Remedial Investigation Activities

As outlined in the RIWP (Floyd|Snider 2019a), site characterization activities were conducted at the Site between 2019 and 2021 to further evaluate and delineate environmental impacts from historical Site activities within nine AOPCs (Figure 3.1). RI work activities were based on the following data needs, identified in the RIWP:

- Nature and extent of impacts, including focused questions of spatial extent, data density for quantifying contaminant volumes, and other data needed for evaluation of remedial alternatives, as might be required
- Assessing seasonal change in the extent of groundwater impacts based on four quarters of groundwater monitoring
- Collecting sufficient data to confirm Site COPCs and COCs and determine CULs
- Collecting sufficient hydrogeologic data to understand the hydrogeology potentially affecting contaminant fate and transport at the Site

Initial RI work activities were conducted during two mobilizations (Phase I and Phase II), including all utility locating, monitoring well surveying, soil collection, sampling analyses, and other data needs, summarized in Sections 3.1 and 3.2 and detailed in the Interim Data Report (Floyd|Snider 2021; Appendix A). Following the Phase I and Phase II activities in 2019 and 2020, described in Sections 3.1 and 3.2 respectively, additional RI work was performed in 2020 and 2021, including four consecutive quarters of groundwater monitoring and sampling as described in Section 3.1.3; two rounds of soil vapor sampling as described in Section 3.4; and hydrogeologic characterization as described in Section 3.5. All activities were conducted in accordance with the Ecology-approved RIWP and associated SAP/Quality Assurance Project Plan (QAPP). Results from RI activities are summarized in Section 4.0.

3.1 PHASE I ACTIVITIES

Phase I fieldwork occurred between November 13, 2019, and November 22, 2019, and consisted of Columbia Technologies, LLC, conducting a high-resolution fluorescence/hydraulic profile characterization of the Site with oversight by Floyd|Snider personnel. This was accomplished using an optical image profiler (OIP) manufactured by Geoprobe and a hydraulic profiling tool (HPT) attached to a direct-push drill rig to investigate the potential for remaining LNAPL and TPH impacts in the subsurface at 73 locations across the Site (OIP-01 through OIP-73; Figure 3.1). The objective of the OIP sampling was to provide detailed delineation of remaining LNAPL and residual TPH impacts. The HPT was used to obtain hydrostratigraphic data in relevant AOPCs.

In addition to the OIP/HPT boring locations, six direct-push boring locations were advanced immediately adjacent to select OIP/HPT locations during Phase I of RI fieldwork to collect continuous soil samples and analytical data (OIP-08, OIP-30, OIP-42, OIP-52, OIP-53, and OIP-66; Figure 3.1). The lithology and analytical results from these direct-push borings were compared to the OIP/HPT results prior to selecting direct-push locations during Phase II. The select direct-push locations were advanced in areas with low to significant hydrocarbon impacts and varying hydrostratigraphy to evaluate the OIP/HPT response data. The OIP/HPT and direct-push locations advanced during the Phase I activities are shown on Figure 3.1. Boring logs are included in Appendix B of the Interim Data Report (Floyd|Snider 2021; Appendix A).

3.2 PHASE II ACTIVITIES

Phase II fieldwork occurred between March 9 and March 13, 2020, and included advancing 32 soil borings, installing two soil vapor points (VP-1 and VP-2) and eight monitoring wells (MW-33 through MW-40), collecting surface soil samples beneath Berth 1 and Berth 2, and conducting a survey for all monitoring wells and vapor points. Direct push borings were advanced adjacent to 24 Phase I OIP/HPT borings (OIP-02, OIP-04, OIP-05, OIP-06, OIP-15, OIP-18, OIP-19, OIP-20, OIP-21, OIP-23, OIP-31, OIP-39, OIP-46, OIP-47, OIP-49, OIP-54, OIP-57, OIP-64, OIP-67, OIP-68, OIP-69, OIP-70, OIP-72, and OIP-73) and at eight additional locations (GP-31 through GP-38; Figure 3.1). The Phase I OIP/HPT and soil data results, along with results from previous investigations (designated GP-1 through GP-30), were used to determine the direct-push and monitoring well locations. Phase I and Phase II soil boring and monitoring well locations, as well as previous investigation locations, are shown on Figures 3.1 and 3.2. Soil and groundwater samples were collected from direct-push borings and soil samples were collected during the installation of monitoring wells to help obtain quantitative soil and groundwater results. A total of 23 soil samples from these boring locations were collected for EPH/VPH analysis to calculate median Site-specific MTCA Method B and C TPH CULs.

Direct-push locations were selected to collect vertical and lateral laboratory analytical samples to delineate the extent of impacts and to assist in future assessments of the volume of TPH-impacted soil. Within each AOPC, at least one direct-push boring was advanced in an area containing residual TPH impacts identified by OIP/HPT to obtain quantitative results and to delineate the vertical extent of TPH impacts within the AOPC. The soil samples for additional EPH/VPH analysis were collected at a range of depths to characterize impacts within each AOPC.

3.3 QUARTERLY GROUNDWATER MONITORING

Four consecutive quarters of groundwater monitoring and sampling were performed in accordance with the Ecology-approved RIWP: May, August, and November 2020 and February 2021. Prior to collecting groundwater samples, depth-to-water (DTW) measurements were collected in all accessible wells, and wells were checked for the presence of LNAPL. If there was a sufficient volume of water, groundwater samples were collected in accordance with the RIWP and any applicable Ecology-approved amendments to the sampling program. Monitoring well locations are shown on Figure 3.2.

In May and August 2020, groundwater samples were collected from 35 of 40 and 36 of 41 planned sampling wells, respectively. Selected monitoring wells not sampled for the following reasons:

- LNAPL was present (MW-09).
- There was an insufficient volume of groundwater (MW-05 and MW-28 in May, and MW-11, MW-16, and MW-20 in August).
- The monitoring wells could not be accessed (MW-04 and MW-30 in May).

MW-30 and T-2 were added and redeveloped to the groundwater sampling program for the August 2020 event.

All groundwater samples were analyzed for GRO, DRO, ORO, BTEX, and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in accordance with the RIWP. A subset of seven spatially representative monitoring wells located in different areas of the Site were sampled and analyzed for volatile organic compounds (VOCs); additionally, samples from four wells were analyzed for lead, 1,2-dibromoethane, 1,2-dichloroethane, methyl *tert*-butyl ether, and naphthalenes to meet the GRO and DRO requirements of Table 830-1 Required Testing for Petroleum Releases in WAC 173-340-900, as per the RIWP. Additionally, 15 samples from monitoring wells screened in both Site water-bearing zones were analyzed for MNA parameters (i.e., nitrate, sulfate, manganese, alkalinity, methane, and field measurements of ferrous iron, dissolved oxygen, oxidation–reduction potential, pH, temperature, and conductivity). All groundwater samples were submitted to Friedman & Bruya, Inc. (FBI) of Seattle, Washington, except for the MNA parameters, which were submitted to Fremont Analytical, Inc. (Fremont) of Seattle, Washington. Result summaries from the May and August 2020 groundwater monitoring events are presented in the Interim Data Report (Floyd|Snider 2021; Appendix A) and results are integrated into this RI/FS.

In October 2020, Ecology approved a change in the quarterly groundwater monitoring program originally proposed in the RIWP (Floyd|Snider 2019a). This change included a reduction in the number of monitoring wells and analytes to be sampled given expansive non-detect results for select analytes during both wet and dry season sampling events (Morris 2020). Consequently, seven monitoring wells were removed from the sampling program, VOC analyses at all monitoring wells were reduced to BTEX compounds, semivolatile organic compound analyses at all monitoring wells were reduced to naphthalenes, and cPAH and total lead analyses were eliminated at all monitoring wells.

Therefore, in November 2020 and February 2021, monitoring wells were sampled according to the modified program described above. In November 2020 and February 2021, 30 of 34 and 33 of 34 planned monitoring wells were sampled, respectively. Some monitoring wells were not sampled for the following reasons:

- There was an insufficient volume of water (MW-04, MW-20, and MW-28 in November).
- LNAPL was present (MW-09 in November and February).

All collected groundwater samples were analyzed at FBI for GRO, DRO, ORO, and BTEX, and a subset of 15 samples was submitted to Fremont and analyzed for MNA parameters.

3.4 SOIL VAPOR SAMPLING

Two soil vapor monitoring events were conducted in May and November 2020 at VP-1 and VP-2, located in the former Warehouse 9 slab and installed as part of Phase II activities. Samples were collected in accordance with the RIWP and Ecology guidance for vapor intrusion (VI) assessment (Ecology 2022) using laboratory-certified 1-liter evacuated Summa canisters equipped with a flow control device and laboratory-provided manifolds and polytetrafluoroethylene tubing. Prior to sample collection, a shut-in (or closed-valve) test was performed to assess the sampling train for air leaks. The closed-valve test was conducted for 5 minutes. All canisters maintained their vacuum for the duration of the test.

Helium and isopropyl alcohol were used as tracer gases during the May and November sampling events, respectively, to test for leaks in the vapor point seal and connections in the manifold during the filling of the Summa canisters. Samples were collected after purging the tubing and vapor screen of at least three volumes of vapor within the sampling train at a flow rate less than 200 milliliters per minute (mL/min). A 6-liter Summa canister was used to purge the tubing. After the sampling train was purged, soil gas samples were collected over 5 minutes at a flow rate of less than 150 mL/min. Sample collection was stopped before the vacuum in the canister was fully depleted. A field duplicate sample was collected at VP-1 using a laboratory-supplied flow splitter.

Soil vapor samples were submitted to FBI for analysis of air-phase petroleum hydrocarbons, BTEX, and naphthalene by USEPA Method TO-15. For leak detection, samples from the May event were analyzed for helium by ASTM D1946, and samples from the November event were analyzed for isopropyl alcohol by TO-15.

3.5 ADDITIONAL HYDROGEOLOGIC CHARACTERIZATION

Hydrogeologic information was gathered as part of the RI to characterize the two shallow water-bearing zones, the perched zone and the alluvial aquifer, to assess any connection between the two units. Components of the hydrogeologic characterization program included four synoptic DTW measurement events prior to quarterly groundwater monitoring, a transducer study, and aquifer testing.

3.5.1 Transducer Study

Six unvented pressure transducer dataloggers were installed on May 8, 2020, in monitoring wells MW-01, MW-17, MW-23, MW-29, MW-31, and MW-33, and were monitored quarterly for approximately 10 months until they were removed on February 23, 2021. These wells were instrumented with Solinst Levelogger Junior transducers in accordance with the RIWP.

A Solinst barologger was deployed to measure ambient atmospheric pressure. Transducers were installed to obtain necessary data to resolve the following data gaps, outlined in the RIWP:

- The effects (if any) of the Oregon Way pump station, part of the flood control system operated and maintained by Consolidated Diking Improvement District (CDID) #1, north of the Site (Figure 1.1) on the alluvial aquifer and perched zone
- The effects (if any) of the Columbia River tidal fluctuations on the alluvial aquifer and perched zone
- The nature of the perched zone (i.e., if it is a substantial water-bearing zone or an ephemeral accumulation)
- The vertical gradient between the perched zone and the alluvial aquifer over a multi-month period

Manual water levels were collected at the time of transducer deployment and at the time of uploading, and the transducers were returned to the wells. Details on transducer placement and results of the initial 3-month transducer study are presented in the Interim Data Report (Floyd|Snider 2021; Appendix A).

3.5.2 Aquifer Testing

In accordance with the RIWP and SAP/QAPP, Floyd|Snider conducted aquifer drawdown testing on November 4, 2020. Constant-rate pumping tests were conducted at two locations, MW-17 (perched zone well) and MW-33 (alluvial aquifer well). Although the RIWP proposed a pumping test at a perched zone well only, an additional pumping test was performed at an alluvial aquifer well to collect data from both water-bearing units that underlie the Site. The objectives of the aquifer tests were to: (1) determine if the perched zone is a substantial water-bearing unit; (2) determine if the perched zone and alluvial aquifer are hydraulically isolated; and (3) to collect sufficient data to estimate aquifer parameters.

4.0 Remedial Investigation Results

The data discussed in this section reflect samples collected in accordance with the RIWP: data collected during Phase I and Phase II activities, soil vapor and quarterly groundwater sampling events between May 2020 and February 2021, and data collected for the hydrogeologic study. Phase I and Phase II field data collection activities are detailed in the Interim Data Report (Floyd|Snider 2021; Appendix A), which includes Columbia Technologies, LLC's High-Resolution Fluorescence/Hydraulic Profile Characterization Report (Columbia Report), the laboratory reports, and the soil parameters.

4.1 REMEDIAL INVESTIGATION SCREENING CRITERIA

Screening criteria for COPCs and other chemicals of interest (such as petroleum additives) were established in the RIWP (Floyd|Snider 2019a). Based on the COPCs and potential exposure pathways identified in the RIWP, MTCA Method A CULs, when available, were used as the default screening levels in the Interim Data Report and are similarly included for comparison to RI results in the following subsections. Soil screening levels are based on worker protection in an industrial setting and protection of potable groundwater; groundwater screening levels are also based on the MTCA Method A CULs for protection of drinking water; and soil vapor results are compared to MTCA Method B sub-slab soil gas screening levels. Table 4.1 provides a summary of RIWP screening levels used for comparison with RI results in the following sections.

For soil and groundwater, the most stringent CUL in cases where a mixture of both DRO and ORO are present is the CUL for summed DRO and ORO. Detected summed total DRO and ORO concentrations, as well as results for the individual petroleum constituents, are included in data tables described in Sections 4.2 and 4.3. The RIWP and Interim Data Report also considered preliminary screening levels for soil to determine areas where the potential exists for accumulation of LNAPL on groundwater in accordance with MTCA. These residual LNAPL saturation screening levels were originally presented in Floyd|Snider's 2015 Data Gaps Report (Floyd Snider 2015), which are based on values published in a Mercer and Cohen paper (Mercer and Cohen 1990):

- GRO: 5,700 mg/kg
- DRO: 13,000 mg/kg
- ORO: 30,000 mg/kg

These LNAPL saturation screening levels are retained for the purposes of presentation and evaluation of the Site soil data to determine preliminary areas with the potential for LNAPL occurrence on groundwater. Therefore, soil results for DRO and ORO are presented separately in figures showing soil analytical results, rather than as summed total DRO and ORO concentrations, to understand where DRO or ORO concentrations are distributed and predictive of LNAPL occurrence based on their individual residual saturation screening levels, in the following section.

Selection of preliminary cleanup levels (PCULs) for the Site is presented in further detail in Section 7.0, and LNAPL occurrence as it correlates to Site soil conditions is discussed in Section 11.4.1.

4.2 SOIL RESULTS: PHASE I AND II SAMPLING EVENTS

A summary of the Phase I OIP/HPT and subsequent Phase II soil results is presented in the following sections for the following specific areas at the Site:

- Southern pipelines and berths (formerly AOPC 1)
- Former 80,000-barrel AST (formerly AOPC 2)
- Former mechanic's shop (formerly AOPC 3)
- Northern portion of the former Standard Pipelines (formerly AOPC 4)
- Central portion of the Site, including the former Calloway Ross Parcel, the former fuel loading rack area, and within the vicinity of the monitoring wells MW-26 and MW-28 (formerly AOPC 5 through AOPC 8)
- Former U.S. Army Reserve Heating Oil UST (formerly AOPC 9)

The extents of contamination have been delineated and expand across one or more of the former AOPCs; therefore, the term "AOPC" and the use of "potential" is no longer needed or carried forward in the RI/FS. However, the extents of the AOPCs and their locations are shown on the Interim Data Report figures (Appendix A).

During the 2019 and 2020 Phase I and Phase II activities, soil samples were initially screened by the laboratory using HCID by NWTPH-HCID. If the reported value of the HCID screening analysis for DRO, ORO, or GRO exceeded the quantitation limits, then the appropriate analytical method was used to quantify the product type detected. Additional EPH and VPH analyses by NWEPH/VPH were conducted on selected soil samples in varying areas across the Site, and at 16 different locations within AOPCs, if substantial petroleum impacts to soil were encountered, based on field screening observations, which included odor, sheen, or elevated OIP fluorescent responses. The 16 locations were selected to be representative of different source areas and the analysis was conducted at various depths (within the perched and alluvial aquifer). The EPH and VPH data were used to calculate MTCA Method B and Method C CULs for TPH (Appendix B).

Analytical data from the RI soil investigation are presented in Tables 4.2 through 4.4 and Figures 4.1 through 4.4. EPH and VPH analytical results, shown as plots on Figure 4.4, are included in Appendix C. In addition to calculating MTCA Method B and Method C CULs, EPH and VPH data were used to provide a simple, broad understanding of the distribution of carbon range fractions across the Site laterally and vertically; locations were selected to be representative of different source areas. OIP fluorescence response results are shown on Figure 4.5, and Table 4.5 compares OIP fluorescence response results with analytical results from select OIP borings. Cross sections showing the vertical and lateral fluorescence response are included in Appendix K. Phase I and Phase II activities are detailed in the Interim Data Report (Floyd|Snider 2021; Appendix A), which includes the Columbia Report, the laboratory reports, and the soil parameters. Based on laboratory analytical results and OIP fluorescence response data from the RI and historical Site investigations, the Site contains a rough order of magnitude estimate of 22,000 cubic yards of TPH-impacted soil.

4.2.1 Southern Pipelines and Berths

Phase I activities consisted of advancing two OIP borings, OIP-05 and OIP-06, on each side of the former Longview Pipeline, within Transit Shed 2. Figure 4.5 shows that fluorescence responses were not observed in these two OIP/HPT locations. In addition, discrete soil samples collected during Phase II indicate that analytical results for OIP-05 and OIP-06 were either less than their respective laboratory quantitation limits or screening levels (Table 4.2). These results indicate that DRO and ORO impacts observed at GP-18, a 1-foot interval of impacted soil at a depth that may correspond to the pre-fill ground surface, is very limited in extent and has been delineated. Additionally, groundwater samples collected from GP-18 and adjacent borings show results less than their respective quantitation limits or screening levels, which indicate that the DRO and ORO impacts in soil are not leaching to groundwater.

Discrete soil samples were also collected during the installation of monitoring wells MW-37 and MW-38 (Figures 4.1 through 4.3). Field screening did not indicate TPH impacts during their advancement; therefore, soil samples were collected from the capillary fringe at depths of 27.5 feet bgs from MW-37 and 23.5 feet bgs from MW-38. Soil analytical results from MW-37 and MW-38 indicate that all constituents were at concentrations less than their respective laboratory quantitation limits (Table 4.2).

Surface samples P3 and P4, beneath the decking of Berth 2, were collected near historical surface samples (P-1 and P-2) and below the eastern pipelines that daylight beneath Berth 2. Samples were collected from the limited soil present on and between the riprap. Due to the lack of soil, deeper subsurface soil samples could not be collected. Surface samples P5 and P6 were collected beneath the westernmost pipelines beneath Berth 1 (Figures 4.1 through 4.3). Deeper soil samples were not collected from P5 and P6 due to no indications of petroleum hydrocarbon impacts in the shallow surface samples during field screening, which included sheen tests, odor, and PID readings. Soil results show ORO concentrations exceeding the screening level in P3 and P6 at concentrations of 4,200 and 2,300 mg/kg, respectively. GRO concentrations were less than the quantitation limit, and DRO concentrations were less than the screening level. cPAHs were detected in P3 and P4 at toxic equivalents (TEQs) of 2.3 and 0.51 mg/kg, respectively, exceeding the PCUL of 0.1 mg/kg for total cPAHs TEQ (Table 4.3).

4.2.2 Former 80,000-Barrel AST

Four OIP/HPT boring locations, OIP-01 through OIP-04, were advanced within the vicinity of the former 80,000-barrel AST during Phase I activities. OIP results showed a slight fluorescence response (less than 10%) in the top 5 feet bgs and no fluorescence response at depths greater than 5 feet bgs in all four locations (Figure 4.5 and Appendix K).

During the second mobilization, discrete soil samples were collected at locations OIP-02 and OIP-04 using a direct-push drill rig. Soil analytical data indicate that DRO and ORO are present in OIP-02 at 5 feet bgs at concentrations of 1,900 and 3,400 mg/kg, respectively (Table 4.2). No other petroleum compounds were detected in these soil samples at concentrations greater than their respective laboratory quantitation limits (Table 4.2). The impacts detected in the shallow soil at OIP-02 are limited vertically, and adjacent soil boring locations with results less than the screening levels indicate that these impacts are limited and delineated laterally.

4.2.3 Former Mechanic's Shop

During the Phase I activities, four OIP/HPT borings (OIP-18 through OIP-21) were advanced within the vicinity of the former mechanic's shop and former USTs. OIP results show a fluorescence response (71.4%) in OIP-20 between approximately 11 and 12 feet bgs (Figure 4.5 and Table 4.5). No other location within this area showed a measurable fluorescence response, indicating no hydrocarbon impacts are expected to be present (Appendix K).

During the second mobilization, a direct-push rig was used to obtain quantitative soil analytical results at locations OIP-18 through OIP-21. Lithology observations and field screening results indicated a thin zone of impacted soil from 10.5 to 12 feet bgs between silty sand and silt layers in OIP-20, which corresponds to the observed OIP/HPT fluorescence response. Therefore, to delineate the western extent of contamination in this area, an additional step-out location, GP-38, was advanced downgradient to the west of OIP-20, and a discrete soil sample was collected at the same depth as TPH impacts encountered in OIP-20 (Table 4.2). GRO exceeding the screening level was detected in OIP-20 between 11 and 11.5 feet bgs at a concentration of 630 mg/kg (Table 4.2 and Figure 4.1). All other soil samples collected within this area, including from GP-38, resulted in concentrations less than laboratory quantitation limits for GRO, DRO, and ORO (Table 4.2). Therefore, the impacts detected in OIP-20 at 11 feet bgs are limited and considered delineated.

4.2.4 Northern Portion of the Former Standard Pipelines

During the Phase I activities, 11 OIP/HPT borings (OIP-57 through OIP-63, OIP-69 through OIP-71, and OIP-73) were advanced within the vicinity of MW-19 in the northern portion of the former Standard Pipelines (Figure 3.1). OIP results show up to 100% fluorescence response at the locations near MW-19 at depths between approximately 6 feet bgs and 15 feet bgs, depending on the location (Figure 4.5, the Columbia Report in Appendix A, and Appendix K). Fluorescence responses in the outermost locations (OIP-57, OIP-69, OIP-70, and OIP-73) were limited to smaller unsustained responses at less than 10% and 60% immediately at the surface at locations OIP-57 and OIP-73, respectively. The fluorescence response observed in OIP-73 was detected within the top 0.3 feet with a thickness of 0.05 feet and is likely from vehicles parking at this location.

During the Phase II activities, a direct push rig was used to obtain discrete soil samples at OIP-57, OIP-69, OIP-70, and OIP-73 to confirm that the lateral extent of impacted soil had been defined as reflected in the OIP/HPT results. All soil samples collected to delineate the extent of impacts in the northern portion of the former Standard Pipelines resulted in GRO, DRO, and ORO concentrations less than laboratory quantitation limits (Table 4.2). Laboratory results corresponded well with OIP/HPT fluorescence responses (Table 4.5). Additionally, four discrete soil samples were collected at varying depths during the installation of MW-39. Soil samples collected at MW-39 resulted in TPH concentrations with exceedances of screening levels for GRO and DRO within the 8 to 9 feet bgs and 13 to 14 feet bgs interval samples (Figures 4.1 and 4.2). The 13 to 14 feet bgs sample at MW-39 had the greatest TPH impacts with a GRO concentration of 990 mg/kg and a DRO concentration of 18,000 mg/kg. GRO and DRO results were less than laboratory quantitation limits in the shallow subsurface sample and the deepest sample at 18.5 feet bgs. ORO results were less than quantitation limits in all subsurface samples except one (MW-39-13-14), which resulted in a sample chromatogram pattern that did not resemble the fuel standard used for quantitation. Samples collected at MW-39 for cPAH and VOC analysis resulted in concentrations either less than laboratory quantitation limits or less than their respective screening levels for all other analytes (Table 4.3).

4.2.5 Central Portion of the Site

The central portion of the Site consists of petroleum impacts in soil and groundwater that are present within and in the vicinity of the former Calloway Ross Parcel, the former fuel loading rack area, and within the vicinity of the monitoring wells MW-26 and MW-28.

4.2.5.1 Former Calloway Ross Parcel

The former Calloway Ross Parcel is located at the north end of the former Warehouse 9 building footprint and west of the rail lines (Figure 2.1). Eleven OIP/HPT borings (OIP-07 through OIP-14 and OIP-66 through OIP-68) were advanced within and in the vicinity of the former Calloway Ross Parcel during the Phase I mobilization (Figure 3.1). OIP results show fluorescence response at the OIP locations throughout the south to north and west to east transects between 9 and 23 feet bgs (Table 4.5, Figure 4.5, Appendix A, and Appendix K). Fluorescence response within this area of the Site is typically represented by multiple fluorescence spikes up to 100% within high-permeability areas located above and below zones of increasing fines with low permeability. OIP results indicate that fluorescence response decreases in percentage and thickness to the northeast and northwest and is not present to the north-northeast at OIP-68 and to the north-northwest at OIP-14; therefore, this area is delineated (Figure 4.5).

During both phases, select discrete soil samples from GP-36, GP-37, OIP-08, OIP-66, OIP-67, and OIP-68 were submitted for laboratory analyses to delineate the lateral and vertical extent of TPH impacts, to assist in determining volume of TPH impacts present, and to help in identifying product type. Soil analytical data indicate that the lateral extent of hydrocarbon impacts within the vicinity of the former Calloway Ross Parcel is delineated to the west at location GP-37 and to the north at OIP-68, with TPH concentrations in these locations less than their respective screening levels (Table 4.2 and Figures 4.1 through 4.3).

The discrete soil samples collected from OIP-08, OIP-66, and OIP-67 were used to confirm the hydrocarbons detected in the OIP/HPT borings. At OIP-08, the sample collected from the 19 to 20 feet bgs interval resulted in GRO and DRO concentrations of 4,900 mg/kg and

12,000 mg/kg, respectively (Table 4.2). Benzene and ethylbenzene exceeding the screening levels were detected at 1.1 mg/kg and 27 mg/kg, respectively, in the sample collected from 19 to 20 feet bgs at OIP-08. At OIP-66, the sample collected from the 12 to 12.5 feet bgs interval resulted in a GRO concentration of 2,000 mg/kg (Table 4.2). The analytical results at both OIP-08 and OIP-66 exceeded the screening levels as expected based on the high fluorescence response during OIP/HPT advancement. Discrete soil samples from OIP-67 show GRO and DRO screening level exceedances between 11 and 15 feet bgs with the greatest GRO concentration, 2,200 mg/kg, detected between 14.5 and 15 feet bgs and the greatest DRO concentration, 4,300 mg/kg, between 11 and 12 feet bgs (Table 4.2). TPH impacts are vertically delineated at a maximum depth of 18 feet in OIP-67, with TPH concentrations less than respective laboratory quantitation limits. With the exception of analytes at GP-36, analytes including BTEX and cPAHs did not exceed their respective screening levels in any other samples collected from this area (Tables 4.2 and 4.3). ORO was less than quantitation limits for all samples collected, with the exception of OIP-08 and OIP-67 (11 to 12 feet bgs), which both had detected ORO at concentrations less than the screening level and chromatographic patterns that did not resemble the fuel standard used for quantitation.

4.2.5.2 Former Fuel Loading Rack Area

The former fuel loading rack area extends from OIP-56 in the north-northeast to the vicinity of MW-17 in the southwest, and from the east near MW-12, OIP-49, and OIP-72 to the former Warehouse 9 building footprint, west of the rail lines. Twenty-six OIP/HPT borings (OIP-15 through OIP-17, OIP-33 through OIP-51, OIP-55, OIP-56, OIP-64, and OIP-72) were completed within the former fuel loading rack area (Figure 4.5). OIP results throughout the former fuel loading rack area show up to 100% fluorescence response at the surface down to 24 feet bgs, with an unsustained response with less than 75% fluorescence at the surface in some locations and the greatest response between 9 and 22 feet bgs (Table 4.5, Figure 4.5, Appendix A, and Appendix K). The thickest fluorescence response was observed beneath the rail lines and immediately adjacent to the former pipelines in the area between OIP-38 to the north and OIP-44 to the south, and to the east within the vicinity of OIP-47 (Floyd|Snider 2021; Appendix A). OIP results indicate that fluorescence response decreases in percentage and thickness to the north-northeast at OIP-56, to the southwest at OIP-64, to the northeast at OIP-72, to the east at OIP-49, and is not present to the south at OIP-33 or OIP-46 (Figure 4.5).

Discrete soil samples were collected during both Phase I and Phase II activities from nine direct-push locations and during installation of monitoring wells MW-33 and MW-40. Soil analytical data indicate that the lateral extent of hydrocarbon impacts within the former loading rack area is delineated to the northeast at GP-35; to the southeast at OIP-46; to the southwest at OIP-64; and to the west at locations GP-1, GP-2, and GP-30 (installed in 2015; Figures 4.1 through 4.3). Soil analytical results at locations OIP-49 and OIP-72 to the east show detections of GRO at concentrations exceeding the screening level, indicating that impacts in this area extends slightly outside the investigated area. The GRO detections in OIP-49 and OIP-72 were at concentrations of 960 mg/kg and 520 mg/kg, respectively (Figure 4.1). OIP results from

OIP-49 and OIP-72 show that these impacts are limited in thickness, less than 1 foot thick, indicating that impacts are pinching out to the east (Figure 4.5 and Table 4.5).

Within the former loading rack area, the greatest GRO concentration was detected in OIP-47 at 5,700 mg/kg between 11 and 12 feet bgs (Table 4.2). The greatest DRO, ORO, and benzene detections were in MW-40 between 10.5 and 11 feet bgs at concentrations of 18,000 mg/kg, 7,900 mg/kg, and 12 mg/kg, respectively (Table 4.2). Based on OIP results and soil analytical data, TPH soil impacts are present at varying depths between 1 foot bgs and 24 feet bgs (Tables 4.2, 4.3, and 4.5). Two distinct zones of impacts are present within the perched zone and the alluvial aquifer, which are typically separated by a layer of finer-grained, impermeable soils.

The soil sample results, and fluorescence response observed, indicate that the greatest impacts are present beneath and immediately adjacent to the rails, but concentrations and thickness decrease to the west and east of the rail lines. Therefore, the extent in this area is considered delineated.

4.2.5.3 Monitoring Wells MW-26 and MW-28

During Phase I and II activities, 15 OIP/HPT borings (OIP-22 through OIP-32, OIP-52 through OIP-54, and OIP-65) were completed, seven direct-push borings (OIP-23, OIP-30, OIP-31, OIP-52, OIP-53, GP-33, and GP-34) were advanced to collect discrete soil samples, and one monitoring well (MW-34) was installed within the vicinity of monitoring wells MW-26 and MW-28.

OIP locations were advanced in two transects, one parallel to the rail lines from northeast to southwest and one perpendicular to the rail lines from approximately west to east (Figure 4.5). OIP results throughout this area show up to 100% fluorescence response at the surface down to 24 feet bgs, with a slight, less than 60%, unsustained response at the surface in some locations and with the greatest response between 11 and 24 feet bgs (Table 4.5, Appendix A, and Appendix K). The thickest fluorescence responses, up to 100%, were observed beneath the rail lines, adjacent to the former Standard Pipelines at locations OIP-22 through OIP-29. Fluorescence responses indicate that thickness of impacts decrease to the west and east at OIP-52 and OIP-30, respectively. OIP results indicate that TPH impacts are bounded along the southwest and northeast transect by OIP-54 and OIP-55 (Figure 4.5). OIP results along the east–west transect show no fluorescence response to the west at OIP-53 and to the east at OIP-31. Most of the elevated fluorescence responses along this transect are present at depths between approximately 11 and 24 feet bgs. A slight fluorescence response was present within the top 2 feet in OIP-30 and OIP-52 with responses of less than 20% and less than 60%, respectively (Floyd|Snider 2021; Appendix A).

Discrete soil samples were collected from direct-push and monitoring locations during Phase II activities. GRO was detected in soil at concentrations exceeding the screening level at depths between 14 and 24.5 feet bgs in OIP-23, OIP-30, OIP-52, GP-33, and MW-34. The greatest GRO concentration was detected in OIP-23 at 790 mg/kg between 19 and 20 feet bgs (Table 4.2). DRO was detected at concentrations exceeding the screening level at depths between 14 and 24 feet bgs in OIP-23, OIP-30, OIP-52, and MW-34 (Table 4.2 and Figure 4.2). The greatest DRO concentration was detected in OIP-23 at 48,000 mg/kg between 19 and 20 feet bgs; OIP fluorescence response data indicate that soil impacts are not present at depths greater than 24 feet bgs at this location. ORO was detected at concentrations exceeding the screening level at depths between 14 and 21 feet bgs in OIP-30 and GP-33 (Table 4.2). The greatest ORO concentration was detected in OIP-30 at 12,000 mg/kg from 20 to 21 feet bgs (Table 4.2).

BTEX and other VOC concentrations did not exceed their respective screening levels in any samples collected within the MW-26 and MW-28 area (Table 4.2). A single cPAH TEQ concentration of 0.54 mg/kg detected in OIP-30 between 20 and 21 feet bgs exceeded the screening level (Table 4.3).

Soil concentrations exceeding MTCA Method A screening levels are delineated in the south-central portion of the Site to the east and west at OIP-31 and OIP-53, respectively, by samples with results less than the screening levels or the laboratory quantitation limits (Tables 4.2 and 4.3 and Figures 4.1 through 4.3). OIP fluorescence response data indicate that soil impacts are delineated to the north by locations OIP-55 and OIP-65 and to the south by locations OIP-21 and OIP-54 (Figure 4.5).

4.2.6 Former U.S. Army Reserve Heating Oil UST

Although there were no OIP/HPT locations advanced during Phase I, two Geoprobe boring locations were drilled adjacent to the location of the former heating oil UST associated with the former U.S. Army Reserve building during Phase II (GP-31 and GP-32). Soils collected from both Geoprobe locations were analyzed for DRO, GRO, and ORO by NWTPH-HCID and resulted in concentrations less than laboratory quantitation limits (Table 4.2).

4.3 GROUNDWATER RESULTS: PHASE II AND QUARTERLY SAMPLING EVENTS

Results from groundwater samples collected from direct-push borings during the Phase II activities and from permanent monitoring wells during four quarterly monitoring events (May, August, and November 2020 and February 2021) are summarized for the following areas at the Site:

- Southern pipelines and berths
- Former 80,000-barrel AST
- Former mechanic’s shop
- Northern portion of the former Standard Pipelines
- Central portion of the Site, including the former Calloway Ross Parcel, the former fuel loading rack area, and within the vicinity of monitoring wells MW-26 and MW-28
- Former U.S. Army Reserve Heating Oil UST
- Perimeter monitoring wells

Analytical groundwater data from the RI groundwater investigation are shown in Tables 4.6 through 4.9, and GRO, DRO, and ORO analytical results from the November 2020 and February 2021 quarterly monitoring events are presented in Figures 4.6 through 4.11. Table 4.8 provides analytical results for MNA parameters, which are discussed and interpreted in Section 9.2.1.3 and Appendix D. Phase II groundwater investigation activities are detailed in the Interim Data Report (Floyd|Snider 2021; Appendix A), which includes figures and laboratory reports summarizing the May and August 2020 sampling events as well as the 2019 sampling results. Groundwater sample results collected from direct-push borings are typically slightly more turbid than samples collected from wells and are considered to be biased high; however, results less than screening levels or laboratory quantitation limits can be used to delineate the dissolved-phase extent. Laboratory reports for the November 2020 and February 2021 groundwater sampling events are included in Appendix E.

4.3.1 Southern Pipelines and Berths

Groundwater samples were collected from OIP-06 during the Phase II activities and from monitoring wells MW-37 and MW-38 during the four quarterly sampling events conducted in 2020 and 2021. No compounds were detected in these samples at concentrations greater than their respective screening levels, and all GRO, DRO, and ORO results were less than laboratory quantification limits, except for the following:

- In the November 2020 monitoring event, MW-38 had a low-level DRO detection that was flagged by the laboratory as not matching a typical diesel standard.
- In the February 2021 monitoring event, MW-37 had low-level detections of GRO and DRO, the DRO detection being flagged by the laboratory as not matching a typical diesel standard. Low-level DRO was also detected in the May 2020 event.

These results demonstrate that the dissolved-phase plume is not present in the southern portion of the property and there is no potential for impacts to be transported to the Columbia River via groundwater.

4.3.2 Former 80,000-Barrel AST

Discrete groundwater samples were collected from OIP-02 and OIP-04 during the Phase II activities. Groundwater samples were collected from monitoring well MW-32 during the first two quarterly sampling events conducted in May and August 2020, and from monitoring well T-2 during the August 2020, November 2020, and February 2021 sampling events.

DRO and ORO were detected in the discrete groundwater sample for direct-push boring OIP-04 at concentrations of 660 µg/L and 870 µg/L, respectively, which exceeded the screening levels. The detections of DRO and ORO in OIP-04 resulted in the addition of monitoring well T-2 to the sampling program for future quarterly sampling events. The results from monitoring well T-2 were less than the quantitation limits for GRO, DRO, and ORO for each sampling event. No other constituents were detected at concentrations greater than their respective screening levels or laboratory quantitation limits in groundwater samples during the sampling events (Tables 4.6 and 4.7).

4.3.3 Former Mechanic's Shop

Groundwater samples were collected from UST-4 during the four quarterly groundwater monitoring events in 2020 and 2021. In addition to the typical analyses, 1,2-dibromoethane, 1,2-dichloroethane, methyl *tert*-butyl ether, and naphthalenes were analyzed for in the first two quarters of monitoring (May and August 2020) in accordance with the SAP/QAPP, Ecology's Table 830-1 Required Testing for Petroleum Releases (WAC 173-340-900), and guidelines for UST decommissioning (WAC 173-360A). These additional components were not detected at concentrations greater than their respective RIWP screening levels or laboratory quantification limits during the first two quarters of monitoring, so they were removed from the analyte list for the last two quarterly monitoring events with Ecology's approval (Morris 2020).

DRO and ORO results detected in UST-4 during the May 2020 sampling event show that the sum of their concentrations of 230 and 320 µg/L, respectively, slightly exceeds the screening level of 500 µg/L. However, the laboratory report flagged the May 2020 results noting that the sample chromatographic pattern does not resemble the fuel standard used for quantitation. The chromatogram resembles highly weathered compounds that are missing the *n*-alkanes within the diesel and oil ranges. Additionally, the USTs associated with the former mechanics' shop contained gasoline not diesel, and DRO and ORO concentrations in all soil samples collected at or within the vicinity of the UST-4 and former mechanic's shop show detections less than the laboratory quantitation limit or less than the CUL for total DRO and ORO. Therefore, the May 2020 result is likely anomalous and not considered to be representative of Site conditions at this location. UST-4 is not included within the extent of total DRO and ORO exceedances in groundwater. However, additional groundwater will be collected during a predesign investigation to confirm that the total DRO and ORO exceedance is anomalous. All other constituents for May 2020 and both the prior and subsequent sampling events were either less than their respective screening levels or less than the laboratory quantitation limit (Tables 4.6 and 4.7).

4.3.4 Northern Portion of the Former Standard Pipelines

During Phase II, temporary wells were utilized to collect discrete groundwater samples at OIP-69 and OIP-70. Temporary screens were set within the alluvial aquifer at OIP-69 and OIP-70 at depths between 12 and 17 feet bgs and 10 and 15 feet bgs, respectively. Groundwater depths and dissipation tests indicate that the alluvial aquifer is present in this area of the Site at depths between 10 and 14.5 feet bgs. Groundwater samples collected from both locations were analyzed for GRO, DRO, ORO, VOCs, and select PAHs. Results indicate low-level detections for DRO at OIP-69 and OIP-70 of 140 µg/L and 220 µg/L, respectively. Sample results at both locations were below laboratory quantitation limits for all other analytes (Tables 4.6 and 4.7).

Groundwater samples were collected from MW-06, MW-19, and MW-39 during the quarterly groundwater monitoring events in 2020 and 2021. Samples collected at MW-19 did not exceed screening levels for any of the analyzed analytes during the first two sampling events, and thus

MW-19 was removed from the sampling program for the last two quarterly monitoring events (Tables 4.6 and 4.7).

Samples collected from MW-06 contained total DRO and ORO screening level exceedances in each monitoring event and ranged between 630 and 2,300 µg/L, detected in February 2021 and August 2020, respectively. Total DRO and ORO concentrations at MW-39 also exceeded screening levels during all 2020 and 2021 quarterly sampling events. The greatest total DRO and ORO concentration in MW-39 was detected during the August 2020 sampling event at a concentration of 7,300 µg/L.

The dissolved-phase plume at this location is delineated by locations MW-01, MW-19, OIP-69, and OIP-70, which surround MW-06 and MW-39.

4.3.5 Central Portion of the Site

The central portion of the Site consists of wells located within the former Calloway Ross Parcel, former fuel loading rack area, and within the vicinity of the monitoring wells MW-26 and MW-28.

4.3.5.1 Former Calloway Ross Parcel

During Phase II, temporary wells were utilized to collect discrete groundwater samples at OIP-67 and OIP-68. Collected groundwater samples were analyzed for GRO, DRO, ORO, VOCs, and select PAHs. Samples collected at OIP-67 resulted in screening level exceedances for both GRO and total DRO and ORO with concentrations of 3,200 µg/L and 2,000 µg/L, respectively. Samples collected at OIP-68 also resulted in screening level exceedances for GRO and total DRO and ORO of 860 µg/L and 1,200 µg/L, respectively.

Monitoring wells MW-02, MW-03, MW-05, MW-08, and MW-10 are considered within or adjacent to the former Calloway Ross Parcel. These wells were sampled during all four quarterly sampling events that occurred in 2020 and 2021, except for MW-05, which had sufficient water for sampling only during the February 2021 event. The following analytes were detected at concentrations exceeding their respective screening levels during the noted quarterly sampling events:

- GRO in monitoring wells MW-08 (all four sampling events) and MW-10 (August and November 2020 and February 2021 only), with the greatest concentration in MW-10 at 5,800 µg/L detected during the February 2021 event
- Total DRO and ORO in monitoring wells MW-02 (August and November 2020 only), MW-03, MW-05 (February 2021 only), MW-08 (all four sampling events), and MW-10 (August and November 2020 and February 2021 only), with the greatest concentration in MW-08 at 2,800 µg/L detected during the August 2020 event
- Benzene in monitoring well MW-10 (all four sampling events), with the greatest concentration of 180 µg/L detected during the February 2021 event

All other analytes were either not detected at laboratory quantitation limits or were detected at concentrations less than their respective screening levels (Tables 4.6 and 4.7).

4.3.5.2 Former Fuel Loading Rack Area

A discrete groundwater sample was collected from OIP-15 during the Phase II activities and analyzed for GRO, DRO, ORO, BTEX, and select PAHs. The total DRO and ORO concentration of 1,700 µg/L at OIP-15 exceeded the screening level. All other analytes from this sample were either not detected at laboratory quantitation limits or did not exceed their respective screening levels (Table 4.6).

Monitoring wells MW-07, MW-09, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-17, MW-20, MW-25, MW-33, and MW-40 are considered within or adjacent to the former loading rack. All of these wells were sampled during each quarterly sampling event, except for MW-09 during all events, MW-20 during the August and November 2020 events, MW-13 during the November 2020 and February 2021 events, and MW-11 and MW-16 during the August and November 2020 and February 2021 events. MW-09 was not sampled because it contained a measurable LNAPL thickness of between 0.07 and 0.53 feet during the quarterly sampling events. MW-11, MW-16, and MW-20 were not sampled during the August 2020 event because they had an insufficient volume of water. Additionally, MW-20 was not sampled during the November event because it had an insufficient volume of water. MW-11, MW-13, and MW-16 were removed from the sampling program for the last two quarterly monitoring events.

Quarterly groundwater analytical results from monitoring wells MW-11, MW-13, MW-14, MW-16, MW-17, and MW-25 show that analytes either were not detected at laboratory quantitation limits or were detected at concentrations less than their respective screening levels (Table 4.6). The following analytes were detected at concentrations exceeding their respective screening levels within wells located in the vicinity of the former fuel loading racks during the 2020 or 2021 sampling events:

- GRO in monitoring wells MW-07 (August 2020 only), MW-12 (August and November 2020 and February 2021), MW-20 (May 2020 and February 2021), and MW-40 (all four sampling events), with the greatest concentration in MW-12 at 7,100 µg/L detected during the August 2020 event
- Total DRO and ORO in monitoring wells MW-07 (all four sampling events), MW-12 (August and November 2020 and February 2021), MW-15 (May 2020 only), MW-20 (May 2020 and February 2021), MW-33 (all four sampling events), and MW-40 (all four sampling events), with the greatest concentration in MW-40 at 3,800 µg/L detected during the November 2020 event
- Benzene in monitoring wells MW-12 and MW-40 (all four sampling events), with the greatest concentration in MW-12 at 910 µg/L detected during the August 2020 event

All other analytes either were not detected at laboratory quantitation limits or were detected at concentrations less than their respective screening levels (Tables 4.6 and 4.7).

4.3.5.3 Monitoring Wells MW-26 and MW-28

During Phase II, a temporary well was utilized to collect a reconnaissance groundwater sample at GP-34. Collected groundwater samples were analyzed for GRO, DRO, ORO, BTEX, and select PAHs. Groundwater analytical results in GP-34 show that no analytes were detected at concentrations exceeding their respective screening levels (Table 4.6).

Monitoring wells MW-18, MW-24, MW-26, MW-27, MW-28, MW-29, and MW-34 are considered within or adjacent to the area formerly known as AOPC 7. These wells were sampled during the four quarterly groundwater monitoring events, except for MW-28, which had an insufficient volume of water during the May and November 2020 events, and MW-27, which was removed from the sampling schedule for the final two quarterly events.

Groundwater analytical results from 2020 and 2021 quarterly sampling events from these monitoring wells show that most analytes either were not detected at laboratory quantitation limits or were detected at concentrations less than their respective screening levels (Tables 4.6 and 4.7). The following analyte was detected at concentrations exceeding its screening level:

- Total DRO and ORO in monitoring wells MW-26 (May, August, and November 2020 only), MW-28 (August 2020 and February 2021), and MW-34 (all four sampling events), with the greatest concentration in MW-28 at 6,100 µg/L detected during the August 2020 event

4.3.6 Former U.S. Army Reserve Heating Oil UST

During Phase II activities, temporary wells were utilized to collect reconnaissance groundwater samples from GP-31 and GP-32. Samples were analyzed for GRO, DRO, ORO, BTEX, and select PAHs. Samples collected from both locations had low-level detections of total DRO and ORO at concentrations of 55 and 150 µg/L, respectively; neither detection exceeded the screening level. GRO did not exceed the laboratory quantitation limit. Analytical results for all other analytes were not detected at laboratory quantitation limits (Table 4.6).

4.3.7 Perimeter Monitoring Wells

Monitoring wells MW-01, MW-04, MW-22, MW-23, MW-30, MW-31, MW-35, and MW-36 are located primarily along the perimeter of the Site or are not closely associated with any source area. Analytical data from these wells are useful in defining the bounding edge of the dissolved-phase plume along the upgradient and downgradient extents of the Site. These wells were sampled during 2020 and 2021 quarterly sampling events except for MW-04 and MW-30, which were inaccessible during the May 2020 event, and MW-04, which had an insufficient volume of water during the August and November 2020 sampling events. Additionally, MW-01 was removed from the sampling program for the final two quarterly sampling events.

Quarterly groundwater analytical results from monitoring wells MW-01, MW-22, MW-23, MW-31, and MW-36 show that analytes were not detected at laboratory quantitation limits.

The following analyte was detected at concentrations exceeding its screening level during the 2020 or 2021 sampling events:

- Total DRO and ORO in monitoring wells MW-04 (February 2021), MW-30 (August and November 2020 and February 2021), and MW-35 (all four sampling events), with the greatest concentration in MW-30 of 2,500 µg/L detected during the November 2020 event

The DRO and ORO detections for MW-04, MW-30, and MW-35 were flagged with a laboratory note indicating that the sample chromatographic pattern does not resemble the fuel standard used for quantitation. Previous sampling events at MW-04 and MW-30 have analyzed DRO and ORO with and without silica gel cleanup. Results with silica gel are nondetect or less than PCULs (Golder 2000). Additionally, groundwater sampling observations at MW-30 have noted the presence of a reddish-brown bacterial growth that is likely associated with iron-reducing organisms. As presented in Appendix D, MW-04 and MW-30 have high average dissolved oxygen and total DRO and ORO concentrations relative to other locations, which are likely due to a portion of the reported total DRO and ORO concentrations instead being detections of organic material. Table 4.8 provides analytical results for MNA parameters, which are discussed in Section 9.2.1.3 and Appendix D. Additional data will be collected during a predesign investigation (PDI) to further investigate and confirm the downgradient edge of the dissolved-phase plume at these locations.

No other analytes at these locations were detected at laboratory quantitation limits (Tables 4.6 and 4.7).

4.4 SOIL VAPOR RESULTS

Soil vapor samples were collected in May and November 2020 from locations VP-1 and VP-2, located northwest of the rail lines in the former Warehouse 9 footprint (Figure 3.2), and were analyzed for the following:

- Air-phase petroleum hydrocarbons, BTEX, and naphthalene by USEPA Method TO-15
- Helium by ASTM D1946 (May) and isopropyl alcohol by USEPA Method TO-15 (November) for leak detection

Soil vapor results are presented in Table 4.9. Soil vapor concentrations are compared to screening levels presented in the updated January 2020 MTCA Method B sub-slab soil gas screening levels listed on Ecology's Cleanup Levels and Risk Calculation worksheet[11] and in Appendix E of Ecology's VI guidance (Ecology 2022).

Laboratory analytical data from both sampling events show that TPH was detected at concentrations between 160 and 450 micrograms per cubic meter (µg/m^3) and total xylenes was detected at concentrations between 5.6 and 56.0 µg/m^3; both analytes were detected at

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[11] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC/Data-tables

concentrations less than their respective MTCA Method B soil vapor screening levels of 4,700 µg/m^3 and 1,500 µg/m^3, respectively. Naphthalene was not detected at the laboratory quantitation limit, and other BTEX results were not detected or were less than screening levels in samples from both events. Helium was not detected at the laboratory quantitation limit in the May event, indicating that there were no leaks in the sampling manifold or vapor point surface seal. Isopropyl alcohol detections during the November sampling event were less than 0.05% of the total sample volume, which indicates that there is little to no influence from outside ambient air and leaks in the sampling manifold or vapor point surface seal were not an issue. The results indicate that there were no detected exceedances when compared to conservative residential MTCA Method B sub-slab soil vapor screening levels.

4.5 HYDROGEOLOGIC RESULTS

This section provides a summary of groundwater elevations for the November 2020 and February 2021 quarterly monitoring events, aquifer testing results, and the findings of the transducer study to elucidate the effect of the nearby Oregon Way pumping station on the site groundwater flow regime. Table 4.10 shows groundwater elevations at Site monitoring wells for all four quarters of RI data collection, and Figures 4.12 through 4.15 show November 2020 and February 2021 groundwater contours in both Site water-bearing zones. Aquifer testing details, including testing parameters and results, are provided in Appendix F.

Results from previous hydrogeologic characterizations associated with the RI, including the effects of Columbia River tidal fluctuations on both water-bearing zones, the vertical gradient between the perched zone and alluvial aquifer, and synoptic DTW measurements from the first two quarters of groundwater monitoring are detailed in Section 3.4 of the Interim Data Report (Floyd|Snider 2021; Appendix A).

4.5.1 Wet Season Groundwater Elevations

Groundwater elevations for both water-bearing units were measured during the November 2020 and February 2021 monitoring events in accordance with the RIWP (Floyd|Snider 2019a). Potentiometric groundwater contour maps and approximate flow directions for these monitoring events are presented in Figures 4.12 through 4.15. In the perched zone, groundwater elevations ranged between 6.98 and 16.94 feet NAVD 88 during the November 2020 event and between 12.24 and 19.12 feet NAVD 88 during the February 2021 event. In the alluvial aquifer, groundwater elevations ranged between 5.74 and 6.71 feet NAVD 88 during the November 2020 event and between 8.02 and 9.11 feet NAVD 88 during the February 2021 event. A discussion of groundwater flow directions and a comparison to dry season data are presented in Section 5.2.1.

4.5.2 Aquifer Testing

Drawdown and recovery data from the two limited constant-rate aquifer tests were used to further characterize the perched zone and alluvial aquifer and to assess any connection between the two units (Appendix F). Data from perched zone well MW-17 showed a linear response curve and did not indicate the presence of a typical cone of depression at a scale suitable for analysis. Therefore, MW-17 data were not suitable for analysis using curve-fitting techniques, and aquifer parameters were not calculated. The low sustainable yield achieved at MW-17 indicates either low-permeability surrounding geology and/or limited hydraulic connection between the well and the surrounding water-bearing zone.

Data from alluvial aquifer well MW-33 showed drawdown and recovery curves more representative of typical aquifer response and were analyzed using a variety of different curve-matching techniques applicable to unconfined, leaky-confined, and/or confined aquifer types (Appendix F). As described in Section 5.2, the conceptual hydrogeologic model for the Site is most consistent with that of a leaky-confined aquifer; groundwater from the overlying perched zone is inferred to slowly “leak” through the underlying silt aquitard to the underlying alluvial aquifer at a rate much slower than the horizontal flow in both units. However, results from all curve-fit solutions were reported to add robustness to the analysis and to account for any variations in aquitard permeability throughout the Site. The leaky-confined aquifer solution produced a hydraulic conductivity of approximately 49 feet per day or $1.7 \text{ X } 10^{-2}$ centimeters per second, which falls within the range of expected values for sandy aquifers.

Notably, no connection between the perched zone and the alluvial aquifer was observed during the alluvial aquifer test; water levels in MW-17 and other nearby perched zone observation wells remained constant during the alluvial aquifer pumping test. This observation indicated that there was no measurable leakage through the silt aquitard despite the reduction in head in the alluvial aquifer and increased vertical gradients between the two water-bearing zones. The lack of induced flux of groundwater between the two units (during the test) is consistent with the Site conceptual hydrogeologic model of negligible transmissivity across the aquitard.

4.5.3 Transducer Study

The CDID #1 encompasses a network of 35 miles of dikes and drainage ditches in the Longview-Kelso Basin constructed for flood protection during high river levels and large storm events. The system consists of six primary pumping stations with a combined total capacity of 628,000 gallons per minute. Active pumping of these drainage ditches at the six pumping stations maintains water levels several feet below the typical stage of the Columbia River (KJC 2010). The Oregon Way pump station, which consists of two pumps, is located approximately 0.9 miles north of the Site. Figure 1.1 shows the location of the CDID #1 Oregon Way pump station and CDID #1 drainage ditch network relative to the Site.

To determine the effect (if any) of Oregon Way pump operation on the Site groundwater flow regime, Site water level data from the 10-month period of transducer deployment (May 2020 to February 2021) were compared to frequency of pumping data from the CDID #1 Oregon Way pump station, obtained from CDID #1. Figure 4.16 shows seasonal groundwater levels at perched zone well MW-17 and alluvial aquifer wells MW-01 and MW-31 as well as pump activations at the Oregon Way pump station between May 1, 2020, and February 4, 2021. Pump activations at the Oregon Way station correspond to one or both pumps at the station being turned on to maintain drainage ditch water levels. The average pumping duration for each activation was approximately 3 hours and 15 minutes, and 84% of all pumping durations were less than 4 hours. The two pumps at the Oregon Way station were most active between September 1, 2020, and February 4, 2021 (Figure 4.16).

Comparison of Site groundwater levels and Oregon Way pump activations over time show that the individual activations have no direct impact on either perched zone or alluvial aquifer groundwater levels at the Site (Figure 4.16) and are instead used to maintain consistent head conditions at the collection ditch, which exert a permanent influence on the groundwater flow direction in the alluvial aquifer. Periods of increased pump activations at the Oregon Way pumping station correspond with groundwater level increases in both water-bearing zones and do not appear to dampen trends of rising water levels, which are likely controlled by seasonal local and regional precipitation. Additionally, Site groundwater flow in both water-bearing zones were relatively constant throughout low- and high-frequency pumping periods, indicating that the pump activations did not significantly affect the Site groundwater flow regime during the period of examination. These data and observations are consistent with the CDID #1 system acting as a constant head boundary for shallow groundwater at the Site. By maintaining a head lower than the Columbia River, the system maintains an overall northerly groundwater flow direction across the Site, away from the Columbia River.

5.0 Physical Setting

This section describes updated Site geology and hydrogeology based on the results of RI data collection activities described in Section 4.0. Preliminary geologic and hydrogeologic settings based on historical data for the Site were presented in the RIWP and subsequently revised in the Interim Data Report (Floyd|Snider 2019a and 2021; refer to Appendix A). The geology and hydrogeology presented in this section informs the CSM presented in Section 9.0.

5.1 GEOLOGY

The Site is located on the northern bank of the Columbia River, adjacent to its confluence with the Cowlitz River to the east. The Site lies on a relatively flat alluvial floodplain at elevations ranging from approximately 18 to 31 feet NAVD 88. Longview, Washington, is situated in a topographic basin surrounded by bedrock uplands. The broad, northwest- to southeast-trending alluvial floodplain consists of unconsolidated and consolidated sediments, which filled in a trough that had been carved by the Columbia River into the underlying Quaternary and Tertiary sedimentary and volcanic rocks. The youngest deposits are unconsolidated Quaternary alluvium generally consisting of interbedded sand, silt, and gravel that extend beneath the Site and the Columbia River as deep as approximately 300 feet bgs (KJC 2012). In the Site vicinity, these native materials typically consist of silty, fine- to medium-grained sand that is interbedded with silty sand and sandy silt lenses and occasional thin layers of volcanic ash, clay, and organic-rich material. In addition, a noncontinuous, soft to stiff silt layer with low to high plasticity and occasional organic debris is sometimes present within the native fine- to medium-grained sand.

Geologic cross-sections based on soil borings and OIP/HPT field measurements advanced at the Site are shown in Figures 5.1 through 5.3. Figure 3.2 shows the cross-section transects in plan view. These borings characterize the shallow subsurface as fill material of an unknown origin, reportedly placed during the late 1880s (Golder 2000), overlying the alluvial sediments. The fill material consists of a heterogeneous mixture of predominantly silt and sand, with a maximum thickness of approximately 20 feet near the areas adjacent to the Columbia River. In the southwestern portion of the Site, underlying the shipping berths and transit sheds, Site boring logs and OIP/HPT field measurements characterize multiple discrete silt lenses within the native sands (Figure 5.1). In the central portion of the Site, underlying the rail tracks and beneath the eastern side of the former Warehouse 9 footprint, the silt lenses increase in frequency and connectivity within the native sands; two approximately 1 to 5 feet thick continuous silt lenses occur between 15 and 10 feet NAVD 88 and between 10 and 5 feet NAVD 88; however, these finer-grained silt lenses thin and/or are not present to the north, east, south, and west of the Site (Figures 5.1 through 5.3). The perched zone present in the central portion of the Site is associated with these less permeable silt lenses with approximately 64% to 88% silt and/or clay and an average porosity of 0.572. The perched zone is discussed in more detail in Section 5.2.

5.2 HYDROGEOLOGY

Groundwater at the Site occurs in two laterally extensive, sandy water-bearing zones, the perched zone and the alluvial aquifer. Water level elevations measured at monitoring wells screened in each zone during the wet and dry seasons (August 2020 and February 2021) are shown on geologic cross-sections A-A’, B-B’, and C-C’, which are presented in Figures 5.1 through 5.3. Groundwater contour maps and inferred flow directions for May and August 2020 are provided in the Interim Data Report (Floyd|Snider 2021; Appendix A), and maps for the November 2020 and February 2021 event are shown in Figures 4.12 through 4.15.

5.2.1 Water-Bearing Units and Groundwater Flow

Descriptions of the perched zone and alluvial aquifer, including horizontal and vertical extensivity, grain size distribution, and groundwater flow characteristics, are presented in the following subsections. Site monitoring wells are classified according to the deepest water-bearing unit that the well screen penetrates (Table 4.10). There are several Site monitoring wells that have portions of their screened interval in both water-bearing zones. MW-09 is screened primarily in the alluvial aquifer but head from the perched zone may artificially raise the measured water level elevations in the alluvial aquifer. MW-25, MW-29, MW-30, and MW-35 are screened primarily in the perched aquifer but may have a limited hydraulic communication with the alluvial aquifer that in turn may artificially lower the measured water level elevations in the perched zone. No anomalous water level values have been specifically identified. These locations are known and effects on inferred flow directions have been considered in descriptions of site hydrogeologic conditions.

5.2.1.1 Perched Water-Bearing Zone

The perched zone is inferred to extend from the location of the former mechanic’s shop to MW-39 and spans approximately between the rail lines and Port Way. The unit occurs between approximately 10 and 15 feet NAVD 88 across the Site and sits largely below an upper confining silt/clay unit that gradually slopes downward toward the north. Boring logs and grain size results characterize the perched zone as a medium- to fine-grained sand with approximately 11% to 13% silt and/or clay and an average porosity of 0.551.

In the perched zone, measured groundwater elevations ranged between 6.98 and 19.12 feet NAVD 88 between May 2020 and February 2021, and were, on average, higher in the wetter months (i.e., November and February) than the drier months (i.e., May and August). Groundwater was observed in all four quarters of monitoring in the perched zone wells located in the center of the Site along the rail lines (i.e., MW-17 and MW-29), whereas wells screened at similar depth intervals to the west (i.e., MW-04 and MW-30) were dry or had very low water levels during the drier months. In the central portion of the Site, where the perched zone was consistently saturated during both the wet and dry months, saturated thickness ranged from approximately 4.9 to 10.7 feet at MW-17 to between 2.61 and 5.02 feet at MW-24.

In May, August, and November 2020 and February 2021, a localized high groundwater elevation point was present at MW-14, located in the northern portion of the perched zone. Radial flow outward from MW-14 was the predominant groundwater flow direction in all quarters, except May 2020, where groundwater flow direction was primarily toward the north. Measured groundwater elevations from the southern portion of the perched zone (between approximately MW-13 and MW-35) in all four quarters of groundwater monitoring show apparent groundwater flow to the west. These results are generally consistent with prior findings of radially outward apparent groundwater flow directions from the center of the Site. The variation in heads and apparent flow directions within the perched zone is consistent with a thin saturated thickness and sensitivity to local recharge.

5.2.1.2 Alluvial Aquifer

Based on site investigations, the alluvial aquifer is inferred to underlie the entirety of the Site and generally sits at elevations below approximately 9 feet NAVD 88. Boring logs and grain size results characterize the alluvial aquifer as a predominantly coarse- to fine-grained sand unit with trace silt that is overlain by a 2- to 5-foot-thick silt/clay aquitard throughout most of the Site north of MW-23. Boring logs and grain size results characterize the alluvial aquifer as a predominantly coarse- to medium-grained sand with approximately 2.5% silt and/or clay and a porosity of 0.445. A deep well log, located north of the Site, indicates that this sandy aquifer unit is approximately 85 feet thick and is underlain by a confining silt layer (KJC 2010).

Measured groundwater elevations in the alluvial aquifer ranged between 5.74 and 9.11 feet NAVD 88 between May 2020 and February 2021 monitoring events and were, on average, higher in the wetter months (i.e., November and February) than the drier months (i.e., May and August). During quarterly groundwater monitoring events, the predominant groundwater flow direction was to the north-northwest, especially in the northern part of the Site, and groundwater elevations were slightly lower in the wells along the rail lines and former Standard Pipelines in the central portion of the Site relative to wells east and west of the rail lines. Alluvial aquifer groundwater elevations were, on average, lower than the average Columbia River Stage elevation, which is also consistent with north-northwest groundwater flow, away from the river (Appendix A). However, throughout the period of monitoring, there was variability in head measurements in the central and southern portions of the Site that suggest local exceptions to the overall north-northwesterly groundwater flow direction.

Locally, groundwater flow directions in the central portions of the Site included some apparent southerly flow directions. These apparent southerly flow directions are based on a few tenths of a foot in head difference over distances of several hundred feet and are associated with the relatively flat hydraulic gradient across this area of the Site. They are also combined with local aquifer heterogeneities that influence head measurements. These apparent local flow directions in the central portion of the Site are not considered important factors in contaminant transport. They do not change the overall north-northwest flow direction that is clearer at the southern and northern edges of the Site. Southerly flow is not likely to be a significant component of the flow direction in the alluvial aquifer, which is consistently measured to the north-northwest away from the Columbia River.

Additionally, water level elevations from February 2021 include a measurement from adjacent to the Columbia River (MW-38), which was lower than nearby wells, suggesting local hydraulic gradient reversal and a component of southerly groundwater flow in the Berth 2 area (Figure 4.14). This local flow direction differs from the northerly flow direction that was indicated by the previous three quarters of water level measurements, which were collected during low tides. Transducer data show that the average elevation of the Columbia River is consistently higher than alluvial aquifer groundwater and that the absolute elevation of the Columbia River is predominantly higher than the alluvial aquifer (Figures 3.20a through 3.20i in Appendix A). These data also support a net hydraulic gradient to the north and a consistently northerly flow direction. Temporary hydraulic gradient reversals that result in low magnitude hydraulic gradients toward the south from locations north of the bank area (e.g., MW-22) may slow the northerly flow of groundwater, but they are not sufficient to reverse the flow direction of the system. The local apparent deviation in hydraulic gradient observed in February 2021 is attributed to local effects including the proximity of this monitoring well to the riverbank and does not suggest significant southerly flow or southerly flow from portions of the Site located north of the bank area where MW-38 is located.

5.2.2 Perched Water-Bearing Zone and Alluvial Aquifer Interaction

Head differences between paired wells in the central (MW-17 and MW-33) and south-central (MW-29 and MW-23) portion of the Site indicate both the direction and magnitude of vertical gradients in the water-bearing zones. Heads measured in the perched zone were significantly greater than those in the alluvial aquifer at both pairs, indicating downward vertical gradients. Significant head differences were observed in both well pairs. Heads at MW-17 were between 5.96 and 9.83 feet greater than those at MW-33 throughout the year, and heads at MW-29 were 5.46 to 6.95 feet greater than those in MW-23. Notably, MW-29 and MW-23 are farther laterally apart than MW-17 and MW-33 and their respective elevations may, therefore, be influenced by other factors as compared to the more geographically proximal well pair. Throughout the four quarters of monitoring, vertical gradients between the perched zone and the alluvial aquifer were strongly downward (greater than +0.6 feet per foot), indicating a potential for downward groundwater flow. The large head difference between the perched zone and the alluvial aquifer, the aquitard soil parameters, and aquifer testing results are consistent with negligible actual flow through the aquitard. This is true even in the case of MW-29, the screened interval of which appears to penetrate into the alluvial aquifer.

As reported in the Interim Data Report, tidal influence was observed in monitoring wells screened in the alluvial aquifer and to a lesser extent, the perched zone, up to approximately 1,600 feet from the Columbia River (Floyd|Snider 2021; Appendix A). In general, the Columbia River tidal influence decreased with distance from the river, and water levels in alluvial aquifer monitoring wells showed a greater degree of tidal influence than those measured in perched zone wells. This observation is consistent with reduced transmissivity between the units from the low permeability aquitard separating the two water-bearing zones. In addition, measurable water level changes in perched zone monitoring wells (MW-17 and MW-29) in response to tidal variations suggests that the aquitard is saturated and that groundwater is transmitted between units; in the case of MW-29, the low but measurable response may be a result of the screened interval penetrating into the alluvial aquifer. Low to no transmissivity of groundwater between the perched zone and alluvial aquifer units was demonstrated by the aquifer tests, which were designed to collect three log scales of data over 100 minutes. During the constant pumping test of the alluvial aquifer (MW-33), no measurable drawdown was observed in the paired perched zone monitoring well (MW-17) or other perched zone observation wells.

Together, these data indicate that perched zone and the alluvial aquifer are distinct water-bearing units with limited hydraulic connection and that the lack of measured flux of groundwater between units resembles slow leakage through a low-permeability aquitard.

6.0 Exposure Pathway Analysis

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 at the Site 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 samples. Therefore, soil and groundwater (with LNAPL) are impacted media but may also be considered secondary contaminant sources. The potential exposure pathways associated with each medium/source are discussed in the following sections, along with the rationale for excluding or including that pathway, and are shown on Figure 6.1. The primary migration pathways are the following:

- **Soil to Direct Contact.** There is soil impacted with TPH in the top 15 feet. Workers routinely excavate shallow soil, within the top 15 feet, to maintain rail and utility lines within the Site. Therefore, there is a potential for these workers to come into direct contact with shallow TPH-impacted soil.
- **Soil to Groundwater.** Releases of petroleum product(s) to the surface and subsurface that occurred during historical Site operations could result in a continued release, or leaching, of contaminants entrained in soil to groundwater. Soil to groundwater is a primary exposure pathway.
- **Soil to Surface Water and Sediment.** Historical observations noted that small amounts of petroleum product had leaked from the abandoned pipes under Berths 1 and 2. All of the pipelines were removed and capped at the bulkhead during the 2019 interim action activities to prevent future leaks. Most of the surface material beneath Berths 1 and 2 is riprap with very limited areas of exposed soil. There are no visible signs of erosion or downslope movement. Routine inspections are conducted beneath the pier to confirm that the pathway of surface soil erosion to surface water and sediment remains protective and incomplete.
- **Soil to Air.** Volatile contaminants in soil have the potential to volatilize to the vapor phase. Based on an empirical demonstration with soil vapor samples collected at the Site, as further described in Section 6.1, this pathway may have been complete in the past but is currently incomplete. The soil to air pathway is considered a secondary exposure pathway and will need to be re-evaluated if buildings are to be constructed within or adjacent to known soil impacts.

- **Groundwater to Surface Water and Sediment.** The Site hydrogeological studies and empirical data have confirmed that groundwater in the perched zone and alluvial aquifer does not flow to the Columbia River (refer to Section 5.2.1). The CDID #1 flood control system permanently maintains flow away from the river. This pathway is considered precluded and, therefore, does not warrant further assessment.
- **Groundwater to Air.** Volatile contaminants in shallow groundwater have the potential to volatilize to the vapor phase. Based on the Site empirical data demonstration, as described in Section 6.2, this pathway may have been complete in the past but is currently incomplete. The groundwater to air pathway is considered a secondary exposure pathway. It will need to be re-evaluated if buildings are to be constructed within or adjacent to known groundwater impacts.

6.1 SOIL AND SOIL VAPOR—EXPOSURE PATHWAYS

6.1.1 Soil Direct Contact, Soil Leaching to Groundwater, and Soil to Surface Water and Sediment

Soil Direct Contact: Based on human exposure via direct contact, the standard POC is throughout the Site from ground surface to 15 feet bgs. Areas of residual TPH soil impacts (GRO, DRO, and/or ORO) within the 15-foot POC for direct contact are present throughout the Site but concentrated primarily on the former Calloway Ross Parcel, along and around the subsurface near the Longview and Standard Pipelines beneath the rail lines, within the vicinity of the former fuel loading racks, and in limited areas near the former 80,000-barrel AST within the vicinity of OIP-02 and OIP-72. Minor surface impacts are also present beneath Berths 1 and 2 where the pipelines daylight.

Potential soil exposure pathways consist of direct contact with shallow impacted soil in unpaved areas by current and future site workers based on industrial exposure scenarios and direct contact with deeper impacted soil by utility workers entering the subsurface soil within the top 15 feet. Unpaved areas that are not covered with railroad spalls, gravel, and/or asphalt pavement are generally limited to the northern portion of the Site, on the former Calloway Ross Parcel (Figure 2.1). Shallow soil impacts at the surface are very limited, noncontinuous, and not expected to pose risks to casual site visitors, current and future site workers, or ecological receptors (i.e., burrowing animals) because residual soil impacts are either beneath gravel, railroad spalls, or asphalt paving that are in areas with restricted access to the public. Site workers routinely excavate shallow soil to maintain rail and utility lines within the Site; therefore, there is a potential for these workers to directly come into contact with shallow TPH soil impacts. Impacted soil with concentrations exceeding the site-specific direct contact CULs can be addressed with institutional controls (ICs) and a Soil Management Plan (SMP).

Soil Leaching to Groundwater: TPH-impacted soil with COC concentrations exceeding their respective MTCA Method A CULs is present within the saturated and capillary zones. Therefore, residual TPH impacts in soil is a contaminant transport pathway for leaching to both the perched zone and the shallow alluvial aquifer.

Soil to Surface Water and Sediment: Field observations confirm that the Under Pier Area is physically stable with no signs of erosion or sloughing that indicates downslope movement of limited soil or riprap. Most of the surface material beneath Berths 1 and 2 is riprap with very limited areas of exposed soil. Sample locations beneath the pier with ORO and cPAH exceedances (P3 and P4) are approximately 13 to 14 feet above the Columbia River at highest high tide. The isolated pockets of petroleum-impacted soil underneath Berths 1 and 2 do not pose a risk to the Columbia River via groundwater migration. Routine inspections are conducted beneath the pier to confirm that the pathway of surface soil erosion to surface water and sediment remains protective and incomplete (Floyd|Snider 2020).

6.1.2 Soil Vapor

MTCA (WAC 173-340-740(3)(b)(iii)(C)) also specifies that the soil to vapor pathway shall be evaluated. Currently, no occupied buildings, which include only the Former Port of Longview Office and the former U.S. Army Reserve building (noted on Figure 2.1), overlie areas of impacted soil or groundwater exceeding proposed cleanup standards. Additionally, no occupied buildings are planned within or immediately adjacent to impacted soil or groundwater. However, the potential for a compete VI pathway into future buildings was evaluated in the RI, focusing on the former Calloway Ross Parcel, within the footprint of former Warehouse 9. Results from the VI pathway analysis are representative of the area of the Site with some of the greatest elevated TPH impacts in soil and groundwater. TPH impacts in this area are not only among the most elevated in soil (residual saturation exceedances) and groundwater, but also where the smear zone is the thickest. TPH impacts in this area are present at depths between 12 and 23 feet bgs, or 7 feet beneath the vapor points installed at 5 feet bgs. Soil vapor data from vapor points VP-1 and VP-2 (i.e., measured concentrations less than the soil vapor screening levels for TPH and BTEX; refer to Section 4.4) were compared to residential screening levels. They indicate that TPH impacts are unlikely to pose a future VI threat; therefore, the soil gas to indoor air pathway is not considered a complete exposure pathway for occupants of any buildings that may be constructed on this portion of the Site.

There is no VI risk to the Former Port of Longview Office, which is outside the lateral inclusion zone based on soil results from GP-5 through GP-8 and MW-32. TPH impacts in soil were detected at a depth of 10 feet bgs in location OIP-72, which is approximately 140 feet to the north-northwest of the former U.S. Army Reserve building. These soil impacts are downgradient from the former U.S. Army Reserve building, along the eastern edge of the impacted soil extent, and are limited in thickness to less than 1 foot (Appendix A and Appendix K). Additionally, the former U.S. Army Reserve building is laterally separated from soil impacts by multiple locations with groundwater results less than the vertical separation thresholds shown on Table B-1 of Ecology's VI guidance (refer to Section 6.2.3; Ecology 2022). Based on these data and the VI data from VP-1 and VP-2, there is likely no VI risk to the former U.S. Army Reserve building.

Figure 6.1 shows the soil vapor pathway as potentially complete because VI risk for industrial land use will need to be reassessed if future occupied buildings are proposed to be built in areas within or immediately adjacent to known soil impacts.

6.2 GROUNDWATER—EXPOSURE PATHWAYS

6.2.1 Groundwater Potability and Direct Contact

The perched zone and the shallow alluvial aquifer at or within the immediate vicinity of the Site are not currently used as a source of water for any purpose by any known individuals, and no known drinking water wells exist in the Site vicinity. The nearest domestic well is approximately 2 miles to the north, or downgradient, of the Site (Ecology 2021b). The use of Site groundwater within the perched zone and shallow alluvial aquifer is highly unlikely given the industrial location and the non-potable characteristics of Site groundwater.

Perched zone groundwater is classified as non-potable, based on evaluation of the criteria presented in WAC 173-340-720(2). As noted above, groundwater in this unit does not serve as a current source of drinking water. Groundwater is also not a potential source of future drinking water due to a low sustainable yield of less than 0.05 gallons per minute measured during the pumping test, which occurred in the portion of the perched zone with the greatest saturated thicknesses (Appendix D). In addition to the low sustainable yield, select perched zone monitoring wells (e.g., MW-04, MW-11, and MW-30) had very low water levels in the drier months relative to the wet season (Section 5.2.1.1), indicating a seasonal sensitivity to local recharge, which may preclude the use of this water-bearing zone as a reliable source of future drinking water. Lastly, aquifer testing data indicate no measurable connection between the perched zone and alluvial aquifer, indicating that impacts present in perched zone groundwater will not migrate to the alluvial aquifer (Appendix D).

The alluvial aquifer exhibits some non-potable characteristics, including mixing with Columbia River surface water during temporary gradient reversals and high natural background concentrations of inorganic constituents present in wells screened in native units below the alluvial aquifer (KJC 2012). Therefore, potable or direct contact to groundwater exposure pathways to receptors are unlikely. However, Ecology classifies groundwater as potable unless determined otherwise by specific criteria listed under WAC 173-340-720(2). The alluvial aquifer does not meet these exclusion criteria, considering the water quality and productivity of the alluvial aquifer; therefore, potable groundwater and direct contact to groundwater are considered further as an exposure pathway for determination of Site cleanup standards.

6.2.2 Groundwater to Surface Water and Sediment

Site hydrological studies have confirmed that the groundwater flow direction in the alluvial aquifer is to the north, away from the river, except in the immediate vicinity of the river, where tidal elevation changes cause gradient reversals sufficient to cause temporary southerly flow from the riverbank. The otherwise northerly flow direction is maintained permanently by the nearby CDID #1 pumping stations for flood control purposes, as described in Sections 4.5.3 and 5.2. In addition, the perched zone exists only in the central and northern portions of the Site and does not extend to the Columbia River. These results demonstrate that there is no potential for impacts to be transported to the Columbia River via groundwater, and the pathway to surface water is not considered a complete pathway. Even though there is not a complete pathway for groundwater to surface water at the Site, sampling results from upgradient wells MW-37 and MW-38 (i.e., closest to the river) were conservatively compared to Ecology's weathered DRO concentrations that are considered protective of aquatic receptors in freshwater, and all results were less than these thresholds, which is 3,000 µg/L for weathered DRO (Ecology 2021c).

6.2.3 Groundwater to Air

Volatile contaminants in shallow groundwater and the presence of LNAPL within the top 15 feet bgs within the vicinity of monitoring well MW-09 have the potential to volatilize, rise through the soil column, and discharge into indoor air. Soil vapor points VP-1 and VP-2 were installed approximately 30 feet west of MW-09 and 60 feet west of MW-40, respectively, within the footprint of the former Warehouse 9. These locations are relevant to a potential future exposure pathway because there is a potential for buildings to be constructed in this area of the Site. Additionally, locations VP-1 and VP-2 were installed 7 feet above known soil impacts and are located adjacent to residual saturation level exceedance in soil. Soil vapor data indicate that TPH impacts at the Site do not likely pose a future VI threat using conservative residential screening levels; therefore, the volatile contaminants from LNAPL and shallow groundwater to indoor air pathway is not considered a complete exposure pathway for occupants of any future buildings constructed on the portion of the Site where soil vapor samples were collected.

Additionally, groundwater analytical data within the vicinity of the former U.S. Army Reserve building indicate that TPH and benzene concentrations in monitoring wells MW-11, MW-13, MW-14, MW-20, MW-25, and MW-32 and direct push borings OIP-02, GP-31, and GP-32 are either less than their respective laboratory quantitation limits or less than the vertical separation thresholds shown on Table B-1 of Ecology's VI guidance (Ecology 2022). Therefore, there is no VI risk from groundwater to air to the occupied former U.S. Army Reserve building. However, Figure 6.1 shows this pathway as potentially complete because VI risk will need to be reassessed if occupied buildings are proposed to be built in areas within or immediately adjacent to known groundwater impacts.

6.3 ECOLOGICAL SETTING AND TERRESTRIAL ECOLOGICAL EVALUATION

The Site is located in an area surrounded by waterfront industrial and other industrial uses. Ground surfaces in the vicinity are generally paved or surfaced with compacted gravel, and vegetated areas are not present on the Site. Limited undeveloped or vegetated land is present in the vicinity of the Site. Terrestrial wildlife is not typically observed at the Site.

MTCA requires that a TEE be completed after the release of hazardous substances to soil to determine the potential impacts to terrestrial organisms at a site (WAC 173-340-7490). A TEE can be excluded if certain criteria are met (WAC 173-340-7491). However, the Site does not meet the exclusion criteria because there is more than 0.25 acres of contiguous undeveloped land within 500 feet of the Site. Therefore, in accordance with MTCA requirements, a simplified TEE was conducted for the Site (Appendix H). The evaluation found the Site does not pose a substantial potential risk to terrestrial receptors due to its commercial use and the surrounding developed land.

7.0 Preliminary Cleanup Levels

This section provides a summary of the approach used to identify the PCULs for COPCs and other chemicals of interest in groundwater and soil determined in the RIWP through evaluation of applicable local, state, and federal laws (ARARs; WAC 173-340-710). In coordination with Ecology, and consistent with the Agreed Order, the RIWP and Interim Data Report compared results to initial screening levels based on MTCA Method A CULs for protection of groundwater to determine potential areas and media of concern. The MTCA Method A framework is the cleanup regulation applicable to the Site, which has been contaminated solely by petroleum releases. The MTCA Method A CULs, where available, are adopted as PCULs. Where MTCA Method A CULs have not been established, MTCA Method B or C CULs and state and federal standards for protection of drinking water quality were considered to determine the most stringent PCULs for screening purposes. PCULs were additionally adjusted for laboratory practical quantitation limits and natural background in accordance with MTCA (WAC 173-340-720(7)(c), WAC 173-340-740(5)(c)).

The following sections identify regulatory criteria considered in the development of PCULs for potentially applicable exposure pathways for each of the impacted media.

7.1 GROUNDWATER PRELIMINARY CLEANUP LEVELS

Table 7.1 and the following present the PCULs for groundwater for each of the potentially complete exposure pathways.

- **Protection of Drinking Water Quality.** Groundwater within the alluvial aquifer at the Site is considered potable (Section 6.2.1); therefore, ARARs protective of drinking water quality apply Site-wide. These include MCLs from the National Primary Drinking Water Regulations and MTCA Method A and Method B CULs. The MTCA Method A CULs, where established, are equivalent to the MCLs for all chemicals analyzed. If these criteria are not available, MTCA Method B CULs are selected as the PCUL.

Other pathways evaluated and determined to be incomplete (refer to Section 6.2) include groundwater to sediment and surface water and groundwater to indoor air. However, VI risk would be assessed for future buildings that may proposed to be constructed above known groundwater impacts. A Tier 1 and possibly Tier 2 evaluation would be conducted in accordance with Ecology's VI guidance (Ecology 2022).

7.2 SOIL PRELIMINARY CLEANUP LEVELS

Table 7.2 presents the PCULs for soil for each of the potentially complete exposure pathways. The exposure pathways considered potentially complete in developing PCULs for soil and the applicable ARARs are presented as follows:

- **Protection of Human Health Direct Contact.** The Site is in an area zoned for industrial use. Therefore, the PCULs included are based on MTCA Method A CULs for industrial land use or MTCA Method C standard formula table values for industrial land use or where MTCA Method A CULs were not available.

- **Protection of Groundwater Quality.** PCULs that are protective of contaminants leaching from soil to groundwater were based on the MTCA Method A CULs for groundwater protection presented in Table 740-1 (for TPH) or, where MTCA Method A CULs were not established, calculated using the fixed parameter three-phase partitioning model, MTCA Equation 747-1. Soil PCULs were developed to protect drinking water. The basis of the groundwater PCULs used in the calculation is described in Section 7.1.

  Soil-to-groundwater equilibrium calculations performed using the three-phase model can be modified to incorporate Site-specific contaminant leaching and transport variables if available, in accordance with WAC 173-340-708(10)(b)(i) using the MTCA default value of 0.001 for total organic carbon.

Other pathways evaluated and determined to be incomplete (refer to Section 6.1) include soil to indoor air, soil to terrestrial ecological receptors, and soil to sediment. However, VI risk will be assessed for future buildings, within an industrial land use area, that are proposed to be constructed above known soil impacts. A Tier 1 and possibly a Tier 2 evaluation will be conducted in accordance with Ecology's VI guidance (Ecology 2022).

7.3 SITE-SPECIFIC TPH CLEANUP LEVELS

As provided for in MTCA WAC 173-340-747, Site-specific TPH MTCA Methods B and C CULs for protection of human health via direct contact were calculated with analytical results from 18 Site soil samples using Ecology's MTCA Workbook Tool (Ecology 2007). Copies of the completed MTCA Methods B and C calculation workbooks are provided in Appendix B.

The soil samples were collected at a range of depths across the Site, and at least one sample was collected from each of the nine AOPCs identified in the RIWP (Figure 3.1; Floyd|Snider 2019a). MTCA Method B CULs ranged from 1,334 to 2,384 mg/kg, and MTCA Method C CULs ranged from 24,278 to 45,743 mg/kg. Because the samples collected were considered representative of the range of potential source areas and petroleum-impacts and mixtures present at the Site, median MTCA Method B and C CULs of 1738 and 29,805.5 mg/kg, respectively, were deemed appropriate for application across the Site. These Site-specific MTCA Method B and Method C CULs are not selected as Site-wide PCULs but will be considered in the development of remedial alternatives for the Site in the FS to ensure that these alternatives adequately protect workers in accordance with MTCA (WAC 173-340-704(4)).

8.0 Development of Contaminants of Concern and Proposed Cleanup Standards

This section identifies the proposed COCs in groundwater and soil at the Site from among COPCs and other chemicals of interest for each medium determined in the RIWP. The selected COCs for a Site are intended to represent the full extent of Site contaminants that pose risk to environmental receptors for development of remedial alternatives. COCs are determined by screening Site data against the PCULs developed for each medium, described in Section 7.0. Once COCs are identified, cleanup standards are proposed. Cleanup standards are defined as a CUL combined with a POC where the CUL applies.

8.1 DETERMINATION OF CONTAMINANTS OF CONCERN

COCs were developed for groundwater and soil in a stepwise approach. First, chemicals in groundwater were compared to initial selection criteria regarding frequency and magnitude of PCUL exceedances. These selection criteria are established in MTCA to determine compliance with cleanup standards:

- The maximum result exceeds the PCUL by more than 2 times per WAC 173-340-720(9)(e)(i).
- Greater than 10% of results exceed the PCUL per WAC 173-340-720(9)(e)(ii).

After the COCs were identified for groundwater, further evaluation was conducted to select COCs in soil. A summary of the groundwater and soil COC selection process and outcomes is presented in the following sections.

8.1.1 Groundwater Contaminants of Concern

This section describes the process for identifying COCs in groundwater by screening groundwater data against the PCULs. Table 8.1 presents Site-wide frequency of exceedance (FOE) information. For each chemical, Table 8.1 presents the PCUL; the number of groundwater results; whether detected results exceeded the PCUL; and for each chemical of interest, the maximum exceedance factor. The most recent groundwater results obtained since 2015 have been included for each monitoring well location. These recent data are reflective of current Site conditions, particularly given the extent of soil interim actions performed at the Site. The chemicals that meet the selection criteria for groundwater presented in Section 8.1 are in Table 8.1.

Based on this evaluation, the chemicals identified as COCs in groundwater are the following:

- GRO
- Total DRO and ORO
- Benzene

8.1.2 Soil Contaminants of Concern

This section describes the process for identifying COCs in soil. Soil COCs were determined using a stepwise approach to evaluate their risk to environmental receptors. The potentially complete pathways for soil are leaching to potable groundwater and direct contact. Of these two pathways, the applicable criteria for groundwater protection are more stringent and are therefore considered first.

The PCULs for groundwater protection discussed in Section 7.2 were developed using default assumptions for the leachability of contaminants. These PCULs are a useful tool for understanding the fate and transport of Site contaminants and potential areas of concern for remediation. When determining whether contaminants in soil are of concern for the leaching pathway at a specific site, however, MTCA contains provisions for further site-specific leachability assessment to determine the list of site COCs. Therefore, for determining whether a chemical in soil is a COC for the leaching pathway at the Site, an empirical demonstration was first performed in accordance with WAC 173-340-747(9). Per the MTCA regulation, the empirical demonstration "specifies the procedures and requirements for demonstrating empirically that soil concentrations measured at the site will not cause an exceedance of the applicable groundwater cleanup levels established under WAC 173-340-720."

To demonstrate empirically that measured soil concentrations will not cause an exceedance of the applicable groundwater CULs via leaching, the following requirements must be fulfilled per WAC 173-340-740(9)(b):

- The groundwater concentrations are representative of expected leaching conditions—i.e., sufficient time has elapsed since contaminant releases to soil for leaching to occur, and the current leaching pathways through the vadose zone in unpaved areas and within the saturated zone are representative of future Site conditions.
- The measured groundwater concentration is less than or equal to the applicable groundwater cleanup level.

The first requirement for empirical demonstration is fulfilled at the Site, as detailed in prior sections of this report. The groundwater impacts associated with releases from petroleum handling that occurred between the mid-1920s and mid-1990s have been measured consistently during multiple investigations conducted throughout the previous 30 years, with significant variations observed only when concentrations decreased due to remediation activities. Furthermore, the Port intends to maintain the current Site configuration and maritime industrial property use for the indefinite future.

The second requirement is assessed in Section 8.1.1 above. The groundwater COCs identified in Section 8.1.1 on the basis of their frequency and magnitude of exceedances of the PCULs include GRO, total DRO and ORO, and benzene. These groundwater COCs are the contaminants for which the leaching pathway from soil is considered to be potentially complete and are assumed to be COCs for soil.

Under some conditions, contaminants that are found to be COCs in groundwater may no longer be present at concentrations of concern in soil (for instance, if a source has been depleted by leaching). To confirm that the groundwater COCs are additionally soil COCs, therefore, Site soil data for the groundwater COCs were screened against the PCULs in Table 8.2. Table 8.2 presents Site-wide FOE information. For each chemical, Table 8.2 presents the PCUL; the number of soil results; whether detected results exceed the PCUL; and the maximum exceedance factor for each chemical. All soil results representative of current Site conditions (i.e., currently present in situ) have been included in the FOE table; soil samples that have been removed through past excavation activities are not included in the FOE table. The chemicals that meet the COC selection criteria established in MTCA (WAC 173-340-740(7)(c)) and were identified as COCs include the following:

- GRO
- Total DRO and ORO
- Benzene

For all compounds not identified as soil COCs on the basis of empirical demonstration in groundwater, the other potentially complete pathway of direct contact was then considered to assess risk to environmental receptors. For each chemical, Table 8.3 presents the applicable direct contact criterion; the number of soil results; whether detected results exceed the direct contact criterion; and the maximum exceedance factor for each chemical. All soil results representative of current Site conditions (i.e., currently present in situ) have been included in the FOE table; soil samples that have been removed through past excavation activities are not included in the FOE table. The maximum detected concentrations were less than the corresponding criteria for direct contact for all remaining COPCs. Therefore, in accordance with the selection criteria established in MTCA (WAC 173-340-740(7)(c)), no additional chemicals were determined to be COCs due to risk to receptors via direct contact.

8.2 GROUNDWATER CLEANUP STANDARDS

Cleanup standards are defined as a CUL combined with a POC where the CUL applies. Groundwater cleanup standards ensure that groundwater leaving the Site is protective of human and ecological receptors in surface water and sediment, and that on-Site groundwater is protective of drinking water and ambient air. Proposed cleanup standards have been selected for each of the proposed COCs identified in Section 8.1.1.

8.2.1 Point of Compliance

Under MTCA (WAC 173-340-720(8)(b)), the standard POC for groundwater is defined as “throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site,” which implies that groundwater would need to meet CULs throughout the Site.

If it can be demonstrated that it is not practicable to meet groundwater CULs at the standard POC within a reasonable restoration time frame using all practicable methods of treatment in the cleanup, then a conditional POC (CPOC) may be approved by Ecology per WAC 173-340-720(8)(c). If a CPOC is necessary, MTCA requires that a CPOC be set as close to the source area as practicable, not to exceed the property boundary. Because groundwater exceeding CULs may still be present at the edge of the groundwater plume in the off-property area (refer to Section 4.3.7; DRO and ORO concentrations in monitoring wells MW-04 and MW-30 are interpreted to include other organic compounds), conditions for a CPOC are not currently met, and the standard POC will be applied.

There is no exposure to groundwater at the Site through the drinking water pathway, which is expected to be permanently ensured with an environmental covenant restricting groundwater use.

8.2.2 Proposed Cleanup Levels

For the groundwater COCs, direct contact and potable groundwater exposure pathways are considered complete for proposed CUL development (refer to Section 6.2). Therefore, the groundwater PCULs in Table 7.1 are numerically equivalent to the proposed CULs, presented in Section 8.4.

8.3 SOIL CLEANUP STANDARDS

Soil cleanup standards will ensure that Site soil is protective of direct contact (human health and ecological risk) pathways and leaching (protection of groundwater) pathways.

8.3.1 Point of Compliance

The standard POC for soil is pathway-dependent, as defined in WAC 173-340-740(6)(b-d). The standard POC for each potentially active soil exposure pathway, along with specific application at the Site, is summarized as follows:

- **Direct Contact.** The standard POC for all direct contact pathways is the top 15 feet of soil per WAC 173-340-740(6)(d) for human health risk assessment. Exposure pathways at the POC include incidental ingestion and dermal contact with soil and would require ICs and an SMP to be protective of workers conducting maintenance on the rail lines and utilities beneath the property.
- **Leaching to groundwater.** The POC is soil throughout the Site per WAC 173-340-740(6)(b). Compliance will be demonstrated by directly comparing groundwater concentrations to the proposed CULs.
- **Soil vapor.** The standard POC is from the surface to the uppermost groundwater table per WAC 173-340-740(6)(c). The depth to groundwater varies seasonally at the Site, dependent on the presence of perched groundwater and topography. Where perched groundwater is present, it is encountered at depths of approximately 6 to 17 feet bgs. Groundwater in the underlying alluvial aquifer is encountered at depths of

approximately 6 to 25 feet bgs and is typically deeper than approximately 12 feet bgs. Compliance for soil vapor has been demonstrated by soil vapor sampling in an area with the greatest concentrations and thicknesses of TPH impacts, which found that soil vapor concentrations do not exceed applicable regulatory screening levels (Table 4.9). However, VI risk will be assessed if future occupied buildings are proposed within areas of known TPH impacts.

8.3.2 Proposed Cleanup Levels

For the soil COCs, the direct contact exposure and leaching pathways are considered complete for proposed CUL development. Therefore, the soil PCULs in Table 7.2 are numerically equivalent to the proposed CULs, presented in Section 8.4.

8.4 SUMMARY OF PROPOSED COCS AND CLEANUP STANDARDS

Groundwater and soil proposed COCs and their proposed cleanup standards are summarized in Table 8.4.

Table 8.4
Summary of Proposed Site COCs and Proposed Cleanup Standards

Proposed COC	Proposed Cleanup Level (1)		Point of Compliance
	Value	Basis	
Groundwater			
GRO	800 µg/L	Protection of drinking water	Site-wide
Total DRO and ORO	500 µg/L	Protection of drinking water	Site-wide
Benzene	5.0 µg/L	Protection of drinking water	Site-wide
Soil			
GRO	30 mg/kg	Protection of groundwater (2)	Site-wide
Total DRO and ORO	2,000 mg/kg	Protection of groundwater (2)	Site-wide
Benzene	0.030 mg/kg	Protection of groundwater	Site-wide

Note:

1 Proposed CULs are based on MTCA Method A protection of groundwater (Tables 720-1 and 740-1).

2 The CULs for protection of leaching to groundwater and protection of direct contact are equivalent for TPH including GRO and total DRO and ORO. CULs based on leaching for benzene are also protective of the direct contact pathway.

9.0 Conceptual Site Model

The preliminary CSM presented in Section 4.0 of the RIWP was refined based on results of the RI data collection described in Section 4.0 of this report. The preliminary CSM used historical information and data to define extents of impacted Site media and outline potential receptors and potentially complete transport and exposure pathways.

This section presents a revised CSM for the Site, including historical sources of proposed COCs and contaminated media, nature and extent of COCs in Site media, and potential receptors and exposure pathways. Figure 9.1 shows the CSM.

9.1 ORIGINAL RELEASE MECHANISMS AND PRIMARY CONTAMINATED MEDIA

Based on historical information for the Site, together with prior and current environmental data, COCs whose concentrations exceed PCULs are petroleum-derived and include GRO, total DRO and ORO, and benzene in soil and groundwater. LNAPL has not been measured since approximately 2000, except for the 0.07 to 0.53 feet measured in MW-09 throughout the 2020 and 2021 quarterly groundwater sampling events.

Field investigations and a review of historical information indicate that the primary sources of COCs include the following:

- Former Standard Pipelines
- Former 80,000-barrel AST
- Former Longview Pipeline
- Former fuel loading racks
- Former Calloway UST

An additional lesser source includes the former mechanic's shop UST. The 2020 Phase II activities and GPR results from Golder's 1993 Phase II investigation did not encounter soil impacts related to the former U.S. Army Reserve heating oil UST, and the GPR results did not indicate the presence of any abandoned-in-place USTs adjacent to and west of the former 80,000-barrel AST and former U.S. Army Reserve building.

Available information indicates that the existing petroleum hydrocarbon impacts are from historical releases associated with the storage and transfer of petroleum fuels. The pipelines were used to convey multiple petroleum products including gasoline, diesel, Bunker C fuel, stove oil, and PS300 fuel (Golder 1993a). Based on the GPR survey and field observations beneath the berth, all former pipelines are inferred to be emplaced between approximately 3 and 14 feet bgs throughout the Site, deepest in the southern part of the Site, where they daylight beneath the berths, but sloping downward from south to north (Figure 5.1; Golder 1994). Historical observations indicate that some of the capped and plugged pipelines had leaked beneath the piers (Golder 1994); however, the 2019 pipeline interim action removed all remaining pipelines extending beyond the bulkhead (Floyd|Snider 2019b), and routine inspections are conducted to ensure that the pathway of surface soil erosion to surface water remains protective. There are currently no continuing sources of petroleum products or other known hazardous substances stored or used at the Site. However, it is unknown if the former Longview Pipeline still contains product but is considered a potential source; although it is likely immobile and currently contained within the pipeline and capped at the ends.

9.2 NATURE AND EXTENT OF CONTAMINATED MEDIA

The proposed COCs for the Site based on groundwater and soil data from historical and RI investigations include GRO, total DRO and ORO, and benzene. LNAPL is present at one monitoring well location (MW-09). The sections that follow describe the nature and extent of groundwater and soil impacts using all available in situ data for each of the COCs described in Section 8.1. Figures 9.2 and 9.3 show extents of groundwater COCs at concentrations greater than proposed CULs. Figures 9.4 through 9.6 show maximum concentrations of soil COCs, and Figure 9.7 shows the extent of soil COCs with concentrations that exceed proposed CULs. Table 9.1 presents chemical-specific properties for each COC that may affect fate and transport in the environment, and thus may help inform the selection of remedial technologies.

9.2.1 Contaminants of Concern in Groundwater

COCs in groundwater include GRO, total DRO and ORO, and benzene. COCs have been sufficiently delineated for the purpose of the RI, which is to collect sufficient information to evaluate and select remedial alternatives for the Site per WAC 173-340-350(1). Figures 9.2 and 9.3 shows the approximate extents of the groundwater plumes in the perched zone and alluvial aquifer, respectively, with COC concentrations exceeding proposed CULs at the Site. Tables 4.6 and 4.7 provide groundwater analytical results relative to RIWP screening criteria since 2015, and Appendix G includes a summary of historical groundwater analytical data from 1991 to 2013.

9.2.1.1 Total DRO and ORO

Total DRO and ORO concentrations in groundwater that exceed the proposed CUL of 500 µg/L are found in both the perched zone and alluvial aquifer. Total DRO and ORO concentrations greater than proposed CULs in groundwater are concentrated most heavily in the area beneath the pipelines between the former Calloway Ross Parcel and the former 80,000-barrel AST and fuel loading racks.

Perched Water-Bearing Zone

In the perched zone, total DRO and ORO concentrations greater than proposed CULs are present in two separate dissolved-phase plumes, which are separated by a zone of clean perched zone groundwater (Figure 9.2). GRO and benzene are not present at concentrations exceeding their respective proposed CULs within the perched zone.

The northern dissolved-phase plume encompasses the central portion of the rail line near the former fuel loading racks and stretches north and west to MW-02 and MW-04, which are located downgradient and north-northwest of the former Calloway Ross Parcel and former Standard and Longview Pipelines (Figure 9.2). Proposed CUL exceedances have been intermittent over time at these locations. Total DRO and ORO was detected at concentrations exceeding proposed CULs at MW-02 and MW-04 in two of five and one of two recent groundwater sampling events, respectively. In addition, MW-02 and MW-04 have high average dissolved oxygen and total DRO and ORO concentrations, relative to other sample locations. It is likely that a portion of the total DRO and ORO concentrations are detections of organic material in this area (Appendix D). This is supported by the laboratory reports, which indicate that the chromatograms do not match the fuel standards used for instrument calibration and analytical results analyzed with and without silica gel cleanup, which was used between 2001 and 2013. These observations and the intermittent exceedances at MW-02 and MW-04 indicate that these locations are at the edge of the dissolved-phase plume. Groundwater analytical data indicate that the northern dissolved-phase plume within the perched zone is delineated to the northeast east, south, and southwest at monitoring wells MW-16, MW-14, MW-11, and MW-17 and likely does not extend further than MW-02 and MW-04.

The second dissolved-phase plume with total DRO and ORO concentrations greater than proposed CULs in perched zone groundwater includes MW-26 and MW-28 near the divergence of the Standard and Longview Pipelines and extends to the west and downgradient to MW-30 and MW-35. The maximum total DRO and ORO concentration of 6,100 µg/L was detected at MW-28 in August 2020, which is located adjacent to and west of the former Standard and Longview Pipelines along the railroad tracks. Proposed CUL exceedances are relatively low (approximately 1 to less than 3 times the proposed CUL) at the other locations, including MW-30, which is located off the Port property across Port Way. Historical groundwater monitoring results indicate that the hydrocarbons detected at MW-30 by the NWTPH-Dx method may be attributed to naturally occurring organics and/or metabolic byproducts of biodegradation as shown by analytical results after silica gel cleanup, which was used between 2001 and 2013. Analytical results for groundwater samples taken from MW-30 with silica gel cleanup were consistently less than the MTCA A Method CUL (equal to the proposed CUL) during this time (Golder 2000). Groundwater analytical data indicate that the southern dissolved-phase plume in the perched zone is delineated to the east, south, and southwest at monitoring wells MW-18, MS-13, MW-24, and MW-29. Although the plume is not delineated to the west and north, groundwater data and MNA results discussed in Appendix D and in Section 9.2.1.3 indicate that MW-02, MW-04, and MW-30 are close to the edge of the dissolved-phase plume.

It is likely that a portion of the total DRO and ORO concentrations detected in MW-02, MW-04, and MW-30 are detections of organic material and/or metabolic byproducts of biodegradation (e.g., alcohols and organic acids, with possible phenols, aldehydes, ketones). These byproducts have oxygen in their molecules and are not considered hydrocarbons but are included as DRO detections. This is supported by the laboratory reports, which note that the chromatograms for these three locations do not match the fuel standards (diesel and oil) used for instrument calibration. The chromatogram patterns could be a result of a variety of reasons, such as weathering, biodegradation, or a combination of a mixture of DRO and ORO. However, MW-30 shows neither a decrease of dissolved oxygen, nitrate, and sulfate nor an increase in total alkalinity, manganese, ferrous iron, and methane concentrations (Table 4.8), and groundwater sampling observations at MW-30 have noted the presence of a reddish-brown bacterial growth that is likely associated with organic iron-reducing bacteria. Based on these observations, MNA data, and analytical data analyzed with silica gel cleanup, biodegradation has likely occurred at these three locations and a portion of the detected total DRO and ORO concentrations are metabolic byproducts. These data and observations can be used to conservatively determine that the edge of the dissolved-phase plume is at or does not extend much farther beyond these three monitoring wells.

To summarize, the groundwater plume within the perched zone is considered delineated off-property, as shown on Figure 9.2, and likely does not extend beyond monitoring wells MW-02, MW-04, MW-30, and MW-35 due to the following:

- Relatively low-level and intermittent proposed groundwater CUL exceedances
- Consistent decrease of COC concentrations relative to historical concentrations
- Stability and active natural attenuation within the plumes (Appendix D)
- Presence of a reddish-brown bacterial growth at location MW-30 that is likely associated with iron-reducing bacteria
- Chromatograms for these locations that do not resemble diesel fuel patterns and COC concentrations that are likely naturally occurring organic material and metabolic byproducts at MW-02, MW-04, MW-30, and MW-35, which is supported by MNA data and groundwater results analyzed with silica gel cleanup

However, these conclusions will be confirmed with additional well installation and sampling as a part of predesign data collection prior to submittal of the Engineering Design Report (EDR), as further discussed in Section 15.1.

Alluvial Aquifer

In the alluvial aquifer, total DRO and ORO concentrations exceeding proposed CULs are concentrated in three separated dissolved-phase plumes (Figure 9.3). The northern plume is in the northeastern portion of the Site adjacent to the former Standard Pipelines and encompasses MW-06 and MW-39. The total DRO and ORO maximum concentration of 7,300 µg/L was detected at MW-39 in August 2020. The extent of dissolved-phase DRO and ORO impacts is delineated to the north, south, and west at MW-19, OIP-69, and downgradient location MW-01.

The central dissolved-phase plume with total DRO and ORO concentrations exceeding proposed CULs in the alluvial aquifer extends from MW-15 in the northeast adjacent to the former 80,000-barrel AST and Standard Pipelines to the southwest at MW-33, underlying the central rail lines and the pipelines. The dissolved-phase plume extends to the east and west between the former Calloway Ross Parcel and former 80,000-barrel AST (MW-05 and MW-12). The plume is approximately centered around MW-09, which is the only location on the Site that currently contains measurable LNAPL. The maximum concentration of 3,800 µg/L for total DRO and ORO was detected at MW-40 in November 2020, which is located near the center of the inferred plume and along the pipelines. The central dissolved-phase plume with total DRO and ORO exceedances is delineated at downgradient location MW-31 as well as to the northeast (at T-2), east (at OIP-02, MW-32), and west (at GP-3, and GP-4).

The southern dissolved-phase plume with total DRO and ORO concentrations that exceed proposed CULs is centered around MW-34, located just west and adjacent to the former Standard and Longview Pipelines. The maximum total DRO and ORO concentration at MW-34 is 1,800 µg/L, which was detected in both November 2020 and February 2021. The southern dissolved-phase plume is inferred to be separated from the plume to the north due to multiple boring locations (OIP-46, OIP-64, and GP-3), with soil samples with analytical results less than proposed CULs and OIP borings (OIP-33, OIP-64, OIP-55, and OIP-65) without fluorescent responses collected in this area. The total DRO and ORO groundwater plume is delineated downgradient at GP-3 and GP-4, cross-gradient at location MW-27, and upgradient at locations UST-4 and MW-23.

9.2.1.2 GRO and Benzene

The extent of groundwater with GRO and benzene concentrations greater than proposed CULs is significantly smaller than the extent of the total DRO and ORO-impacted groundwater, and GRO and benzene exceedances are present only within the alluvial aquifer. The dissolved-phase GRO plume encompasses the dissolved-phase benzene plume, and exceedances of proposed CULs are collocated at MW-10, MW-12, and MW-40 (Figure 9.3). The greatest GRO and benzene concentrations are encountered in the vicinity of the former Calloway UST, beneath the former Standard and Longview Pipelines, and adjacent to the former 80,000-barrel AST. The maximum concentrations of GRO and benzene concentrations were detected at MW-12 in August 2020 at 7,100 and 910 µg/L, respectively.

The dissolved-phase GRO plume within the alluvial aquifer extends from MW-12 in the east to MW-03 and MW-40 in the west and from MW-20 and MW-40 in the south to MW-08 in the north. The dissolved-phase benzene plume extends from MW-40 and MW-10 in the west to MW-12 in the east. Despite the GRO concentrations detected in MW-20, the extent of the GRO impacts in the alluvial aquifer are not expected to extend farther upgradient to the southeast and south due to the lack of a source, groundwater flow direction, and being bounded to the east by OIP-02, GP-31, and MW-32. The GRO and benzene groundwater plume in the alluvial aquifer is considered adequately delineated by results less than proposed CULs at downgradient location MW-31 and cross-gradient locations MW-05, MW-15, MW-32, MW-33, OIP-02, and T-2.

9.2.1.3 Natural Attenuation of Contaminants

Natural attenuation is the unaided reduction of contaminant concentration and mass by using the natural assimilative capacity of a site groundwater/soil system in situ. As defined in WAC 173-340-200, these in situ processes include natural biodegradation; dispersion; dilution; sorption; volatilization; and chemical or biological stabilization, transformation, or destruction of hazardous substances. When used as part of a cleanup action, natural attenuation is referred to by the USEPA as MNA to differentiate it from a no action alternative (USEPA 1999). Appendix D provides a summary of these indicators—how metabolic byproducts and electron donors/acceptors can be used to infer the efficacy of natural attenuation processes at a site—and an assessment of the MNA status in both perched zone and alluvial aquifer groundwater.

Site analytical groundwater results (Table 4.8) provide evidence that natural attenuation of groundwater contaminants by various types of biodegradation is occurring in both the perched and alluvial water-bearing zones. In the alluvial aquifer, results show decreased concentrations of dissolved oxygen, nitrate, and sulfate and increased manganese, ferrous iron, methane, and total alkalinity concentrations within the dissolved-phase groundwater plume, relative to unimpacted groundwater. This observation indicates that both aerobic and anaerobic biodegradation are occurring in the alluvial aquifer, particularly in the dissolved-phase plume that surrounds the LNAPL in MW-09. In the perched zone, decreased, but measurable dissolved oxygen concentrations as well as low nitrate and sulfate concentrations within the dissolved-phase plume, relative to impacted groundwater provide evidence for both aerobic and anaerobic biodegradation (i.e., denitrification and sulfate reduction) in groundwater. Strong positive (manganese, ferrous iron, and methane) and negative (dissolved oxygen, nitrate, and sulfate) correlations between these MNA parameters and total DRO and ORO concentrations in both perched zone and alluvial aquifer groundwater provide further evidence that biodegradation is occurring at locations with petroleum-impacted groundwater in the perched zone (Appendix D).

To evaluate the stability of the Site dissolved-phase groundwater plumes, time series plots of total DRO and ORO, GRO, and benzene were constructed for monitoring well locations in both water-bearing zones with available historical groundwater data (Appendix G). In addition, Mann-Kendall analyses using Ecology’s natural attenuation data analysis tool package (Ecology 2005) were used to assess the stability of contaminant plumes at individual monitoring well locations. Results indicate that the groundwater plumes in both the perched zone and alluvial aquifer are stable or shrinking.

9.2.2 Light Non-Aqueous Phase Liquid

The occurrence of LNAPL on groundwater and analysis of the correlation of LNAPL with soil results for petroleum are described in the following sections. It should be noted that, consistent with the cleanup standards presented in Section 8.4, results for total DRO and ORO are used to analyze correlation between soil concentrations and LNAPL occurrence.

9.2.2.1 Nature and Extent of LNAPL

Historically, LNAPL has been present in measurable concentrations with thicknesses between 0.01 and 1.34 feet in perched zone monitoring well MW-16 (Figure 9.2) and alluvial aquifer wells MW-03, MW-07, MW-09, MW-19, and MW-20 (Figure 9.3). LNAPL has not been detected in monitoring wells MW-16 and MW-19 since June 1993. Between April 1999 and 2014, absorbent socks were deployed to remove LNAPL in monitoring wells MW-03, MW-07, MW-09, and MW-20. During the 2019 Site-wide groundwater monitoring event, LNAPL was measured only in MW-09, at a thickness of 0.01 feet. Absorbent socks were removed from MW-03, MW-07, MW-09, and MW-20 to assess LNAPL recoverability in these wells.

Since 2019, MW-03, MW-07, and MW-20 remained without measurable LNAPL, and LNAPL thicknesses in MW-09 slowly increased to 0.53 feet in February 2021 (Table 4.10). The depletion in dissolved oxygen, nitrate, and sulfate and increases in manganese and ferrous iron at monitoring well MW-20 indicate that natural attenuation is occurring after the removal of LNAPL using absorbent socks (Appendix D), which is likely occurring at MW-03 and MW-07 as well. Therefore, TPH impacts in soil are no longer present at concentrations for mobile LNAPL to accumulate on the water table at these locations. The slow increase of measurable LNAPL in MW-09 indicates that LNAPL transmissivity within the alluvial aquifer is very low; however, remaining residual LNAPL is likely to continue to accumulate on the water table at MW-09. Because MW-09 is surrounded by alluvial aquifer wells (i.e., MW-07, MW-10, and MW-40) and a perched zone aquifer well (MW-14) that have no measurable LNAPL, the residual LNAPL plume on the Site is inferred to be small in extent, stable, and confined to the portion of the alluvial aquifer underlying MW-09 or likely immobile beyond MW-09 (Figure 9.3). LNAPL extent is considered sufficiently delineated for the purposes of this RI.

9.2.3 Contaminants of Concern in Soil

The extents of known total DRO and ORO, GRO, and benzene in soil at concentrations exceeding proposed CULs are shown in Figure 9.7. The extents of soil impacted by total DRO and ORO and by GRO largely overlap, with the exception of some scattered exceedances in the far northern and southern portions of the Site. The soil impacts are largely concentrated in three areas centered along the former Standard and Longview Pipelines as they transect the Site beneath the rail lines from MW-39 in the north to GP-27 in the south. Beneath the rail lines, the affected soil extends laterally to the east and west in three areas: (1) in the vicinity of MW-39 with impacts extending from approximately OIP-69 to OIP-73; (2) in the central portion of the Site near the former fuel loading rack location, where impacts encompass the area between the former Calloway UST and the former 80,000-barrel AST; and (3) in the southern portion of the Site where the former Standard and Longview Pipelines diverge, where impacts are concentrated between MW-34 and MW-24.

In the northernmost area, soil impacted by total DRO and ORO has been identified between 2 and 14 feet bgs at MW-19 and MW-39, with a maximum concentration of 130,000 mg/kg (MW-19). GRO was detected at concentrations greater than the proposed CUL only at MW-39, although historical detection limits for GRO were not available for the soil samples collected at MW-19. Impacted soil in this area is delineated on all sides by analytical results less than proposed CULs at OIP-57, OIP-69, OIP-7, and OIP-73.

The most heavily impacted soil occurs beneath the rail lines within the vicinity of the former fuel loading racks located between the former Calloway UST and the former 80,000-barrel AST and stretches from approximately OIP-56 to OIP-33. The soil impacts, which include total DRO and ORO, GRO, and benzene, are centered around MW-09, which is the only monitoring well with current measurable LNAPL; however, this area includes zones of soil impacts at concentrations greater than preliminary residual saturation levels (Section 4.0). The extent of soil impacted by GRO and by total DRO and ORO stretches eastward into the former 80,000-barrel AST footprint; although this area was excavated to an average depth of 6 feet bgs in 1996, confirmation samples and subsequent RI samples and OIP borings indicate that some impacted material remains at or below the base of the excavation and beyond the southeastern sidewall near OIP-2 (Floyd|Snider 2021). COC exceedances occur between approximately 1.5 and 20 feet bgs in this area, but exceedances are concentrated between 8 and 17 feet bgs. The maximum detected concentrations for COCs in this area are as follows:

- Total DRO and ORO of 160,000 mg/kg at SCR-2 (0 to 1 foot bgs)
- GRO of 16,000 mg/kg at MW-16 (10 feet bgs)
- Benzene of 12 mg/kg at MW-40 (10.5 to 11 feet bgs)

Soil in this area with total TPH concentrations greater than the Site-specific MTCA Method C CUL for direct contact includes sample locations SCR-1 and SCR-2 (0 to 1 foot bgs) as well as MW-11 (1.5 feet bgs). The extents of total DRO and ORO and GRO concentrations exceeding proposed CULs largely overlap in this area (Figure 9.7), and benzene exceeding proposed CULs was detected in soil from four locations within these extents in a small band just west of the pipelines and MW-09. Saturated zone soil total DRO and ORO that is at or exceeds preliminary residual saturation levels occurs from approximately MW-09 to MW-17, beneath and just west of the rail lines, primarily in a zone between 13 and 18 feet bgs. Based on boring logs and water level measurements, this impacted saturated zone soil is in contact with the upper few feet of the alluvial aquifer. Soil GRO concentrations equal to or exceeding residual saturation levels occur between OIP-47 and MW-16 and are concentrated slightly shallower, between 8 and 12 feet bgs, which is consistent with perched zone water level elevations in these locations. The GRO detections in OIP-49 and OIP-72 were at concentrations of 960 mg/kg and 520 mg/kg, respectively. However, OIP results from OIP-49 and OIP-72 show that these impacts are limited in thickness, less than 1 foot thick, indicating that impacts are pinching out to the east. Therefore, this area is considered delineated on all sides by multiple historical and RI soil analytical results and OIP borings (Figure 9.7).

A zone of clean soil separates the soil impacts centered around MW-09 from the impacts centered around MW-26 in the vicinity of the bend in the former Longview Pipeline and just to the north of the former mechanic's shop and associated USTs. The area includes soil with GRO and total DRO and ORO at concentrations greater than proposed CULs. Maximum COC concentrations include 49,000 mg/kg for total DRO and ORO and 5,600 mg/kg for GRO at OIP-23 and MW-24, respectively. Impacted soil in this area occurs between 12.8 and 24 feet bgs, which is at or below the silt aquitard inferred to separate the perched zone from the alluvial aquifer. Soil exceeds preliminary residual saturation levels for total DRO and ORO between 14 and 20 feet bgs at five boring locations. In addition, soil exceeds the Site-specific total TPH MTCA Method C CUL for direct contact at MW-24 (15.5 feet bgs), MW-26 (18 feet bgs), and OIP-23 (19 to 20 feet bgs). This area is delineated on all sides by analytical results less than proposed CULs at MW-18, OIP-53, OIP-54, UST2, GP-34, and OIP-31.

9.2.3.1 Isolated Soil Contamination

Outside of the three main areas of impacted soil beneath the railroad tracks, there are several isolated locations where GRO and total DRO and ORO have been detected at concentrations greater than proposed CULs (Figure 9.7). Along the northern Site boundary, sample SCR-7 (0 to 1 foot bgs), collected in 1993, had a total DRO and ORO concentration of 2,700 mg/kg that exceeded the proposed CUL. South of the former mechanic's shop and USTs, OIP-20 had a thin sand layer (less than 1 foot thick) of impacted soil with a GRO exceedance at 11.5 feet bgs but is considered delineated on all sides. In the southern part of the Site, near the termination of the pipelines and shipping berths, there were multiple limited, non-continuous, low-level exceedances of total cPAHs TEQ and total DRO and ORO in the locations underneath Berths 1 and 2 (P1 through P6), as well as GRO, total DRO and ORO exceedances at GP-18 at 27 feet bgs (Floyd|Snider 2020). However, groundwater data collected at GP-18 show total DRO and ORO detections less than laboratory quantitation limits, which indicate that the total DRO and ORO exceedances in soil at GP-18 at 27 feet bgs do not impact groundwater (Tables 4.2 and 4.6). Additionally, groundwater results in wells MW-37 and MW-38 indicate that the low-level TPH and cPAHs detections in soil beneath the berths do not impact groundwater. Additionally, the residual cPAHs detection beneath the berths are approximately 14 feet above the highest recorded tidal levels. Using the National Oceanic and Atmospheric Administration's (NOAAs) online tool (NOAA 2021), these impacts will not come into contact with the maximum projected sea level rise of 10 feet with high tide flooding (refer to Section 9.4).

9.3 CURRENT AND FUTURE POTENTIAL LAND USES

The Site is actively used for marine cargo operations, which include a rail-dependent bulk export facility. Activities and uses in support of those operations include storage of cargo handling equipment, cargo storage, conveyers, rail dump pit, baghouses, ship loader, office, maintenance shop, wastewater pre-treatment plant, transit sheds, and maintenance material storage. Future land use is expected to remain the same.

Ecological receptors are not likely to be impacted by Site use in the future, as indicated by the simplified TEE evaluation (refer to Appendix H). Per the simplified TEE, no further evaluation is necessary.

9.4 VULNERABILITY ASSESSMENT

Resilience to climate change impacts is evaluated using the Ecology guidance Adaptation Strategies for Resilient Cleanup Remedies (i.e., climate change guidance; Ecology 2017). The groundwater elevation in the alluvial aquifer at the Site is tidally influenced due to the close proximity the Columbia River; therefore, climate change impacts have a potential to adversely affect the Site. These impacts include the rise in sea level and coastal inundation, high tide flooding, and severe storms. NOAA provides an online analytical tool for doing an initial screening to understand the potential vulnerability of cleanup sites to sea level rise (NOAA 2021). NOAA's Sea Level Riser Viewer shows that the surface elevation of the Site, including the shallow soil impacts beneath the berths, are above a projected sea level rise of 10 feet, which is above projected high tide flooding. In addition, the Site has a low risk to flooding and a low-risk scenario of being impacted by a severe storm (FEMA 2021). Based on this assessment, the remedial alternatives considered (refer to Section 13.0) are not considered vulnerable to projected sea level rise and or flooding.

10.0 Remedial Investigation Summary and Conclusions

As discussed in the preceding sections, soil and groundwater beneath the Site have been impacted by incidental releases and leaks from historical sources associated with the storage and transfer of petroleum fuels on the Site, including gasoline, diesel, Bunker C fuel, stove oil, and PS300 fuel. As part of this RI, the Site is considered fully characterized, which was concurred by Ecology (Groven 2021); the horizontal and vertical extent of soil and groundwater impacts have been delineated, and the risks of soil vapor to indoor air and groundwater discharge to surface water have been precluded. The fate and transport of contaminants have been adequately characterized and the CSM has been well-defined for the purpose of development and evaluation of remedial alternatives, in accordance with WAC 173-340-350.

Areas of residual TPH soil impacts, which include DRO, ORO, GRO, and benzene, are present throughout the Site but concentrated primarily on the former Calloway Ross Parcel, along and around the subsurface Standard and Longview Pipelines beneath the rail lines, and near the former 80,000-barrel AST. Within these areas, soil concentrations for GRO and total DRO and ORO greater than preliminary residual saturation levels are also present and primarily along the former pipelines. TPH-impacted soil in the central and northern parts of the Site is concentrated between approximately 8 and 17 feet bgs, which is below the estimated depth of the pipelines (3 to 4 feet bgs). In the southern portion of the Site, TPH-impacted soil is concentrated deeper, between approximately 13 and 24 feet bgs, which corresponds to the area where the pipelines are buried more deeply.

Current groundwater impacts exist in both the perched zone and alluvial aquifer, and measurable LNAPL is present only within the alluvial aquifer at MW-09. The perched zone, which is hydrologically isolated from the alluvial aquifer by a low-permeability silt aquitard at its base, includes two zones of groundwater impacted by total DRO and ORO that are centered around approximately MW-09 and MW-28 and include areas beyond the edge of the Port property at MW-04 and MW-30, respectively. Proposed CUL exceedances are low and intermittent at these locations, which constitute the plume edges. Laboratory and MNA data also suggest that a portion of the DRO concentrations detected at MW-02, MW-04, and MW-30 could be metabolic byproducts of biodegradation, which suggests that the plume is degrading and shrinking. Generally, the dissolved-phase groundwater plumes in the perched zone occur in or downgradient of areas with highly TPH-impacted soil. Dissolved-phase plumes of total DRO and ORO in alluvial aquifer groundwater are present in three main areas underlying the rail tracks, former fuel loading rack area, and the former Standard and Longview Pipelines and are associated with areas of greatest total DRO and ORO concentrations in soil. A smaller dissolved-phase GRO and benzene plume is centered around MW-09 beneath the railroad tracks and is correlated to areas with elevated GRO and benzene soil concentrations, which are located just west of the rail lines.

Overall, both TPH concentrations and measurable LNAPL extents in both perched zone and alluvial aquifer groundwater over the past approximately 40 years have substantially decreased and are continuing to decline, likely due to active biodegradation and natural attenuation processes. Based on the CSM and available data, pathways of concern include soil leaching to groundwater and direct contact for soil impacts in unpaved areas above the POC of 15 feet bgs throughout the Site.

The nature and extent of contamination at the Site has been sufficiently characterized by the investigations conducted, and the current and potential exposure pathways have been determined for the purposes of assessing and selecting remedial alternatives in the FS. The remaining sections of this report contain the FS, which will define Cleanup Action Areas (CAAs) and evaluate remedial options for the Site to address and interrupt these pathways of concern.

11.0 Feasibility Study Introduction and Objectives

The remaining sections of this report comprise the FS, which has been developed in accordance with MTCA (WAC 173-340-351). This FS develops and evaluates remedial action alternatives for the Site and then presents the Preferred Alternative to Ecology for consideration. As part of the FS, the following tasks were conducted:

- Determined remedial action goals and objectives for the Site.
- Evaluated ARARs (i.e., identified applicable local, state, and federal laws and applicable and relevant requirements).
- Defined CAAs based on contamination extents and accessibility.
- Compiled, evaluated, and screened potentially applicable remedial technologies.
- Aggregated and evaluated proposed remedial alternatives that meet MTCA requirements.
- Compared remedial alternatives to the MTCA requirements for a cleanup action per WAC 173-340-351(6).
- Completed a Disproportionate Cost Analysis (DCA) procedure consistent with WAC 173-340-360(5)(c)(iv) to identify the alternative that is permanent to the maximum extent practicable.
- Identified the Preferred Alternative for the Site (Section 15.0) for recommendation to Ecology for consideration in development of the Cleanup Action Plan (CAP) for the Site, and explained how the Preferred Alternative meets RAOs and complies with MTCA and ARARs.

11.1 REMEDIAL ACTION OBJECTIVES

The RAOs are Site-specific objectives that can be used to compare the effectiveness of proposed cleanup actions and to ensure compliance with ARARs. The RAOs identified for the Site include the following:

- Protect human health and the environment from contamination that exceeds applicable CULs through compliance with the requirements for cleanup actions as described in WAC 173-340-360(3) including the following:
    - Remove unacceptable human health risk resulting from direct contact with contaminated soil.
    - Reduce, to the extent practicable, concentrations of COCs in soil at the Site that are sources of continuing groundwater contamination.
    - Reduce concentrations of hazardous substances in groundwater at the Site to prevent off-property migration.
- Remove, to the extent practicable, LNAPL accumulations on the water table, per WAC 173-340-360(3)(c)(iii) .

These RAOs will be achieved in a manner that considers current and future site use, in particular, the continuing operations of the Port Terminal and the railway that services Berth 2.

Each remedial alternative proposed in this FS is evaluated for its ability to accomplish the RAOs listed above, as described in the following sections.

11.2 APPLICABLE LOCAL, STATE, AND FEDERAL LAWS

The selected remedial alternative must comply with MTCA cleanup regulations (WAC 173-340) and with applicable local, state, and federal laws. Together, these regulations and laws are identified as ARARs. Under WAC 173-340-200 and WAC 173-340-710, the term "applicable requirements" refers to regulatory cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that specifically address a remedial action, location, COC, or other circumstance at the Site. The "relevant and appropriate" requirements are regulatory requirements or guidance that do not apply to the Site under law but have been determined by Ecology to be appropriate for use at the Site.

ARARs are often categorized as location-specific, action-specific, or chemical-specific, described as follows and summarized in Table 11.1.

- **Location-Specific ARARs** are requirements that are applicable to the specific area where the Site is located and can restrict the performance of activities, including cleanup actions, solely because they occur in specific locations.
- **Action-Specific ARARs** are requirements that are applicable to certain types of activities that occur or technologies that are used during the implementation of cleanup actions. Waste disposal regulations are an example of an action-specific ARAR.
- **Chemical-Specific ARARs** are applicable to the types of contaminants present at the Site. The cleanup of contaminated media must meet the proposed CULs developed under MTCA; these CULs are considered chemical-specific ARARs.

The potentially applicable ARARs for remediation are presented in Table 11.1. Location-specific ARARs would be met through compliance with the applicable local, state, and federal regulations based on the physical location of the Site such as land use regulations for heavy industrial use. Action-specific ARARs would be met through implementation of construction activities in compliance with all applicable construction-related requirements such as regulation for disposal of excavated materials or injection of groundwater treatment reagents. Chemical-specific ARARs will be met through compliance with proposed cleanup standards.

Cleanup actions conducted under an agreed order with Ecology are exempt from the state and local ARAR procedural requirements, such as certain permitting and approval requirements. Cleanup actions must, however, demonstrate compliance with the substantive requirements of those ARARs (WAC 173-340-710(9)). This exemption applies to procedural permitting requirements under the Washington State Water Pollution Control Act, the Solid Waste Management Act, and the Shoreline Management Act, as well as local laws requiring permitting such as City of Longview municipal codes and regulations. Cleanup actions are not exempt from procedural requirements of federal ARARs.

11.3 CLEANUP ACTION AREAS

Remedial actions conducted within the rail lines would impact Port activities, and remedial actions outside the rail lines would likely not interfere with Port activities. Therefore, the Site is divided into two CAAs, the areas outside the active rail lines (CAA-1) and the area within the active rail lines (CAA-2), to enable a better comparison and evaluation of technologies in the FS due to the large size of the Site and the various source areas. A brief description of each CAA is presented in Sections 11.3.1 and 11.3.2.

11.3.1 CAA-1 (CAA-1A and CAA-1B)

CAA-1 encompasses the entirety of the Site outside of the active rail lines and is subdivided into areas CAA-1A and CAA-1B. CAA-1A includes the impacted soil and groundwater present north, west, and east of the rail lines within the former Calloway Ross Parcel; in the former Warehouse 9 footprint; and within the vicinity of the former 80,000-barrel AST. CAA-1B includes the City of Longview right-of-way (ROW) and the portions of Washington State Department of Transportation (WSDOT) property in the vicinities of MW-04 and MW-30 that have impacted groundwater. The off-property area is subdivided into CAA-1B because the different site conditions and ownership circumstances call for different approaches to achieving the RAOs. It is expected to be more practicable to remediate the WSDOT and City of Longview ROW while avoiding placing ICs on the properties not owned by the Port. Because all of CAA-1[12] is outside of the active rail lines, implementing remedial actions and technologies in this CAA is more accessible and feasible compared with CAA-2.

COCs in soil and/or groundwater in CAA-1 are present at concentrations exceeding proposed CULs and include GRO, total DRO and ORO, and benzene. CAA-1A also includes two areas of soil that have total DRO and ORO concentrations greater than residual saturation levels (Figure 11.1).

11.3.2 CAA-2

CAA-2 constitutes the portion of the Site that is contained within the active rail lines, including the soil and groundwater impacts that lie within the former fuel loading rack area, vicinity of MW-26 and MW-28, former mechanic's shop, and the northern portion of the Standard Pipelines. Per the RAOs in Section 11.1, the rail lines are an important part of the Port operations, and remedial technologies implemented within CAA-2 will need to limit impact to current or future Port operations. A portion of the rail lines within CAA-2 are owned by the Port

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[12] When using "CAA-1", the text is referring to both CAA-1A and CAA-1B

and/or BNSF Railway Company, and the Port operates the rail lines that traverse the Site within CAA-2.

COCs in soil and groundwater in CAA-2 are present at concentrations exceeding proposed CULs include GRO, total DRO and ORO, and benzene. Additionally, CAA-2 includes three areas of soil where GRO and/or total DRO and GRO concentrations exceed residual saturation levels in soil and groundwater (Figure 9.7). Measurable LNAPL is present in MW-09.

11.4 REMEDIATION LEVELS

This section discusses the use of RELs at the Site. In accordance with WAC 173-340-355 and as defined in WAC 173-340-200, a REL is "a concentration (or other method of identification) of a hazardous substance in soil, water, air, or sediment used to identify where a particular cleanup action component is required as part of a cleanup action at a site." RELs are, by definition, concentrations that exceed CULs and are used when a combination of cleanup action components are necessary to achieve CULs at a POC or CPOC. The use of RELs is consistent with the requirements under MTCA. Specifically, all of the remedial alternatives evaluated meet the minimum requirements under WAC 173-340-360 for selection of a cleanup action, including a determination that the alternatives are protective of human health and the environment. In addition, the results of the DCA (refer to Section 14.3) indicate that a more permanent cleanup action is not practicable, as required under WAC 173-340-360 (3)(b)(i).

RELs are applicable to this Site because implementation of removal- and treatment-based technologies and MNA will be necessary to achieve proposed CULs for groundwater. Specifically, RELs based on residual saturation levels are proposed for soil within CAA-2, where overlapping COCs are present in soil and groundwater, and any remedial activities within CAA-2 will impact Port operations. Remedial actions to attain RELs will be followed by MNA to attain CULs. Therefore, RELs are proposed within CAA-2, and the basis for these proposed RELs is summarized in the following sections.

11.4.1 Residual Saturation Levels Development as Remediation Levels within CAA-2

Soil TPH concentrations at or near the perched zone and alluvial aquifer groundwater tables were compared to the occurrence of LNAPL at the Site to determine empirical residual saturation values for use in future Site investigations, actions, or studies, including this RI/FS. The soil contamination remaining in the smear zone (e.g., as residual saturation) acts as a reservoir for continued release of contaminants in groundwater and will continue to do so until the TPH completely dissolves out, volatilizes, biologically degrades, or is remediated. Empirical values of residual saturation were also compared to those values reported in Mercer and Cohen's 1990 study (Mercer and Cohen 1990) and Alaska Department of Environmental Conservation's (ADEC's) *Maximum Allowable Concentration, Residual Saturation, and Free-Product Mobility* (ASCWG 2006).

Two historical soil samples were taken within the screened interval at MW-09 (8 to 18 feet bgs), the only monitoring well location with measurable LNAPL at present. The soil sample collected at 11 feet bgs had concentrations of 1,400 and 22,000 mg/kg for GRO and total DRO and ORO, respectively. The lower soil sample, collected at 14 feet bgs, had GRO and total DRO and ORO concentrations of 4,700 and 9,800 mg/kg, respectively. Additionally, a saturated soil sample collected from MW-16 contained GRO and total DRO and ORO concentrations of 16,000 and 2,200 mg/kg, respectively. LNAPL has been measured historically at MW-16.

Data from perched zone wells MW-11, MW-14, MW-17, and MW-26 provide empirical demonstrations of elevated soil TPH concentrations within or directly above the saturated zone that have not resulted in LNAPL migration to site groundwater. However, MW-26 has had elevated TPH concentrations in the past near LNAPL levels. Total DRO and ORO soil concentrations at these locations within the saturated zone range from 12,000 to 42,000 mg/kg, and GRO concentrations range from less than laboratory quantitation limits to 6,900 mg/kg. Additionally, analytical results from monitoring wells MW-10, MW-34, and MW-39, screened in the alluvial aquifer, provide empirical data for determination of Site residual saturation levels. Saturated soil samples from these locations contain total DRO and ORO concentrations that range from 4,400 to 18,340 mg/kg and GRO concentrations that range from 280 to 3,900 mg/kg without LNAPL being observed at these locations. Therefore, these data empirically demonstrate that LNAPL is not accumulating on the water table at residual saturation levels of up to 20,000 mg/kg for total DRO and ORO and up to 6,900 mg/kg for GRO.

These values were then compared to studies from ADEC and Mercer and Cohen, which proposed residual saturation levels as functions of soil type and petroleum product. Site soils are identified as primarily a mixture of fine to coarse sand with the two water-bearing zones separated by a silt aquitard, with the perched zone also including some discontinuous silt lenses. Soil parameters were conducted during RI activities, and the grain size analysis confirmed that the perched and alluvial water bearing units were primarily composed of fine to coarse sand, refer to Appendix F of the Interim Data Report (Floyd|Snider 2021). LNAPL samples collected from MW-09 in 1995 indicate that the product encountered in MW-09 consisted of mainly weathered diesel fuel with a small percentage of very weathered gasoline (AGRA 1995). The ADEC recommendations propose residual saturation values of 7,500 mg/kg for GRO and 17,000 mg/kg for middle distillates in fine sand/silt, and 2,800 mg/kg for GRO and 6,500 mg/kg for middle distillates in coarse sand (no values were proposed for fine to medium sand; ASCWG 2006). Mercer and Cohen 1990 study provides residual saturation values of values of 5,625 and 13,333 mg/kg for GRO and middle distillates, respectively, in fine to medium sand. The Mercer and Cohen study also proposes residual saturation values of 3,266 and 7,742 mg/kg GRO and middle distillates, respectively, for medium to coarse sand.

Therefore, preliminary residual saturation levels of 6,900 mg/kg for GRO and 18,000 mg/kg for total DRO and ORO were selected for use at the Site based on empirical data and adjusted based on applicable agency guidance documents. Site soil GRO concentrations at monitoring well locations were observed to reach approximately 6,900 mg/kg without LNAPL accumulating on the water table. A preliminary residual saturation level for GRO of 6,900 mg/kg is more conservative than ADEC’s proposed value of 7,500 mg/kg for GRO and less conservative than Ecology’s value of 5,625 mg/kg for fine to medium sand. The total DRO and ORO value of

18,000 mg/kg was selected using empirical data from five monitoring well locations and was not adjusted based on guidance documents due to the broad and consistent agreement of LNAPL occurrence and total DRO and ORO data across the Site.

11.4.2 Soil Remediation Levels

The basis for the proposed soil RELs within CAA-2 is to limit adverse impacts to Port operations while achieving both short- and long-term cleanup goals. The short-term goal is to eliminate potential mobile LNAPL in areas within CAA-2 that exceed the residual saturation limits. The long-term goal is to achieve compliance with the proposed CULs in groundwater at the downgradient property boundary. The achievement of cleanup action requirements where RELs are used will be evaluated in accordance with a Compliance Monitoring Plan that meets the requirements of WAC 173-340-410. Performance and confirmation monitoring benchmarks will be developed during engineering design of the Preferred Alternative.

11.4.2.1 Total Petroleum Hydrocarbons

TPH RELs based on residual saturation concentrations are proposed only for CAA-2 and not for CAA-1, which is located outside of the rail lines. A residual saturation value is defined as the concentration at which the petroleum product is not mobile in groundwater. Selection of residual saturation values as RELs is consistent with WAC 173-340-747(3)(g), which states that soil concentrations left on site must not result in the accumulation of non-aqueous phase liquid on or in groundwater. The proposed RELs are 6,900 mg/kg for GRO and 18,000 mg/kg for total DRO and ORO, which were empirically demonstrated to be site-specific residual saturation levels as described in detail in Section 11.4.1. The distribution of GRO and total DRO and ORO in saturated soil at concentrations greater than the REL is shown on Figure 9.7.

11.4.2.2 Benzene

Benzene impacts in soil are limited to exceedances of proposed CULs for the leaching pathway only; no benzene results were greater than the MTCA Method C direct contact criteria for protection of human health of 2,400 mg/kg. It is anticipated that remediation of GRO in soil, which is the source of benzene, will address benzene in soil and facilitate meeting proposed groundwater CULs over time. Therefore, the REL proposed for benzene is based on soil remediation meeting the GRO soil REL.

11.4.3 Groundwater Remediation Levels

Groundwater RELs are not proposed at the Site. Soil RELs described in the preceding sections are intended to be protective of groundwater and, when applied, will facilitate groundwater compliance with the proposed CULs over time in combination with MNA.

The long-term compliance groundwater monitoring program for the Site will include all COCs and assess compliance relative to the proposed groundwater CULs.

12.0 Identification and Screening of Remedial Technologies

This section identifies and briefly describes commonly implemented remedial technologies for remediation of the TPH-based impacts present in soil and groundwater at the Site and the application and limitations of each technology.

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

- Passive remediation
- In situ remediation
- Ex situ remediation
- LNAPL removal technologies

Sections 12.1 through 12.4 describe the remedial technologies identified for the four categories above, and Section 12.5 describes the preliminary technology screening performed to eliminate technologies that do not meet the Site RAOs, are not technically feasible, or do not address the types of contamination present. The preliminary screening process is also summarized in Table 12.1.

12.1 PASSIVE TECHNOLOGIES

Passive remediation involves not actively treating or removing soil/groundwater from a source area. The approach relies on either (1) stagnation of groundwater flow or existing flow barriers to contain contaminated groundwater or (2) natural groundwater flow to deliver contaminated groundwater to biologically active areas. Passive technologies are described briefly as follows and include no action, ICs, MNA, and surface capping.

No Action: No action indicates that no active remedial technology would be implemented. No action provides a reference for comparison of the benefits of other remedial technologies. No action applies to both soil and groundwater.

Institutional Controls: ICs are physical, legal, and administrative measures that are implemented to minimize or prevent human exposure to contamination by restricting access to the Site. ICs 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. ICs are typically implemented in addition to other technologies when those technologies leave COCs or COCs onsite at concentrations greater than CULs. ICs can apply to both soil and groundwater.

Monitored Natural Attenuation: MNA involves regular groundwater sampling to monitor the results of one or more naturally occurring physical, chemical, or biological processes that reduce the mass, toxicity, volume, or concentration of contaminants in soil. The implementation of MNA is feasible; however, the restoration time frame for this remedy would have to be further evaluated and MNA parameters closely monitored. MNA applies to groundwater.

Surface Capping: Surface capping involves placing a cover over contaminated material, such as contaminated soil. Surface caps isolate and keep contaminated soil in place, while preventing people and wildlife from having contact with contaminants, and may also limit leaching by infiltration. Surface cap materials include asphalt, concrete, aggregate clay, vegetative layers, or a geomembrane. ICs are typically required to maintain the cap. Surface capping applies to both soil and groundwater (by protection of soil to groundwater pathway).

12.2 IN SITU TECHNOLOGIES

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 that could be applicable to the Site include soil vapor extraction (SVE), bioremediation, solidification/stabilization, vitrification, thermal treatment, and chemical oxidant applications. Groundwater remediation alternatives include air sparging (AS), dual-phase extraction (DPE) and multiphase extraction (MPE), enhanced bioremediation (bioventing, biosparging, or enhanced aerobic biodegradation), and chemical oxidant injections. In situ remediation can require several years to reduce the contaminant concentrations to less than MTCA CULs depending on site conditions and the effectiveness of the treatment system. In situ treatment can be a part of a combined remedy to reduce aqueous-phase contaminant concentrations to near compliance and then transition from active remediation to passive remediation (e.g., MNA). In situ treatment technologies are often used and can be effective in treating impacted soil and groundwater that are either inaccessible or left in place due to existing site infrastructure or ongoing operations. The overall result is to reduce the restoration time frame.

Permeable Reactive Barrier Using Granular Activated Carbon: A permeable reactive barrier (PRB) is a permanent structure that is constructed to intercept and passively treat impacted groundwater. As groundwater flows through the PRB, it contacts reactive media, such as granular activated carbon (GAC), which treat the impacted groundwater. This passive, in situ treatment system relies on groundwater flow to bring contaminants to the reactive media. PRBs with GAC are applicable to groundwater.

Air Sparging: During AS, air is injected through a contaminated aquifer, where it passes horizontally and vertically through channels in the soil column, which removes contaminants by volatilization. This injected air helps to flush the contaminants into the unsaturated zone where a vapor extraction system is usually implemented in conjunction with AS to remove the generated vapor phase contamination. This technology is designed to operate at high flow rates to maintain increased contact between groundwater and soil, reducing concentrations of volatile constituents in petroleum products that are adsorbed to soils and dissolved in groundwater. AS typically targets the lighter range petroleum products, such as GRO, and is less effective for the heavier range fuel types, such as DRO and ORO.

In Situ Chemical Oxidation Using Direct-Push Drill Rig and/or Vertical Injection Wells: In situ chemical oxidation (ISCO) involves injecting oxidizing agents, such as ozone; hydrogen peroxide; permanganate; or specialized, advanced reagents, such as Regenesis' RegenOx, PersulfOx, or Advanced Oxygen Release Compound (ORC-A) products, into the subsurface to rapidly destroy organic chemicals and treat groundwater in place. The volume of injected agent and the rate of chemical injection depend on the subsurface conditions. Injection points may be installed as permanent injection wells or may be injected via temporary borings. The effectiveness of injections depends on site conditions; it is important to consider the heterogeneous nature of site conditions to support an even and effective distribution of the oxidant. When using ISCO, the properties of each product require consideration. For example, PersulfOx has a larger radius of influence and requires fewer injection events than RegenOx; however, PersulfOx may be corrosive to non-stainless steel or polyvinyl chloride (PVC) materials and can be hazardous for utilities if within the radius of influence.

In Situ Chemical Oxidation Using Horizontal Injection Wells: Horizontal injection wells can be installed to remediate areas beneath the rail lines and to reduce impact to Port activities. The use of horizontal injection wells is evaluated in select alternatives (Sections 13.3 and 13.4) as a method to address a larger area of impacts beneath the rail lines to reduce the restoration time frame and as a potential implementation method for plume-wide ISCO (Section 13.5). Because of the presence of two water-bearing zones, advancing and installation of horizontal wells beneath the rail lines would require two horizontal wells to be placed every 20 feet: one within the perched zone and a second at the top of the alluvial aquifer. Although feasible, this technology would have a high cost associated with installation of two horizontal wells every 20 feet (based on estimated radius of influence). This technology is applicable to saturated soil and groundwater.

In Situ Treatment by Bioremediation: The activity of naturally occurring microorganisms (e.g., fungi, bacteria) is stimulated by adding amendments, such as nitrogen peroxide or ORC-A, to contaminated soils or groundwater to enhance in situ biological degradation (metabolism) of organic contaminants. Nutrients, oxygen, or other amendments may be used to enhance bioremediation and contaminant desorption from subsurface materials, and products such as ORC-A can be placed in excavations during backfilling activities to accelerate aerobic biodegradation. In the presence of sufficient oxygen (aerobic conditions), microorganisms would ultimately convert many organic contaminants to carbon dioxide, water, and microbial cell mass. In the absence of oxygen (anaerobic conditions), many contaminants would be ultimately metabolized to methane. In the absence of a strong groundwater flow gradient and homogenous geology, this technology is constrained to relatively small footprints of contamination. This technology is applicable to soil and groundwater.

Surfactant Injection and Extraction: Surfactant injection and extraction is the process of applying or injecting water, or water containing an additive such as Regenesis’ PetroCleanze, into soil to enhance contaminant solubility, which can significantly increase the desorption rates of hydrocarbons bound in saturated soil. This process causes contaminants, such as subsurface LNAPL, to leach into the groundwater, which is then extracted and treated. This process can be effective at sites where the majority of the remaining LNAPL is trapped in discontinuous pockets and the ability of LNAPL to travel to the monitoring wells is severely diminished or completely immobile. This technology is applicable to soil.

Solidification and Stabilization: Solidification or stabilization of impacted soil physically and chemically immobilizes the contaminants within the soil matrix, thereby reducing or eliminating contaminant mobility. With solidification, the contaminants are either enclosed or bound within the soil matrix via a binding agent such as modified sulfur cement, polyethylene extrusion, or emulsified asphalt. Stabilization involves adding and mixing a chemical amendment with the contaminated soil to make the contaminants immobile through a chemical reaction that forms a new compound that is less toxic than the parent contaminants or through adsorption processes. The feasibility of solidification and stabilization decrease with depth, and implementation of these technologies is not typically feasible for deep impacts (i.e., greater than 15 feet bgs). This technology is applicable to soil.

Thermal Treatment: Thermal treatment (which is commonly applied via electrical resistance heating or thermal conduction) is a process that quickly and evenly heats the subsurface to volatilize chemicals with low boiling points (e.g., TPH) by passing electrical current or direct heat through zones of contaminated soil and groundwater. With electrical resistance heating, a current is delivered to the subsurface through a series of closely spaced electrodes. Resistance to the flow of electricity between electrodes via the natural resistance of the soil matrix generates heat in the subsurface. If heated close to the boiling point of water, the heating process volatilizes chemical droplets embedded in soil into a vapor phase. The contaminated vapors, along with steam produced by the boiling of groundwater, are recovered by a subsurface network of vapor recovery wells and condensed and treated. Chemicals in the vapor stream are typically treated using activated carbon or thermal oxidation. Due to the high cost of implementation and significant impact to surface activities, thermal treatment is typically only used in relatively small or inaccessible areas. This technology is applicable to soil and groundwater.

Soil Vapor Extraction: SVE is used to treat vadose zone soil through a system in which a vacuum is applied, through extraction wells, to the soil to induce the controlled flow of air. The controlled flow of air removes mostly volatile contaminants from the soil in a vapor stream that is then treated to recover or destroy the contaminants. Implementation of SVE has the potential to cause disturbance to surface activities during installation and maintenance. This technology can be used in conjunction with AS to reduce the contaminant mass. SVE is applicable to soil and facilitates protection of groundwater from vapor-phase migration.

Vitrification: In situ vitrification is a solidification and stabilization technology that applies high temperatures via electrical current to soil and any other underlying material to immobilize inorganic contaminants and destroy organic contaminants. The inorganic contaminants are incorporated into a vitrified glass/vitreous mass, and the organic contaminants are destroyed by pyrolysis (i.e., incineration that chemically decomposes organics by heat in the absence of oxygen). The resulting vitreous mass is chemically durable and leach resistant but may affect groundwater flow at a site. The technology is effective to a depth of approximately 20 feet bgs but requires very high electricity loads and is, therefore, typically feasible only in relatively small areas of impacted soil. Vaporization of volatile contaminants via in situ vitrification also requires capture and treatment of the VOCs. Similar to thermal treatment, the contaminated vapors are condensed and treated through a network of vapor recovery wells. This technology is applicable to soil.

Immobilization and Biodegradation: This technology involves the injection of a water-based product, such as the liquid activated carbon product PlumeStop, into the subsurface to inhibit the spreading of contaminant plumes and protect sensitive receptors. Product is typically injected in closely spaced rows of injection points downgradient of a dissolved-phase plume to form a barrier to future contaminant migration. In addition to serving as a barrier, products may be amended with zero-valent iron, which is an electron acceptor that aids in the biodegradation of contaminants that come into contact with the product barrier and persists in the subsurface for multiple years. This technology is applicable to groundwater.

Sorption and Biodegradation: This technology is similar to immobilization and biodegradation but involves the injection of a different water-based product, such as Regenesis' PetroFix, into the subsurface. PetroFix, which is an activated carbon-based reagent, removes hydrocarbons from the dissolved phase by adsorbing them to activated carbon particles. It also contains slow-and quick-release electron acceptors that then stimulate biodegradation of the adsorbed hydrocarbons. The product is generally deployed using injections along the downgradient edge of a dissolved-phase plume to form a barrier to prevent contaminant migration. This technology is applicable to groundwater.

12.3 EX SITU TECHNOLOGIES

Ex situ remediation includes DPE, MPE, pump and treat, and excavation of contaminated soil for either aboveground treatment or off-site disposal. Aboveground treatment technologies include biopiles, landfarming, and low-temperature thermal desorption. Off-site disposal is primarily applied to soil and consists of contaminated soil excavation and transport to an engineered, permitted landfill. Groundwater generated through pump and treat technologies are typically treated onsite or transported off-site to a facility to be treated.

Soil Excavation and Landfill Disposal: Excavation of contaminated soil using standard construction equipment is a common method to achieve remediation goals. For off-site disposal, excavated contaminated soil is transported either by truck or rail to an appropriate licensed landfill. Following soil removal, excavated areas are subjected to confirmation soil sampling prior to backfill, compaction, and site restoration. Excavation may require demolition or relocation of structures, shoring to maintain sidewall stability, and dewatering or drawdown of the groundwater table if excavation is to occur below the groundwater table. Compliance may not occur immediately and may require a short time frame for subsurface conditions to stabilize. This technology is applicable to soil; however, over-excavation into the smear zone will help to reduce dissolved-phase concentrations.

Dual-Phase/Multiphase Extraction: During DPE and MPE, generally, a high vacuum system and pumping are used to remove various combinations of contaminated groundwater, LNAPL, and hydrocarbon vapor from the subsurface. Extracted liquids and vapor are treated or collected for disposal. This technology is used primarily in cases where a fuel hydrocarbon lens is floating on the water table. LNAPL may be removed from subsurface formations by active methods (e.g., pumping) or a passive collection system. Systems may be designed to recover only LNAPL, mixed LNAPL and water, or separate streams of LNAPL and water (i.e., dual pump or dual well systems). DPE/MPE typically results in a significant disruption to existing surface activities during construction and maintenance. This technology typically has high costs associated with perpetual O&M. This technology is applicable to groundwater.

Pump and Treat: A pump and treat system involves pumping contaminated groundwater from the subsurface and treating it before it is discharged. Treatment is generally conducted by air stripping or filtration via activated carbon. Groundwater pump and treat can reduce chemical concentrations in saturated soil, but only slowly by increasing the diffusion of soil contamination into groundwater. Extraction system design and treatment depend on the site characteristics and chemical type. Extraction wells may be screened at different levels or intervals to maximize the system effectiveness; however, restoration time frames for pump and treat systems are often very long because pump and treat cannot significantly accelerate the removal of mass from source areas, which are often large enough to leach chemicals into groundwater for long periods of time. Additionally, this technology typically has high costs associated with perpetual O&M and discharge of treated waste. This technology is applicable to groundwater.

12.4 LNAPL REMOVAL TECHNOLOGIES

LNAPL removal technologies are focused on removing LNAPL mass from site soil and groundwater using physical or chemical means, and include hand bailing or passive recovery inserts, passive recovery (skimming wells), active recovery (vacuum enhanced), and bioslurping. Soil surfactant injection and extraction, which is described in Section 12.2, is also an applicable LNAPL removal technology.

Hand Bailing or Passive Recovery Inserts: Hand bailing or passive recovery inserts are generally utilized when there is little LNAPL remaining at a site. These technologies may be deployed after a more aggressive recovery technology has been implemented. Bailing is performed using either reusable or disposable bailer that is lowered into the well casing to physically remove any remaining LNAPL. Alternatively, absorbent inserts can be deployed in wells with residual LNAPL to absorb any remaining LNAPL that is floating on the surface of the groundwater table. Both technologies can be performed at a range of frequencies, from daily to monthly, but generally have a limited radius of capture. This technology is applicable to soil and groundwater.

Passive Recovery (Skimming Wells): Passive recovery techniques, such as skimming wells, are deployed to remove LNAPL as it flows into a recovery well or trench. These technologies are also often deployed when little LNAPL remains at a site. Skimming wells recover LNAPL using a variety of devices, including floating skimmers, pneumatic pumps, mechanical belt/filter canisters, and passive absorbent bailers, with little groundwater recovery. The rate of LNAPL recovery is typically slow and does not remove residual LNAPL in soil. This technology is applicable to groundwater.

Active Recovery (Vacuum Enhanced): Vacuum-enhanced recovery applies a vacuum to skimmer wells or induced water table gradient recovery wells to induce a larger potential gradient toward the recovery well through negative pressure, while minimizing the physical movement of the oil-water interface. This technology extracts volatile hydrocarbons from the unsaturated zone and minimizes smearing from the cone of depression. Extracted liquids and vapor are treated and collected for disposal. Active recovery typically includes high O&M costs. This technology is applicable to groundwater.

Bioslurping: Bioslurping is the adaptation and application of vacuum-enhanced dewatering technologies to remediate hydrocarbon-contaminated sites. Bioslurping utilizes elements of both bioventing, which involves addition of air to the vadose zone, and LNAPL recovery to address two separate contaminated media. Bioslurping combines elements of these technologies to simultaneously recover LNAPL and bioremediate vadose zone soils. Bioslurping can improve LNAPL 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 drawing air into the soil as the soil gas is withdrawn via the recovery well. The system is designed to minimize environmental discharge of groundwater and soil gas. This technology is applicable to soil and groundwater.

12.5 PRELIMINARY SCREENING OF APPLICABLE TECHNOLOGIES

A preliminary screening of the remedial technologies listed in Sections 12.1, 12.2, 12.3, and 12.4 was completed in accordance with WAC 173-340-351(6)(c). The objective of the screening was to remove technologies from further evaluation if they clearly did not meet the minimum requirements of the RAOs or considerations for Site conditions. The preliminary screening process retains or rejects technologies based on the applicability at the Site given the following:

- The COCs and impacted media
- Effectiveness based on proven success at similar sites
- Applicability of the technology within the Site physical constraints
- The ability of the technology to achieve RAOs

Table 12.1 provides a summary of the general technology benefits and constraints and evaluation relative to these criteria and describes the rationale for why the technology was retained or rejected as a result of the screening process.

Based on this preliminary screening step, the following technologies were rejected from further evaluation for remediation of soil and groundwater:

- No action
- Surface capping
- PRB using GAC

- AS
- Solidification and stabilization
- Thermal treatment
- SVE
- Vitrification
- Immobilization and biodegradation
- DPE/MPE
- Pump and treat
- Hand bailing or passive recovery inserts
- Passive recovery (skimming wells)
- Active recovery (vacuum enhanced)
- Bioslurping

The remaining technologies were retained for further consideration as part of the remedial alternative evaluation in one or both CAAs:

- ICs
- MNA
- ISCO
- In situ treatment by bioremediation
- Surfactant injection and extraction
- Sorption and biodegradation
- Soil excavation and landfill disposal

These technologies may be implemented as stand-alone treatments or in combination with other technologies, as appropriate, depending on subsurface conditions. These retained technologies were evaluated for each CAA and then aggregated into Site-wide alternatives for further evaluation, as described in Section 13.0.

13.0 Description of Remedial Alternatives

The retained technologies identified in Section 12.0 have been aggregated into remedial alternatives for soil and groundwater contamination at the Site, as described in the following sections. The alternatives are evaluated in Section 14.0 in accordance with the MTCA procedures for selection of cleanup actions, including a DCA to compare the costs and benefits of the remedial alternatives and identify the alternative that is permanent to the maximum extent practicable.

A summary of each of the five Site-wide alternatives is included in Table 13.1, with a brief description included in the following sections. Assumptions, approximate extents, and the number of injection points within each area and the area's square footage are for cost estimating purposes only. Details for engineering design of soil and groundwater cleanup actions will be included in the CAP. A PDI work plan will be prepared and submitted as a part of predesign data collection prior to submittal of the EDR, once the RI/FS and the Preferred Alternative are finalized and approved.

The five alternatives have been assembled from the retained technologies to meet RAOs and ARARs. They generally range from least to most complex, and they employ combinations of active and passive remedial technologies that either eliminate or manage current and potential future exposure to contaminated media at the Site. The estimated restoration time frames for each alternative include the time anticipated for construction of the cleanup action and subsequent groundwater monitoring until CULs are met for COCs at the downgradient Port property boundary and across the Site. All five alternatives contain the following common components, as described in Section 13.6:

- An inspection of the former Longview Pipeline contents
- Surfactant injections and extraction activities to eliminate the presence of residual LNAPL within MW-09
- Installation of additional monitoring wells along the downgradient northwestern Port property boundary
- Groundwater compliance monitoring including MNA analyses in select wells downgradient, upgradient, and within the source area
- ICs

The need for additional wells will be evaluated and proposed in the PDI work plan. In addition, all five alternatives include treating off-property impacts to avoid placing ICs on properties not owned by the Port (refer to Section 8.2).

13.1 ALTERNATIVE 1—LNAPL REMOVAL AND MNA

Alternative 1 is shown on Figure 13.1 and includes the following:

- Surfactant injection and LNAPL extraction activities within the vicinity of MW-09 (CAA-2)

- Installation of additional alluvial and perched monitoring wells along the western, northwestern, and northern Port property boundary (CAA-1A), which will be used to confirm that groundwater is in compliance at the downgradient property boundary.
- Inspection of the former Longview Pipeline contents
- Compliance groundwater monitoring for assessment of MNA in select wells downgradient, upgradient, and within the source area

In addition, ICs would be implemented, such as an environmental covenant and an SMP documenting the actions set in place to protect human health and the environment from a release or threatened release of hazardous substance at the facility at least until the MNA process is completed.

Restoration Time Frame and Cost: The predicted restoration time frame to meet groundwater CULs at the western, northwestern, and northern property boundary wells for this alternative is estimated to be approximately 30 years. A Site-wide restoration time frame was not evaluated for this alternative; however, an estimated time frame to meet CULs across the entire Site for this alternative is estimated to be approximately 30 years. This alternative includes eliminating LNAPL from accumulating on the groundwater table, as per MTCA; however, the majority of the hydrocarbon mass will remain and will be addressed by natural attenuation. This approximate time frame is based on the relatively slow rate of attenuation at the downgradient edge of the plume observed in groundwater monitoring over the previous 30 years, and the continued presence of the impacted soil upgradient of the CPOC. The estimated cost for Alternative 1 is $1,600,000 as in Table I.1 of Appendix I. Line-item costs for Alternative 1 are shown in Table I.2.

13.2 ALTERNATIVE 2—IN SITU TREATMENT BARRIER AND LNAPL REMOVAL

Alternative 2 is shown on Figure 13.2 and includes the following:

- Installation of a Regenesis' PetroFix in situ treatment barrier in areas outside the rail lines within the former Calloway Ross Parcel and former Warehouse 9 footprint (CAA-1A)
- Off-property ISCO injections in the vicinities of MW-04 and MW-30 (CAA-1B)
- Surfactant injection and LNAPL extraction activities within the vicinity of MW-09 (CAA-2)
- Installation of additional alluvial and perched monitoring wells along the western, northwestern, and northern Port property boundary (CAA-1A)
- Inspection of the former Longview pipeline contents
- Compliance groundwater monitoring for assessment of MNA in select wells downgradient, upgradient, and within the source area

In addition, ICs would be implemented, such as an environmental covenant and an SMP documenting the actions set in place to protect human health and the environment from a release or threatened release of hazardous substance at the facility at least until the MNA process is completed.

Groundwater Treatment Barrier (CAA-1A): The dissolved-phase groundwater plumes would be contained on Port property within CAA-1A by an injection of an activated carbon-based reagent, such as Regenesis' PetroFix or equivalent product, that uses 1- to 2-micrometer activated carbon in a water-based suspension along with added nutrients. The nutrients—either sulfate or sulfite, and nitrate—are to stimulate bioremediation on and around the activated carbon. PetroFix is easily injectable and can last for multiple years as long as there are terminal electron acceptors for contamination biodegradation and for preventing off-property migration of the dissolved-phase perched zone and alluvial aquifer plumes onto WSDOT and City of Longview property. Figure 13.2 shows the approximate location of PetroFix injections. For purposes of this evaluation, it is assumed that the groundwater treatment barrier would be composed of up to 218 injection points with 6-foot spacing within two rows with a length of 650 linear feet, which is a consistent number of injections when compared with other projects with similar lithologies. Additional injections may be needed if groundwater monitoring results indicate that there is contaminant breakthrough of the barrier.

Off-Property ISCO Injections (CAA-1B): In an effort to reduce the extent and eliminate the presence of the dissolved-phase hydrocarbons beneath WSDOT property (Figure 9.2), PersulfOx would be injected in the vicinity of MW-04 and MW-30 (Figure 13.2). For this evaluation, it is assumed that approximately 24 injection points, with a 12- to 14-foot spacing, would be advanced to a depth of 20 feet bgs within a 3,850-square-foot area around MW-04, and 14 injection points would be advanced to a depth of 20 feet bgs within a 1,500-square-foot area around MW-30. This depth is approximate and is based on the maximum depths of soil impacts along the western edge of the known soil exceedances and groundwater depths measured at monitoring wells MW-04 and MW-30. Additional targeted injections will be considered if groundwater does not achieve CULs in off-property wells within the estimated restoration time frame, or if groundwater monitoring data do not indicate that the plumes are shrinking in a reasonable time frame.

PersulfOx may be corrosive to non-stainless steel or PVC materials, which can be damaging to utilities. Therefore, care would be taken not to inject PersulfOx at locations within 10 feet laterally or 5 to 10 feet vertically from any utilities.

Restoration Time Frame and Costs: This alternative includes eliminating LNAPL from accumulating on the groundwater table, as per MTCA; however, the majority of the hydrocarbon mass will remain beneath the rail lines. This alternative is designed to target the off-property dissolve-phase plume and prevent further off-property migration with a treatment barrier. The restoration time frame to meet CULs in groundwater at the western, northwestern, and northern property boundary is estimated to be approximately 5 to 10 years. This approximate time frame is conservatively based on the time needed for impacted water at the property edge to be replaced by treated water that flows through the barrier. However, long-term O&M costs would be expected to maintain the treatment barrier, including a periodic need (approximately 10-year intervals) for re-injection of PetroFix barrier to restore electron acceptors. A site-wide restoration time frame was not evaluated for this alternative; however, an estimated time frame to meet CULs across the entire Site for this alternative is estimated to be approximately 30 years. The estimated cost for Alternative 2 is $4,200,000 as in Table I.1 of Appendix I. Line-item costs for Alternative 2 are shown in Table I.3.

13.3 ALTERNATIVE 3—TARGETED ISCO INJECTIONS AND LNAPL REMOVAL

Alternative 3 is shown on Figure 13.3 and includes the following:

- Targeted ISCO injections within accessible areas where soil impacts exceed proposed CULs (CAA-1A)
- Targeted ISCO injections along the rail lines within hotspots or where soil concentrations exceed RELs (CAA-2)
- Off-property ISCO injections in the vicinities of MW-04 and MW-30 (CAA-1B)
- Surfactant injection and LNAPL extraction activities within the vicinity of MW-09 (CAA-2)
- Installation of additional perched and alluvial monitoring wells along the western, northwestern, northern Port property boundary (CAA-1A)
- Inspection of the former Longview Pipeline contents
- Compliance groundwater monitoring for assessment of MNA in select wells downgradient, upgradient, and within the source area

Approximately 77% of the impacted soil mass will be treated using targeted ISCO injections in the saturated zone in both the perched and alluvial aquifers. OIP fluorescence data show that the extent of the proposed Alternative 3 treatment area includes the majority of the hydrocarbon mass at the Site (Appendix K). In addition, ICs would be implemented, such as an environmental covenant and an SMP documenting the actions set in place to protect human health and the environment from a release or threatened release of hazardous substance at least until the MNA process is completed. This alternative would address off-property impacts, which avoids placing ICs on properties not owned by the Port. Remaining residual soil impacts outside the treatment area would be located upgradient and would not result in off-property exceedances of CULs because the groundwater plumes in the perched zone and alluvial aquifer are stable or shrinking (refer to Appendix D).

Off-Property ISCO Injections Extent (CAA-1B): In an effort to reduce the extent and eliminate the presence of the dissolved-phase hydrocarbons beneath WSDOT property, PersulfOx would be injected in the vicinity of MW-04 and MW-30 (Figure 13.3). It is assumed that approximately 24 injection points with a 12- to 14-foot spacing would be advanced to a depth of 20 feet bgs within a 3,850-square-foot area around MW-04, and 14 injection points would be advanced to a depth of 20 feet bgs within a 1,500-square-foot area around MW-30. This depth is approximate and is based on the maximum depths of soil impacts along the western edge of the known soil exceedances and groundwater depths measured at monitoring wells MW-04 and MW-30. Additional targeted injections will be considered if groundwater does not achieve CULs in off-property wells within the estimated restoration time frame, or if groundwater monitoring data do not indicate that the plumes are shrinking in a reasonable time frame.

Targeted ISCO Injections Outside Rail Lines on Port Property (CAA-1A): Accessible areas with hydrocarbon impacts in soil greater than the CULs (within the perched and alluvial zones), not located within the active rail lines, would be addressed with ISCO injections. It is assumed that approximately 213 PersulfOx injection points with a 12- to 14-foot spacing would be advanced within accessible areas on the Port property to help destroy organic contaminants found in groundwater and soil through abiotic chemical oxidation reactions. There are few known utilities within CAA-1A; therefore, this area could be addressed with PersulfOx, which would reduce the number of mobilizations needed. In the event of daylighting of the amendments/catalysts being injected due to various factors including the ability of the subsurface conditions to accept the volume being injected within a densely injected area, in-field assessment, decisions, and steps will be detailed in a CAP to address daylighting of amendments. OIP fluorescence data will be used to target soil impacts laterally and vertically within both the alluvial and perched zones across the Site. If groundwater does not achieve TPH CULs along the downgradient property boundary within the restoration time frame, or if groundwater and MNA data do not indicate that the plumes are shrinking in a reasonable time frame, additional targeted in situ treatment may be considered to address remaining areas of groundwater contamination. Contingency actions are summarized in Section 15.2

In CAA-1A, PersulfOx would be injected within the following two areas, based on OIP fluorescence data:

- Within the vicinity of the former Warehouse 9 footprint and former Calloway Ross Parcel at depths between 10 and 22 feet bgs in up to 180 injection points within a 30,000-square-foot area
- In the southern portion the Site and west of MW-26 and MW-28 at depths between 12 and 24 feet bgs in up to 33 injection points within a 5,650-square-foot area

Targeted ISCO Injections Inside Rail Lines (CAA-2): The residual saturation levels for GRO and total DRO and ORO are proposed as RELs for soil and groundwater impacts within the rail lines (CAA-2). The smaller extent of remedial activities within CAA-2, using RELs as a guideline and wells that had historical detections of LNAPL, would lessen impact to Port activities but still treat the majority of TPH impacts in soil (approximately 77% of the total mass) and groundwater impacts and reduce the overall hydrocarbon mass within the source area. ISCO amendments would be injected in approximately 202 locations within CAA-2 using PersulfOx and RegenOx, depending on utility locations and depths. As stated previously, PersulfOx has a larger radius of influence with a 12- to 14-foot spacing and requires fewer injection events than RegenOx but may be corrosive to non-stainless steel or PVC materials, which can be hazardous for utilities. PersulfOx injections would consist of one application, and RegenOx locations with a 10- to 14-foot spacing would be injected over three events separated by 2 to 4 weeks. ISCO injections are effective in the saturated zone and not as effective in the vadose zone. Therefore, ISCO injections are not proposed for the soil impacts that extend to the east of MW-12 and within the vicinity of the former AST because these shallow impacts are within the vadose zone and are less than 1-foot thick (Appendix K). In the event of daylighting of the amendments/catalysts being injected due to various factors including the ability of the subsurface conditions to accept the volume being injected within a densely injected area, in-field assessment, decisions, and steps will be detailed in a CAP to address daylighting of amendments. OIP fluorescence data will be used to target soil impacts laterally and vertically within both the alluvial and perched zones across the Site.

In CAA-2, ISCO amendments would be applied within the following three areas, based on OIP fluorescence data:

- Within the vicinity of MW-19 and MW-39 at depths between 7.5 and 16 feet bgs in up to 36 injection points within a 5,000-square-foot area or the extent practicable
- In the central portion of the Site within the vicinity of the former fuel loading racks and former pipelines at depths between 7 and 20 feet bgs in up to 113 injection points within a 16,000-square-foot area
- Within the vicinity of MW-26 at depths between 12 and 24 feet bgs in up to 71 injection points within a 10,000-square-foot area

The use of horizontal injection wells was evaluated for remediation of hydrocarbon mass beneath the rail lines because it could remediate a larger volume than vertical injection borings could and would limit impact to Port operations. However, given the difficulties of using horizontal wells (refer to Section 12.2), the additional cost associated with layout and design, and the small percentage of hydrocarbon mass that would be treated using horizontal wells, the use of this method would neither be much more effective nor substantially reduce the restoration time frame compared to vertical injection borings. The fluorescence response cross sections included as Appendix K show that the majority of the TPH mass (77%) would be treated by the proposed ISCO injections in Alternative 3. Horizontal borings would provide no unique benefits for Alternative 3 or as a stand-alone alternative and are instead considered a potential implementation method for plume-wide ISCO injections (Alternative 5). If groundwater does not achieve TPH CULs along the downgradient property boundary within the restoration time frame, or if MNA data do not indicate that the plumes are shrinking in a reasonable time frame, additional targeted in situ treatment may be considered to address remaining areas of groundwater contamination. Contingency actions are summarized in Section 15.2.

Restoration Time Frame and Costs: The predicted restoration time frame to meet groundwater CULs at the downgradient property boundary for this alternative is estimated to be approximately 5 to 10 years, which is the expected time required for groundwater attenuation following full soil treatment in CAA-1 and partial soil treatment in CAA-2 based on observed declining trends in groundwater concentrations and current ongoing attenuation along the Port property boundary. The site-wide restoration for Alternative 3 will occur less than 10 years to approximately 28 years after remedy implementation is complete. A site-wide restoration time frame is evaluated in Section 15.4. The estimated cost for Alternative 3 is $4,200,000 as in Table I.1 of Appendix I. Line item costs for Alternative 3 are shown in Table I.4.

13.4 ALTERNATIVE 4—LIMITED EXCAVATION, TARGETED ISCO INJECTIONS, AND LNAPL REMOVAL

Alternative 4 is shown on Figure 13.4 and includes the following:

- Excavation of approximately 13,000 cubic yards of impacted soil exceeding proposed CULs (CAA-1A)
- Targeted ISCO injections along the rail lines within hotspots or where soil COC concentrations exceed RELs (CAA-2)
- Off-property ISCO injections in the vicinities of MW-04 and MW-30 (CAA-1B)
- Surfactant injection and LNAPL extraction activities within the vicinity of MW-09
- Installation of additional alluvial and perched monitoring wells along the western, northwestern, and northern Port property boundary (CAA-1A)
- Inspection of the former Longview Pipeline contents
- Compliance groundwater monitoring for assessment of MNA in select wells downgradient, upgradient, and within the source area

Approximately 77% of the impacted soil will be remediated by this alternative using targeted ISCO injections in the saturated zone in both the perched and alluvial aquifers and excavating all impacted soil located downgradient from source areas within CAA-2. In addition, ICs would be implemented, such as an environmental covenant and an SMP documenting the actions set in place to protect human health and the environment from a release or threatened release of hazardous substance at the facility at least until the MNA process is completed. This alternative would remediate off-property impacts and eliminate the need to place ICs on properties not owned by the Port.

Off-Property ISCO Injections Extent (CAA-1B): In an effort to reduce the extent and eliminate the presence of the dissolved-phase hydrocarbons beneath WSDOT property, PersulfOx would be injected in the vicinity of MW-04 and MW-30 (Figure 13.4). It is assumed that approximately 24 injection points would be advanced to a depth of 20 feet bgs within a 3,850-square-foot area around MW-04, and 14 injection points would be advanced to a depth of 20 feet bgs within a 1,500-square-foot area around MW-30. This depth is approximate and is based on the maximum depths of soil impacts along the western edge of the known soil exceedances and groundwater depths measured at monitoring wells MW-04 and MW-30. Additional targeted injections will be considered if groundwater does not achieve CULs in off-property wells within the estimated restoration time frame, or if groundwater monitoring data do not indicate that the plumes are shrinking in a reasonable time frame.

Limited Excavation on Port Property (CAA-1A): Approximately 13,000 cubic yards of impacted soil would be excavated in two areas outside and to the northwest of the rail lines, within the footprints of the former Calloway Ross Parcel and former Warehouse 9. Soil in these two areas would be excavated from the surface to approximately 23 feet bgs, which is the maximum depth that impacts were identified in these areas. Temporary sheet piles would be installed along the rail lines to the east, and the excavation would be dewatered to achieve the required depth. Clean overburden soil would be stockpiled onsite, sampled, and reused as backfill where appropriate. Excavated impacted soil would be transported off-site to an appropriate disposal/treatment facility, and the excavation would be backfilled with ORC-A pellets to help with ongoing biodegradation processes and a top layer of clean fill material. Water pumped from the excavation would be treated onsite with a temporary water treatment system. If groundwater does not achieve TPH CULs along the downgradient property boundary within the restoration time frame, or if MNA data do not indicate that the plumes are shrinking in a reasonable time frame, additional targeted in situ treatment may be considered to address remaining areas of groundwater contamination. Contingency actions are summarized in Section 15.2

Targeted ISCO Injections Inside Rail Lines (CAA-2): The residual saturation levels for GRO and total DRO and ORO are proposed as RELs for soil and groundwater impacts within CAA-2. The smaller extent of remedial activities within CAA-2, using RELs as a guideline and wells that had historical detections of LNAPL to determine remedial extent, would lessen impact to Port activities but still treat the majority of TPH impacts in soil (approximately 77% of the total mass) and groundwater impacts and reduce the overall hydrocarbon mass within the source area. ISCO amendments would be injected in approximately 202 locations within CAA-2 using PersulfOx and RegenOx, depending on utility locations and depths. PersulfOx injections would consist of one application, and RegenOx locations would be injected over three events separated by 2 to 4 weeks. ISCO injections are effective in the saturated zone and not as effective in the vadose zone. Therefore, ISCO injections are not proposed for the soil impacts that extend to the east of MW-12 and within the vicinity of the former AST because these shallow impacts are within the vadose zone and are less than 1-foot thick (Appendix K). In the event of daylighting of the amendments/catalysts being injected due to various factors including the ability of the subsurface conditions to accept the volume being injected within a densely injected area, in-field assessment, decisions, and steps will be detailed in a CAP to address daylighting of amendments.

In CAA-2, ISCO amendments would be applied within the following three areas, based on OIP fluorescence data:

- Within the vicinity of MW-19 and MW-39 at depths between 7.5 and 16 feet bgs in up to 36 injection points within a 5,000-square-foot area or to the extent practicable
- In the central portion of the Site within the vicinity of the former fuel loading racks and former pipelines at depths between 7 and 20 feet bgs in up to 113 injection points within a 16,000-square-foot area
- Within the vicinity of MW-26 at depths between 12 and 24 feet bgs in up to 71 injection points within a 10,000-square-foot area

The use of horizontal injection wells was evaluated for remediation of hydrocarbon mass beneath the rail lines because it could remediate a larger volume than vertical injection borings could and would limit impact to Port operations. However, given the difficulties of using horizontal wells (refer to Section 12.2), the additional cost associated with layout and design, and the small percentage of hydrocarbon mass that would be treated using horizontal wells, the use of this method would neither be much more effective nor substantially reduce the restoration time frame compared to vertical injection borings. The fluorescence response cross sections included as Appendix K show that the majority of the TPH mass (77%) would be treated by the proposed ISCO injections and excavation activities proposed in Alternative 4. Horizontal injection borings would provide no unique benefits for Alternative 4 or as a stand-alone alternative and are instead considered a potential implementation method for plume-wide ISCO injections (Alternative 5). If groundwater does not achieve TPH CULs along the downgradient property boundary within the restoration time frame, or if MNA data do not indicate that the plumes are shrinking in a reasonable time frame, additional targeted in situ treatment may be considered to address remaining areas of groundwater contamination. Contingency actions are summarized in Section 15.2.

Restoration Time Frame and Costs: The predicted restoration time frame to meet groundwater CULs at the downgradient property boundary for this alternative is estimated to be approximately 5 to 10 years, which is the expected time required for groundwater attenuation following full soil removal in CAA-1A and partial soil treatment in CAA-2 based on observed declining trends in groundwater concentrations and current ongoing attenuation along the Port property boundary. The site-wide restoration for Alternative 4 is similar to Alternative 3 and will likely occur less than 10 years to approximately 28 years after remedy implementation is complete. A site-wide restoration time frame is evaluated in Section 15.4. The estimated cost for Alternative 4 is $10,200,000 as in Table I.1 of Appendix I. Line-item costs for Alternative 3 are shown in Table I.5.

13.5 ALTERNATIVE 5—PLUME-WIDE ISCO INJECTIONS AND LNAPL REMOVAL

Alternative 5 is shown on Figure 13.5 and includes the following:

- ISCO injections throughout the entire extent of groundwater impacts exceeding proposed CULs, including in the vicinity of off-property locations MW-04 and MW-30 (CAA-1B)
- Surfactant injection and LNAPL extraction activities within the vicinity of MW-09
- Installation of additional alluvial and perched monitoring wells along the western, northwestern, and northern Port boundary (CAA-1A)
- Inspection of the former Longview Pipeline contents
- Compliance groundwater monitoring for assessment of MNA in select wells downgradient, upgradient, and within the source area

In addition, ICs would be implemented, such as an environmental covenant and an SMP documenting the actions set in place to protect human health and the environment from a release or threatened release of hazardous substance at the facility at least until the MNA process is completed. Although Alternative 5 does not fully meet the definition of a permanent cleanup action, it is consistent with WAC 173-340-351(5)(b) because it is the most permanent alternative to the maximum extent practicable and it is not technically feasible to address all contaminated soil beneath all active structures and rail lines. Alternative 5 would address the majority of contaminated saturated soil and groundwater present at the Site.

Plume-Wide ISCO Injections: ISCO amendments would be injected in up to approximately 1,370 locations within an approximate total area of 210,000 square feet. Use of PersulfOx and RegenOx at each injection location would depend on utility locations and depths. PersulfOx would be injected at locations farther than 10 feet laterally or 5 feet vertically from any utilities. RegenOx injections would be applied in locations within close vicinity of known utilities. RegenOx is typically injected over a minimum of three events separated by 2 to 4 weeks each to account for matrix back-diffusion, which occurs once groundwater contamination is oxidized, then resolubilized from existing soil contamination. In the event of daylighting of the amendments being injected due to various factors including the ability of the subsurface conditions to accept the volume being injected within a densely injected area, in-field assessment, decisions, and steps will be detailed in a CAP to address daylighting of amendments. OIP fluorescence data will be used to target soil impacts laterally and vertically within both the alluvial and perched zones across the Site. Horizontal borings could be used as a potential implementation method for plume-wide ISCO injection. For the reasons described in Section 12.2, however, this technology is expected to be less technically implementable and to have a higher cost for treatment of the same area as vertical injection borings. If groundwater does not achieve TPH CULs along the downgradient property boundary within the restoration time frame, or if groundwater monitoring and MNA data do not indicate that the plumes are shrinking in a reasonable time frame, additional targeted in situ treatment may be considered to address remaining areas of groundwater contamination. Contingency actions are summarized in Section 15.2.

Restoration Time Frame and Costs: The predicted restoration time frame to meet groundwater CULs at the western, northwestern, and northern property boundary is estimated to be approximately 5 to 10 years. This is conservatively based on the time required for groundwater at the downgradient property boundary to reach equilibrium conditions following plume-wide groundwater and soil treatment. The site-wide restoration for Alternative 5 will likely take less time than Alternative 3 because the entire groundwater plume extent will be treated; therefore, it is estimated that site-wide restoration will likely occur less than 10 years to approximately 20 years after remedy implementation is complete. The estimated cost for Alternative 5 is $8,300,000 as in Table I.1 of Appendix I. Line-item costs for Alternative 5 are shown in Table I.6.

13.6 REMEDIAL ELEMENTS COMMON TO ALL ALTERNATIVES

13.6.1 Former Longview Pipeline Inspection and Potential Source Assessment

In Ecology’s July 2019 review of the RIWP, Ecology stated that “it will be important to determine the true extent of remaining product in the pipelines” (Ecology 2019). To meet Ecology’s requirements to complete the Site characterization and assess the potential risk of further releases, the former Longview Pipeline would be exposed in an accessible area where it is known to be at a shallow depth, likely in the northern portion of the Site. This is proposed to determine if there is residual product remaining in the pipeline and to confirm that the remaining residual product, if any, is not mobile. Once the pipeline is exposed, spill response measures would be placed when the pipeline is cut to determine if there is still residual product remaining in pipeline, and its current characteristics, such as viscosity, would be noted. The pipeline would be resealed after observations are recorded. Remediation costs associated with emptying and rinsing the former Longview Pipeline are not included because it has not been determined if there is residual product in the pipeline. If residual product remains in the pipeline, observations will be recorded to assess viscosity and a sample collected for analysis. If the remaining product has a high viscosity, similar to asphalt, no further action is necessary. If residual product is present and is potentially mobile and can impact groundwater, remedial options will be evaluated to determine options for source control. Depending on what is encountered, source control options may include (but not limited to) pumping, rinsing, and capping; excavation and removal; or encapsulation.

The CAP will include a pipeline inspection plan with various detailed scenarios and outcomes based on inspection results. Pipeline inspection details will be included as a part of the pre-design work plan and will be conducted during the pre-design investigation.

13.6.2 Surfactant Injections and Extractions

All five alternatives include surfactant injection and extraction activities to eliminate the presence of residual LNAPL. Surfactant injection and extraction activities include the installation of up to four injection/recovery wells within the vicinity of MW-09, which would be used to conduct three surfactant injection events using Regenesis’ PetroCleanze, each followed by an extraction event, 1 to 2 weeks after each injection event to have the most effective removal of LNAPL. Surfactant injection is a method used to enhance LNAPL removal from soil by the addition of chemicals that can increase LNAPL recoverability. Surfactants can do this through a number of mechanisms such as changing the interfacial tension between LNAPL and groundwater, decreasing LNAPL viscosity, and desorption of LNAPL entrained in the soil matrix, which ultimately allows for removal by subsequent extraction. Surfactant injection and extraction is designed to be used within a limited area to eliminate LNAPL from accumulating on the groundwater table. Because surfactant can take up the available soil oxygen demand, which is needed to help the biodegradation process, it is not recommended to be applied to a large area. Therefore, the surfactant injection and extraction activities would be designed to remove hydrocarbon mass within a 400-square-foot area focused within the vicinity of MW-09. However, surfactant injections can be performed in additional locations if LNAPL is observed in recently installed wells, such as MW-39 and MW-40, during the predesign period.

13.6.3 Installation of Additional Downgradient Monitoring Wells

Additional alluvial and perched monitoring wells would be installed along the northwestern and northern (downgradient) edges of the Port property in each alternative. These wells would be used as CPOC monitoring wells once TPH concentrations in these wells and off-property wells MW-04 and MW-30 are in compliance with proposed CULs.

13.6.4 Monitored Natural Attenuation and Groundwater Monitoring

MNA for groundwater is a component of each alternative, and natural attenuation processes would be assumed for groundwater recovery. The goal of MNA is to utilize natural attenuation processes to degrade or destroy Site contaminants to concentrations less than applicable CULs within a reasonable time frame. As discussed in Section 9.2.1.3 and detailed in Appendix D, recent MNA groundwater data indicate that biodegradation of contaminants is occurring in both Site water-bearing zones, and the groundwater plumes in the perched zone and alluvial aquifer are stable or shrinking. Therefore, post-remedy groundwater monitoring would be part of each alternative after remedy implementation. Specific details for compliance groundwater monitoring would be included in a Groundwater Monitoring Plan (GMP) developed as part of a Compliance Monitoring Plan (CMP) for the Site. The GMP would include annual groundwater monitoring and sampling that would be conducted, and select MNA parameters (i.e., dissolved oxygen, nitrate, ferrous iron, sulfate, manganese, total alkalinity, and methane) would be monitored to ensure that biodegradation continues to occur. If monitoring does not indicate that the plumes are shrinking at a reasonable rate, additional active remediation techniques may be needed; details would be addressed in the CMP.

13.6.5 Institutional Controls

ICs are expected to be included for the selected remedy for the Site because all alternatives under consideration would leave contamination in place exceeding one or more cleanup standards for soil or groundwater. Specific ICs would include:

- Provisions to restrict the use of both perched zone and alluvial aquifer groundwater until proposed CULs are met.
- Provision to re-evaluated vapor intrusion risk if new or existing buildings are to be constructed or modified for occupancy within the 30-foot lateral and applicable vertical inclusion zones of known soil and groundwater impacts, in accordance with Ecology's VI guidance (Ecology 2022).
- An SMP would be prepared, as part of the CMP, to address the management of potentially contaminated soil, including soil that exceeds the site-specific direct-contact CUL for total TPH, remaining in place in the upper 15 feet bgs that could be encountered during Site redevelopment or O&M of the rail lines and utilities at the Port. The SMP would include field protocols for identification, response actions, communication, removal, temporary storage or stockpiling, transportation, and disposal of Class II or Class III contaminated soil at a subtitle D facility. The SMP will also include any small, isolated soil impacts at the Site, including the low-level residual TPH impacts beneath the berths as shown on Figure 9.7, that may be encountered during routine maintenance activities (refer to Section 9.2.3.1).In addition, routine inspections are conducted beneath the berths to ensure that the soil containing these small isolated TPH impacts is stable and that there is no sloughing or erosion occurring beneath the berths.

14.0 Alternatives Evaluation and Disproportionate Cost Analysis

This section evaluates the remedial alternatives developed for the Site in Section 13.0 against MTCA requirements for a cleanup action in accordance with WAC 173-340-360.

14.1 REMEDIAL ALTERNATIVE EVALUATION

This section provides a summary of the requirements and criteria that each remedial alternative is evaluated against in accordance with MTCA per WAC 173-340-360(3). Each of the proposed remedial alternatives are screened relative to mandatory MTCA threshold requirements and other MTCA requirements for evaluation described in the following sections. In Section 14.2, the results of a DCA are presented to identify the alternative that is permanent to the maximum extent practicable using DCA evaluation criteria specified in WAC 173-340-360(5)(d). Based on these evaluations, a Preferred Alternative is identified and proposed to Ecology and described in Section 15.0.

14.1.1 MTCA Requirements

WAC 173-340-360(3) states that all individual cleanup actions must meet the following requirements and that when multiple technologies are implemented for a single site, the overall cleanup action must also meet the requirements listed as follows:

- **Protect Human Health and the Environment.** Protection of human health and the environment shall be achieved through implementation of the selected remedial alternative.
- **Comply with Cleanup Standards.** Cleanup standards, as defined by MTCA, include CULs for hazardous substances present at the site, the location, or POC where the CULs must be met, and any regulatory requirements that may apply to the site due to the type of action being implemented or the location of the site.
- **Comply with Applicable State and Federal Laws.** WAC 173-340-710 states that cleanup standards shall comply with applicable state and federal laws, as ARARs for the site. ARARs applicable to this Site are detailed in Table 11.1 and consist of chemical-specific ARARs applicable to the contamination types present at the Site, location-specific ARARs that apply to the physical location of the Site, and action-specific ARARs that apply to the construction components of the remedy.
- **Provide for Compliance Monitoring.** MTCA requires that all selected remedial alternatives provide for compliance monitoring as described in WAC 173-340-410. Compliance monitoring consists of three different types of monitoring, including the following:
    - *Protection Monitoring* during construction, operation, and maintenance of the cleanup action to confirm protection of human health and the environment.

  - *Performance Monitoring* to confirm compliance with the site CULs immediately following cleanup action to demonstrate compliance with a permit or substantive requirements of other laws.
  - *Confirmation Monitoring* to evaluate long-term effectiveness of the cleanup action following attainment of the cleanup standards.

- **Use Permanent Solutions to the Maximum Extent Practicable.** The use of permanent solutions to the maximum extent practicable for a cleanup action is analyzed according to the procedure described in WAC 173-340-360(5). Preference is given to alternatives that implement permanent solutions, defined in MTCA as actions that can meet cleanup standards "without further action being required at the site being cleaned up or any other site involved with the cleanup action, other than the approved disposal of any residue from the treatment of hazardous substances" (WAC 173-340-200). The DCA process is conducted to identify the alternative that uses permanent solutions to the maximum extent practicable.
- **Provide for a Reasonable Restoration Time Frame.** Restoration time frame is defined in MTCA as "the period of time needed to achieve the required cleanup levels at the points of compliance established for the site" (WAC 173-340-200). A cleanup action shall provide for a reasonable restoration time frame. The factors to be considered when determining the reasonable restoration time frame are listed in WAC 173-340-360(4)(c) and include, but are not limited to, the potential risks posed by the site; the practicability of achieving a shorter restoration time frame; long-term effectiveness of the alternative; and the current and expected future use of the site.
- **Consider Public Concerns.** Public involvement must be initiated according to the requirements set forth in WAC 173-340-600. Public concerns are considered at each step in the formal process under MTCA. Public comment was received on the RIWP, and responses were incorporated in the RI/FS development. This RI/FS will be made available for public review and comment, and Ecology's decision on alternative selection will also be presented for public comment in the draft CAP.

14.1.2 Evaluation of Requirements

All five proposed alternatives meet the MTCA threshold requirements. The proposed alternatives are evaluated against the MTCA threshold requirements as follows:

- **Protect Human Health and the Environment.** The proposed alternatives provide for protection of human health and the environment through a variety of technologies of contaminated mass removal (e.g., excavation), destruction (e.g., natural attenuation, in situ treatment), and containment (e.g., ICs).
- **Comply with Cleanup Standards.** The proposed alternatives are all capable of achieving the proposed groundwater CULs at the standard POC. Proposed groundwater CULs are anticipated to be met by all alternatives over their respective

predicted restoration time frames, with Alternatives 2 through 5 having the shortest restoration time frames and Alternative 1 having the longest restoration time frame.

- **Comply with Applicable State and Federal Laws.** All alternatives address and comply with all state and federal laws relevant and applicable to this project, as described in Section 11.2.
- **Provide for Compliance Monitoring.** All alternatives would include compliance monitoring, which includes protection monitoring, performance monitoring, and confirmation as per WAC 173-340-410. For any alternative selected as the Preferred Alternative, a GMP would be prepared as part of the CMP and would include compliance groundwater monitoring to be conducted following completion of cleanup activities to evaluate compliance with proposed CULs.
- **Use Permanent Solutions to the Maximum Extent Practicable.** The DCA, which is presented in Section 14.2, is used to select the alternative that uses permanent solutions to the maximum extent practicable.
- **Provide for a Reasonable Restoration Time Frame.** Site-specific groundwater conditions have been taken into consideration under WAC 173-340-360(4)(c) to consider the definition of a reasonable restoration time frame and whether it is practicable to achieve a shorter restoration time frame. The primary potential risks to human health and the environment from groundwater are in the potential use of groundwater impacted by TPH constituents (i.e., DRO, GRO, and ORO) for drinking water. ICs would be implemented quickly to restrict Site groundwater usage, and downgradient use would be protected by compliance with CULs at the downgradient property boundary, so that the time frame for compliance at the property boundary is the more relevant time frame for consideration. Additionally, all of the alternatives include leaving at least a small footprint of shallow soil with COC concentrations exceeding proposed soil CULs, and smaller isolated, non-continuous areas of shallow soil impacts exceeding the Site-specific direct-contact screening levels would remain, which would be protected in perpetuity by ICs. Due to the lateral extent of the dissolved-phase plumes in the two water-bearing zones and quantity of residual contaminant mass present in soil, a restoration time frame shorter than 10 years for the entire Site is not practical, even with full-scale treatment. The practicality of reducing this restoration time frame through use of technologies (e.g., horizontal borings) to treat a larger area has been evaluated and found to provide no additional effectiveness and to carry additional cost. Because all alternatives include varying degrees of in situ soil or groundwater treatment, and the plumes of impacted groundwater are stable at the downgradient edge and would be monitored along the downgradient property boundary, the predicted restoration time frames for Site-wide groundwater (including Alternative 1, which is longer than 10 years) are all reasonable. The predicted restoration time frames for groundwater to meet proposed groundwater CULs at the downgradient property boundary for TPH constituents and benzene for each alternative are as follows:

  - Alternative 1: 30 years
  - Alternative 2: 5 to 10 years
  - Alternative 3: 5 to 10 years
  - Alternative 4: 5 to 10 years
  - Alternative 5: 5 to 10 years

  A site-wide restoration time frame for the preferred alternative is presented in Section 15.4. Once site-wide CULs have been met for groundwater, all applicable CULs will have been met and the soil to direct contact pathway will be addressed with the implementation of ICs and an SMP.

- **Consider Public Concerns.** Public concerns are addressed by the Ecology-led public comment process for the RI/FS, which includes the DCA for all alternatives.

14.2 DISPROPORTIONATE COST ANALYSIS

The MTCA DCA procedure is used to evaluate whether a cleanup action uses permanent solutions to the maximum extent practicable as determined by the level of attainment of specific criteria defined in WAC 173-340-360(5)(d) and listed as follows. As stated in MTCA, the cost of an individual alternative is determined disproportionate "if the incremental costs of the alternative over that of a lower cost alternative exceed the incremental degree of benefits achieved by the alternative over that of the other lower cost alternative" (WAC 173-340-360(3)(e)(i)).

Evaluation of disproportionate cost allows comparison of each alternative to the most permanent alternative presented, as determined by attainment of MTCA criteria. This analysis can be qualitative or quantitative. If multiple alternatives possess equivalent benefits, the lower cost alternative will be selected. The seven DCA criteria defined in MTCA (WAC 173-340-360(5)(d)) are summarized as follows:

- **Protectiveness.** Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, the time required to reduce these risks, and the overall improvement in environmental quality.
- **Permanence.** The degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances.
- **Effectiveness over the Long Term.** Long-term effectiveness consists of the degree of certainty that the alternative will be successful, the reliability of the alternative during the time that hazardous substances are expected to remain onsite at concentrations greater than CULs, the magnitude of the residual risk with the alternatives in place, and the effectiveness of controls in place to control risk while contaminants remain onsite.
- **Management of Implementation Risks.** Short-term risks consist of the risk to human health and the environment associated with the alternative during construction and implementation and the effectiveness of measures taken to control those risks.

- **Technical and Administrative Implementability.** The ability of the alternative to be implemented is based on whether the alternative is technically possible and meets administrative and regulatory requirements, and if all necessary services, supplies, and facilities are readily available.
- **Consideration of Public Concerns.** These considerations involve whether the community has concerns regarding the alternative and, if so, to what extent the alternative addresses those concerns.
- **Costs.** The cost to implement the alternative, consisting of construction, net present value of any long-term costs, and agency oversight costs that are recoverable.

As part of the DCA conducted in this FS, each alternative was ranked and assigned a numerical score for each DCA criterion on a scale of 1 to 10, where a score of 10 represents the greatest benefit and a score of 1 represents the least benefit. Each numerical score was then multiplied by a weighting value, and the scores were summed to determine the total alternative benefit score. The weighting values used in this FS are as follows:

- Protectiveness: 30%
- Permanence: 20%
- Effectiveness over the long-term: 20%
- Management of implementation risks: 10%
- Technical and administrative implementability: 10%
- Consideration of public concerns: 10%

The alternatives are evaluated relative to their ability to comply with the criteria listed and are compared to both each other and the criteria. Because some alternatives provide a similar degree of compliance with a given criterion, the associated evaluation statements may be the same or similar. The following sections provide a summary of each of the DCA criteria and discuss the rationale for each alternative's score in relation to the other alternatives. A full description of all aspects evaluated under each criterion for the alternatives is included in Table 14.1. A summary of the scoring for each criterion, including the estimated costs for each alternative, is presented in Table 14.2.

14.2.1 Protectiveness

Protectiveness of each alternative was evaluated based on the degree to which existing risks to human health and the environment were reduced, time required to reduce risks and attain cleanup standards, risks resulting from alternative implementation, and improvement in overall environmental quality. Factors contributing to each alternative's score are summarized as follows.

- Alternative 1 is considered the least protective remedy and contains the minimum requirements for a remedial action. This alternative includes eliminating LNAPL from accumulating on the groundwater table, as per MTCA; however, this alternative addresses only a small area (approximately 400 square feet) of the source mass. The majority of the hydrocarbon mass will remain and will be addressed by natural attenuation; therefore, Alternative 1 has the longest restoration time frame for achievement of proposed groundwater CULs and would achieve the lowest overall improvement in environmental quality. Alternative 1 scored a 2.

- Alternative 2 is considered more protective than Alternative 1 because it includes targeted off-property ISCO injections as well as a barrier to minimize off-property migration of impacted groundwater. However, overall improvement in environmental quality would be low to moderate because it does not include source removal and a substantial amount of residual soil and groundwater exceeding proposed CULs would remain onsite. Alternative 2 scored a 6.
- Alternative 3 is considered more protective than Alternatives 1 and 2 because it includes targeted in situ soil and groundwater remediation in both CAAs to reduce soil and groundwater contaminant mass; has a similar restoration time frame as Alternatives 2, 4, and 5; and has the third-highest improvement in overall environmental quality. Alternative 3 scored a 7.
- Alternative 4 combines in situ treatment and soil removal technologies that would result in the removal of a large quantity of contaminated soil in CAA-1A and CAA-2. Alternative 4 has a similar restoration time frame along the downgradient property boundary as Alternatives 2, 3, and 5 but would more quickly mitigate the off-property migration risk than Alternative 3. Alternative 4 scored an 8.
- Alternative 5 is considered the most protective cleanup action because it would involve the most laterally and vertically extensive in situ groundwater treatment program. The ISCO injections would result in the destruction of the greatest volume of contaminant mass in soil and groundwater exceeding proposed CULs. This alternative also provides a similar restoration time frame for groundwater along the downgradient property boundary as Alternatives 2, 3, and 4; however, Alternative 5 would result in the highest overall improvement in environmental quality and eventually meet CULs in groundwater across the entire Site in a shorter time frame than the other alternatives. Alternative 5 scored a 9.

14.2.2 Permanence

Permanence was evaluated based on the degree of reduction of contaminant toxicity, mobility, volume, adequacy of destruction of hazardous substances, reduction or elimination of release sources, degree of irreversibility, and risk of treatment residuals. The technologies proposed in all five alternatives include irreversible destruction and contaminant reduction mechanisms and do not result in any treatment residuals. Factors contributing to each alternative’s score are summarized as follows.

- Alternative 1 is the least permanent solution. It includes residual LNAPL removal within a 400 square foot area around MW-09; however, it would provide the lowest reduction in contaminant volume compared to other alternatives, and it relies on natural biodegradation and ICs, which are a less certain contaminant reduction mechanism than destruction or removal of contaminants. Alternative 1 scored a 1.

- Alternative 2 is considered more permanent than Alternative 1 because it includes targeted off-property ISCO injections to reduce off-property groundwater contaminant mass and a treatment barrier. However, the treatment barrier is expected to last only between 5 and 10 years before replacement, and the alternative would leave in place a substantial of contaminant mass in the CAAs. Alternative 2 scored a 4.
- Alternative 3 is considered more permanent than Alternatives 1 and 2 because it includes targeted in situ soil and groundwater remediation in both CAAs to reduce soil and groundwater contaminant mass. Alternative 3 scored a 7.
- Alternative 4 is considered marginally more permanent to Alternative 3 because although it would result in the removal of a slightly higher quantity of soil exceeding proposed CULs, vadose zone impacts exceeding proposed CULs would remain in CAA-1A. Alternative 4 scored an 8.
- Alternative 5 would treat the greatest area of soil and groundwater exceeding proposed CULs, resulting in the greatest destruction and reduction of contaminant mass. Although Alternative 5 does not meet the definition of a permanent cleanup action, it is consistent with WAC 173-340-351(5)(b) because it is the most permanent alternative to the maximum extent practicable, and it is not technically feasible to address all contaminated soil beneath all active structures and rail lines, even if horizontal borings were to be used. Alternative 5 would provide the greatest reduction in contaminant volume compared to the other alternatives. Alternative 5 scored a 9.

14.2.3 Effectiveness Over the Long-Term

Long-term effectiveness was evaluated based on the degree of certainty of success, reliability while contaminants remain onsite, magnitude of residual risk, and effectiveness of controls to manage residual risk. All alternatives address residual risks associated with leaving varying amounts of soil and groundwater exceeding proposed CULs in place with ICs, including an CMP and SMP. Factors contributing to each alternative’s score are summarized as follows.

- Alternative 1 relies primarily on MNA but also includes source treatment as a component of the LNAPL removal. Alternative 1 would be least effective at achieving Site-wide proposed groundwater CULs and would not address off-property migration risk. Alternative 1 scored a 1.
- Alternative 2 provides a higher degree of certainty of success than Alternative 1 and would be more reliable in reducing risk associated with off-property migration. However, there is a low certainty of maintaining groundwater CULs at the downgradient

property boundary after 10 years without additional barrier injections, because most of the source area would not be actively treated. Alternative 2 scored a 4.

- Alternative 3 employs focused in situ soil and groundwater treatment to reduce contaminant mass in both CAAs and would be more effective at achieving groundwater CULs site-wide and at the downgradient property boundary than Alternatives 1 and 2, which would not treat any residual hydrocarbon mass in CAA-2. Alternative 3 scored an 8.
- Alternative 4 is considered to have a slightly higher degree of certainty of success eliminating off-property migration risk than Alternative 3 because it would permanently remove a significant amount of soil exceeding proposed CULs within CAA-1A; however, the overall long-term effectiveness would be the same as Alternative 3 because the treatment is similar for impacts within CAA-2. Alternative 4 scored a 9.
- Alternative 5 has the highest certainty of success to achieve soil and groundwater CULs option because it would treat the greatest area of soil and groundwater exceeding proposed CULs, resulting in the greatest destruction and reduction of contaminant mass. Alternative 5 would not be as immediately effective in CAA-1 when compared to excavation of impacted soil but would treat the largest area of impacts exceeding CULs; therefore, Alternative 5 scored a 10.

14.2.4 Management of Short-Term Risks

Short-term risk management was evaluated based on the risk to human health and the environment associated with remedy implementation and the effectiveness of controls to manage the short-term risk. All five alternatives include managing the risks associated with approximately 6,000 gallons of contaminated fluids, which will be extracted during surfactant injection and extraction in the MW-09 vicinity. Factors contributing to each alternative's score are summarized as follows.

- Alternative 1 is the least invasive alternative that does not include excavation or an extensive in situ injection program, only surfactant injection and extraction to remove LNAPL. Thus, it has the lowest potential for worker or public contact with contaminated media. Alternative 1 scored a 9.
- Alternative 2 includes injections associated with the groundwater barrier and off-property contamination, which have relatively low to moderate short-term risk to workers and the public. Alternative 2 scored a 7.
- Alternative 3 includes a similar scope of work as Alternative 2 but with a higher total number of injections. Alternative 3 scored a 7.
- Alternative 4 includes a large excavation, requiring shoring, dewatering, and a significant number of truck trips associated with handling and disposal of contaminated soil, which would have a negative balance of environmental impact due

to CO_2 emissions. Alternative 4 also includes a significant number of injections. Alternative 4 scored a 5.

- Alternative 5 scored a 6 because it includes the largest scope of in situ treatment, including the most injection points, some of which would be in the City of Longview ROW. Similar short-term risks would apply if horizontal borings were to be used, given the number and density of the horizontal borings that would be needed.

14.2.5 Technical and Administrative Implementability

Technical and administrative implementability was evaluated based on technical possibility and complexity of the remedy; availability of off-site services, facilities, and materials; regulatory and administrative requirements; ease of site access for remedy implementation; monitoring requirements; and integration with existing Site operations. All five alternatives include an in situ injection component, which involves obtaining underground injection control (UIC) permits and selecting a qualified contractor, many of which exist in the area. All five alternatives also include routine groundwater monitoring as part of a CMP. Factors contributing to each alternative's score are summarized as follows.

- Alternative 1 is the smallest in scale, includes the fewest number of technologies, and would be the least disruptive to Site operations. However, proposed off-property ICs may not be accepted by the property owners, and the alternative could impact future development activities on Port, WSDOT, or City of Longview property. Alternative 1 scored a 5.
- Alternative 2 is larger in scale than Alternative 1 but still relatively small in scale and complexity and would not impede current/future property use on WSDOT or City of Longview property. Alternative 2 scored an 8.
- Alternative 3 is roughly the same in scale and technical complexity to Alternative 2. Although injections inside the rail lines have the potential to cause minimal disruption to Site operations, it is assumed that these would be performed during times when the rail lines are not active. Alternative 3 scored an 8.
- Alternative 4 is equal in scale to Alternative 3; however, it includes the greatest number of technologies and has the highest degree of technical complexity. Alternative 4 scored a 4.
- Alternative 5 is the largest in scale and has potential to cause the highest disruption in Site operations due to the number of proposed injection locations and days within CAA-2. Potential use of horizontal injection wells would be technically and administratively difficult to implement because of the required density of horizontal wells and concerns about boring beneath active rail lines. Alternative 5 scored a 6.

14.2.6 Consideration of Public Concerns

Public concerns will be reviewed following the public comment period and will be addressed as part of the final remedial alternative selection and design. All alternatives were scored prior to public comment because it is anticipated that the public perception will not be the same for each alternative. Factors that could contribute to different public perception of the alternatives are summarized as follows.

- Alternative 1 may cause public concern because it has the longest restoration time frame, would leave the most impacted soil and groundwater in place, would not address off-property migration risk, and may be of concern to adjacent property owners, as well as members of the public. Alternative 1 scored a 2.
- Alternative 2 would not disrupt off-property businesses and would have minimal impact on traffic. However, the alternative would not destroy/remove most source area impacts, which may be of concern to adjacent property owners, as well as members of the public. Alternative 2 scored a 5.
- Alternative 3 would likely cause less public concern than Alternatives 1 and 2 because it has a shorter restoration time frame than Alternative 1 and would destroy/remove more source area impacts than Alternative 2. Although coordination of cleanup actions with rail activities is expected during implementation, this alternative has potential to cause some disruption of Port activities. Alternative 3 scored a 7.
- Alternative 4 may have less public concern than Alternative 1 and 2 but may have a greater public concern than Alternative 3 due to significant number of truck trips associated with handling and disposal of contaminated soil, which would have a negative balance of environmental impact due to CO_2 emissions. Implementation of Alternative 4 has the potential to cause disruptions of Port activities consistent with Alternative 3. Alternative 4 scored a 6.
- Alternative 5 may elicit public concern due to the possible short-term disruptions to Port operations as well as proposed injections in the City of Longview ROW that may involve short-duration traffic lane closures. This would also be expected to apply if horizontal injection wells were used. Because Alternative 5 includes a greater number of injections in the active rail line, the potential for disruptions to Port operations is greater than both Alternatives 3 and 4. However, Alternative 5 would also result in the greatest degree of contaminant reduction, which would satisfy public concerns about Site impacts. Lane closures would not be expected to impact nearby businesses. Alternative 5 scored a 7.

14.2.7 Cost

Costs were estimated for each alternative and include costs for construction and permitting, long-term operations, maintenance, monitoring, and agency oversight. In addition, all costs include sales tax, a 25% contingency on direct construction costs, and a 20% contingency on indirect construction costs. Estimated costs for each alternative are summarized in Table 14.1

and presented in detail in Appendix I. The costs and benefit per unit cost ratio13 for each alternative are shown on Table 14.2 and are as follows:

- Alternative 1: $1,600,000 and 1.63
- Alternative 2: $4,200,000 and 1.29
- Alternative 3: $4,200,000 and 1.74
- Alternative 4: $10,200,000 and 0.72
- Alternative 5: $8,300,000 and 1.01

14.3 REMEDIAL ALTERNATIVES EVALUATION SUMMARY

Based on the evaluation presented in Tables 14.1 and 14.2 and in the previous sections, Alternative 3 is proposed as the Preferred Alternative for recommendation to Ecology. Section 15.0 describes the Preferred Alternative in greater detail.

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[13] Benefit per unit cost ratio calculated by dividing the total weighted benefit score by the estimated total alternative cost; for this calculation, cost was standardized by dividing by 1 million. Higher value indicates the most benefit per unit cost.

15.0 Preferred Remedial Alternative

15.1 DESCRIPTION OF THE PREFERRED REMEDIAL ALTERNATIVE

Alternative 3 provides the greatest degree of benefit for the associated cost out of the five alternatives discussed in Section 14.0 and is proposed as the Preferred Alternative for the Site (Figure 13.3). Alternative 3 includes the following components:

- Targeted ISCO injections within accessible areas where soil impacts exceed proposed CULs (CAA-1A)
- Targeted ISCO injections along the rail lines where soil concentrations exceed RELs (CAA-2)
- Off-property ISCO injections in the vicinities of MW-04 and MW-30 (CAA-1B)
- Surfactant injection and LNAPL extraction activities within the vicinity of MW-09
- Installation of additional alluvial and perched monitoring wells along the downgradient western, northwestern, and northern Port property boundary (CAA-1A)
- Inspection of the former Longview Pipeline contents
- Compliance groundwater monitoring for assessment of MNA, which includes an evaluation of groundwater and MNA data to determine if the plume is stable and shrinking within a reasonable time frame and if additional contingency injections are required
- ICs on the Port property including the following provisions:
    - Restrictions on the use of both perched zone and alluvial aquifer groundwater
    - Implementation of an SMP to address remaining, small, isolated soil impacts that can be encountered during redevelopment activities or O&M of the rail lines and utilities
    - Re-evaluate VI risk for new buildings or modified buildings to be used for occupancy that are proposed within the lateral and vertical inclusion zones, as per Ecology’s VI guidance
- Potential ICs on adjacent properties if determined necessary after cleanup actions have been performed

Together, these technologies would remove contaminant mass in soil and groundwater through destruction and LNAPL recovery. The Preferred Alternative is a comprehensive final remedy for the Site that is compliant with all the applicable remedy selection requirements under MTCA. This alternative has a restoration time frame between 10 and approximately 28 years for the standard POC, with the majority of the Site in compliance in less than 10 years. It would provide the greatest environmental benefit for the associated cost based on the DCA presented in Section 14.0 and Tables 14.1 and 14.2.

15.1.1 Surfactant Injections and Extractions

The Preferred Alternative includes surfactant injections and extractions, which are designed to eliminate the presence of residual LNAPL, which currently exists in MW-09. In addition to decreasing the LNAPL viscosity, which renders it more recoverable, adding surfactant increases desorption potential of LNAPL from the soil matrix. Surfactant injection and extraction activities include the installation of up to four 4-inch-diameter injection/recovery wells within a 400-square-foot vicinity of MW-09. Existing wells MW-09 and MW-10 would be used in combination with these injection/recovery wells to conduct three injection and extraction events using PetroCleanze. It is assumed that each injection event would consist of injecting approximately 281 gallons of surfactant at each of the six locations, followed by an extraction event that would remove approximately 2,000 gallons of groundwater from all six locations. Extraction events would occur approximately 1 to 2 weeks after each injection event to achieve the most effective removal of LNAPL. Subsequent injection events would occur immediately after extraction. Extraction events would be coordinated around Port operations and rail line usage and may require temporary closure of some rail operation. Additional surfactant and extraction activities may be required, if residual LNAPL is accumulating on the water table in any Site monitoring well, refer to Section 15.2.

Extracted groundwater would be containerized and transported to an appropriate disposal or treatment facility in the area.

15.1.2 In Situ Soil and Groundwater Treatment

ISCO injections would be the primary method of contaminant destruction used in the Preferred Alternative. ISCO injections would focus on remediating impacted soil and groundwater in CAA-1 and CAA-2, as well as groundwater impacts on WSDOT property, located across Port Way. To maximize the effectiveness and vertical extent of in situ soil and groundwater treatment, ISCO injections would be implemented in the wet season (i.e., October through March) when seasonal groundwater levels are high. In the event of daylighting of the ISCO amendments being injected due to various factors including the ability of the subsurface conditions to accept the volume being injected within a densely injected area, in-field assessment, decisions, and steps will be detailed in a CAP to address daylighting of amendments.

Off-Property ISCO Injections (CAA-1B): To reduce the extent and eliminate the presence of the dissolved-phase hydrocarbons beneath the WSDOT property, PersulfOx would be injected in the vicinity of MW-04 and MW-30, where recent groundwater monitoring results have exceeded proposed CULs for TPH constituents (Figure 13.3). Up to 38 injection points would be advanced to a depth of 20 feet bgs on the WSDOT property: 24 injection points within a 3,850-square-foot area around MW-04 and 14 injection points within a 1,500-square-foot area around MW-30. The proposed spacing between injection points is between 12 and 14 feet, and the target injection intervals is 10 to 20 feet. Because injections are not expected to be within 10 feet of utility lines, PersulfOx is the preferred product in this area because one application is expected to result in the reduction of groundwater contaminant concentrations to less than proposed CULs. Additional targeted injections will be considered if groundwater does not achieve CULs in off-property wells within the estimated restoration time frame, or if groundwater monitoring data do not indicate that the plumes are shrinking in a reasonable time frame.

ISCO Injections Outside Rail Lines on Port Property (CAA-1A): Accessible areas in CAA-1A with hydrocarbon impacts in soil greater than the proposed CULs would be targeted by ISCO injections. Up to 213 PersulfOx injection points would be advanced in accessible areas to destroy TPH contaminants found in groundwater and soil through abiotic chemical oxidation reaction. There are few known utilities within CAA-1A; therefore, impacts in this area could be addressed with PersulfOx, which is expected to reduce soil and groundwater contaminant concentrations to less than proposed CULs after one application. Figure 13.3 shows the extent of PersulfOx injection locations within CAA-1A, which would be focused in two areas: a 30,000-square-foot area encompassing part of the former Calloway Ross Parcel and former Warehouse 9 footprint (180 injection points) and a 5,650-square-foot area to the south (33 injection points). The proposed spacing between injection points is between 12 and 14 feet, and the target injection intervals is 10 to 20 feet. OIP fluorescence data will be used to target soil impacts laterally and vertically within both the alluvial and perched zones within CAA-1A.

If groundwater does not achieve TPH CULs along the downgradient property boundary within the restoration time frame, or if MNA data do not indicate that the plumes are shrinking in a reasonable time frame, additional targeted in situ treatment may be considered to address remaining areas of groundwater contamination. Once groundwater CULs have been met, continued monitoring will be conducted on select wells to ensure that remaining residual TPH impacts in CAA-2 are not recontaminating groundwater within CAA-1A in a way that may affect compliance with TPH CULs along the downgradient property boundary. If groundwater data, post-remedial implementation, indicate that the TPH groundwater plume is expanding and migrating off-property, additional injections will be conducted. Locations for additional injections will be determined using the most recent groundwater data at that time, which could include, but not limited to, injections within CAA-2 or remaining source areas. Contingency actions are summarized in Section 15.2.

ISCO Injections Inside Rail Lines (CAA-2): ISCO treatment in CAA-2 is focused on areas of GRO and total DRO and ORO that exceed proposed RELs for soil. The targeted treatment (as opposed to treating all soil exceeding proposed CULs) would lessen the impact to Port activities and still treat a large volume of soil and groundwater impacts to reduce the overall hydrocarbon mass within the source area. ISCO injection events would be coordinated around Port operations in CAA-2 to the greatest degree possible but may require occasional, temporary closure of some rail lines. ISCO amendments would be injected in up to 202 locations within CAA-2 using a combination of PersulfOx and RegenOx, depending on utility locations and depths. Figure 13.3 shows the three target treatment areas: 5,000-square-foot area surrounding MW-39 (up to 36 injection points or to the extent practicable), 16,000-square-foot area near MW-40 (113 injection points), and a 10,000-square-foot area centered on MW-26 (71 injection points). ISCO injections are effective in the saturated zone and not as effective in the vadose zone. Therefore, ISCO injections are not proposed for the soil impacts that extend to the east of MW-12 and within the vicinity of the former AST because these shallow impacts are within the vadose zone and are less than 1-foot thick (Appendix K).

PersulfOx has a larger radius of influence and requires fewer injection events than RegenOx, and thus it is the preferred product for ISCO in this area. However, because PersulfOx is corrosive to non-stainless steel or PVC materials (i.e., utilities), which are known to exist in this area, treatment with RegenOx would be necessary in some locations. Areas of PersulfOx and RegenOx treatment would be clearly demarcated through extensive utility locating, which would include a GPR survey, and coordination with Port staff prior to remedy implementation. Injection point spacing would be between 12 and 14 feet and 10 and 14 feet for PersulfOx and RegenOx injection locations, respectively. PersulfOx treatments would consist of one application, and RegenOx locations would be injected over three events separated by 2 to 4 weeks. OIP fluorescence data will be used to target soil impacts laterally and vertically within both the alluvial and perched zones within CAA-2. If groundwater does not achieve TPH CULs along the downgradient property boundary within the restoration time frame, or if MNA data do not indicate that the plumes are shrinking in a reasonable time frame, additional targeted in situ treatment may be considered to address remaining areas of groundwater contamination. The locations of additional targeted injections will be determined using the most recent groundwater data at that time.

15.1.3 Installation of Additional On-Property Downgradient Monitoring Wells

The Preferred Alternative includes the installation of at least two additional 2-inch-diameter monitoring wells along the downgradient northwestern and northern edges of the Port property (just east of Port Way), likely equally spaced between existing wells MW-05 and MW-35. The additional monitoring wells would be part of the compliance monitoring network (refer to Section 15.3). The number of wells and installation details will be proposed in a PDI work plan, prior to submittal of the EDR.

15.1.4 Former Longview Pipeline Inspection

As requested by Ecology in their 2019 RIWP review (Ecology 2019), the Preferred Alternative includes a limited inspection of the former Longview Pipeline to determine presence/absence of residual product. This inspection will be done prior to remedial implementation activities during the PDI activities. The limited inspection would involve excavating approximately 125 cubic feet (5-foot by 5-foot by 5-foot excavation) of surface soil overlying the pipeline in the northern portion of the Site, where the pipeline is known to lie at a shallow depth of approximately 5 feet bgs. Once the pipeline is exposed, spill response measures and air monitoring would be put into place in and around the excavation. The top of the pipeline would be cut open using either a small drill bit or a saw and, using this hole, the interior of the pipeline would be inspected for residual product. If residual product exists within the pipeline, observations, including approximate volume, color, odor, viscosity, and any other notable characteristics, would be recorded. Following the inspection, the pipeline would be resealed. Excavated soil would be stockpiled and tested for Site COCs and, pending analytical results, will be used to backfill the excavation if results indicate concentrations less than their respective MTCA CULs. The results of the inspection would be used to confirm that potential residual product is not mobile or not present, or that contingency action is needed, which would include a cost benefit analysis. Details of the pipeline inspection work plan will be included as part of the PDI. The selection of contingency action, if determined that one is required, for Longview Pipeline will be subject to Ecology's approval. The remedial action for Longview Pipeline, if needed, will allow the site to complete the actions approved by Ecology, as part of the CAP, without extending the restoration time frame.

15.1.5 Monitoring Natural Attenuation and Groundwater Monitoring

MNA for groundwater is a component of the Preferred Alternative after the destruction of the soil source contamination, and natural attenuation processes are assumed for groundwater recovery. As discussed in Section 9.2.1.3 and detailed in Appendix D, recent MNA groundwater data suggest that biodegradation of contaminants is occurring in Site groundwater, and the groundwater plumes in both the perched zone and alluvial aquifer are stable or shrinking. As part of MNA, groundwater monitoring would be conducted in select wells throughout the plume, downgradient and upgradient of in situ source treatment, following remedy implementation. Specific wells that will be sampled for MNA parameters will be provided in the CMP and subject to Ecology's approval. Select MNA parameters, including dissolved oxygen, nitrate, ferrous iron, sulfate, manganese, total alkalinity, and methane, would be monitored to ensure that biodegradation is ongoing.

15.1.6 Institutional Controls

ICs are legal and administrative controls intended to minimize the potential for human exposure to contamination or protect the integrity of the implemented remedy. ICs, such as an environmental covenant, would be included as part of the Preferred Alternative for the Site where contaminants in soil and groundwater are left in place exceeding the cleanup standards. ICs would include restrictions on the use of both perched zone and alluvial aquifer groundwater until proposed CULs are met across the Site. Additionally, although ISCO injections target all saturated soil with TPH concentrations greater than proposed CULs in CAA-1A, there would be shallow, limited small areas of soil within the vadose zone in CAA-2 with residual impacts exceeding direct-contact CULs for total TPH. To address management of possible exposure to these residual soil impacts during Site redevelopment or rail and utility line O&M, an SMP would be prepared as part of the CMP.

15.2 CONTINGENCY ACTIONS

Contingency actions may be considered if groundwater does not achieve CULs within the estimated restoration time frame. If groundwater does not achieve TPH CULs in downgradient off-property or along the downgradient property boundary within the restoration time frame, or if MNA data do not indicate the plumes are shrinking in a reasonable time frame, additional targeted in situ treatment may be considered to address remaining areas of groundwater contamination. Post remedial implementation groundwater results will be evaluated to determine if and where additional injections would be appropriate, refer to Section 15.1.2. Additional surfactant and extraction activities may be required, if residual LNAPL is still accumulating on the water table in MW-09 after three injection/extraction events. Costs for one contingency PersulfOx injection event, targeting approximately 5,000 square feet along the downgradient property boundary, were assumed for evaluation purposes and included in alternative costs. More detailed information regarding the triggers for contingency actions and scope of such actions would be presented in the CMP.

Contingency actions may also be considered in the event that residual product is encountered within the Longview Pipeline that is determined to be mobile enough to result in a potential release to the environment.

15.3 COMPLIANCE MONITORING

The CMP will describe long-term post-construction groundwater monitoring and adaptive management to ensure the long-term protectiveness of the Preferred Alternative. Compliance monitoring consists of protection monitoring, performance monitoring, and confirmation monitoring in accordance with WAC 173-340-410. 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 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. Details will be provided within the cleanup action plan.

Groundwater compliance will be determined based on a comparison of groundwater data to Site CULs. Following completion of remedial activities, groundwater compliance monitoring will be conducted on an annual basis for the first 10 years or until concentrations are less than Site CULs, and then compliance monitoring will be conducted on a semiannual basis during the wet and dry season. Once Site-wide concentrations meet CULs during semiannual monitoring, groundwater monitoring will be conducted on a quarterly basis to meet MTCA regulations of four consecutive quarters.

Based on current conditions, the standard POC for groundwater will be applied. However, under future conditions, the northwestern and northern Port property boundary could serve as a CPOC once impacted dissolved-phase hydrocarbons in groundwater at off-property and on-property downgradient perimeter wells attenuate to concentrations less than proposed CULs (refer to Section 8.2.1).

15.4 RESTORATION TIME FRAME

Surfactant injections and extractions and ISCO injections would help destroy a large portion of the hydrocarbon mass at the Site (approximately 77%) within 1 to 2 years, which would help promote natural attenuation and reduce the restoration time frame to meet groundwater CULs when compared to relying on MNA as a stand-alone alternative. Additional treatment to further reduce the restoration time frame was evaluated but was not found to be effective. Treatment of a larger area of CAA-2 than proposed in Alternative 3, including use of horizontal injection wells, would not materially shorten the restoration time frame as evaluated using the factors provided under WAC 173-340-360(4)(c). Because Alternative 3 targets the most concentrated source areas, the remaining hydrocarbon mass that would be left in place would be relatively thin and spread out. A sharp decline in groundwater concentrations is expected within 6 months of the last round of injections. Surfactant injections and extractions are expected to remove LNAPL from the MW-09 vicinity within approximately 6 to 8 weeks after the first round of surfactant injections. As described in Section 15.1.6, ICs would be implemented to manage future exposures while contamination remains.

The restoration time frame for soil and groundwater site-wide was evaluated based on the estimated rate of biodegradation for site conditions following in situ treatment (refer to Appendix D). Based on this evaluation, the site-wide restoration will occur less than 10 years to approximately 28 years after remedy implementation is complete. The restoration time frame estimate found that the majority of the currently impacted area, including near the western, northwestern, and northern property boundary, would attain CULs within approximately 2 to 5 years following implementation. It is estimated that a relatively small area of the Site where residual soil mass would remain would take the longest to attenuate, up to approximately 28 years.

15.5 SUMMARY OF ESTIMATED REMEDY COSTS

Estimated remedial costs for the Preferred Alternative are presented in Table I.4 of Appendix I. The costs associated with remedy implementation consist of capital construction costs, compliance monitoring and closure costs following remedy completion, and agency oversight that would include periodic reviews of the constructed remedy. The estimated costs for remedy construction are as follows:

- Construction capital costs that include remedy implementation and construction as well as permitting are estimated to be approximately $1,567,000.
- Construction indirect costs that include construction project management, agency oversight, engineering design/reporting, planning, and field management and oversight are estimated to be $551,000.
- Compliance groundwater monitoring and closure net present value costs were estimated based on annual monitoring and reporting costs for 30 years after remedy implementation, cost to negotiate ICs, well abandonment, and draft and final closure reports. One event of contingency PersulfOx injections to address any residual proposed CUL groundwater exceedances at the downgradient property boundary was also included in the estimate. The compliance groundwater monitoring costs were estimated to be $1,278,000.

The total project cost for the Preferred Alternative, which includes a 25% contingency on direct construction costs, 20% contingency on indirect construction costs, and 10% sales tax, is estimated to be $4,200,000.

15.6 COMPLIANCE WITH MTCA

The Preferred Alternative meets the minimum requirements for selection of a cleanup action under MTCA (WAC 173-340-360(3)(a)) because it is protective of human health and the environment, complies with cleanup standards, complies with applicable state and federal laws, provides for compliance monitoring. The Preferred Alternative also meets other MTCA requirements (WAC 173-340-360(3)(b-d)) for selection of a cleanup action, including using permanent solutions to the maximum extent practicable, providing for a reasonable restoration time frame, and consideration of public concerns.

The Preferred Alternative also meets the requirements of expectations for cleanup actions under MTCA (WAC 173-340-370(7)) where natural attenuation can be appropriate for sites where source control has been conducted to the maximum extent practicable; where leaving contaminants onsite during the restoration time frame does not pose an unacceptable threat to human health or the environment; where there is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate; and where appropriate monitoring requirements are conducted to ensure that the natural attenuation process is taking place and that human health and the environment are protected.

15.7 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Compliance with ARARs is a minimum requirement for cleanup actions. ARARs are divided into location-specific, action-specific, and chemical-specific, and are summarized in Table 11.1. The applicability of the ARARs to the Preferred Alternative, and how the Preferred Alternative will meet the ARARs, are described as follows.

Location-Specific ARARs: The location-specific ARARs are not applicable to the Preferred Alternative, which does not include removal of soil or other ground-disturbing activities or demolition of structures.

Action-Specific ARARs: The action-specific ARARs potentially applicable to the Preferred Alternative include the ARARs governing noise that may be generated during injection (i.e., the Noise Control Act of 1974), the Washington State UIC Program, City of Longview codes regarding ROW and hydrant water use, and Occupational Safety and Health Act (OSHA) regulations applicable to Site workers involved in cleanup implementation. Compliance with the UIC Program would be achieved by obtaining the appropriate UIC permit from Ecology. Injection work in ROWs would be performed in accordance with City of Longview standards, and a hydrant permit, if needed for injection of water-based reagents, would be obtained from the City of Longview. A Health and Safety Plan detailing hazards and necessary controls associated with cleanup action implementation would be prepared for Site workers to meet OSHA requirements.

Chemical-Specific ARARs: The chemical-specific ARARs are all applicable to the Preferred Alternative and would be met through compliance with proposed CULs.

As stated in Section 11.4, remedial actions conducted under an agreed order with Ecology are exempt from state and local ARAR procedural requirements; however, the Preferred Alternative would be implemented in compliance with the substantive requirements of the appliable state and local requirements.

15.8 COMPLIANCE WITH REMEDIAL ACTION OBJECTIVES

The Preferred Alternative achieves the RAOs through the following actions:

- Protect human health and the environment from Site impacts that exceed proposed CULs by greatly reducing the hydrocarbon mass in soil and groundwater through ISCO injections and management of exposure pathways (i.e., ICs to prevent groundwater withdrawal until proposed CULs are met and an SMP to manage areas with residual soil concentrations greater than direct-contact CULs). Treating all soil that exceeds proposed CULs in CAA-1 (as well as downgradient off-property groundwater) will significantly reduce off-property migration risk.
- Protect human health and the environment from Site impacts and reduce the restoration time frame by actively treating source areas of soil in CAA-2 (active rail lines) that exceed RELs with ISCO injections. ISCO injections are minimally disruptive and, with proper coordination with the Port and its tenants, can be deployed in CAA-2 when the rail lines are not active, so no rail lines are closed. Additionally, ISCO treatment of all impacted soil and groundwater in CAA-1A would not impact future redevelopment activities on Port property.
- Remove LNAPL accumulations from Site media by implementing surfactant injections and extractions in the MW-09 vicinity and targeting areas of soil GRO and total DRO and ORO concentrations greater than residual saturation levels with ISCO injections.
- Develop and implement an CMP with a provision for compliance groundwater monitoring to evaluate the effectiveness of the Preferred Alternative and to determine that CULs are met at the downgradient property boundary and throughout the Site.

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Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Tables

Table 4.1
RIWP Screening Levels

Exposure Pathway for Soil	
Analyte	**Unrestricted Land Use (MTCA Method A)**
Gasoline-range organics	30 mg/kg
Diesel-range organics	2,000 mg/kg
Oil-range organics	2,000 mg/kg
cPAHs	0.1 mg/kg
Benzene	0.03 mg/kg
Toluene	7 mg/kg
Ethylbenzene	6 mg/kg
Total xylenes	9 mg/kg
Exposure Pathway for Groundwater	
Analyte	**MTCA Method A Protection of Drinking Water (1)**
Gasoline-range organics	800 µg/L
Diesel-range organics	500 µg/L
Oil-range organics	500 µg/L
cPAHs	0.1 µg/L
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Total xylenes	1,000 µg/L
Exposure Pathway for Indoor Air	
Analyte	**Sub-Slab MTCA Method B Soil Gas Screening Level (2)**
Total TPH (3,4)	4,700 µg/m³
Benzene	11 µg/m³
Ethylbenzene	15,000 µg/m³
Methyl tert-butyl ether	320 µg/m³
Naphthalene	2.5 µg/m³
Toluene	7,600 µg/m³
Total Xylenes	1,500 µg/m³

Notes:

-- Not applicable.
1 Site-specific cleanup levels may be developed from EPH/VPH data.
2 Screening levels acquired from the July 2022 CLARC Spreadsheet and Ecology 2022.
3 Total TPH concentrations are compared to Indoor Air Cleanup Levels listed on Ecology's CLARC worksheet and in Appendix E of Ecology 2022.
4 A MTCA Method C screening for total TPH has not been established by Ecology.

Abbreviations:

CLARC	Cleanup Levels and Risk Calculation
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
Ecology	Washington State Department of Ecology
EPH	Extractable petroleum hydrocarbons
µg/m³	Micrograms per cubic meter
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
RIWP	Remedial Investigation Work Plan
TPH	Total petroleum hydrocarbons
VPH	Volatile petroleum hydrocarbons

Table 4.2
RI Soil Analytical Results: TPH and BTEX

			Analyte Class	Total Petroleum Hydrocarbons (TPH)					Benzene, Toluene, Ethylbenzene, and Xylene Compounds					
			Analyte	Gasoline-Range Organics	Diesel-Range Organics	Oil-Range Organics	Total DRO and ORO	TPH [2]	Benzene	Toluene	Ethylbenzene	Xylene (meta & para)	Xylene (ortho)	Xylene (total)
			Screening Level [1]	30	2,000	2,000	2,000	--	0.030	7.0	6.0	--	--	9.0
			MTCA Method C	--	--	--	35,647 [3]	--	2,400	280,000	350,000	700,000	700,000	700,000
			Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Location Name	Sample Name	Date	Depth Range (ft bgs)											
2015 Data Gaps Investigation														
GP-1	GP-1-19.5-20	9/15/2015	19.5–20	18	280	250	280		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	GP-1-21-21.5	9/15/2015	21–21.5	20 U	50 U	250 U	250 U							
GP-2	GP-2-16-16.5	9/15/2015	16–16.5	20 U	50 U	250 U	250 U							
GP-3	GP-3-2-3	9/15/2015	2–3	20 U	50 U	250 U	250 U							
	GP-3-16-16.5	9/15/2015	16–16.5	20 U	50 U	250 U	250 U							
GP-4	GP-4-21-21.5	9/15/2015	21–21.5	20 U	50 U	470	470							
GP-6	GP-6-16-17	9/15/2015	16–17	20 U	50 U	140 JQ	140 JQ							
GP-7	GP-7-25.5-26	9/15/2015	25.5–26	20 U	50 U	470	470							
GP-8	GP-8-25.5-26	9/15/2015	25.5–26	20 U	50 U	720	720							
GP-9	GP-9-27.5-28	9/16/2015	27.5–28	20 U	50 U	250 U	250 U							
GP-10	GP-10-28-28.5	9/16/2015	28–28.5	20 U	50 U	250 U	250 U							
GP-11	GP-11-27-27.5	9/16/2015	27–27.5	20 U	120 JM	530	650							
GP-12	GP-12-26-26.5	9/16/2015	26–26.5	20 U	50 U	250 U	250 U							
GP-13	GP-13-26.5-27	9/16/2015	26.5–27	20 U	50 U	250 U	250 U							
GP-14	GP-14-26-26.5	9/16/2015	26–26.5	20 U	50 U	250 U	250 U							
GP-15	GP-15-27-27.5	9/16/2015	27–27.5	20 U	50 U	250 U	250 U							
GP-16	GP-16-27.5-28	9/16/2015	27.5–28	20 U	50 U	250 U	250 U							
GP-18	GP-18-27-28	9/16/2015	27–28	**71**	**4,400**	**5,600**	**10,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	GP-18-29-30	9/16/2015	29–30	20 U	50 U	250 U	250 U							
GP-5	GP-5-19-19.5	9/17/2015	19–19.5	20 U	50 U	250 U	250 U							
GP-17	GP-17-26-26.5	9/17/2015	26–26.5	20 U	50 U	250 U	250 U							
GP-19	GP-19-23.5-24	9/17/2015	23.5–24	20 U	50 U	250 U	250 U							
GP-20	GP-20-24-25	9/17/2015	24–25	20 U	50 U	250 U	250 U							
GP-21	GP-21-21-21.5	9/17/2015	21–21.5	20 U	50 U	250 U	250 U							
	GP-21-25.5-26	9/17/2015	25.5–26	20 U	50 U	250 U	250 U							
GP-22	GP-22-29-29.5	9/17/2015	29–29.5	20 U	50 U	250 U	250 U							
GP-23	GP-23-10.5-11	9/17/2015	10.5–11	20 U	50 U	510	510							
	GP-23-27-27.5	9/17/2015	27–27.5	20 U	50 U	250 U	250 U							
GP-24	GP-24-20-20.5	9/17/2015	20–20.5	20 U	50 U	250 U	250 U							
GP-25	GP-25-20-20.5	9/17/2015	20–20.5	20 U	50 U	250 U	250 U							
GP-26	GP-26-14-14.5	9/18/2015	14–14.5	20 U	50 U	250 U	250 U							
	GP-26-19-19.5	9/18/2015	19–19.5	20 U	50 U	250 U	250 U							
GP-27	GP-27-14-14.5	9/18/2015	14–14.5	30	**11,000**	**11,000**	**22,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	GP-27-17-18	9/18/2015	17–18	20 U	50 U	250 U	250 U							
GP-29	GP-29-25-25.5	9/18/2015	25–25.5	20 U	50 U	250 U	250 U							
	GP-29-27-27.5	9/18/2015	27–27.5	20 U	50 U	250 U	250 U							
GP-30	GP-30-16-16.5	9/18/2015	16–16.5	20 U	50 U	250 U	250 U							
	GP-30-19.5-20	9/18/2015	19.5–20	20 U	50 U	250 U	250 U							

Table 4.2
RI Soil Analytical Results: TPH and BTEX

			Analyte Class	Total Petroleum Hydrocarbons (TPH)					Benzene, Toluene, Ethylbenzene, and Xylene Compounds					
			Analyte	**Gasoline-Range Organics**	**Diesel-Range Organics**	**Oil-Range Organics**	**Total DRO and ORO**	**TPH (2)**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene (meta & para)**	**Xylene (ortho)**	**Xylene (total)**
			Screening Level (1)	**30**	**2,000**	**2,000**	**2,000**	**--**	**0.030**	**7.0**	**6.0**	**--**	**--**	**9.0**
			MTCA Method C	**--**	**--**	**--**	**35,647 (3)**	**--**	**2,400**	**280,000**	**350,000**	**700,000**	**700,000**	**700,000**
			Unit	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Location Name	**Sample Name**	**Date**	**Depth Range (ft bgs)**											
Former 80,000-Barrel AST														
TP-2	TP-2-7	11/23/1992	7–7	**650**	**13,000**	**1,200**	**14,000**							
TP-3	TP-3-8	11/23/1992	8–8	**1,800**	660	540	1,200							
	TP-3-11	11/23/1992	11–11	ND U (4)	150	ND U (4)	150							
TP-6	TP-6-11	11/23/1992	11–11	**1,200**	130	160	290							
MW-21	MW-21-14	5/21/1993	14–14	ND U (4)	ND U (4)	ND U (4)	ND U (4)	ND U (4)						
	MW-21-16.8	5/21/1993	16.8–16.8	ND U (4)	ND U (4)	ND U (4)	ND U (4)	ND U (4)						
	MW-21-17	5/21/1993	17–17	ND U (4)	ND U (4)	ND U (4)	ND U (4)	ND U (4)						
T-1	T-1-9	8/30/1995	9–9		ND U (4)	ND U (4)	ND U (4)							
	T-1-20	8/30/1995	20–20		78	ND U (4)	78							
T-2	T-2-19	8/30/1995	19–19		ND U (4)	ND U (4)	ND U (4)							
UBV1	UBV1	6/5/1996	3–3					25 U						
UBV2	UBV2	6/5/1996	4–4					25 U						
UBV3	UBV3	6/5/1996	3–3					25 U						
UBV4	UBV4	6/5/1996	6–6					50 U						
UBV5	UBV5	6/5/1996	7.5–7.5					50 U						
UBV6	UBV6	6/10/1996	6–6					25 U						
UBV7	UBV7	6/10/1996	6–6					92						
UBV8	UBV8	6/10/1996	6–6					50 U						
UBV9	UBV9	6/11/1996	6–6					8,300						
UBV10	UBV10	6/11/1996	4–4					25 U						
UBV11	UBV11	6/11/1996	3–3					25 U						
UBV12	UBV12	6/11/1996	6–6					28						
MW-32	MW-32-10-11.5	6/24/1998	10–11.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-32-20-21.5	6/24/1998	20–21.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
OIP-02	OIP-02-5-5.5	3/11/2020	5–5.5	20 U	**1,900 (5)**	**3,400**	**5,300**							
	OIP-02-14-15	3/11/2020	14–15	20 U	50 U	250 U	250 U							
OIP-04	OIP-04-4-5	3/10/2020	4–5	20 U	50 U	250 U	250 U							
	OIP-04-15-16	3/10/2020	15–16	20 U	50 U	250 U	250 U							
Former Calloway Ross Parcel														
MW-03	PL-MW3-9-10.5	5/1/1991	9–10.5	10 U	1,700	10 U	1,700							
SB-1	PL-SB1-5.5-7	5/1/1991	5.5–7	***100 U***	**4,800**	100 U	**4,800**							
	PL-SB1-7-8.5	5/1/1991	7–8.5	***100 U***	**2,300**	100 U	**2,300**							
SB-2	PL-SB2-2.5-4	5/1/1991	2.5–4	10 U	10 U	220	220							
	PL-SB2-6-7.5	5/1/1991	6–7.5	**540**	**7,800**	100 U	**7,800**							
	PL-SB5-6-7.5	5/1/1991	6–7.5	**590**	**7,200**	100 U	**7,200**							
	PL-SB2-7.5-9	5/1/1991	7.5–9	**1,500**	**13,000**	100 U	**13,000**							
SB-3	PL-SB3-10-11.5	5/1/1991	10–11.5	10 U	450	10 U	450							
SB-4	PL-SB4-7-8.5'	5/2/1991	7–8.5	***100 U***	**11,000**	100 U	**11,000**							
SB-5	PL-SB5-10-11.5'	5/2/1991	10–11.5	10 U	10 U	10 U	10 U							
	PL-SB8-10-11.5'	5/2/1991	10–11.5	ND U (4)	43	110	150							
SB-6	PL-SB6-11.5-13'	5/2/1991	11.5–13	10 U	10 U	10 U	10 U							
SB-7	PL-SB7-7.5-9	5/2/1991	7.5–9	25	54	10 U	54							
SB-8	PL-SB8-9-10.5'	5/2/1991	9–10.5	10 U	10 U	10 U	10 U							

Table 4.2
RI Soil Analytical Results: TPH and BTEX

			Analyte Class	Total Petroleum Hydrocarbons (TPH)					Benzene, Toluene, Ethylbenzene, and Xylene Compounds					
			Analyte	Gasoline-Range Organics	Diesel-Range Organics	Oil-Range Organics	Total DRO and ORO	TPH (2)	Benzene	Toluene	Ethylbenzene	Xylene (meta & para)	Xylene (ortho)	Xylene (total)
			Screening Level (1)	30	2,000	2,000	2,000	--	0.030	7.0	6.0	--	--	9.0
			MTCA Method C	--	--	--	35,647 (3)	--	2,400	280,000	350,000	700,000	700,000	700,000
			Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Location Name	Sample Name	Date	Depth Range (ft bgs)											
Former Calloway Ross Parcel (cont.)														
MW-05	PL-MW5-11-12.5'	5/3/1991	11–12.5	10 U	10 U	10 U	10 U							
SB-9	PL-SB9-9-10.5'	5/3/1991	9–10.5	10 U	10 U	10 U	10 U							
MW-08	MW-8-10	12/8/1992	10–10	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-8-16	12/8/1992	16–16	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-8-24	12/8/1992	24–24	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-10	MW-10-2	12/7/1992	2–2	10	110	140	250							
	MW-10-8	12/7/1992	8–8	**1,800**	660	540	1,200							
	MW-10-9	12/7/1992	9–9	**1,000**	**4,900**	310	**5,200**							
	MW-10-11	12/7/1992	11–11	ND U (4)	150	ND U (4)	150							
	MW-10-14	12/7/1992	14–14	**3,900**	**4,100**	300	**4,400**							
	MW-10-24	12/7/1992	24–24	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
SCR-1	SCR-1	3/22/1993	0–1	ND U (4)	**60,000**	**3,500**	**64,000**							
SCR-2	SCR-2	3/22/1993	0–1	ND U (4)	**14,000**	**150,000**	**160,000**							
SCR-3	SCR-3	3/22/1993	0–1	ND U (4)	**5,300**	**21,000**	**26,000**							
SCR-7	SCR-7	3/22/1993	0–1	ND U (4)	300	**2,400**	**2,700**							
SCR-10	SCR-10	3/22/1993	0–1	ND U (4)	220	1,400	1,700							
UAV2	UAV 2	6/1/1996	4–4					25 U						
UAV3	UAV 3	6/1/1996	3–3					25 U						
OIP-08	OIP08-19-20-112219	11/22/2019	19–20	**4,900**	**12,000**	1,000 (5)	**13,000**		**1.1**	0.74	**27**	3.2	0.25 U	3.2
OIP-66	OIP66-12-12.5-1112219	11/22/2019	12–12.5	**1,500**	760	250 U	760		0.030 U	0.050 U	0.12	0.10 U	0.050 U	0.10 U
	OIP166-12-12.5D	11/22/2019	12–12.5	**2,000**	490	250 U	490		0.030 U	0.050 U	0.25	0.10 U	0.050 U	0.10 U
OIP-68	OIP-68-10-11	3/11/2020	10–11	20 U	50 U	250 U	250 U							
	OIP-68-10-11D	3/11/2020	10–11	20 U	50 U	250 U	250 U							
	OIP-68-13.5-14	3/11/2020	13.5–14	20 U	50 U	250 U	250 U							
GP-36	GP-36-13-14	3/12/2020	13–14	**4,100**	**3,500**	250 U	**3,500**		**0.25**	0.27	4.7	1.5	0.050 U	1.5
	GP-36-16-17	3/12/2020	16–17	**950**	**15,000**	970 (5)	**16,000**		**0.61**	0.47	**7.6**	2.5	0.056	2.6
	GP-36-22-23	3/12/2020	22–23	20 U	50 U	250 U	250 U							
GP-37	GP-37-12-14	3/12/2020	12–14	20 U	50 U	250 U	250 U							
	GP-37-12-14D	3/12/2020	12–14	20 U	50 U	250 U	250 U							
OIP-67	OIP-67-7-8	3/12/2020	7–8	20 U	50 U	250 U	250 U							
	OIP-67-11-12	3/12/2020	11–12	**1,500**	**4,300**	310 (5)	**4,600**		0.030 U	0.050 U	0.062	0.10 U	0.050 U	0.10 U
	OIP-67-14.5-15	3/12/2020	14.5–15	**2,200**	**2,100**	250 U	**2,100**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	OIP-67-18-19	3/12/2020	18–19	20 U	50 U	250 U	250 U							

Table 4.2
RI Soil Analytical Results: TPH and BTEX

			Analyte Class	Total Petroleum Hydrocarbons (TPH)					Benzene, Toluene, Ethylbenzene, and Xylene Compounds					
			Analyte	Gasoline-Range Organics	Diesel-Range Organics	Oil-Range Organics	Total DRO and ORO	TPH (2)	Benzene	Toluene	Ethylbenzene	Xylene (meta & para)	Xylene (ortho)	Xylene (total)
			Screening Level (1)	30	2,000	2,000	2,000	--	0.030	7.0	6.0	--	--	9.0
			MTCA Method C	--	--	--	35,647 (3)	--	2,400	280,000	350,000	700,000	700,000	700,000
			Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Location Name	Sample Name	Date	Depth Range (ft bgs)											
Former Fuel Loading Racks														
MW-09	MW-9-2	12/2/1992	2–2	16	1,500	**4,600**	**6,100**							
	MW-9-7	12/2/1992	7–7	**650**	**13,000**	1,200	**14,000**							
	MW-9-10	12/2/1992	10–10	ND U (4)	180	270	450							
	MW-9-11	12/2/1992	11–11	**1,400**	**19,000**	2,600	**22,000**							
	MW-9-14	12/2/1992	14–14	**4,700**	**9,000**	830	**9,800**							
	MW-9-19.5	12/2/1992	19.5–19.5	ND U (4)	550	ND U (4)	550							
MW-11	MW-11-1.5	12/3/1992	1.5–1.5	**450**	**26,000**	**34,000**	**60,000**							
	MW-11-9	12/3/1992	9–9	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-11-11	12/3/1992	11–11	ND U (4)	**17,000**	830	**18,000**							
	MW-11-15	12/3/1992	15–15	ND U (4)	**16,000**	700	**17,000**							
	MW-11-19	12/3/1992	19–19	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-11-20	12/3/1992	20–20	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-12	MW-12-6	12/4/1992	6–6	**510**	120	ND U (4)	120							
	MW-12-14	12/4/1992	14–14	**4,900**	1,800	180	2,000							
	MW-12-19	12/4/1992	19–19	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-12-22	12/4/1992	22–22	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
IB-2	IB-2-20	12/4/1992	20–20	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-07	MW-7-9	12/7/1992	9–9	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-7-16	12/7/1992	16–16	**490**	370	ND U (4)	370							
	MW-7-24	12/7/1992	24–24	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-14	MW-14-8	5/17/1993	8–8	**6,900**	**13,000**	410	**13,000**							
	MW-14-11	5/17/1993	11–11	**6,000**	**12,000**	ND U (4)	**12,000**							
MW-15	MW-15-10	5/18/1993	10–10	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-15-13.5	5/18/1993	13.5–13.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-15-16.5	5/18/1993	16.5–16.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-16	MW-16-10	5/18/1993	10–10	**16,000**	1,900	290	**2,200**							
	MW-16-13.5	5/18/1993	13.5–13.5	ND U (4)	**9,400**	ND U (4)	**9,400**							
	MW-16-18	5/18/1993	18–18	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-17	MW-17-11	5/19/1993	11–11	ND U (4)	**2,300**	ND U (4)	**2,300**							
	MW-17-13.5	5/19/1993	13.5–13.5	ND U (4)	**20,000**	970	**21,000**							
	MW-17-19.7	5/19/1993	19.7–19.7	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-20	MW-20-11.5	5/20/1993	11.5–11.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-20-18-19	5/20/1993	18–19	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-20-19	5/20/1993	19–19	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-13	MW-13-1	5/26/1993	1–1	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-25	MW-25-9.5	3/2/1994	9.5–9.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
OIP-42	OIP42-17-17.5-112119	11/21/2019	17–17.5	**3,600**	**17,000**	1,500 (5)	**19,000**		**2.4**	0.99	**41**	4.1	0.50 U	4.1
MW-33	MW-33-12-12.5	3/9/2020	12–12.5	**230**	**15,000**	600 (5)	**16,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	MW-33-19.5-20	3/9/2020	19.5–20	5.0 U	50 U	250 U	250 U		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	MW-33-22.5-23	3/9/2020	22.5–23	20 U	50 U	250 U	250 U							

Table 4.2
RI Soil Analytical Results: TPH and BTEX

			Analyte Class	Total Petroleum Hydrocarbons (TPH)					Benzene, Toluene, Ethylbenzene, and Xylene Compounds					
			Analyte	Gasoline-Range Organics	Diesel-Range Organics	Oil-Range Organics	Total DRO and ORO	TPH (2)	Benzene	Toluene	Ethylbenzene	Xylene (meta & para)	Xylene (ortho)	Xylene (total)
			Screening Level (1)	30	2,000	2,000	2,000	--	0.030	7.0	6.0	--	--	9.0
			MTCA Method C	--	--	--	35,647 (3)	--	2,400	280,000	350,000	700,000	700,000	700,000
			Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Location Name	Sample Name	Date	Depth Range (ft bgs)											
Former Fuel Loading Racks (cont.)														
MW-40	MW-40-1.0-1.5	3/9/2020	1–1.5	20 U	200 (5)	2,400	2,600							
	MW-40-10.5-11	3/9/2020	10.5–11	2,000	18,000	7,900 (5)	26,000		12	7.4	5.4			15
	MW-40-17	3/9/2020	17–17	170	2,400	250 U	2,400		0.33	0.050 U	0.14	0.13	0.050 U	0.13
	MW-40-17D	3/9/2020	17–17	1,700	2,100	320 (5)	2,400		0.088	0.050 U	0.19	0.12	0.050 U	0.12
	MW-40-24-24.5	3/9/2020	24–24.5	20 U	50 U	250 U	250 U							
OIP-47	OIP-47-2-3	3/9/2020	2–3	20 U	50 U	250 U	250 U							
	OIP-47-11-12	3/9/2020	11–12	5,700	210 (5)	250 U	210		0.030 U	0.12	27	1.9	0.30	2.2
	OIP-47-17	3/9/2020	17–17	49	360	250 U	360		0.030 U	0.089	7.0	1.6	0.15	1.8
	OIP-47-25	3/9/2020	25–25	20 U	50 U	250 U	250 U							
OIP-49	OIP-49-10	3/9/2020	10–10	22	50 U	360	360		0.020 U	0.16	0.020 U			0.41
	OIP-49-17	3/9/2020	17–17	960	50 U	250 U	250 U		0.020 UJ	0.020 UJ	14 J			14 J
GP-35	GP-35-7-8	3/10/2020	7–8	20 U	590	250 U	590							
	GP-35-16-17	3/10/2020	16–17	20 U	50 U	250 U	250 U							
OIP-39	OIP-39-15-15.5	3/10/2020	15–15.5	5.0 U	50 U	250 U	250 U		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	OIP-39-16.5-17	3/10/2020	16.5–17	7.3	50 U	250 U	250 U		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	OIP-39-21-22	3/10/2020	21–22	20 U	50 U	250 U	250 U							
OIP-46	OIP-46-10-11	3/10/2020	10–11	20 U	50 U	250 U	250 U							
	OIP-46-14	3/10/2020	14–14	20 U	50 U	250 U	250 U							
OIP-72	OIP-72-10-11	3/11/2020	10–11	520	50 U	250 U	250 U		0.020 UJ	0.020 UJ	6.1 J			7.0 J
	OIP-72-16-17	3/11/2020	16–17	270	50 U	250 U	250 U		0.020 U	0.020 U	2.1			2.3
OIP-15	OIP-15-15-16	3/12/2020	15–16	35	2,300	370 (5)	2,700		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	OIP-15-20-21	3/12/2020	20–21	5.0 U	50 U	250 U	250 U		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	OIP-15-23-24	3/12/2020	23–24	20 U	50 U	250 U	250 U							
OIP-64	OIP-64-14-15	3/12/2020	14–15	20 U	50 U	250 U	250 U							
Former Mechanic's Shop														
UST1	UST1-722-24	7/22/1993	24–24	20 U	50 U	100 U	100 U							
UST2	UST2-723-15	7/23/1993	15–15	20 U	50 U	100 U	100 U							
UST3	UST3-723-14.5	7/23/1993	14.5–14.5	20 U	50 U	100 U	100 U							
UST4	UST4-726-10	7/26/1993	10–10	20 U	50 U	100 U	100 U							
UST5	UST5-9	6/3/1994	9–9	790	170	200	370							
	UST5-13	6/3/1994	13–13	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	UST5-18	6/3/1994	18–18	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
GP-34	GP-34-14-15	3/9/2020	14–15	20 U	50 U	250 U	250 U							
GP-38	GP-38-11-11.5	3/13/2020	11–11.5	20 U	50 U	250 U	250 U							
OIP-18	OIP-18-19-19.5	3/13/2020	19–19.5	20 U	50 U	250 U	250 U							
OIP-19	OIP-19-19-20	3/13/2020	19–20	20 U	50 U	250 U	250 U							
OIP-20	OIP-20-11-11.5	3/13/2020	11–11.5	630	440 (5)	250 U	440		0.030 U	0.050 U	0.11	0.11	0.050 U	0.11
	OIP-20-19-19.5	3/13/2020	19–19.5	20 U	50 U	250 U	250 U							
OIP-21	OIP-21-18-19	3/13/2020	18–19	20 U	50 U	250 U	250 U							
Former U.S. Army Reserve Heating Oil UST														
GP-31	GP-31-14-15	3/11/2020	14–15	20 U	50 U	250 U	250 U							
GP-32	GP-32-17.5-18.5	3/11/2020	17.5–18.5	20 U	50 U	250 U	250 U							

Table 4.2
RI Soil Analytical Results: TPH and BTEX

			Analyte Class	Total Petroleum Hydrocarbons (TPH)					Benzene, Toluene, Ethylbenzene, and Xylene Compounds					
			Analyte	Gasoline-Range Organics	Diesel-Range Organics	Oil-Range Organics	Total DRO and ORO	TPH (2)	Benzene	Toluene	Ethylbenzene	Xylene (meta & para)	Xylene (ortho)	Xylene (total)
			Screening Level (1)	30	2,000	2,000	2,000	--	0.030	7.0	6.0	--	--	9.0
			MTCA Method C	--	--	--	35,647 (3)	--	2,400	280,000	350,000	700,000	700,000	700,000
			Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Location Name	Sample Name	Date	Depth Range (ft bgs)											
Monitoring Wells MW-26 and MW-28														
MW-18	MW-18-17	5/19/1993	17–17	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-18-17-DUP	5/19/1993	17–17	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-24	MW-24-15.5	3/3/1994	15.5–15.5	**5,600**	**43,000**	360	**43,000**							
	MW-24-15.5-DUP	3/3/1994	15.5–15.5		**47,000**		**47,000 (6)**							
	MW-24-20	3/3/1994	20–20	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-24-22.2	3/3/1994	22.2–22.2	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-26	MW-26-12.8	3/3/1994	12.8–12.8	**2,300**	**17,000**	94	**17,000**							
	MW-26-12.8-DUP	3/3/1994	12.8–12.8	**1,900**	**15,000**	93	**15,000**							
	MW-26-18	3/3/1994	18–18	**2,100**	**42,000**		**42,000 (6)**							
	MW-26-37.5	3/3/1994	37.5–37.5	ND U (4)	5.4		5.4 (6)							
MW-27	MW-27-18.2	3/21/1994	18.2–18.2	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-28	MW-28-14.6	3/22/1994	14.6–14.6	**760**	**8,400**		**8,400 (6)**							
	MW-28-14.6-DUP	3/22/1994	14.6–14.6	**830**	**8,700**		**8,700 (6)**							
	MW-28-27.7	3/22/1994	27.7–27.7	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-28-29.5	3/22/1994	28–29.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-29	MW-29-10	6/3/1994	10–10	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-29-20	6/3/1994	20–20	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-29-24	6/3/1994	24–24	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
OIP-30	OIP30-20-21-111919	11/19/2019	20–21	**61**	**11,000**	**12,000**	**23,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.063	0.063
GP-33	GP-33-14-14.5	3/9/2020	14–14.5	**170**	830 (5)	**3,800**	**4,630**		0.020 U	0.11	0.58			1.7
	GP-33-19.5-20	3/9/2020	19.5–20	20 U	50 U	250 U	250 U							
	GP-33-24-25	3/9/2020	24–25	20 U	50 U	250 U	250 U							
	GP-33-28-29	3/9/2020	28–29	20 U	50 U	250 U	250 U							
OIP-52	OIP52-19-19.5-112219	11/22/2019	19–19.5	**86**	530	250 U	530		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	OIP52-22-22.5-112219	11/22/2019	22–22.5	**260**	**2,200**	250 U	**2,200**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
OIP-53	OIP53-22-22.5-112219	11/22/2019	22–22.5	5.0 U	50 U	250 U	250 U		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
OIP-31	OIP-31-17	3/9/2020	17–17	20 U	50 U	250 U	250 U							
	OIP-31-20	3/9/2020	20–20	20 U	50 U	250 U	250 U							
MW-34	MW-34-15-15.5	3/10/2020	15–15.5	**760**	**23,000**	540 (5)	**24,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	MW-34-20-20.5	3/10/2020	20–20.5	**280**	**17,000**	480 (5)	**17,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	MW-34-24-24.5	3/10/2020	24–24.5	**46**	300	250 U	300		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	MW-34-28-28.5	3/10/2020	28–28.5	20 U	50 U	250 U	250 U							
OIP-23	OIP-23-14-15	3/10/2020	14–15	**420**	**13,000**	250 U	**13,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	OIP-23-19-20	3/10/2020	19–20	**790**	**48,000**	1,300 (5)	**49,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.081	0.081
	OIP-23-23-24	3/10/2020	23–24	**200**	**5,700**	250 U	**5,700**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	OIP-23-29.5-30	3/10/2020	29.5–30	20 U	50 U	250 U	250 U							
OIP-54	OIP-54-15-16	3/11/2020	15–16	20 U	50 U	660	660							

Table 4.2
RI Soil Analytical Results: TPH and BTEX

			Analyte Class	**Total Petroleum Hydrocarbons (TPH)**					**Benzene, Toluene, Ethylbenzene, and Xylene Compounds**					
			Analyte	**Gasoline-Range Organics**	**Diesel-Range Organics**	**Oil-Range Organics**	**Total DRO and ORO**	**TPH (2)**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene (meta & para)**	**Xylene (ortho)**	**Xylene (total)**
			Screening Level (1)	**30**	**2,000**	**2,000**	**2,000**	**--**	**0.030**	**7.0**	**6.0**	**--**	**--**	**9.0**
			MTCA Method C	**--**	**--**	**--**	**35,647 (3)**	**--**	**2,400**	**280,000**	**350,000**	**700,000**	**700,000**	**700,000**
			Unit	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Location Name	**Sample Name**	**Date**	**Depth Range (ft bgs)**											
Northern Portion of the Former Standard Pipelines														
MW-06	MW-6-14	12/9/1992	14–14	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-6-19	12/9/1992	19–19	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-19	MW-19-2-4	5/18/1993	2–4	ND U (4)	**3,700**	**12,000**	**16,000**							
	MW-19-4-8	5/18/1993	4–8	ND U (4)	**72,000**	**58,000**	**130,000**							
OIP-57	OIP-57-14	3/10/2020	14–14	20 U	50 U	250 U	250 U							
OIP-70	OIP-70-8	3/10/2020	8–8	20 U	50 U	250 U	250 U							
	OIP-70-12-14	3/10/2020	12–14	20 U	50 U	250 U	250 U							
OIP-69	OIP-69-11-12	3/11/2020	11–12	20 U	50 U	250 U	250 U							
	OIP-69-14.5-15	3/11/2020	14.5–15	20 U	50 U	250 U	250 U							
MW-39	MW-39-2-4	3/12/2020	2–4	20 U	50 U	250 U	250 U							
	MW-39-8-9	3/12/2020	8–9	**150**	**4,400**	250 U	**4,400**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	MW-39-13-14	3/12/2020	13–14	**990**	**18,000**	340 (5)	**18,000**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	MW-39-18.5-20	3/12/2020	18.5–20	5.0 U	50 U	250 U	250 U		0.030 U	0.050 UJ	0.050 U	0.10 U	0.050 U	0.10 U
OIP-73	OIP-73-13-14	3/12/2020	13–14	20 U	50 U	250 U	250 U							
	OIP-73-13-14D	3/12/2020	13–14	20 U	50 U	250 U	250 U							
	OIP-73-9-10	3/12/2020	9–10	20 U	50 U	250 U	250 U							
Perimeter Monitoring Wells														
MW-22	MW-22-27.5	3/1/1994	27.5–27.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-23	MW-23-26.5	3/2/1994	26.5–26.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-30	MW-30-16-16.5	6/24/1998	16–16.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-30-25-26.5	6/24/1998	25–26.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-31	MW-31-10-11	6/24/1998	10–11	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
	MW-31-20-21.5	6/24/1998	20–21.5	ND U (4)	ND U (4)	ND U (4)	ND U (4)							
MW-35	MW-35-15.5-16	3/10/2020	15.5–16	20 U	50 U	250 U	250 U							
MW-36	MW-36-25.5-26	3/11/2020	25.5–26	20 U	50 U	250 U	250 U							

Table 4.2
RI Soil Analytical Results: TPH and BTEX

			Analyte Class	Total Petroleum Hydrocarbons (TPH)					Benzene, Toluene, Ethylbenzene, and Xylene Compounds					
			Analyte	**Gasoline-Range Organics**	**Diesel-Range Organics**	**Oil-Range Organics**	**Total DRO and ORO**	**TPH [2]**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene (meta & para)**	**Xylene (ortho)**	**Xylene (total)**
			Screening Level [1]	**30**	**2,000**	**2,000**	**2,000**	--	**0.030**	**7.0**	**6.0**	--	--	**9.0**
			MTCA Method C	--	--	--	**35,647 [3]**	--	**2,400**	**280,000**	**350,000**	**700,000**	**700,000**	**700,000**
			Unit	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Location Name	**Sample Name**	**Date**	**Depth Range (ft bgs)**											
Southern Pipelines and Berths														
P-1	P-1	4/1/1994	0–1		**4,400**	600	**5,000**							
P-2	P-2	4/1/1994	0–1		**8,300**	**5,400**	**14,000**							
MW-38	MW-38-23.5-24	3/11/2020	23.5–24	20 U	50 U	250 U	250 U							
MW-37	MW-37-27.5-28	3/12/2020	27.5–28	20 U	50 U	250 U	250 U							
	MW-37-27.5-28D	3/12/2020	27.5–28	20 U	50 U	250 U	250 U							
P3	P3-0-0.5	3/12/2020	0–0.5	25 U	620 [5]	**4,200**	**4,800**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
P4	P4-0-0.5	3/12/2020	0–0.5	25 U	300 [5]	1,900	**2,200**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
P5	P5-0-0.5	3/12/2020	0–0.5	25 U	860	1,200	**2,100**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
P6	P6-0.5-1.0	3/12/2020	0.5–1	25 U	580	**2,300**	**2,900**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
	P6-0.5-1.0D	3/12/2020	0.5–1	25 U	560	**2,100**	**2,700**		0.030 U	0.050 U	0.050 U	0.10 U	0.050 U	0.10 U
OIP-05	OIP-05-27-28	3/13/2020	27–28	20 U	50 U	250 U	250 U							
OIP-06	OIP-06-27-28	3/13/2020	27–28	20 U	50 U	250 U	250 U							

Notes:

	Blank cells are intentional.
	All results rounded to two significant figures.
BOLD RED	Result exceeds screening level and is detected.
Bold Italics	Analyte not detected; reporting limit exceeds screening level.
1	Remedial investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2	TPH by WTPH 418.8.
3	MTCA Method C criteria calculated using site data.
4	Historical data that did not provide reporting limits. Result reported as ND.
5	The laboratory indicated that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
6	Total DRO and ORO sum calculated with only DRO; ORO analysis unavailable.

Abbreviations:

AST	Aboveground storage tank
bgs	Below ground surface
DRO	Diesel-range organics
ft	Feet
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
ND	Not detected
ORO	Oil-range organics
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
JQ	Concentration is an estimated value reported less than the associated quantitation limit but greater than the method detection limit.
U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimate.

Table 4.3
RI Soil Analytical Results: VOCs and PAHs

			Location Area	2015 Data Gaps Investigation		Former Calloway Ross Parcel					
			Location Name	**GP-1**	**GP-27**	**OIP-08**	**OIP-66**		**OIP-68**	**GP-36**	
			Sample Name	**GP-1-19.5-20**	**GP-27-14-14.5**	**OIP08-19-20-112219**	**OIP66-12-12.5-1112219**	**OIP166-12-12.5D**	**OIP-68-14-14.5**	**GP-36-13-14**	**GP-36-16-17**
			Sample Date	**9/15/2015**	**9/18/2015**	**11/22/2019**	**11/22/2019**	**11/22/2019**	**3/11/2020**	**3/12/2020**	**3/12/2020**
			Depth Range (ft bgs)	**19.5–20**	**14–14.5**	**19–20**	**12–12.5**	**12–12.5**	**14–14.5**	**13–14**	**16–17**
Analyte	**Screening Level (1)**	**MTCA Method C**	**Unit**								
Conventionals											
Total organic carbon	--	--	%						0.16		
Metals											
Lead	--	1,000	mg/kg	1.8	5.1		3.0	3.8		2.7	3.8
Semivolatile Organic Compounds											
cPAHs (MTCA TEQ-HalfND)	0.10	130	mg/kg	0.0076 U	**0.95**	0.042	0.038 U	0.038 U		0.038	0.045
cPAHs (MTCA TEQ-ZeroND)	0.10	130	mg/kg	0 U (2)	**0.95**	0.0073	0 U (2)	0 U (2)		0.00064	0.010
1-Methylnaphthalene	--	--	mg/kg	0.010 U	15	32	1.7	1.4			
2-Methylnaphthalene	--	--	mg/kg	0.010 U	7.2	27	1.9	1.6			
Acenaphthene	--	210,000	mg/kg	0.010 U	1.6	1.0	0.053	0.050 U			
Acenaphthylene	--	--	mg/kg	0.010 U	0.10 U	0.050 U	0.050 U	0.050 U			
Anthracene	--	1,100,000	mg/kg	0.010 U	2.6	0.050 U	0.050 U	0.050 U			
Benzo(a)anthracene	--	--	mg/kg	0.010 U	2.0	0.057	0.050 U	0.050 U		0.050 U	0.091
Benzo(a)pyrene	--	130	mg/kg	0.010 U	0.65	0.050 U	0.050 U	0.050 U		0.050 U	0.050 U
Benzo(b)fluoranthene	--	--	mg/kg	0.010 U	0.35	0.050 U	0.050 U	0.050 U		0.050 U	0.050 U
Benzo(g,h,i)perylene	--	--	mg/kg	0.010 U	0.19	0.050 U	0.050 U	0.050 U			
Benzo(k)fluoranthene	--	--	mg/kg	0.010 U	0.10 U	0.050 U	0.050 U	0.050 U		0.050 U	0.050 U
Chrysene	--	--	mg/kg	0.010 U	3.8	0.16	0.050 U	0.050 U		0.064	0.11
Dibenzo(a,h)anthracene	--	--	mg/kg	0.010 U	0.16	0.050 U	0.050 U	0.050 U		0.050 U	0.050 U
Fluoranthene	--	140,000	mg/kg	0.010 U	0.94	0.16	0.050 U	0.050 U			
Fluorene	--	140,000	mg/kg	0.036	2.9	6.8	0.28	0.24			
Indeno(1,2,3-c,d)pyrene	--	--	mg/kg	0.010 U	0.10 U	0.050 U	0.050 U	0.050 U		0.050 U	0.050 U
Naphthalene	--	70,000	mg/kg	0.010 U	0.10 U	0.050 U	0.050 U	0.050 U		1.1	2.0
Phenanthrene	--	--	mg/kg	0.076	10	8.8	0.32	0.30			
Pyrene	--	110,000	mg/kg	0.010 U	4.3	0.43	0.050 U	0.050 U			
Volatile Organic Compounds											
1,2-Dibromoethane	--	66	mg/kg	0.050 U	0.050 U	0.25 U	0.050 U			0.050 U	0.050 U
1,2-Dichloroethane	--	1,400	mg/kg	0.050 U	0.050 U	0.25 U	0.050 U			0.050 U	0.050 U
Methyl-tert-butyl ether	--	73,000	mg/kg	0.050 U	0.050 U	0.25 U	0.050 U			0.050 U	0.050 U
n-Hexane	--	210,000	mg/kg	0.25 U	0.25 U	23	1.1			18	32

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
BOLD RED Result exceeds screening level.
Bold Italics Analyte not detected; reporting limit exceeds screening level.
1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

bgs Below ground surface
cPAH Carcinogenic polycyclic aromatic hydrocarbon
ft Feet
mg/kg Milligrams per kilogram
MTCA Model Toxics Control Act
TEQ Toxic equivalent

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
U Analyte is not detected at the associated reporting limit.
UJ Analyte is not detected at the associated reporting limit, which is an estimate.

Table 4.3
RI Soil Analytical Results: VOCs and PAHs

			Location Area	Former Calloway Ross Parcel (cont.)		Former Fuel Loading Rack Area						
			Location Name	OIP-67		OIP-42	MW-33		MW-40		OIP-47	
			Sample Name	OIP-67-11-12	OIP-67-14.5-15	OIP42-17-17.5-112119	MW-33-12-12.5	MW-33-19.5-20	MW-40-17	MW-40-17D	OIP-47-11-12	OIP-47-17
			Sample Date	3/12/2020	3/12/2020	11/21/2019	3/9/2020	3/9/2020	3/9/2020	3/9/2020	3/9/2020	3/9/2020
			Depth Range (ft bgs)	12-Nov	14.5–15	17–17.5	12–12.5	19.5–20	17–17	17–17	11–12	17–17
Analyte	**Screening Level (1)**	**MTCA Method C**	**Unit**									
Conventionals												
Total organic carbon	--	--	%									
Metals												
Lead	--	1,000	mg/kg	5.0	1.6		1.1	3.6	2.1	1.5	3.3	2.6
Semivolatile Organic Compounds												
cPAHs (MTCA TEQ-HalfND)	0.10	130	mg/kg	0.048	0.038 U	0.052	0.039	0.0076 U	0.038	0.038	0.0076 U	0.0076 U
cPAHs (MTCA TEQ-ZeroND)	0.10	130	mg/kg	0.015	0 U (2)	0.017	0.0010	0 U (2)	0.00068	0.00088	0 U (2)	0 U (2)
1-Methylnaphthalene	--	--	mg/kg			38						
2-Methylnaphthalene	--	--	mg/kg			27						
Acenaphthene	--	210,000	mg/kg			1.3						
Acenaphthylene	--	--	mg/kg			0.050 U						
Anthracene	--	1,100,000	mg/kg			0.050 U						
Benzo(a)anthracene	--	--	mg/kg	0.080	0.050 U	0.13	0.050 U	0.010 U	0.050 U	0.050 U	0.010 U	0.010 U
Benzo(a)pyrene	--	130	mg/kg	0.050 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.010 U	0.010 U
Benzo(b)fluoranthene	--	--	mg/kg	0.063	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.010 U	0.010 U
Benzo(g,h,i)perylene	--	--	mg/kg			0.050 U						
Benzo(k)fluoranthene	--	--	mg/kg	0.050 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.010 U	0.010 U
Chrysene	--	--	mg/kg	0.093	0.050 U	0.40	0.10	0.010 U	0.068	0.088	0.010 U	0.010 U
Dibenzo(a,h)anthracene	--	--	mg/kg	0.050 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.010 U	0.010 U
Fluoranthene	--	140,000	mg/kg			0.24						
Fluorene	--	140,000	mg/kg			8.0						
Indeno(1,2,3-c,d)pyrene	--	--	mg/kg	0.050 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.010 U	0.010 U
Naphthalene	--	70,000	mg/kg		0.15	0.050 U						6.3
Phenanthrene	--	--	mg/kg			11						
Pyrene	--	110,000	mg/kg			0.71						
Volatile Organic Compounds												
1,2-Dibromoethane	--	66	mg/kg	0.050 U	0.050 U	0.50 U	0.050 U	0.050 U			0.050 U	0.050 U
1,2-Dichloroethane	--	1,400	mg/kg	0.050 U	0.050 U	0.50 U	0.050 U	0.050 U			0.050 U	0.050 U
Methyl-tert-butyl ether	--	73,000	mg/kg	0.050 U	0.050 U	0.50 U	0.050 U	0.050 U			0.050 U	0.050 U
n-Hexane	--	210,000	mg/kg	0.32	1.0	45	0.25 U	0.25 U			3.6	1.3

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
BOLD RED Result exceeds screening level.
Bold Italics Analyte not detected; reporting limit exceeds screening level.
1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

bgs	Below ground surface
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
ft	Feet
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
TEQ	Toxic equivalent

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimate.

Table 4.3
RI Soil Analytical Results: VOCs and PAHs

			Location Area	Former Fuel Loading Rack Area (cont.)					Former Mechanic's Shop	Monitoring Wells MW-26 and MW-28	
			Location Name	**OIP-39**		**OIP-46**	**OIP-15**		**OIP-20**	**OIP-30**	**OIP-52**
			Sample Name	**OIP-39-15-15.5**	**OIP-39-16.5-17**	**OIP-46-8**	**OIP-15-15-16**	**OIP-15-20-21**	**OIP-20-11-11.5**	**OIP30-20-21-111919**	**OIP52-19-19.5-112219**
			Sample Date	**3/10/2020**	**3/10/2020**	**3/10/2020**	**3/12/2020**	**3/12/2020**	**3/13/2020**	**11/19/2019**	**11/22/2019**
			Depth Range (ft bgs)	**15–15.5**	**16.5–17**	**8–8**	**15–16**	**20–21**	**11–11.5**	**20–21**	**19–19.5**
Analyte	**Screening Level (1)**	**MTCA Method C**	**Unit**								
Conventionals											
Total organic carbon	--	--	%			0.075 U					
Metals											
Lead	--	1,000	mg/kg		1.2		1.1	1.9	8.2		1.0 U
Semivolatile Organic Compounds											
cPAHs (MTCA TEQ-HalfND)	0.10	130	mg/kg	0.0076 U	0.0076 U		0.038 U	0.0076 U	0.0076 U	**0.54**	0.0076 U
cPAHs (MTCA TEQ-ZeroND)	0.10	130	mg/kg	0 U (2)	0 U (2)		0 U (2)	0 U (2)	0 U (2)	**0.53**	0 U (2)
1-Methylnaphthalene	--	--	mg/kg							13	0.55
2-Methylnaphthalene	--	--	mg/kg							15	0.010 U
Acenaphthene	--	210,000	mg/kg							0.94	0.077
Acenaphthylene	--	--	mg/kg							0.10 U	0.010 U
Anthracene	--	1,100,000	mg/kg							2.1	0.010 U
Benzo(a)anthracene	--	--	mg/kg	0.010 U	0.010 U		0.050 U	0.010 U	0.010 U	0.81	0.010 U
Benzo(a)pyrene	--	130	mg/kg	0.010 U	0.010 U		0.050 U	0.010 U	0.010 U	0.40	0.010 U
Benzo(b)fluoranthene	--	--	mg/kg	0.010 U	0.010 U		0.050 U	0.010 U	0.010 U	0.24	0.010 U
Benzo(g,h,i)perylene	--	--	mg/kg							0.11	0.010 U
Benzo(k)fluoranthene	--	--	mg/kg	0.010 U	0.010 U		0.050 U	0.010 U	0.010 U	0.10 U	0.010 U
Chrysene	--	--	mg/kg	0.010 U	0.010 U		0.050 U	0.010 U	0.010 U	2.0	0.010 U
Dibenzo(a,h)anthracene	--	--	mg/kg	0.010 U	0.010 U		0.050 U	0.010 U	0.010 U	0.10 U	0.010 U
Fluoranthene	--	140,000	mg/kg							0.58	0.011
Fluorene	--	140,000	mg/kg							4.3	0.57
Indeno(1,2,3-c,d)pyrene	--	--	mg/kg	0.010 U	0.010 U		0.050 U	0.010 U	0.010 U	0.10 U	0.010 U
Naphthalene	--	70,000	mg/kg					0.050 U	1.5	0.10 U	0.010 U
Phenanthrene	--	--	mg/kg							8.4	0.87
Pyrene	--	110,000	mg/kg							3.4	0.026
Volatile Organic Compounds											
1,2-Dibromoethane	--	66	mg/kg		0.050 U		0.050 U	0.050 U	0.050 U	0.050 U	
1,2-Dichloroethane	--	1,400	mg/kg		0.050 U		0.050 U	0.050 U	0.050 U	0.050 U	
Methyl-tert-butyl ether	--	73,000	mg/kg		0.050 U		0.050 U		0.050 U	0.050 U	
n-Hexane	--	210,000	mg/kg		0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

--	Not established.
BOLD RED	Result exceeds screening level.
Bold Italics	Analyte not detected; reporting limit exceeds screening level.
1	Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2	None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

bgs	Below ground surface
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
ft	Feet
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
TEQ	Toxic equivalent

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimate.

Table 4.3
RI Soil Analytical Results: VOCs and PAHs

			Location Area	Monitoring Wells MW-26 and MW-28 (cont.)								
			Location Name	**OIP-52 (cont.)**	**OIP-53**	**MW-34**			**OIP-23**			**OIP-54**
			Sample Name	**OIP52-22-22.5-112219**	**OIP53-22-22.5-112219**	**MW-34-15-15.5**	**MW-34-20-20.5**	**MW-34-24-24.5**	**OIP-23-14-15**	**OIP-23-19-20**	**OIP-23-23-24**	**OIP-54-18-19**
			Sample Date	**11/22/2019**	**11/22/2019**	**3/10/2020**	**3/10/2020**	**3/10/2020**	**3/10/2020**	**3/10/2020**	**3/10/2020**	**3/11/2020**
			Depth Range (ft bgs)	**22–22.5**	**22–22.5**	**15–15.5**	**20–20.5**	**24–24.5**	**14–15**	**19–20**	**23–24**	**18–19**
Analyte	**Screening Level (1)**	**MTCA Method C**	**Unit**									
Conventionals												
Total organic carbon	--	--	%		0.075 U							0.075 U
Metals												
Lead	--	1,000	mg/kg	1.2	1.0 U	1.1	1.3	1.0 U				
Semivolatile Organic Compounds												
cPAHs (MTCA TEQ-HalfND)	0.10	130	mg/kg	0.0076	0.0076 U	0.039	0.038	0.0076 U	0.038	0.053	0.038 U	
cPAHs (MTCA TEQ-ZeroND)	0.10	130	mg/kg	0.00010	0 U (2)	0.0014	0.00072	0 U (2)	0.00058	0.018	0 U (2)	
1-Methylnaphthalene	--	--	mg/kg	8.1	0.010 U							
2-Methylnaphthalene	--	--	mg/kg	0.010 U	0.010 U							
Acenaphthene	--	210,000	mg/kg	0.39	0.010 U							
Acenaphthylene	--	--	mg/kg	0.010 U	0.010 U							
Anthracene	--	1,100,000	mg/kg	0.010 U	0.010 U							
Benzo(a)anthracene	--	--	mg/kg	0.010 U	0.010 U	0.050 U	0.050 U	0.010 U	0.050 U	0.16	0.050 U	
Benzo(a)pyrene	--	130	mg/kg	0.010 U	0.010 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	
Benzo(b)fluoranthene	--	--	mg/kg	0.010 U	0.010 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	
Benzo(g,h,i)perylene	--	--	mg/kg	0.010 U	0.010 U							
Benzo(k)fluoranthene	--	--	mg/kg	0.010 U	0.010 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	
Chrysene	--	--	mg/kg	0.010	0.010 U	0.14	0.072	0.010 U	0.058	0.23	0.050 U	
Dibenzo(a,h)anthracene	--	--	mg/kg	0.010 U	0.010 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	
Fluoranthene	--	140,000	mg/kg	0.045	0.010 U							
Fluorene	--	140,000	mg/kg	3.5	0.010 U							
Indeno(1,2,3-c,d)pyrene	--	--	mg/kg	0.010 U	0.010 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	
Naphthalene	--	70,000	mg/kg	0.010 U	0.010 U							
Phenanthrene	--	--	mg/kg	4.0	0.010 U							
Pyrene	--	110,000	mg/kg	0.10	0.010 U							
Volatile Organic Compounds												
1,2-Dibromoethane	--	66	mg/kg						0.050 U	0.050 U	0.050 U	
1,2-Dichloroethane	--	1,400	mg/kg						0.050 U	0.050 U	0.050 U	
Methyl-tert-butyl ether	--	73,000	mg/kg						0.050 U	0.050 U	0.050 U	
n-Hexane	--	210,000	mg/kg						0.25 U	0.42	0.25 U	

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
BOLD RED Result exceeds screening level.
Bold Italics Analyte not detected; reporting limit exceeds screening level.
1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

bgs Below ground surface
cPAH Carcinogenic polycyclic aromatic hydrocarbon
ft Feet
mg/kg Milligrams per kilogram
MTCA Model Toxics Control Act
TEQ Toxic equivalent

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
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Table 4.3
RI Soil Analytical Results: VOCs and PAHs

			Location Area	**Northern Portion of the Former Standard Pipelines**				**Southern Pipelines and Berths**					
			Location Name	**OIP-69**	**MW-39**			**GP-18**	**P3**	**P4**	**P5**	**P6**	
			Sample Name	**OIP-69-14.5-15**	**MW-39-8-9**	**MW-39-13-14**	**MW-39-18.5-20**	**GP-18-27-28**	**P3-0-0.5**	**P4-0-0.5**	**P5-0-0.5**	**P6-0.5-1.0**	**P6-0.5-1.0D**
			Sample Date	**3/11/2020**	**3/12/2020**	**3/12/2020**	**3/12/2020**	**9/16/2015**	**3/12/2020**	**3/12/2020**	**3/12/2020**	**3/12/2020**	**3/12/2020**
			Depth Range (ft bgs)	**14.5–15**	**8–9**	**13–14**	**18.5–20**	**27–28**	**0–0.5**	**0–0.5**	**0–0.5**	**0.5–1**	**0.5–1**
Analyte	**Screening Level (1)**	**MTCA Method C**	**Unit**										
Conventionals													
Total organic carbon	--	--	%	0.075 U									
Metals													
Lead	--	1,000	mg/kg					8.9					
Semivolatile Organic Compounds													
cPAHs (MTCA TEQ-HalfND)	0.10	130	mg/kg		0.0077 J	0.038	0.0076 U	**0.50**	**2.3**	**0.51**	***0.76 U***	***0.76 U***	***7.1 U***
cPAHs (MTCA TEQ-ZeroND)	0.10	130	mg/kg		0.00023 J	0.00071	0 U (2)	**0.20**	**2.3**	**0.51**	0 U (2)	0 U (2)	0 U (2)
1-Methylnaphthalene	--	--	mg/kg					10					
2-Methylnaphthalene	--	--	mg/kg					0.50 U					
Acenaphthene	--	210,000	mg/kg					1.1					
Acenaphthylene	--	--	mg/kg					0.50 U					
Anthracene	--	1,100,000	mg/kg					1.6					
Benzo(a)anthracene	--	--	mg/kg		0.010 U	0.050 U	0.010 U	0.86	1.8	0.46	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	--	130	mg/kg		0.010 U	0.050 U	0.010 U	0.50 U	1.5	0.35	1.0 U	1.0 U	10 U
Benzo(b)fluoranthene	--	--	mg/kg		0.010 U	0.050 U	0.010 U	0.50 U	3.5	0.66	1.0 U	1.0 U	10 U
Benzo(g,h,i)perylene	--	--	mg/kg					0.50 U					
Benzo(k)fluoranthene	--	--	mg/kg		0.010 U	0.050 U	0.010 U	0.50 U	1.0	0.22	1.0 U	1.0 U	10 U
Chrysene	--	--	mg/kg		0.023	0.071	0.010 U	1.5	3.1	0.63	1.0 U	1.0 U	1.0 U
Dibenzo(a,h)anthracene	--	--	mg/kg		0.010 UJ	0.050 U	0.010 U	0.50 U	1.0 U	0.10 U	1.0 U	1.0 U	10 U
Fluoranthene	--	140,000	mg/kg					0.50 U					
Fluorene	--	140,000	mg/kg					2.5					
Indeno(1,2,3-c,d)pyrene	--	--	mg/kg		0.010 U	0.050 U	0.010 U	0.50 U	1.3	0.19	1.0 U	1.0 U	10 U
Naphthalene	--	70,000	mg/kg					0.50 U					
Phenanthrene	--	--	mg/kg					3.6					
Pyrene	--	110,000	mg/kg					2.4					
Volatile Organic Compounds													
1,2-Dibromoethane	--	66	mg/kg			0.050 U		0.050 U					
1,2-Dichloroethane	--	1,400	mg/kg			0.050 U		0.050 U					
Methyl-tert-butyl ether	--	73,000	mg/kg			0.050 U		0.050 U					
n-Hexane	--	210,000	mg/kg			0.25 U		0.25 U					

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
BOLD RED Result exceeds screening level.
Bold Italics Analyte not detected; reporting limit exceeds screening level.
1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

bgs	Below ground surface
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
ft	Feet
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
TEQ	Toxic equivalent

Qualifiers:

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U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimate.

Table 4.4
RI Soil Analytical Results: EPH and VPH

Location Area		**Former Calloway Ross Parcel**							**Former Fuel Loading Rack Area**				
Location Name		**GP-1**	**OIP-08**	**OIP-66**	**GP-36**		**OIP-67**		**OIP-42**	**MW-33**		**OIP-47**	
Sample Name		**GP-1-19.5-20**	**OIP08-19-20-112219**	**OIP66-12-12.5-1112219**	**GP-36-13-14**	**GP-36-16-17**	**OIP-67-11-12**	**OIP-67-14.5-15**	**OIP42-17-17.5-112119**	**MW-33-12-12.5**	**MW-33-19.5-20**	**OIP-47-11-12**	**OIP-47-17**
Sample Date		**9/15/2015**	**11/22/2019**	**11/22/2019**	**3/12/2020**	**3/12/2020**	**3/12/2020**	**3/12/2020**	**11/21/2019**	**3/9/2020**	**3/9/2020**	**3/9/2020**	**3/9/2020**
Depth Range (ft bgs)		**19.5–20**	**19–20**	**12–12.5**	**13–14**	**16–17**	**11–12**	**14.5–15**	**17–17.5**	**12–12.5**	**19.5–20**	**11–12**	**17–17**
Analyte	**Unit**												
Petroleum Fractionation Data													
EPH Aliphatic C8-C10	mg/kg	6.0 UJ	820 J	240 J	170 J	440 J	320 J	42 J	920 J	110 J	30 UJ	27 UJ	32 J
EPH Aliphatic C10-C12	mg/kg	6.0 UJ	1,100	200	350	820	580	62 J	1,300	690	15 U	17	19
EPH Aliphatic C12-C16	mg/kg	18 J	3,300	270	1,200	2,400	1,500	210 J	4,100	3,300	20	13 U	15 U
EPH Aliphatic C16-C21	mg/kg	26 J	2,800	200	1,200	2,300	1,500	230 J	3,500	3,000	15 U	13 U	15 U
EPH Aliphatic C21-C34	mg/kg	6.0 UJ	870	45	250 J	520 J	330 J	22 J	990	720 J	15 U	13 U	15 U
EPH Aromatic C8-C10	mg/kg	6.0 U	80 J	13 UJ	13 UJ	22 J	12 UJ	12 UJ	110 J	13 UJ	15 UJ	13 UJ	15 UJ
EPH Aromatic C10-C12	mg/kg	6.0 U	290	69	120	240	180	14 J	400	110	15 U	16	28
EPH Aromatic C12-C16	mg/kg	6.0 U	890	96	450	880	610	57 J	1,300	850	15 U	16	15 U
EPH Aromatic C16-C21	mg/kg	19	2,000	180	970	1,800	1,200	190 J	2,600	2,400	15 U	13 U	18
EPH Aromatic C21-C34	mg/kg	6.0 U	390	93	170	400	250	19 J	500	490	15 U	13 U	27
VPH Aliphatic C5-C6	mg/kg	2.2 U	16 U	1.3 U	62 U	63	35 U	5.4 J	280	7.7	1.5 U	270	8.5
VPH Aliphatic C6-C8	mg/kg	2.2 U	270	36	89 U	400	250	120 J	600	12	2.1 U	830	110
VPH Aliphatic C8-C10	mg/kg	2.2 U	290	35	50 U	170	540	150 J	120	40	1.2 U	330	100
VPH Aliphatic C10-C12	mg/kg	2.2 U	620	60	53 U	240	800	230 J	220	210	1.3 U	470	110
VPH Aromatic C8-C10	mg/kg	7.8	430	57	110 U	190	510	120 J	200	53 J	2.5 U	330	130 J
VPH Aromatic C10-C12	mg/kg	3.9 J	1,400	200	79	560	1,900 J	440 J	540	760	14	1,100	360
VPH Aromatic C12-C13	mg/kg	7.1	2,200	170	610	820	4,300 J	780 J	560	2,200 J	20 J	1,200	420

Notes:

All results rounded to two significant figures.

Fractional range does not have screening level or cleanup level criteria.

Abbreviations:

bgs	Below ground surface
EPH	Extractable petroleum hydrocarbons
ft	Feet
mg/kg	Milligrams per kilogram
VPH	Volatile petroleum hydrocarbons

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JQ	Concentration is an estimated value reported less than the associated quantitation limit but greater than the method detection limit.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.4
RI Soil Analytical Results: EPH and VPH

Location Area		**Former Fuel Loading Rack Area (cont.)**			**Former Mechanic's Shop**		**Monitoring Wells MW-26 and MW-28**				**Northern Portion of the Former Standard Pipelines**	**Southern Pipelines and Berths**
Location Name		**OIP-39**	**OIP-15**		**GP-27**	**OIP-20**	**OIP-30**	**OIP-23**			**MW-39**	**GP-18**
Sample Name		**OIP-39-16.5-17**	**OIP-15-15-16**	**OIP-15-20-21**	**GP-27-14-14.5**	**OIP-20-11-11.5**	**OIP30-20-21-111919**	**OIP-23-14-15**	**OIP-23-19-20**	**OIP-23-23-24**	**MW-39-13-14**	**GP-18-27-28**
Sample Date		**3/10/2020**	**3/12/2020**	**3/12/2020**	**9/18/2015**	**3/13/2020**	**11/19/2019**	**3/10/2020**	**3/10/2020**	**3/10/2020**	**3/12/2020**	**9/16/2015**
Depth Range (ft bgs)		**16.5–17**	**15–16**	**20–21**	**14–14.5**	**11–11.5**	**20–21**	**14–15**	**19–20**	**23–24**	**13–14**	**27–28**
Analyte	**Unit**											
Petroleum Fractionation Data												
EPH Aliphatic C8-C10	mg/kg	37 J	23 UJ	26 UJ	9.4	71 J	33 J	140 J	620 J	70 J	200 J	7.7
EPH Aliphatic C10-C12	mg/kg	12 U	150	13 U	150 JQ	64	150	630	2,800	300	890	75 JQ
EPH Aliphatic C12-C16	mg/kg	12 U	1,100	13 U	950	32	1,300	2,900	12,000	1,600	4,300	370 JQ
EPH Aliphatic C16-C21	mg/kg	12 U	1,100	13 U	1,100	14 U	1,700	3,100	11,000	1,800	4,600	390 JQ
EPH Aliphatic C21-C34	mg/kg	12 U	310 J	13 U	880	14 U	2,000	470 J	1,600 J	260 J	630 J	370 JQ
EPH Aromatic C8-C10	mg/kg	12 UJ	11 UJ	13 UJ	6.8 U	14 UJ	16 J	13 UJ	44 J	12 UJ	10 UJ	5.9 U
EPH Aromatic C10-C12	mg/kg	12 U	11 U	13 U	49	130	56	98	480	49	130	28
EPH Aromatic C12-C16	mg/kg	12 U	120	13 U	580 JQ	110	560	910	3,600	490	1,000	330 JQ
EPH Aromatic C16-C21	mg/kg	12 U	740	13 U	1,900	20	1,700	2,700	9,500	1,500	3,300	1,000
EPH Aromatic C21-C34	mg/kg	12 U	270	13 U	1,300	20	2,300	320	910	160	410	920
VPH Aliphatic C5-C6	mg/kg	1.3 U	1.1 U	1.8 U	2.3 U	1.7 U	1.6 U	17 U	16 U	27 U	15 U	2.6 U
VPH Aliphatic C6-C8	mg/kg	2.1	1.6 U	2.5 U	2.3 U	26	6.2	24 U	39	38 U	33	2.6 U
VPH Aliphatic C8-C10	mg/kg	1.0 U	0.88 U	1.4 U	2.3 U	56	9.5	35	65	22 U	57	2.6 U
VPH Aliphatic C10-C12	mg/kg	1.1 U	13	1.5 U	7.7	120	39	110	310	84	260	12
VPH Aromatic C8-C10	mg/kg	2.2 U	1.9 U	3.1 U	11	51	18	34 J	110 J	46 U	63	8.1
VPH Aromatic C10-C12	mg/kg	0.85	31	0.61 U	29 J	270	44	470	1,000	320	520	23 J
VPH Aromatic C12-C13	mg/kg	5.2 U	200	7.1 U	56	280	140	900 J	4,000	1,700 J	2,700 J	48

Notes:

All results rounded to two significant figures.

Fractional range does not have screening level or cleanup level criteria.

Abbreviations:

bgs	Below ground surface
EPH	Extractable petroleum hydrocarbons
ft	Feet
mg/kg	Milligrams per kilogram
VPH	Volatile petroleum hydrocarbons

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JQ	Concentration is an estimated value reported below the associated quantitation limit but above the MDL.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.5
OIP Fluorescence Percentage and Thickness

OIP Location	Maximum Fluorescence Response (%)	Depth of Maximum Detection (ft bgs)	Thickness (ft)	Approximate Depth Range of Maximum Percentage (ft bgs)	Soil Analytical Data in mg/kg (1)			
					GRO (30)	DRO (2,000)	ORO (2,000)	Sample Depth (ft bgs)
OIP-02	1.4	2.65	0.25	2.5–2.75	--	1,900	**3,400**	5
OIP-04	0.5	1	0.1	0.9–1.0	--	--	--	4
OIP-05	0	--	--	--	--	--	--	27
OIP-06	0	--	--	--	--	--	--	27
OIP-08	89.1	21.75	8.85	13.6–22.45	**4,900**	**12,000**	1,000	19
OIP-09 (2)	64	17.65	0.65	17.6–18.25	18	280	--	19.5
OIP-15	100	15	2	14.5–15.3; 20.6–21.6	**35**	**2,300**	370	15
					--	--	--	20
OIP-18	0	--	--	--	--	--	--	19
OIP-19	0	--	--	--	--	--	--	19
OIP-20	71.4	11.3	0.25	11.2–11.45	**630**	440	--	11
OIP-21	0	--	--	--	--	--	--	18
OIP-23	100	12.7	12	11.8–23.8	**420**	**13,000**	--	14
					790	**48,000**	1,300	19
					200	**5,700**	--	23
					--	--	--	29.5
OIP-30	74.1	18.35	0.8	18–18.8	**61**	**11,000**	**12,000**	20
OIP-31	0	--	--	--	--	--	--	17
					--	--	--	20
OIP-39	83.5	16.85	1	15–15.3; 16.5–17.3	7.3	--	--	16.5
OIP-42	89.9	16.15	3.3	15.8–19.1	**3,600**	**17,000**	1,500	17
OIP-46	14.9	12.05	0.25	12–12.25	--	--	--	10
OIP-47	90.2	11.7	6.4	10.1–12.0; 15.5–19	**5,700**	210	--	11
					49	360	--	17
					--	--	--	25
OIP-49	77.4	18.1	0.8	10.7–11.2; 18–18.3	22	--	360	10
					960	--	--	17
OIP-52	99.7	19.4	3	13.5–15.5; 19.4–20; 22–22.4	**86**	530	--	19
					260	**2,200**	--	22
OIP-53	0	--	--	--	--	--	--	22
OIP-54	0	--	--	--	--	--	660	15
OIP-57	3.7	0.5	0.5	0.2–0.7	--	--	--	14
OIP-64	0	--	--	--	--	--	--	14
OIP-66	77.8	12.05	0.3	11.9–12.2	**2,000**	760	--	12
OIP-67	79.9	12.8	7.8	7.4–15.2	--	--	--	7
					1,500	**4,300**	--	11
					2,200	**2,100**	--	14.5
					--	--	--	18
OIP-68	0	--	--	--	--	--	--	10
					--	--	--	13.5
OIP-69	0	--	--	--	--	--	--	11
					--	--	--	14.5
OIP-70	0	--	--	--	--	--	--	8
					--	--	--	12
OIP-72	84.7	10.2	0.8	10–10.8	**520**	--	--	10
					270	--	--	16
OIP-73	55	0.3	0.1	0.05	--	--	--	9
					--	--	--	13

Notes:

--	Not applicable or not detected at or greater than laboratory detection limit.
BOLD RED	Concentration exceeds respective MTCA Method A screening levels for soil; MTCA Method A is used only as a screening level and to compare concentrations with fluorescence response.
1	This table is used to show correlation between fluorescence response and select soil analytical data; refer to Tables 4.1 through 4.3 for details and complete soil laboratory results. Screening levels are presented in parentheses.
2	Fluorescence response results are compared to GP-01 soil analytical results due to their collocation.

Abbreviations:

bgs	Below ground surface
DRO	Diesel-range organics
ft	Feet
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
OIP	Optical image profiler
ORO	Oil-range organics

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	2015 Data Gaps Investigation														
		Location Name	GP-1	GP-2	GP-3	GP-4	GP-6	GP-7	GP-8	GP-13	GP-14	GP-15	GP-16	GP-17	GP-20	GP-21	GP-28
		Sample Name	GP-1-GW	GP-2-GW	GP-3-GW	GP-4-GW	GP-6-GW	GP-7-GW	GP-8-GW	GP-13-GW	GP-14-GW	GP-15-GW	GP-16-GW	GP-17-GW	GP-20-GW	GP-21-GW	GP-28-GW
		Sample Date	9/15/2015	9/15/2015	9/15/2015	9/15/2015	9/15/2015	9/15/2015	9/15/2015	9/16/2015	9/16/2015	9/16/2015	9/16/2015	9/17/2015	9/17/2015	9/17/2015	9/18/2015
Analyte	**Screening Level (1)**	**Unit**															
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																	
Gasoline-range organics	800	µg/L	290	310	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics	500	µg/L	**820 JM**	**1,100 JM**	50 U	110 JM	**600 JM**	50 U	50 U	180 JM	100 JM	50 U	50 U	68 JM	50 U	50 U	50 U
Oil-range organics	500	µg/L	250 U	250 U	250 U	250 U	290 JM	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Total DRO and ORO	500	µg/L	**820**	**1,100**	250 U	110	**900**	250 U	250 U	180	100	250 U	250 U	68	250 U	250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																	
Diesel-range organics	500	µg/L															
Oil-range organics	500	µg/L															
Total DRO and ORO	500	µg/L															
BTEX Compounds by USEPA 8021B/8260D																	
Benzene	5.0	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1	1.0 U	1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L															
Xylene (ortho)	--	µg/L															
Xylene (total)	1,000	µg/L	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Semivolatile Organic Compounds (SVOCs)																	
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L															
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L															
Total HPAH	--	µg/L															
Total LPAH	--	µg/L															
Total PAH	--	µg/L															
1-Methylnaphthalene	--	µg/L															
2-Methylnaphthalene	--	µg/L															
Acenaphthene	--	µg/L															
Acenaphthylene	--	µg/L															
Anthracene	--	µg/L															
Benzo(a)anthracene	--	µg/L															
Benzo(a)pyrene	--	µg/L															
Benzo(b)fluoranthene	--	µg/L															
Benzo(g,h,i)perylene	--	µg/L															
Benzo(k)fluoranthene	--	µg/L															
Chrysene	--	µg/L															
Dibenzo(a,h)anthracene	--	µg/L															
Fluoranthene	--	µg/L															
Fluorene	--	µg/L															
Hexachlorobutadiene	--	µg/L															
Indeno(1,2,3-c,d)pyrene	--	µg/L															
Naphthalene	--	µg/L															
Phenanthrene	--	µg/L															
Pyrene	--	µg/L															

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

--	Not established.
BOLD RED	Result exceeds screening level.
Bold Italics	Analyte not detected; reporting limit exceeds screening level.
1	Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2	The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
3	Xylene (total) result is a calculated value.
4	None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	**Former 80,000-Barrel AST**									**Former Calloway Ross Parcel**			
		Location Name	**OIP-02**		**OIP-04**	**MW-32**			**T-2**			**OIP-67**	**OIP-68**	**MW-02**	
		Sample Name	**OIP-02-GW-14.5-19.5**	**OIP-02-GW-14.5-19.5D**	**OIP-04-GW-15-20**	**MW-32-022819**	**MW-32-050720**	**MW-32-081120**	**T-2-081120**	**T-2-110220**	**T-2-022321**	**OIP-67-GW-14-19**	**OIP-68-GW-13-18**	**MW-02-022719**	**MW-02-050620**
		Sample Date	**3/11/2020**	**3/11/2020**	**3/10/2020**	**2/28/2019**	**5/7/2020**	**8/11/2020**	**8/11/2020**	**11/2/2020**	**2/23/2021**	**3/12/2020**	**3/11/2020**	**2/27/2019**	**5/6/2020**
Analyte	**Screening Level (1)**	**Unit**													
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx															
Gasoline-range organics	800	µg/L	100 U	100 U	130	100 U	100 U	100 U	100 U	100 U	100 U	**3,200**	**860**	100 U	100 U
Diesel-range organics	500	µg/L	110 (2)	94 (2)	**660** (2)	60 U	50 U	50 U	50 U	50 U	54 (2)	**2,000**	**900** (2)	60 U	310 (2)
Oil-range organics	500	µg/L	250 U	250 U	**870** (2)	300 U	250 U	250 U	250 U	250 U	250 U	250 U	290 (2)	300 U	250 U
Total DRO and ORO	500	µg/L	110 (2)	94 (2)	**1,500** (2)	300 U	250 U	250 U	250 U	250 U	54 (2)	**2,000**	**1,200** (2)	300 U	310 (2)
Total Petroleum Hydrocarbons by NWTPH-Dx Sg															
Diesel-range organics	500	µg/L				60 U								60 U	
Oil-range organics	500	µg/L				300 U								300 U	
Total DRO and ORO	500	µg/L				300 U								300 U	
BTEX Compounds by USEPA 8021B/8260D															
Benzene	5.0	µg/L	0.35 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	1.3	0.35 U	1.0 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.3	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.3	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.2	2.0 U		2.0 U
Xylene (ortho)	--	µg/L	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.2 (3)	2.0 U (3)	3.0 U	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)															
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U	0.030 U	0.030 U		0.030 U	0.0302 U	0.0302 U			0.030 UJ	0.030 U		0.030 U
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U (4)	0 U (4)	0 U (4)		0 U (4)	0 U (4)	0 U (4)			0 UJ (4)	0 U (4)		0 U (4)
Total HPAH	--	µg/L					0.040 U								0.040 U
Total LPAH	--	µg/L					0.40 UJ								0.40 UJ
Total PAH	--	µg/L					0.40 UJ								0.40 UJ
1-Methylnaphthalene	--	µg/L					0.40 U								0.40 U
2-Methylnaphthalene	--	µg/L					0.40 U								0.40 U
Acenaphthene	--	µg/L					0.040 U								0.040 U
Acenaphthylene	--	µg/L					0.040 U								0.040 U
Anthracene	--	µg/L					0.040 U								0.040 U
Benzo(a)anthracene	--	µg/L	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U	0.040 U			0.040 U	0.040 U		0.040 U
Benzo(a)pyrene	--	µg/L	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U	0.040 U			0.040 UJ	0.040 U		0.040 U
Benzo(b)fluoranthene	--	µg/L	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U	0.040 U			0.040 U	0.040 U		0.040 U
Benzo(g,h,i)perylene	--	µg/L					0.040 U								0.040 U
Benzo(k)fluoranthene	--	µg/L	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U	0.040 U			0.040 U	0.040 U		0.040 U
Chrysene	--	µg/L	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U	0.040 U			0.040 U	0.040 U		0.040 U
Dibenzo(a,h)anthracene	--	µg/L	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U	0.040 U			0.040 UJ	0.040 U		0.040 U
Fluoranthene	--	µg/L					0.040 U								0.040 U
Fluorene	--	µg/L					0.040 UJ								0.040 UJ
Hexachlorobutadiene	--	µg/L							1.0 U						
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U	0.040 U			0.040 U	0.040 U		0.040 U
Naphthalene	--	µg/L	1.0 U	1.0 U	1.0 U		0.40 U		1.0 U			1.0 U	1.0 U		0.40 U
Phenanthrene	--	µg/L					0.060 U								0.060 U
Pyrene	--	µg/L					0.040 U								0.040 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Former Calloway Ross Parcel (cont.)														
		Location Name	**MW-02 (cont.)**			**MW-03**						**MW-05**		**MW-08**			
		Sample Name	**MW-02-081020**	**MW-02-110220**	**MW-02-022321**	**MW-03-022719**	**MW-03-050620**	**MW-03-081020**	**MW-03-110220**	**MW-03-022321**	**MW-103-022321**	**MW-05-022719**	**MW-05-022421**	**MW-08-050620**	**MW-08-081020**	**MW-08-110220**	**MW-08-022321**
		Sample Date	**8/10/2020**	**11/2/2020**	**2/23/2021**	**2/27/2019**	**5/6/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**2/23/2021**	**2/27/2019**	**2/24/2021**	**5/6/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**
Analyte	**Screening Level (1)**	**Unit**															
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																	
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	**960**	260	570	370	**950**	**870**	100 U	100 U	**2,300**	**3,000**	**2,500**	**2,900**
Diesel-range organics	500	µg/L	**640** (2)	**630** (2)	110 (2)	**1,700** (2)	**1,500** (2)	**1,100** (2)	**1,000** (2)	**1,200** (2)	**1,200** (2)	82 (2)	**790** (2)	**2,100** (2)	**2,400** (2)	**2,100** (2)	**2,200** (2)
Oil-range organics	500	µg/L	330 (2)	460 (2)	250 U	450 (2)	**590** (2)	410 (2)	**620** (2)	**550** (2)	**550** (2)	300 U	**520** (2)	280 (2)	370 (2)	370 (2)	480 (2)
Total DRO and ORO	500	µg/L	**970** (2)	**1,100** (2)	110 (2)	**2,200** (2)	**2,100** (2)	**1,500** (2)	**1,600** (2)	**1,800** (2)	**1,800** (2)	82 (2)	**1,300** (2)	**2,400** (2)	**2,800** (2)	**2,500** (2)	**2,700** (2)
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																	
Diesel-range organics	500	µg/L				73 (2)						60 U					
Oil-range organics	500	µg/L				300 U						300 U					
Total DRO and ORO	500	µg/L				73 (2)						300 U					
BTEX Compounds by USEPA 8021B/8260D																	
Benzene	5.0	µg/L	0.35 U	0.35 U	0.35 U	**13**	1.1	1.2	1.0	0.88	0.89	1.0 U	0.35 U	1.1	1.0	1.1	1.1
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0	1.8	1.9	1.9
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U		2.0 U	2.7	3.2	2.6	2.3
Xylene (ortho)	--	µg/L	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	2.0 U (3)	2.0 U (3)	15 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.7 (3)	3.2 (3)	2.6 (3)	2.3 (3)
Semivolatile Organic Compounds (SVOCs)																	
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U				0.030 U	0.030 U						0.030 U	0.038 U		
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U (4)				0 U (4)	0 U (4)						0 U (4)	0 U (4)		
Total HPAH	--	µg/L					0.040 U							0.040 U			
Total LPAH	--	µg/L					0.40 UJ							2.2 J			
Total PAH	--	µg/L					0.40 UJ							2.2 J			
1-Methylnaphthalene	--	µg/L					0.40 U							20			
2-Methylnaphthalene	--	µg/L					0.40 U							0.40 U			
Acenaphthene	--	µg/L					0.040 U							0.46			
Acenaphthylene	--	µg/L					0.040 U							0.040 U			
Anthracene	--	µg/L					0.040 U							0.040 U			
Benzo(a)anthracene	--	µg/L	0.040 U				0.040 U	0.040 U						0.040 U	0.050 U		
Benzo(a)pyrene	--	µg/L	0.040 U				0.040 U	0.040 U						0.040 U	0.050 U		
Benzo(b)fluoranthene	--	µg/L	0.040 U				0.040 U	0.040 U						0.040 U	0.050 U		
Benzo(g,h,i)perylene	--	µg/L					0.040 U							0.040 U			
Benzo(k)fluoranthene	--	µg/L	0.040 U				0.040 U	0.040 U						0.040 U	0.050 U		
Chrysene	--	µg/L	0.040 U				0.040 U	0.040 U						0.040 U	0.050 U		
Dibenzo(a,h)anthracene	--	µg/L	0.040 U				0.040 U	0.040 U						0.040 U	0.050 U		
Fluoranthene	--	µg/L					0.040 U							0.040 U			
Fluorene	--	µg/L					0.040 UJ							1.5 J			
Hexachlorobutadiene	--	µg/L															
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U				0.040 U	0.040 U						0.040 U	0.050 U		
Naphthalene	--	µg/L					0.40 U	1.0 U						0.40 U			
Phenanthrene	--	µg/L					0.060 U							0.28			
Pyrene	--	µg/L					0.040 U							0.040 U			

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST Aboveground storage tank
BTEX Benzene, toluene, ethylbenzene, and xylenes
cPAH Carcinogenic polycyclic aromatic hydrocarbon
HPAH High molecular weight polycyclic aromatic hydrocarbon
LNAPL Light non-aqueous phase liquid
LPAH Low molecular weight polycyclic aromatic hydrocarbon
µg/L Micrograms per liter
PAH Polycyclic aromatic hydrocarbon
TEQ Toxic equivalent
UST Underground storage tank

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JM Concentration is estimated due to poor match to standard.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Former Calloway Ross Parcel (cont.)					Former Fuel Loading Rack Area								
		Location Name	**MW-10**					**OIP-15**	**MW-07**						**MW-11**	
		Sample Name	**MW-10-022719**	**MW-10-050620**	**MW-10-081020**	**MW-10-110220**	**MW-10-022321**	**OIP-15-GW-14-19**	**MW-07-022719**	**MW-07-050620**	**MW-07-081120**	**MW-107-081120**	**MW-07-110220**	**MW-07-022421**	**MW-11-022819**	**MW-11-050720**
		Sample Date	**2/27/2019**	**5/6/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**3/12/2020**	**2/27/2019**	**5/6/2020**	**8/11/2020**	**8/11/2020**	**11/2/2020**	**2/24/2021**	**2/28/2019**	**5/7/2020**
Analyte	**Screening Level (1)**	**Unit**														
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																
Gasoline-range organics	800	µg/L	100 U	450	**4,100**	**5,300**	**5,800**	380	**1,100**	560	**1,200**	**1,300**	700	490	100 U	100 U
Diesel-range organics	500	µg/L	60 U	340 (2)	**1,400 (2)**	**1,900 (2)**	**1,600 (2)**	**1,300**	**780 (2)**	**820**	**1,200**	**1,200**	**750**	**590**	60 U	66 (2)
Oil-range organics	500	µg/L	300 U	250 U	250 U	250 U	250 U	380 (2)	300 U	250 U	250 U	250 U	250 U	250 U	300 U	250 U
Total DRO and ORO	500	µg/L	300 U	340 (2)	**1,400 (2)**	**1,900 (2)**	**1,600 (2)**	**1,700 (2)**	**780 (2)**	**820**	**1,200**	**1,200**	**750**	**590**	300 U	66 (2)
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																
Diesel-range organics	500	µg/L	60 U						340 (2)						60 U	
Oil-range organics	500	µg/L	300 U						300 U						300 U	
Total DRO and ORO	500	µg/L	300 U						340 (2)						300 U	
BTEX Compounds by USEPA 8021B/8260D																
Benzene	5.0	µg/L	1.1	**42**	**120**	**170**	**180**	0.35 U	2.0	0.45	0.56	0.58	0.35 U	0.35 U	1.0 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	7.6	60	83	68	1.0 U	2.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	5.0	19	28	31	1.0 U	9.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L		2.5	20	38	45	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U		2.0 U
Xylene (ortho)	--	µg/L		1.0 U	1.0 U	1.0 U	1.1	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U
Xylene (total)	10,000	µg/L	3.0 U	2.5 (3)	20 (3)	38 (3)	46 (3)	2.0 U (3)	6.0	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)																
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L		0.030 U	0.030 U			0.030 U		0.030 U	0.030 U	0.030 U				0.030 U
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L		0 U (4)	0 U (4)			0 U (4)		0 U (4)	0 U (4)	0 U (4)				0 U (4)
Total HPAH	--	µg/L		0.040 U						0.040 U						0.040 U
Total LPAH	--	µg/L		0.075 J						0.40 UJ						0.40 UJ
Total PAH	--	µg/L		0.075 J						0.40 UJ						0.40 UJ
1-Methylnaphthalene	--	µg/L		2.1						0.40 U						0.40 U
2-Methylnaphthalene	--	µg/L		0.40 U						0.40 U						0.40 U
Acenaphthene	--	µg/L		0.040 U						0.040 U						0.040 U
Acenaphthylene	--	µg/L		0.040 U						0.040 U						0.040 U
Anthracene	--	µg/L		0.040 U						0.040 U						0.040 U
Benzo(a)anthracene	--	µg/L		0.040 U	0.040 U			0.040 U		0.040 U	0.040 U	0.040 U				0.040 U
Benzo(a)pyrene	--	µg/L		0.040 U	0.040 U			0.040 U		0.040 U	0.040 U	0.040 U				0.040 U
Benzo(b)fluoranthene	--	µg/L		0.040 U	0.040 U			0.040 U		0.040 U	0.040 U	0.040 U				0.040 U
Benzo(g,h,i)perylene	--	µg/L		0.040 U						0.040 U						0.040 U
Benzo(k)fluoranthene	--	µg/L		0.040 U	0.040 U			0.040 U		0.040 U	0.040 U	0.040 U				0.040 U
Chrysene	--	µg/L		0.040 U	0.040 U			0.040 U		0.040 U	0.040 U	0.040 U				0.040 U
Dibenzo(a,h)anthracene	--	µg/L		0.040 U	0.040 U			0.040 U		0.040 U	0.040 U	0.040 U				0.040 U
Fluoranthene	--	µg/L		0.040 U						0.040 U						0.040 U
Fluorene	--	µg/L		0.075 J						0.040 UJ						0.040 UJ
Hexachlorobutadiene	--	µg/L		1.0 U	1.0 U											
Indeno(1,2,3-c,d)pyrene	--	µg/L		0.040 U	0.040 U			0.040 U		0.040 U	0.040 U	0.040 U				0.040 U
Naphthalene	--	µg/L		0.40 U	1.0 U			1.0 U		0.40 U	1.0 U	1.0 U				0.40 U
Phenanthrene	--	µg/L		0.060 U						0.060 U						0.060 U
Pyrene	--	µg/L		0.040 U						0.040 U						0.040 U

Notes:

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All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

--	Not established.
BOLD RED	Result exceeds screening level.
Bold Italics	Analyte not detected; reporting limit exceeds screening level.
1	Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2	The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
3	Xylene (total) result is a calculated value.
4	None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Former Fuel Loading Rack Area (cont.)														
		Location Name	**MW-12**					**MW-13**			**MW-14**					**MW-15**	
		Sample Name	**MW-12-022719**	**MW-12-050720**	**MW-12-081120**	**MW-12-110320**	**MW-12-022321**	**MW-13-022819**	**MW-13-050720**	**MW-13-081020**	**MW-14-022719**	**MW-14-050720**	**MW-14-081120**	**MW-14-110220**	**MW-14-022421**	**MW-15-022719**	**MW-15-050720**
		Sample Date	**2/27/2019**	**5/7/2020**	**8/11/2020**	**11/3/2020**	**2/23/2021**	**2/28/2019**	**5/7/2020**	**8/10/2020**	**2/27/2019**	**5/7/2020**	**8/11/2020**	**11/2/2020**	**2/24/2021**	**2/27/2019**	**5/7/2020**
Analyte	**Screening Level (1)**	**Unit**															
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																	
Gasoline-range organics	800	µg/L	600	470	**7,100**	**5,500**	**4,900**	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	140
Diesel-range organics	500	µg/L	490 (2)	130 (2)	**2,100**	**1,900** (2)	**1,100** (2)	60 U	50 U	60 (2)	150 (2)	120 (2)	230 (2)	80 (2)	50 U	78 (2)	**510** (2)
Oil-range organics	500	µg/L	300 U	250 U	250 U	250 U	250 U	300 U	250 U	250 U	300 U	250 U	250 U	250 U	250 U	300 U	250 U
Total DRO and ORO	500	µg/L	490 (2)	130 (2)	**2,100** (2)	**1,900** (2)	**1,100** (2)	300 U	250 U	60 (2)	150 (2)	120 (2)	230 (2)	80 (2)	250 U	78 (2)	**510** (2)
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																	
Diesel-range organics	500	µg/L	100 (2)					60 U			81					60 U	
Oil-range organics	500	µg/L	300 U					300 U			300 U					300 U	
Total DRO and ORO	500	µg/L	100 (2)					300 U			81					300 U	
BTEX Compounds by USEPA 8021B/8260D																	
Benzene	5.0	µg/L	**61**	**81**	**910**	**620**	**180**	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	0.35 U
Ethylbenzene	700	µg/L	3.5	2.0	46	39	36	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	6.4	2.8	42	39	23	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L		3.6	57	62	38		2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U		2.0 U
Xylene (ortho)	--	µg/L		1.0 U	1.3	1.4	1.0		1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U		1.0 U
Xylene (total)	10,000	µg/L	6.2	3.6 (3)	58 (3)	63 (3)	39 (3)	3.0 U	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)																	
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L		0.030 U	0.030 U				0.030 U	0.030 U		0.030 U	0.030 U				0.030 U
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L		0 U (4)	0 U (4)				0 U (4)	0 U (4)		0 U (4)	0 U (4)				0 U (4)
Total HPAH	--	µg/L		0.040 U					0.040 U			0.040 U					0.040 U
Total LPAH	--	µg/L		0.40 UJ					0.40 UJ			0.40 UJ					0.66 J
Total PAH	--	µg/L		0.40 UJ					0.40 UJ			0.40 UJ					0.66 J
1-Methylnaphthalene	--	µg/L		0.40 U					0.40 U			0.40 U					0.40 U
2-Methylnaphthalene	--	µg/L		0.40 U					0.40 U			0.40 U					0.40 U
Acenaphthene	--	µg/L		0.040 U					0.040 U			0.040 U					0.38
Acenaphthylene	--	µg/L		0.040 U					0.040 U			0.040 U					0.040 U
Anthracene	--	µg/L		0.040 U					0.040 U			0.040 U					0.040 U
Benzo(a)anthracene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U				0.040 U
Benzo(a)pyrene	--	µg/L		0.040 UJ	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U				0.040 U
Benzo(b)fluoranthene	--	µg/L		0.040 UJ	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U				0.040 U
Benzo(g,h,i)perylene	--	µg/L		0.040 UJ					0.040 U			0.040 U					0.040 U
Benzo(k)fluoranthene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U				0.040 U
Chrysene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U				0.040 U
Dibenzo(a,h)anthracene	--	µg/L		0.040 UJ	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U				0.040 U
Fluoranthene	--	µg/L		0.040 U					0.040 U			0.040 U					0.040 U
Fluorene	--	µg/L		0.040 UJ					0.040 UJ			0.040 UJ					0.19 J
Hexachlorobutadiene	--	µg/L		1.0 U	1.0 U												
Indeno(1,2,3-c,d)pyrene	--	µg/L		0.040 UJ	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U				0.040 U
Naphthalene	--	µg/L		0.40 U	1.0 U				0.40 U			0.40 U					0.40 U
Phenanthrene	--	µg/L		0.060 U					0.060 U			0.060 U					0.087
Pyrene	--	µg/L		0.040 U					0.040 U			0.040 U					0.040 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Former Fuel Loading Rack Area (cont.)														
		Location Name	**MW-15 (cont.)**			**MW-16**		**MW-17**					**MW-20**			**MW-25**	
		Sample Name	**MW-15-081020**	**MW-15-110220**	**MW-15-022321**	**MW-16-022719**	**MW-16-050720**	**MW-17-022819**	**MW-17-050720**	**MW-17-081120**	**MW-17-110320**	**MW-17-022421**	**MW-20-022819**	**MW-20-050720**	**MW-20-022321**	**MW-25-022819**	**MW-25-050720**
		Sample Date	**8/10/2020**	**11/2/2020**	**2/23/2021**	**2/27/2019**	**5/7/2020**	**2/28/2019**	**5/7/2020**	**8/11/2020**	**11/3/2020**	**2/24/2021**	**2/28/2019**	**5/7/2020**	**2/23/2021**	**2/28/2019**	**5/7/2020**
Analyte	**Screening Level (1)**	**Unit**															
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																	
Gasoline-range organics	800	µg/L	120	180	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	**1,500**	**2,800**	**2,600**	100 U	100 U
Diesel-range organics	500	µg/L	300 (2)	430 (2)	54 (2)	60 U	84 (2)	60 U	67 (2)	62 (2)	50 U	53 (2)	**970 (2)**	**1,000 (2)**	**1,000 (2)**	60 U	50 U
Oil-range organics	500	µg/L	250 U	250 U	250 U	300 U	250 U	300 U	250 U	250 U	250 U	250 U	360 (2)	290 (2)	490 (2)	300 U	250 U
Total DRO and ORO	500	µg/L	300	430 (2)	54 (2)	300 U	84 (2)	300 U	67	62	250 U	53 (2)	**1,300 (2)**	**1,300 (2)**	**1,500 (2)**	300 U	250 U
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																	
Diesel-range organics	500	µg/L				60 U		65 U					370 (2)			60 U	
Oil-range organics	500	µg/L				300 U		320 U					300 U			300 U	
Total DRO and ORO	500	µg/L				300 U		320 U					370 (2)			300 U	
BTEX Compounds by USEPA 8021B/8260D																	
Benzene	5.0	µg/L	0.35 U	0.35 U	0.35 U	1.0 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	1.7	1.6	0.86	1.0 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	7.0	5.5	4.3	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.7	1.8	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U	2.0 U		4.3	2.0 U		2.0 U
Xylene (ortho)	--	µg/L	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U		1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	9.1	4.3 (3)	2.0 U (3)	3.0 U	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)																	
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U				0.030 U		0.030 U	0.030 U				0.030 U			0.030 U
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U (4)				0 U (4)		0 U (4)	0 U (4)				0 U (4)			0 U (4)
Total HPAH	--	µg/L					0.040 U		0.040 U					0.040 U			0.040 U
Total LPAH	--	µg/L					0.40 UJ		0.40 UJ					0.40 UJ			0.40 UJ
Total PAH	--	µg/L					0.40 UJ		0.40 UJ					0.40 UJ			0.40 UJ
1-Methylnaphthalene	--	µg/L					0.40 U		0.40 U					7.4			0.40 U
2-Methylnaphthalene	--	µg/L					0.40 U		0.40 U					0.40 U			0.40 U
Acenaphthene	--	µg/L					0.040 U		0.040 U					0.040 U			0.040 U
Acenaphthylene	--	µg/L					0.040 U		0.040 U					0.040 U			0.040 U
Anthracene	--	µg/L					0.040 U		0.040 U					0.040 U			0.040 U
Benzo(a)anthracene	--	µg/L	0.040 U				0.040 U		0.040 U	0.040 U				0.040 U			0.040 U
Benzo(a)pyrene	--	µg/L	0.040 U				0.040 U		0.040 U	0.040 U				0.040 U			0.040 U
Benzo(b)fluoranthene	--	µg/L	0.040 U				0.040 U		0.040 U	0.040 U				0.040 U			0.040 U
Benzo(g,h,i)perylene	--	µg/L					0.040 U		0.040 U					0.040 U			0.040 U
Benzo(k)fluoranthene	--	µg/L	0.040 U				0.040 U		0.040 U	0.040 U				0.040 U			0.040 U
Chrysene	--	µg/L	0.040 U				0.040 U		0.040 U	0.040 U				0.040 U			0.040 U
Dibenzo(a,h)anthracene	--	µg/L	0.040 U				0.040 U		0.040 U	0.040 U				0.040 U			0.040 U
Fluoranthene	--	µg/L					0.040 U		0.040 U					0.040 U			0.040 U
Fluorene	--	µg/L					0.040 UJ		0.040 UJ					0.040 UJ			0.040 UJ
Hexachlorobutadiene	--	µg/L															
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U				0.040 U		0.040 U	0.040 U				0.040 U			0.040 U
Naphthalene	--	µg/L					0.40 U		0.40 U					0.40 U			0.40 U
Phenanthrene	--	µg/L					0.060 U		0.060 U					0.060 U			0.060 U
Pyrene	--	µg/L					0.040 U		0.040 U					0.040 U			0.040 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST Aboveground storage tank

BTEX Benzene, toluene, ethylbenzene, and xylenes

cPAH Carcinogenic polycyclic aromatic hydrocarbon

HPAH High molecular weight polycyclic aromatic hydrocarbon

LNAPL Light non-aqueous phase liquid

LPAH Low molecular weight polycyclic aromatic hydrocarbon

µg/L Micrograms per liter

PAH Polycyclic aromatic hydrocarbon

TEQ Toxic equivalent

UST Underground storage tank

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.

JM Concentration is estimated due to poor match to standard.

U Analyte was not detected at the given reporting limit.

UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Former Fuel Loading Rack Area (cont.)												
		Location Name	MW-25 (cont.)			MW-33						MW-40			
		Sample Name	MW-25-081120	MW-25-110320	MW-25-022321	MW-33-050620	MW-133-050620	MW-33-081120	MW-33-110220	MW-133-110220	MW-33-022421	MW-40-050620	MW-40-081120	MW-40-110220	MW-40-022421
		Sample Date	8/11/2020	11/3/2020	2/23/2021	5/6/2020	5/6/2020	8/11/2020	11/2/2020	11/2/2020	2/24/2021	5/6/2020	8/11/2020	11/2/2020	2/24/2021
Analyte	**Screening Level [1]**	**Unit**													
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx															
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	160	130	150	170	170	190	**1,100**	**2,000**	**1,600**	**2,300**
Diesel-range organics	500	µg/L	50 U	50 U	50 U	**1,100**	**850**	**930**	**890** [2]	**890** [2]	**830** [2]	**2,900** [2]	**3,400**	**3,400**	**2,500**
Oil-range organics	500	µg/L	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	220 U	320 [2]	330 [2]	400 [2]	290 [2]
Total DRO and ORO	500	µg/L	250 U	250 U	250 U	**1,100**	**850**	**930**	**890** [2]	**890** [2]	**830** [2]	**3,200** [2]	**3,700** [2]	**3,800** [2]	**2,800** [2]
Total Petroleum Hydrocarbons by NWTPH-Dx Sg															
Diesel-range organics	500	µg/L													
Oil-range organics	500	µg/L													
Total DRO and ORO	500	µg/L													
BTEX Compounds by USEPA 8021B/8260D															
Benzene	5.0	µg/L	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	**430**	**310**	**300**	**200**
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	7.4	1.1	3.9	2.6
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11	6.3	9.6	9.7
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.2	2.0	4.5	4.5
Xylene (ortho)	--	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	10,000	µg/L	2.0 U [3]	2.0 U [3]	2.0 U [3]	2.0 U [3]	2.0 U [3]	2.0 U [3]	2.0 U [3]	2.0 U [3]	2.0 U [3]	4.2 [3]	2.0 U [3]	4.5 [3]	4.5 [3]
Semivolatile Organic Compounds (SVOCs)															
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U			0.030 U	0.030 U	0.030 U				0.030 U	0.030 U		
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U [4]			0 U [4]	0 U [4]	0 U [4]				0 U [4]	0 U [4]		
Total HPAH	--	µg/L				0.040 U	0.040 U					0.040 U			
Total LPAH	--	µg/L				1.5 J	1.6 J					8.5 J			
Total PAH	--	µg/L				1.5 J	1.6 J					8.5 J			
1-Methylnaphthalene	--	µg/L				0.40 U	0.40 U					53			
2-Methylnaphthalene	--	µg/L				0.40 U	0.40 U					3.8			
Acenaphthene	--	µg/L				0.34	0.36					1.2			
Acenaphthylene	--	µg/L				0.040 U	0.040 U					0.040 U			
Anthracene	--	µg/L				0.040 U	0.040 U					0.040 U			
Benzo(a)anthracene	--	µg/L	0.040 U			0.040 U	0.040 U	0.040 U				0.040 U	0.040 U		
Benzo(a)pyrene	--	µg/L	0.040 U			0.040 U	0.040 U	0.040 U				0.040 U	0.040 U		
Benzo(b)fluoranthene	--	µg/L	0.040 U			0.040 U	0.040 U	0.040 U				0.040 U	0.040 U		
Benzo(g,h,i)perylene	--	µg/L				0.040 U	0.040 U					0.040 U			
Benzo(k)fluoranthene	--	µg/L	0.040 U			0.040 U	0.040 U	0.040 U				0.040 U	0.040 U		
Chrysene	--	µg/L	0.040 U			0.040 U	0.040 U	0.040 U				0.040 U	0.040 U		
Dibenzo(a,h)anthracene	--	µg/L	0.040 U			0.040 U	0.040 U	0.040 U				0.040 U	0.040 U		
Fluoranthene	--	µg/L				0.040 U	0.040 U					0.040 U			
Fluorene	--	µg/L				0.70 J	0.74 J					5.2 J			
Hexachlorobutadiene	--	µg/L										1.0 U	1.0 U		
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U			0.040 U	0.040 U	0.040 U				0.040 U	0.040 U		
Naphthalene	--	µg/L				0.40 U	0.40 U					0.40 U	1.0 U		
Phenanthrene	--	µg/L				0.44	0.47					2.1			
Pyrene	--	µg/L				0.040 U	0.040 U					0.040 U			

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Former Mechanic's Shop								Former U.S. Army Reserve Heating Oil UST		Monitoring Wells MW-26 and MW-28		
		Location Name	GP-34	UST-4							GP-31	GP-32	MW-18		
		Sample Name	GP-34-GW-14-19	UST-4-022819	UST-104-022819	UST-4-050620	UST-4-081020	UST-4-110220	UST-104-110220	UST-4-022321	GP-31-GW-13.5-18.5	GP-32-GW-14-19	MW-18-022819	MW-18-050720	MW-18-081120
		Sample Date	3/9/2020	2/28/2019	2/28/2019	5/6/2020	8/10/2020	11/2/2020	11/2/2020	2/23/2021	3/11/2020	3/11/2020	2/28/2019	5/7/2020	8/11/2020
Analyte	**Screening Level (1)**	**Unit**													
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx															
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics	500	µg/L	330 (2)	140 (2)	140 (2)	230 (2)	57 (2)	50 U	50 U	87 (2)	55 (2)	150 (2)	60 U	50 U	50 U
Oil-range organics	500	µg/L	250 U	300 U	300 U	320 (2)	250 U	250 U	250 U	290 (2)	250 U	250 U	300 U	250 U	250 U
Total DRO and ORO	500	µg/L	330	140	140	**550** (2)	57 (2)	250 U	250 U	380 (2)	55 (2)	150 (2)	300 U	250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-Dx Sg															
Diesel-range organics	500	µg/L		60 U	60 U								60 U		
Oil-range organics	500	µg/L		300 U	300 U								300 U		
Total DRO and ORO	500	µg/L		300 U	300 U								300 U		
BTEX Compounds by USEPA 8021B/8260D															
Benzene	5.0	µg/L	0.35 U	1.0 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U			2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U
Xylene (ortho)	--	µg/L	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	3.0 U	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)															
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U			0.030 U	0.030 U				0.030 U	0.030 U		0.030 U	0.030 U
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U (4)			0 U (4)	0 U (4)				0 U (4)	0 U (4)		0 U (4)	0 U (4)
Total HPAH	--	µg/L				0.040 U								0.040 U	
Total LPAH	--	µg/L				0.40 UJ								0.40 UJ	
Total PAH	--	µg/L				0.40 UJ								0.40 UJ	
1-Methylnaphthalene	--	µg/L				0.40 U								0.40 U	
2-Methylnaphthalene	--	µg/L				0.40 U								0.40 U	
Acenaphthene	--	µg/L				0.040 U								0.040 U	
Acenaphthylene	--	µg/L				0.040 U								0.040 U	
Anthracene	--	µg/L				0.040 U								0.040 U	
Benzo(a)anthracene	--	µg/L	0.040 U			0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U
Benzo(a)pyrene	--	µg/L	0.040 U			0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U
Benzo(b)fluoranthene	--	µg/L	0.040 U			0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U
Benzo(g,h,i)perylene	--	µg/L				0.040 U								0.040 U	
Benzo(k)fluoranthene	--	µg/L	0.040 U			0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U
Chrysene	--	µg/L	0.040 U			0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U
Dibenzo(a,h)anthracene	--	µg/L	0.040 U			0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U
Fluoranthene	--	µg/L				0.040 U								0.040 U	
Fluorene	--	µg/L				0.040 UJ								0.040 UJ	
Hexachlorobutadiene	--	µg/L													
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U			0.040 U	0.040 U				0.040 U	0.040 U		0.040 U	0.040 U
Naphthalene	--	µg/L	1.0 U			0.40 U	1.0 U							0.40 U	
Phenanthrene	--	µg/L				0.060 U								0.060 U	
Pyrene	--	µg/L				0.040 U								0.040 U	

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

--	Not established.
BOLD RED	Result exceeds screening level.
Bold Italics	Analyte not detected; reporting limit exceeds screening level.
1	Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
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Abbreviations:

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PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Monitoring Wells MW-26 and MW-28 (cont.)													
		Location Name	**MW-18 (cont.)**		**MW-24**					**MW-26**					**MW-27**	
		Sample Name	**MW-18-110320**	**MW-18-022421**	**MW-24-022819**	**MW-24-050720**	**MW-24-081120**	**MW-24-110320**	**MW-24-022321**	**MW-26-022819**	**MW-26-050720**	**MW-26-081020**	**MW-26-110220**	**MW-26-022321**	**MW-27-022819**	**MW-27-050720**
		Sample Date	**11/3/2020**	**2/24/2021**	**2/28/2019**	**5/7/2020**	**8/11/2020**	**11/3/2020**	**2/23/2021**	**2/28/2019**	**5/7/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**2/28/2019**	**5/7/2020**
Analyte	**Screening Level (1)**	**Unit**														
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics	500	µg/L	50 U	50 U	60 U	50 U	50 U	50 U	50 U	140 (2)	**670** (2)	**610** (2)	**570** (2)	50 U	60 U	150 (2)
Oil-range organics	500	µg/L	250 U	250 U	300 U	250 U	250 U	250 U	250 U	300 U	250 U	250 U	250 U	250 U	300 U	250 U
Total DRO and ORO	500	µg/L	250 U	250 U	300 U	250 U	250 U	250 U	250 U	140 (2)	**670** (2)	**610** (2)	**570** (2)	250 U	300 U	150 (2)
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																
Diesel-range organics	500	µg/L			60 U					60 U					60 U	
Oil-range organics	500	µg/L			300 U					300 U					300 U	
Total DRO and ORO	500	µg/L			300 U					300 U					300 U	
BTEX Compounds by USEPA 8021B/8260D																
Benzene	5.0	µg/L	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U		2.0 U
Xylene (ortho)	--	µg/L	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U		1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)																
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L				0.030 U	0.030 U				0.030 U	0.0302 U				0.030 U
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L				0 U (4)	0 U (4)				0 U (4)	0 U (4)				0 U (4)
Total HPAH	--	µg/L				0.040 U					0.040 U					0.040 U
Total LPAH	--	µg/L				0.40 UJ					0.40 UJ					0.40 UJ
Total PAH	--	µg/L				0.40 UJ					0.40 UJ					0.40 UJ
1-Methylnaphthalene	--	µg/L				0.40 U					0.40 U					0.40 U
2-Methylnaphthalene	--	µg/L				0.40 U					0.40 U					0.40 U
Acenaphthene	--	µg/L				0.040 U					0.040 U					0.040 U
Acenaphthylene	--	µg/L				0.040 U					0.040 U					0.040 U
Anthracene	--	µg/L				0.040 U					0.040 U					0.040 U
Benzo(a)anthracene	--	µg/L				0.040 U	0.040 U				0.040 U	0.040 U				0.040 U
Benzo(a)pyrene	--	µg/L				0.040 U	0.040 U				0.040 U	0.040 U				0.040 U
Benzo(b)fluoranthene	--	µg/L				0.040 U	0.040 U				0.040 U	0.040 U				0.040 U
Benzo(g,h,i)perylene	--	µg/L				0.040 U					0.040 U					0.040 U
Benzo(k)fluoranthene	--	µg/L				0.040 U	0.040 U				0.040 U	0.040 U				0.040 U
Chrysene	--	µg/L				0.040 U	0.040 U				0.040 U	0.040 U				0.040 U
Dibenzo(a,h)anthracene	--	µg/L				0.040 U	0.040 U				0.040 U	0.040 U				0.040 U
Fluoranthene	--	µg/L				0.040 U					0.040 U					0.040 U
Fluorene	--	µg/L				0.040 UJ					0.040 UJ					0.040 UJ
Hexachlorobutadiene	--	µg/L														
Indeno(1,2,3-c,d)pyrene	--	µg/L				0.040 U	0.040 U				0.040 U	0.040 U				0.040 U
Naphthalene	--	µg/L				0.40 U					0.40 U					0.40 U
Phenanthrene	--	µg/L				0.060 U					0.060 U					0.060 U
Pyrene	--	µg/L				0.040 U					0.040 U					0.040 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Monitoring Wells MW-26 and MW-28 (cont.)													
		Location Name	**MW-27 (cont.)**		**MW-28**			**MW-29**					**MW-34**			
		Sample Name	**MW-127-050720**	**MW-27-081020**	**MW-28-022819**	**MW-28-081120**	**MW-28-022421**	**MW-29-022819**	**MW-29-050620**	**MW-29-081120**	**MW-29-110320**	**MW-29-022421**	**MW-34-050620**	**MW-34-081020**	**MW-34-110220**	**MW-34-022421**
		Sample Date	**5/7/2020**	**8/10/2020**	**2/28/2019**	**8/11/2020**	**2/24/2021**	**2/28/2019**	**5/6/2020**	**8/11/2020**	**11/3/2020**	**2/24/2021**	**5/6/2020**	**8/10/2020**	**11/2/2020**	**2/24/2021**
Analyte	**Screening Level (1)**	**Unit**														
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	130	110	100 U
Diesel-range organics	500	µg/L	190 (2)	110 (2)	**5,500 (2)**	**5,200 (2)**	**1,200 (2)**	60 U	54 (2)	50 U	50 U	50 U	**1,300 (2)**	**1,500 (2)**	**1,300 (2)**	**1,500 (2)**
Oil-range organics	500	µg/L	250 U	250 U	**1,600 (2)**	**890 (2)**	**680 (2)**	300 U	250 U	250 U	250 U	250 U	250 U	290 (2)	310 (2)	310 (2)
Total DRO and ORO	500	µg/L	190 (2)	110 (2)	**7,100 (2)**	**6,100 (2)**	**1,900 (2)**	300 U	54 (2)	250 U	250 U	250 U	**1,300 (2)**	**1,800 (2)**	**1,600 (2)**	**1,800 (2)**
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																
Diesel-range organics	500	µg/L			**610**			60 U								
Oil-range organics	500	µg/L			300 U			300 U								
Total DRO and ORO	500	µg/L			**610**			300 U								
BTEX Compounds by USEPA 8021B/8260D																
Benzene	5.0	µg/L	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U		2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Xylene (ortho)	--	µg/L	1.0 U	1.0 U		1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)																
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U	0.030 U		0.030 U			0.030 U	0.030 U			0.030 U	0.030 U		
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U (4)	0 U (4)		0 U (4)			0 U (4)	0 U (4)			0 U (4)	0 U (4)		
Total HPAH	--	µg/L	0.040 U						0.040 U				0.040 U			
Total LPAH	--	µg/L	0.40 UJ						0.40 UJ				0.24 J			
Total PAH	--	µg/L	0.40 UJ						0.40 UJ				0.24 J			
1-Methylnaphthalene	--	µg/L	0.40 U						0.40 U				0.40 U			
2-Methylnaphthalene	--	µg/L	0.40 U						0.40 U				0.40 U			
Acenaphthene	--	µg/L	0.040 U						0.040 U				0.095			
Acenaphthylene	--	µg/L	0.040 U						0.040 U				0.040 U			
Anthracene	--	µg/L	0.040 U						0.040 U				0.040 U			
Benzo(a)anthracene	--	µg/L	0.040 U	0.040 U		0.040 U			0.040 U	0.040 U			0.040 U	0.040 U		
Benzo(a)pyrene	--	µg/L	0.040 U	0.040 U		0.040 U			0.040 U	0.040 U			0.040 U	0.040 U		
Benzo(b)fluoranthene	--	µg/L	0.040 U	0.040 U		0.040 U			0.040 U	0.040 U			0.040 U	0.040 U		
Benzo(g,h,i)perylene	--	µg/L	0.040 U						0.040 U				0.040 U			
Benzo(k)fluoranthene	--	µg/L	0.040 U	0.040 U		0.040 U			0.040 U	0.040 U			0.040 U	0.040 U		
Chrysene	--	µg/L	0.040 U	0.040 U		0.040 U			0.040 U	0.040 U			0.040 U	0.040 U		
Dibenzo(a,h)anthracene	--	µg/L	0.040 U	0.040 U		0.040 U			0.040 U	0.040 U			0.040 U	0.040 U		
Fluoranthene	--	µg/L	0.040 U						0.040 U				0.040 U			
Fluorene	--	µg/L	0.040 UJ						0.040 UJ				0.14 J			
Hexachlorobutadiene	--	µg/L				1.0 U							1.0 U	1.0 U		
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U	0.040 U		0.040 U			0.040 U	0.040 U			0.040 U	0.040 U		
Naphthalene	--	µg/L	0.40 U			1.0 U			0.40 U				0.40 U	1.0 U		
Phenanthrene	--	µg/L	0.060 U						0.060 U				0.060 U			
Pyrene	--	µg/L	0.040 U						0.040 U				0.040 U			

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST Aboveground storage tank
BTEX Benzene, toluene, ethylbenzene, and xylenes
cPAH Carcinogenic polycyclic aromatic hydrocarbon
HPAH High molecular weight polycyclic aromatic hydrocarbon
LNAPL Light non-aqueous phase liquid
LPAH Low molecular weight polycyclic aromatic hydrocarbon
µg/L Micrograms per liter
PAH Polycyclic aromatic hydrocarbon
TEQ Toxic equivalent
UST Underground storage tank

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JM Concentration is estimated due to poor match to standard.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	**Northern Portion of the Former Standard Pipelines**													
		Location Name	**OIP-69**	**OIP-70**	**MW-06**					**MW-19**			**MW-39**			
		Sample Name	**OIP-69-GW-12-17**	**OIP-70-GW-10-15**	**MW-06-022719**	**MW-06-050620**	**MW-06-081020**	**MW-06-110220**	**MW-06-022321**	**MW-19-022719**	**MW-19-050720**	**MW-19-081020**	**MW-39-050720**	**MW-39-081020**	**MW-39-110220**	**MW-39-022321**
		Sample Date	**3/11/2020**	**3/10/2020**	**2/27/2019**	**5/6/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**2/27/2019**	**5/7/2020**	**8/10/2020**	**5/7/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**
Analyte	**Screening Level (1)**	**Unit**														
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	380	510	370	500
Diesel-range organics	500	µg/L	140	220 (2)	**800 (2)**	**780 (2)**	**1,900 (2)**	**1,300 (2)**	**630 (2)**	67 (2)	50 U	76 (2)	**5,700**	**6,500 (2)**	**5,500 (2)**	**4,800 (2)**
Oil-range organics	500	µg/L	250 U	250 U	300 U	250 U	360 (2)	400 (2)	250 U	300 U	250 U	250 U	**950 (2)**	**790 (2)**	**1,200 (2)**	**800 (2)**
Total DRO and ORO	500	µg/L	140	220 (2)	**800 (2)**	**780 (2)**	**2,300 (2)**	**1,700 (2)**	**630 (2)**	67 (2)	250 U	76 (2)	**6,700 (2)**	**7,300 (2)**	**6,700 (2)**	**5,600 (2)**
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																
Diesel-range organics	500	µg/L			140					60 U						
Oil-range organics	500	µg/L			300 U					300 U						
Total DRO and ORO	500	µg/L			140					300 U						
BTEX Compounds by USEPA 8021B/8260D																
Benzene	5.0	µg/L	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Xylene (ortho)	--	µg/L	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)																
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U	0.030 U		0.030 U	0.030 U				0.030 U	0.030 U	0.030 U	0.030 U		
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U (4)	0 U (4)		0 U (4)	0 U (4)				0 U (4)	0 U (4)	0 U (4)	0 U (4)		
Total HPAH	--	µg/L				0.040 U					0.040 U		0.040 U			
Total LPAH	--	µg/L				0.80 J					0.40 UJ		10 J			
Total PAH	--	µg/L				0.80 J					0.40 UJ		10 J			
1-Methylnaphthalene	--	µg/L				0.40 U					0.40 U		11			
2-Methylnaphthalene	--	µg/L				0.40 U					0.40 U		0.40 U			
Acenaphthene	--	µg/L				0.15					0.040 U		1.7			
Acenaphthylene	--	µg/L				0.040 U					0.040 U		0.040 U			
Anthracene	--	µg/L				0.040 U					0.040 U		0.040 U			
Benzo(a)anthracene	--	µg/L	0.040 U	0.040 U		0.040 U	0.040 U				0.040 U	0.040 U	0.040 U	0.040 U		
Benzo(a)pyrene	--	µg/L	0.040 U	0.040 U		0.040 U	0.040 U				0.040 U	0.040 U	0.040 U	0.040 U		
Benzo(b)fluoranthene	--	µg/L	0.040 U	0.040 U		0.040 U	0.040 U				0.040 U	0.040 U	0.040 U	0.040 U		
Benzo(g,h,i)perylene	--	µg/L				0.040 U					0.040 U		0.040 U			
Benzo(k)fluoranthene	--	µg/L	0.040 U	0.040 U		0.040 U	0.040 U				0.040 U	0.040 U	0.040 U	0.040 U		
Chrysene	--	µg/L	0.040 U	0.040 U		0.040 U	0.040 U				0.040 U	0.040 U	0.040 U	0.040 U		
Dibenzo(a,h)anthracene	--	µg/L	0.040 U	0.040 U		0.040 U	0.040 U				0.040 U	0.040 U	0.040 U	0.040 U		
Fluoranthene	--	µg/L				0.040 U					0.040 U		0.040 U			
Fluorene	--	µg/L				0.65 J					0.040 UJ		7.2 J			
Hexachlorobutadiene	--	µg/L									1.0 U	1.0 U		1.0 U		
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U	0.040 U		0.040 U	0.040 U				0.040 U	0.040 U	0.040 U	0.040 U		
Naphthalene	--	µg/L	1.0 U	1.0 U		0.40 U					0.40 U	1.0 U	0.40 U	1.0 U		
Phenanthrene	--	µg/L				0.060 U					0.060 U		1.5			
Pyrene	--	µg/L				0.040 U					0.040 U		0.040 U			

Notes:

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All results rounded to two significant figures.

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--	Not established.
BOLD RED	Result exceeds screening level.
Bold Italics	Analyte not detected; reporting limit exceeds screening level.
1	Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2	The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
3	Xylene (total) result is a calculated value.
4	None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
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TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Perimeter Monitoring Wells													
		Location Name	MW-01			MW-04		MW-22					MW-23			
		Sample Name	MW-01-022719	MW-01-050620	MW-01-081020	MW-04-022819	MW-04-022421	MW-22-022819	MW-22-050720	MW-22-081120	MW-22-110320	MW-22-022421	MW-23-091415	MW-23-022819	MW-23-050620	MW-23-081120
		Sample Date	2/27/2019	5/6/2020	8/10/2020	2/28/2019	2/24/2021	2/28/2019	5/7/2020	8/11/2020	11/3/2020	2/24/2021	9/14/2015	2/28/2019	5/6/2020	8/11/2020
Analyte	**Screening Level (1)**	**Unit**														
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics	500	µg/L	60 U	50 U	50 U	60 U	**520** (2)	60 U	50 U	50 U	50 U	50 U	50 U	60 U	50 U	50 U
Oil-range organics	500	µg/L	300 U	250 U	250 U	300 U	440 (2)	300 U	250 U	250 U	250 U	250 U	250 U	300 U	250 U	250 U
Total DRO and ORO	500	µg/L	300 U	250 U	250 U	300 U	**960** (2)	300 U	250 U	250 U	250 U	250 U	250 U	300 U	250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-Dx Sg																
Diesel-range organics	500	µg/L	60 U			60 U		60 U						60 U		
Oil-range organics	500	µg/L	300 U			300 U		300 U						300 U		
Total DRO and ORO	500	µg/L	300 U			300 U		300 U						300 U		
BTEX Compounds by USEPA 8021B/8260D																
Benzene	5.0	µg/L	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	1.0 U	0.35 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L		2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U	2.0 U			2.0 U	2.0 U
Xylene (ortho)	--	µg/L		1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U	1.0 U			1.0 U	1.0 U
Xylene (total)	10,000	µg/L	3.0 U	2.0 U (3)	2.0 U (3)	3.0 U	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	3.0 U	2.0 U (3)	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)																
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L		0.030 U	0.030 U				0.030 U	0.030 U					0.030 U	0.030 U
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L		0 U (4)	0 U (4)				0 U (4)	0 U (4)					0 U (4)	0 U (4)
Total HPAH	--	µg/L		0.040 U					0.040 U						0.040 U	
Total LPAH	--	µg/L		0.40 UJ					0.40 UJ						0.40 UJ	
Total PAH	--	µg/L		0.40 UJ					0.40 UJ						0.40 UJ	
1-Methylnaphthalene	--	µg/L		0.40 U					0.40 U						0.40 U	
2-Methylnaphthalene	--	µg/L		0.40 U					0.40 U						0.40 U	
Acenaphthene	--	µg/L		0.040 U					0.040 U						0.040 U	
Acenaphthylene	--	µg/L		0.040 U					0.040 U						0.040 U	
Anthracene	--	µg/L		0.040 U					0.040 U						0.040 U	
Benzo(a)anthracene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U					0.040 U	0.040 U
Benzo(a)pyrene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U					0.040 U	0.040 U
Benzo(b)fluoranthene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U					0.040 U	0.040 U
Benzo(g,h,i)perylene	--	µg/L		0.040 U					0.040 U						0.040 U	
Benzo(k)fluoranthene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U					0.040 U	0.040 U
Chrysene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U					0.040 U	0.040 U
Dibenzo(a,h)anthracene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U					0.040 U	0.040 U
Fluoranthene	--	µg/L		0.040 U					0.040 U						0.040 U	
Fluorene	--	µg/L		0.040 UJ					0.040 UJ						0.040 UJ	
Hexachlorobutadiene	--	µg/L													1.0 U	1.0 U
Indeno(1,2,3-c,d)pyrene	--	µg/L		0.040 U	0.040 U				0.040 U	0.040 U					0.040 U	0.040 U
Naphthalene	--	µg/L		0.40 U					0.40 U						0.40 U	1.0 U
Phenanthrene	--	µg/L		0.060 U					0.060 U						0.060 U	
Pyrene	--	µg/L		0.040 U					0.040 U						0.040 U	

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

--	Not established.
BOLD RED	Result exceeds screening level.
Bold Italics	Analyte not detected; reporting limit exceeds screening level.
1	Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2	The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
3	Xylene (total) result is a calculated value.
4	None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Perimeter Monitoring Wells (cont.)										
		Location Name	MW-23 (cont.)		MW-30			MW-31					
		Sample Name	MW-23-110320	MW-23-022421	MW-30-081120	MW-30-110220	MW-30-022421	MW-31-022719	MW-131-022719	MW-31-050620	MW-31-081020	MW-31-110220	MW-31-022321
		Sample Date	11/3/2020	2/24/2021	8/11/2020	11/2/2020	2/24/2021	2/27/2019	2/27/2019	5/6/2020	8/10/2020	11/2/2020	2/23/2021
Analyte	Screening Level (1)	Unit											
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx													
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics	500	µg/L	50 U	50 U	**1,100** (2)	**1,600** (2)	**940** (2)	60 U	60 U	50 U	50 U	50 U	50 U
Oil-range organics	500	µg/L	250 U	250 U	480 (2)	**920** (2)	**550** (2)	300 U	300 U	250 U	250 U	250 U	250 U
Total DRO and ORO	500	µg/L	250 U	250 U	**1,600** (2)	**2,500** (2)	**1,500** (2)	300 U	300 U	250 U	250 U	250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-Dx Sg													
Diesel-range organics	500	µg/L						60 U	60 U				
Oil-range organics	500	µg/L						300 U	300 U				
Total DRO and ORO	500	µg/L						300 U	300 U				
BTEX Compounds by USEPA 8021B/8260D													
Benzene	5.0	µg/L	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U			2.0 U	2.0 U	2.0 U	2.0 U
Xylene (ortho)	--	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	3.0 U	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)													
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L			0.030 U					0.030 U	0.030 U		
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L			0 U (4)					0 U (4)	0 U (4)		
Total HPAH	--	µg/L								0.040 U			
Total LPAH	--	µg/L								0.40 UJ			
Total PAH	--	µg/L								0.40 UJ			
1-Methylnaphthalene	--	µg/L								0.40 U			
2-Methylnaphthalene	--	µg/L								0.40 U			
Acenaphthene	--	µg/L								0.040 U			
Acenaphthylene	--	µg/L								0.040 U			
Anthracene	--	µg/L								0.040 U			
Benzo(a)anthracene	--	µg/L			0.040 U					0.040 U	0.040 U		
Benzo(a)pyrene	--	µg/L			0.040 U					0.040 U	0.040 U		
Benzo(b)fluoranthene	--	µg/L			0.040 U					0.040 U	0.040 U		
Benzo(g,h,i)perylene	--	µg/L								0.040 U			
Benzo(k)fluoranthene	--	µg/L			0.040 U					0.040 U	0.040 U		
Chrysene	--	µg/L			0.040 U					0.040 U	0.040 U		
Dibenzo(a,h)anthracene	--	µg/L			0.040 U					0.040 U	0.040 U		
Fluoranthene	--	µg/L								0.040 U			
Fluorene	--	µg/L								0.040 UJ			
Hexachlorobutadiene	--	µg/L											
Indeno(1,2,3-c,d)pyrene	--	µg/L			0.040 U					0.040 U	0.040 U		
Naphthalene	--	µg/L								0.40 U			
Phenanthrene	--	µg/L								0.060 U			
Pyrene	--	µg/L								0.040 U			

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.
-- Not established.
BOLD RED Result exceeds screening level.
Bold Italics Analyte not detected; reporting limit exceeds screening level.
1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.
2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.
3 Xylene (total) result is a calculated value.
4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Perimeter Monitoring Wells (cont.)									
		Location Name	**MW-35**					**MW-36**				
		Sample Name	**MW-35-050620**	**MW-35-081020**	**MW-35-110320**	**MW-35-022421**	**MW-135-022421**	**MW-36-050620**	**MW-36-081020**	**MW-136-081020**	**MW-36-110220**	**MW-36-022321**
		Sample Date	**5/6/2020**	**8/10/2020**	**11/3/2020**	**2/24/2021**	**2/24/2021**	**5/6/2020**	**8/10/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**
Analyte	**Screening Level (1)**	**Unit**										
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx												
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics	500	µg/L	**630** (2)	**670** (2)	**620** (2)	470 (2)	**520** (2)	50 U	50 U	50 U	50 U	50 U
Oil-range organics	500	µg/L	250 U	260 (2)	330 (2)	250 U	270 (2)	250 U	250 U	250 U	250 U	250 U
Total DRO and ORO	500	µg/L	**630** (2)	**930** (2)	**950** (2)	470	**790** (2)	250 U	250 U	250 U	250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-Dx Sg												
Diesel-range organics	500	µg/L										
Oil-range organics	500	µg/L										
Total DRO and ORO	500	µg/L										
BTEX Compounds by USEPA 8021B/8260D												
Benzene	5.0	µg/L	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Xylene (ortho)	--	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)												
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U	0.030 U				0.030 U	0.030 U	0.030 U		
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U (4)	0 U (4)				0 U (4)	0 U (4)	0 U (4)		
Total HPAH	--	µg/L	0.040 U					0.040 U				
Total LPAH	--	µg/L	0.40 UJ					0.40 UJ				
Total PAH	--	µg/L	0.40 UJ					0.40 UJ				
1-Methylnaphthalene	--	µg/L	0.40 U					0.40 U				
2-Methylnaphthalene	--	µg/L	0.40 U					0.40 U				
Acenaphthene	--	µg/L	0.040 U					0.040 U				
Acenaphthylene	--	µg/L	0.040 U					0.040 U				
Anthracene	--	µg/L	0.040 U					0.040 U				
Benzo(a)anthracene	--	µg/L	0.040 U	0.040 U				0.040 U	0.040 U	0.040 U		
Benzo(a)pyrene	--	µg/L	0.040 U	0.040 U				0.040 U	0.040 U	0.040 U		
Benzo(b)fluoranthene	--	µg/L	0.040 U	0.040 U				0.040 U	0.040 U	0.040 U		
Benzo(g,h,i)perylene	--	µg/L	0.040 U					0.040 U				
Benzo(k)fluoranthene	--	µg/L	0.040 U	0.040 U				0.040 U	0.040 U	0.040 U		
Chrysene	--	µg/L	0.040 U	0.040 U				0.040 U	0.040 U	0.040 U		
Dibenzo(a,h)anthracene	--	µg/L	0.040 U	0.040 U				0.040 U	0.040 U	0.040 U		
Fluoranthene	--	µg/L	0.040 U					0.040 U				
Fluorene	--	µg/L	0.040 UJ					0.040 UJ				
Hexachlorobutadiene	--	µg/L	1.0 U	1.0 U								
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U	0.040 U				0.040 U	0.040 U	0.040 U		
Naphthalene	--	µg/L	0.40 U	1.0 U				0.40 U				
Phenanthrene	--	µg/L	0.060 U					0.060 U				
Pyrene	--	µg/L	0.040 U					0.040 U				

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.6
RI Groundwater Analytical Results: TPH, BTEX, and PAHs

		Location Area	Southern Pipelines and Berths									
		Location Name	**OIP-06**	**GP-18**	**MW-37**				**MW-38**			
		Sample Name	**OIP-06-GW-25-30**	**GP-18-GW**	**MW-37-050720**	**MW-37-081020**	**MW-37-110220**	**MW-37-022321**	**MW-38-050720**	**MW-38-081020**	**MW-38-110220**	**MW-38-022321**
		Sample Date	**3/13/2020**	**9/18/2015**	**5/7/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**5/7/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**
Analyte	**Screening Level (1)**	**Unit**										
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx												
Gasoline-range organics	800	µg/L	100 U	100 U	100 U	120	100 U	260	100 U	100 U	100 U	100 U
Diesel-range organics	500	µg/L	200 (2)	50 U	210 (2)	50 U	160 (2)	63 (2)	74 (2)	57 (2)	50 U	50 U
Oil-range organics	500	µg/L	250 U	250 U	250 U	250 UJ	250 U	250 U	250 U	250 U	250 U	250 U
Total DRO and ORO	500	µg/L	200 (2)	250 U	210 (2)	250 UJ	160 (2)	63 (2)	74 (2)	57 (2)	250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-Dx Sg												
Diesel-range organics	500	µg/L										
Oil-range organics	500	µg/L										
Total DRO and ORO	500	µg/L										
BTEX Compounds by USEPA 8021B/8260D												
Benzene	5.0	µg/L	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
Ethylbenzene	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.7	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	µg/L	1.0 U	1.0 U	1.0 U	2.5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	--	µg/L	2.0 U		2.0 U	2.0 U	2.0 U	2.7	2.0 U	2.0 U	2.0 U	2.0 U
Xylene (ortho)	--	µg/L	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	10,000	µg/L	2.0 U (3)	3.0 U	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.7 (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)	2.0 U (3)
Semivolatile Organic Compounds (SVOCs)												
cPAHs (MTCA TEQ-HalfND)	0.10	µg/L	0.030 U		0.030	0.030 U			0.030 U	0.030 U		
cPAHs (MTCA TEQ-ZeroND)	0.10	µg/L	0 U (4)		0.00045	0 U (4)			0 U (4)	0 U (4)		
Total HPAH	--	µg/L			0.198				0.040 U			
Total LPAH	--	µg/L			0.89 J				0.40 UJ			
Total PAH	--	µg/L			1.1 J				0.40 UJ			
1-Methylnaphthalene	--	µg/L			0.40 U				0.40 U			
2-Methylnaphthalene	--	µg/L			0.40 U				0.40 U			
Acenaphthene	--	µg/L			0.82				0.040 U			
Acenaphthylene	--	µg/L			0.040 U				0.040 U			
Anthracene	--	µg/L			0.040 U				0.040 U			
Benzo(a)anthracene	--	µg/L	0.040 U		0.040 U	0.040 U			0.040 U	0.040 U		
Benzo(a)pyrene	--	µg/L	0.040 U		0.040 U	0.040 U			0.040 U	0.040 U		
Benzo(b)fluoranthene	--	µg/L	0.040 U		0.040 U	0.040 U			0.040 U	0.040 U		
Benzo(g,h,i)perylene	--	µg/L			0.040 U				0.040 U			
Benzo(k)fluoranthene	--	µg/L	0.040 U		0.040 U	0.040 U			0.040 U	0.040 U		
Chrysene	--	µg/L	0.040 U		0.045	0.040 U			0.040 U	0.040 U		
Dibenzo(a,h)anthracene	--	µg/L	0.040 U		0.040 U	0.040 U			0.040 U	0.040 U		
Fluoranthene	--	µg/L			0.043				0.040 U			
Fluorene	--	µg/L			0.073 J				0.040 UJ			
Hexachlorobutadiene	--	µg/L										
Indeno(1,2,3-c,d)pyrene	--	µg/L	0.040 U		0.040 U	0.040 U			0.040 U	0.040 U		
Naphthalene	--	µg/L	1.0 U		0.40 U				0.40 U			
Phenanthrene	--	µg/L			0.060 U				0.060 U			
Pyrene	--	µg/L			0.11				0.040 U			

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

Some wells were not samples each quarter due to accessibility, insufficient volume of groundwater, or presence of LNAPL, or were removed from the sampling program after the August 2020 sampling event. For additional details, refer to Section 4.3.

-- Not established.

BOLD RED Result exceeds screening level.

Bold Italics Analyte not detected; reporting limit exceeds screening level.

1 Remedial Investigation screening criteria established in the Remedial Investigation Work Plan (Floyd|Snider 2019a) and discussed in Section 4.1.

2 The laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3 Xylene (total) result is a calculated value.

4 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
HPAH	High molecular weight polycyclic aromatic hydrocarbon
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
PAH	Polycyclic aromatic hydrocarbon
TEQ	Toxic equivalent
UST	Underground storage tank

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JM	Concentration is estimated due to poor match to standard.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.7
RI Groundwater Analytical Results: VOCs

Location Area			Former 80,000-Barrel AST	Former Calloway Ross Parcel				Former Fuel Loading Rack Area						
Location Name			T-2	MW-03		MW-10		MW-07			MW-12		MW-40	
Sample Name			T-2-081120	MW-03-050620	MW-03-081020	MW-10-050620	MW-10-081020	MW-07-050620	MW-07-081120	MW-107-081120	MW-12-050720	MW-12-081120	MW-40-050620	MW-40-081120
Sample Date			8/11/2020	5/6/2020	8/10/2020	5/6/2020	8/10/2020	5/6/2020	8/11/2020	8/11/2020	5/7/2020	8/11/2020	5/6/2020	8/11/2020
Analyte	**Screening Level [1]**	**Unit**												
Volatile Organic Compounds by USEPA 8260D														
1,1-Dichloroethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloropropene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	--	µg/L	10 U			10 U	10 U				10 U	10 U	10 U	10 U
1,2-Dibromoethane [2]	--	µg/L	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
1,2-Dibromoethane	--	µg/L	1.0 U				1.0 U			1.0 U		1.0 U		1.0 U
1,2-Dichlorobenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	--	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichloropropane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0	1.0 U	1.0 U
1,3-Dichlorobenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
1,3,5-Trimethylbenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	3.3	1.0 U	1.0 U
1,4-Dichlorobenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	--	µg/L	10 U			10 U	10 U				10 U	10 U	10 U	10 U
2,2-Dichloropropane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Acetone	--	µg/L	50 U			50 U	50 U				50 U	50 U	50 U	50 U
Bromobenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	--	µg/L	5.0 U			5.0 U	5.0 U				5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	--	µg/L	5.0 U			5.0 U	5.0 U				5.0 U	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	--	µg/L	10 U			10 U	10 U				10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Cymene	--	µg/L	1.0 U			1.0 U	1.1				1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Methyl ethyl ketone	--	µg/L	20 U			20 U	20 U				20 U	20 U	20 U	20 U
Methylene chloride	--	µg/L	5.0 U			5.0 U	5.0 U				5.0 U	5.0 U	5.0 U	5.0 U
Methyl-tert-butyl ether	--	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
n-Hexane	--	µg/L	5.0 U			3.7	49				10	190	22	10
n-Propylbenzene	--	µg/L	1.0 U			9.1	64				3.7	82	19	5.0
sec-Butylbenzene	--	µg/L	1.0 U			1.0 U	3.2				1.0 U	3.5	2.9	1.2
Styrene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U

Table 4.7
RI Groundwater Analytical Results: VOCs

		Location Area	Former 80,000-Barrel AST	Former Calloway Ross Parcel				Former Fuel Loading Rack Area						
		Location Name	**T-2**	**MW-03**		**MW-10**		**MW-07**			**MW-12**		**MW-40**	
		Sample Name	**T-2-081120**	**MW-03-050620**	**MW-03-081020**	**MW-10-050620**	**MW-10-081020**	**MW-07-050620**	**MW-07-081120**	**MW-107-081120**	**MW-12-050720**	**MW-12-081120**	**MW-40-050620**	**MW-40-081120**
		Sample Date	**8/11/2020**	**5/6/2020**	**8/10/2020**	**5/6/2020**	**8/10/2020**	**5/6/2020**	**8/11/2020**	**8/11/2020**	**5/7/2020**	**8/11/2020**	**5/6/2020**	**8/11/2020**
Analyte	**Screening Level [1]**	**Unit**												
Volatile Organic Compounds by USEPA 8260D (cont.)														
tert-Butylbenzene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	--	µg/L	1.0 U			1.0 U	1.0 U				1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	--	µg/L	0.20 U			0.20 U	0.20 U				0.20 U	0.20 U	0.20 U	0.20 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

1 These volatile organic compounds were analyzed per the Remedial Investigation Work Plan (Floyd|Snider 2019a), but no screening criteria have been developed for this site.

2 1,2-Dibromoethane analyzed by USEPA Method 8011M.

Abbreviations:

AST	Aboveground storage tank
µg/L	Micrograms per liter
USEPA	U.S. Environmental Protection Agency

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 4.7
RI Groundwater Analytical Results: VOCs

		Location Area	**Former Mechanic's Shop**		**Monitoring Wells MW-26 and MW-28**			**Northern Portion of the Former Standard Pipelines**				**Perimeter Monitoring Wells**			
		Location Name	**UST4**		**MW-28**	**MW-34**		**MW-19**		**MW-39**		**MW-23**		**MW-35**	
		Sample Name	**UST-4-050620**	**UST-4-081020**	**MW-28-081120**	**MW-34-050620**	**MW-34-081020**	**MW-19-050720**	**MW-19-081020**	**MW-39-050720**	**MW-39-081020**	**MW-23-050620**	**MW-23-081120**	**MW-35-050620**	**MW-35-081020**
		Sample Date	**5/6/2020**	**8/10/2020**	**8/11/2020**	**5/6/2020**	**8/10/2020**	**5/7/2020**	**8/10/2020**	**5/7/2020**	**8/10/2020**	**5/6/2020**	**8/11/2020**	**5/6/2020**	**8/10/2020**
Analyte	**Screening Level** [1]	**Unit**													
Volatile Organic Compounds by USEPA 8260D															
1,1-Dichloroethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloropropene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	--	µg/L			10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U	10 U	10 U
1,2-Dibromoethane [2]	--	µg/L	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
1,2-Dibromoethane	--	µg/L			1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
1,2-Dichlorobenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	--	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichloropropane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3,5-Trimethylbenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	--	µg/L			10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U	10 U	10 U
2,2-Dichloropropane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	--	µg/L			50 U	50 U	50 U	50 U	50 U		50 U	50 U	50 U	50 U	50 U
Bromobenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	--	µg/L			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	--	µg/L			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	--	µg/L			10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cymene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl ethyl ketone	--	µg/L			20 U	20 U	20 U	20 U	20 U		20 U	20 U	20 U	20 U	20 U
Methylene chloride	--	µg/L			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl-tert-butyl ether	--	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
n-Hexane	--	µg/L			5.0 U	1.0 U	5.0 U	1.0 U	5.0 U	1.0 U	5.0 U	1.0 U	5.0 U	1.0 U	5.0 U
n-Propylbenzene	--	µg/L			1.0 U	1.0 U	1.2	1.0 U	1.0 U		9.4	1.0 U	1.0 U	1.0 U	1.0 U
sec-Butylbenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		2.3	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Table 4.7
RI Groundwater Analytical Results: VOCs

Location Area			Former Mechanic's Shop		Monitoring Wells MW-26 and MW-28			Northern Portion of the Former Standard Pipelines				Perimeter Monitoring Wells			
Location Name			UST4		MW-28	MW-34		MW-19		MW-39		MW-23		MW-35	
Sample Name			UST-4-050620	UST-4-081020	MW-28-081120	MW-34-050620	MW-34-081020	MW-19-050720	MW-19-081020	MW-39-050720	MW-39-081020	MW-23-050620	MW-23-081120	MW-35-050620	MW-35-081020
Sample Date			5/6/2020	8/10/2020	8/11/2020	5/6/2020	8/10/2020	5/7/2020	8/10/2020	5/7/2020	8/10/2020	5/6/2020	8/11/2020	5/6/2020	8/10/2020
Analyte	**Screening Level (1)**	**Unit**													
Volatile Organic Compounds by USEPA 8260D (cont.)															
tert-Butylbenzene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	--	µg/L			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	--	µg/L			0.20 U	0.20 U	0.20 U	0.20 U	0.20 U		0.20 U	0.20 U	0.20 U	0.20 U	0.20 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

1 These volatile organic compounds were analyzed per the Remedial Investigation Work Plan (Floyd|Snider 2019a), but no screening criteria have been developed for this site.

2 1,2-Dibromoethane analyzed by USEPA Method 8011M.

Abbreviations:

AST	Aboveground storage tank
µg/L	Micrograms per liter
USEPA	U.S. Environmental Protection Agency

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 4.8

RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	Former 80,000-Barrel AST					Former Calloway Ross Parcel					
		Location Name	MW-32		T-2			MW-02				MW-03	
		Sample Name	MW-32-050720	MW-32-081120	T-2-081120	T-2-110220	T-2-022321	MW-02-050620	MW-02-081020	MW-02-110220	MW-02-022321	MW-03-050620	MW-03-081020
		Sample Date	5/7/2020	8/11/2020	8/11/2020	11/2/2020	2/23/2021	5/6/2020	8/10/2020	11/2/2020	2/23/2021	5/6/2020	8/10/2020
Analyte	**Screening Level (1)**	**Unit**											
Conventionals													
Ferrous iron	--	mg/L											
Nitrate (as nitrogen)	--	mg/L											
Sulfate	--	mg/L											
Alkalinity (as $CaCO_3$)	--	mg/L											
Biochemical oxygen demand	--	mg/L											
Chemical oxygen demand	--	mg/L											
Field Parameters													
Conductivity	--	µS/cm	351.7	403	333	383.7	256	544	481.5	640	229.4	400	276.3
Dissolved oxygen	--	mg/L	0.63	0.50	2.63	0.45	1.03	6.58	1.49	1.18	8.47	0.14	0.2
ORP	--	mV	-119	-113	-65.5	-24.2	-76.1	84.2	119.2	74.6	195.9	-175.6	-16.5
pH	--	pH	6.26	6.5	6.47	6.41	6.75	6.29	6.28	6.18	6.68	6.36	6.32
Temperature	--	°C	13.6	16.1	14.4	14.3	12.6	13.6	16.6	16.9	12.9	14.7	16.7
Turbidity	--	NTU	9.07	5.8	22.3	0.65	17.6	8.9	4.22	1.12	2.51	3.3	6.95
Dissolved Gases													
Methane	--	mg/L											
Total Metals													
Lead	15	µg/L										1.0 U	1.0 U
Dissolved Metals													
Lead	15	µg/L										1.0 U	
Manganese	--	µg/L											

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 4.8

RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	**Former Calloway Ross Parcel (cont.)**										
		Location Name	**MW-03 (cont.)**		**MW-05**	**MW-08**				**MW-10**			
		Sample Name	**MW-03-110220**	**MW-03-022321**	**MW-05-022421**	**MW-08-050620**	**MW-08-081020**	**MW-08-110220**	**MW-08-022321**	**MW-10-050620**	**MW-10-081020**	**MW-10-110220**	**MW-10-022321**
		Sample Date	**11/2/2020**	**2/23/2021**	**2/24/2021**	**5/6/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**5/6/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**
Analyte	**Screening Level [(1)]**	**Unit**											
Conventionals													
Ferrous iron	--	mg/L								1.1	3.0	2.5	3.0
Nitrate (as nitrogen)	--	mg/L								0.10 UJ	0.20 U	0.20 UJ	0.20 U
Sulfate	--	mg/L								0.78	0.60 U	0.60 U	1.2 U
Alkalinity (as $CaCO_3$)	--	mg/L								43	120	130	150
Biochemical oxygen demand	--	mg/L											
Chemical oxygen demand	--	mg/L											
Field Parameters													
Conductivity	--	µS/cm	357	251	409	543	571	648	534	145.4	426.4	570	480
Dissolved oxygen	--	mg/L	0.15	1.19	3.93	0.080	0.21	0.26	0.8	0.42	0.24	0.18	1.18
ORP	--	mV	-95.8	-54.3	79.5	-87.9	-85	-157	177.7	52.8	-6.5	-146	-119
pH	--	pH	6.31	6.6	7.9	6.51	6.47	6.43	6.55	5.83	6.34	6.47	6.72
Temperature	--	°C	14.9	13.6	12.4	13.9	15.9	15.1	13.4	13.6	15.1	14.1	13.7
Turbidity	--	ntu	0.86	0.95	45.6	11.17	7.36	1.87	7.23	35.44	4.15	1.1	0.98
Dissolved Gases													
Methane	--	mg/L								1.6	2.4	4.4	3.3
Total Metals													
Lead	15	µg/L								1.0 U	1.0 U		
Dissolved Metals													
Lead	15	µg/L								1.0 U			
Manganese	--	µg/L								660	2,300	2,300	2,500

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 4.8
RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	**Former Fuel Loading Rack Area**											
		Location Name	**MW-07**					**MW-11**	**MW-12**				**MW-13**	
		Sample Name	**MW-07-050620**	**MW-07-081120**	**MW-107-081120**	**MW-07-110220**	**MW-07-022421**	**MW-11-050720**	**MW-12-050720**	**MW-12-081120**	**MW-12-110320**	**MW-12-022321**	**MW-13-050720**	**MW-13-081020**
		Sample Date	**5/6/2020**	**8/11/2020**	**8/11/2020**	**11/2/2020**	**2/24/2021**	**5/7/2020**	**5/7/2020**	**8/11/2020**	**11/3/2020**	**2/23/2021**	**5/7/2020**	**8/10/2020**
Analyte	**Screening Level [1]**	**Unit**												
Conventionals														
Ferrous iron	--	mg/L							2.62	2.5	4.0	2.5		
Nitrate (as nitrogen)	--	mg/L							0.92	0.10 U	0.10 U	0.10 U		
Sulfate	--	mg/L							0.50	0.31	0.36	0.60 U		
Alkalinity (as $CaCO_3$)	--	mg/L							54	200	190	190		
Biochemical oxygen demand	--	mg/L												
Chemical oxygen demand	--	mg/L												
Field Parameters														
Conductivity	--	µS/cm	452.4	494.4		429.1	333.1	535	129.5	554	515	503.1	568	533
Dissolved oxygen	--	mg/L	3.08	0.030		1.19	0.59	8.66	2.69	0.020	1.17	0.44	3.36	0.53
ORP	--	mV	-0.3	-128		-94.7	213.8	61.6	8.02	-109	-136.5	-117.2	-40.2	-128
pH	--	pH	6.52	6.69		6.21	6.53	6.9	6.38	6.45	6.4	6.44	6.88	6.66
Temperature	--	°C	14.4	14.1		14.4	12.6	14.6	14.5	14.6	13.3	12.6	14.5	16.4
Turbidity	--	ntu	45	0.60		0.65	2.41	39.8	6.28	9.0	0.68	1.25	27	4.28
Dissolved Gases														
Methane	--	mg/L							0.061	4.6	11	7.1		
Total Metals														
Lead	15	µg/L	1.0 U	1.0 U	1.0 U									
Dissolved Metals														
Lead	15	µg/L	1.0 U											
Manganese	--	µg/L							23	1,800	20	1,900		

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 4.8
RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	**Former Fuel Loading Rack Area (cont.)**												
		Location Name	**MW-14**				**MW-15**				**MW-16**	**MW-17**			
		Sample Name	**MW-14-050720**	**MW-14-081120**	**MW-14-110220**	**MW-14-022421**	**MW-15-050720**	**MW-15-081020**	**MW-15-110220**	**MW-15-022321**	**MW-16-050720**	**MW-17-050720**	**MW-17-081120**	**MW-17-110320**	**MW-17-022421**
		Sample Date	**5/7/2020**	**8/11/2020**	**11/2/2020**	**2/24/2021**	**5/7/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**5/7/2020**	**5/7/2020**	**8/11/2020**	**11/3/2020**	**2/24/2021**
Analyte	**Screening Level [1]**	**Unit**													
Conventionals															
Ferrous iron	--	mg/L	0.02		0.5 U	0.5 U						0.05	0.5 U	0.5 U	0.5 U
Nitrate (as nitrogen)	--	mg/L	3.0 J	0.10	3.6 J	2.8						0.88	0.27	2.0	2.0
Sulfate	--	mg/L	7.3	2.4	29	1.6						3.3	2.0	9.4	5.9
Alkalinity (as $CaCO_3$)	--	mg/L	210	220	220	180						210	170	93	170
Biochemical oxygen demand	--	mg/L													
Chemical oxygen demand	--	mg/L													
Field Parameters															
Conductivity	--	µS/cm	334.3	0.426	501	301.5	434.5	643	546	570	286.9	429	296.3	253.3	350.6
Dissolved oxygen	--	mg/L	2.16	0.56	1.73	2.02	0.35	0.03	1.13	1.27	2.78	8.55	5.38	6.99	7.1
ORP	--	mV	78.1	30.5	0.2	188.2	-96.6	-132.5	-133.5	-113.6	68.9	161.3	108	89.8	117.8
pH	--	pH	6.63	6.56	6.34	6.41	6.24	6.59	6.4	6.69	6.44	6.25	6.91	6.89	6.62
Temperature	--	°C	15.3	18	16	10.9	15.2	14.8	14.9	12.8	14.11	14.5	14.5	14.7	12
Turbidity	--	ntu	25.4	12.4	7.08	3.15	9.64	5.2	63.32	2	3.12	6.8	8.7	12.29	1.65
Dissolved Gases															
Methane	--	mg/L	0.0086 U	1.6	0.0086 U	0.007						0.0086 U	0.19	0.0086 U	0.0081
Total Metals															
Lead	15	µg/L													
Dissolved Metals															
Lead	15	µg/L													
Manganese	--	µg/L	6	88	19	1.9						2.5	2.7	2.5	2.5

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST Aboveground storage tank
°C Degrees Celsius
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg/L Milligrams per liter
MTCA Model Toxics Control Act
mV Millivolts
NTU Nephelometric turbidity units
ORP Oxidation-reduction potential

Qualifiers:

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

Table 4.8
RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	**Former Fuel Loading Rack Area (cont.)**													
		Location Name	**MW-20**		**MW-25**				**MW-33**				**MW-40**			
		Sample Name	**MW-20-050720**	**MW-20-022321**	**MW-25-050720**	**MW-25-081120**	**MW-25-110320**	**MW-25-022321**	**MW-33-050620**	**MW-33-081120**	**MW-33-110220**	**MW-33-022421**	**MW-40-050620**	**MW-40-081120**	**MW-40-110220**	**MW-40-022421**
		Sample Date	**5/7/2020**	**2/23/2021**	**5/7/2020**	**8/11/2020**	**11/3/2020**	**2/23/2021**	**5/6/2020**	**8/11/2020**	**11/2/2020**	**2/24/2021**	**5/6/2020**	**8/11/2020**	**11/2/2020**	**2/24/2021**
Analyte	**Screening Level [(1)]**	**Unit**														
Conventionals																
Ferrous iron	--	mg/L	4.8	2.5	3.11	4.5	2.5	3.5								
Nitrate (as nitrogen)	--	mg/L	0.20 U	0.10 U	0.10 U	0.11	1.0 U	0.10 U								
Sulfate	--	mg/L	0.69	0.60 U	4.1	0.34	0.35	4.5								
Alkalinity (as $CaCO_3$)	--	mg/L	430	430	78	190	190	280								
Biochemical oxygen demand	--	mg/L	45										11 J			
Chemical oxygen demand	--	mg/L	69										46			
Field Parameters																
Conductivity	--	µS/cm	802	914	301.9	398	434.9	416	474.6	298.6	397.3	432	407	279.1	415	263
Dissolved oxygen	--	mg/L	2.23	0.54	0.08	0.67	1.08	0.49	2.74	0.4	0.66	0.28	0.21	5.6	0.41	0.55
ORP	--	mV	-124	-135.5	-70.9	-102	-135.9	-84.5	-53.8	88.4	-101.8	-108.6	-156	104.3	-152	182
pH	--	pH	6.76	6.69	6.52	6.47	6.45	6.33	6.46	6.3	6.48	6.48	6.54	6.37	6.54	6.65
Temperature	--	°C	16.6	12.2	12.4	15.8	16.2	10.8	14.8	14.2	14	13	14	14.8	14.3	12.3
Turbidity	--	ntu	43.4	2.34	7.3	3.9	1.7	1.09	72.5	19.33	3.57	1.17	3.7	5.89	2.01	0.98
Dissolved Gases																
Methane	--	mg/L	5.9 J	9.2	2.1	4.6	7.3	5.1								
Total Metals																
Lead	15	µg/L														
Dissolved Metals																
Lead	15	µg/L														
Manganese	--	µg/L	3,000	2,800	720	1,400	2,000	1,000								

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 4.8

RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

Location Area			**Former Mechanic's Shop**				**Monitoring Wells MW-26 and MW-28**									
Location Name			**UST4**				**MW-18**				**MW-24**				**MW-26**	
Sample Name			**UST-4-050620**	**UST-4-081020**	**UST-4-110220**	**UST-4-022321**	**MW-18-050720**	**MW-18-081120**	**MW-18-110320**	**MW-18-022421**	**MW-24-022321**	**MW-24-050720**	**MW-24-081120**	**MW-24-110320**	**MW-26-050720**	**MW-26-081020**
Sample Date			**5/6/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**5/7/2020**	**8/11/2020**	**11/3/2020**	**2/24/2021**	**2/23/2021**	**5/7/2020**	**8/11/2020**	**11/3/2020**	**5/7/2020**	**8/10/2020**
Analyte	**Screening Level [(1)]**	**Unit**														
Conventionals																
Ferrous iron	--	mg/L					0.15	0.5 U	0.5 U	0.5 U	0.5 U	0.0 U	0.5 U	0.5 U		
Nitrate (as nitrogen)	--	mg/L					0.96	0.54	1.6	2.8	1.3	0.88	0.95	2.3		
Sulfate	--	mg/L					4.0	3.8	7.5	6.8	5.9	5.2	4.8	7.6		
Alkalinity (as $CaCO_3$)	--	mg/L					88	110	69	62	89	110	130	120		
Biochemical oxygen demand	--	mg/L														
Chemical oxygen demand	--	mg/L														
Field Parameters																
Conductivity	--	µS/cm	277.5	211	267.9	220	194	198.2	161.1	209.4	166	188	247.9	275	195.1	218.5
Dissolved oxygen	--	mg/L	8.13	4.48	3.57	6.26	9.63	2.13	7.93	8.68	7.43	5.89	7.11	6.2	1.57	7.29
ORP	--	mV	94.7	127	99.7	35.1	114	63.8	78.1	124	75.2	109	113.9	65.5	-28.3	-67.7
pH	--	pH	5.9	6.05	6.02	6.13	6.8	6.51	6.69	6.73	6.78	6.92	6.8	6.91	6.29	6.52
Temperature	--	°C	14.8	17.5	15.8	13.9	13.7	14.6	14.1	11.6	12.1	13.1	14	13.5	13.2	22.2
Turbidity	--	ntu	19.1	15.3	1.4	2.42	5.5	6.69	1.21	0.79	11.5	17.2	39.87	2.72	28.01	20.87
Dissolved Gases																
Methane	--	mg/L					0.0086 U	0.025	0.019	0.0068 U	0.0068 U	0.016	0.0086 U	0.0086 U		
Total Metals																
Lead	15	µg/L	1.0 U	1.0 U												
Dissolved Metals																
Lead	15	µg/L	1.0 U													
Manganese	--	µg/L					3.5	100	12	1.8 U	2.9	9.1	6.4	3.1		

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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UJ	Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 4.8

RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	Monitoring Wells MW-26 and MW-28 (cont.)													
		Location Name	MW-26 (cont.)		MW-27		MW-28		MW-29				MW-34			
		Sample Name	MW-26-110220	MW-26-022321	MW-27-050720	MW-27-081020	MW-28-081120	MW-28-022421	MW-29-050620	MW-29-081120	MW-29-110320	MW-29-022421	MW-34-050620	MW-34-081020	MW-34-110220	MW-34-022421
		Sample Date	11/2/2020	2/23/2021	5/7/2020	8/10/2020	8/11/2020	2/24/2021	5/6/2020	8/11/2020	11/3/2020	2/24/2021	5/6/2020	8/10/2020	11/2/2020	2/24/2021
Analyte	**Screening Level [1]**	**Unit**														
Conventionals																
Ferrous iron	--	mg/L						0.5 U	0.0 U	0.5 U	0.5 U	0.5 U				
Nitrate (as nitrogen)	--	mg/L						1.4	2.4 J	2.2	2.1	0.87				
Sulfate	--	mg/L						4.2	9.9	14	13	1.3				
Alkalinity (as $CaCO_3$)	--	mg/L						41	47	49	64	45				
Biochemical oxygen demand	--	mg/L														
Chemical oxygen demand	--	mg/L														
Field Parameters																
Conductivity	--	µS/cm	259.6	137	531	445	203.4	114	120.6	167	210	92	267.8	1,906	2,706	856
Dissolved oxygen	--	mg/L	0.59	7.31	3.12	0.73	1.57	1.5	4.12	2.78	1.39	6.29	0.46	0.56	0.45	1.31
ORP	--	mV	-4.8	51.5	21.6	-37.8	2.8	175.4	120.3	63.7	42.7	51.2	-56.2	-25.5	-8.7	-31.5
pH	--	pH	6.39	6.08	6.48	6.31	6.2	5.5	6.17	6.35	6.35	6.32	5.79	5.88	5.9	6.51
Temperature	--	°C	16	12.3	13.9	16.3	17.5	12	14.2	14.1	14.3	12.4	15.3	17.3	14.9	14.5
Turbidity	--	ntu	12.8	3.87	22.2	18.24	17.02	10.36	0.17	3.69	0.72	3.94	4.77	3.3	2.19	4.48
Dissolved Gases																
Methane	--	mg/L						0.052	0.0097	0.017	0.0086 U	0.0068 U				
Total Metals																
Lead	15	µg/L														
Dissolved Metals																
Lead	15	µg/L														
Manganese	--	µg/L						10	2.0 U	2.0 U	2.5	1.8 U				

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 4.8
RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	Northern Portion of the Former Standard Pipelines										Perimeter Monitoring Wells		
		Location Name	MW-06				MW-19		MW-39				MW-01		MW-04
		Sample Name	MW-06-050620	MW-06-081020	MW-06-110220	MW-06-022321	MW-19-050720	MW-19-081020	MW-39-050720	MW-39-081020	MW-39-110220	MW-39-022321	MW-01-050620	MW-01-081020	MW-04-022421
		Sample Date	5/6/2020	8/10/2020	11/2/2020	2/23/2021	5/7/2020	8/10/2020	5/7/2020	8/10/2020	11/2/2020	2/23/2021	5/6/2020	8/10/2020	2/24/2021
Analyte	**Screening Level (1)**	**Unit**													
Conventionals															
Ferrous iron	--	mg/L					0.02	0.5 U							
Nitrate (as nitrogen)	--	mg/L					5.3 J	7.7 J							
Sulfate	--	mg/L					10	16							
Alkalinity (as $CaCO_3$)	--	mg/L					110	93							
Biochemical oxygen demand	--	mg/L													
Chemical oxygen demand	--	mg/L													
Field Parameters															
Conductivity	--	µS/cm	185	239.4	285.7	252.6	273.8	422.8	522	562	482.7	613.5	225	274.6	477
Dissolved oxygen	--	mg/L	0.15	0.1	1.13	0.61	3.34	0.97	2.93	0.01	1.13	2.53	3.76	-0.03	7.7
ORP	--	mV	-86.4	-116.1	-104.6	-111.4	71.1	126.4	-7.9	-144.4	-120.4	-129.5	-39.8	-93.2	55.4
pH	--	pH	6.61	6.55	6.19	6.42	5.98	6.13	6.45	6.51	6.19	6.41	6.4	6.51	11.26
Temperature	--	°C	13.1	16.3	15.5	13.4	14.6	15.4	16	16.1	14.7	13.5	13	15.1	11.5
Turbidity	--	ntu	10.65	2.4	0.61	2.57	3.8	0	5.8	-0.4	1	0.81	5.7	-2.0	2.67
Dissolved Gases															
Methane	--	mg/L					0.0086 U	0.0086 U							
Total Metals															
Lead	15	µg/L													
Dissolved Metals															
Lead	15	µg/L													
Manganese	--	µg/L					2.0 U	2.0 U							

Notes:

	Blank cells are intentional.
	All laboratory results rounded to two significant figures. Field parameters are not rounded.
--	Not established.
1	MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 4.8
RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	**Perimeter Monitoring Wells (cont.)**												
		Location Name	**MW-22**					**MW-23**					**MW-30**		
		Sample Name	**MW-22-050720**	**MW-22-081120**	**MW-122-081120**	**MW-22-110320**	**MW-22-022421**	**MW-23-050620**	**MW-23-081120**	**MW-23-110320**	**MW-123-110320**	**MW-23-022421**	**MW-30-081120**	**MW-30-110220**	**MW-30-022421**
		Sample Date	**5/7/2020**	**8/11/2020**	**8/11/2020**	**11/3/2020**	**2/24/2021**	**5/6/2020**	**8/11/2020**	**11/3/2020**	**11/3/2020**	**2/24/2021**	**8/11/2020**	**11/2/2020**	**2/24/2021**
Analyte	**Screening Level [(1)]**	**Unit**													
Conventionals															
Ferrous iron	--	mg/L	5.26	4.0		1.5	3.5	9.64	2.5	4		4.5	0.5 U	0.5 U	0.5 U
Nitrate (as nitrogen)	--	mg/L	0.11	0.10 U	0.10 U	1.0 U	0.10 U	0.20 UJ	0.40 U	1.0 U	1.0 U	1.0 U	42 J	58 J	24
Sulfate	--	mg/L	0.3 U	0.31	0.30	0.33	2.3	3.3	7.3	14	14	14	130	230	97
Alkalinity (as $CaCO_3$)	--	mg/L	150	150	150	160	130	100	93	88	100	83	140	150	140
Biochemical oxygen demand	--	mg/L													
Chemical oxygen demand	--	mg/L													
Field Parameters															
Conductivity	--	µS/cm	284.2	266		302	205	633	712	1,154		720	1,167	1,872	700
Dissolved oxygen	--	mg/L	2.74	0.51		0.53	0.38	0.15	0.29	1.24		1.45	2.49	2.1	3.85
ORP	--	mV	27.3	-49.6		14.1	15	-99.1	-385	-98.9		11.2	127.3	35.6	54
pH	--	pH	6.23	6.38		6.48	6.38	6.5	6.44	6.15		6.31	6.28	6.37	6.84
Temperature	--	°C	14.8	15.4		14.5	13.6	15.5	15.5	13.4		13.7	15.5	15.7	13.2
Turbidity	--	ntu	9.9	6		0.71	0.43	4.14	3.35	1.57		1.23	4.2	0.27	0.35
Dissolved Gases															
Methane	--	mg/L	0.98	4.0	2.8	3.0	2.6	0.77	0.75	0.46	0.35	0.94	0.0086 U	0.0086 U	0.0068 U
Total Metals															
Lead	15	µg/L													
Dissolved Metals															
Lead	15	µg/L													
Manganese	--	µg/L	790	1,100	1,100	1,100	870	2,100	2,600	3,700	4,000	1,600	130	490	180

Notes:

Blank cells are intentional.
All laboratory results rounded to two significant figures. Field parameters are not rounded.
-- Not established.
1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 4.8
RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	Perimeter Monitoring Wells (cont.)												
		Location Name	MW-31				MW-35					MW-36			
		Sample Name	MW-31-050620	MW-31-081020	MW-31-110220	MW-31-022321	MW-35-050620	MW-35-081020	MW-35-110220	MW-35-022421	MW-135-022421	MW-36-050620	MW-36-081020	MW-36-110220	MW-36-022321
		Sample Date	5/6/2020	8/10/2020	11/2/2020	2/23/2021	5/6/2020	8/10/2020	11/2/2020	2/24/2021	2/24/2021	5/6/2020	8/10/2020	11/2/2020	2/23/2021
Analyte	**Screening Level [1]**	**Unit**													
Conventionals															
Ferrous iron	--	mg/L	0.0 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U					
Nitrate (as nitrogen)	--	mg/L	5.6 J	4.4	1.5 J	5.1		13 J	5.3 J	9.3	9.3				
Sulfate	--	mg/L	17	18	16	13		8.3	6.7	15	16				
Alkalinity (as $CaCO_3$)	--	mg/L	230	200	210	190		78	88	86	89				
Biochemical oxygen demand	--	mg/L													
Chemical oxygen demand	--	mg/L													
Field Parameters															
Conductivity	--	µS/cm	375.8	386	458	319	364.8	433	338.9	403.4		270	232	266	191
Dissolved oxygen	--	mg/L	3.53	6.09	1.46	2.9	0.13	1.05	0.43	1.35		0.24	1.29	0.49	6.22
ORP	--	mV	124.1	127.3	42.9	187	120	74.9	49.8	138.2		100	61.1	42.8	15.6
pH	--	pH	6.53	6.42	6.44	6.53	6.55	6.44	6.6	6.67		6.42	6.26	6.1	6.45
Temperature	--	°C	14.3	16	14.8	13.6	13.2	18.4	15	13.3		15.5	17.1	15.9	14.2
Turbidity	--	ntu	6.03	6	15.6	5.34	7.7	9.6	1.02	1.43		10.7	9.3	3.0	52.4
Dissolved Gases															
Methane	--	mg/L	0.0086 U	0.0086 U	0.022	0.043		0.013	0.017	0.0068 U	0.0068 U				
Total Metals															
Lead	15	µg/L													
Dissolved Metals															
Lead	15	µg/L													
Manganese	--	µg/L	2.0 U	2.0 U	2.1	9.2		26	6.4	9.1	9.1				

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST	Aboveground storage tank
°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MTCA	Model Toxics Control Act
mV	Millivolts
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 4.8
RI Groundwater Analytical Results: Monitored Natural Attenuation Parameters and Metals

		Location Area	**Southern Pipelines and Berths**							
		Location Name	**MW-37**				**MW-38**			
		Sample Name	**MW-37-050720**	**MW-37-081020**	**MW-37-110220**	**MW-37-022321**	**MW-38-050720**	**MW-38-081020**	**MW-38-110220**	**MW-38-022321**
		Sample Date	**5/7/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**	**5/7/2020**	**8/10/2020**	**11/2/2020**	**2/23/2021**
Analyte	**Screening Level (1)**	**Unit**								
Conventionals										
Ferrous iron	--	mg/L								
Nitrate (as nitrogen)	--	mg/L								
Sulfate	--	mg/L								
Alkalinity (as $CaCO_3$)	--	mg/L								
Biochemical oxygen demand	--	mg/L								
Chemical oxygen demand	--	mg/L								
Field Parameters										
Conductivity	--	µS/cm	1,799	1,267	1,509	890	466.3	381	487	338
Dissolved oxygen	--	mg/L	0.12	0.4	1.78	0.20	3.49	0.43	0.49	0.29
ORP	--	mV	-130.8	-110.5	-57.1	-1.8	-6.5	-83.6	-47.5	-37.7
pH	--	pH	6.84	6.83	6.42	6.89	6.3	6.61	6.33	6.49
Temperature	--	°C	14.6	18.5	15.4	12.9	14.6	17.2	15.7	14.7
Turbidity	--	ntu	8.7	87.3	2.54	1.74	230.1	104	92.1	3.58
Dissolved Gases										
Methane	--	mg/L								
Total Metals										
Lead	15	µg/L								
Dissolved Metals										
Lead	15	µg/L								
Manganese	--	µg/L								

Notes:

Blank cells are intentional.

All laboratory results rounded to two significant figures. Field parameters are not rounded.

-- Not established.

1 MTCA Method A cleanup levels are used as screening levels for total and dissolved lead.

Abbreviations:

AST Aboveground storage tank
°C Degrees Celsius
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg/L Milligrams per liter
MTCA Model Toxics Control Act
mV Millivolts
NTU Nephelometric turbidity units
ORP Oxidation-reduction potential

Qualifiers:

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

Table 4.9
RI Soil Vapor Analytical Results

		Location Area	**Former Calloway Ross Parcel**					
		Location Name	**VP-1**				**VP-2**	
		Sample Name	**SVP-01-050820**	**SVP-101-050820**	**SVP-1-110320**	**SVP-101-110320**	**SVP-02-050820**	**SVP-2-110320**
		Sample Date	**5/8/2020**	**5/8/2020**	**11/3/2020**	**11/3/2020**	**5/8/2020**	**11/3/2020**
Analyte	**MTCA Sub-slab Method B Screening Level**	**Unit**						
Conventionals								
Helium	--	%	0.60 U	0.60 U			0.60 U	
Isopropyl alcohol	--	µg/m³			28 U	27 U		330 J
Total Petroleum Hydrocarbons (TPH)								
TPH	4,700	µg/m³	180	160			450	
Air Phase Hydrocarbons								
C5-C8 Aliphatics	--	µg/m³	90 U	96 U	130 U	120 U	100	210
C9-C10 Aromatics	--	µg/m³	75 U	80 U	82	86	77 U	82 U
C9-C12 Aliphatics	--	µg/m³	180	160	480	480	350	310
Volatile Organic Compounds								
Benzene	11	µg/m³	0.96 U	1.0 U	1.0 U	0.99 U	0.99 U	1.1 U
Toluene	7,600	µg/m³	57 U	60 U	60 U	58 U	58 U	62 U
Ethylbenzene	15,000	µg/m³	1.3 U	1.4 U	1.7	1.4	1.3 U	9.0
Xylene (total)	1,500	µg/m³	2.6 U	2.8 U	10	8.2	5.6	56
Polycyclic Aromatic Hydrocabons								
Naphthalene	2.5	µg/m³	0.79 U	0.84 U	0.84 U	0.81 U	0.81 U	0.86 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not available.

Abbreviations:

µg/m³ Micrograms per cubic meter

MTCA Model Toxics Control Act

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.

U Analyte was not detected at the given reporting limit.

Table 4.10
Monitoring Well Groundwater Elevations

Well	Aquifer	Screened Interval (ft bgs)	TOC Elevation (ft NAVD 88)	Date	Time	Depth to Water (ft bgs)	Depth to LNAPL (ft bgs)	Groundwater Elevation (ft NAVD 88)
MW-01	Alluvial Aquifer	6.3–16.3	17.96	5/6/2020	11:34	11.17	--	6.79
				8/10/2020	10:08	11.70	--	6.26
				11/2/2020	9:45	12.06	--	5.90
				2/23/2021	9:57	9.74	--	8.22
MW-02	Perched	6.2–12.4	22.71	5/6/2020	10:59	9.76	--	12.95
				8/10/2020	10:19	10.17	--	12.54
				11/2/2020	10:19	10.18	--	12.53
				2/23/2021	9:36	8.50	--	14.21
MW-03	Alluvial Aquifer	8.4–18.4	20.93	5/6/2020	10:48	13.39	--	7.54
				8/10/2020	10:15	14.18	--	6.75
				11/2/2020	11:41	14.65	--	6.28
				2/23/2021	9:26	12.28	--	8.65
MW-04 (1)	Perched	7.4–17.4	24.22	5/6/2020	--	--	--	--
				8/10/2020	9:30	17.12	--	7.10
				11/2/2020	9:37	17.24	--	6.98
				2/23/2021	9:30	10.52	--	13.70
MW-05	Alluvial Aquifer	12.5–22.5	22.69	5/6/2020	11:11	14.96	--	7.73
				8/10/2020	10:21	15.90	--	6.79
				11/2/2020	11:47	16.36	--	6.33
				2/23/2021	9:30	13.74	--	8.95
MW-06	Alluvial Aquifer	16–21	17.48	5/6/2020	11:45	10.62	--	6.86
				8/10/2020	10:15	11.35	--	6.13
				11/2/2020	10:59	11.64	--	5.84
				2/23/2021	10:26	9.35	--	8.13
MW-07	Alluvial Aquifer	18–23	22.21	5/6/2020	11:57	14.82	--	7.39
				8/10/2020	10:40	15.60	--	6.61
				11/2/2020	--	--	--	--
				2/23/2021	11:05	13.57	--	8.64
MW-08	Alluvial Aquifer	18–23	20.61	5/6/2020	10:25	13.19	--	7.42
				8/10/2020	10:08	13.93	--	6.68
				11/2/2020	11:36	14.42	--	6.19
				2/23/2021	9:22	12.05	--	8.56
MW-09	Alluvial Aquifer (2)	8–18	23.36	5/6/2020	14:30	16.19	16.05	7.28
				8/11/2020	10:05	16.96	16.85	6.49
				11/2/2020	10:47	17.02	16.95	6.40
				2/23/2021	11:02	14.98	14.45	8.81
MW-10	Alluvial Aquifer	18–23	22.89	5/6/2020	10:36	15.38	--	7.51
				8/10/2020	10:11	16.21	--	6.68
				11/2/2020	11:49	16.30	--	6.59
				2/23/2021	9:46	14.43	--	8.46
MW-11	Perched	6.7–16.7	25.07	5/07/2020 (4)	12:37	12.39	--	12.68
				8/10/2020	10:55	15.43	--	9.64
				11/2/2020	10:27	14.84	--	10.23
				2/23/2021	10:43	6.45	--	18.62
MW-12	Alluvial Aquifer	22–27	21.16	5/07/2020 (4)	13:58	13.60	--	7.56
				8/11/2020 (5)	12:28	14.60	--	6.56
				11/2/2020	10:41	14.95	--	6.21
				2/23/2021	10:45	12.52	--	8.64
MW-13	Perched	13–18	25.09	5/07/2020 (4)	11:01	11.03	--	14.06
				8/10/2020	11:06	11.46	--	13.63
				11/2/2020	10:21	10.99	--	14.10
				2/23/2021	10:22	9.05	--	16.04
MW-14	Perched	7–12	23.77	5/07/2020 (4)	13:44	6.43	--	17.34
				8/10/2020	10:42	8.51	--	15.26
				11/2/2020	10:43	6.83	--	16.94
				2/23/2021	10:57	4.65	--	19.12
MW-15	Alluvial Aquifer	8.5–18.5	21.75	5/07/2020 (4)	12:40	14.11	--	7.64
				8/10/2020	10:25	15.00	--	6.75
				11/2/2020	10:56	15.50	--	6.25
				2/23/2021	10:40	12.99	--	8.76
MW-16	Perched	4.5–14.5	22.06	5/07/2020 (4)	11:30	9.92	--	12.14
				8/10/2020	10:31	12.41	--	9.65
				11/2/2020	10:55	10.84	--	11.22
				2/23/2021	11:00	5.40	--	16.66
MW-17	Perched	7.5–17.5	25.24	5/07/2020 (4)	9:48	10.07	--	15.17
				8/10/2020	11:12	12.62	--	12.62
				11/2/2020	11:28	9.13	--	16.11
				2/23/2021	10:20	6.80	--	18.44
MW-18	Perched	8–18	26.56	5/07/2020 (4)	12:37	12.50	--	14.06
				8/10/2020	11:40	13.40	--	13.16
				11/2/2020	10:17	12.69	--	13.87
				2/23/2021	10:33	9.80	--	16.76

Table 4.10
Monitoring Well Groundwater Elevations

Well	Aquifer	Screened Interval (ft bgs)	TOC Elevation (ft NAVD 88)	Date	Time	Depth to Water (ft bgs)	Depth to LNAPL (ft bgs)	Groundwater Elevation (ft NAVD 88)
MW-19	Alluvial Aquifer	13.5–18.5	20.20	5/7/2020 (4)	13:55	13.30	--	6.90
				8/10/2020	10:14	13.95	--	6.25
				11/2/2020	11:12	14.35	--	5.85
				2/23/2021	10:37	12.09	--	8.11
MW-20	Alluvial Aquifer	11.5–21.5	23.34	5/07/2020 (4)	12:13	15.55	--	7.79
				8/11/2020 (5)	10:00	16.78	--	6.56
				11/2/2020	10:33	17.10	--	6.24
				2/23/2021	10:57	14.74	--	8.60
MW-22	Alluvial Aquifer	20.2–30.2	31.40	5/6/2020	9:28	23.04	--	8.36
				8/10/2020	11:07	24.76	--	6.64
				11/2/2020	9:54	24.97	--	6.43
				2/23/2021	9:55	22.83	--	8.57
MW-23	Alluvial Aquifer	22.4–32.4	31.43	5/6/2020	8:53	22.93	--	8.50
				8/10/2020	10:43	24.72	--	6.71
				11/2/2020	9:43	24.95	--	6.48
				2/23/2021	9:46	22.90	--	8.53
MW-24	Perched	9.6–19.6	27.89	5/6/2020	10:02	12.58	--	15.31
				8/10/2020	11:36	13.31	--	14.58
				11/2/2020	10:04	12.51	--	15.38
				2/23/2021	10:10	10.90	--	16.99
MW-25	Perched (3)	7.8–17.8	21.45	5/07/2020 (4)	10:45	8.02	--	13.43
				8/11/2020 (5)	11:31	9.68	--	11.77
				11/2/2020	10:36	10.45	--	11.00
				2/23/2021	10:50	6.40	--	15.05
MW-26	Perched	9.4–19.4	27.14	5/6/2020	10:13	12.89	--	14.25
				8/10/2020	11:20	13.08	--	14.06
				11/2/2020	10:06	13.10	--	14.04
				2/23/2021	10:12	10.48	--	16.66
MW-27	Alluvial Aquifer	18–28	25.90	5/07/2020 (4)	10:01	18.10	--	7.80
				8/10/2020	11:27	18.50	--	7.40
				11/2/2020	10:13	19.85	--	6.05
				2/23/2021	10:36	17.40	--	8.50
MW-28	Perched	9.8–19.8	27.36	5/07/2020 (4)	15:50	17.91	--	9.45
				8/10/2020	11:35	13.60	--	13.76
				11/2/2020	10:10	18.45	--	8.91
				2/23/2021	10:15	11.75	--	15.61
MW-29	Perched (3)	15–27.7	29.77	5/6/2020	15:05	15.82	--	13.95
				8/10/2020	11:31	16.20	--	13.57
				11/2/2020	10:49	16.46	--	13.31
				2/23/2021	10:08	14.30	--	15.47
MW-30 (1)	Perched (3)	9–26	26.32	5/6/2020	--	--	--	--
				8/10/2020	8:45	16.80	--	9.52
				11/2/2020	9:34	17.32	--	9.00
				2/23/2021	9:25	13.75	--	12.57
MW-31	Alluvial Aquifer	9–19	19.89	5/6/2020	11:22	13.09	--	6.80
				8/10/2020	10:02	13.72	--	6.17
				11/2/2020	10:16	14.15	--	5.74
				2/23/2021	9:48	11.87	--	8.02
MW-32	Alluvial Aquifer	8–18	21.17	5/6/2020	12:08	13.38	--	7.79
				8/10/2020	09:45	14.31	--	6.86
				11/2/2020	11:25	14.76	--	6.41
				2/23/2021	10:12	12.06	--	9.11
MW-33	Alluvial Aquifer	18–28	25.91	5/6/2020	15:08	18.32	--	7.59
				8/10/2020	11:15	19.25	--	6.66
				11/2/2020	11:05	19.61	--	6.30
				2/23/2021	10:18	17.30	--	8.61
MW-34	Alluvial Aquifer	22–32	26.67	5/6/2020	8:30	18.74	--	7.93
				8/10/2020	10:21	20.27	--	6.40
				11/2/2020	9:25	20.55	--	6.12
				2/23/2021	9:15	18.45	--	8.22
MW-35	Perched (3)	16–26	26.95	5/6/2020	8:41	14.20	--	12.75
				8/10/2020	10:36	15.08	--	11.87
				11/2/2020	9:27	16.24	--	10.71
				2/23/2021	9:20	14.71	--	12.24
MW-36	Alluvial Aquifer	25–35	31.59	5/6/2020	9:39	23.50	--	8.09
				8/10/2020	11:13	25.05	--	6.54
				11/2/2020	9:57	25.34	--	6.25
				2/23/2021	10:00	23.08	--	8.51
MW-37	Alluvial Aquifer	25–35	31.13	5/6/2020	9:05	22.54	--	8.59
				8/10/2020	10:59	23.91	--	7.22
				11/2/2020	9:47	24.42	--	6.71
				2/23/2021	9:50	22.52	--	8.61

Table 4.10
Monitoring Well Groundwater Elevations

Well	Aquifer	Screened Interval (ft bgs)	TOC Elevation (ft NAVD 88)	Date	Time	Depth to Water (ft bgs)	Depth to LNAPL (ft bgs)	Groundwater Elevation (ft NAVD 88)
MW-38	Alluvial Aquifer	25–35	31.09	5/6/2020	09:16	22.32	--	8.77
				8/10/2020	11:03	24.09	--	7.00
				11/2/2020	9:51	24.48	--	6.61
				2/23/2021	9:53	22.74	--	8.35
MW-39	Alluvial Aquifer	8–18	18.95	5/07/2020 (4)	13:18	12.08	--	6.87
				8/10/2020	10:30	12.80	--	6.15
				11/2/2020	11:09	13.16	--	5.79
				2/23/2021	10:32	10.85	--	8.10
MW-40	Alluvial Aquifer	16–26	24.65	5/6/2020	14:14	17.05	--	7.60
				8/10/2020	10:55	18.07	--	6.58
				11/2/2020	10:29	18.71	--	5.94
				2/23/2021	10:48	16.40	--	8.25
UST-4 (6)	Perched	14.3–24.3	31.68	5/6/2020	9:51	17.34	--	14.34
				8/10/2020	11:19	17.67	--	14.01
				11/2/2020	10:00	18.03	--	13.65
				2/23/2021	10:05	16.31	--	15.37
T-2 (1)	Alluvial Aquifer	9.8–19.8 (7)	19.30	5/6/2020	--	--	--	--
				8/10/2020	10:00	12.91	--	6.39
				11/2/2020	11:28	13.20	--	6.10
				2/23/2021	10:16	10.82	--	8.48

Notes:

--	Not applicable.
1	Well not accessible or known during the May 2020 sampling event.
2	A portion of the well screen extends through both the perched zone and alluvial aquifer. Groundwater elevations appear to be in equilibrium with the alluvial aquifer, but may also be affected by pressure in the overlying perched zone.
3	The well screen extends through both the perched zone and alluvial aquifer. Groundwater elevations appear to be in equilibrium with the perched aquifer, but may also be affected by the pressure in the underlying alluvial aquifer.
4	Well not accessible on first day of depth to water measurements.
5	Groundwater elevation not used in contour figures due to depth to water measurement collected on a different day.
6	Groundwater elevation not used in contour figures.
7	Well log not available; screened interval is based on total depth and consistency with Site wells.

Abbreviations:

bgs	Below ground surface
ft	Feet
LNAPL	Light non-aqueous phase liquid
NAVD 88	North American Vertical Datum of 1988
TOC	Top of casing

Table 7.1
Groundwater Preliminary Cleanup Levels

		Protection of Drinking Water				Adjustment Factors (1)	
Analyte	**CAS No.**	**MTCA Method A Cleanup Levels**	**MTCA Method B Cleanup Levels**	**Federal MCL Goal (Non-cancer)**	**Washington State MCL**	**Practical Quantitation Limit**	**Preliminary CUL (2)**
Metals (µg/L) (3)							
Lead	7439-92-1	15	--	--	15	1.0	15
Total Petroleum Hydrocarbons (µg/L)							
Gasoline-range organics (4)	GRO	800	--	--	--	100	800
Diesel-range organics	DRO	500	--	--	--	50	500
Oil-range organics	ORO	500	--	--	--	250	500
Total DRO and ORO	DRO+ORO	500	--	--	--	250	500
Volatile Organic Compounds (µg/L)							
1,1-Dichloroethane	75-34-3	--	7.7	--	--	1.0	7.7
1,1-Dichloroethene	75-35-4	--	400	7.0	7.0	1.0	7.0
1,1,1-Trichloroethane	71-55-6	200	16,000	200	200	1.0	200
1,1,1,2-Tetrachloroethane	630-20-6	--	1.7	--	--	1.0	1.7
1,1,2-Trichloroethane	79-00-5	--	0.77	3.00	5.00	1.0	3.0
1,1,2,2-Tetrachloroethane	79-34-5	--	0.22	--	--	1.0	1.0
1,2-Dibromo-3-chloropropane	96-12-8	--	0.06	--	0.20	10	10
1,2-Dibromoethane	106-93-4	0.010	0.02	--	0.050	0.010	0.010
1,2-Dichloroethane	107-06-2	5.0	0.48	--	5.0	1.0	5.0
1,2-Dichloropropane	78-87-5	--	1.20	--	5.0	1.0	5.0
1,2,3-Trichloropropane	96-18-4	--	0.0015	--	--	1.0	1.0
1,2,4-Trichlorobenzene	120-82-1	--	1.5	70	70	1.0	70
1,2,4-Trimethylbenzene	95-63-6	--	80	--	--	1.0	80
1,3,5-Trimethylbenzene	108-67-8	--	80	--	--	1.0	80
1,4-Dichlorobenzene	106-46-7	--	8.1	75	75	1.0	75
2-Chlorotoluene	95-49-8	--	160	--	--	1.0	160
2-Hexanone	591-78-6	--	40	--	--	10	40
Acetone	67-64-1	--	7,200	--	--	50	7,200
Benzene	71-43-2	5.0	0.80	--	5.0	0.35	5.0
Bromobenzene	108-86-1	--	64	--	--	1.0	64
Bromodichloromethane	75-27-4	--	0.71	--	80	1.0	80
Bromoform	75-25-2	--	5.5	--	80	5.0	80
Bromomethane	74-83-9	--	11	--	--	5.0	11
Carbon tetrachloride	56-23-5	--	0.63	--	5.0	1.0	5.0
Chlorobenzene	108-90-7	--	160	100	100	1.0	100
Chloroform	67-66-3	--	1.4	70	80	1.0	70
cis-1,2-Dichloroethene	156-59-2	--	16	70	70	1.0	70
cis-1,3-Dichloropropene	10061-01-5	--	0.44	--	--	1.0	1.0
Dibromochloromethane	124-48-1	--	0.52	60	80	1.0	60
Dibromomethane	74-95-3	--	80	--	--	1.0	80
Dichlorodifluoromethane	75-71-8	--	1,600	--	--	1.0	1,600
Ethylbenzene	100-41-4	700	800	700	700	1.0	700
Isopropylbenzene	98-82-8	--	800	--	--	1.0	800
Xylene (meta & para)	108-38-3	--	1,600	--	--	2.0	1,600
Methyl ethyl ketone	78-93-3	--	4,800	--	--	20	4,800
Methyl isobutyl ketone	108-10-1	--	640	--	--	10	640
Methyl-tert-butyl ether	1634-04-4	20	24	--	--	1.0	24
Methylene chloride	75-09-2	5.0	22	--	5	5.0	5.0
n-Propylbenzene	103-65-1	--	800	--	--	1.0	800
Xylene (ortho)	95-47-6	--	1600	--	--	2.0	1,600
Styrene	100-42-5	--	1600	100	100	1.0	100
tert-Butylbenzene	98-06-6	--	800	--	--	1.0	800
Tetrachloroethene	127-18-4	5.0	21	--	5.00	1.0	5.0
Toluene	108-88-3	1,000	640	1,000	1,000	1.0	1,000
Xylenes (total)	1330-20-7	1,000	1,600	10,000	10,000	2.0	1,000
trans-1,2-Dichloroethene	156-60-5	--	160	100	100	1.0	100
trans-1,3-Dichloropropene	10061-02-6	--	0.44	--	--	1.0	1.0
Trichloroethene	79-01-6	5.0	0.54	--	5.00	1.0	5.0
Trichlorofluoromethane	75-69-4	--	2,400	--	--	1.0	2,400
Vinyl chloride	75-01-4	0.20	0.029	--	2.00	0.20	0.20

Table 7.1
Groundwater Preliminary Cleanup Levels

		Protection of Drinking Water				Adjustment Factors [(1)]	
Analyte	**CAS No.**	**MTCA Method A Cleanup Levels**	**MTCA Method B Cleanup Levels**	**Federal MCL Goal (Non-cancer)**	**Washington State MCL**	**Practical Quantitation Limit**	**Preliminary CUL [(2)]**
Semivolatile Organic Compounds (μg/L)							
cPAH TEQ	BaPEq (U=0)	0.10	0.023	--	0.20	0.30	0.10
Acenaphthene	128-39-2	--	960	--	--	0.04	960
Acenaphthylene	117-81-7	--	6.3	--	6.0	0.04	6.0
Anthracene	101-55-3	--	4,800	--	--	0.04	4,800
Benzo(a)pyrene	50-32-8	0.10	0.023	--	0.20	0.04	0.10
Fluoranthene	206-44-0	--	640	--	--	0.04	640
Fluorene	86-73-7	--	640	--	--	0.04	640
Hexachlorobutadiene	87-68-3	--	0.56	--	--	1.00	0.56
Naphthalene[(5)]	91-20-3	160	--	--	--	0.04	160
Pyrene	129-00-0	--	480	--	--	0.04	480

Notes:

Criteria have been rounded to two significant digits.
-- Not available.
🟧 Preliminary CUL is based on the PQL provided by Friedman & Bruya, Inc., and Fremont Analytical, Inc.
1 Proposal of natural background concentrations for other chemicals may be appropriate per WAC 173-340-709.
2 The preliminary CUL is the minimum of MTCA Method A or the MCLs, or the MTCA Method B CUL if MTCA Method A and MCLs are not available, adjusted for the PQL in accordance with WAC 173-340-705(6), as appropriate.
3 Metals criteria may apply to either the dissolved metals fraction or total metals fraction.
4 MTCA Method A criteria for gasoline-range organics has assumed that benzene is present.
5 The MTCA Method A CUL defined in Table 720-1 applies to the summed concentrations of naphthalene, 1-methylnaphthalene and 2-methylnaphthalene.

Abbreviations:

CAS	Chemical Abstracts Service
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
CUL	Cleanup level
DRO	Diesel-range organics
MCL	Maximum contaminant level
μg/L	Micrograms per liter
MTCA	Model Toxics Control Act
ORO	Oil-range organics
PQL	Practical quantitation limit
TEQ	Toxic equivalent
WAC	Washington Administrative Code

Table 7.2
Soil Preliminary Cleanup Levels

		Protection of Direct Contact	**Protection of Groundwater Leaching**	**Adjustment Factors**			
Analyte	**CAS No.**	**MTCA Method C Cleanup Levels—Direct Contact (1)**	**Protect Drinking Water via Groundwater (2)**	**Washington State Natural Background (3)**	**Practical Quantitation Limit (4)**	**Most Stringent Risk-Based Criteria**	**Preliminary CUL (5)**
Metals (mg/kg)							
Lead	7439-92-1	1,000	250	24	1.00	250	250
Total Petroleum Hydrocarbons (mg/kg)							
Gasoline-range organics (6)	GRO	30	30	--	20	30	30
Diesel-range organics	DRO	2,000	2,000	--	50	2,000	2,000
Oil-range organics	ORO	2,000	2,000	--	250	2,000	2,000
Total DRO and ORO	DRO+ORO	2,000	2,000	--	250	2,000	2,000
Volatile Organic Compounds (mg/kg)							
1,2-Dibromoethane	106-93-4	66	0.0050	--	0.050	0.0050	0.050
1,2-Dichloroethane	107-06-2	1,400	--	--	0.050	1,400	1,400
Benzene	71-43-2	2,400	0.030	--	0.030	0.030	0.030
Ethylbenzene	100-41-4	350,000	6.0	--	0.050	6.0	6.0
Xylene (meta & para)	108-38-3	700,000	--	--	0.050	700,000	700,000
Toluene	108-88-3	280,000	7.0	--	0.050	7.0	7.0
Xylenes (total)	1330-20-7	700,000	9.0	--	0.10	9.0	9.0
Semivolatile Organic Compounds—PAHs (mg/kg)							
cPAH TEQ	BaPEq (U=0)	130	0.10	--	0.0076	0.10	0.10
Naphthalene(7)	91-20-3	70,000	5.0	--	0.010	0.10	5.0
Benzo(a)pyrene	50-32-8	130	0.10	--	0.010	0.10	0.10

Notes:

Criteria have been rounded to two significant digits.

-- Not available.

🟧 Preliminary CUL is based on the PQL provided by Friedman & Bruya, Inc., and Fremont Analytical, Inc.

1 MTCA Method A has been used where MTCA Method B/C is not available (applies to lead and total petroleum hydrocarbons).

2 The preliminary CUL for protection of drinking water is the MTCA Method A CUL presented in WAC Table 740-1, which is calculated accrdoing to the procedures in WAC 173-340-747.

3 Values from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994) are used for the metals.

4 PQL values from Friedman & Bruya, Inc., and Fremont Analytical, Inc., of Seattle, Washington.

5 The preliminary CUL for each chemical is based on the lowest of the protection of industrial (MTCA Method C) direct contact and leaching ARAR, adjusted for background and the PQL in accordance with WAC 173-340-705(6), as appropriate.

6 MTCA Method A criteria for gasoline-range organics has assumed that benzene is present.

7 The MTCA Method A CUL defined in Table 740-1 applies to the summed concentrations of naphthalene, 1-methylnaphthalene and 2-methylnaphthalene.

Abbreviations:

ARAR	Applicable or Relevant and Appropriate Requirement	MTCA	Model Toxics Control Act
CAS	Chemical Abstracts Service	ORO	Oil-range organics
cPAH	Carcinogenic polycyclic aromatic hydrocarbon	PAH	Polcyclic aromatic hydrocarbon
CUL	Cleanup level	PQL	Practical quantitation limit
DRO	Diesel-range organics	TEQ	Toxic equivalent
MCL	Maximum contaminant level	WAC	Washington Administrative Code
mg/kg	Milligrams per kilogram		

Table 8.1
Groundwater Frequency of Exceedance

Analyte	CAS No.	PCUL	PCUL Basis [(1)]	Unit	Number of Results	Number of Detections	Number of Detected Results Exceeding PCUL	Percentage of Detected Results Exceeding PCUL	Maximum Detected Value	Location of Maximum Detected Value	Sample Date	Exceedance Factor	Retained as COC? [(2)]
Metals													
Lead	7439-92-1	15	MTCA A/MCL	µg/L	12	None	None	None	None	None	None	None	No
Total Petroleum Hydrocarbons													
Gasoline-range organics	GRO	800	MTCA A	µg/L	189	51	23	45%	7,100	MW-12	8/11/2020	8.9	Yes; >10% of results exceed and the maximum exceedance factor is >2.
Diesel-range organics	DRO	500	MTCA A	µg/L	218	123	69	56%	6,500	MW-39	8/10/2020	13	NA [(3)]
Oil-range organics	ORO	500	MTCA A	µg/L	218	43	14	33%	1,600	MW-28	2/28/2019	3.2	NA [(3)]
Total DRO and ORO	DRO+ORO	500	MTCA A	µg/L	218	123	70	57%	7,300	MW-39	8/10/2020	15	Yes; >10% of results exceed and the maximum exceedance factor is >2.
Volatile Organic Compounds													
1,1-Dichloroethane	75-34-3	7.7	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
1,1-Dichloroethene	75-35-4	7.0	MCL	µg/L	17	None	None	None	None	None	None	None	No
1,1,1-Trichloroethane	71-55-6	3.0	MTCA A/MCL	µg/L	17	None	None	None	None	None	None	None	No
1,1,1,2-Tetrachloroethane	630-20-6	1.7	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
1,1,2-Trichloroethane	79-00-5	5.0	MCL	µg/L	17	None	None	None	None	None	None	None	No
1,1,2,2-Tetrachloroethane	79-34-5	1.0	PQL	µg/L	17	None	None	None	None	None	None	None	No [(2)]
1,2-Dibromo-3-chloropropane	96-12-8	10	PQL	µg/L	17	None	None	None	None	None	None	None	No [(2)]
1,2-Dibromoethane	106-93-4	0.010	MTCA A	µg/L	34	None	None	None	None	None	None	None	No
1,2-Dichloroethane	107-06-2	5.0	MTCA A/MCL	µg/L	24	None	None	None	None	None	None	None	No
1,2-Dichloropropane	78-87-5	5.0	MCL	µg/L	17	None	None	None	None	None	None	None	No
1,2,3-Trichloropropane	96-18-4	1.0	PQL	µg/L	17	None	None	None	None	None	None	None	No [(2)]
1,2,4-Trichlorobenzene	120-82-1	70	MCL	µg/L	17	None	None	None	None	None	None	None	No
1,2,4-Trimethylbenzene	95-63-6	80	MTCA B	µg/L	17	1	None	None	1	MW-12	8/11/2020	None	No
1,3,5-Trimethylbenzene	108-67-8	80	MTCA B	µg/L	17	1	None	None	3.3	MW-12	8/11/2020	None	No
1,4-Dichlorobenzene	106-46-7	75	MCL	µg/L	17	None	None	None	None	None	None	None	No
2-Chlorotoluene	95-49-8	160	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
2-Hexanone	591-78-6	40	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Acetone	67-64-1	7,200	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Benzene	71-43-2	5.0	MTCA A/MCL	µg/L	189	30	14	47%	910	MW-12	8/11/2020	180	Yes; >10% of results exceed and the maximum exceedance factor is >2.
Bromobenzene	108-86-1	64	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Bromodichloromethane	75-27-4	80	MCL	µg/L	17	None	None	None	None	None	None	None	No
Bromoform	75-25-2	80	MCL	µg/L	17	None	None	None	None	None	None	None	No
Bromomethane	74-83-9	11	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Carbon tetrachloride	56-23-5	5.0	MCL	µg/L	17	None	None	None	None	None	None	None	No

Table 8.1
Groundwater Frequency of Exceedance

Analyte	CAS No.	PCUL	PCUL Basis (1)	Unit	Number of Results	Number of Detections	Number of Detected Results Exceeding PCUL	Percentage of Detected Results Exceeding PCUL	Maximum Detected Value	Location of Maximum Detected Value	Sample Date	Exceedance Factor	Retained as COC? (2)
Volatile Organic Compounds (cont.)													
Chlorobenzene	108-90-7	7.0	MCL	µg/L	17	None	None	None	None	None	None	None	No
Chloroform	67-66-3	80	MCL	µg/L	17	None	None	None	None	None	None	None	No
cis-1,2-Dichloroethene	156-59-2	70	MCL	µg/L	17	None	None	None	None	None	None	None	No
cis-1,3-Dichloropropene	10061-01-5	1.0	PQL	µg/L	17	None	None	None	None	None	None	None	No (2)
Dibromochloromethane	124-48-1	6.0	MCL	µg/L	17	None	None	None	None	None	None	None	No
Dibromomethane	74-95-3	80	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Dichlorodifluoromethane	75-71-8	1,600	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Ethylbenzene	100-41-4	700	MTCA A/MCL	µg/L	189	19	None	None	83	MW-10	11/2/2020	None	No
Isopropylbenzene	98-82-8	800	MTCA B	µg/L	17	9	None	None	34	MW-12	8/11/2020	None	No
Xylene (meta & para)	108-38-3/106-42-3	1,600	MTCA B	µg/L	143	19	None	None	62	MW-12	11/3/2020	None	No
Methyl ethyl ketone	78-93-3	4,800	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Methyl isobutyl ketone	108-10-1	640	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Methyl-tert-butyl ether	1634-04-4	24	MTCA A	µg/L	24	None	None	None	None	None	None	None	No
Methylene chloride	75-09-2	5.0	MTCA A/MCL	µg/L	17	None	None	None	None	None	None	None	No
n-Propylbenzene	103-65-1	800	MTCA B	µg/L	17	8	None	None	82	MW-12	8/11/2020	None	No
Xylene (ortho)	95-47-6	1,600	MTCA B	µg/L	143	4	None	None	1.4	MW-12	11/3/2020	None	No
sec-Butylbenzene	135-98-8	800	MTCA B	µg/L	17	5	None	None	3.5	MW-12	8/11/2020	None	No
Styrene	100-42-5	100	MCL	µg/L	17	None	None	None	None	None	None	None	No
tert-Butylbenzene	98-06-6	800	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Tetrachloroethene	127-18-4	5.0	MTCA A/MCL	µg/L	17	None	None	None	None	None	None	None	No
Toluene	108-88-3	1,000	MTCA A/MCL	µg/L	189	24	None	None	42	MW-12	8/11/2020	None	No
Xylene (total)	1330-20-7	1,000	MTCA A	µg/L	189	22	None	None	63	MW-12	11/3/2020	None	No
trans-1,2-Dichloroethene	156-60-5	100	MCL	µg/L	17	None	None	None	None	None	None	None	No
trans-1,3-Dichloropropene	10061-02-6	1.0	PQL	µg/L	17	None	None	None	None	None	None	None	No (2)
Trichloroethene	79-01-6	5.0	MTCA A/MCL	µg/L	17	None	None	None	None	None	None	None	No
Trichlorofluoromethane	75-69-4	2,400	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Vinyl chloride	75-01-4	0.20	MTCA A	µg/L	17	None	None	None	None	None	None	None	No
Semivolatile Organic Compounds													
cPAHs (MTCA TEQ-ZeroND)	BaPEq (U=0)	0.10	MTCA A	µg/L	81	1	None	None	0.00045	MW-37	5/7/2020	None	No
cPAHs (MTCA TEQ-HalfND)	BaPEq (U=1/2)	0.10	MTCA A	µg/L	81	1	None	None	0.03	MW-37	5/7/2020	None	No
1-Methylnaphthalene	90-12-0	1.5	MTCA B	µg/L	35	5	5	100%	53	MW-40	5/6/2020	35	Yes; >10% of results exceed and the maximum exceedance factor is >2.
2-Methylnaphthalene	91-57-6	32	MTCA B	µg/L	35	1	None	None	3.8	MW-40	5/6/2020	None	No
Acenaphthene	83-32-9	960	MTCA B	µg/L	35	8	None	None	1.7	MW-39	5/7/2020	None	No
Acenaphthylene	208-96-8	6.0	MCL	µg/L	35	None	None	None	None	None	None	None	No
Anthracene	120-12-7	4,800	MTCA B	µg/L	35	None	None	None	None	None	None	None	No
Benzo(a)pyrene	50-32-8	0.10	MTCA A	µg/L	81	None	None	None	None	None	None	None	No
Fluoranthene	206-44-0	640	MTCA B	µg/L	35	1	None	None	0.043	MW-37	5/7/2020	None	No

Table 8.1
Groundwater Frequency of Exceedance

Analyte	CAS No.	PCUL	PCUL Basis (1)	Unit	Number of Results	Number of Detections	Number of Detected Results Exceeding PCUL	Percentage of Detected Results Exceeding PCUL	Maximum Detected Value	Location of Maximum Detected Value	Sample Date	Exceedance Factor	Retained as COC? (2)
Semivolatile Organic Compounds (cont.)													
Fluorene	86-73-7	640	MTCA B	µg/L	35	9	None	None	7.2	MW-39	5/7/2020	None	No
Hexachlorobutadiene	87-68-3	0.56	MTCA B	µg/L	17	None	None	None	None	None	None	None	No
Naphthalene	91-20-3	160	MTCA A (4)	µg/L	57	5	None	None	56.8	MW-40	5/6/2020	None	No
Pyrene	129-00-0	480	MTCA B	µg/L	35	1	None	None	0.11	MW-37	5/7/2020	None	No

Notes:

Only analytes with applicable PCULs are shown. Field duplicate samples are not included in the total number of results.

PCULs and results are presented in µg/L. PCULs, results, and exceedance factors are rounded to two significant figures.

🟧 Analyte retained as a COC.

1 All regulatory criteria used to determine PCULs are for protection of drinking water, which is the only groundwater pathway determined to be potentially complete at the Site.

2 Five volatile organic compounds that were not detected at any locations have PCULs that were adjusted upward to the PQL because the PQL was greater than the available risk-based criteria. Each of these chemicals, however, can be eliminated from further consideration as a COC because none of these chemicals are suspected of being present at the Site based on Site history and other knowledge, per WAC 173-340-720(9)(f)(v).

3 The PCUL is also applicable to the summed DRO and ORO fractions, which is retained as a preliminary COC.

4 The PCUL applies to the summed concentrations of naphthalene, 1-methylnaphthalene and 2-methylnaphthalene. If methylnaphthalenes were not analyzed, the result for napthalene is compared to the PCUL.

Abbreviations:

CAS	Chemical Abstracts Service
COC	Contaminant of concern
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
DRO	Diesel-range organics
MCL	Maximum contaminant level
µg/L	Micrograms per liter
MTCA	Model Toxics Control Act
NA	Not applicable
ORO	Oil-range organics
PCUL	Preliminary cleanup level
PQL	Practical quantitation limit
TEQ	Toxic equivalent

Table 8.2
Soil Frequency of Exceedance for Groundwater COCs

Analyte	CAS No.	PCUL	PCUL Basis	Number of Results	Number of Detections	Number of Detected Results Exceeding PCUL	Percentage of Detected Results Exceeding PCUL	Maximum Detected Value	Location of Maximum Detected Value	Sample Date	Sample Depth (ft bgs)	Exceedance Factor	Retained as COC?
Total Petroleum Hydrocarbons													
Gasoline-range organics	GRO	30	MTCA A Groundwater Protection	245	64	55	86%	16,000	MW-16	5/18/1993	10–10	530	Yes; >10% of the results exceed, the maximum exceedance factor is >2, and it is retained as a COC in groundwater.
Diesel-range organics	DRO	2,000	MTCA A Groundwater Protection	251	99	60	61%	72,000	MW-19	5/18/1993	4–8	36	NA (1)
Oil-range organics	ORO	2,000	MTCA A Groundwater Protection	247	71	27	38%	150,000	SCR-2	3/22/1993	0–1	75	NA (1)
Total DRO and ORO	DRO+ORO	2,000	MTCA A Groundwater Protection	251	107	71	66%	160,000	SCR-2	3/22/1993	0–1	80	Yes; >10% of the results exceed, the maximum exceedance factor is >2, and it is retained as a COC in groundwater.
Volatile Organic Compounds													
Benzene	71-43-2	0.03	MTCA A Groundwater Protection	43	6	6	100%	12	MW-40	3/9/2020	10.5–11	400	Yes; >10% of the results exceed, the maximum exceedance factor is >2, and it is retained as a COC in groundwater.

Notes:

Only analytes with applicable PCULs are shown. Field duplicates are not included in the total number of results.

PCULs and results are presented in mg/kg. PCULs, results, and exceedance factors are rounded to two significant figures.

🟧 Analyte retained as a COC.

1 The PCUL is also applicable to the summed DRO and ORO fractions, which is retained as a COC.

Abbreviations:

bgs	Below ground surface
CAS	Chemical Abstracts Service
COC	Contaminant of concern
DRO	Diesel-range organics
ft	Feet
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
NA	Not applicable
ORO	Oil-range organics
PCUL	Preliminary cleanup level

Table 8.3
Soil Frequency of Exceedance for Other COPCs

Analyte	CAS No.	Direct Contact Criterion	Direct Contact Criterion Basis	Number of Results	Number of Detections	Number of Detected Results Exceeding PCUL	Percentage of Detected Results Exceeding PCUL	Maximum Detected Value	Location of Maximum Detected Value	Sample Date	Sample Depth (ft bgs)	Exceedance Factor	Retained as COC?
Metals													
Lead	7439-92-1	1,000	MTCA A Industrial	23	20	None	None	8.9	GP-18	9/16/2015	27–28	None	No
Volatile Organic Compounds													
1,2-Dibromoethane	106-93-4	66	MTCA C	23	None	None	None	None	None	None	None	None	No
1,2-Dichloroethane	107-06-2	1,400	MTCA C	23	None	None	None	None	None	None	None	None	No
Ethylbenzene	100-41-4	350,000	MTCA C	43	15	None	None	41	OIP-42	11/21/2019	17–17.5	None	No
Xylene (meta & para)	108-38-3/106-42-3	700,000	MTCA C	37	8	None	None	4.1	OIP-42	11/21/2019	17–17.5	None	No
Toluene	108-88-3	280,000	MTCA C	43	9	None	None	7.4	MW-40	3/9/2020	10.5–11	None	No
Xylene (total)	1330-20-7	700,000	MTCA C	43	16	None	None	15	MW-40	3/9/2020	10.5–11	None	No
Semivolatile Organic Compounds													
1-methylnaphthalene	90-12-0	4,500	MTCA C (1)	10	8	None	None	38	OIP-42	11/21/2019	17–17.5	None	No
2-methylnaphthalene	91-57-6	14,000	MTCA C (1)	10	5	None	None	27	OIP-42	11/21/2019	17–17.5	None	No
cPAHs (MTCA TEQ-ZeroND)	BaPEq (U=0)	130	MTCA C	37	19	None	None	2.3	P3	3/12/2020	0–0.5	None	No
cPAHs (MTCA TEQ-HalfND)	BaPEq (U=1/2)	130	MTCA C	37	19	None	None	2.3	P3	3/12/2020	0–0.5	None	No
Benzo(a)pyrene	50-32-8	130	MTCA C	37	4	None	None	1.5	P3	3/12/2020	0–0.5	None	No
Naphthalene	91-20-3	70,000	MTCA C (1)	16	5	None	None	6.3	OIP-47	3/9/2020	17	None	No

Notes:

Only analytes with applicable direct contact criteria are shown. Field duplicates are not included in the total number of results.

Criteria and results are presented in mg/kg. Criteria, results, and exceedance factors are rounded to two significant figures.

1 Summed naphthalene criteria presented in Table 7.2 apply to the leaching pathway; applicable direct contact criteria are compared separately to results for naphthalene, 1-methylnaphthalene, and 2-methylnaphthale.

Abbreviations:

bgs	Below ground surface
CAS	Chemical Abstracts Service
COC	Contaminant of concern
COPC	Contaminant of potential concern
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
ft	Feet
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
PCUL	Preliminary cleanup level
TEQ	Toxic equivalent

Table 9.1
Chemical-Specific Properties for Site COCs

Contaminant of Concern	CAS No.	Boiling Point (°C)	Form at 20 °C	Vapor Pressure (atm)	Volatile	Solubility at 20 °C (mg/L)	Henry's Law at 13 °C (atm-m^3/mol)	Partitioning Coefficient (K$_{oc}$) (cm^3/g)	Mobility in Water
Total Petroleum Hydrocarbons									
Gasoline-range organics	GRO	50–200 (1)	liquid	0.4–0.9 (1)	moderate	Insoluble (2)	0.00033–0.00048 at 20 °C (2)	Log 1.8-4.6 (2)	high
Diesel-range organics	DRO	282–338 (3)	liquid	0.003–0.035 (3)	moderate	5 (3)	0.000059–0.000074 at 20 °C (3)	Log 3.0-6.7 (3)	moderate
Oil-range organics	ORO	101–588 (3)	liquid	0.003–0.035 (3)	moderate	5 (3)	0.000059–0.000074 at 20 °C (3)	Log 3.0-6.7 (3)	low
Volatile Organic Compounds									
Benzene	71-43-2	80 (4)	liquid	0.1 (4)	moderate	1,750 (5)	0.133 (5)	62 (5)	high

Notes:

1. Chemical and physical properties data for gasoline from the IARC Working Group on the Evaluation of Carcinogenic Risk to Humans' 1989 *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, No. 45* (https://www.ncbi.nlm.nih.gov/books/NBK531262/).
2. From the Agency for Toxic Substances & Disease Registry's Toxic Substances Portal page for Gasoline, Automotive (https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=83).
3. From the Agency for Toxic Substances & Disease Registry's Toxic Substances Portal page for Fuel Oils/Kerosene (https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=91).
4. From NIOSH pocket guide to Chemical Hazards, distributed and published by Centers for Disease Control and Prevention, DHHS (NIOSH) Publication No. 97-140.
5. From Cleanup Levels and Risk Calculation worksheet (https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC/Data-tables).

Abbreviations:

atm	Atmospheres
CAS	Chemical Abstracts Service
cm^3/g	Cubic centimeters per gram
°C	Degrees Celsius
DHHS	Department of Health and Human Services
IARC	International Agency for Research on Cancer
K$_{oc}$	Soil organic carbon–water partitioning coefficient
m^3/mol	Cubic meters per mole
mg/L	Milligrams per liter
NIOSH	National Institute for Occupational Safety and Health

Table 11.1
Potential Applicable or Relevant and Appropriate Requirements

Standard, Requirement, or Limitation [1]	Description
Location-Specific ARARs [2]	
Washington Shoreline Management Act (RCW 90.58; WAC 173-14)	The Washington Shoreline Management Act, authorized under the federal Coastal Zone Management Act, establishes requirements for substantial development occurring within the waters of Washington or within 200 feet of a shoreline.
Longview Shorelines Master Program (17.60 LMC)	Implements the requirements imposed on the City of Longview by the Washington Shoreline Management Act (RCW 90.58) and ensures that development under the program will not cause a net loss of ecological functions. Applies to areas with 200 feet of a water body regulated by the program.
Longview Critical Areas Regulations (17.10 LMC)	This chapter establishes regulations pertaining to the development within or adjacent to critical areas, which include areas that provide a variety of biological and physical functions that benefit the City of Longview and its residents, including water quality protection, fish and wildlife habitat, and food chain support.
Endangered Species Act (16 USC 1531 et seq.; 50 CFR 17, 225, and 402) Migratory Bird Treaty Act (16 USC 742a-j and 40 CFR 10.13)	These statutes regulate the incidental take of migratory birds (such as Canada geese) and other endangered species by facility operations and construction activities.
Native American Graves Protection and Repatriation Act (25 USC 3001 through 3013; 43 CFR 10) Washington's Indian Graves and Records Law (RCW 27.44)	These statutes prohibit the destruction or removal of Native American cultural items and require written notification of inadvertent discovery to the appropriate agencies and Native American tribe. These programs are applicable to the remedial action if cultural items are found. The activities must cease in the area of the discovery; a reasonable effort must be made to protect the items discovered; and notice must be provided.
Archaeological Resources Protection Act (16 USC 470aa et seq.; 43 CFR 7)	This program sets forth requirements that are triggered when archaeological resources are discovered. These requirements only apply if archaeological items are discovered during implementation of the selected remedy.
National Historic Preservation Act (16 USC 470 et seq.; 36 CFR parts 60, 63, and 800)	This program sets forth a national policy of historic preservation and provides a process that must be followed to ensure that impacts of actions on archaeological, historic, and other cultural resources are protected.
Action-Specific ARARs [3]	
State Environmental Policy Act (RCW 43.21C, WAC 197-11)	Establishes the state's policy for protection and preservation of the natural environment. Applies to cleanup actions conducted under MTCA.
Resource Conservation and Recovery Act (42 USC 6921-6949a; 40 CFR Part 268, Subtitles C and D)	Establishes requirements for the identification, handling, and disposal of hazardous and nonhazardous waste.
Dangerous Waste Regulations (RCW 70.105; WAC 173-303)	Establishes regulations that are the state equivalent of RCRA requirements for determining whether a solid waste is a state dangerous waste. This regulation also provides requirements for the management of dangerous wastes.
Solid Waste Disposal Act (42 USC Sec. 6901-6992; 40 CFR 257-258) Federal Land Disposal Requirements (40 CFR 268)	Protects health and the environment and promotes conservation of valuable material and energy resources. The Solid Waste Disposal Act establishes a framework for regulation of solid waste disposal. Federal land disposal requirements promulgated under the authority of the Solid Waste Disposal Act set minimum safety requirements for landfills including limitations on storage and land disposal for hazardous substances.
Department of Transportation Hazardous Materials Regulations (49 CFR 172)	Regulates the safe and secure transportation of hazardous materials, including documentation and handling requirements for shipping.
Washington Minimum Functional Standards for Solid Waste Handling (WAC 173-304)	Sets minimum functional standards for the proper handling of all solid waste materials originating from residences, commercial, agricultural, and industrial operations, as well as other sources.
Washington Solid Waste Handling Standards (RCW 70.95 and WAC 173-350)	Establishes minimum standards for handling and disposal of solid waste. Solid waste includes wastes that are likely to be generated as a result of site remediation, including contaminated soils, construction and demolition wastes, and garbage.
Washington Water Pollution Control Law (RCW 90.48; WAC 173-216, WAC 173-220) National Pollution Discharge Elimination System (CWA Part 402)	Washington has been delegated authority to issue NPDES permits. CWA Section 301, 302, and 303 require states to adopt water quality standards and implement a NPDES permitting process. The Washington Water Pollution Control Law and regulations address this requirement.
Noise Control Act of 1974 (RCW 70.107, WAC 173-60)	Establishes maximum noise levels.
Washington State Underground Injection Control Program (WAC 173-218)	Washington is authorized under CWA Sections 144 through 147 to administer a statewide Underground Injection Control program to protect groundwater by regulating the discharge of fluid from injection wells including temporary injection points.
Occupational Safety and Health Act 29 USC 651 (29 CFR 1910)	Applies to onsite workers involved in cleanup implementation.
City of Longview Streets and Sidewalks Code (12.30 LMC)	The City of Longview code regulates construction use and permitting in the right of way.

Table 11.1
Potential Applicable or Relevant and Appropriate Requirements

Standard, Requirement, or Limitation [1]	Description
Action-Specific ARARs [3] (cont.)	
City of Longview Construction Codes for Grading (17.10.060 LMC)	Required for the excavation or addition of material within an Environmentally Critical Area.
National Electrical Code (NFPA 70) and the Seattle Electric Code Supplement for Class 1 Division 2 Environments.	Establishes restrictions and guidelines for temporary and/or permanent electrical installations.
City of Longview Water Utilities Code (15.10 LMC)	Establishes rules for hydrant water use.
City of Longview Sewage Disposal Code (15.26 LMC)	Regulates discharge of liquid waste to the wastewater (sanitary sewer) system.
Federal, State, and Local Air Quality Protection Programs State Implementation of Ambient Air Quality Standards NWAPA Ambient and Emission Standards Regional Standards for Fugitive Dust Emissions Toxic Air Pollutants	Regulations promulgated under the federal Clean Air Act (42 USC 7401) and the Washington State Clean Air Act (RCW 70.94) govern the release of airborne contaminants from point and nonpoint sources. Local air pollution control authorities such as PSCAA have also set forth regulations for implementing these air quality requirements. These requirements may be applicable to the Site for the purposes of demolition or dust control. PSCAA requires notification prior to demolition of any building with asbestos-containing material. Both PSCAA (under Regulation III) and WAC 173-460 establish ambient source impact levels for arsenic.
Chemical-Specific ARARs [4]	
Model Toxics Control Act (WAC 173-340)	Establishes Washington administrative processes and standards to identify, investigate, and clean up facilities where hazardous substances are located.
Drinking Water Standards—State MCLs (WAC 246-290-310)	Establishes standards for contaminant levels in drinking water for water system purveyors.
Water Quality Standards for Groundwaters of the State of Washington (WAC 173-200)	Implements the Water Pollution Control Act and the Water Resources Act of 1971 (90.54 RCW).
National Recommended Water Quality Standards (40 CFR 131) Washington Maximum Contaminant Levels (WAC 246-290-310)	These water quality standards define the water quality goals of the water body by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards from 40 CFR 131 to protect public health or welfare, enhance the quality of water, and serve the purposes of the CWA. Washington water quality standards (MCLs) are presented in WAC.

Notes:

1 Projects conducted under a consent decree are exempt from the procedural requirements of most state and local permits (RCW 70.105D.090); however, the remedial actions must still comply with the substantive requirements of the exempt permits. Therefore, for exempt permits, the statutory review timelines do not apply; actual timelines will be based on negotiations with the jurisdiction or agency, which should result in an expedited review timeline.

2 Location-specific ARARs are requirements that are applicable to the specific area where the Site is located, and can restrict the performance of activities, including cleanup actions, solely because they occur in specific locations.

3 Action-specific ARARs are requirements that are applicable to certain types of activities that occur or technologies that are used during the implementation of cleanup actions.

4 Chemical-specific ARARs are applicable to the types of contaminants present at the Site. The cleanup of contaminated media at the Site must meet the CULs developed under MTCA; these CULs are considered chemical-specific ARARs.

Abbreviations:

ARAR	Applicable or Relevant and Appropriate Requirement
CFR	Code of Federal Regulations
CUL	Cleanup level
CWA	Clean Water Act
MCL	Maximum Contaminant Level
MTCA	Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
NWAPA	Northwest Air Pollution Authority
PSCAA	Puget Sound Clean Air Agency
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
USC	U.S. Code
WAC	Washington Administrative Code

Table 12.1
Preliminary Screening of Remedial Technologies

Remedial Technology	Applicable Media	General Technology Benefits	General Technology Constraints	Consideration of Site Physical Conditions and RAOs	Rationale for Retaining or Rejecting Technology
Passive Technologies					
No Action	• Soil • Groundwater	• No cost to implement. • No long-term monitoring cost. • Does not cause significant impacts to site operations.	• Does not reduce or remove chemical concentrations. • Does not protect human health and the environment. • Does not meet cleanup goals in a reasonable restoration time frame.	• Not impacted by physical conditions at the Site. • Does not contribute to achievement of RAOs. • Does not contribute to achievement of RAOs (e.g., LNAPL removal) when not used in combination with other remedial technologies.	The No Action technology does not address any of the Site COCs in soil or groundwater or achieve RAOs. **No Action is Rejected** from further evaluation.
Institutional Controls	• Soil • Groundwater	• Low cost to implement. • Protective of direct contact pathway through controls. • Technology has proven success at sites with similar conditions.	• Does not reduce or remove chemical concentrations. • Must be used in combination with other technologies. • Limits future site use through restrictive covenants or administrative measures.	• Can be implemented in conjunction with site development plans for building or paving. • Not limited by site physical conditions. • Contributes to achievement of RAOs when used in combination with other technologies. • Does not contribute to achievement of RAOs (i.e., LNAPL removal) when not used in combination with other remedial technologies.	Institutional controls are applicable to all COCs and all media, achieve RAOs when used in combination with other technologies, and can be implemented given Site conditions. **Institutional Controls are Retained** for further evaluation.
Monitored Natural Attenuation	• Groundwater	• Low cost associated with implementation. • Does not cause impacts to site operations. • Technology does have proven success at sites with similar conditions.	• Long-term monitoring required in perpetuity. • Does not control chemical migration.	• Is not limited by site physical conditions and can be implemented under any future use conditions. • Does not contribute to achievement of RAOs (e.g., LNAPL removal) when not used in combination with other remedial technologies.	Monitored natural attenuation would be applicable to achieving RAOs for naturally degrading COCs in groundwater when used in combination with other technologies. **Monitored Natural Attenuation is Retained** for further evaluation.
Surface Capping	• Soil • Groundwater (by protection of soil to groundwater pathway)	• Contains contaminated soil below the ground surface, provides barrier from contact pathways, and may reduce or prevent infiltration that would cause leaching.	• Chemicals remain in place and are not removed or destroyed. • Surface cap maintenance and inspections required in perpetuity.	• Current Site uses, such as rail lines, prevent surface capping from being utilized in some areas of contaminated soil. • Implementing a surface cap in areas outside of the rail tracks may impede future development. • Does not contribute to achievement of RAOs (i.e., LNAPL removal) when not used in combination with other remedial technologies.	Although surface capping may help achieve RAOs when used in combination with other technologies, the technology is not feasible to implement within the rail and could potentially restrict future development/land use in areas outside of the rail tracks. **Surface Capping is Rejected** for further evaluation.

Table 12.1
Preliminary Screening of Remedial Technologies

Remedial Technology	Applicable Media	General Technology Benefits	General Technology Constraints	Consideration of Site Physical Conditions and RAOs	Rationale for Retaining or Rejecting Technology
In Situ Technologies					
Permeable Reactive Barrier Using Granular Activated Carbon	• Groundwater	• Passively treats contaminated groundwater as it passes through the PRB area. • Can be straightforward to implement, except at significant depths (i.e., greater than 15 feet). • Is relatively feasible to implement at shallow depths and does not cause significant disruption to site operations.	• A PRB can become "clogged" by migration of fines in groundwater and can be costly to maintain. • Depending on the concentrations in groundwater, the PRB may require replacement once the reaction capacity of the material in the barrier is reached, or the pores become clogged. This concern is even greater for multiple COCs and the required media to address their migration.	• Site COCs are generally not mobile, and groundwater contamination does not extend off-site, such as the Columbia River, or to sensitive receptors. • Installation of PRB around perimeter would be cost prohibitive considering the general lack of mobility of COCs.	The relative stability and containment of the plume to the Site limits the potential effectiveness of a PRB in achieving RAOs. It would provide marginal if any benefit compared to the capital construction and long-term maintenance costs. **Permeable Reactive Barrier Using Granulated Activated Carbon is Rejected** from further evaluation.
Air Sparging	• Soil • Groundwater	• Proven effective technology for small, impacted areas with elevated VOC and GRO concentrations. • Readily available equipment and easily implemented. • Requires no removal, treatment, storage, or discharge of groundwater.	• Limited effectiveness for DRO, ORO, and heavier fuel types. • Effectiveness depends on site-specific factors, including limited soil heterogeneity.	• Air sparging will likely be ineffective for impacts within the perched water-bearing zone due to the interbedded silt and sand layers. • Less effective for DRO, which is the most extensive COC at the Site. • Does not contribute to achievement of RAOs (i.e., LNAPL removal) when not used in combination with other remedial technologies.	Air sparging would have limited effectiveness in achieving RAOs due to Site hydrologic conditions and the nature of Site contamination. **Air Sparging is Rejected** from further evaluation.
In Situ Chemical Oxidation	• Soil • Groundwater	• Technology reduces contaminant concentrations and mass in place. • Oxidizing agents include ozone, hydrogen peroxide, PersulfOx, RegenOx, or an oxygen-release compound.	• Effectiveness limited by subsurface conditions and site heterogeneity because injected solutions can follow preferential pathways. • Sometimes requires multiple rounds of injection. • Contaminant rebound may be observed when source concentrations and volume are elevated and insufficient source treatment has occurred.	• Technology does not cause significant impacts to Site activities if conducted when there are no rail activities. • Large portions of the Site have not yet been developed and are currently accessible. This technology would be more challenging within developed site conditions. • Can be used in combination with other remedial technologies. • Some oxidizing agents can corrode utility lines or potentially corrode the ductile iron pipelines.	In situ groundwater and soil treatment by ISCO is applicable to TPH in soil and groundwater, is implementable given Site conditions, poses minimal impacts to Port operations when compared to other technologies, and achieves RAOs. **In Situ Chemical Oxidation is Retained** for further evaluation.

Table 12.1
Preliminary Screening of Remedial Technologies

Remedial Technology	Applicable Media	General Technology Benefits	General Technology Constraints	Consideration of Site Physical Conditions and RAOs	Rationale for Retaining or Rejecting Technology
In Situ Technologies (cont.)					
In Situ Treatment by Bioremediation	• Soil • Groundwater	• The activity of naturally occurring microorganisms is stimulated by adding water-based solutions to enhance the biological degradation of organic contaminants.	• Effectiveness is highly dependent on geochemical conditions, and success is highly dependent on the ability to deliver the substrate to the affected areas. • Groundwater gradient and fine-grained interbeds would limit effectiveness. Radius of influence for each area of injection expected to be localized.	• The extensive dissolved-phase plume within the perched water-bearing zone and deeper alluvial aquifer would make this technology challenging to achieve RAOs.	In situ groundwater treatment by bioremediation is applicable to TPH in soil and groundwater, is implementable given Site conditions, and achieves RAOs. **In Situ Treatment by Bioremediation is Retained** for further evaluation.
Surfactant Soil Flushing (1)	• Soil	• Can be implemented with minimal disturbance to surface activities.	• Requires injection of large volumes of water and surfactant to release soil contamination into groundwater. • High risk associated with capturing all downgradient groundwater/surfactant to ensure chemicals are not mobilized when transported downgradient. • Installation of recovery wells required for extraction. • Significant impact to existing surface activities, so applicable only in specific small locations.	• Surfactant injection and extraction will likely be ineffective for impacts within the perched water-bearing zone due to the low yield and inability to recover the required volume of mixed water and surfactant. • Can be used in combination with other remedial technologies.	Surfactant soil flushing would be applicable to achieving RAOs when used in combination with other technologies. **Surfactant Soil Flushing is Retained** for further evaluation.
Solidification and Stabilization	• Soil	• Technology reduces the mobility of soil contamination through physical or chemical immobilization. • Toxicity of individual COCs may be reduced through chemical reaction processes (stabilization only). • Controls contaminant migration or leaching to groundwater.	• Feasibility of implementation decreases with depth below ground surface. • Chemicals remain in place and are immobilized, but not removed (solidification). • Significant impact to existing surface activities, so applicable only in specific small locations.	• Could be difficult to implement due to the large footprint of contamination. • Can be implemented when there is a break in rail activities.	Due to the extensive footprint of impacts, solidification and stabilization would not be cost effective and not address Site groundwater impacts. **Solidification and Stabilization is Rejected** for further evaluation.

Table 12.1
Preliminary Screening of Remedial Technologies

Remedial Technology	Applicable Media	General Technology Benefits	General Technology Constraints	Consideration of Site Physical Conditions and RAOs	Rationale for Retaining or Rejecting Technology
In Situ Technologies (cont.)					
Thermal Treatment	• Soil • Groundwater	• Can be implemented in a short time frame. • Can be implemented at greater depths than other technologies. • Treats both soil and groundwater contamination simultaneously. • No long-term maintenance required.	• High cost associated with implementation. • Requires large loads of on-site power. • Requires substantial surface infrastructure for operation. • Requires intensive O&M during short-term operation (usually 1 to 2 years). • Significant impact to existing surface activities, so applicable only in specific small locations.	• Technology not limited by site physical conditions and can be implemented in coordination with future use conditions. • Would be difficult to implement due to the large site footprint and rail activities. • Potential issue with mobilization of Bunker C pipeline contents. • Tidal fluctuations may cause excessive heat loss.	Thermal treatment is energy intensive and disruptive and would not be cost effective to treat the small source area of contamination and the large groundwater plume. **Thermal Treatment is Rejected** from further evaluation.
Soil Vapor Extraction	• Soil	• System can be easily turned on and off to optimize performance and cost. • Facilitates protection of groundwater from vapor-phase contaminant migration.	• Limited to treatment of vadose zone soil and volatile contaminants. • Relatively expensive to install and maintain. • Does not address groundwater contamination for Site COCs. • Technology does not have proven success at sites with similar conditions. • Potential disturbance to surface activities.	• Does not address contamination in the saturated zone or LNAPL. • Accessibility and widespread nature of soil contamination are additional obstacles. • Tight spacing of wells anticipated due to geology. • Multiple systems would be required across the Site.	Soil vapor extraction would not address the large footprint of saturated zone soil and groundwater impacts at the Site. **Soil Vapor Extraction is Rejected** from further evaluation.
Vitrification	• Soil	• Completely immobilizes inorganic contaminants and destroys organic contaminants by high temperatures. • Effective to depths of up to 20 feet bgs. • Resulting glass/vitreous mass prevents contamination from leaching to groundwater.	• Requires heating the ground to very high temperatures, which is costly. • Resulting glass/vitreous mass would affect Site groundwater flow. • Does not treat deep contamination (greater than 20 feet bgs). • Vaporized contamination requires capture and treatment.	• No significant inorganic issues at the Site. Not an appropriate tool if inorganic contamination is not a concern. • Would be difficult to implement due to the large site footprint. • Might not be effective for any product remaining in the former Longview Pipeline.	Vitrification is not applicable to Site contaminants, which are organic, and thus would not achieve RAOs. **Vitrification is Rejected** from further evaluation.

Table 12.1
Preliminary Screening of Remedial Technologies

Remedial Technology	Applicable Media	General Technology Benefits	General Technology Constraints	Consideration of Site Physical Conditions and RAOs	Rationale for Retaining or Rejecting Technology
In Situ Technologies (cont.)					
Immobilization and Biodegradation	• Groundwater	• Used to prevent further migration of contaminants. • Removes hydrocarbons from the dissolved phase by adsorbing them onto activated carbon matrix. Once immobile, contaminants degrade via biodegradation.	• Can be expensive compared to other in situ chemical oxidation technologies. • Can be difficult to implement in certain geological conditions.	• Could be easily implemented within the rail lines during periods of no activity. • Can be used in combination with other remedial technologies. • High amounts of LNAPL could both overwhelm sorption sites on the PlumeStop carbon and the rates of anaerobic degradation. • Low permeability soils and low yield in the water-bearing zone for this Site will likely result in this technology being less effective.	Immobilization and biodegradation (PlumeStop) would be applicable to achieving RAOs when used in combination with other technologies. However, another similar technology, sorption and biodegradation using PetroFix, is a better fit for Site conditions, and PlumeStop does not offer any marginal benefit. **Immobilization and Biodegradation is Rejected** from future evaluation.
Sorption and Biodegradation	• Groundwater	• Used to prevent further migration of contaminants. • Removes hydrocarbons from the dissolved phase by adsorbing them onto activated carbon particles and contains electron acceptors, which stimulate biodegradation.	• Is not as effective with carbon ranges higher than C34 and is effective for component in the higher end carbon ranges that are soluble and mobile. • Can be difficult to implement in certain geological conditions.	• Could be easily implemented within the rail lines during periods of no activity. • Can be used in combination with other remedial technologies. • High amounts of LNAPL could overwhelm sorption sites on the PetroFix carbon and decrease the rates of biodegradation. • Contains more carbon than PlumeStop but with a decreased radius of influence. • Low permeability soils in the perched water-bearing zone could be an issue.	Sorption and biodegradation using PetroFix would be applicable to achieving RAOs when used in combination with other technologies. **Sorption and Biodegradation is Retained** for future evaluation.

Table 12.1
Preliminary Screening of Remedial Technologies

Remedial Technology	Applicable Media	General Technology Benefits	General Technology Constraints	Consideration of Site Physical Conditions and RAOs	Rationale for Retaining or Rejecting Technology
Ex Situ Technologies					
Soil Excavation and Landfill Disposal	• Soil • Groundwater	• Results in immediate removal of chemicals from a site, reducing mass in a short time frame. • Effectively removes all COCs in excavation area. • Removal of soil contamination in areas of impacted groundwater removes the ongoing source of contaminants to groundwater. • Does not require long-term monitoring and maintenance.	• Can be expensive to implement because of landfill disposal costs. • Significant impacts to surface activities. • Technology is limited by contaminant depth and active rail lines. • In accessible areas, excavation depths can extend down to depths up to 23 feet bgs; therefore, shoring will likely be required for stability if open cuts cannot be made. • Dewatering may be required for excavations extending below the groundwater table, which generates liquid waste streams that would require treatment and disposal.	• Excavation would be limited to select areas outside of the rail lines (not feasible in the areas in and around the rail lines). • Landfarming might be an option in lieu of off-site landfill disposal. • Does not contribute to achievement of RAOs (i.e., LNAPL removal) when not used in combination with other remedial technologies.	Source removal addresses all COCs, is implementable given Site conditions, and achieves RAOs when combined with other remedial technologies for downgradient groundwater. **Soil Excavation and Landfill Disposal is Retained** for further evaluation.
Dual-Phase/ Multiphase Extraction	• Groundwater	• Effective at treating vadose and smear zone where LNAPL often accumulates.	• Expensive O&M costs. • Significant impact to existing surface activities.	• Likely difficult to implement and conduct O&M within rail lines.	The lateral and vertical extents of groundwater impacts at the Site limit the effectiveness of dual-phase/multiphase extraction. It would provide marginal if any benefit compared to the capital and long-term O&M costs. **Dual-Phase/Multiphase Extraction is Rejected** from further evaluation.

Table 12.1
Preliminary Screening of Remedial Technologies

Remedial Technology	Applicable Media	General Technology Benefits	General Technology Constraints	Consideration of Site Physical Conditions and RAOs	Rationale for Retaining or Rejecting Technology
Ex Situ Technologies (cont.)					
Pump and Treat	• Groundwater	• Removes dissolved-phase chemicals from groundwater. • Typically causes minimal impact to site operations.	• Does not treat soil source contamination and generally unsuccessful at meeting groundwater cleanup levels when soil source remains. • High groundwater pumping rates may be required resulting in high volumes of groundwater for treatment and disposal. • Significant cost associated with treatment and discharge of treated waste stream. • Long-term O&M required for extraction system in perpetuity.	• Permeable subsurface conditions in the alluvial aquifer would likely result in excessive water volumes requiring treatment and disposal in perpetuity. • Difficult to implement within rail lines but could be installed along the western boundary of rails. • Generally low mobility of COCs and stagnant plume do not support the need for implementation of this technology.	Pump and treat could eventually achieve RAOs but would not be cost effective over time and would result in a longer restoration time frame than other groundwater treatment technologies. **Pump and Treat is Rejected** from further evaluation.
LNAPL Removal Technologies					
Hand Bailing or Passive Recovery Inserts	• Soil • Groundwater	• Can be implemented with minimal disturbance to surface activities. • Relatively low-cost to implement and maintain.	• The limited capture area of this technology is not an efficient recovery method for persistent LNAPL and would leave in place substantial product in soils.	• Implemented in the past at this Site with little effect but can be easily implemented because it does not interfere with Site operations.	Hand bailing or passive recovery inserts would be applicable to achieving RAOs; however, historical bailing activities were not as effective and surfactant soil flushing would likely be more effective. **Hand Bailing or Passive Recovery Inserts is Rejected** for further evaluation.
Passive Recovery (Skimming Wells)	• Groundwater	• Skimming wells recover product using a variety of means with little groundwater recovery.	• Rate of recovery is slow, and this technology would leave in place substantial residual product in soils.	• Can be easily implemented. • Would likely leave residual product in soils. • O&M cost is relatively inexpensive compared to other active remediation technologies.	Passive recovery (skimming wells) would be applicable to achieving RAOs; however, soil flushing with surfactants will likely be more effective in removing residual LNAPL present in the soil. **Passive Recovery is Rejected** for further evaluation.

Table 12.1
Preliminary Screening of Remedial Technologies

Remedial Technology	Applicable Media	General Technology Benefits	General Technology Constraints	Consideration of Site Physical Conditions and RAOs	Rationale for Retaining or Rejecting Technology
LNAPL Removal Technologies (cont.)					
Active Recovery (Vacuum Enhanced)	• Groundwater	• Applies a vacuum to induce a larger potential gradient toward recovery wells through negative pressure. • Minimizes the physical movement of the oil–water interface. • Extracts volatile hydrocarbons (liquid and vapor) from the unsaturated zone.	• Expensive O&M costs.	• Difficult to implement and conduct O&M within rail lines. • Would likely leave residual product in soils.	Active recovery would be applicable to achieving RAOs when used in combination with other technologies. However, considering the Site conditions, this expensive technology would offer no benefit over surfactant soil flushing, which is a more cost-effective LNAPL removal technology. **Active recovery is Rejected** from further evaluation.
Bioslurping	• Soil • Groundwater	• Allows for removal of product with minimal depression of the water table. • Vapor recovery remediates residual product in the unsaturated zone and enhances bioremediation.	• Expensive O&M costs.	• Difficult to implement and conduct O&M within rail lines. • Would likely leave residual product in soils.	Bioslurping would be applicable to achieving RAOs when used in combination with other technologies. However, considering the Site conditions, this expensive technology would offer no benefit over surfactant soil flushing, which is a more cost-effective LNAPL removal technology. **Bioslurping is Rejected** from further evaluation.

Notes:

▨	Shading indicates technology rejected from further consideration for remedial alternative development.
1	Soil flushing also retained as an LNAPL removal technology.

Abbreviations:

bgs	Below ground level
COC	Contaminant of concern
DRO	Diesel-range organics
GRO	Gasoline-range organics
ISCO	In situ chemical oxidation
LNAPL	Light non-aqueous phase liquid
ORO	Oil-range organics
O&M	Operations and maintenance
PRB	Permeable reactive barrier
RAO	Remedial action objective
VOC	Volatile organic compound
TPH	Total petroleum hydrocarbons

Table 13.1
Summary of Remedial Alternatives

Preliminary Alternatives	Summary Description	Conceptual Components	Benefits	Issues/Considerations	Sustainability	Estimated Total Alternative Cost (1)
Alternative 1 - LNAPL Removal and MNA	- Surfactant injection and LNAPL extraction activities in MW-09 - Installation of additional downgradient wells along the western, northwestern, and northern Port property boundary - Inspection of the former Longview Pipeline contents - Long-term groundwater monitoring and MNA - Institutional Controls and SMP	- Surfactant injection and extraction activities including installation of additional 4-inch-diameter recovery wells within the vicinity of MW-09, which would be used during injections and extraction activities - Surfactant and water extraction, soil handling/disposal - Institutional controls indefinitely (or until MNA) including an SMP - MNA monitoring - indefinite	- Low cost, low disturbance from minimal active construction. - Surfactant injection and extraction would help eliminate residual LNAPL in soil and groundwater.	- Requires ICs on Port, City of Longview, and WSDOT properties; ICs on City of Longview and WSDOT properties may not be acceptable to those entities. - Does not address the majority of the soil source contamination present in CAA-2. - Indefinite long-term monitoring. - There might be public and tribal concerns with off-property migration.	- Small negative balance of environmental impact due to carbon dioxide emissions from implementation. The small carbon footprint due to raw material consumption (fuels and electricity) and greenhouse gas emissions (heavy equipment) is more sustainable than the other alternatives.	Low. $1,600,000
Alternative 2 - In Situ Treatment Barrier and LNAPL Removal	- Installation of in situ treatment barrier with PetroFix - Off-property ISCO injections in the vicinities of MW-04 and MW-30 - Surfactant injection and LNAPL extraction activities in MW-09 - Installation of additionaldowngradient wells along the western, northwestern, and northern Port property boundary - Inspection of the former Longview Pipeline contents - Long-term groundwater monitoring and MNA - Institutional Controls and SMP	- Installation of a PetroFix barrier in area outside the rail lines within the footprint of the former Calloway Ross Parcel and former Warehouse 9 footprint - Surfactant injection and extraction activities including installation of additional 4-inch-diameter recovery wells within the vicinity of MW-09, which would be used during injections and extraction activities - In situ injections to address off-property downgradient plume on WSDOT property - Institutional controls indefinitely (or until MNA) including an SMP - MNA and compliance monitoring	- Prevents off-property migration onto WSDOT and City of Longview property. - PetroFix expected to last from 5 to 10 years as long as there are terminal electron acceptors. - Surfactant injection and extraction would help reduce hydrocarbon mass and eliminate LNAPL. - Low disturbance to rail activities.	- Containment remedy that would not address source areas in CAA-1 and CAA-2, resulting in indefinite restoration time frame - Long-term O&M costs to maintain treatment barrier to meet CULs at at the downgradient Port property boundary, which includes a potential for re-injection of PetroFix barrier to restore electron acceptors	- Small negative balance of environmental impact due to carbon dioxide emissions from implementation. The small carbon footprint due to raw material consumption (fuels and electricity) and greenhouse gas emissions (heavy equipment) is more sustainable than Alternatives 3 through 5.	Low to Moderate implementation cost, with greater long-term O&M cost than other options. $4,200,000
Alternative 3 - Targeted ISCO Injections and LNAPL Removal	- Targeted ISCO injections within accessible areas where soil COC concentrations exceed proposed CULs (CAA-1) - Targeted ISCO injections along the rail lines within hotspots or where soil COC concentrations exceed RELs (CAA-2) - Off-property ISCO injections in the vicinities of MW-04 and MW-30 - Surfactant injection and LNAPL extraction activities in MW-09 - Installation of additional downgradient wells along the western, northwestern, and northern Port property boundary - Inspection of the former Longview Pipeline contents - Long-term groundwater monitoring and MNA - Institutional Controls and SMP	- Accessible areas outside the rail lines: In situ injections within extent of MTCA Method A soil exceedances to protect groundwater; PersulfOx injections within alluvial aquifer and RegenOx in perched water-bearing zone - Within the rail lines: Focused PersulfOx injections within alluvial aquifer and RegenOx in perched water-bearing zone - In situ RegenOx injections to address off-property downgradient plume on WSDOT property - LNAPL removal via surfactant injections and extractions within the vicinity of MW-09 - Institutional controls including an SMP - Performance monitoring and long-term monitoring	- Would prevent off-property migration to City of Longview and WSDOT properties. - Would more quickly achieve CULs in accessible areas than Alternative 1 and 2 and allow the Port to develop and lease the areas outside of the rail lines. - Least invasive injection alternative, would use RELs for remediating soil exceeding residual saturation levels within rail lines to reduce impact to Port activities. - Lower expected cost than aggressive injections and excavation.	- Would not address impacts less than residual saturation levels within the rail lines resulting in long restoration time frame for Site-wide impacts; however, the restoration time frame to meet groundwater CULs at the downgradient Port property boundary is 5 to 10 years. - Some uncertainty concerning whether the injections would reach all intended areas. - Access constraints, disruption to rail activities (approximately a total of up to 30 days of injection activities in the rail lines) but less impact than Alternative 5. - May require supplemental injections to meet remedial action goals.	- Small negative balance of environmental impact due to carbon dioxide emissions from implementation. The small carbon footprint due to raw material consumption (fuels and electricity) and greenhouse gas emissions (heavy equipment) is not as sustainable as Alternatives 1 and 2 but is more sustainable than Alternative 4.	Moderate. $4,200,000

Table 13.1
Summary of Remedial Alternatives

Preliminary Alternatives	Summary Description	Conceptual Components	Benefits	Issues/Considerations	Sustainability	Estimated Total Alternative Cost (1)
Alternative 4 - Limited Excavation, Targeted ISCO Injections, and LNAPL Removal	- Excavation of approximately 13,000 cubic yards of impacted soil exceeding proposed CULs (CAA-1) - Targeted ISCO injections along the rail lines within hotspots or where soil concentrations exceed RELs (CAA-2) - Off-property ISCO injections in the vicinities of MW-04 and MW-30 - Surfactant injection and LNAPL extraction activities in MW-09 - Installation of additional downgradient wells along the western, northwestern, and northern Port property boundary - Inspection of the former Longview Pipeline contents - Long-term groundwater monitoring and MNA - Institutional Controls and SMP	-Excavation of approximately 13,000 cubic yards of impacted soil in areas outside the rail lines within the footprint of the former Calloway Ross Parcel and former Warehouse 9 footprint; impacts present to depths up to 23 feet bgs; ORC-A applied in excavation - PersulfOx injections within hotspots beneath rail lines in alluvial aquifer and RegenOx within hotspots beneath rail lines in perched water-bearing zone - Surfactant injection and extraction activities including installation of additional 4-inch-diameter recovery wells within the vicinity of MW-09, which would be used during injections and extraction activities - In situ injections to address off-property downgradient plume on WSDOT property - Insitutional controls including an SMP - Performance monitoring and long-term monitoring	- Would prevent off-property migration to City of Longview and WSDOT properties more quickly than all other alternatives - Moderate disruption during injection activities - More effective than excavation alone within accessible areas - Would more quickly achieve CULs in accessible areas than Alternatives 1, 2 and 3, and would allow the Port to develop and lease the areas outside of the rail lines - Would use RELs for remediate soil exceeding residual saturation levels within rail lines to reduce impact to Port activities - Lower cost than a full Site-wide excavation - Has a potential to more quickly meet groundwater CULs at the downgradient Port property boundary than Alternative 3, but similar restoration time frame within the rail lines as Alternative 3.	- Would not address impacts less than residual saturation levels within the rail lines, resulting in long restoration time frame for Site-wide impacts; however, the restoration time frame to meet groundwater CULs at the downgradient Port property boundary is 5 to 10 years. - Access constraints and disruption to rail lines (approximately a total of up to 30 days of injection activities in the rail lines) but less impact than Alternative 5 - Some uncertainty concerning if the injections would reach all intended areas - Excavation depths would require extensive, high-cost shoring to protect rail lines and expected to require geotechnical evaluation. - Dewatering may be needed to dewater perched water-bearing zone and reach required depths.	- There is a negative balance of environmental impact due to carbon dioxide emissions from numerous trucks hauling impacted soil and clean backfill to and from the Site. The increase in the carbon footprint due to raw material consumption (fuels and electricity) and greenhouse gas emissions (heavy equipment) is not as sustainable as the other alternatives.	High. $10,200,000
Alternative 5 - Plume-Wide ISCO Injections and LNAPL Removal	- ISCO injections throughout the entire extent of groundwater impacts exceeding proposed CULs, including in the vicinity of off-property locations MW-04 and MW-30 - Surfactant injection and LNAPL extraction activities in MW-09 - Installation of additional downgradient wells along the western, northwestern, and northern Port property boundary - Inspection of the former Longview Pipeline contents - Long-term groundwater monitoring and MNA - Institutional Controls and SMP	-Installation of additional 4-inch-diameter wells within the vicinity of MW-09 to assist with surfactant injection and extraction -PersulfOx injections in alluvial aquifer and RegenOx in the perched water-bearing zone within the entire extent of groundwater impacts; both with close injection point spacing to maximize contaminant destruction - Horizontal injection wells as potential alternative implementation option - In situ injections to address off-property downgradient plume on WSDOT property - Insitutional controls including an SMP - Performance and compliance monitoring	- Would prevent off-property migration to City of Longview and WSDOT properties - More cleanup certainty by addressing the entire dissolved-phase plumes within the perched water-bearing zone and alluvial aquifer - Quicker compliance throughout plume, which would allow the Port to redevelop portions of the Site - Most permanent option that will treat all soil to meet leaching pathway CULs	- Access constraints, disruption to rail activities - Potential use of horizontal wells would involve technical and administrative difficulties and concerns about boring beneath active rail lines - High cost to treat entire dissolve-phase plumes and soil impacts exceeding most conservative screening levels - Some uncertainty concerning if the injections would reach all intended areas - May require supplemental injections to meet remedial action goals within the estimated restoration time frame at downgradient Port property boundary, but this is less of a concern when compared to Alternative 3	- Small negative balance of environmental impact due to carbon dioxide emissions from implementation. The small carbon footprint due to raw material consumption (fuels and electricity) and greenhouse gas emissions (heavy equipment) is not as sustainable as Alternatives 1 and 2 but is more sustainable than Alternative 4.	Moderate to high. $8,300,000

Description of Regenesis In Situ Technologies:

PetroCleanze	PetroCleanze is a customized formulation of the widely used RegenOx ISCO technology. This two-part reagent contains purposefully enhanced, detergent-like properties which significantly increase the desorption rates of hydrocarbons bound in saturated soils. Once the hydrocarbons are liberated into the dissolved phase, they are more readily available for removal using a range of enhanced recovery techniques. PetroCleanze is designed to increase the viability and efficiency of enhanced recovery techniques such as dual-phase extraction, vacuum-enhanced extraction, and pump and treat systems.
PetroFix	PetroFix is an activated carbon-based reagent that uses 1- to 2-micrometer activated carbon in a water-based suspension along with added nutrients. The nutrients—either sulfate or sulfite, and nitrate—are to stimulate bioremediation on and around the activated carbon. PetroFix is easily injectable and can last for multiple years as a long as there are terminal electron acceptors for contamination biodegradation.
PersulfOx	PersulfOx is an advanced ISCO reagent that destroys organic contaminants found in groundwater and soil through abiotic chemical oxidation reactions. It is an all-in-one product with a built-in catalyst that activates the sodium persulfate component and generates contaminant-destroying free radicals without the costly and potentially hazardous addition of a separate activator. The patented catalyst enhances the oxidative destruction of both petroleum hydrocarbons and chlorinated contaminants in the subsurface.
RegenOx	RegenOx is a calcium percarbonate-based reagent that is engineered to be safe near utilities. The downside to RegenOx is its short-lived and highly reactive nature. RegenOx is typically injected over a minimum of three events separated by 2 to 4 weeks each. Oxygen (O_2) is often rapidly produced when RegenOx contacts organic matter or contamination. Should the suggested volume not be possible, the percentage of the RegenOx mixture may be increased or point spacing may be tightened. RegenOx is a metal- and utility-safe product.

Note:

1 Detailed cost estimate information for each alternative is provided in Appendix I.

Abbreviations:

bgs	Below ground surface	MTCA	Model Toxic Controls Act
CUL	Cleanup level	O&M	Operations and maintenance
ft	Feet	ORC	Oxygen release compound
GW	Groundwater	REL	Remediation Levels
ISCO	In situ chemcial oxidation	ROW	Right-of-way
LNAPL	Light non-aqueous phase liquid	SMP	Soil Management Plan
LTM	Long-term monitoring	sq. ft.	Square feet
MNA	Monitored natural attenuation	WSDOT	Washington State Department of Transportation

Table 14.1
Disproportionate Cost Analysis Alternative Evaluation

Criteria	Alternative 1 LNAPL Removal and MNA	Alternative 2 In Situ Treatment Barrier and LNAPL Removal	Alternative 3 Targeted ISCO Injections and LNAPL Removal	Alternative 4 Limited Excavation, Targeted ISCO Injections, and LNAPL Removal	Alternative 5 Plume-wide ISCO Injections and LNAPL Removal
Alternative Description	Alternative 1 consists of the following: • PetroCleanze surfactant injections and extractions, including installation of additional 4-inch-diameter injection/recovery wells within the vicinity of MW-09, which will be used during injections and extraction activities. • Former Longview Pipeline inspection • Installation of additional monitoring wells along the western downgradient boundary • Long-term MNA Once the dissolved-phase plumes are no longer present off-property, compliance groundwater monitoring would be implemented along the northwestern and northern edge of the Port property to verify plume status and to ensure no off-property migration of contamination. Groundwater monitoring would include MNA to verify natural attenuation of groundwater, which is expected to eventually achieve groundwater CULs at the downgradient property boundary in a restoration time frame of approximately 30 years. ICs would be required indefinitely to address remaining soil and groundwater contamination on- and off-property (or until MNA). A soil management plan would be prepared to address the management of potentially contaminated soil remaining in place in the upper 15 feet bgs that could be encountered during Site redevelopment or O&M of the rail lines and utilities at the Port.	Alternative 2 consists of the following: • Installation of a PetroFix barrier in CAA-1 within the footprint of the former Calloway Ross Parcel and former Warehouse 9 footprint. • In situ PersulfOx injections to address the off-property downgradient groundwater plume on WSDOT property. • PetroCleanze surfactant injection and extraction activities include installation of additional 4-inch-diameter injection/recovery wells within the vicinity of MW-09, which will be used during injections and extraction activities. • Former Longview Pipeline inspection • Installation of additional monitoring wells along the western downgradient boundary • Long-term MNA Compliance groundwater monitoring would be implemented to verify plume status and to ensure no off-property migration of contamination onto the City of Longview and WSDOT properties. Groundwater CULs at the downgradient property boundary are expected to be met in a restoration time frame of approximately 5 to 10 years. ICs would be required indefinitely to address remaining soil and groundwater contamination on Port property. A soil management plan would be prepared to address the management of potentially contaminated soil remaining in place in the upper 15 feet bgs that could be encountered during Site redevelopment or O&M of the rail lines and utilities at the Port.	Alternative 3 consists of the following: • Accessible areas outside the rail lines (CAA-1): In situ PersulfOx and RegenOx injections within extent of MTCA Method A soil exceedances to protect groundwater. • Within the rail lines (CAA-2): Focused PersulfOx and RegenOx injections in both water-bearing zones in areas where soil concentrations exceed RELs. • In situ PersulfOx injections to address off-property downgradient groundwater plume on WSDOT property. • PetroCleanze surfactant injection and extraction activities include installation of additional 4-inch-diameter recovery wells within the vicinity of MW-09, which will be used during injections and extraction activities. • Former Longview Pipeline inspection • Installation of additional monitoring wells along the western downgradient boundary • Long-term MNA Performance monitoring would be implemented to verify the efficacy of in situ injections, and long-term monitoring would be implemented to verify plume status. Groundwater CULs at the downgradient property boundary are expected to be met in a restoration time frame of approximately 5 to 10 years. ICs would be required indefinitely to address remaining soil contamination on Port property. A soil management plan would be prepared to address the management of potentially contaminated soil remaining in place in the upper 15 feet bgs that could be encountered during Site redevelopment or O&M of the rail lines and utilities at the Port.	Alternative 4 consists of the following: • Excavation of approximately 13,000 cubic yards of impacted soil in areas outside the rail lines within the footprint of the former Calloway Ross Parcel and former Warehouse 9 footprint (CAA-1). ORC-A applied in base of excavation. Excavated soil would be transported off-site for disposal. • PersulfOx and RegenOx injections in both water-bearing zones in areas where soil concentrations exceed RELs within the rail lines (CAA-2). • In situ PersulfOx injections to address off-property downgradient groundwater plume on WSDOT property. • PetroCleanze surfactant injection and extraction activities include installation of additional 4-inch-diameter recovery wells within the vicinity of MW-09, which will be used during injections and extraction activities. • Former Longview Pipeline inspection • Installation of additional monitoring wells along the western downgradient boundary • Long-term MNA Performance monitoring would be implemented to verify the efficacy of in situ injections, and long-term monitoring would be implemented to verify plume status. Groundwater CULs at the downgradient property boundary are expected to be met in a restoration time frame of approximately 5 to 10 years. ICs would be required indefinitely to address remaining soil contamination on Port property. A soil management plan would be prepared to address the management of potentially contaminated soil remaining in place in the upper 15 feet bgs that could be encountered during Site redevelopment or O&M of the rail lines and utilities at the Port.	Alternative 5 consists of the following: • PersulfOx and RegenOx injections within the entire extent of the groundwater plumes in both water-bearing zones. • PetroCleanze surfactant injection and extraction activities include installation of additional 4-inch-diameter recovery wells within the vicinity of MW-09, which will be used during injections and extraction activities. • Former Longview Pipeline inspection • Installation of additional monitoring wells along the western downgradient boundary • Long-term MNA Performance monitoring would be implemented to verify the efficacy of in situ injections, and long-term monitoring would be implemented to verify plume status. Groundwater CULs at the downgradient property boundary are expected to be met in a restoration time frame of approximately 5 to 10 years. ICs would be required indefinitely to address remaining vadose zone soil contamination. A soil management plan would be prepared to address the management of potentially contaminated soil remaining in place in the upper 15 feet bgs that could be encountered during Site redevelopment or O&M of the rail lines and utilities at the Port.

Table 14.1
Disproportionate Cost Analysis Alternative Evaluation

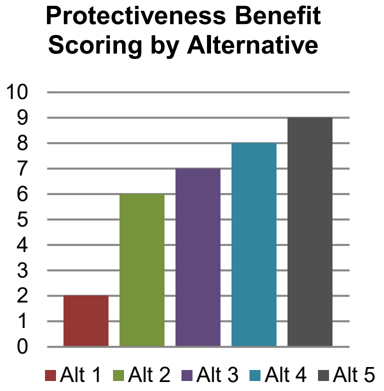
Criteria	Alternative 1 LNAPL Removal and MNA	Alternative 2 In Situ Treatment Barrier and LNAPL Removal	Alternative 3 Targeted ISCO Injections and LNAPL Removal	Alternative 4 Limited Excavation, Targeted ISCO Injections, and LNAPL Removal	Alternative 5 Plume-wide ISCO Injections and LNAPL Removal
Overall Protectiveness • Degree to which existing risks to human health and the environment are reduced • Time required to reduce risks and attain cleanup standards • On-site and off-site risks resulting from alternative implementation • Improvement in overall environmental quality 	• Risks associated with LNAPL present in the MW-09 vicinity would be removed with surfactant injections/extractions. Risks from contaminated groundwater rely on long-term effectiveness of natural attenuation and ICs on Port, City of Longview, and WSDOT properties. Risks associated with contaminated soil would be managed by ICs on Port property, as well as a soil management plan. • There are few current risks from on-site soil and groundwater. However, risk reduction is less than other alternatives, which include ISCO treatment and soil excavation. • The time frame for achievement of groundwater CULs at the downgradient property boundary is anticipated to be approximately 30 years. • On-site risks during LNAPL removal and routine monitoring would be managed by proper H&S protocols and site security. Surfactant injections/extractions within the active rail lines would require planning to target time windows without rail traffic. The off-site risks associated with contaminated material transport and disposal are negligible and would be managed using licensed operators and permitted disposal facilities. • Alternative 1 achieves the lowest improvement in overall environmental quality because TPH contamination will remain in soil and groundwater for the longest amount of time after remedy implementation. This alternative has a significantly longer restoration time frame relative to Alternatives 2, 3, 4, and 5 because it does not include contaminated soil removal or active treatment of the downgradient portions of the groundwater plume.	• Risks associated with LNAPL present in the MW-09 vicinity would be removed with surfactant injections/extractions. Risks from contaminated groundwater on Port property would be gradually reduced through natural attenuation, ICs, and a downgradient PetroFix barrier to prevent off-property migration. Risks from contaminated groundwater on the City of Longview and WSDOT property would be reduced by ISCO injections. Contaminated soil would be managed by ICs on Port property, as well as a soil management plan. • Risk reduction and overall protectiveness are slightly higher than Alternative 1 because this alternative includes a barrier to prevent off-property migration and actively treats off-property impacts. • The time frame for achievement of groundwater CULs at the downgradient property boundary is anticipated to be 5 to 10 years. Groundwater impacts on the City of Longview and WSDOT properties are expected to attenuate to concentrations less than CULs within 5 to 10 years of ISCO injections. • On-site risks during construction would be managed by proper H&S protocols and site security. Surfactant injections/extractions within the active rail lines would require planning to target time windows without rail traffic. The off-site risks associated with contaminated material transport and disposal are negligible and would be managed using licensed operators and permitted disposal facilities. • Alternative 2 achieves the fourth-highest improvement in overall environmental quality because the majority of TPH contamination will remain in soil and groundwater for an indefinite amount of time following remedy implementation. Alternative 2 is considered more protective than Alternative 1 because it includes targeted off-property in situ treatment and a PetroFix barrier to prevent off-property migration of contaminated groundwater.	• Risks associated with LNAPL present in the MW-09 vicinity would be removed with surfactant injections/extractions. Risks from contaminated groundwater on Port property would be moderately reduced through ISCO injections in areas with soil exceeding CULs outside the rail lines and areas with soil exceeding RELs inside the rail lines. Risks from contaminated groundwater on the City of Longview and WSDOT properties would be eliminated by ISCO injections on and off Port property. Risks associated with remaining contaminated soil beneath the Port property would be managed by ICs and a soil management plan. • Risk reduction and overall protectiveness are higher than both Alternatives 1 and 2 because Alternative 3 actively treats the source area (destruction vs. reliance on downgradient barrier and ICs). • The time frame for achievement of groundwater CULs at the downgradient property boundary is anticipated to be 5 to 10 years. • On-site risks during construction would be managed by proper H&S protocols and site security. This alternative would require significant planning to work around active rail lines. There are no other added on-site risks. The off-site risks associated with contaminated material transport would be limited to incidental investigation-derived waste and extracted impacted groundwater because no soil excavation is proposed. • Alternative 3 achieves the third-highest improvement in overall environmental quality because it actively treats the soil source area and is expected to fully achieve CULs in groundwater. This alternative has a similar anticipated restoration time frame for achievement of groundwater CULs at the downgradient property boundary as Alternative 2, but also leaves contaminated soil on the Site indefinitely.	• Risks associated with LNAPL present in the MW-09 vicinity would be removed with surfactant injections/extractions. Risks from contaminated groundwater on Port property would be moderately to strongly reduced through an excavation with added ORC-A in areas with soil exceeding CULs outside the rail lines and ISCO injections in areas with soil exceeding RELs inside the rail lines. Risks from contaminated groundwater on the City of Longview and WSDOT properties would be eliminated by excavation of impacted soil and ISCO injections. Risks associated with remaining contaminated soil beneath the Port property would be managed by ICs and a soil management plan. • Risk reduction and overall protectiveness are similar to Alternative 3 because this alternative includes an excavation component to remove source area material. The removal of soil from beneath the property would significantly reduce off-property migration of contamination. • The time frame for achievement of groundwater CULs at the downgradient property boundary is anticipated to be 5 to 10 years. • On-site risks during construction would be managed by proper H&S protocols and site security. This alternative would require significant planning to work around active rail lines. The excavation would also require extensive shoring and potentially a geotechnical evaluation to protect active rail lines. Dewatering may also be required. The off-site risks are associated with contaminated material transport of soil and groundwater waste. • Alternative 4 achieves the second-highest improvement in overall environmental quality because it permanently removes a large volume of impacted soil outside the rail lines and is expected to fully achieve CULs in groundwater through ISCO injections. This alternative has a similar anticipated restoration time frame for achievement of the groundwater CULs at the downgradient property boundary as Alternatives 2 and 3. However, this alternative would have the highest carbon footprint due to the transportation of impacted soil for disposal and imported backfill material.	• Risks associated with LNAPL present in the MW-09 vicinity would be removed with surfactant injections/extractions. In situ treatment throughout the entirety of the Site groundwater plumes would significantly reduce risks from contaminated soil and groundwater. Risks associated with remaining contaminated soil in the vadose zone would be managed by ICs and a soil management plan. • Risk reduction and overall protectiveness are marginally higher than Alternative 4 because this alternative includes plume-wide injections, which would assist biodegradation of the largest extent and volume of the impacted soil and groundwater extents at the Site (destruction vs. reliance on containment and ICs). • The time frame for achievement of groundwater CULs at the downgradient property boundary is anticipated to be 5 to 10 years. Although the ISCO injections will help attain soil CULs in the saturated zone, there will likely be residual soil impacts in the vadose zone. • On-site risks during construction would be managed by proper H&S protocols and site security. This alternative would require significant planning to work around active rail lines. There are no other added on-site risks. The off-site risks associated with impacted material transport would be limited to incidental investigation-derived waste and extracted impacted groundwater because no soil excavation is proposed. • Alternative 5 achieves the highest improvement in overall environmental quality because it addresses the largest extent of impacts exceeding CULs and the least amount of residual soil with CUL exceedances would be left on site. This alternative has a similar anticipated restoration time frame for achievement of the groundwater CULs at the downgradient property boundary as Alternatives 2, 3, and 4.

Table 14.1
Disproportionate Cost Analysis Alternative Evaluation

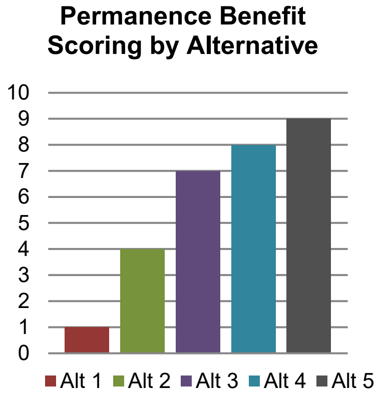
Criteria	Alternative 1 LNAPL Removal and MNA	Alternative 2 In Situ Treatment Barrier and LNAPL Removal	Alternative 3 Targeted ISCO Injections and LNAPL Removal	Alternative 4 Limited Excavation, Targeted ISCO Injections, and LNAPL Removal	Alternative 5 Plume-wide ISCO Injections and LNAPL Removal
Permanence • Degree of reduction of contaminant toxicity, mobility, and volume • Adequacy of destruction of hazardous substances • Reduction or elimination of substance release, and source of release • Degree of irreversibility of waste treatment processes • Volume and characteristics of generated treatment residuals  **Permanence Benefit Scoring by Alternative** 	• Alternative 1 is the least permanent alternative and provides a low reduction in contaminant volume compared to other alternatives because most of the impacts would be addressed by natural attenuation. Off-property migration of contaminants would not be addressed. • Remaining soil impacts would be controlled by ICs on WSDOT, City of Longview, and Port properties, as well as a soil management plan for any site redevelopment or O&M activities in those areas. • Attenuation via breakdown of contaminants is irreversible. LNAPL removal and surfactant extraction is also irreversible. • There are no treatment residuals associated with implementation of this technology.	• Alternative 2 provides low reduction in contaminant volume compared to Alternatives 3, 4, and 5. • Installation of a PetroFix barrier northwest of the rail lines in CAA-1 would prevent downgradient contamination migration, but not actively reduce source area contaminant volume. In situ PersulfOx injections would reduce groundwater impacts on WSDOT property. • Remaining soil impacts would be controlled by ICs on Port property as well as by a soil management plan for any site redevelopment or O&M activities in areas with remaining impacts. • The PetroFix barrier is expected to last between 5 and 10 years or as long as there are terminal electron acceptors present. In situ biodegradation and LNAPL removal and surfactant extraction are both irreversible. • ISCO injections can increase dissolved iron and sulfate concentrations in groundwater for a short period of time. Sulfate and iron will be monitored after injections and compared to GWQS criteria of 250 mg/L and 0.30 mg/L, respectively (WAC 173-200-040). There are no other treatment residuals associated with implementation of this technology.	• Alternative 3 provides a moderate reduction in contaminant volume compared to other alternatives. • Impacted soil and groundwater in CAA-1 (including the City of Longview and WSDOT properties) would be reduced using ISCO injections and biodegradation. In situ treatment in areas with soil concentrations greater than RELs in CAA-2 would reduce hydrocarbon mass in the source area to concentrations that would eventually be protective of groundwater over the restoration time frame. • Remaining soil impacts within the Port property would be controlled by ICs, as well as by a soil management plan for any site redevelopment or O&M activities in areas with remaining impacts. • In situ biodegradation, LNAPL removal, and surfactant extraction are irreversible. However, this alternative may require supplemental injections to meet remediation goals. • ISCO injections can increase dissolved iron and sulfate concentrations in groundwater for a short period of time. Sulfate and iron will be monitored after injections and compared to GWQS criteria of 250 mg/L and 0.30 mg/L, respectively (WAC 173-200-040). There are no other treatment residuals associated with implementation of this technology.	• Alternative 4 provides a moderate to high reduction in contaminant volume compared to other alternatives. This alternative ranks slightly higher than Alternative 3 because the excavation will remove vadose zone impacts in CAA-1. • Impacted soil and groundwater in CAA-1 (including the City of Longview and WSDOT properties) would be removed by excavation and in situ treatment. In situ treatment in areas with soil concentrations greater than RELs in CAA-2 would reduce hydrocarbon mass in the source area to concentrations that would eventually be protective of groundwater over the restoration time frame. • Remaining soil impacts within the Port property would be controlled by ICs, as well as by a soil management plan for any site redevelopment or O&M activities in areas with remaining impacts. • Excavation and off-site disposal of impacted soil, in situ biodegradation, and LNAPL removal/surfactant extraction are all irreversible. ORC-A pellets applied to the base of the excavation would help with ongoing attenuation of groundwater impacts and serve as a barrier to prevent contamination from migrating off-site. • ISCO injections can increase dissolved iron and sulfate concentrations in groundwater for a short period of time. Sulfate and iron will be monitored after injections and compared to GWQS criteria of 250 mg/L and 0.30 mg/L, respectively (WAC 173-200-040). There are no other treatment residuals associated with implementation of this technology.	• Although Alternative 5 does not fully meet the definition of a permanent cleanup action, it is consistent with WAC 173-340-350(8)(c)(ii)(B)(II) because it is the most permanent alternative to the maximum extent practicable and it is not technically feasible to address all contaminated soil beneath all active structures and rail lines, even if horizontal injection wells are used. Alternative 5 provides the greatest reduction in contaminant volume compared to other alternatives. • Plume-wide in situ treatment would address Site soil and groundwater impacts in CAA-1 and CAA-2 and prevent off-property migration. • Remaining vadose zone soil impacts within the Port property would be controlled by ICs, as well as by a soil management plan for any site redevelopment or O&M activities in areas with remaining impacts. • In situ biodegradation, LNAPL removal, and surfactant extraction are irreversible. However, this alternative may require supplemental injections to meet remediation goals. • ISCO injections can increase dissolved iron and sulfate concentrations in groundwater for a short period of time. Sulfate and iron will be monitored after injections and compared to GWQS criteria of 250 mg/L and 0.30 mg/L, respectively (WAC 173-200-040). There are no other treatment residuals associated with implementation of this technology.

Table 14.1
Disproportionate Cost Analysis Alternative Evaluation

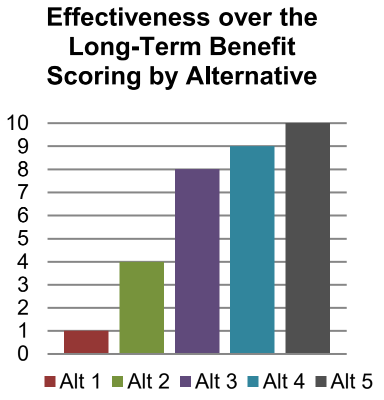
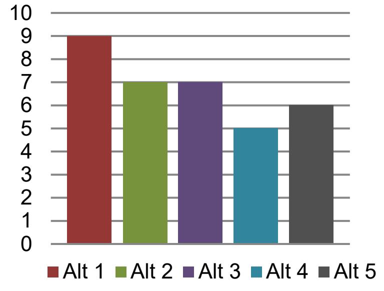
Criteria	Alternative 1 LNAPL Removal and MNA	Alternative 2 In Situ Treatment Barrier and LNAPL Removal	Alternative 3 Targeted ISCO Injections and LNAPL Removal	Alternative 4 Limited Excavation, Targeted ISCO Injections, and LNAPL Removal	Alternative 5 Plume-wide ISCO Injections and LNAPL Removal
Effectiveness over the Long-Term • Degree of certainty of alternative success • Reliability while contaminants on-site remain greater than CULs • Magnitude of residual risk • Effectiveness of controls implemented to manage residual risk 	• Alternative 1 provides a low degree of certainty of success to meet RAOs and achieve groundwater CULs at the downgradient property boundary within a 30-year restoration time frame. • Degree of certainty for success to remediate groundwater Site-wide is low because the majority of the TPH plumes would not be targeted by active treatment. Natural attenuation of contaminants is ongoing in Site groundwater, but at a slow rate. • Residual risk from contaminated soil and groundwater on Port property would be managed by ICs and a soil management plan. The Port is expected to own the property in perpetuity, ensuring the long-term success of these controls. However, the ownership future of the WSDOT property is uncertain, and placing an IC on the City of Longview and WSDOT properties to restrict groundwater usage may not be feasible or acceptable to those entities. • Off-property exposure risk to groundwater contamination during the restoration time frame would be monitored by routine groundwater monitoring events until in compliance with CULs.	• Alternative 2 provides a moderate degree of certainty of success to meet RAOs and achieve groundwater CULs at the downgradient property boundary within a 5- to 10-year restoration time frame. • Degree of certainty for success to meet groundwater CULs at the downgradient property boundary is moderate. Although off-property groundwater impacts would be remediated through ISCO injections, the majority of the TPH plumes would not be targeted by active treatment. Initially, the off-property migration risk would be mitigated by the downgradient PetroFix barrier, but the barrier would likely have to be replaced after 5 to 10 years to ensure groundwater CULs continue to be met at the Port property boundary. • Residual risk from contaminated soil and groundwater on Port property would be managed by ICs and a soil management plan. The Port is expected to own the property in perpetuity, ensuring the long-term success of these controls. A PetroFix barrier would also protect downgradient migration of impacted groundwater. • Off-property exposure risk to groundwater contamination during the restoration time frame would be monitored by routine groundwater monitoring events until in compliance with CULs.	• Alternative 3 provides a moderate to high degree of certainty of success to meet RAOs and achieve groundwater CULs at the downgradient property boundary within a 5- to 10-year restoration time frame. • In situ treatment is an effective and reasonably common technology to implement and would remove TPH impacts in groundwater and saturated soil. • Degree of certainty for success to meet groundwater CULs at the Port property boundary is moderate to high because this alternative does not include soil removal; however, ISCO injections would be implemented in areas within CAA-2 where soil concentrations exceed RELs and in CAA-1 where soil concentrations exceed MTCA Method A CULs. Off-property groundwater impacts would also be addressed by ISCO injections. • Residual risk from contaminated soil and groundwater on Port property would be managed by ICs and a soil management plan. The Port is expected to own the property in perpetuity, ensuring the long-term success of these controls. • Off-property exposure risk to groundwater contamination during the restoration time frame would be monitored by routine groundwater monitoring events until in compliance with CULs.	• Alternative 4 provides a high degree of certainty of success to meet RAOs and achieve groundwater CULs at the downgradient property boundary within a 5- to 10-year restoration time frame. • In situ treatment is an effective and standard technology to implement and would remove TPH impacts in groundwater and saturated soil. Excavation is an effective and common technology that would fully remove contaminants in soil. • Degree of certainty for success to meet groundwater CULs at the Port property boundary is moderate to high because of soil removal in CAA-1 and ISCO injections in CAA-2 would significantly reduce the TPH mass in Site soils exceeding RELs. • Residual risk from contaminated soil and groundwater on Port property would be managed by ICs and a soil management plan. The Port is expected to own the property in perpetuity, ensuring the long-term success of these controls. • Off-property exposure risk to groundwater contamination during the restoration time frame would be monitored by routine groundwater monitoring events until in compliance with CULs.	• Alternative 5 provides a high degree of certainty of success to meet RAOs and achieve groundwater CULs at the downgradient property boundary within a 5- to 10-year restoration time frame. • In situ treatment is an effective and standard technology to implement and would remove TPH impacts in groundwater and saturated soil. • Degree of certainty for success to meet groundwater CULs at the Port property boundary is high because of extensive plume-wide in situ treatment. This alternative also has a high degree of certainty for success in remediating saturated zone soil concentrations, which could contribute to Site-wide achievement of groundwater CULs. • Residual risk from contaminated soil and groundwater on Port property would be managed by ICs and a soil management plan. The Port is expected to own the property in perpetuity, ensuring the long-term success of these controls. • Off-property exposure risk to groundwater contamination during the restoration time frame would be monitored by routine groundwater monitoring events until in compliance with CULs.

Table 14.1
Disproportionate Cost Analysis Alternative Evaluation

Criteria	Alternative 1 LNAPL Removal and MNA	Alternative 2 In Situ Treatment Barrier and LNAPL Removal	Alternative 3 Targeted ISCO Injections and LNAPL Removal	Alternative 4 Limited Excavation, Targeted ISCO Injections, and LNAPL Removal	Alternative 5 Plume-wide ISCO Injections and LNAPL Removal
Short-Term Risk Management • Risk to human health and the environment associated with alternative construction • The effectiveness of controls in place to manage short-term risks **Short-Term Risk Management Benefit Scoring by Alternative**  	• Alternative 1 has a low short-term risk to human health and the environment during implementation. There are residual risks to human health and the environment posed by surfactant injection/extraction, and transport of contaminated fluid. • There is a low risk to site workers during handling of liquid PetroCleanze surfactant and groundwater monitoring activities. There is a low risk associated with the handling and transportation for disposal of the impacted soil from drill cuttings during the installation of the injection/recovery wells within the vicinity of MW-09. • Approximately 6,000 gallons of contaminated fluids containing product and dissolved-phase hydrocarbons will be generated during surfactant extraction events and managed on-site. • Site activities would require appropriate PPE, BMPs, site controls to restrict site access, rail traffic control, and appropriate training requirements for management of risk. These controls are highly effective and anticipated to adequately manage short-term risk.	• Alternative 2 has a low to moderate short-term risk to human health and the environment during implementation. Short term risk is slightly higher than Alternative 1 due to the addition of low risks associated with the ISCO injections. There are residual risks to human health and the environment posed by surfactant injection/extraction, and transport of contaminated fluid. These risks would be managed by proper BMPs, worker H&S protocols, and site security. • There is a low risk to site workers during handling of PetroCleanze, PersulfOx, RegenOx, and PetroFix injection substrates and groundwater monitoring activities. There is a low risk associated with the handling and transportation for disposal of the impacted soil from drill cuttings during the installation of the injection/recovery wells within the vicinity of MW-09. • There is a low risk that ISCO injections can potentially increase dissolved iron and sulfate concentrations in groundwater for a short period of time. • Approximately 6,000 gallons of contaminated fluids containing product and dissolved-phase hydrocarbons will be generated during surfactant extraction events and managed on-site. • ISCO injections will occur in primarily vacant and inactive areas of the Port and WSDOT properties. However, access to all locations is not controlled, and there is a small possibility of encountering traffic or WSDOT and Port employees in these locations. Additional controls to restrict Site access, including exclusion zones and traffic cones, would be implemented in applicable areas. • Site activities would require appropriate PPE, BMPs, site controls to restrict site access, rail traffic control, and appropriate training requirements for management of risk. These controls are highly effective and anticipated to adequately manage short-term risk.	• Alternative 3 has a low to moderate short-term risk to human health and the environment during implementation. Short-term risk is slightly higher than Alternative 2 due to the addition of injection points. There are residual risks to human health and the environment posed by surfactant injection/extraction, and disposal/transport of contaminated fluid. • There is a low risk to site workers during handling of PetroCleanze, PersulfOx, and RegenOx injection substrates and groundwater monitoring activities. There is a low risk associated with the handling and transportation for disposal of the impacted soil from drill cuttings during the installation of the injection/recovery wells within the vicinity of MW-09. • There is a low risk that ISCO injections can potentially increase dissolved iron and sulfate concentrations in groundwater for a short period of time. • Approximately 6,000 gallons of contaminated fluids containing product and dissolved phase hydrocarbons will be generated during surfactant extraction events and managed on-site. • ISCO injections within CAA-2 will occur during periods when the lines are inactive to minimize risk to on-site workers. • Site activities would require appropriate PPE, BMPs, site controls to restrict site access, coordination with railyard, and appropriate training requirements for management of risk. These controls are highly effective and anticipated to adequately manage short-term risk.	• Alternative 4 has a moderate to high short-term risk to human health and the environment during implementation, which is the highest of all the alternatives. There are residual risks to human health and the environment posed by surfactant injection/extraction, and disposal/transport of contaminated fluid. • Handling and disposal of contaminated soil would require a significant number of truck trips to haul contaminated soil off-site that would increase traffic risks and would have a larger carbon footprint. There is also some risk for public exposure with this alternative due to increased traffic associated with contaminated soil transportation from the site for disposal over public roadways; however, the excavated soil would be managed by licensed professionals at a permitted landfill. • There is a low risk to site workers during handling of PetroCleanze, PersulfOx, and RegenOx injection substrates and groundwater monitoring activities. There is a low risk associated with the handling and transportation for disposal of the impacted soil from drill cuttings during the installation of the injection/recovery wells within the vicinity of MW-09. • There is a low risk that ISCO injections can potentially increase dissolved iron and sulfate concentrations in groundwater for a short period of time. • Approximately 6,000 gallons of contaminated fluids containing product and dissolved-phase hydrocarbons will be generated during surfactant extraction events and managed on-site. • ISCO injections within CAA-2 will occur during periods when the lines are inactive to minimize risk to on-site workers. • Site activities would require appropriate PPE, BMPs, site controls to restrict site access, coordination with railyard, and appropriate training requirements for management of risk. The large excavation would also require extensive shoring and potentially a geotechnical evaluation. These controls are highly effective and anticipated to adequately manage short-term risk.	• Alternative 5 has a moderate short-term risk to human health and the environment during implementation. There are residual risks to human health and the environment posed by surfactant injection/extraction, and disposal/transport of contaminated fluid. • There is a low risk to site workers during handling of PetroCleanze, PersulfOx, and RegenOx injection substrates and groundwater monitoring activities. There is a low risk associated with the handling and transportation for disposal of the impacted soil from drill cuttings during the installation of the injection/recovery wells within the vicinity of MW-09. • There is a low risk that ISCO injections can potentially increase dissolved iron and sulfate concentrations in groundwater for a short period of time. • Approximately 6,000 gallons of contaminated fluids containing product and dissolved-phase hydrocarbons will be generated during surfactant extraction events and managed on-site. • ISCO injections within CAA-2 will occur during periods when the lines are inactive to minimize risk to on-site workers. Injections within the City of Longview ROW pose risks to workers and the public due to working in the roadway and may also increase the risk of traffic collisions due to detours. Alternative 5 is the only alternative that would require work in the ROW. Similar short-term risks would apply if horizontal injection wells were used, given the number and density of borings. • Site activities would require appropriate PPE, BMPs, site controls to restrict site access, coordination with railyard, traffic control, and appropriate training requirements for management of risk. These controls are highly effective and anticipated to adequately manage short-term risk.

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Disproportionate Cost Analysis Alternative Evaluation

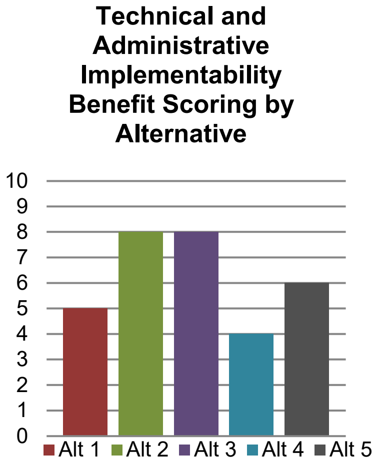
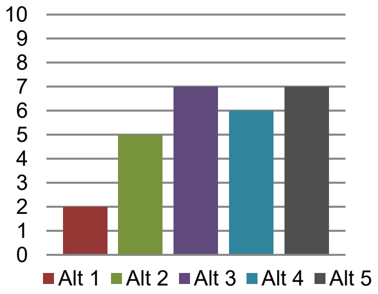
Criteria	Alternative 1 LNAPL Removal and MNA	Alternative 2 In Situ Treatment Barrier and LNAPL Removal	Alternative 3 Targeted ISCO Injections and LNAPL Removal	Alternative 4 Limited Excavation, Targeted ISCO Injections, and LNAPL Removal	Alternative 5 Plume-wide ISCO Injections and LNAPL Removal
Technical and Administrative Implementability • Technical possibility • Availability of off-site facilities, services, and materials • Administrative and regulatory requirements • Schedule, size, and complexity of construction • Monitoring requirements • Site access for construction, operations, and monitoring • Integration with existing site operations or other current and potential future remedial action 	• Alternative 1 is the smallest in scale. Surfactant injections and extractions is a somewhat specialized construction element; however, many licensed drillers in the region are qualified to safely perform this work. This surfactant injections/extractions associated with this alternative can be implemented in a single construction season. • All necessary off-site facilities, materials, and services are available within the region. • UIC permits would need to be obtained prior to injection activities. • Monitoring requirements include performance monitoring during injection and extraction and MNA groundwater monitoring following implementation. • ICs and a soil management plan would be developed for contamination remaining on Port property. ICs would need to be placed on WSDOT and City of Longview properties to restrict groundwater use. This might not be feasible or accepted by the property owners, which would make this more technically challenging. • This alternative would not impede current property use or preclude potential future remedial action. However, this alternative could impact future redevelopment activities on the Port, WSDOT, or City of Longview properties if excavation or dewatering is required.	• Alternative 2 is the second smallest in scale. In situ injection is a somewhat specialized construction element; however, many licensed drillers in the region are qualified to safely perform this work. This alternative can be implemented in a single construction season. • All necessary off-site facilities, materials, and services are available within the region. • UIC permits would need to be obtained prior to injection activities. • An access agreement with WSDOT would be required to perform injection activities on WSDOT property. • Monitoring requirements include performance monitoring during injection and extraction and long-term groundwater monitoring following implementation. • ICs and a soil management plan would be developed for contamination remaining on Port property. • This alternative would not impede current or future property use or preclude potential future remedial action. However, this alternative could impact future redevelopment activities on the Port property if excavation or dewatering is required.	• Alternative 3 is the second largest in scale. In situ injection is a somewhat specialized construction element; however, many licensed drillers in the region are qualified to safely perform this work. This alternative can be implemented in a single construction season but would require coordination with Port activities along the rail lines. • All necessary off-site facilities, materials, and services are available within the region. • UIC permits would need to be obtained prior to injection activities. • An access agreement with WSDOT would be required to perform injection activities on their property. • Monitoring requirements include performance monitoring during injection and extraction activities and long-term groundwater monitoring following implementation. • ICs and a soil management plan would be developed for remaining contamination on Port property. • This alternative has the potential to cause minimal disruption to existing Site operations but would not impede current property as heavy industrial use. This alternative would not preclude potential future management of impacted soil during Port operations.	• Alternative 4 incorporates the greatest number of technologies and has the highest degree of technical complexity. Excavation with shoring and dewatering is a technically challenging, yet common technology that can be safely implemented by contractors in the region. In situ injection is a somewhat specialized construction element; however, many licensed drillers in the region are qualified to safely perform this work. This alternative can be implemented in a single construction season but would require a significant amount of planning for the excavation activities would require and coordination with Port activities along the rail lines. • All necessary off-site facilities, materials, and services are available within the region. • UIC permits would need to be obtained prior to injection activities. • An access agreement with WSDOT would be required to performed injection activities on their property. • Monitoring requirements include protection monitoring for workers during construction; performance monitoring during injection and extraction activities; and long-term groundwater monitoring following implementation. • ICs and a soil management plan would be developed for contamination remaining on Port property. • This alternative has the potential to cause short-term disruption to existing Site operations but would not impede current property use. This alternative would not preclude potential future management of impacted soil during Port operations.	• Alternative 5 is the largest in scale. In situ injection is a somewhat specialized construction element; however, many licensed drillers in the region are qualified to safely perform this work. This alternative can be implemented in a single construction season but would require a significant amount of coordination with Port activities along the rail lines. Use of horizontal injection wells would involve technical and administrative challenges because of the number and density of wells and boring beneath active rail lines. • All necessary off-site facilities, materials, and services are available within the region. • UIC permits would need to be obtained prior to injection activities. • Access agreements with WSDOT and the City of Longview would be required to perform injection activities on their properties. • Monitoring requirements include performance monitoring during injection and extraction activities; and long-term groundwater monitoring following implementation. • ICs and a soil management plan would be developed for contamination remaining on Port property. • Alternative 5 involves work in the City ROW and may require single lane closures of an arterial roadway for some portions of remedy implementation. Minimal lane closures will not affect surrounding businesses or private property. • This alternative has the potential to cause short-term disruption to existing Site operations due to extensive injections in active rail lines but would not impede current property use. This alternative would not preclude potential future management of impacted soil during Port operations.

Table 14.1
Disproportionate Cost Analysis Alternative Evaluation

Criteria	Alternative 1 LNAPL Removal and MNA	Alternative 2 In Situ Treatment Barrier and LNAPL Removal	Alternative 3 Targeted ISCO Injections and LNAPL Removal	Alternative 4 Limited Excavation, Targeted ISCO Injections, and LNAPL Removal	Alternative 5 Plume-wide ISCO Injections and LNAPL Removal
Consideration of Public Concerns • Whether the community has concerns • Degree to which the alternative addresses those concerns **Consideration of Public Concerns Benefit Scoring by Alternative**  	• Disturbance to Port operations and traffic impacts are also expected to be of concern to the Port and the public. Alternative 1 does not impact Port operations and does not require lane closures on arterial roads. • Alternative 1 is expected to elicit the highest amount of public concern because it does not include source area removal or treatment. • Public concerns will be reviewed following the public comment period and will be addressed as part of the final remedial alternative selection and design.	• Alternative 2 addresses potential public concerns regarding contaminated groundwater impacts to private and City of Longview properties with targeted groundwater treatment of off-property impacts and a PetroFix barrier to minimize the risk of off-site migration of contamination. • Alternative 2 does not impact Port operations and does not require lane closures on arterial roads. • Public concerns will be reviewed following the public comment period and will be addressed as part of the final remedial alternative selection and design.	• Alternative 3 addresses potential public concerns regarding contaminated groundwater impacts to private and City of Longview properties with targeted groundwater treatment of off-property impacts. • Possible minor disturbances to Port operations are expected to be of concern to the Port and the public. Alternative 3 does not require lane closures or traffic controls. • Public concerns will be reviewed following the public comment period and will be addressed as part of the final remedial alternative selection and design.	• Alternative 4 addresses potential public concerns regarding contaminated groundwater impacts to private and City of Longview properties with targeted groundwater treatment of off-property impacts. • Possible disturbances to Port operations are expected to be of concern to the Port and the public. Alternative 4 does not require lane closures or traffic controls. However, Alternative 4 may elicit public concern due to the significant number of truck trips (and CO2 emissions) associated with the handling and disposal of contaminated soil. • Public concerns will be reviewed following the public comment period and will be addressed as part of the final remedial alternative selection and design.	• Alternative 5 addresses potential public concerns regarding contaminated groundwater impacts to private and City of Longview properties with targeted groundwater treatment of off-property impacts and extensive source treatment on Port property. • Disturbances to Port operations are expected to be of concern to the Port and the public. Alternative 5 involves work in the City of Longview ROW and may require single lane closures of an arterial roadway for some portions of remedy implementation. This would also be expected to apply if horizontal injection wells were used. Lane closures are not anticipated to impact nearby businesses. • Public concerns will be reviewed following the public comment period and will be addressed as part of the final remedial alternative selection and design.
Cost [(1)] • Cost of construction and permitting • Long-term monitoring and closure costs, including maintenance/contingency injections • Sales tax and 25% contingency on direct construction costs and 20% contingency on indirect construction costs • Agency oversight costs	• Total cost: $1,600,000	• Total cost: $4,200,000 • Includes two maintenance injection events	• Total cost: $4,200,000 • Includes one contingency injection event	• Total cost: $10,200,000	• Total cost: $8,300,000 • Includes one contingency injection event

Note:

1 Long-term monitoring costs are adjusted for Net Present Value using a discount rate of 5%.

Abbreviations:

bgs	Below ground surface	ISCO	In situ chemical oxidation	Port	Port of Longview
BMP	Best management practice	LNAPL	Light non-aqueous phase liquid	PPE	Personal protective equipment
CAA	Cleanup Action Area	mg/L	Milligrams per liter	RAO	Remedial action objective
CUL	Cleanup level	MNA	Monitored Natural Attenuation	TPH	Total petroleum hydrocarbons
GWQS	Groundwater Quality Standards	MTCA	Model Toxics Control Act	UIC	Underground Injection Control
H&S	Health and safety	O&M	Operations & Maintenance	WAC	Washington Administrative Code
IC	Institutional control	ORC-A	Advanced oxygen release compound	WSDOT	Washington Department of Transportation

Table 14.2
Disproportionate Cost Analysis Summary

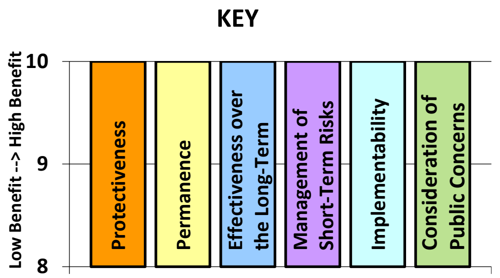
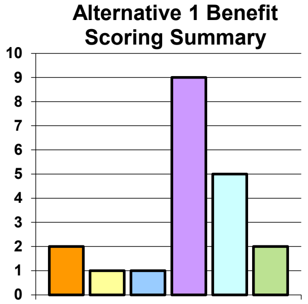
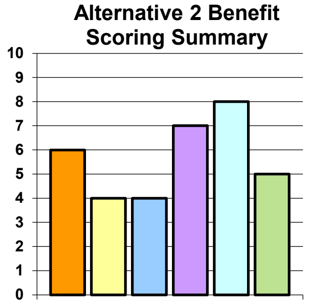
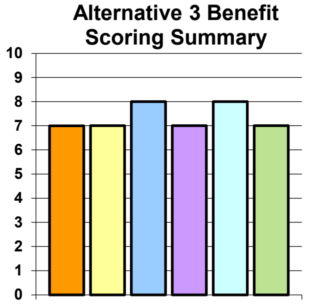
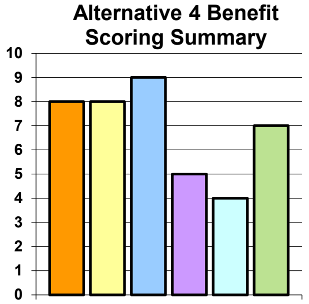
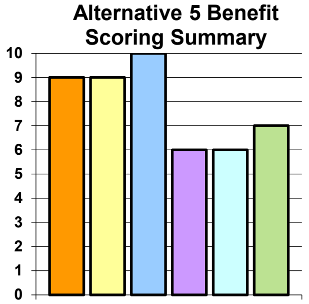
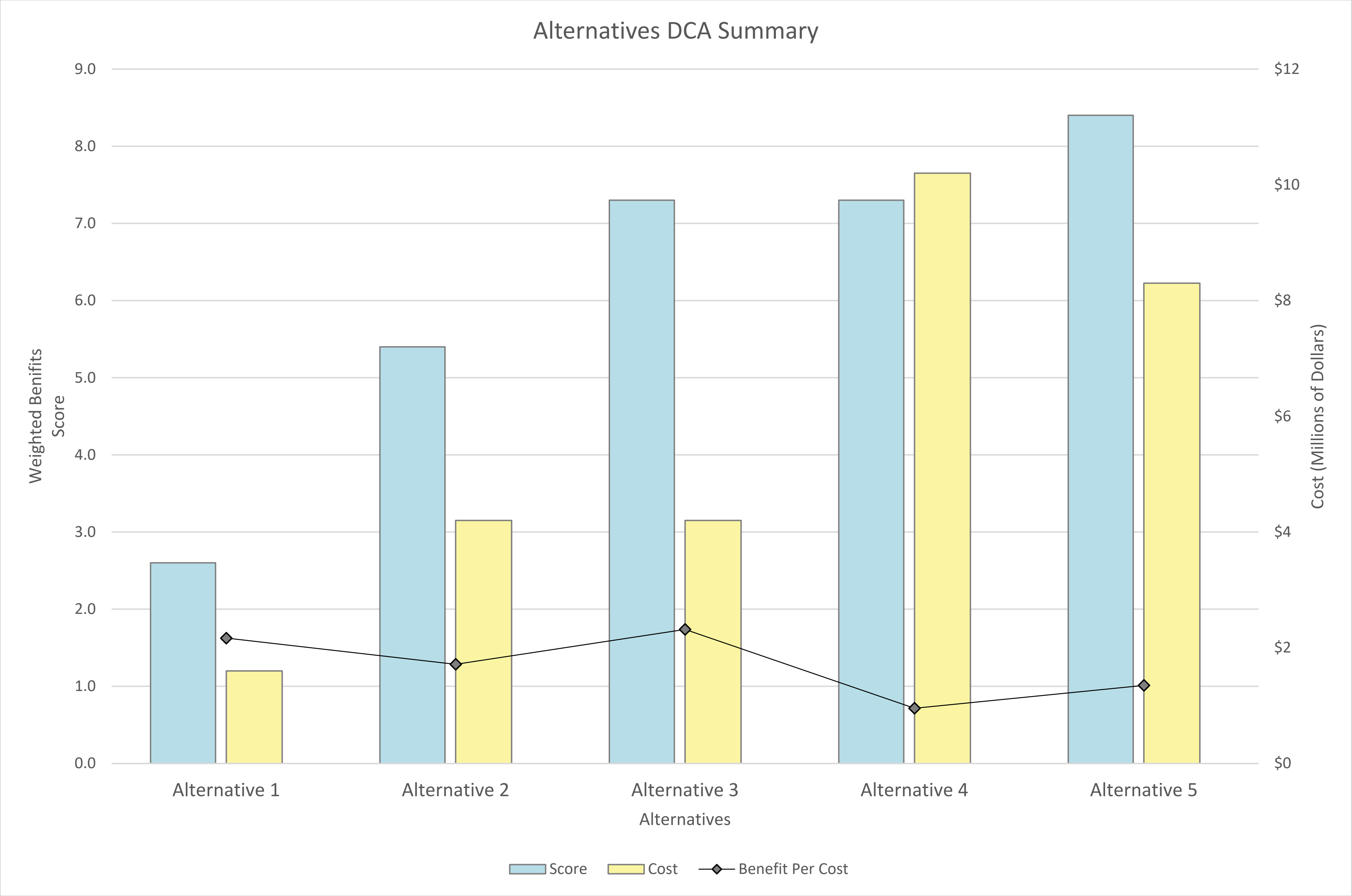
Alternative	**Alternative 1** **LNAPL Removal and MNA**	**Alternative 2** **In Situ Treatment Barrier and LNAPL Removal**	**Alternative 3** **Targeted ISCO Injections and LNAPL Removal**	**Alternative 4** **Limited Excavation, Targeted ISCO Injections, and LNAPL Removal**	**Alternative 5** **Plume-wide ISCO Injections and LNAPL Removal**
Alternative Description	Alternative 1 includes: (1) LNAPL removal in MW-09 vicinity (2) Former Longview Pipeline inspection (3) Installation of additional downgradient monitoring wells (4) Long-term monitoring and MNA (5) ICs and SMP	Alternative 2 includes: (1) LNAPL removal in MW-09 vicinity (2) Former Longview Pipeline inspection (3) Installation of additional downgradient monitoring wells (4) In situ PetroFix barrier along northwestern and northern Site boundary (CAA-1) to prevent downgradient migration of groundwater plume (5) ISCO groundwater treatment by injection of PersulfOx to address the downgradient groundwater plume on WSDOT property (6) Long-term monitoring and MNA (7) ICs and SMP	Alternative 3 includes: (1) LNAPL removal in MW-09 vicinity (2) Former Longview Pipeline inspection (3) Installation of additional downgradient monitoring wells (4) Focused ISCO treatment by PersulfOx and RegenOx in CAA-2 (hot spots at concentrations greater than RELs) and CAA-1 (areas with soil concentrations greater than MTCA Method A) of the rail tracks to remediate contaminated soil and groundwater (5) ISCO groundwater treatment by injection of PersulfOx to address the downgradient groundwater plume on WSDOT property (6) Long-term monitoring and MNA (7) ICs and SMP	Alternative 4 includes: (1) LNAPL removal in MW-09 vicinity (2) Former Longview Pipeline inspection (3) Installation of additional downgradient monitoring wells (4) Excavation of soil with concentrations greater than MTCA Method A in CAA-1 (approximately 13,000 cubic yards) (5) ISCO treatment by PersulfOx and RegenOx in CAA-2 where soil concentrations exceed RELs (6) ISCO groundwater treatment by injection of PersulfOx to address the downgradient groundwater plume on WSDOT property (7) Long-term monitoring and MNA (8) ICs and SMP	Alternative 5 includes: (1) LNAPL removal in MW-09 vicinity (2) Former Longview Pipeline inspection (3) Installation of additional downgradient monitoring wells (4) Plume-wide injections of PersulfOx and RegenOx in areas of soil and groundwater proposed CUL exceedances in CAA-1, CAA-2, and off-property (5) Long-term monitoring and MNA (6) ICs and SMP
					
Complies with MTCA Threshold Requirements	Yes	Yes	Yes	Yes	Yes
Restoration Time Frame (to achieve proposed CULs in groundwater at the Port property boundary)	30 years	5 to 10 years	5 to 10 years	5 to 10 years	5 to 10 years
Protectiveness (30%)	2	6	7	8	9
Permanence (20%)	1	4	7	8	9
Effectiveness over the Long Term (20%)	1	4	8	9	10
Management of Short-Term Risks (10%)	9	7	7	5	6
Technical and Administrative Implementability (10%)	5	8	8	4	6
Consideration of Public Concerns (10%) (1)	2	5	7	6	7
Total Weighted Benefit Score (Relative Benefit Ranking)	**2.6**	**5.4**	**7.3**	**7.3**	**8.4**
Estimated Total Alternative Cost (2)	$1.6 million	$4.2 million	$4.2 million	$10.2 million	$8.3 million
Benefit per Unit Cost Ratio (3)	**1.63**	**1.29**	**1.74**	**0.72**	**1.01**
Costs Disproportionate to Incremental Benefits	No	No	No	No	No
Overall Alternative Ranking	**2**	**3**	**1**	**5**	**4**

Table 14.2
Disproportionate Cost Analysis Summary



Notes:

1 Scores for Consideration of Public Concerns are pending public comment but expected to remain similar to initial rankings.
2 Specific cost estimate information is provided in Appendix I.
3 Benefit per Unit Cost Ratio calculated by dividing the Total Weighted Benefit Score by the Estimated Total Alternative Cost; for this calculation, cost was standardized by dividing by 1 million. Higher value indicates the most benefit per unit cost.

Abbreviations:

CAA	Cleanup Action Area	LNAPL	Light non aqueous phase liquid	REL	Remediation level
CUL	Cleanup level	MNA	Monitored natural attenuation	SMP	Soil Management Plan
DCA	Disproportionate cost analysis	MTCA	Model Toxics Control Act	WSDOT	Washington State Department of Transportation
IC	Institutional control				

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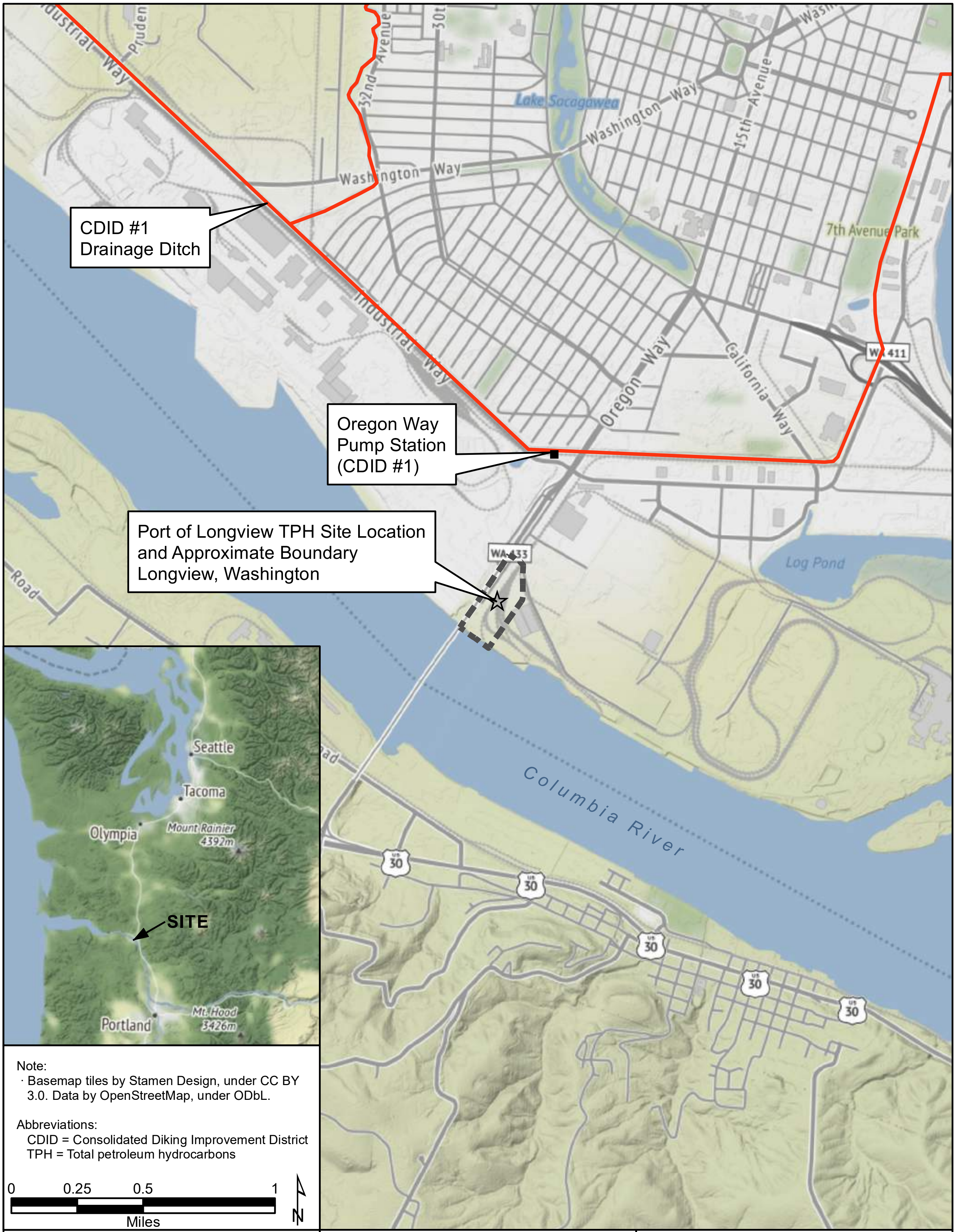
Port of Longview TPH Site

Figures



Note:
- Basemap tiles by Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

Abbreviations:
CDID = Consolidated Diking Improvement District
TPH = Total petroleum hydrocarbons

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Figure 1.1
Vicinity Map

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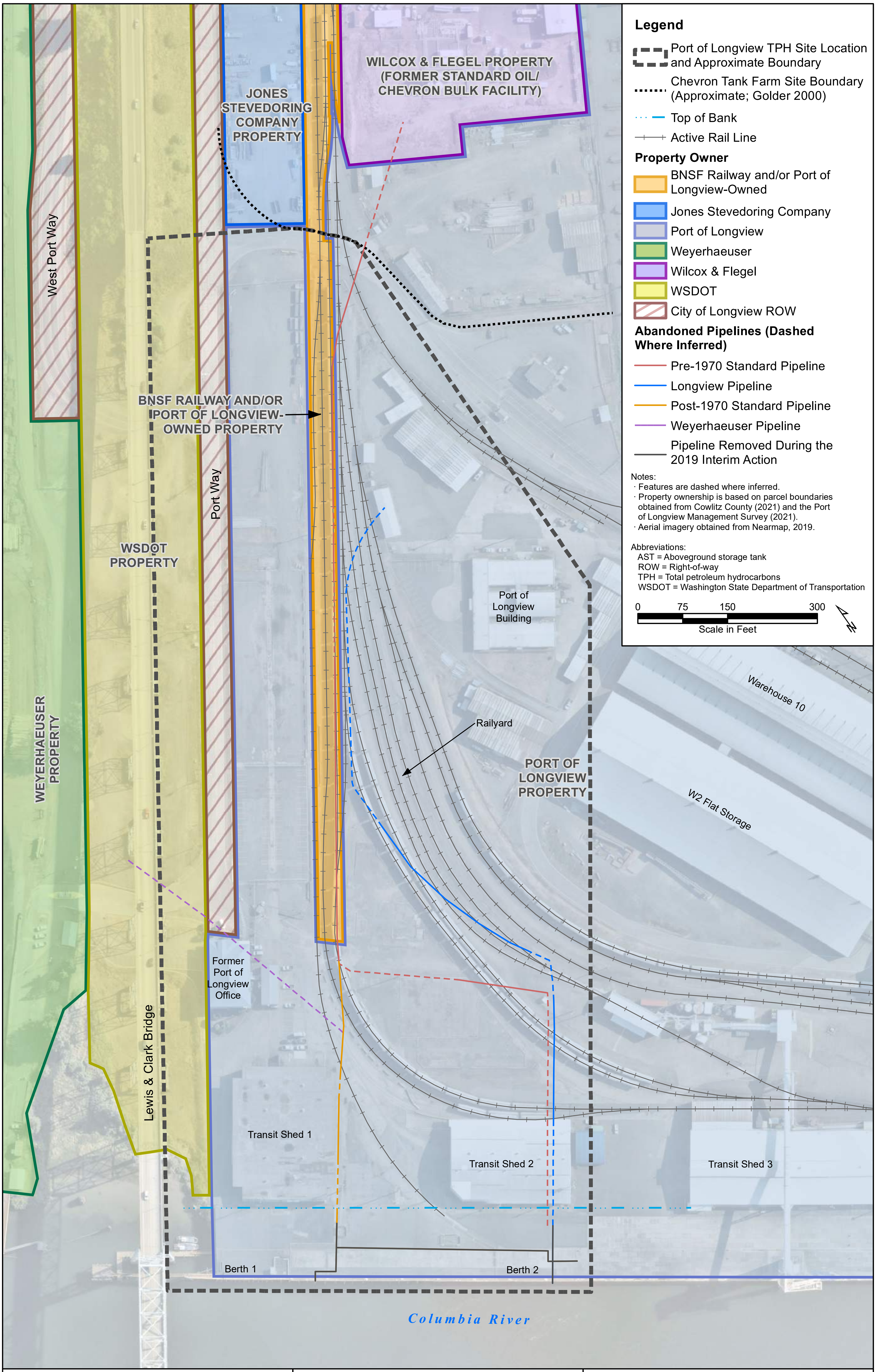

Notes:
- Features are dashed where inferred.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
WSDOT = Washington State Department of Transportation

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Figure 1.2
Site Map and Vicinity Property Ownership

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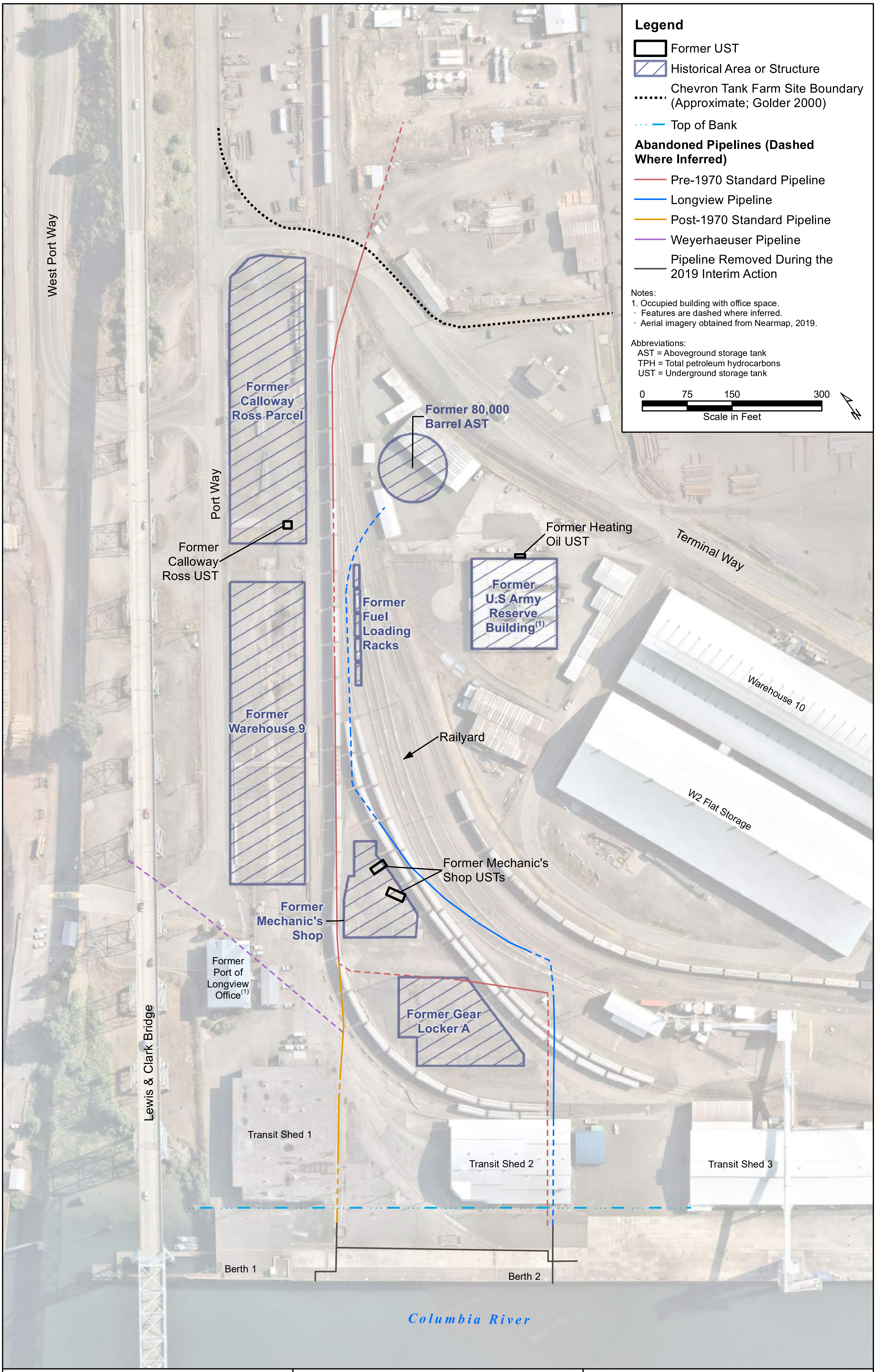

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Figure 2.1
Historical Site Features

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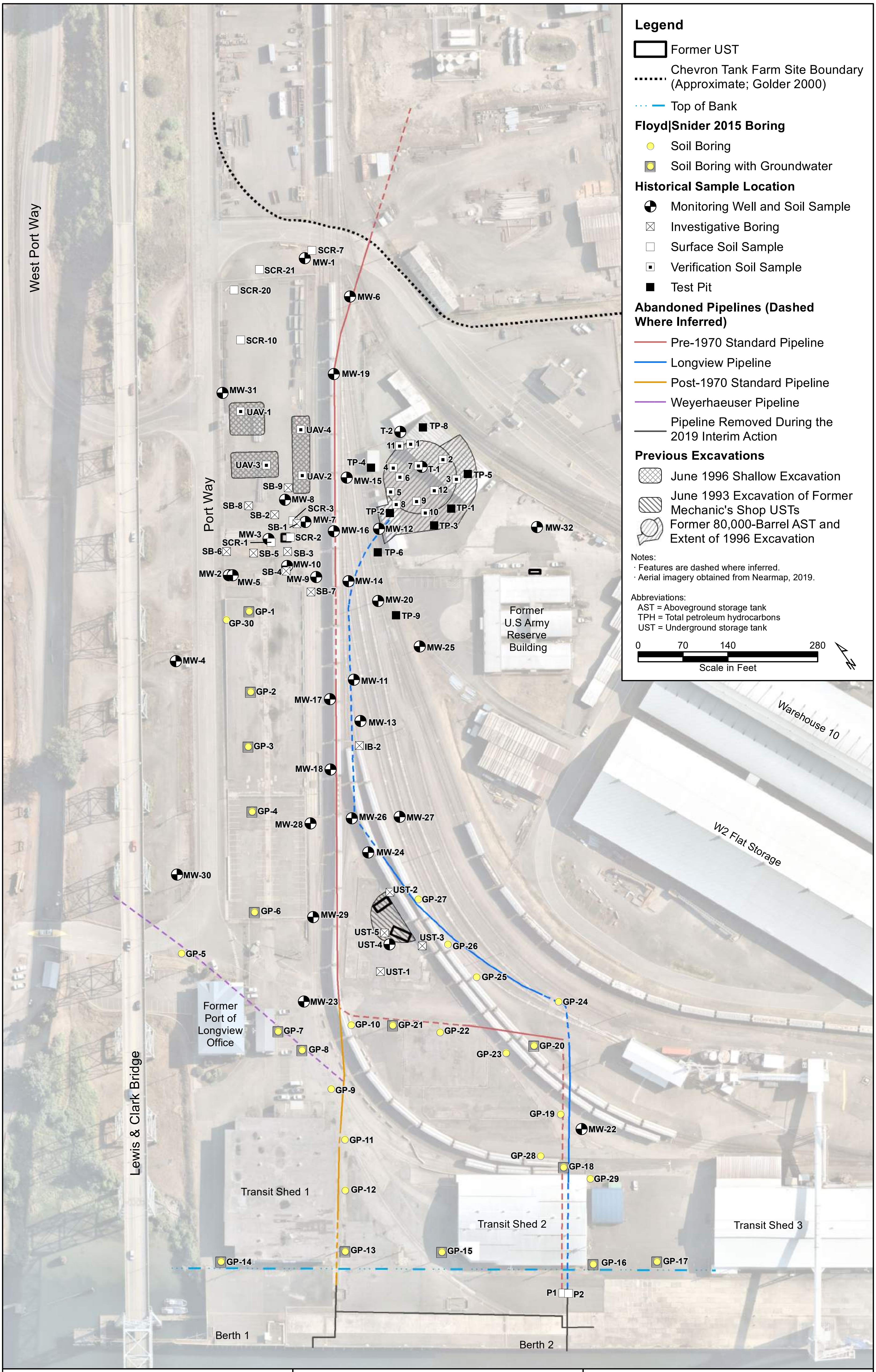

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Figure 2.2
Historical and 2015 Sample Locations

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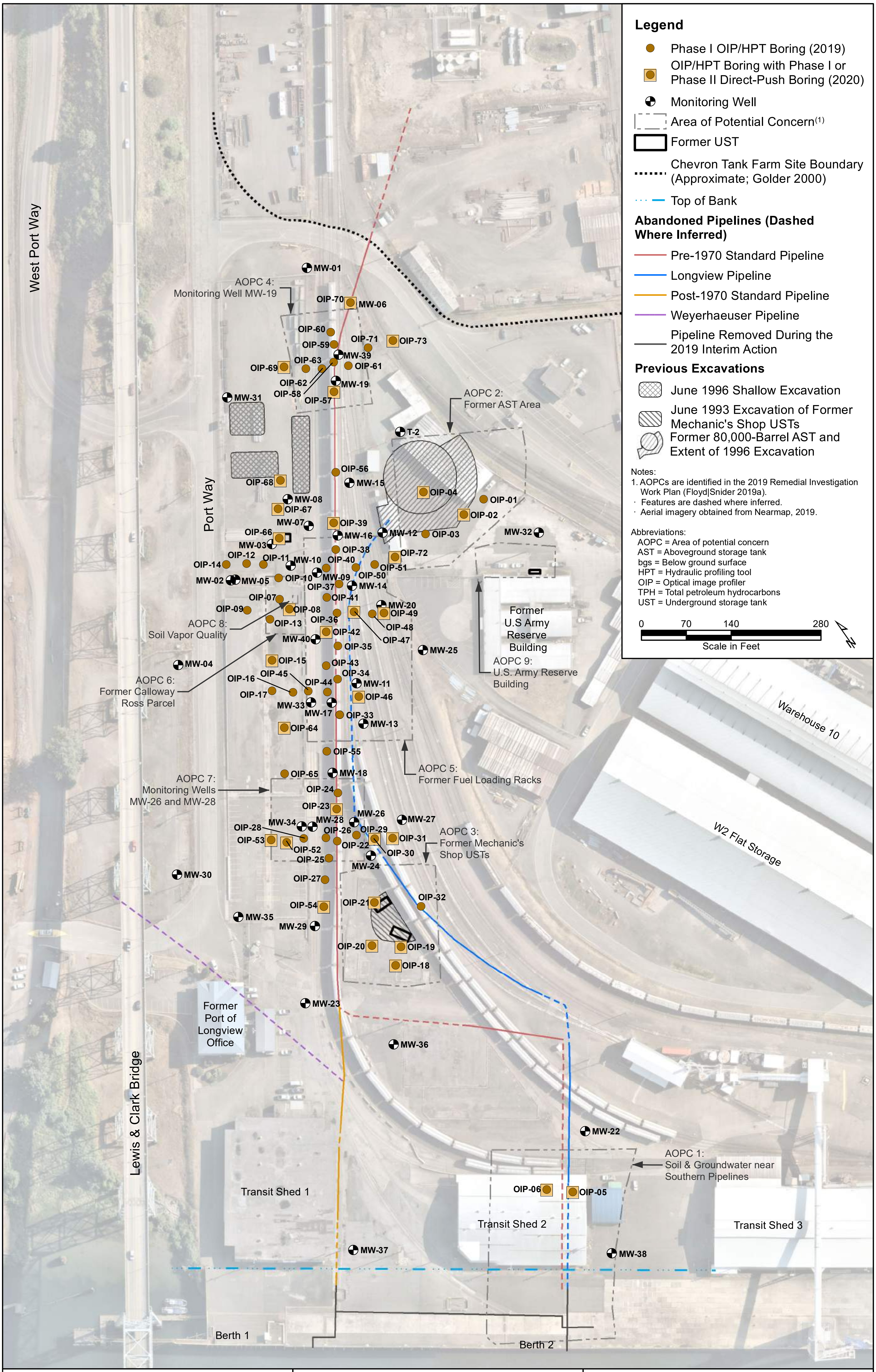

Notes:
1. AOPCs are identified in the 2019 Remedial Investigation Work Plan (Floyd|Snider 2019a).
· Features are dashed where inferred.
· Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of potential concern
AST = Aboveground storage tank
bgs = Below ground surface
HPT = Hydraulic profiling tool
OIP = Optical image profiler
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 3.1
Phase I OIP/HPT Boring Locations

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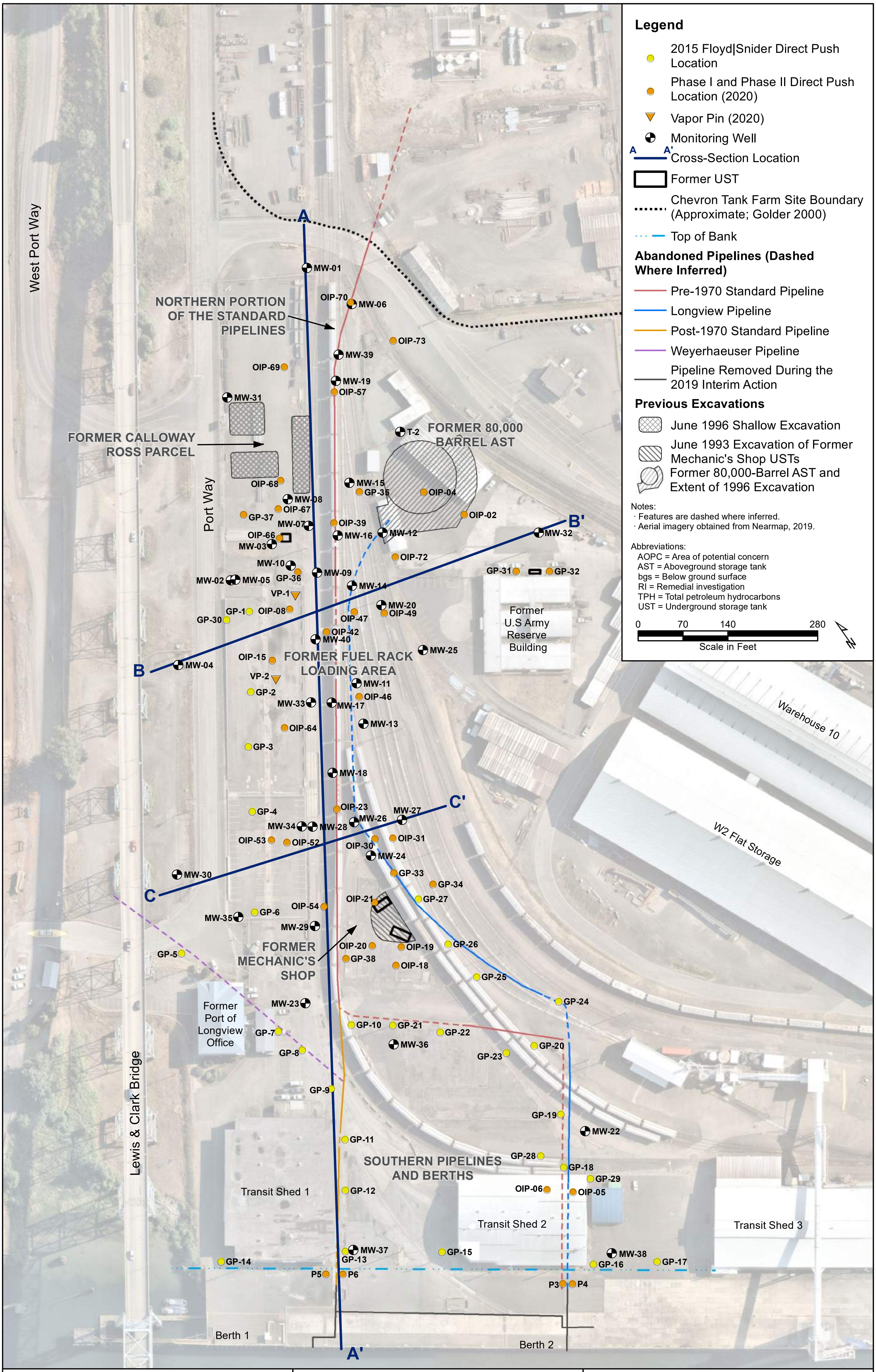

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Figure 3.2
RI Soil Sample and Monitoring Well Locations

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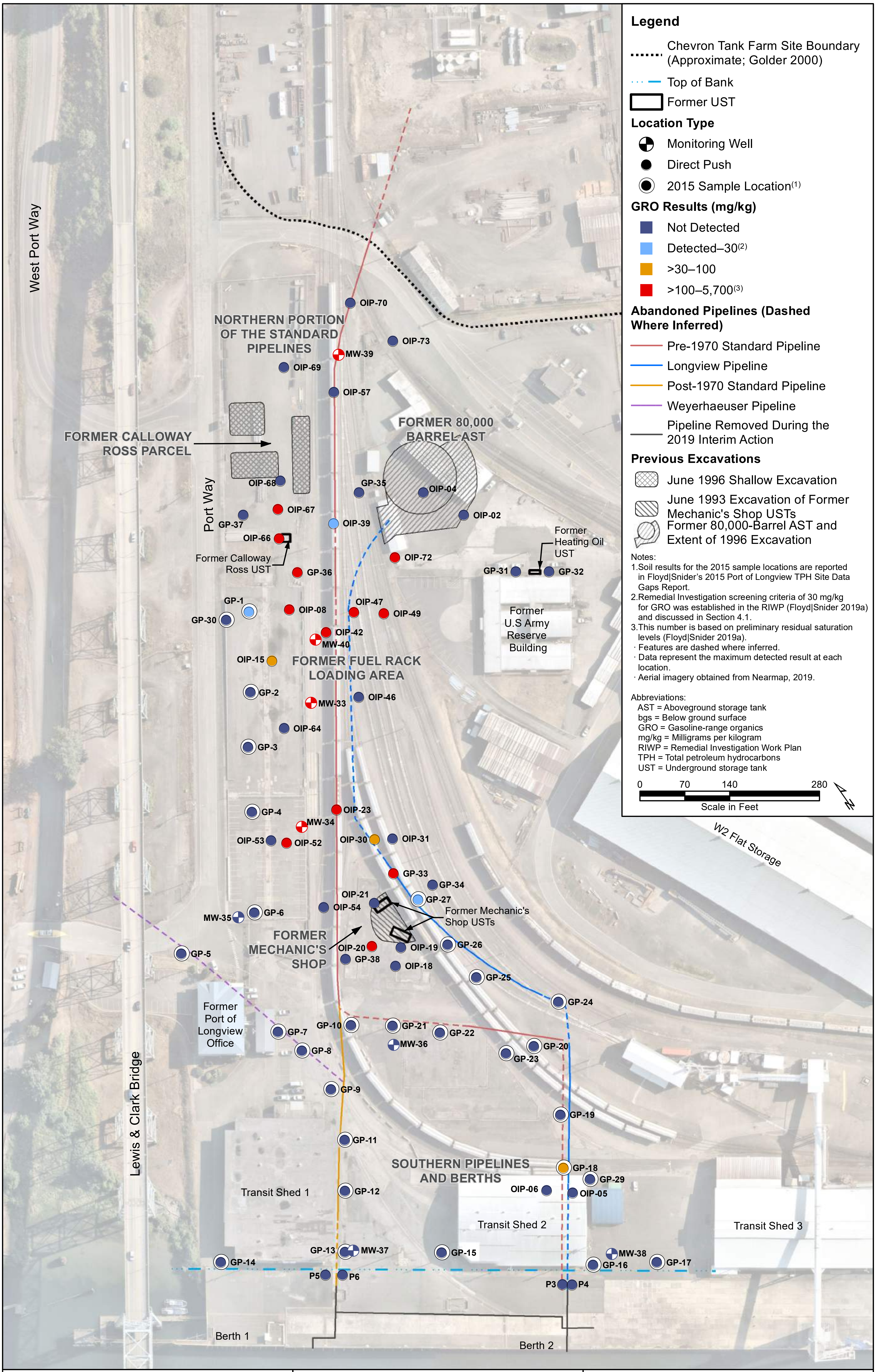

Notes:
1. Soil results for the 2015 sample locations are reported in Floyd|Snider's 2015 Port of Longview TPH Site Data Gaps Report.
2. Remedial Investigation screening criteria of 30 mg/kg for GRO was established in the RIWP (Floyd|Snider 2019a) and discussed in Section 4.1.
3. This number is based on preliminary residual saturation levels (Floyd|Snider 2019a).
- Features are dashed where inferred.
- Data represent the maximum detected result at each location.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
bgs = Below ground surface
GRO = Gasoline-range organics
mg/kg = Milligrams per kilogram
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 4.1
Concentrations of Gasoline-Range Organics in Soil

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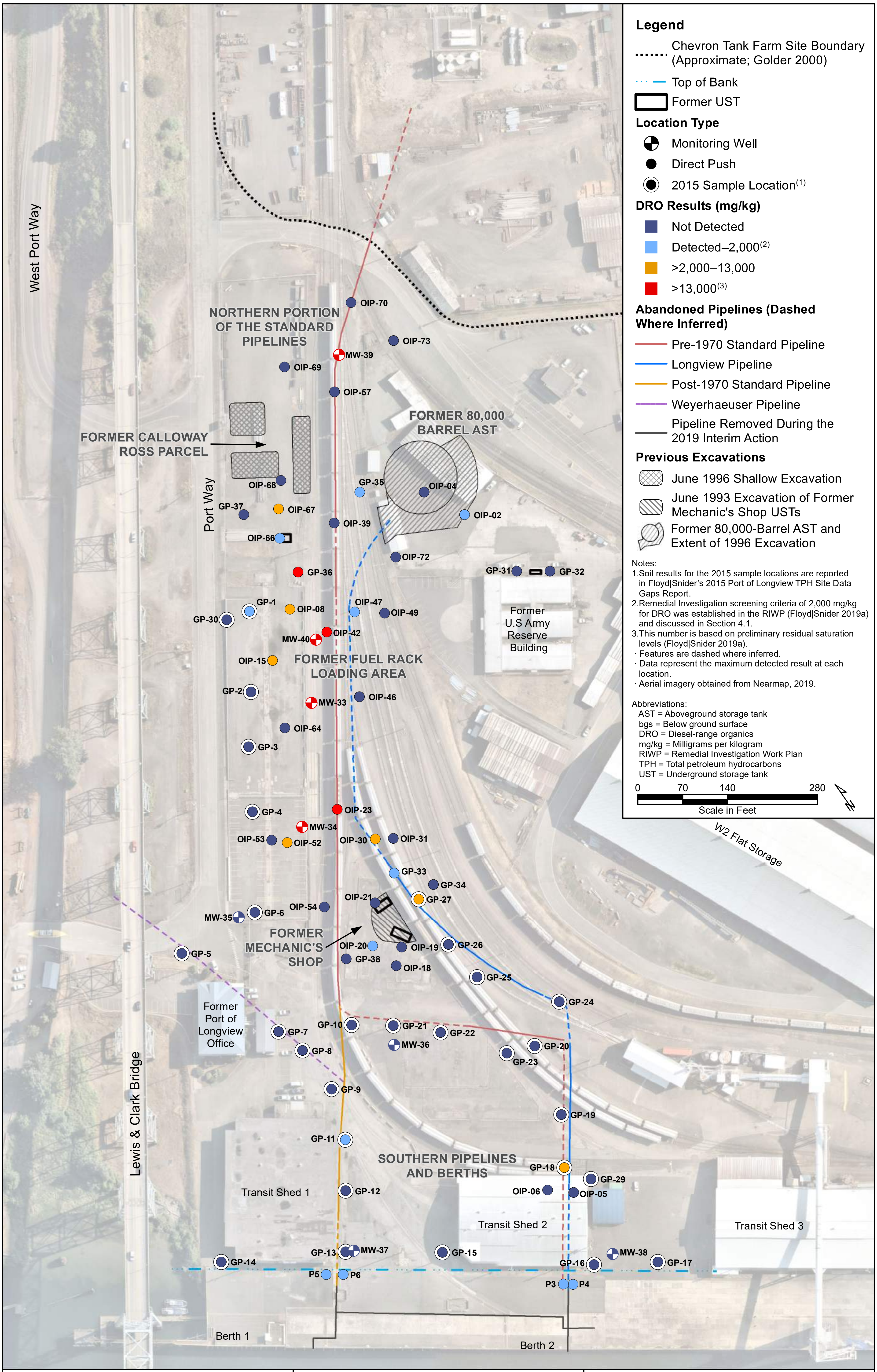

Notes:
1. Soil results for the 2015 sample locations are reported in Floyd|Snider's 2015 Port of Longview TPH Site Data Gaps Report.
2. Remedial Investigation screening criteria of 2,000 mg/kg for DRO was established in the RIWP (Floyd|Snider 2019a) and discussed in Section 4.1.
3. This number is based on preliminary residual saturation levels (Floyd|Snider 2019a).
- Features are dashed where inferred.
- Data represent the maximum detected result at each location.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
bgs = Below ground surface
DRO = Diesel-range organics
mg/kg = Milligrams per kilogram
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 4.2
Concentrations of Diesel-Range Organics in Soil

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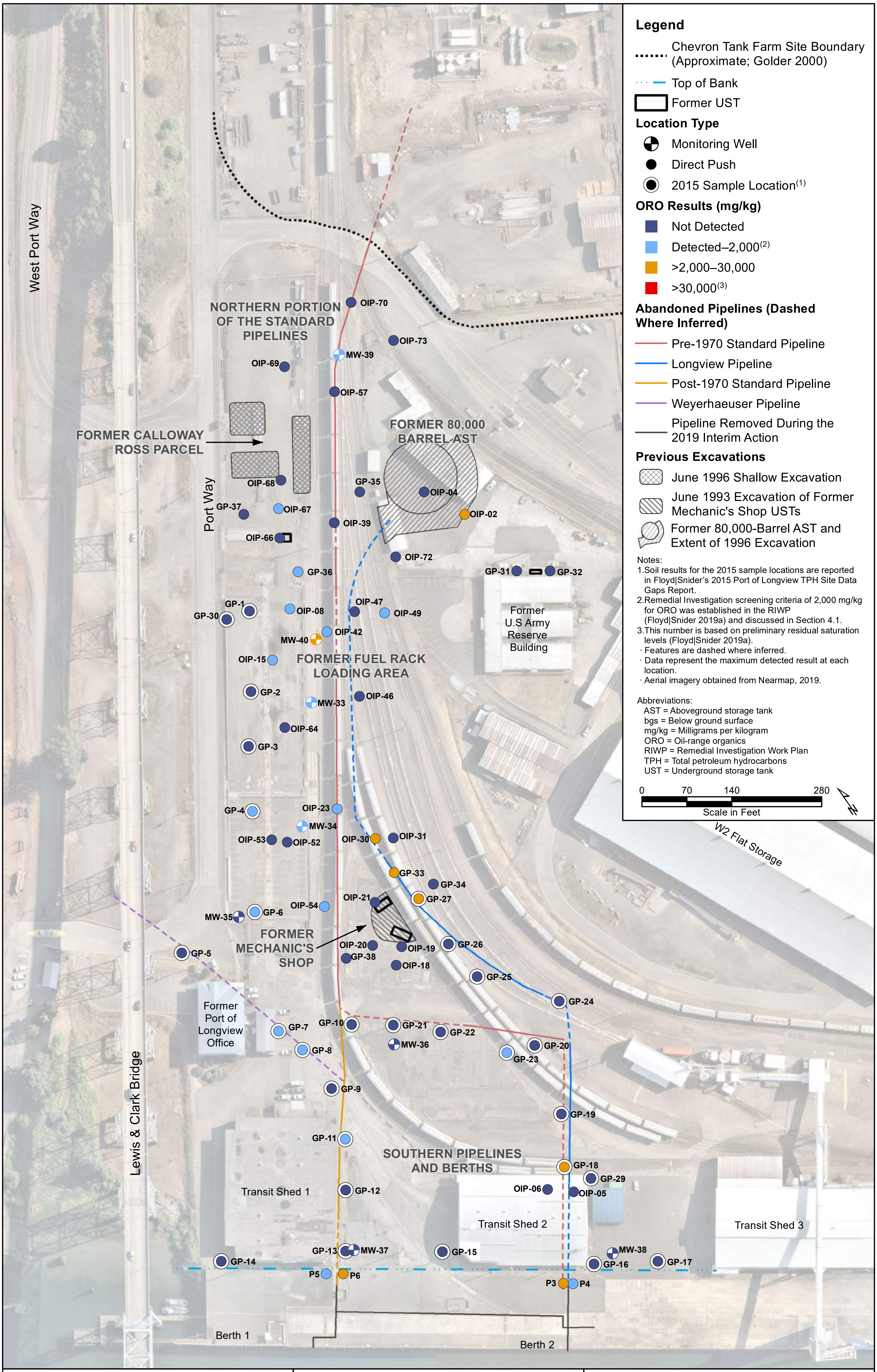

Notes:

1. Soil results for the 2015 sample locations are reported in Floyd|Snider's 2015 Port of Longview TPH Site Data Gaps Report.
2. Remedial Investigation screening criteria of 2,000 mg/kg for ORO was established in the RIWP (Floyd|Snider 2019a) and discussed in Section 4.1.
3. This number is based on preliminary residual saturation levels (Floyd|Snider 2019a).

- Features are dashed where inferred.
- Data represent the maximum detected result at each location.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
bgs = Below ground surface
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 4.3
Concentrations of Oil-Range Organics in Soil

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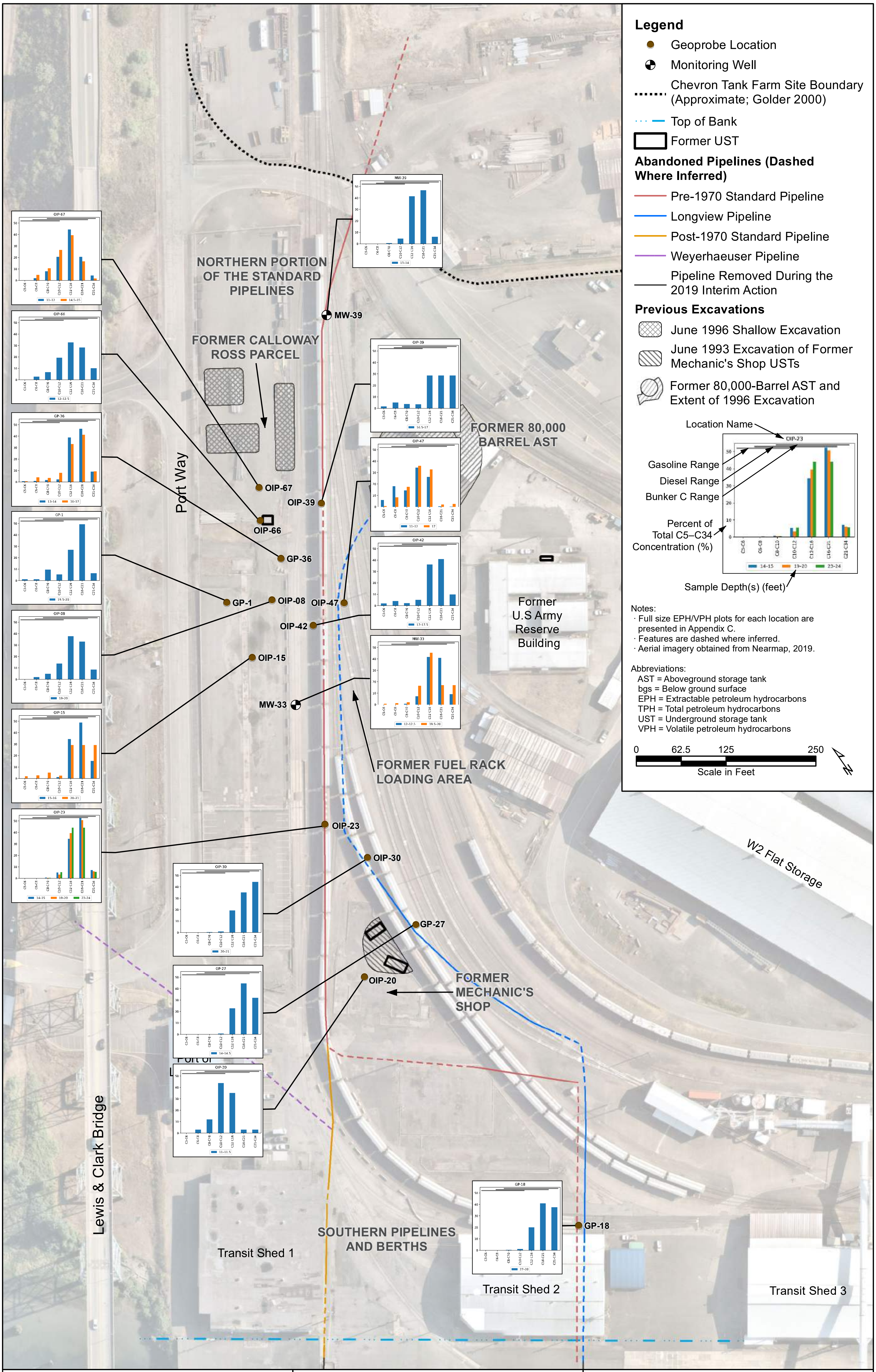

Legend

● Geoprobe Location

◐ Monitoring Well

Chevron Tank Farm Site Boundary (Approximate; Golder 2000)

Top of Bank

▭ Former UST

Abandoned Pipelines (Dashed Where Inferred)

Pre-1970 Standard Pipeline

Longview Pipeline

Post-1970 Standard Pipeline

Weyerhaeuser Pipeline

Pipeline Removed During the 2019 Interim Action

Previous Excavations

▩ June 1996 Shallow Excavation

▨ June 1993 Excavation of Former Mechanic's Shop USTs

Former 80,000-Barrel AST and Extent of 1996 Excavation

Notes:
- Full size EPH/VPH plots for each location are presented in Appendix C.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
bgs = Below ground surface
EPH = Extractable petroleum hydrocarbons
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
VPH = Volatile petroleum hydrocarbons

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Figure 4.4
Soil EPH/VPH Results

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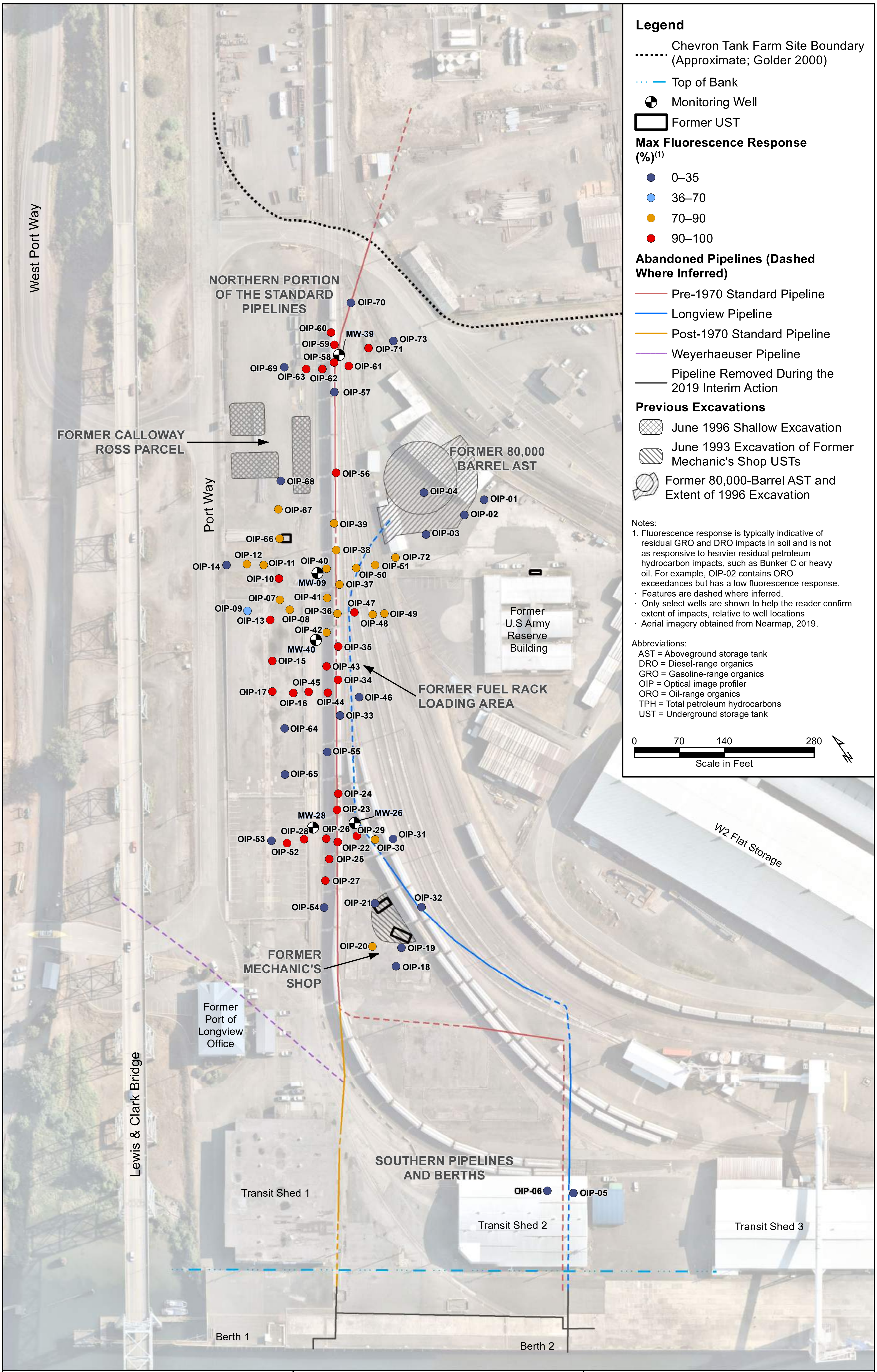

Notes:

1. Fluorescence response is typically indicative of residual GRO and DRO impacts in soil and is not as responsive to heavier residual petroleum hydrocarbon impacts, such as Bunker C or heavy oil. For example, OIP-02 contains ORO exceedances but has a low fluorescence response.

- Features are dashed where inferred.
- Only select wells are shown to help the reader confirm extent of impacts, relative to well locations
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
DRO = Diesel-range organics
GRO = Gasoline-range organics
OIP = Optical image profiler
ORO = Oil-range organics
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 4.5
OIP Fluorescence Response

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.5 OIP Fluorescence Response.mxd
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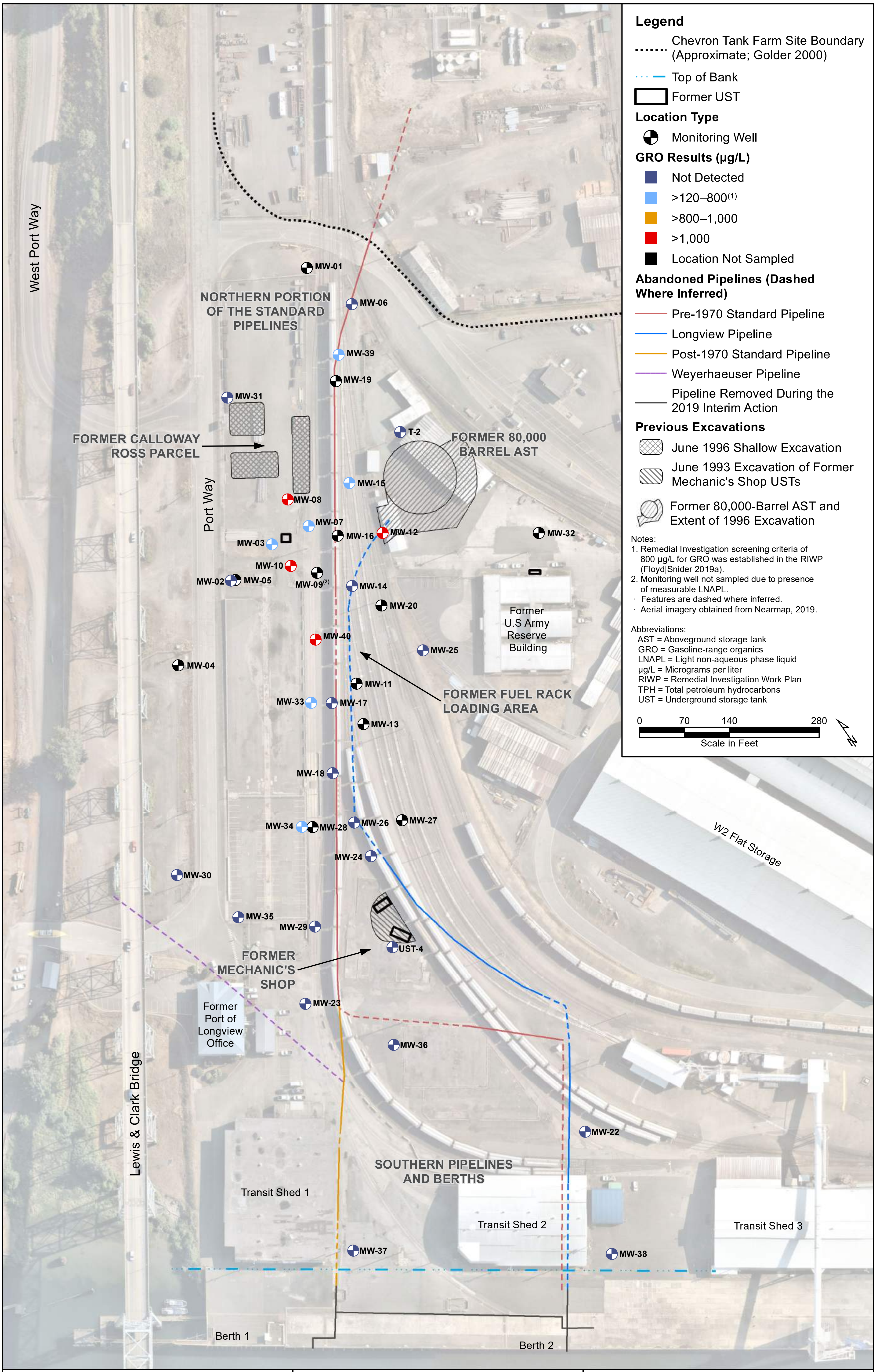

Notes:
1. Remedial Investigation screening criteria of 800 µg/L for GRO was established in the RIWP (Floyd|Snider 2019a).
2. Monitoring well not sampled due to presence of measurable LNAPL.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
GRO = Gasoline-range organics
LNAPL = Light non-aqueous phase liquid
µg/L = Micrograms per liter
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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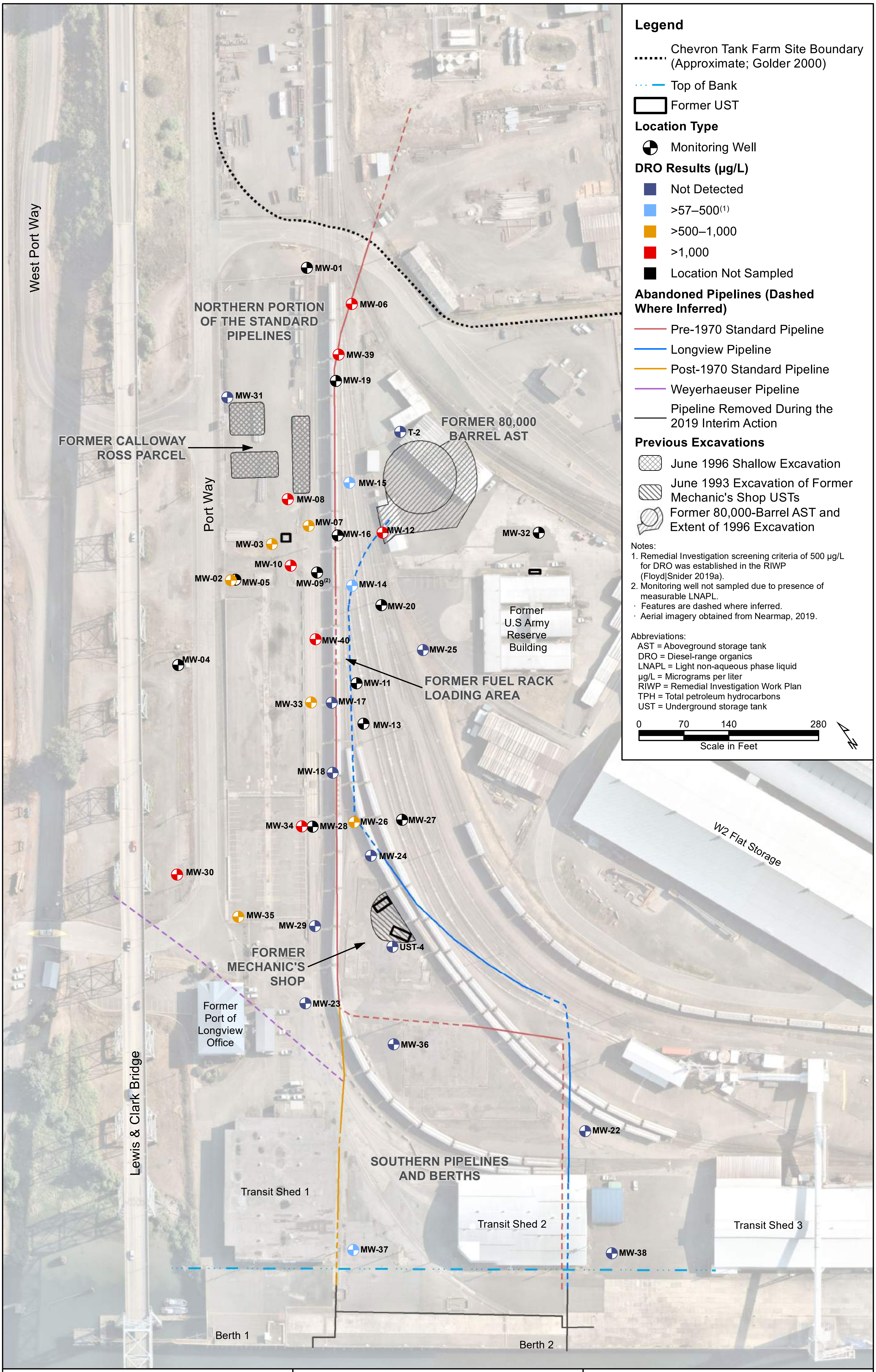
Figure 4.6
November 2020 Concentrations of Gasoline-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.6 November 2020 Concentrations of Gasoline-Range Organics in Groundwater.mxd
6/11/2023



Notes:
1. Remedial Investigation screening criteria of 500 µg/L for DRO was established in the RIWP (Floyd|Snider 2019a).
2. Monitoring well not sampled due to presence of measurable LNAPL.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
DRO = Diesel-range organics
LNAPL = Light non-aqueous phase liquid
µg/L = Micrograms per liter
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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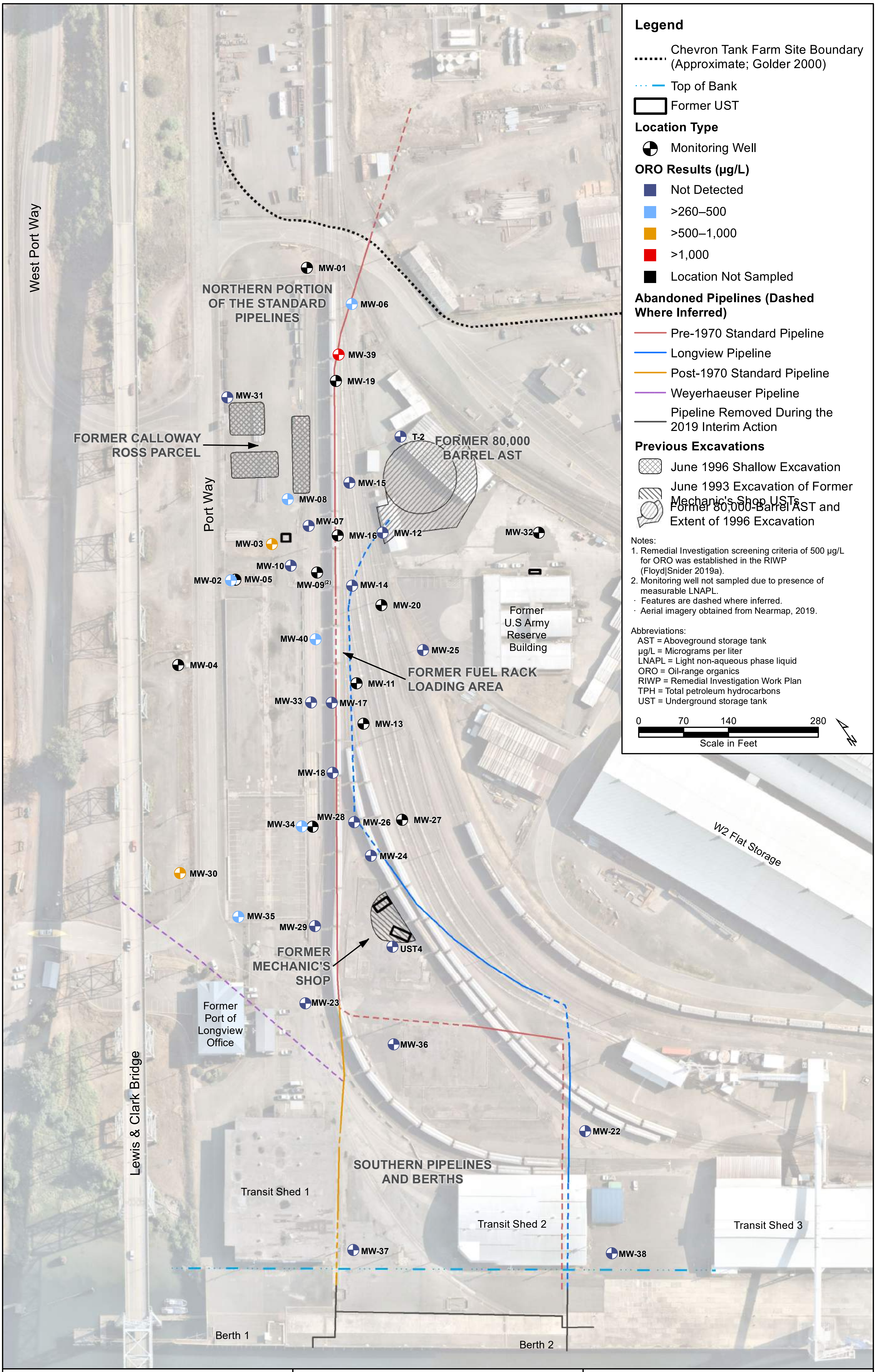
Figure 4.7
November 2020 Concentrations of Diesel-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.7 November 2020 Concentrations of Diesel-Range Organics in Groundwater.mxd
6/11/2023



Notes:
1. Remedial Investigation screening criteria of 500 µg/L for ORO was established in the RIWP (Floyd|Snider 2019a).
2. Monitoring well not sampled due to presence of measurable LNAPL.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
µg/L = Micrograms per liter
LNAPL = Light non-aqueous phase liquid
ORO = Oil-range organics
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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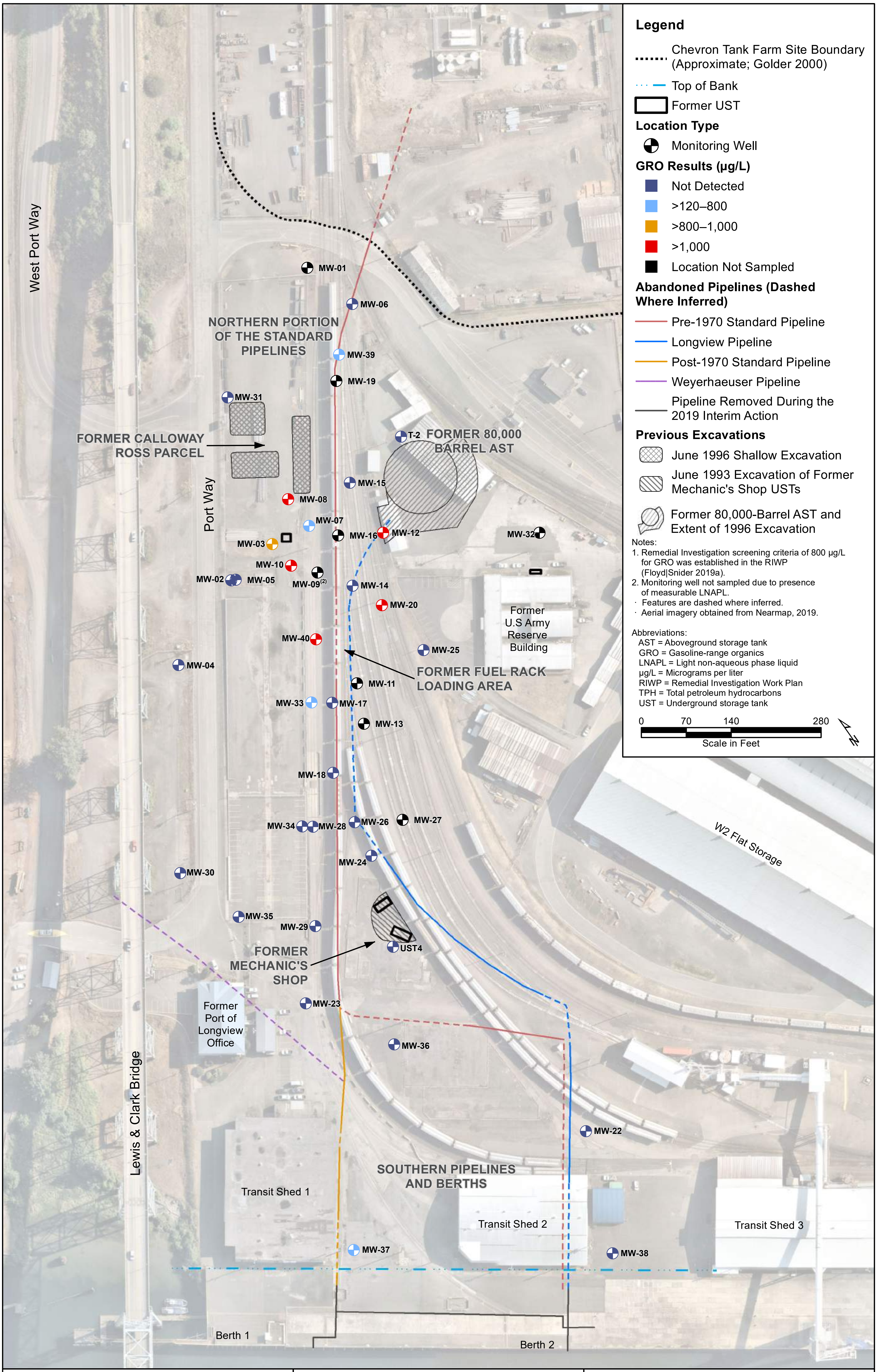
Figure 4.8
November 2020 Concentrations of Oil-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.8 November 2020 Concentrations of Oil-Range Organics in Groundwater.mxd
6/11/2023



Notes:
1. Remedial Investigation screening criteria of 800 µg/L for GRO was established in the RIWP (Floyd|Snider 2019a).
2. Monitoring well not sampled due to presence of measurable LNAPL.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
GRO = Gasoline-range organics
LNAPL = Light non-aqueous phase liquid
µg/L = Micrograms per liter
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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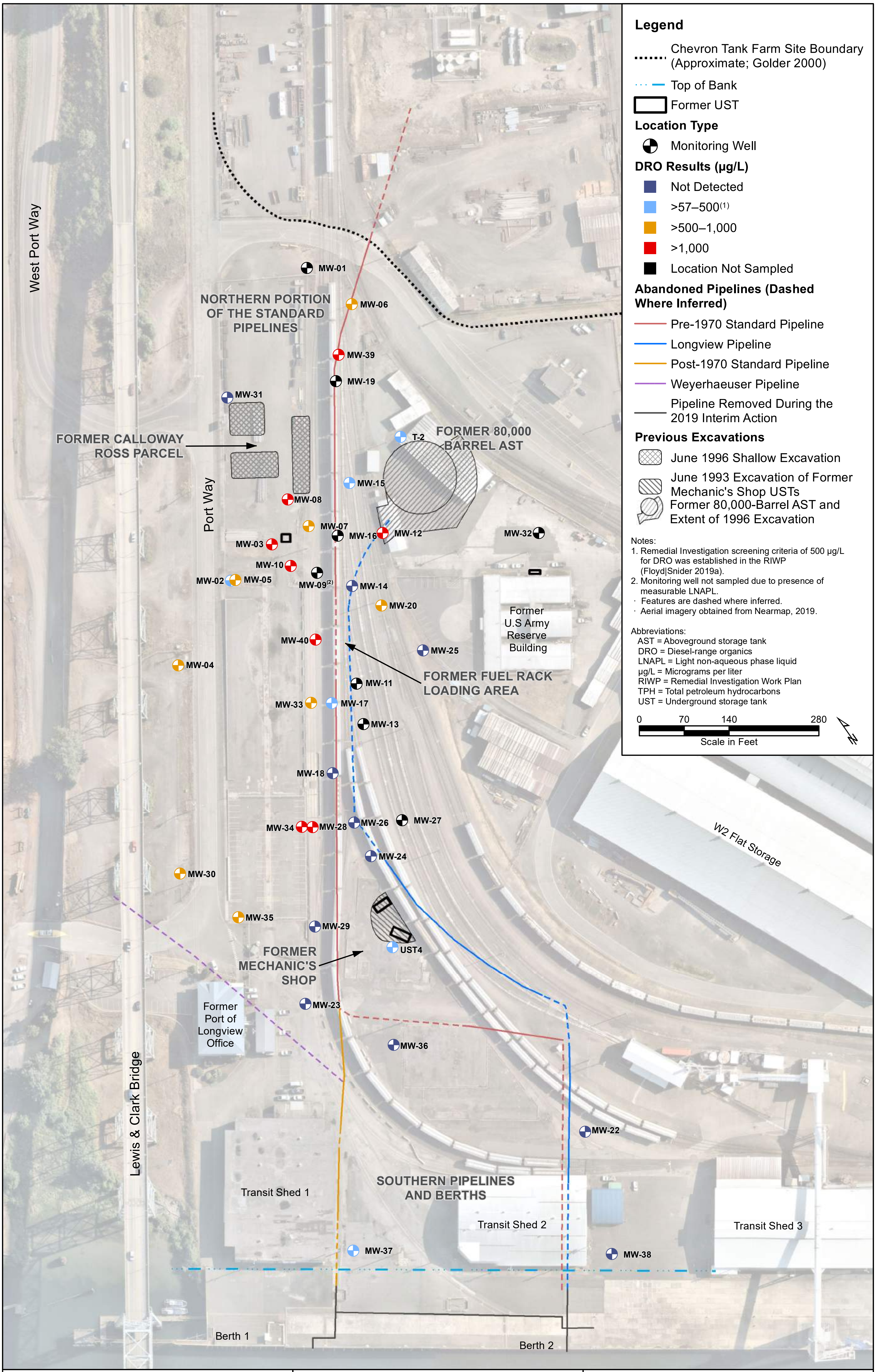
Figure 4.9
February 2021 Concentrations of Gasoline-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.9 February 2021 Concentrations of Gasoline-Range Organics in Groundwater.mxd
6/12/2023



Notes:
1. Remedial Investigation screening criteria of 500 µg/L for DRO was established in the RIWP (Floyd|Snider 2019a).
2. Monitoring well not sampled due to presence of measurable LNAPL.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
DRO = Diesel-range organics
LNAPL = Light non-aqueous phase liquid
µg/L = Micrograms per liter
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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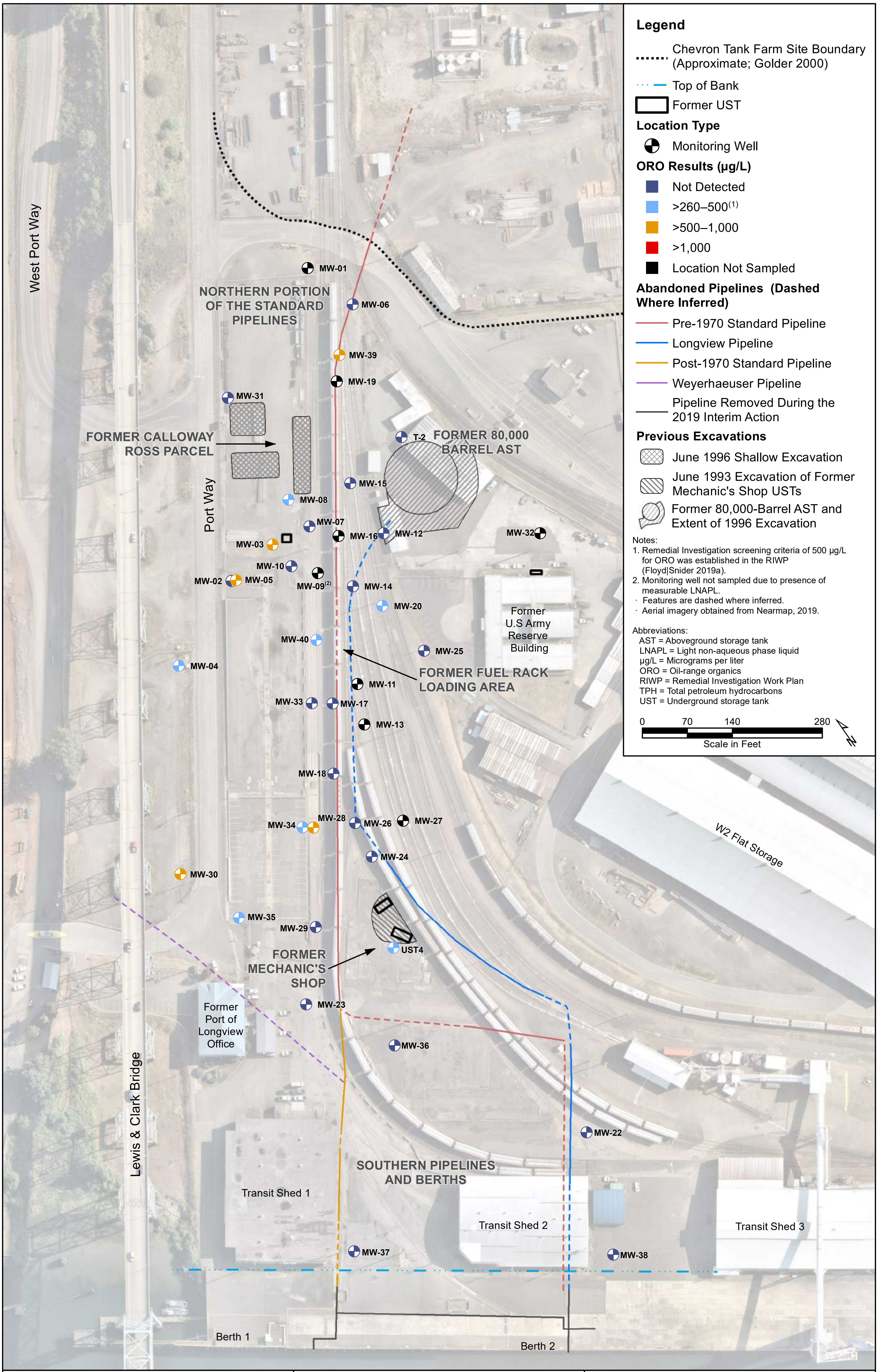
Figure 4.10
February 2021 Concentrations of Diesel-Range Organics in Groundwater



Notes:
1. Remedial Investigation screening criteria of 500 µg/L for ORO was established in the RIWP (Floyd|Snider 2019a).
2. Monitoring well not sampled due to presence of measurable LNAPL.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
LNAPL = Light non-aqueous phase liquid
µg/L = Micrograms per liter
ORO = Oil-range organics
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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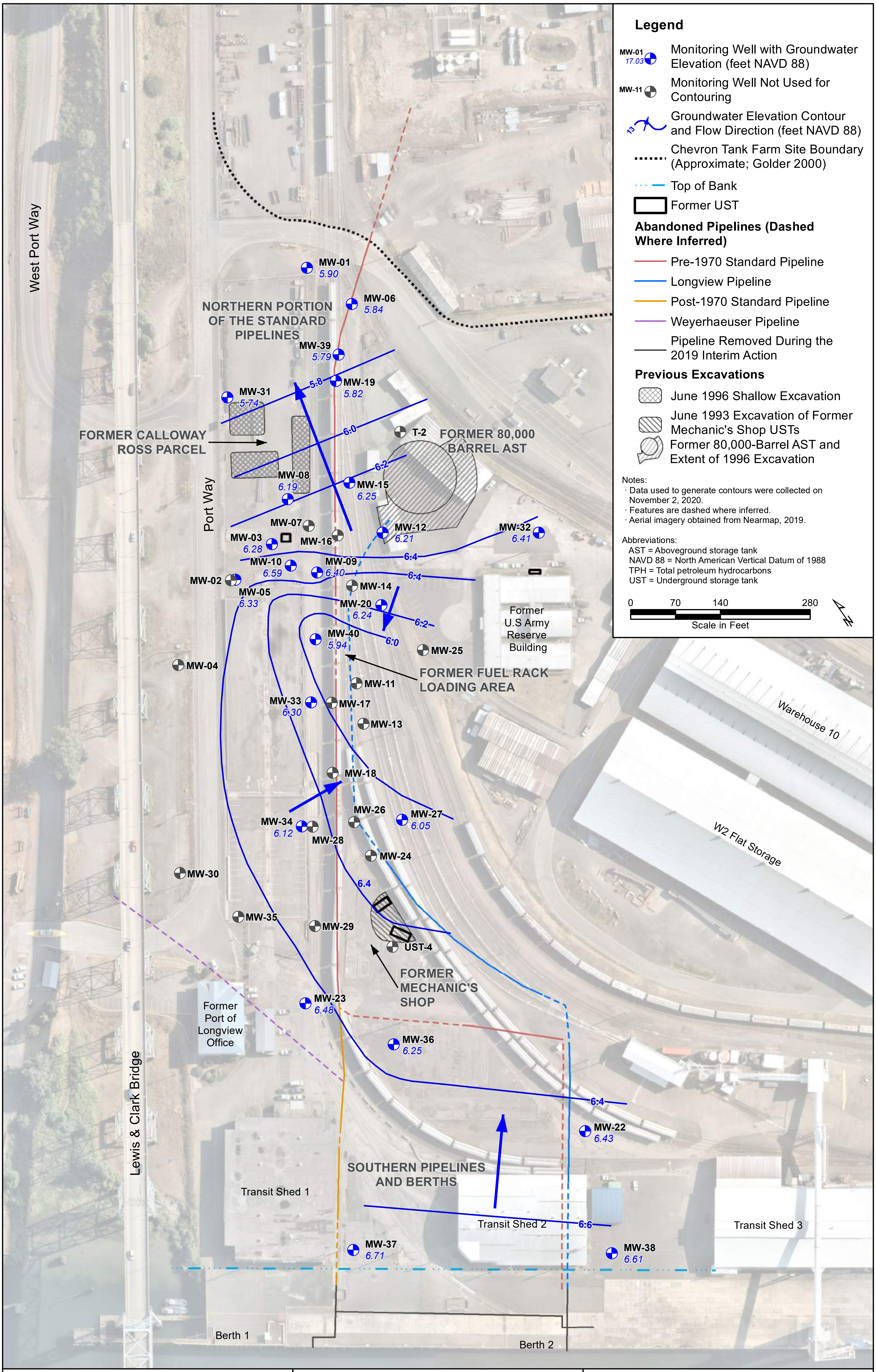
Figure 4.11
February 2021 Concentrations of Oil-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.11 February 2021 Concentrations of Oil-Range Organics in Groundwater.mxd
6/12/2023



Notes:
- Data used to generate contours were collected on November 2, 2020.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
NAVD 88 = North American Vertical Datum of 1988
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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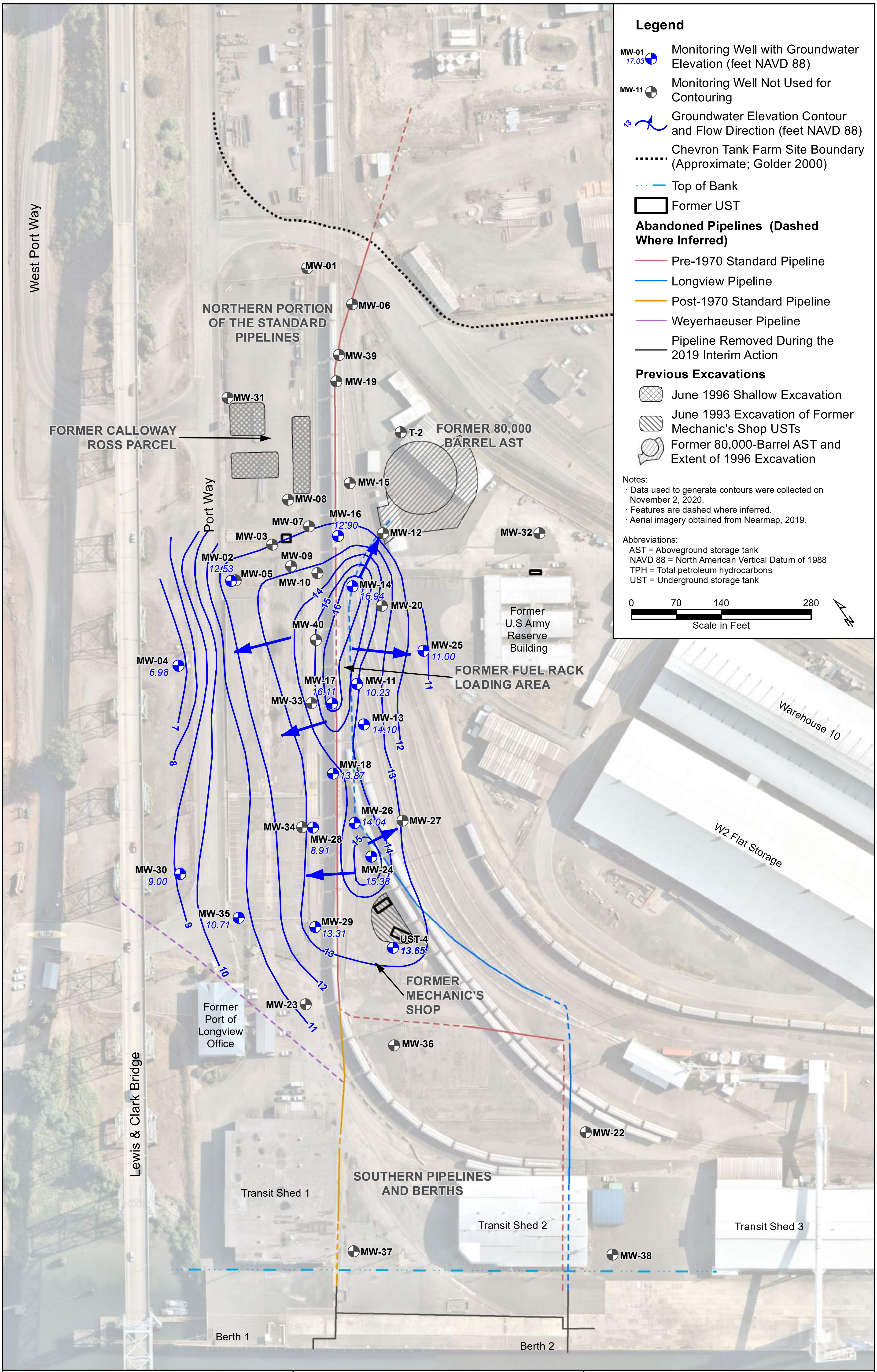
Figure 4.12
November 2020 Groundwater Contours—Alluvial Aquifer

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.12 Nov 2020 Groundwater Contours - Alluvial Aquifer.mxd
6/11/2023



Notes:

- Data used to generate contours were collected on November 2, 2020.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
NAVD 88 = North American Vertical Datum of 1988
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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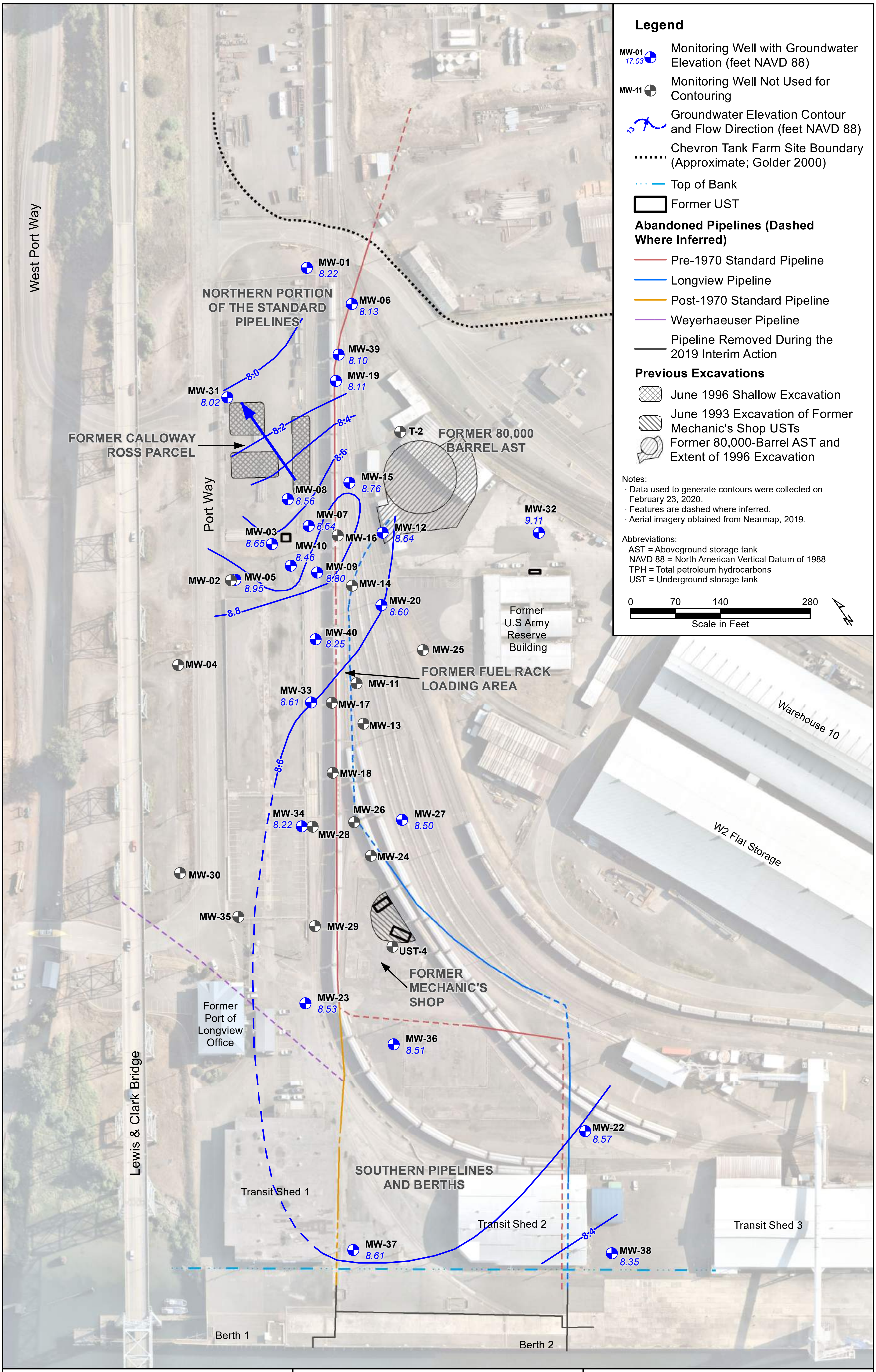
Figure 4.13
November 2020 Groundwater Contours—
Perched Water-Bearing Zone

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.13 Nov 2020 Groundwater Contours - Perched Water-Bearing Zone.mxd
6/11/2023



Notes:
- Data used to generate contours were collected on February 23, 2020.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
NAVD 88 = North American Vertical Datum of 1988
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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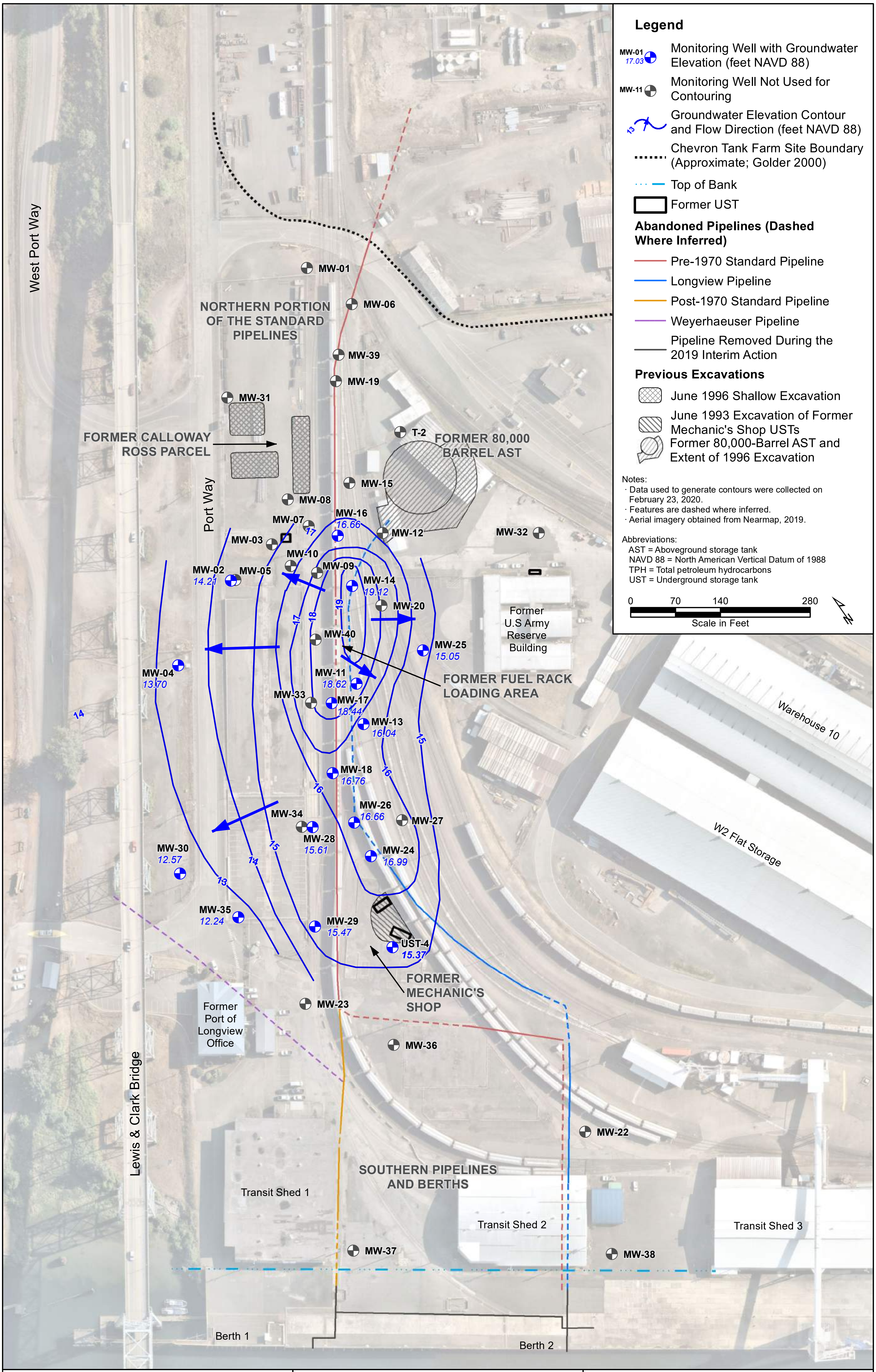
Figure 4.14
February 2021 Groundwater Contours—Alluvial Aquifer

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.14 Feb 2021 Groundwater Contours - Alluvial Aquifer.mxd
6/11/2023



Notes:
· Data used to generate contours were collected on February 23, 2020.
· Features are dashed where inferred.
· Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
NAVD 88 = North American Vertical Datum of 1988
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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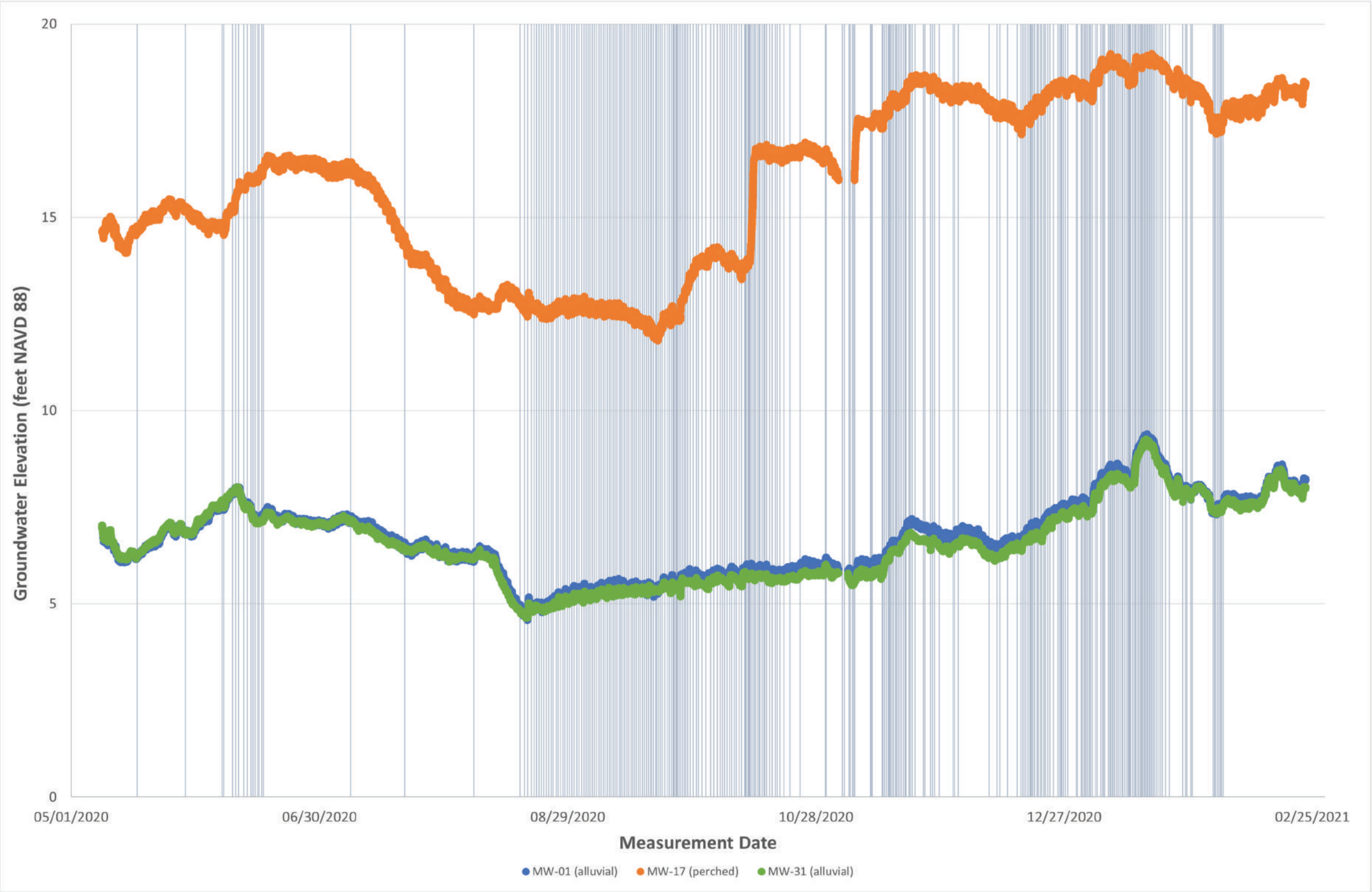
Figure 4.15
February 2021 Groundwater Contours—Perched Water-Bearing Zone

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 4.15 Feb 2021 Groundwater Contours - Perched Water-Bearing Zone.mxd
6/11/2023



Notes:

- Vertical blue lines represent activations of one or both pumps at the CDID #1 Oregon Way pumping station between May 1, 2020, and February 4, 2021.
- Oregon Way pump activation data obtained from CDID #1 on February 4, 2021.

Abbreviations:
CDID = Consolidated Diking Improvement District
NAVD 88 = North American Vertical Datum of 1988

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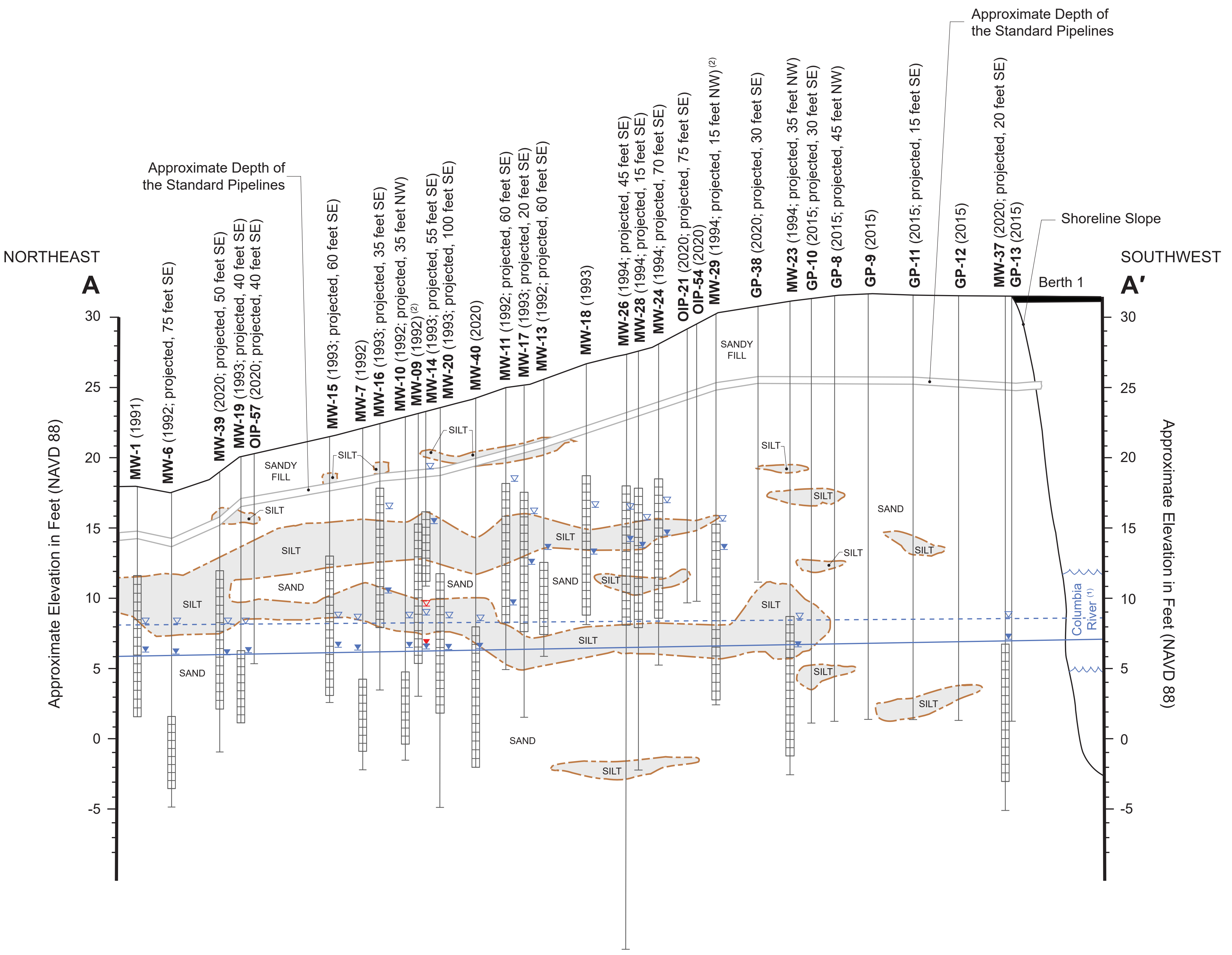
Figure 4.16
2020–2021 Groundwater Elevations and Oregon Way Pumping Activations



Legend

MW-02 (1992) Year Installed and Distance and Direction of Offset

Boring

▽ Groundwater measured February 23, 2021

▼ Groundwater measured August 10 or 11, 2020

Well Screen Interval

▽ LNAPL observed during February 2021 sampling event

▼ LNAPL observed during August 2020 sampling event

- - - Approximate alluvial aquifer groundwater elevation measured on February 23, 2021

— Approximate alluvial aquifer groundwater elevation measured on August 10 and 11, 2020

– – Contact boundary between lithologies

SANDY FILL	Heterogeneous mixture of sand, silt, and gravel materials likely emplaced on the ground surface and graded. Commonly observed fill materials at the Site include railroad ballast, spall, and other types of crushed rock.
SAND	Fine to coarse SAND with little to some silt and trace to few gravel. This lithology can include thin layers of sandy gravel, silt, silty sand, and silty gravel.
SILT	SILT with low to high plasticity and little to some sand and varying amounts of clay. This lithology can also include thin layers of interbedded sand, silty sand, and clay.

Notes:

1 The Columbia River Stage has an approximate highest tide of 12 feet NAVD 88 and approximate lowest tide of 4.9 feet NAVD 88. Elevations represent the average of average monthly highest and lowest tide elevations from 2002 to 2021 at Station 9440422.

2 The well screen extends through both the perched zone and alluvial aquifer. MW-09 and MW-29 groundwater elevations appear to be in equilibrium with the alluvial and perched, respectively, water bearing zones (Table 4.10).

- Cross-section location shown on Figure 3.2.
- Cross-section incorporates lithology from boring logs (Appendix J) and Hydraulic Profiling Tool (HPT) logs (Appendix A of the Interim Data Report, included as Appendix A). In locations where conflicting subsurface information exists, continuous soil data from direct push, sonic, and/or HPT logs are preferentially depicted.
- Only calculated groundwater elevations using manual water level measurements are shown.

Abbreviations:
LNAPL = Light non-aqueous phase liquid, NAVD 88 = North American Vertical Datum of 1988, TPH = Total petroleum hydrocarbons

Horizontal Scale in Feet
0′ 50′ 100′ 200′
0′ 2′ 4′ 8′
Vertical Scale in Feet
Vertical Exaggeration = 25x

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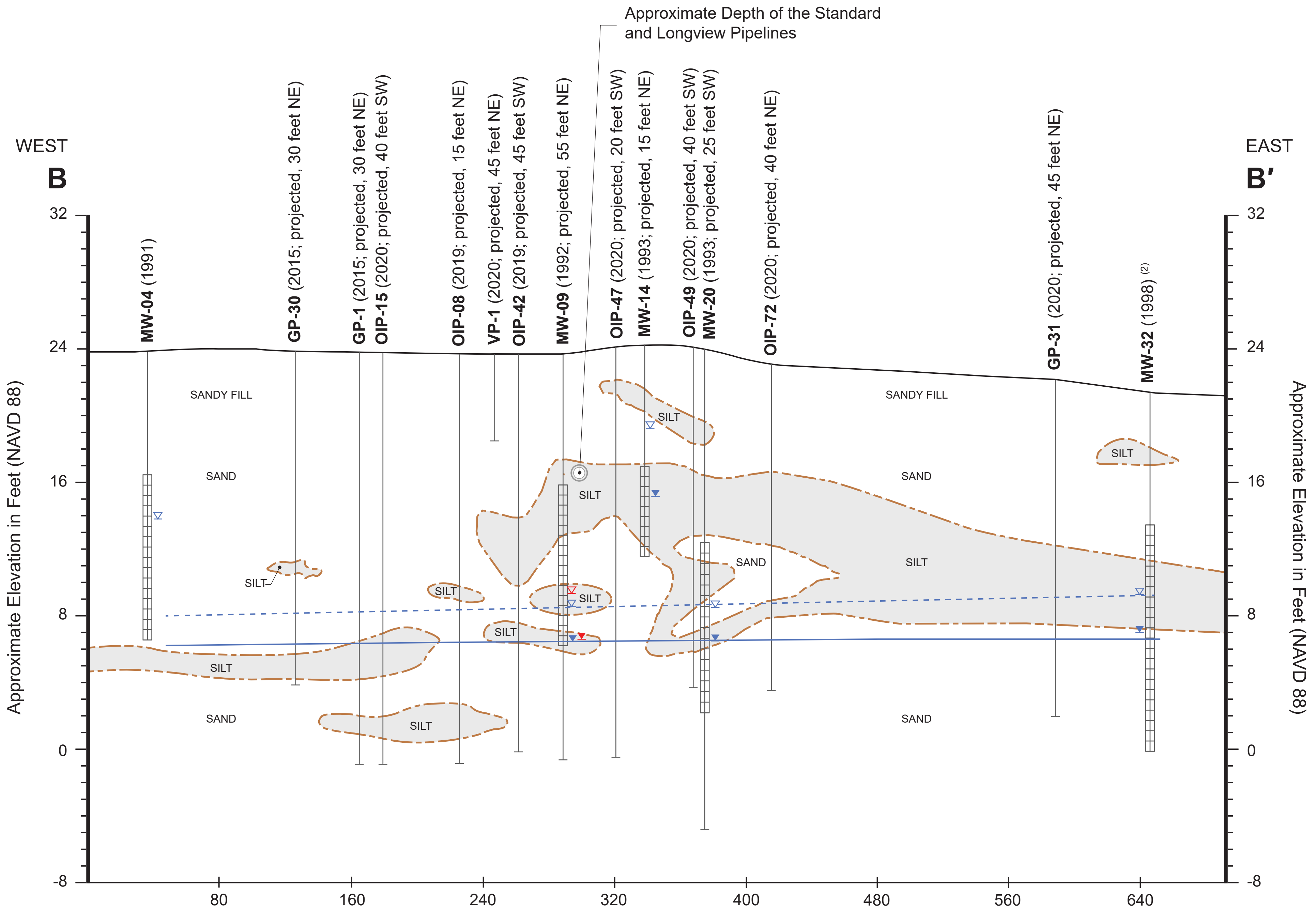
Figure 5.1
Cross-Section A-A′



Legend

MW-20 (1993) — Year Installed and Distance and Direction of Offset

Boring

▽ Groundwater measured February 23, 2021

▼ Groundwater measured August 10 or 11, 2020

Well Screen Interval

▽ LNAPL observed during February 2021 sampling event

▼ LNAPL observed during August 2020 sampling event

- - - - Approximate alluvial aquifer groundwater elevation measured on February 23, 2021 (1)

—— Approximate alluvial aquifer groundwater elevation measured on August 10 and 11, 2020 (1)

– – – Contact boundary between lithologies

SANDY FILL	Heterogeneous mixture of sand, silt, and gravel materials likely emplaced on the ground surface and graded. Commonly observed fill materials at the Site include railroad ballast, spall, and other types of crushed rock.
SAND	Fine to coarse SAND with little to some silt and trace to few gravel. This lithology can include thin layers of sandy gravel, silt, silty sand, and silty gravel.
SILT	SILT with low to high plasticity and little to some sand and varying amounts of clay. This lithology can also include thin layers of interbedded sand, silty sand, and clay.

Notes:

1 Groundwater elevations west of MW-09 are inferred based on subsurface geology and water level elevations from nearby monitoring wells.

2 The well screen extends through both the perched zone and alluvial aquifer. MW-32 groundwater elevations appear to be in equilibrium with the perched water bearing zone (Table 4.10).

- Cross-section location shown on Figure 3.2.
- Cross-section incorporates lithology from boring logs (Appendix J) and Hydraulic Profiling Tool (HPT) logs (Appendix A of the Interim Data Report, included as Appendix A). In locations where conflicting subsurface information exists, continuous soil data from direct push, sonic, and/or HPT logs are preferentially depicted.
- Only calculated groundwater elevations using manual water level measurements are shown.

Abbreviations:
LNAPL = Light non-aqueous phase liquid, NAVD 88 = North American Vertical Datum of 1988, TPH = Total petroleum hydrocarbons

Horizontal Scale in Feet
0′ 20′ 40′ 80′
0′ 2′ 4′ 8′
Vertical Scale in Feet
Vertical Exaggeration = 10x

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Figure 5.2
Cross-Section B-B′

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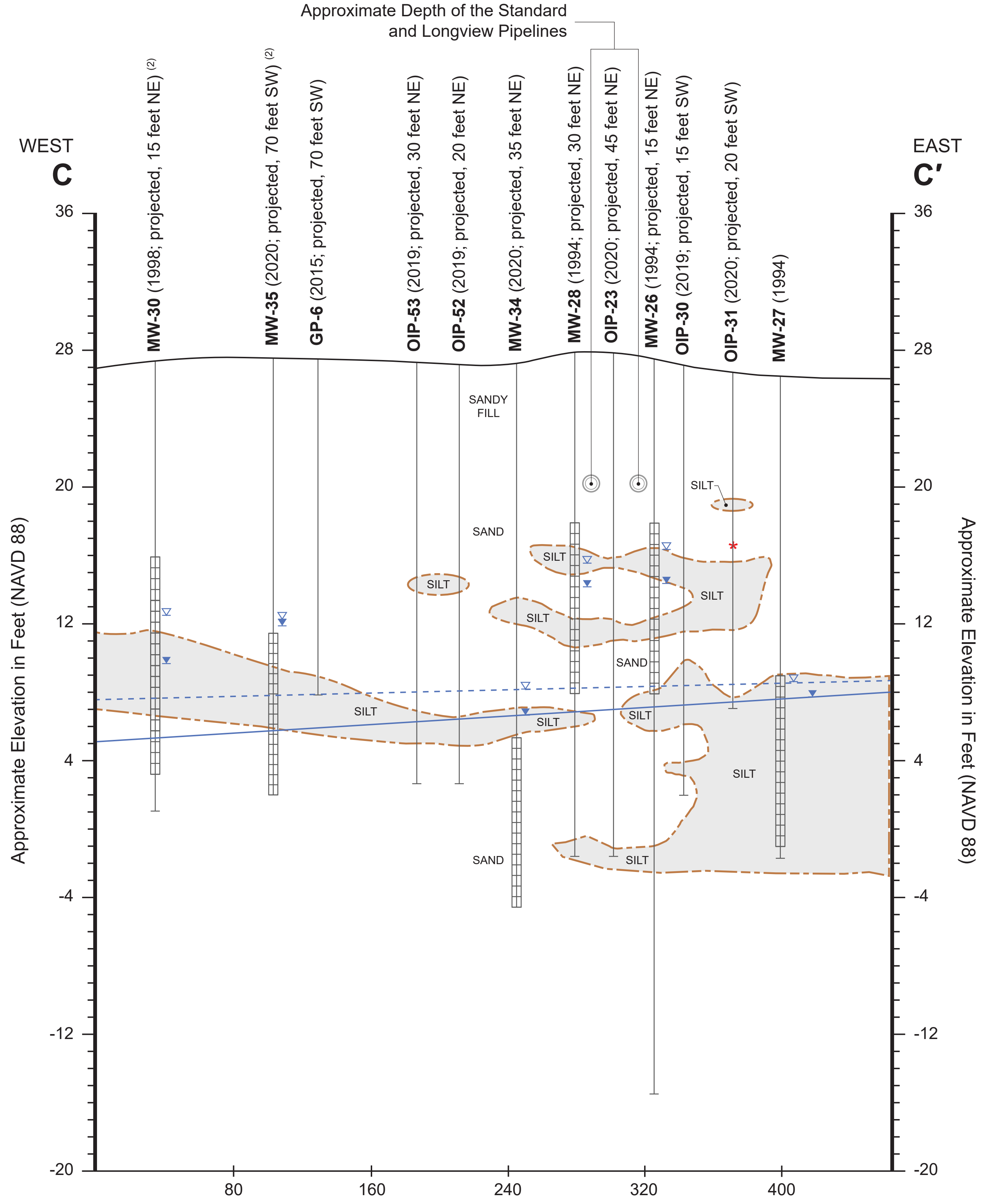
12/12/2022



Legend

MW-27 (1994) — Year Installed and Distance and Direction of Offset

Boring

▽ Groundwater measured February 23, 2021

▼ Groundwater measured August 10 or 11, 2020

Well Screen Interval

▽ LNAPL observed during February 2021 sampling event

▼ LNAPL observed during August 2020 sampling event

Approximate alluvial aquifer groundwater elevation measured on February 23, 2021 (1)

Approximate alluvial aquifer groundwater elevation measured on August 10 and 11, 2020 (1)

Contact boundary between lithologies

SANDY FILL — Heterogeneous mixture of sand, silt, and gravel materials likely emplaced on the ground surface and graded. Commonly observed fill materials at the Site include railroad ballast, spall, and other types of crushed rock.

SAND — Fine to coarse SAND with little to some silt and trace to few gravel. This lithology can include thin layers of sandy gravel, silt, silty sand, and silty gravel.

SILT — SILT with low to high plasticity and little to some sand and varying amounts of clay. This lithology can also include thin layers of interbedded sand, silty sand, and clay.

Notes:

1 Groundwater elevations west of MW-34 are inferred based on subsurface geology and water level elevations from nearby monitoring wells.

2 The well screen extends through both the perched zone and alluvial aquifer. MW-30 and MW-35 groundwater elevations appear to be in equilibrium with the perched water bearing zone (Table 4.10).

- Cross-section location shown on Figure 3.2.
- Cross-section incorporates lithology from boring logs (Appendix J) and Hydraulic Profiling Tool (HPT) logs (Appendix A of the Interim Data Report, included as Appendix A). In locations where conflicting subsurface information exists, continuous soil data from direct push, sonic, and/or HPT logs are preferentially depicted.
- Only calculated groundwater elevations using manual water level measurements are shown.

Abbreviations:

LNAPL = Light non-aqueous phase liquid, NAVD 88 = North American Vertical Datum of 1988, TPH = Total petroleum hydrocarbons

Horizontal Scale in Feet
0' 20' 40' 80'
0' 2' 4' 8'
Vertical Scale in Feet
Vertical Exaggeration = 10x

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Figure 5.3
Cross-Section C-C′

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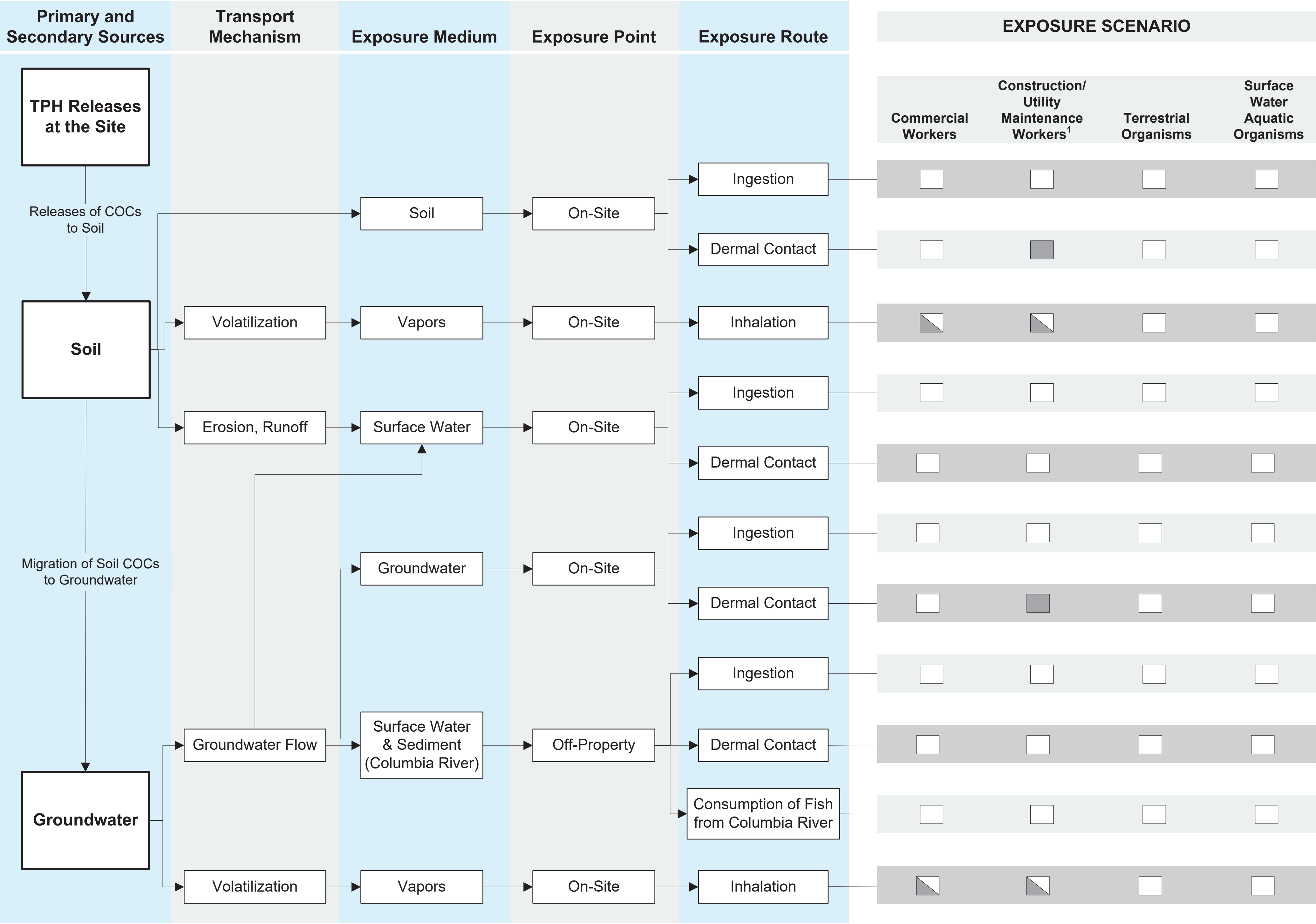
12/12/2022



Exposure Medium	Exposure Point	Exposure Route	Commercial Workers	Construction/ Utility Maintenance Workers[1]	Terrestrial Organisms	Surface Water Aquatic Organisms
Soil	On-Site	Ingestion	☐	☐	☐	☐
		Dermal Contact	☐	■	☐	☐
Vapors	On-Site	Inhalation	◪	◪	☐	☐
Surface Water	On-Site	Ingestion	☐	☐	☐	☐
		Dermal Contact	☐	☐	☐	☐
Groundwater	On-Site	Ingestion	☐	☐	☐	☐
		Dermal Contact	☐	■	☐	☐
Surface Water & Sediment (Columbia River)	Off-Property	Ingestion	☐	☐	☐	☐
		Dermal Contact	☐	☐	☐	☐
		Consumption of Fish from Columbia River	☐	☐	☐	☐
Vapors	On-Site	Inhalation	◪	◪	☐	☐

Legend

■ Complete Exposure Pathway

◪ Potentially Complete Exposure Pathway

☐ Incomplete Exposure Pathway

These exposure scenarios are reasonable maximum exposure scenarios. Therefore, these scenarios are considered protective of other similar exposure scenarios. All potential receptors are on-site, unless otherwise noted.

1 Shallow soil contamination is limited to areas adjacent to or within the rail lines with a potential for workers conducting utility repairs or rail maintenance to come into direct contact with impacted soil at concentrations exceeding the site-specific direct contact Model Toxics Control Act Method C cleanup level. This will be addressed with a soil management plan as a component of the remedial action.

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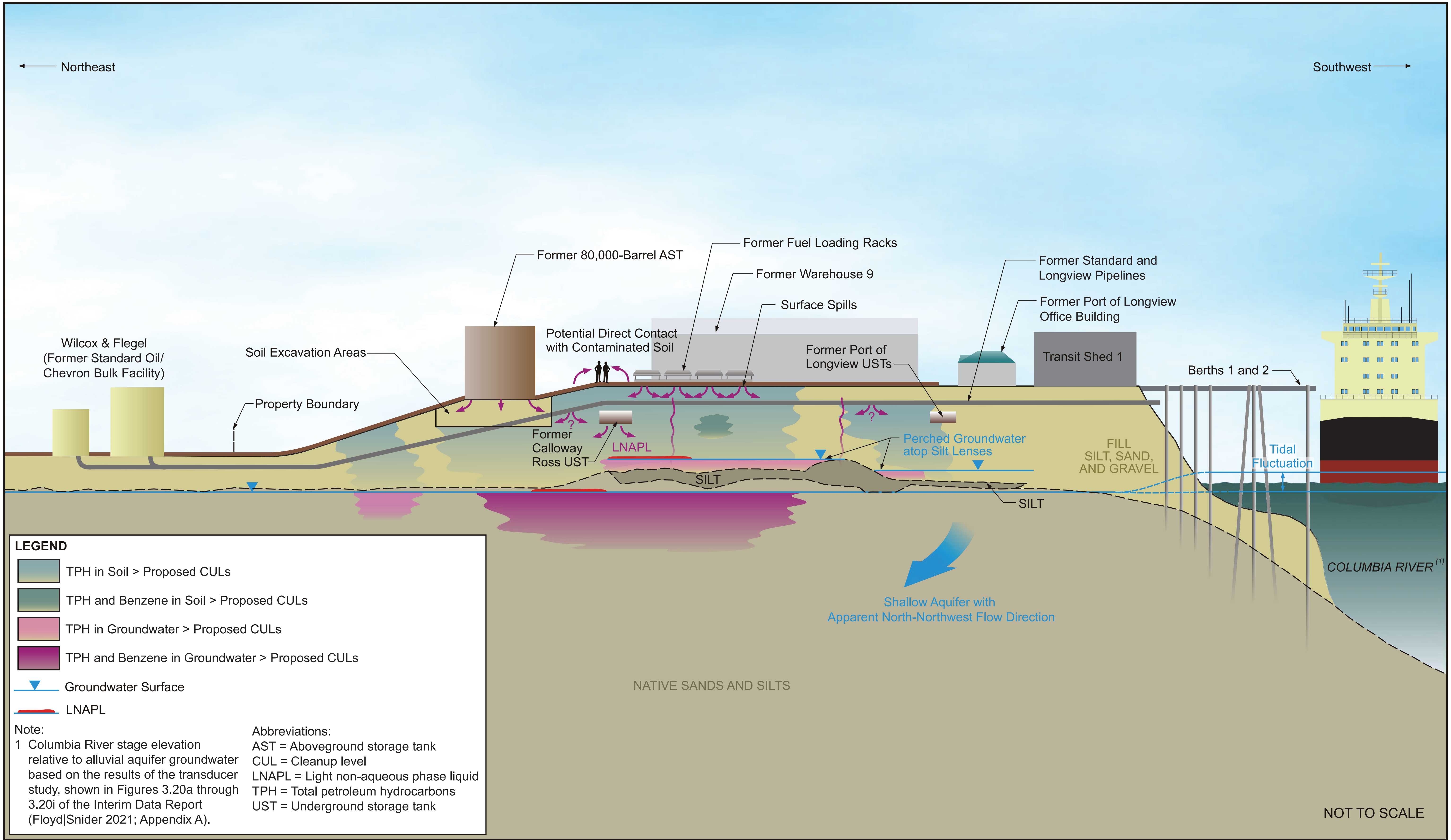
Figure 6.1
Conceptual Site Model of
Potential Exposure Scenarios and Receptors

10/27/2022



LEGEND

▨ TPH in Soil > Proposed CULs

▨ TPH and Benzene in Soil > Proposed CULs

▨ TPH in Groundwater > Proposed CULs

▨ TPH and Benzene in Groundwater > Proposed CULs

▼ Groundwater Surface

▬ LNAPL

Note:

1 Columbia River stage elevation relative to alluvial aquifer groundwater based on the results of the transducer study, shown in Figures 3.20a through 3.20i of the Interim Data Report (Floyd|Snider 2021; Appendix A).

Abbreviations:

AST = Aboveground storage tank
CUL = Cleanup level
LNAPL = Light non-aqueous phase liquid
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 9.1
Conceptual Site Model

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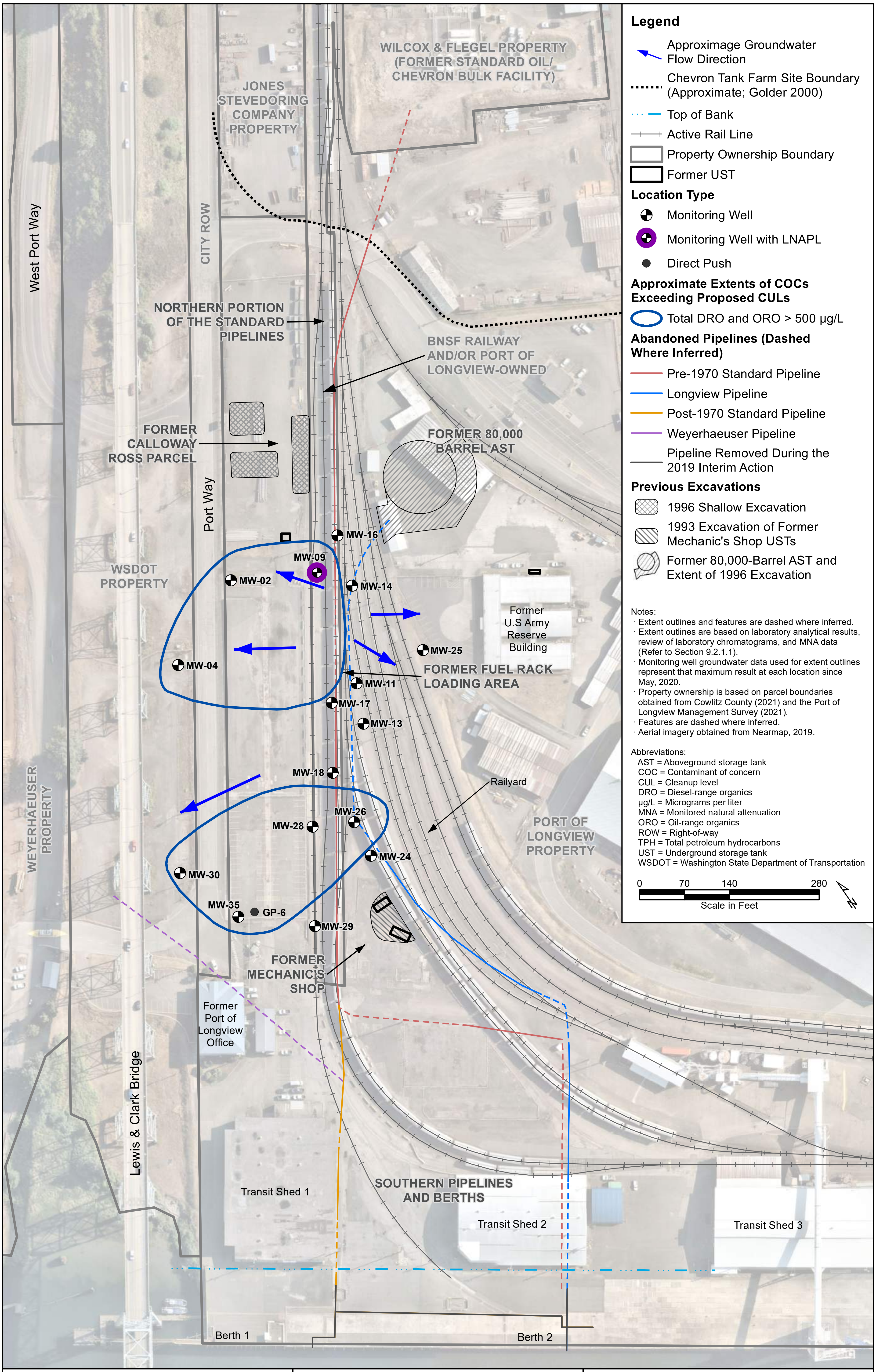
09/02/2021



Notes:
- Extent outlines and features are dashed where inferred.
- Extent outlines are based on laboratory analytical results, review of laboratory chromatograms, and MNA data (Refer to Section 9.2.1.1).
- Monitoring well groundwater data used for extent outlines represent that maximum result at each location since May, 2020.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
µg/L = Micrograms per liter
MNA = Monitored natural attenuation
ORO = Oil-range organics
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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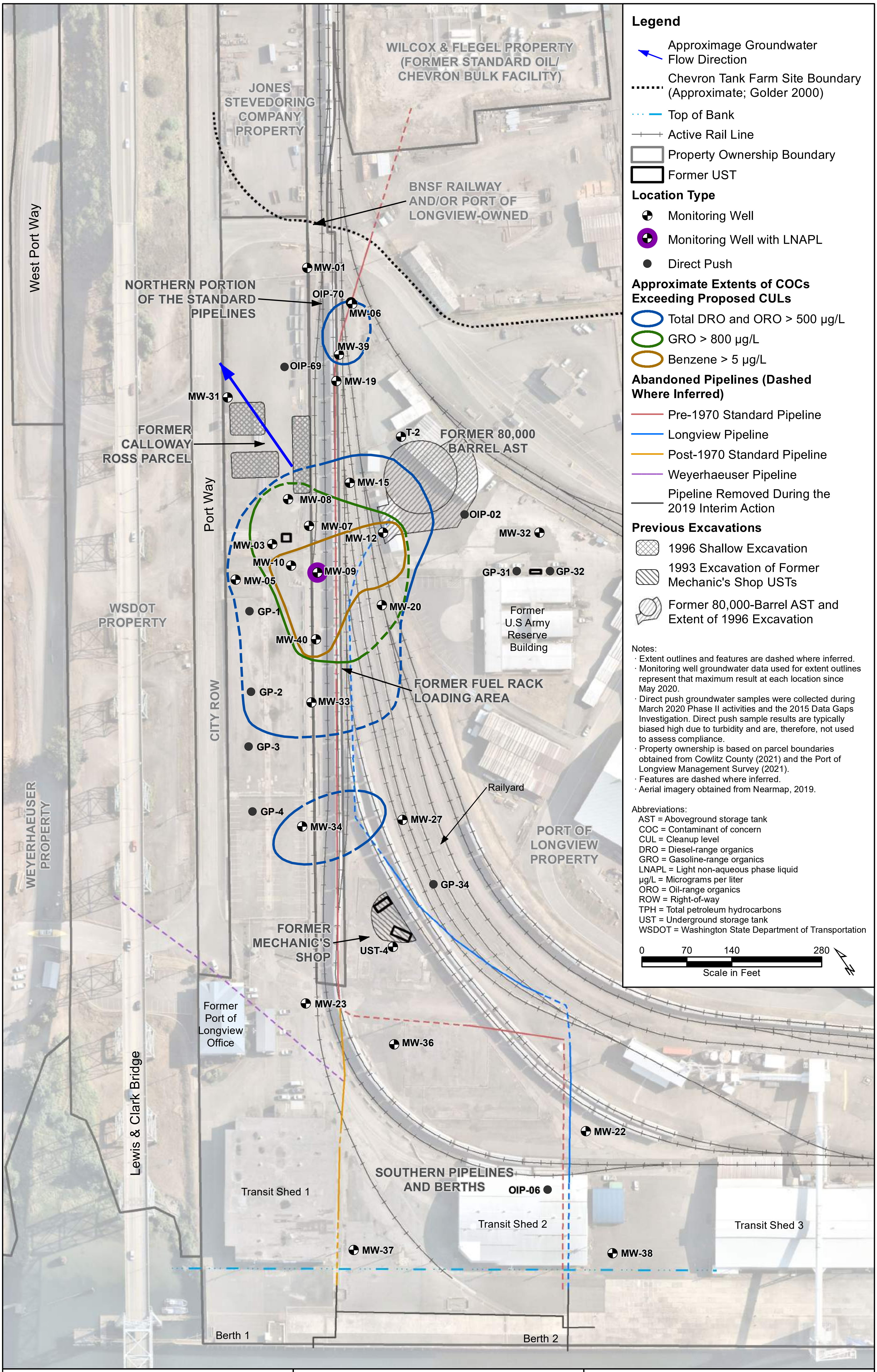
Figure 9.2
Extent of COCs in Perched Zone Groundwater Exceeding Proposed CULs



Legend

- Approximage Groundwater Flow Direction
- Chevron Tank Farm Site Boundary (Approximate; Golder 2000)
- Top of Bank
- Active Rail Line
- Property Ownership Boundary
- Former UST

Location Type

- Monitoring Well
- Monitoring Well with LNAPL
- Direct Push

Approximate Extents of COCs Exceeding Proposed CULs

- Total DRO and ORO > 500 µg/L
- GRO > 800 µg/L
- Benzene > 5 µg/L

Abandoned Pipelines (Dashed Where Inferred)

- Pre-1970 Standard Pipeline
- Longview Pipeline
- Post-1970 Standard Pipeline
- Weyerhaeuser Pipeline
- Pipeline Removed During the 2019 Interim Action

Previous Excavations

- 1996 Shallow Excavation
- 1993 Excavation of Former Mechanic's Shop USTs
- Former 80,000-Barrel AST and Extent of 1996 Excavation

Notes:

- Extent outlines and features are dashed where inferred.
- Monitoring well groundwater data used for extent outlines represent that maximum result at each location since May 2020.
- Direct push groundwater samples were collected during March 2020 Phase II activities and the 2015 Data Gaps Investigation. Direct push sample results are typically biased high due to turbidity and are, therefore, not used to assess compliance.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
GRO = Gasoline-range organics
LNAPL = Light non-aqueous phase liquid
µg/L = Micrograms per liter
ORO = Oil-range organics
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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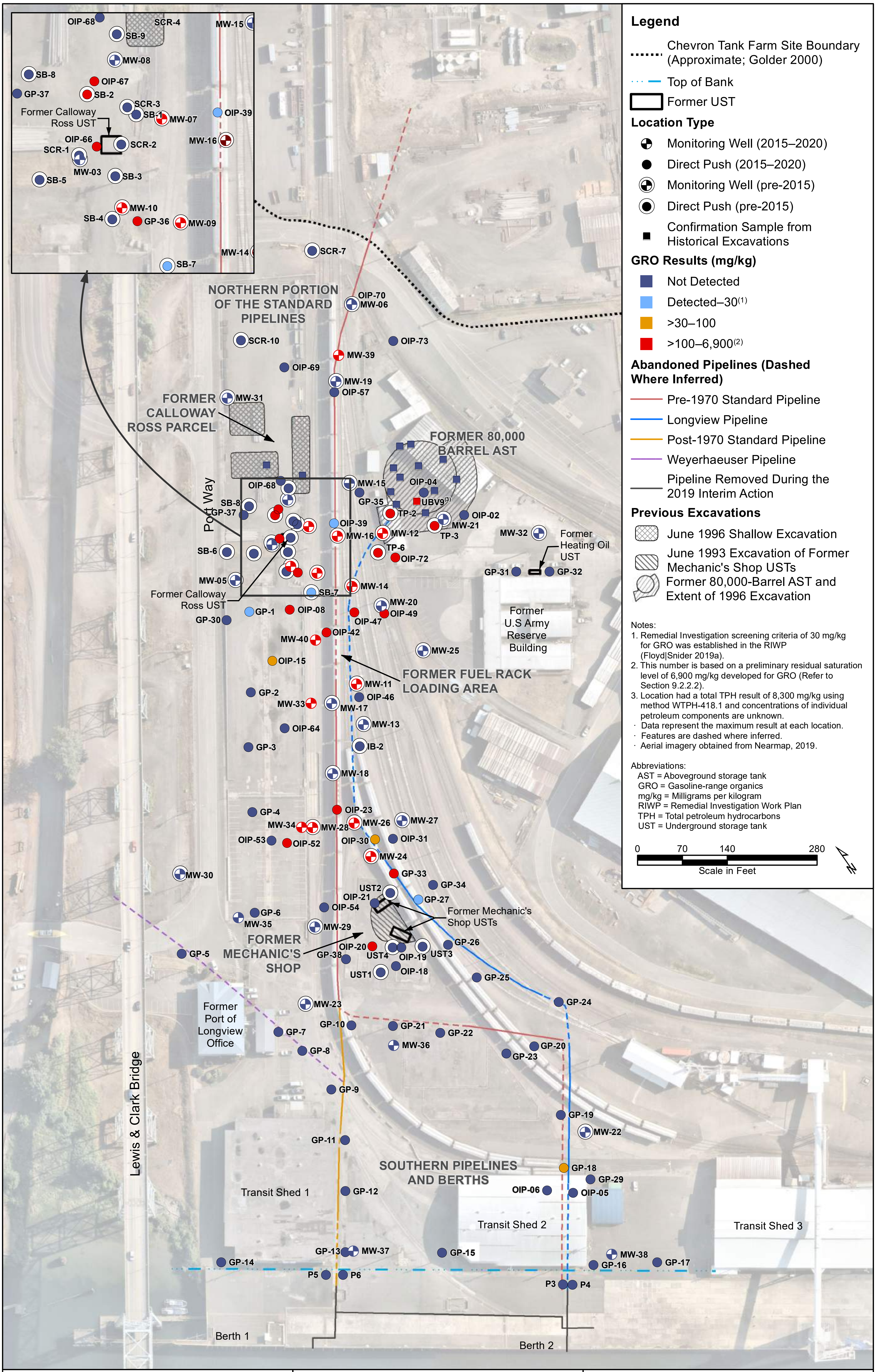
Figure 9.3
Extent of COCs in Alluvial Aquifer Groundwater Exceeding Proposed CULs

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 9.3 Extent of COCs in Alluvial Aquifer Groundwater Exceeding PCULs.mxd
6/12/2023



Notes:
1. Remedial Investigation screening criteria of 30 mg/kg for GRO was established in the RIWP (Floyd|Snider 2019a).
2. This number is based on a preliminary residual saturation level of 6,900 mg/kg developed for GRO (Refer to Section 9.2.2.2).
3. Location had a total TPH result of 8,300 mg/kg using method WTPH-418.1 and concentrations of individual petroleum components are unknown.

- Data represent the maximum result at each location.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
GRO = Gasoline-range organics
mg/kg = Milligrams per kilogram
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Port of Longview TPH Site
Longview, Washington

Figure 9.4
Maximum Concentrations of Gasoline-Range Organics in Soil

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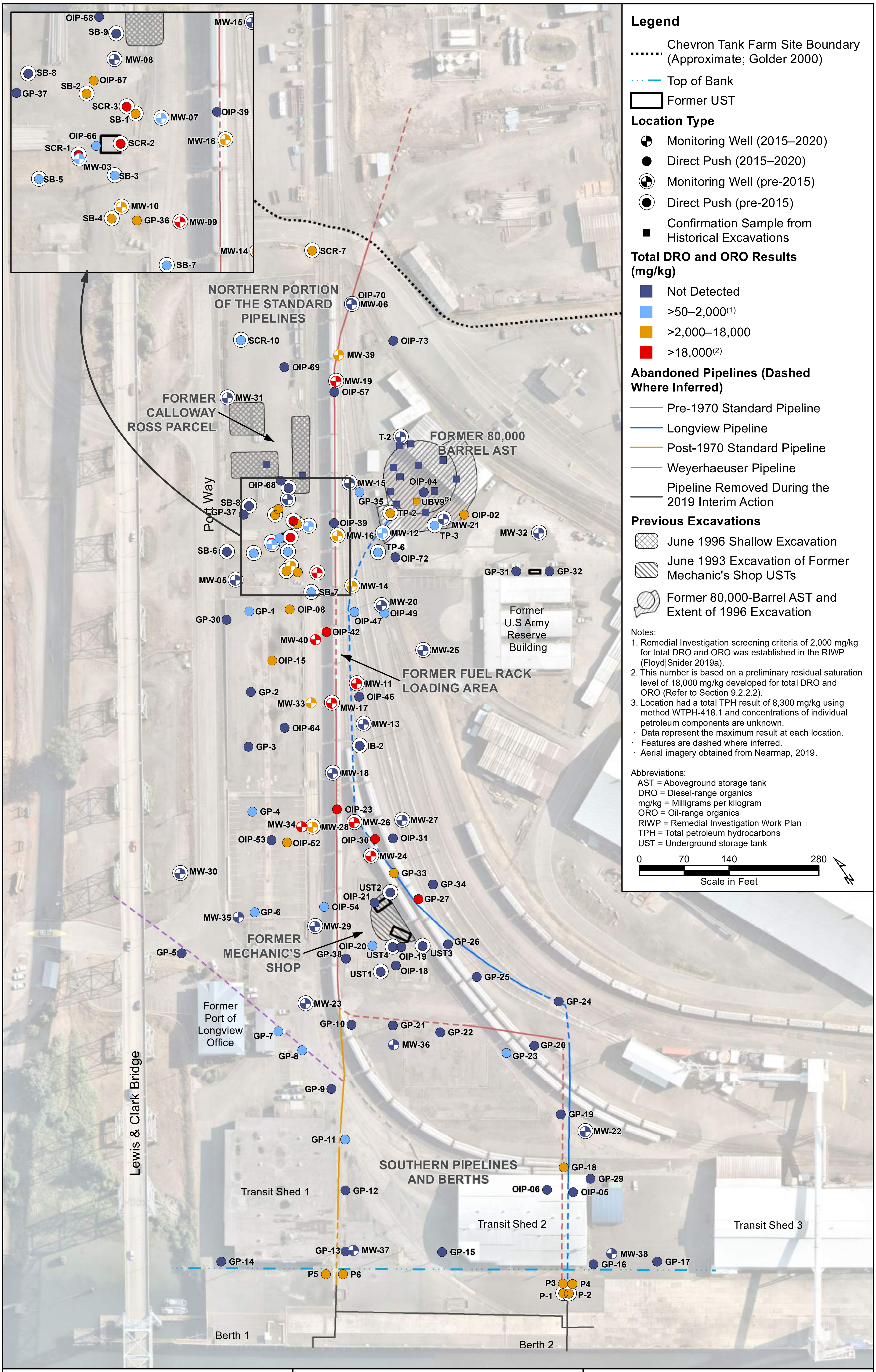
6/11/2023



Legend

Chevron Tank Farm Site Boundary (Approximate; Golder 2000)

Top of Bank

Former UST

Location Type

- Monitoring Well (2015–2020)
- Direct Push (2015–2020)
- Monitoring Well (pre-2015)
- Direct Push (pre-2015)
- Confirmation Sample from Historical Excavations

Total DRO and ORO Results (mg/kg)

- Not Detected
- >50–2,000(1)
- >2,000–18,000
- >18,000(2)

Abandoned Pipelines (Dashed Where Inferred)

- Pre-1970 Standard Pipeline
- Longview Pipeline
- Post-1970 Standard Pipeline
- Weyerhaeuser Pipeline
- Pipeline Removed During the 2019 Interim Action

Previous Excavations

- June 1996 Shallow Excavation
- June 1993 Excavation of Former Mechanic's Shop USTs
- Former 80,000-Barrel AST and Extent of 1996 Excavation

Notes:
1. Remedial Investigation screening criteria of 2,000 mg/kg for total DRO and ORO was established in the RIWP (Floyd|Snider 2019a).
2. This number is based on a preliminary residual saturation level of 18,000 mg/kg developed for total DRO and ORO (Refer to Section 9.2.2.2).
3. Location had a total TPH result of 8,300 mg/kg using method WTPH-418.1 and concentrations of individual petroleum components are unknown.

- Data represent the maximum result at each location.
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
DRO = Diesel-range organics
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
RIWP = Remedial Investigation Work Plan
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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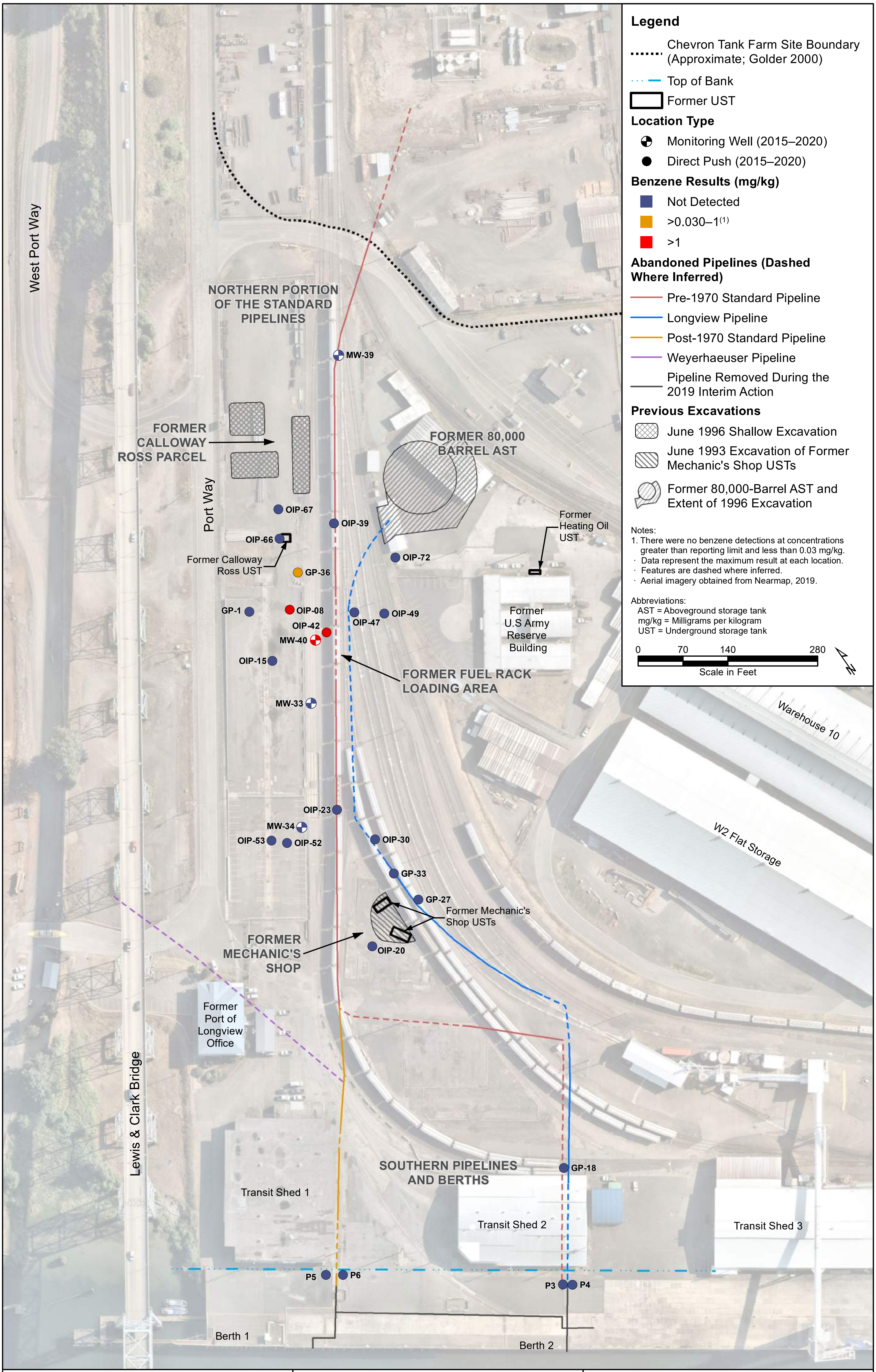
Port of Longview TPH Site
Longview, Washington

Figure 9.5
Maximum Concentrations of Total DRO and ORO in Soil

I:\GIS\Projects\POL-TPH\MXD\RIFS\Figure 9.5 Maximum Concentrations of Total DRO and ORO in Soil.mxd
6/11/2023



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Port of Longview TPH Site
Longview, Washington

Figure 9.6
Maximum Concentrations of Benzene in Soil

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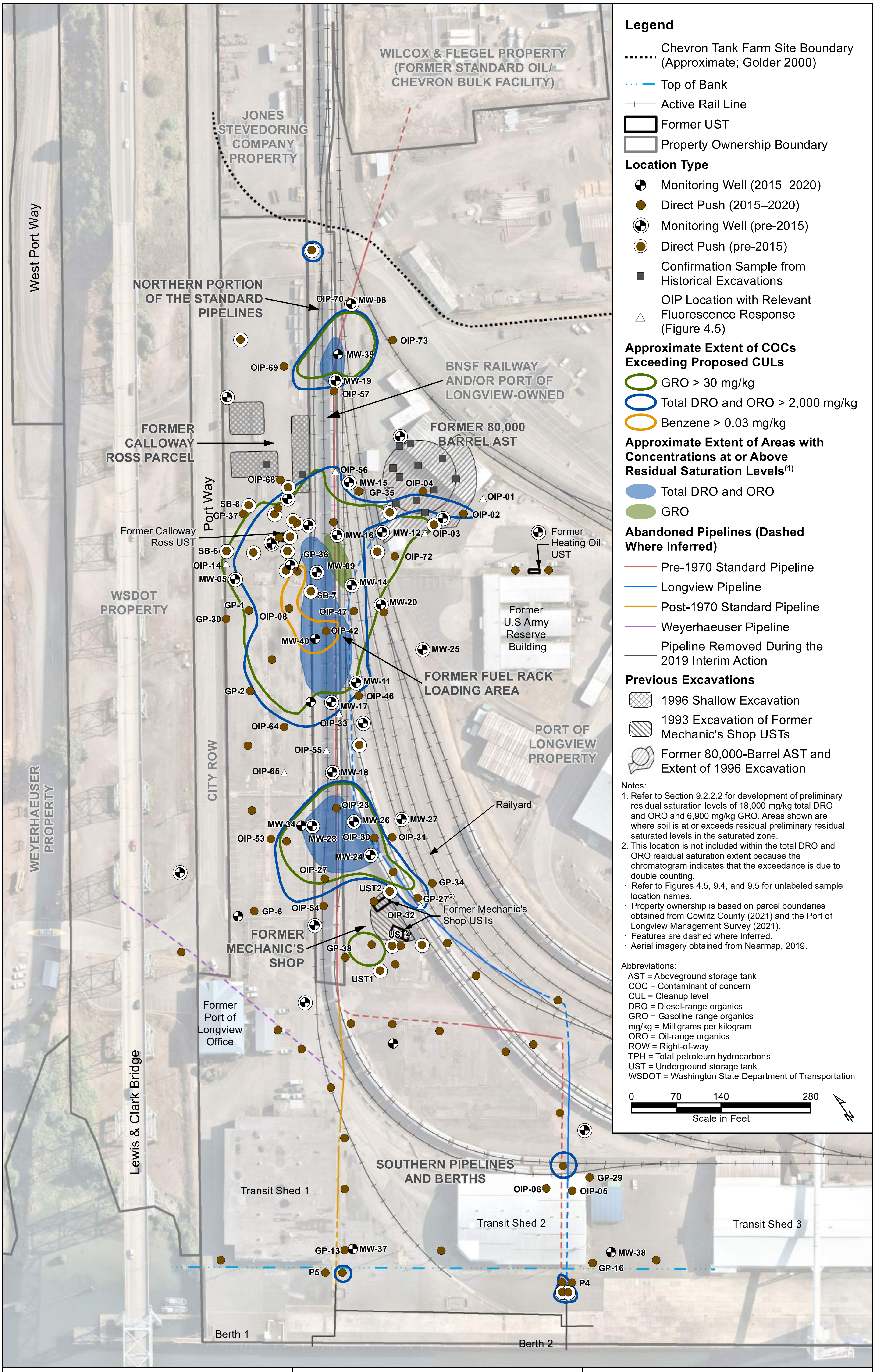
6/11/2023



Notes:

1. Refer to Section 9.2.2.2 for development of preliminary residual saturation levels of 18,000 mg/kg total DRO and ORO and 6,900 mg/kg GRO. Areas shown are where soil is at or exceeds residual preliminary residual saturated levels in the saturated zone.
2. This location is not included within the total DRO and ORO residual saturation extent because the chromatogram indicates that the exceedance is due to double counting.

- Refer to Figures 4.5, 9.4, and 9.5 for unlabeled sample location names.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
GRO = Gasoline-range organics
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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Longview, Washington

Figure 9.7
Extent of COCs in Soil Exceeding Proposed CULs

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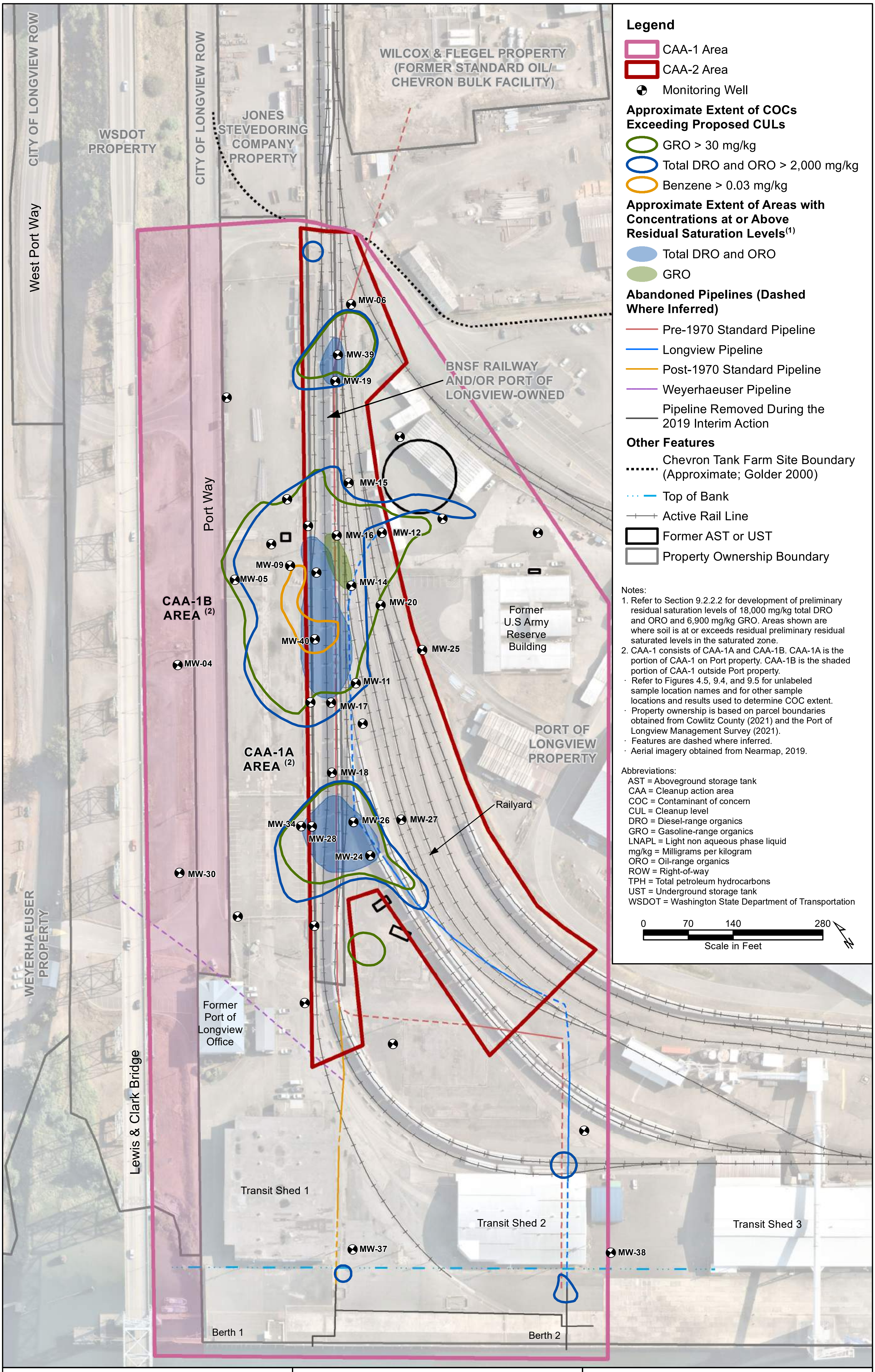
6/11/2023



Notes:
1. Refer to Section 9.2.2.2 for development of preliminary residual saturation levels of 18,000 mg/kg total DRO and ORO and 6,900 mg/kg GRO. Areas shown are where soil is at or exceeds residual preliminary residual saturated levels in the saturated zone.
2. CAA-1 consists of CAA-1A and CAA-1B. CAA-1A is the portion of CAA-1 on Port property. CAA-1B is the shaded portion of CAA-1 outside Port property.
- Refer to Figures 4.5, 9.4, and 9.5 for unlabeled sample location names and for other sample locations and results used to determine COC extent.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
CAA = Cleanup action area
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
GRO = Gasoline-range organics
LNAPL = Light non aqueous phase liquid
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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Longview, Washington

Figure 11.1
Cleanup Action Areas

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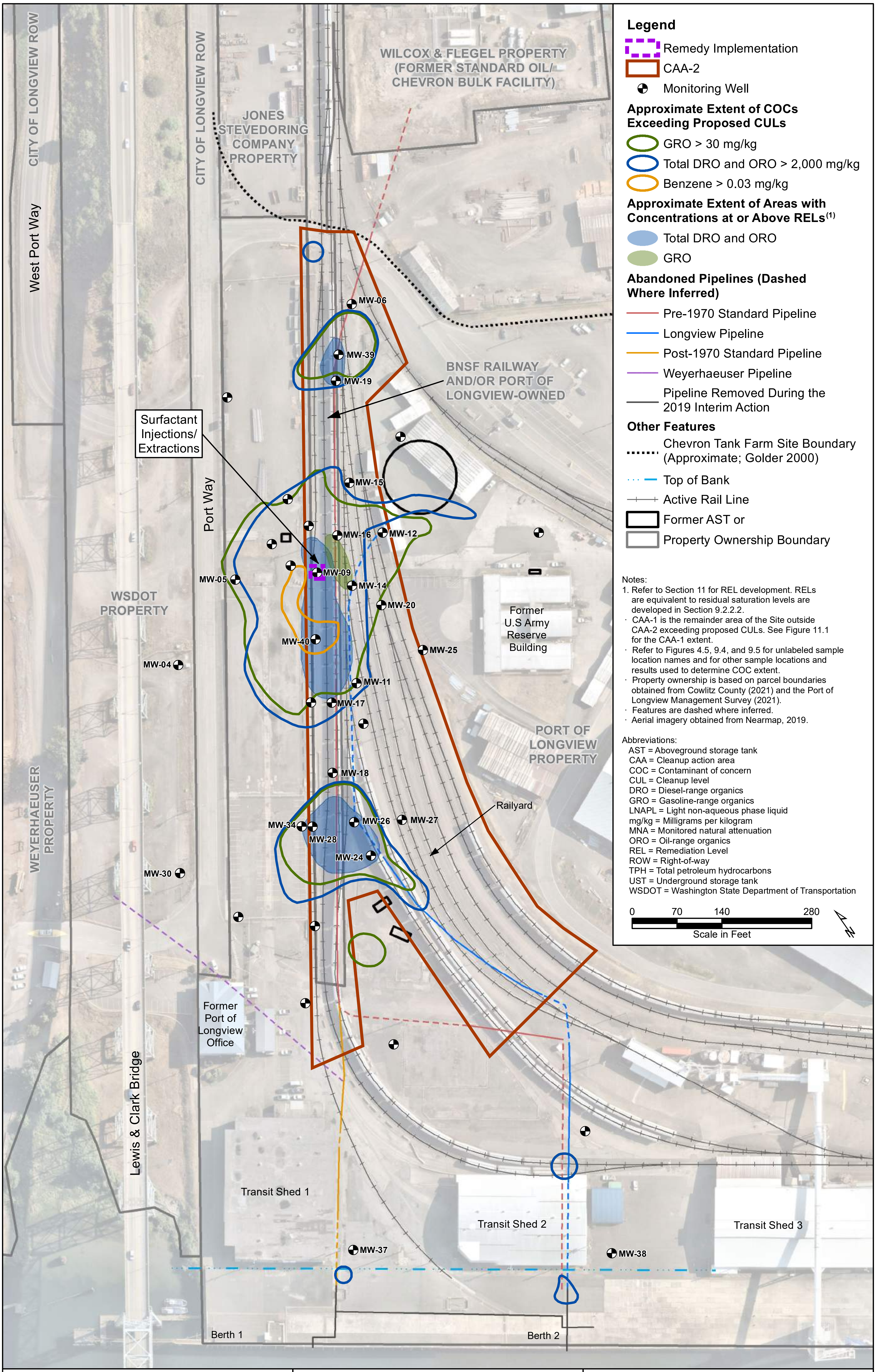

Notes:
1. Refer to Section 11 for REL development. RELs are equivalent to residual saturation levels are developed in Section 9.2.2.2.
- CAA-1 is the remainder area of the Site outside CAA-2 exceeding proposed CULs. See Figure 11.1 for the CAA-1 extent.
- Refer to Figures 4.5, 9.4, and 9.5 for unlabeled sample location names and for other sample locations and results used to determine COC extent.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
CAA = Cleanup action area
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
GRO = Gasoline-range organics
LNAPL = Light non-aqueous phase liquid
mg/kg = Milligrams per kilogram
MNA = Monitored natural attenuation
ORO = Oil-range organics
REL = Remediation Level
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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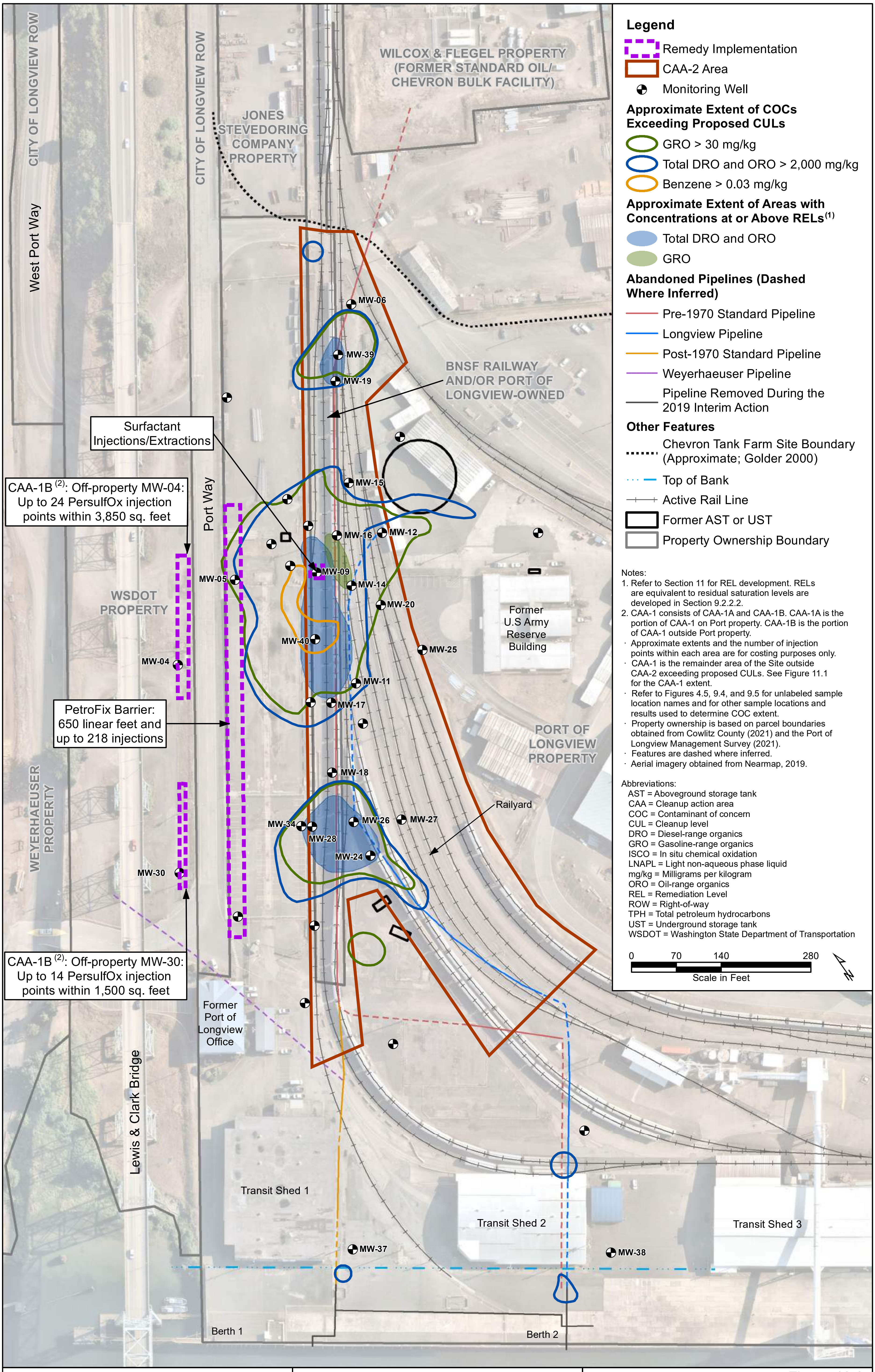
Longview, Washington

Figure 13.1
Alternative 1—
LNAPL Removal and MNA



Legend

- Remedy Implementation
- CAA-2 Area
- Monitoring Well

Approximate Extent of COCs Exceeding Proposed CULs

- GRO > 30 mg/kg
- Total DRO and ORO > 2,000 mg/kg
- Benzene > 0.03 mg/kg

Approximate Extent of Areas with Concentrations at or Above RELs[1]

- Total DRO and ORO
- GRO

Abandoned Pipelines (Dashed Where Inferred)

- Pre-1970 Standard Pipeline
- Longview Pipeline
- Post-1970 Standard Pipeline
- Weyerhaeuser Pipeline
- Pipeline Removed During the 2019 Interim Action

Other Features

- Chevron Tank Farm Site Boundary (Approximate; Golder 2000)
- Top of Bank
- Active Rail Line
- Former AST or UST
- Property Ownership Boundary

Notes:

1. Refer to Section 11 for REL development. RELs are equivalent to residual saturation levels are developed in Section 9.2.2.2.
2. CAA-1 consists of CAA-1A and CAA-1B. CAA-1A is the portion of CAA-1 on Port property. CAA-1B is the portion of CAA-1 outside Port property.

- Approximate extents and the number of injection points within each area are for costing purposes only.
- CAA-1 is the remainder area of the Site outside CAA-2 exceeding proposed CULs. See Figure 11.1 for the CAA-1 extent.
- Refer to Figures 4.5, 9.4, and 9.5 for unlabeled sample location names and for other sample locations and results used to determine COC extent.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
CAA = Cleanup action area
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
GRO = Gasoline-range organics
ISCO = In situ chemical oxidation
LNAPL = Light non-aqueous phase liquid
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
REL = Remediation Level
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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Port of Longview TPH Site
Longview, Washington

Figure 13.2
Alternative 2—
In Situ Treatment Barrier and
LNAPL Removal

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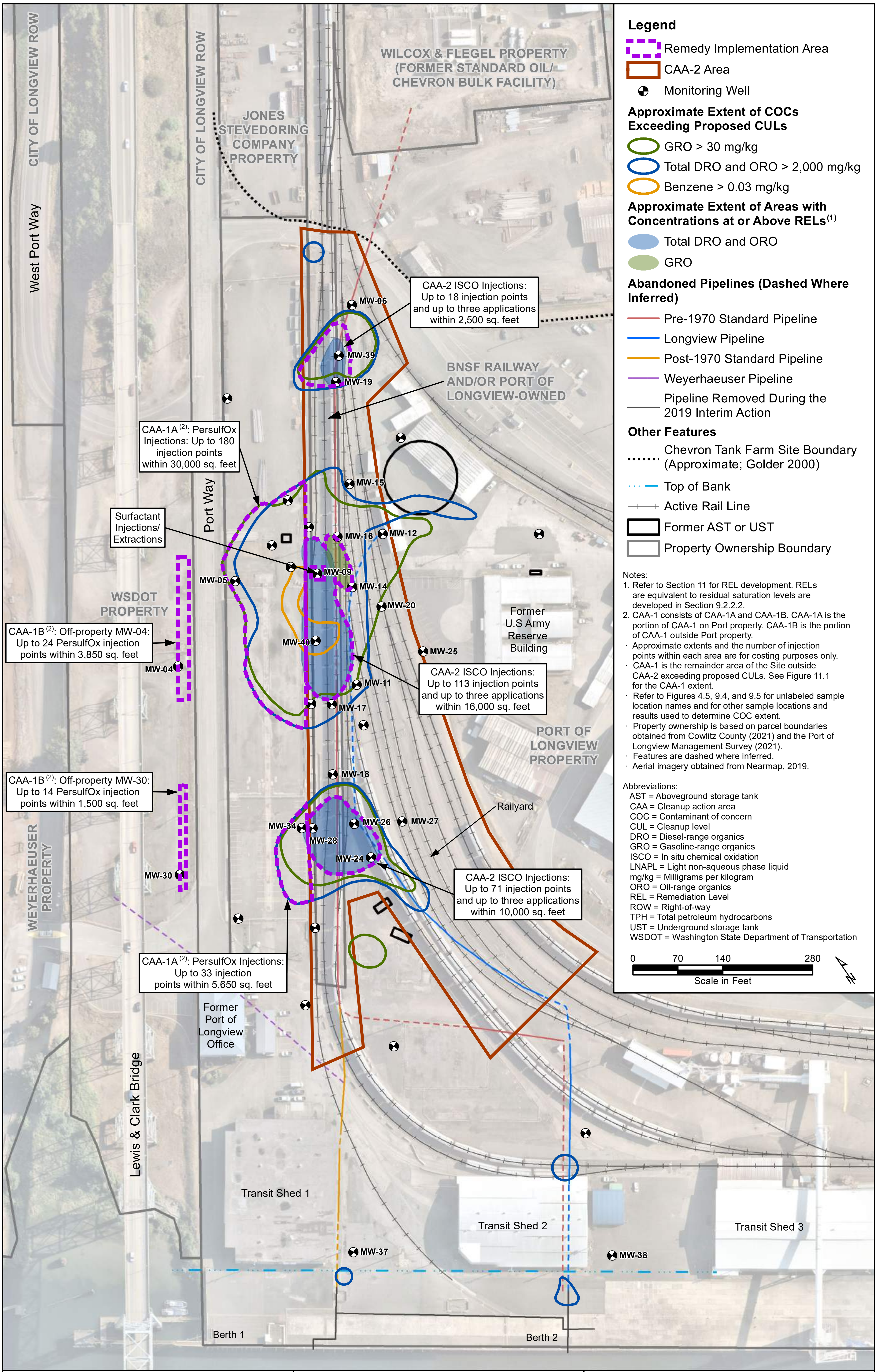
8/7/2023



Notes:
1. Refer to Section 11 for REL development. RELs are equivalent to residual saturation levels are developed in Section 9.2.2.2.
2. CAA-1 consists of CAA-1A and CAA-1B. CAA-1A is the portion of CAA-1 on Port property. CAA-1B is the portion of CAA-1 outside Port property.
- Approximate extents and the number of injection points within each area are for costing purposes only.
- CAA-1 is the remainder area of the Site outside CAA-2 exceeding proposed CULs. See Figure 11.1 for the CAA-1 extent.
- Refer to Figures 4.5, 9.4, and 9.5 for unlabeled sample location names and for other sample locations and results used to determine COC extent.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
CAA = Cleanup action area
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
GRO = Gasoline-range organics
ISCO = In situ chemical oxidation
LNAPL = Light non-aqueous phase liquid
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
REL = Remediation Level
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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Port of Longview TPH Site
Longview, Washington

Figure 13.3
Alternative 3—
Targeted ISCO Injections and
LNAPL Removal

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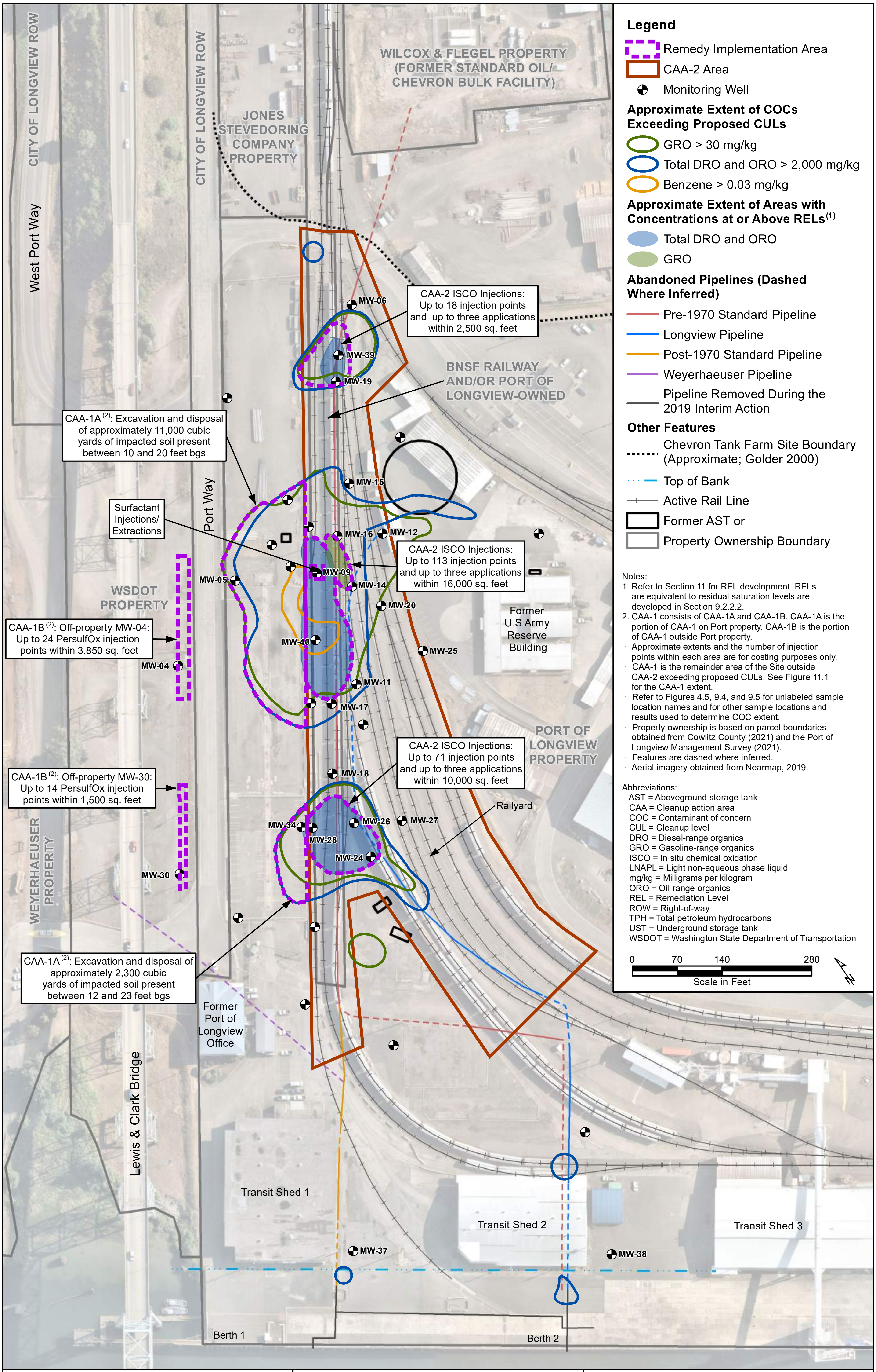

CAA-2 ISCO Injections: Up to 18 injection points and up to three applications within 2,500 sq. feet

CAA-1A[(2)]: Excavation and disposal of approximately 11,000 cubic yards of impacted soil present between 10 and 20 feet bgs

Surfactant Injections/ Extractions

CAA-2 ISCO Injections: Up to 113 injection points and up to three applications within 16,000 sq. feet

CAA-1B[(2)]: Off-property MW-04: Up to 24 PersulfOx injection points within 3,850 sq. feet

CAA-1B[(2)]: Off-property MW-30: Up to 14 PersulfOx injection points within 1,500 sq. feet

CAA-2 ISCO Injections: Up to 71 injection points and up to three applications within 10,000 sq. feet

CAA-1A[(2)]: Excavation and disposal of approximately 2,300 cubic yards of impacted soil present between 12 and 23 feet bgs

Legend

- Remedy Implementation Area
- CAA-2 Area
- Monitoring Well

Approximate Extent of COCs Exceeding Proposed CULs

- GRO > 30 mg/kg
- Total DRO and ORO > 2,000 mg/kg
- Benzene > 0.03 mg/kg

Approximate Extent of Areas with Concentrations at or Above RELs[(1)]

- Total DRO and ORO
- GRO

Abandoned Pipelines (Dashed Where Inferred)

- Pre-1970 Standard Pipeline
- Longview Pipeline
- Post-1970 Standard Pipeline
- Weyerhaeuser Pipeline
- Pipeline Removed During the 2019 Interim Action

Other Features

- Chevron Tank Farm Site Boundary (Approximate; Golder 2000)
- Top of Bank
- Active Rail Line
- Former AST or
- Property Ownership Boundary

Notes:
1. Refer to Section 11 for REL development. RELs are equivalent to residual saturation levels are developed in Section 9.2.2.2.
2. CAA-1 consists of CAA-1A and CAA-1B. CAA-1A is the portion of CAA-1 on Port property. CAA-1B is the portion of CAA-1 outside Port property.

- Approximate extents and the number of injection points within each area are for costing purposes only.
- CAA-1 is the remainder area of the Site outside CAA-2 exceeding proposed CULs. See Figure 11.1 for the CAA-1 extent.
- Refer to Figures 4.5, 9.4, and 9.5 for unlabeled sample location names and for other sample locations and results used to determine COC extent.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AST = Aboveground storage tank
CAA = Cleanup action area
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
GRO = Gasoline-range organics
ISCO = In situ chemical oxidation
LNAPL = Light non-aqueous phase liquid
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
REL = Remediation Level
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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Port of Longview TPH Site
Longview, Washington

Figure 13.4
Alternative 4—
Limited Excavation, Targeted ISCO Injections, and LNAPL Removal

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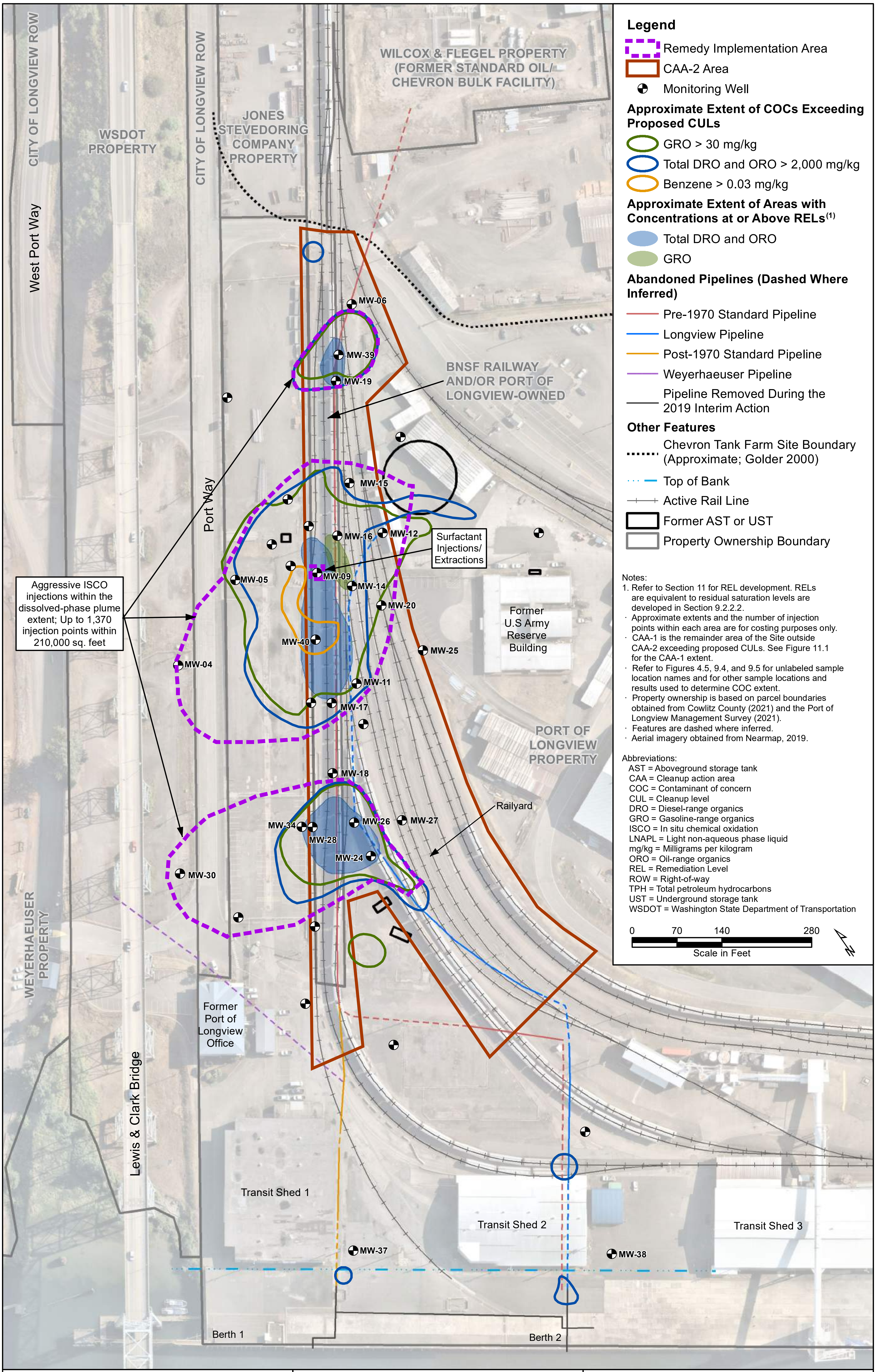
8/7/2023



Notes:

1. Refer to Section 11 for REL development. RELs are equivalent to residual saturation levels are developed in Section 9.2.2.2.

- Approximate extents and the number of injection points within each area are for costing purposes only.
- CAA-1 is the remainder area of the Site outside CAA-2 exceeding proposed CULs. See Figure 11.1 for the CAA-1 extent.
- Refer to Figures 4.5, 9.4, and 9.5 for unlabeled sample location names and for other sample locations and results used to determine COC extent.
- Property ownership is based on parcel boundaries obtained from Cowlitz County (2021) and the Port of Longview Management Survey (2021).
- Features are dashed where inferred.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AST = Aboveground storage tank
CAA = Cleanup action area
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
GRO = Gasoline-range organics
ISCO = In situ chemical oxidation
LNAPL = Light non-aqueous phase liquid
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
REL = Remediation Level
ROW = Right-of-way
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
WSDOT = Washington State Department of Transportation

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Remedial Investigation/Feasibility Study
Port of Longview TPH Site
Longview, Washington

Figure 13.5
Alternative 5—
Plume-wide ISCO Injections and LNAPL Removal

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix A
Interim Data Report

Port of Longview TPH Site

Interim Data Report

Prepared for

Port of Longview
10 Port Way
Longview, Washington 98632

June 2021

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Seattle, Washington 98101 • tel: 206.292.2078

LIMITATIONS

This report has been prepared for the exclusive use of the Port of Longview**,** their authorized agents, and regulatory agencies. It has been prepared following the described methods and information available at the time of the work. No other party should use this report for any purpose other than that originally intended, unless Floyd|Snider agrees in advance to such reliance in writing. The information contained herein should not be utilized for any purpose or project except the one originally intended. Under no circumstances shall this document be altered, updated, or revised without written authorization of Floyd|Snider.

Interim Data Report

This document was prepared for
The Port of Longview
under the supervision of:

State of Washington
2357
Licensed Geologist
Gabriel Cisneros

Name: Gabriel Cisneros, LG
Date: June 1, 2021

Hydrogeologic interpretations
were prepared
under the supervision of:

Brett Beaulieu

Name: Brett Beaulieu, LHG
Date: June 1, 2021

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Appendix D	Field Forms
Appendix E	Data Validation Summary Memorandum and Laboratory Reports
Appendix F	Soil Parameter Laboratory Data
Appendix G	MTCA Method B and C Calculation Workbooks

List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
Agreed Order	Agreed Order No. DE 15907
AOPC	Area of Potential Concern
AST	Aboveground storage tank
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
Chevron	Chevron Environmental Management Company
COC	Contaminant of concern
Columbia	Columbia Technologies, LLC
Columbia Report	Columbia Technologies, LLC's High-Resolution Fluorescence/Hydraulic Profile Characterization Report
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
CSM	Conceptual site model
CUL	Cleanup level
DRO	Diesel-range organics
DTW	Depth to water
EC	Electrical conductivity
Ecology	Washington State Department of Ecology
EDB	1,2-Dibromoethane

Acronym/ Abbreviation	**Definition**
EDC	1,2-Dichloroethane
EIM	Environmental Information Management
EPH	Extractable petroleum hydrocarbons
FBI	Friedman and Bruya, Inc.
Fremont	Fremont Analytical, Inc.
Georgia-Pacific	Georgia-Pacific LLC
GPR	Ground-penetrating radar
GRO	Gasoline-range organics
HCID	Hydrocarbon identification
HPT	Hydraulic profiling tool
IDW	Investigation-derived waste
LNAPL	Light non-aqueous phase liquid
µg/L	Micrograms per liter
$\mu g/m^3$	Micrograms per cubic meter
mg/kg	Milligrams per kilogram
mL/min	Milliliters per minute
MNA	Monitored natural attenuation
MTBE	Methyl *tert*-butyl ether
MTCA	Model Toxics Control Act
NAVD 88	North American Vertical Datum of 1988
OIP	Optical Image Profiler
ORO	Oil-range organics
PAH	Polycyclic aromatic hydrocarbon
PLP	Potentially liable party
Port	Port of Longview
PPE	Personal protective equipment
RI	Remedial investigation
SAP/QAPP	Sampling and Analysis Plan/Quality Assurance Project Plan
Site	Port of Longview Total Petroleum Hydrocarbons Site

Acronym/ Abbreviation	**Definition**
TEQ	Toxic equivalent
TPH	Total petroleum hydrocarbons
UST	Underground storage tank
VI	Vapor intrusion
VOC	Volatile organic compound
VPH	Volatile petroleum hydrocarbons
WestRock	WestRock Longview LLC
Wilson	Wilson Oil, Inc., doing business as Wilcox & Flegel Oil Company
Work Plan	Remedial Investigation Work Plan
WSDOT	Washington State Department of Transportation

1.0 Introduction

This Interim Data Report presents the data collected during the 2019 to 2020 remedial investigation (RI) activities performed at of the Port of Longview (Port) Total Petroleum Hydrocarbons (TPH) Site (Site) in Longview, Washington (Figure 1.1). The RI activities were completed on behalf of the Port in accordance with the approved RI Work Plan (Work Plan; Floyd|Snider 2019) and were conducted as a specific requirement of Agreed Order No. DE 15907 (Agreed Order) between the Port, Chevron Environmental Management Company (Chevron), Georgia-Pacific LLC (Georgia-Pacific), and the Washington State Department of Ecology (Ecology). Other potentially liable parties (PLPs) related to the Site include Wilson Oil, Inc., doing business as Wilcox & Flegel Oil Company (Wilson) and WestRock Longview LLC (WestRock), a corporate predecessor to Longview Fibre Paper and Packaging, Inc.[1] Both the Agreed Order signatories and the other PLPs are collectively referred to as the PLP Group.

The purpose of the Interim Data Report is to present the initial field data and identify any remaining data gaps to be filled prior to preparing the RI report. Specifically, the Interim Data Report describes the work conducted to collect the data and includes a summary of the sampling plan, sampling methods, and sampling results. The sampling results are provided both in summary tables and on figures and are compared to the preliminary screening levels contained in the Work Plan to evaluate the nature and extent of the chemicals detected.

1.1 BACKGROUND

The Site is located at 10 International Way in Longview, Washington, on the north side of the Columbia River, directly east of the Lewis and Clark Bridge. The total area of the Port's property that encompasses the Site is approximately 28.2 acres and consists of an office building, multiple buildings and warehouses, two berths, and a railyard (Figure 1.2).

A log export facility is adjacent to (northwest of) the Site, an active bulk fuel facility is located to the northeast of the Site. Land uses at the Site and in the surrounding area are industrial.

As a result of the discovery of releases of petroleum products to soil and groundwater associated with various historical uses, the Site was included on the Ecology list of confirmed and suspected impacted sites in 1991. In the past, investigation and remediation work as well as routine groundwater monitoring at the Site have been accomplished cooperatively between the Port, Chevron, Longview Fibre Company (a corporate predecessor to Longview Fibre Paper and Packaging, Inc., a corporate predecessor to WestRock), and the James River Corporation (a corporate successor to Crown Zellerbach and corporate predecessor of Georgia-Pacific).

Following the cessation of routine groundwater monitoring in 2013, the Port undertook a review of data gaps and conducted an additional investigation in 2015 to address priority data gaps. The

---

[1] Longview Fibre Paper and Packaging, Inc., a corporate predecessor to Longview Fibre Company, did business as KapStone Kraft Paper Corporation, which is the name referenced in the Agreed Order and is a corporate predecessor to WestRock.

data gaps and the results of the 2015 priority data gaps investigation are described in the Data Gaps Report (Floyd|Snider 2015). The remaining data gaps, not addressed during the 2015 investigation, provide the basis for much of the scope of the RI activities described in the Work Plan. Additionally, the Port performed interim action activities in 2019 to remove exposed portions of the pipelines located beneath Berth 1 and Berth 2. Only a small capped stub from each pipeline remains where the pipelines extend out of the bulkhead.

In 2016, Ecology issued PLP letters to the Port, Chevron, Georgia-Pacific, Wilson, and KapStone Kraft Paper Corporation (a corporate predecessor to WestRock). The Port, Chevron, and Georgia-Pacific worked with Ecology to prepare the Agreed Order, which underwent public comment and was entered with an effective date of February 13, 2019.

1.2 INTERIM DATA REPORT ORGANIZATION

The remaining sections of this report are organized as follows:

- **Section 2—Remedial Investigation Work Performed:** Describes the work performed during two field investigation mobilizations (designated Phase I and Phase II), and the first two quarters of groundwater monitoring conducted following completion of the Phase I and Phase II field events. Section 2.0 is divided to discuss data collection activities individually for each Area of Potential Concern (AOPC) identified in the Work Plan.
- **Section 3—Results:** Describes the results of the Phase I and Phase II field investigations, for each AOPC, and describes results of the two completed groundwater monitoring events conducted following completion of Phase I and Phase II activities. This includes discussion of soil vapor testing and initial evaluation of hydrogeologic data collection.
- **Section 4.0—Conclusions:** Discusses the data collected for each media, and considers the sufficiency of the existing data set for completion of the RI process. This section also describes the recommended changes to the ongoing groundwater monitoring program.
- **Section 5.0—References:** Includes references cited in this report.

2.0 Remedial Investigation Work Performed

Previous investigations including soil and groundwater data collected in 2015 and 2019, which are presented in the Data Gaps Report and Work Plan, have largely defined the location and concentration of contaminants of concern (COCs) in soil and groundwater at the Site (Floyd|Snider 2015 and 2019). Within the Site boundaries, well-defined data gaps in the understanding of the nature and extent of contamination remain only in selected AOPCs. Additional data were collected from these AOPCs to address remaining data gaps in the nature and extent of contamination and to support more accurate estimates of contaminated soil volume for remedial evaluation and the development of remedial alternatives. The following RI work activities were (or will be) completed to address the remaining data needs:

- Collecting sufficient soil and groundwater data to confirm the nature and extent of impacts to conduct focused assessments of spatial extent, to estimate volume of contaminated media, and to evaluate remedial alternatives
- Assessing seasonal change in the extent of groundwater impacts based on four quarters of groundwater monitoring
- Collecting sufficient data to confirm Site COCs and determine cleanup levels (CULs)
- Collecting sufficient hydrogeologic data to understand the hydrogeologic regime at the Site and how it affects the contaminant fate and transport

RI work activities conducted during two mobilizations (Phase I and Phase II) to investigate soil and groundwater conditions are described in Sections 2.1 and 2.2. Following the Phase I and Phase II mobilizations, additional work was performed as part of the RI activities, including two consecutive quarters of groundwater monitoring and sampling as described in Section 2.3; the first round of soil vapor sampling as described in Section 2.4; and the dry season portion of the hydrogeologic study as described in Section 2.5. Results from these additional RI activities are also summarized in this report. All activities were conducted in accordance with the Work Plan and associated Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP).

2.1 OVERVIEW OF PHASE I AND PHASE II INVESTIGATION ACTIVITIES

Data collection activities related to defining the nature and extent of impacted media at the Site during Phase I and Phase II are summarized in this section. Data collection included soil, groundwater, and soil vapor. A detailed discussion of Phase I and Phase II investigations completed at each AOPC is presented in Section 2.2; AOPCs and their primary data gaps or areas of potential concern are illustrated on Figure 2.1. The extents of each AOPC shown on Figure 2.1 are approximate and are illustrated to show the general area of concern. Prior to any subsurface investigation work, a public one-call and a private utility survey were conducted to identify conductible lines, and drilling locations were cleared of utilities using a hand auger or compressed air and a vactor truck to remove soil down to at least 5 feet prior to drilling. The following sections briefly summarize the overall Phase I and Phase II activities.

2.1.1 Phase I Activities

Phase I occurred between November 13 and 22, 2019, and consisted of a high-resolution fluorescence/hydraulic profile characterization of the Site conducted by Columbia Technologies, LLC (Columbia), overseen by Floyd|Snider personnel. This was accomplished by using an Optical Image Profiler (OIP), manufactured by Geoprobe, and a hydraulic profiling tool (HPT) attached to a direct-push drill rig to investigate the potential for residual light non-aqueous phase liquid (LNAPL) and TPH impacts in the subsurface at 73 locations across the Site (OIP-01 through OIP-73). The OIP was utilized to provide rapid and cost-effective delineation of residual LNAPL and residual TPH impacts. The HPT was used to obtain hydrostratigraphic data in relevant AOPCs. The OIP/HPT data for each location are shown in Columbia's report included as Appendix A; OIP/HPT locations advanced during the Phase I activities are shown on Figure 2.2.

In addition to the OIP/HPT boring locations, six direct-push boring locations were advanced immediately adjacent to select OIP/HPT locations during Phase I of RI fieldwork to collect continuous soil samples and analytical data (OIP-08, OIP-30, OIP-42, OIP-52, OIP-53, and OIP-66). The lithology and analytical results from these direct-push borings were compared to the OIP/HPT results prior to proposing direct-push locations during the Phase II. The select direct-push locations were advanced in areas with low to significant petroleum hydrocarbon impacts and varying hydrostratigraphy to evaluate the OIP/HPT response data. In general, the observations between the fluorescence response of the OIP tool and soil analytical results were as follows:

- The OIP tool exhibited a strong fluorescence response in areas impacted with gasoline-range organics (GRO), diesel-range organics (DRO), and lighter polycyclic aromatic hydrocarbon (PAH) ranges but was less responsive with heavier oil fuels.
- OIP response is shown as a percent area fluorescence based on analysis of the images as the probe advances with depth. For example, a fluorescence response of 50% is when the half of the frame shows a fluorescence response.
- The OIP tool provided qualitative to semiquantitative information about the distribution of subsurface petroleum-impacted soil and extent of LNAPL both above and below the perched water-bearing zone and lower water table.
- A comparison of the OIP fluorescence response and quantitative soil results indicated that a fluorescence response greater than 50% indicated an exceedance of screening levels for GRO and DRO. A fluorescence response of less than 10% generally indicated that GRO and DRO impacts were present but at concentrations less than screening levels.

A summary of the OIP/HPT and laboratory analytical results are discussed for each AOPC in Section 3.0. Boring logs are included in Appendix B, the OIP/HPT report is included in Appendix A.

2.1.2 Phase II Activities

Phase II fieldwork occurred between March 9, 2020, and March 13, 2020, and included advancing 32 soil borings, installing two soil vapor points (VP-1 and VP-2) and eight monitoring wells (MW-33 through MW-40), collecting surface samples beneath Berth 1 and Berth 2, and conducting a professional land survey for all monitoring wells and vapor points. Direct push borings were advanced adjacent to 24 Phase I OIP/HPT borings (OIP-02, OIP-04, OIP-05, OIP-06, OIP-15, OIP-18, OIP-19, OIP-20, OIP-21, OIP-23, OIP-31, OIP-39, OIP-46, OIP-47, OIP-49, OIP-54, OIP-57, OIP-64, OIP-67, OIP-68, OIP-69, OIP-70, OIP-72, and OIP-73) and at eight additional locations (GP-31 through GP-38). The Phase I OIP/HPT and soil data results, along with results from previous investigations (designated GP-1 through GP-30), were used to determine the direct-push and monitoring well locations. Phase I and Phase II soil boring and monitoring well locations, as well as previous investigation locations, are shown on Figure 2.3. Soil and reconnaissance groundwater samples (samples collected from boreholes to provide general groundwater quality information) were collected from direct-push borings and soil samples were collected during the installation of monitoring wells to help obtain quantitative soil and groundwater results. Direct-push locations were selected to collect vertical and lateral laboratory analytical samples to delineate the extent of impacts and to assist in future assessments of the volume of TPH-impacted soil. Within each AOPC, at least one direct-push boring was advanced in an area containing residual TPH impacts identified by OIP/HPT to obtain quantitative results and to delineate the vertical extent of TPH impacts within the AOPC.

2.1.2.1 Direct-Push Locations and Surface Samples

During all direct-push activities, soil cores were continuously collected and soil was field screened for indications of petroleum hydrocarbon impacts, which were recorded on the soil boring logs (Appendix B). In general, direct-push soil borings were advanced to the groundwater surface or past the bottom depth of visible impacts. Soil samples were generally collected from the depth representative of the greatest impacts based on field screening observations (e.g., photoionization detector measurements, sheen, odor, staining), and a minimum of one soil sample was collected from where the capillary fringe was first encountered. Groundwater samples were collected from select direct-push borings that were located in areas of the Site that do not have existing wells or to confirm groundwater concentrations observed in adjacent wells. Discrete groundwater samples (samples collected from specific depth intervals based on existing information) were collected at depths where groundwater was encountered during the OIP/HPT survey and based on the hydraulic permeability determined from the HPT pressure profiles. Temporary well screens were used to collect samples from the upper 5 to 10 feet of groundwater encountered. Prior to collecting samples, groundwater was purged until the groundwater was visibly clear, at which time turbidity readings, ranging between 1 and 39 nephelometric turbidity units, were collected and recorded in the field notebook. Surface samples were collected beneath Berth 1 and Berth 2 below the capped pipelines. All soil and groundwater samples collected during Phase I and Phase II activities were submitted to Friedman and Bruya, Inc. (FBI) of Seattle, Washington, for laboratory analysis.

2.1.2.2 Monitoring Well Installation

All monitoring wells, except for MW-39, were advanced using a hollow-stem auger rig. All monitoring wells were constructed of 2-inch-diameter Schedule 40 polyvinyl chloride with a flush threaded riser, including a threaded end plug and a machine-slotted 10-foot-long, 0.010-inch slotted screen. The screen interval depths varied at each location. The annular space around the screen was filled with clean 12-20 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 drill 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.

MW-39 was advanced and installed using a track-mounted direct-push drill rig due to the limited access of the location within the rail lines. Although installed with a direct-push rig, MW-39 was constructed similarly to the other wells with a pre-pack well screen with clean 12-20 silica sand.

During monitoring well installation activities, soil samples were collected at least every 2.5 feet using a split-spoon sampler (or continuously using a 5-foot disposable plastic liner at MW-39). Soil analytical samples were generally collected at the depth representative of greatest field screening impacts, if observed. A minimum of one soil analytical sample was collected from the capillary fringe.

The wells were developed by surging and purging until extracted water was clean with no visible turbidity, and at least 10 well volumes were removed from each monitoring well. The volume of water purged during development was recorded in the field notebook and ranged between 23 and 50 gallons per well.

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 B. All monitoring wells were installed and developed in accordance with the Work Plan.

2.1.2.3 Soil Vapor Point Installation

Two soil vapor points, VP-1 and VP-2, were installed during Phase II activities using a direct-push rig to advance each vapor point to a depth of 5.5 feet below ground surface (bgs). A 6-inch-long, 0.75-inch-diameter stainless steel screen was installed that is capped on the bottom end and fitted with an airtight Swagelok fitting connected on the other end. The screen was set at a depth of 5.25 feet bgs in order for the center of the screen to be set at 5 feet bgs. A length of 0.25-inch-outer-diameter rigid wall nylon tubing was attached to the fitting at the end of probe screen and set to be exposed above grade. The above-grade end of the tubing was fitted with an on/off control valve, which is used to prevent short-circuiting of ambient air into the probes and to conduct closed-valve tests.

The 6-inch screen tip was vertically centered in a 1-foot-long interval containing standard sand pack, resulting in 3 inches of sand above and below the screen. The sand pack was covered with a 1-foot interval of dry granular bentonite, which was covered with 1 foot of pre-hydrated granular bentonite. The dry granular bentonite was emplaced immediately above the sand pack to ensure that pre-hydrated granular bentonite slurry did not flow down to the probe screen. The remainder of the borehole was completed with a 2-foot-thick cement cap. A flush-mounted well box was installed to protect the nylon tubing and on/off control valve. Soil vapor point installation logs are included in Appendix B.

2.1.2.4 Professional Land Surveying Activities

Following completion of drilling and well installation activities, a licensed surveyor located the positions of all monitoring wells (former and new) and vapor points and surveyed the elevations of the top of each monitoring well monument and the top of each monitoring well casing. All monitoring casings were surveyed on the north side of each casing to the nearest 0.01 foot. Horizontal position coordinates were reported relative to the in North American Datum of 1983 Washington, State Plane South. Elevations were reported relative to the North American Vertical Datum of 1988 (NAVD 88). Well logs provided in Appendix B include the Washington State Plane South coordinates of the well and the top of well casing elevation. The soil borings, monitoring wells, and vapor point locations are shown on Figure 2.3.

2.2 DESCRIPTION OF ACTIVITIES BY AOPC

2.2.1 AOPC 1: Soil and Groundwater Near Southern Pipelines

AOPC 1 is located in the vicinity of Transit Shed 2, adjacent to Berth 2, and beneath Berth 2 (Figure 2.1). The 2015 data gaps investigation in this area identified soil contamination inland of Transit Shed 2 at boring location GP-18. In addition, two surface samples P-1 and P-2, collected in 1994 beneath the end of the abandoned pipelines beneath Berth 2, contained residual TPH impacts (Golder 1994; Figure 2.1). The data gaps in AOPC 1 consist of delineating the extent of soil impacts previously observed in GP-18 and further investigation of impacts to surface soil beneath Berth 2. To collect additional information on soil and groundwater conditions in this area, two direct-push borings (OIP-05 and OIP-06) were advanced; four surface soil samples (P3 through P6) were collected; and two monitoring wells (MW-37 and MW-38) were installed within AOPC 1 during the Phase I and Phase II activities (Figures 2.2 and 2.3).

2.2.1.1 Phase I Activities: AOPC 1

During the Phase I activities, two OIP/HPT borings, OIP-05 and OIP-06, within Transit Shed 2 and downgradient of GP-18 were advanced to determine if soil impacts detected in soil boring GP-18 were present beneath the building.

2.2.1.2 Phase II Activities: AOPC 1

During the Phase II activities, direct-push soil borings were advanced immediately adjacent to OIP/HPT locations OIP-05 and OIP-06 to collect analytical soil samples to delineate the extent of impacts observed in GP-18. In addition, a discrete groundwater sample was collected from the OIP-06 boring.

The exposed sections of the pipelines located beneath Berth 1 and Berth 2 were removed during the 2019 interim action activities conducted by the Port, and only a small capped stub from each pipeline remains where the pipes extend out of the bulkhead. Surface samples were collected to investigate current soil conditions beneath the southern pipelines under Berth 2. Surface samples P3 and P4 were collected near historical surface samples (P-1 and P-2) and below the remaining eastern pipeline segments that are visible beneath Berth 2. Surface samples P5 and P6 were collected beneath the remaining westernmost pipeline segments beneath Berth 1. Surface samples P3 and P4 were collected from the very small amount of soil that accumulated within the riprap. There was insufficient soil volume at locations P3 and P4 within the riprap to collect deeper subsurface soil samples. Deeper soil samples were not collected from P3 through P6 due to the absence of petroleum hydrocarbon impacts based on field screening observations. Surface sample logs are included in Appendix B, and photographs of these locations are included in Appendix C.

To confirm the quality of groundwater adjacent to the Columbia River and between areas of confirmed soil and groundwater impacts and the river, two monitoring wells, MW-37 and MW-38, were installed within the vicinity of previous boring locations GP-13 and GP-16. Both wells were installed using a hollow-stem auger drill rig. Petroleum hydrocarbon impacts were not detected in either MW-37 or MW-38 via field screening; therefore, soil samples were collected from the capillary fringe. Well logs, including soil sample descriptions and as-built construction details, are included as Appendix B.

2.2.2 AOPC 2: Former AST Area

AOPC 2 is located in the northeast portion of the Site and encompasses the former aboveground storage tank (AST) area. An excavation was conducted in 1996 to an average depth of 6 feet bgs and expanded past the footprint of the AST toward the south, west, and east in order to remove the impacted soil. Soil data from samples collected during the 1996 interim action cleanup show that one sample collected from the base of the excavation pit contained TPH concentrations exceeding Model Toxics Control Act (MTCA) Method A CULs. Additionally, no verification samples were collected beyond the extent of the former AST footprint and former test pit locations with known soil impacts (Golder 1996). Therefore, additional data were needed to determine if impacted soil remains below the excavated area and if soil impacts extend to the east, southeast, and south of the former AST excavation. To address these data gaps, four OIP/HPT borings and two direct push borings were advanced within AOPC 2 during the Phase I and Phase II activities (Figures 2.2 and 2.3).

2.2.2.1 Phase I Activities: AOPC 2

During the first mobilization, four OIP/HPT boring locations, OIP-01 through OIP-04, were advanced within the vicinity of the former AST. Borings were advanced to a depth of at least

32 feet bgs to investigate residual impacts including the presence of residual LNAPL and to obtain hydrostratigraphic data. OIP/HPT boring locations are shown on Figure 2.2.

2.2.2.2 Phase II Activities: AOPC 2

During the second mobilization, locations OIP-02 and OIP-04 were advanced immediately adjacent to their respective Phase I locations with direct-push borings for collection of soil and discrete groundwater samples. Analytical soil samples were collected at depths where the OIP/HPT borings displayed a fluorescence response indicative of TPH impacts, and just above encountered groundwater (Section 3.0 includes a summary of the results and how to interpret the OIP/HPT data). Discrete groundwater samples were collected from both OIP-02 and OIP-04. Soil boring locations are shown on Figure 2.3.

2.2.3 AOPC 3: Former Mechanic's Shop USTs

AOPC 3 is located in the south-central portion of the Site, in the vicinity of the former mechanic's shop. In 1993, approximately 15 cubic yards of petroleum-impacted soil was removed during the decommissioning of a 4,000-gallon and 8,000-gallon gasoline underground storage tanks (USTs) associated with the former mechanic's shop. The maximum depth of the excavation was approximately 11 feet bgs. Soil samples collected from the excavation indicated that residual hydrocarbon impacts remained (Golder 1993a). Additional data were needed to establish the vertical and horizontal extent of soil impacts adjacent to and downgradient of the former mechanic's shop USTs; therefore, four OIP/HPT borings and five direct-push borings were advanced within AOPC 3 (Figures 2.2 and 2.3).

2.2.3.1 Phase I Activities: AOPC 3

During the first mobilization, four OIP/HPT borings (OIP-18 through OIP-21) were advanced within the vicinity of the former mechanic's shop and former UST locations (Figure 2.2). Borings were advanced to a depth of at least 30 feet bgs to investigate residual impacts and/or presence of residual LNAPL and to obtain hydrostratigraphic data.

2.2.3.2 Phase II Activities: AOPC 3

During the second mobilization, a direct-push rig was used to obtain soil analytical data, based on the OIP/HPT results, at locations OIP-18 through OIP-21. OIP results and field screening during drilling indicated a thin zone of petroleum hydrocarbon-impacted soil from 10.5 to 12 feet bgs in OIP-20. Therefore, an additional step-out location, GP-38, was advanced in the presumed downgradient direction of OIP-20 and a soil sample was collected at the same depth as TPH impacts encountered in OIP-20 (Figure 2.3). Soil samples within AOPC 3 were collected in accordance with Ecology's Table 830-1 of Required Testing for Petroleum Releases (WAC 173-340-900) and guidelines for UST decommissioning (WAC 173-360A) and in accordance with the SAP/QAPP. In addition, a soil sample from OIP-20 was submitted for additional analyses to be used for product identification and to calculate MTCA Method B and Method C CULs for TPH.

2.2.4 AOPC 4: Monitoring Well MW-19

AOPC-4 is located along the rail corridor, on the northern extent of the Site. LNAPL was historically observed in a monitoring well in this area (MW-19 in 1993) but has not been detected in more recent monitoring events. In addition, MW-19 is more than 100 feet from the closest investigation location. Therefore, additional soil and groundwater data were needed to assess whether LNAPL is present within the vicinity of MW-19 and to further define any TPH impacts between MW-19 and MW-6 to the north and MW-15 to the south. To address this data gap, 11 OIP/HPT borings were completed in the vicinity of MW-19, and four direct push locations and one monitoring well location were advanced during Phase II to collect additional soil and groundwater data.

2.2.4.1 Phase I Activities: AOPC 4

During the first mobilization, 11 OIP/HPT borings (OIP-57 through OIP-63, OIP-69 through OIP-71, and OIP-73) were advanced within the vicinity of MW-19 to investigate the potential for residual LNAPL and TPH impacts in the subsurface and to obtain hydrostratigraphic data (Figure 2.2). Originally, three OIP/HPT borings were proposed in AOPC 4; however, additional OIP/HPT borings were added to delineate the extent of impacts based on OIP results in the initial three locations, OIP-57, OIP-58, and OIP-59.

2.2.4.2 Phase II Activities: AOPC 4

During the second mobilization, four direct-push locations (OIP-57, OIP-69, OIP-70, and OIP-73) were advanced to collect laboratory analytical samples to delineate the lateral and vertical extent of TPH impacts in AOPC 4. Monitoring well MW-39 was installed to collect information about shallow groundwater elevations and impacts. Soil analytical samples were collected at depths where adjacent OIP/HPT boring locations displayed fluorescence response, and just above encountered groundwater. Discrete groundwater samples were collected from direct-push locations OIP-69 and OIP-70 to help delineate the extent of TPH impacts in groundwater and to confirm groundwater results from the adjacent monitoring well, respectively.

During implementation of the Phase I investigation, OIP/HPT results indicated the screen interval for MW-19 (13.5 to 19.5 feet bgs) does not capture petroleum hydrocarbon impacts observed by the OIP/HPT results between 11.5 to 14 feet bgs. OIP/HPT results also indicated MW-19 is not screened across the top of the groundwater table (depth to groundwater has been recorded at 12 feet bgs during the wet season). Although not originally proposed in the Work Plan, installation of monitoring well MW-39 was considered necessary to investigate shallow groundwater elevations and hydrocarbon impacts. Due to limited access and rail lines, monitoring well MW-39 was advanced and installed using a direct-push, track-mounted drill rig. Continuous soil samples were collected for logging and select depth intervals were submitted for laboratory analysis to delineate the vertical extent of soil impacts. Select soil samples from MW-39 were submitted for additional laboratory analyses to be used for petroleum hydrocarbon product identification and to calculate MTCA Method B and Method C CULs for TPH. Well logs, including soil sample descriptions and as-built construction details, are included in Appendix B.

2.2.5 AOPC 5: Former Fuel Loading Racks

AOPC 5 is located in the central portion of the Site, in the area of the former fuel loading racks along the rail corridor. There are limited soil data within the former fuel loading racks area, which has historically included measurements of LNAPL in MW-20, limiting understanding of the current extents and volume of impacted soil present; therefore, additional soil data were needed to assess shallow soil conditions.

To assess this area, 26 OIP/HPT borings were completed during Phase I; 10 direct-push borings were advanced during Phase II; and two monitoring wells were installed within AOPC 5 (Figures 2.2 and 2.3).

2.2.5.1 Phase I Activities: AOPC 5

During the first mobilization, 26 borings were advanced (OIP-15 through OIP-17, OIP-33 through OIP-51, OIP-55, OIP-56, OIP-64, and OIP-72) at approximately 25-foot spacings along the entire length of the former loading racks between the loading racks and the former pipelines. Three perpendicular transects of OIP/HPT borings were advanced to the eastern portion of the rail lines and to the west adjacent to and within the former Warehouse 9 footprint.

In addition to advancing OIP/HPT boring locations during Phase I, one direct-push boring was advanced immediately adjacent to OIP-42 within an area with significant OIP/HPT fluorescence response and varying stratigraphy in order to evaluate the OIP/HPT response data. The lithology and analytical results from analytical samples collected in this boring at OIP-42 were compared to the OIP/HPT results to inform the locations of direct-push borings during Phase II of the RI activities. The OIP/HPT locations are shown on Figure 2.2.

2.2.5.2 Phase II Activities: AOPC 5

During Phase II, eight direct-push locations were advanced, with six immediately adjacent to OIP/HPT locations (OIP-15, OIP-39, OIP-46, OIP-47, OIP-49, and OIP-64) and two at additional locations (GP-35 and GP-36), to collect laboratory analytical samples. Two monitoring wells, MW-33 and MW-40, were installed to delineate the lateral and vertical extent of TPH impacts in this area of the Site. Laboratory analytical soil samples were collected from depths at which adjacent OIP/HPT borings displayed elevated fluorescence responses, and just above encountered groundwater. Shallow soil samples were also collected and submitted for analyses in OIP-47 and MW-40 to delineate the extent of contamination in shallow soils. In addition, select soil samples from GP-36, OIP-42, OIP-47, MW-33, and MW-40 were submitted for additional analyses to be used for petroleum hydrocarbon product identification and to calculate MTCA Method B and Method C CULs for TPH.

The preliminary conceptual site model (CSM) presented in the Work Plan identified a need for groundwater data from the alluvial aquifer in this area of the Site (Floyd|Snider 2019). Monitoring well MW-33 was installed to fill a gap for the alluvial aquifer in the center of the Site between MW-10 and MW-23. The location of MW-33 will also allow for calculation of vertical hydraulic gradients relative to the adjacent perched water-bearing zone well MW-17. Monitoring well MW-40 was not originally proposed in the Work Plan. However, OIP/HPT results showed elevated fluorescence response deeper than existing well screen intervals within this area of the Site. Therefore, MW-40 was constructed to assess dissolved-phase hydrocarbon impacts within the deeper alluvial aquifer. Well logs are included in Appendix B.

In addition to the chemical sampling program, soil samples were collected during the installation of MW-33 at depths of 7.5 to 9 feet bgs, 10 to 11 feet bgs, 13 to 15 feet bgs, 17.5 to 19 feet bgs, and 21 to 23 feet bgs and submitted for physical parameters (grain size, porosity, fraction organic carbon, and bulk density). Samples were collected from several depths within the perched water-bearing zone, silt underlying the perched water-bearing zone, and the alluvial aquifer. These data will be evaluated in the RI to support the preliminary CSM for the perched area in the center of the Site, which proposes this unit is relatively insubstantial as a water-bearing unit and has limited hydraulic connection with the alluvial aquifer below.

2.2.6 AOPC 6: Former Calloway Ross Parcel

AOPC 6 is the location of the former Calloway Ross facility where historical activities included a gasoline UST that was removed and surface spills and leaks that were remediated through removal of approximately 175 tons of impacted soil. However, the extent of impacts were not adequately delineated by previous investigations in the southern portion of the property and beneath the former Warehouse 9 building footprint. Data gaps at AOPC 6 consist of adequately delineating the vertical and lateral extent of impacts in this area and beneath the former Warehouse 9 footprint. Therefore, 11 OIP/HPT borings were completed, and five direct-push borings were advanced to collect soil and discrete groundwater samples to be used for delineation and petroleum hydrocarbons product identification within AOPC 6 (Figures 2.2 and 2.3).

2.2.6.1 Phase I Activities: AOPC 6

During the first mobilization, 11 borings (OIP-07 through OIP-14 and OIP-66 through OIP-68) were advanced at spacings between 25 and 50 feet along approximate north-south and east-west transects within the former Warehouse 9 building footprint and adjacent to the former Calloway Ross UST. OIP/HPT location OIP-09 was advanced immediately adjacent to former direct-push location GP-1 (Floyd|Snider 2015). The lithology and analytical results from GP-1 were compared to the OIP/HPT results of OIP-9 and a correlation was confirmed between the OIP/HPT response, analytical results, and lithology. The comparison of these results enabled a qualitative determination of whether the lateral extent of impacts were bounded via OIP/HPT results in the field during Phase I.

In addition to advancing OIP/HPT boring locations during Phase I, two direct-push borings were advanced immediately adjacent to OIP-08 and OIP-66 within areas with significant fluorescence response and varying stratigraphy in order to further evaluate the OIP/HPT response data. The lithology and analytical results were compared to the OIP/HPT results prior to proposing direct-push locations during Phase II of the RI activities. The OIP/HPT locations are shown on Figure 2.2, and locations for GP-1 through GP-30 are shown on Figure 2.3.

2.2.6.2 Phase II Activities: AOPC 6

During the second mobilization, three direct-push locations (OIP-67, OIP-68, and GP-37; refer to Figure 2.3) were advanced to collect laboratory analytical soil samples and to delineate the lateral and vertical extent of TPH impacts on the northern portion of AOPC 6. Soil samples from OIP-68 and GP-37 were collected to bound the lateral extent of impacts, and discrete groundwater samples were collected from direct-push locations OIP-67 and OIP-68.

During both phases, select soil samples from OIP-08, OIP-66, OIP-67, and OIP-68 were submitted for additional analyses to be used for petroleum hydrocarbon product identification and to calculate MTCA Method B and Method C CULs for TPH.

2.2.7 AOPC 7: Monitoring Wells MW-26 and MW-28

AOPC 7 is located north of Former Warehouse 9, on the west side of the rail corridor and extends to the east to include the former Longview Pipeline. The results of 2019 groundwater monitoring indicated elevated concentrations of DRO and oil-range organics (ORO) detected at monitoring well MW-28. Both monitoring wells in this area, MW-26 and MW-28, are screened within the perched water-bearing zone. Historical soil data show DRO detections at a concentration of 42,000 milligrams per kilogram (mg/kg) in monitoring well MW-26 at 18 feet bgs. The spatial and matrix distribution of contamination within this area of the Site required additional delineation.

To provide this delineation, 17 OIP/HPT borings were completed; seven direct-push borings were advanced to collect soil samples; and one monitoring well was installed within AOPC 7 (Figures 2.2 and 2.3).

2.2.7.1 Phase I Activities: AOPC 7

During the first mobilization, 15 borings (OIP-22 through OIP-32,[2] OIP-52 through OIP-54, and OIP-65) were advanced at approximately 25-foot to 40-foot spacings along the rail lines and the former pipelines. A perpendicular transect of OIP/HPT borings was advanced from the eastern portion of the rail lines, near MW-27 and adjacent to the former Longview Pipeline, to the west adjacent to and within the former Warehouse 9 footprint.

In addition to advancing OIP/HPT boring locations during Phase I, three direct-push borings were advanced immediately adjacent to OIP-30, OIP-52, and OIP-53 to evaluate the OIP/HPT response data. Laboratory analytical soil samples were collected from OIP-53 to delineate the lateral extent of impacts to the west. The lithology and analytical results from these direct-push borings

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[2] Although OIP-32 is physically located within AOPC 3, OIP-32 results are summarized within AOPC 7 because this location was installed for evaluation of the data gaps associated with AOPC 7 and not those associated with AOPC 3. The AOPC 7 data gaps include impacts associated with the former Longview Pipeline, to which OIP-32 is adjacent, and delineation of groundwater DRO and ORO impacts observed in MW-26 and MW-28. OIP-32 was installed in the presumed downgradient direction and in the vicinity of the 2015 boring location GP-27, which contained DRO and ORO exceedances. The data gap associated with AOPC 3 is GRO impacts.

were compared to the OIP/HPT results prior to proposing direct-push locations during Phase II of the RI activities. The OIP/HPT locations are shown on Figure 2.2.

2.2.7.2 Phase II Activities: AOPC 7

During the Phase II activities, four direct-push locations (OIP-23, OIP-31, GP-33, and GP-34; refer to Figure 2.3) were advanced to collect soil samples for laboratory analyses and to delineate the lateral and vertical extent of TPH impacts within AOPC 7. Soil samples for laboratory analyses were collected from borings OIP-31 and GP-34 to bound the eastern and southeastern lateral extent of impacts, and a reconnaissance groundwater sample was collected from GP-34.

During both phases, select soil samples from OIP-30 and OIP-23 were submitted for additional analyses to be used for petroleum hydrocarbon product identification and calculation of MTCA Method B and Method C CULs for TPH.

Furthermore, there is a need for groundwater data from the alluvial aquifer in this area of the Site. Monitoring well MW-34 was installed adjacent to MW-28 and within the deeper alluvial aquifer. The location of MW-34 will allow for calculation of vertical hydraulic gradients relative to the adjacent perched water-bearing zone well MW-28. Well logs are included in Appendix B.

In addition to the chemical sampling program, soil samples were collected during the installation of MW-34 at depths of 12 to 13 feet bgs, 14 to 16 feet bgs, 18 to 20 feet bgs, and 20.5 to 21.5 feet bgs and submitted for soil physical parameters (grain size, porosity, fraction organic carbon, and bulk density). Soil samples were collected from the several depths within the perched water-bearing zone, silt underlying the perched water-bearing zone, and the alluvial aquifer.

2.2.8 AOPC 8: Soil Vapor Quality

AOPC 8 is associated with the potential for soil gas migration into future buildings adjacent to a residual LNAPL plume identified at MW-09 where LNAPL has been observed since 1993 (Golder 1993b). Currently, there are no occupied buildings over or in the vicinity of shallow impacted soil, LNAPL, or groundwater impacted by dissolved-phase hydrocarbons. Vapor intrusion (VI) is a relevant potential future exposure pathway because there is a potential for buildings to be constructed within 30 feet of monitoring well MW-09, which contained LNAPL thicknesses of 0.14 feet and 0.11 feet during the May and August 2020 groundwater sampling events, respectively. To evaluate the soil vapor pathway, two soil vapor points were installed: VP-1 was installed in the slab of the former Warehouse 9 in the northeastern corner, near MW-09; and VP-2 was installed in the middle of the former Warehouse 9 slab (Figure 2.3).

2.2.8.1 Phase I Activities: AOPC 8

The Work Plan proposed installation of two vapor pins within the former Warehouse 9 footprint; however, the former Warehouse 9 slab consisted of asphalt, not concrete. There is a chance that ambient air can enter the samples via short-circuiting from the surface when vapor pins are installed within asphalt. Therefore, two vapor points were installed at a depth of 5.25 feet to prevent short circuiting of ambient air. Vapor point installation was conducted in accordance with Floyd|Snider's Vapor Intrusion Standard Guideline, which was included in Appendix B of the Work Plan (Floyd|Snider 2019). Prior to installation, Ecology was informed of the proposed change from vapor pins to vapor points and provided concurrence by email on January 24, 2020 (Morris 2020). Vapor point installation details are summarized in Section 2.1.2.3, and soil vapor point installation logs are included in Appendix B.

2.2.9 AOPC 9: U.S. Army Reserve Building

AOPC 9 is located on the northeast side of the former U.S. Army Reserve building, east of the rail lines. A former heating oil UST was located on the northeast side of the building, and evaluation of potential impacts from this UST were the focus of investigation in this area. Investigation activities in this area included installation of direct-push soil borings during Phase II (refer to Figure 2.3).

2.2.9.1 Phase II Activities: AOPC 9

During the Phase II activities, two direct-push soil borings, GP-31 and GP-32, were advanced on either side of the former heating oil UST that was located adjacent to the former U.S. Army Reserve building. Although it was proposed in the Work Plan to locate the former UST, a ground-penetrating radar (GPR) survey was not necessary because building drawings were obtained from the Port that showed the location of the tank, which supplied fuel for the building's steam boiler immediately northeast of the building (U.S. Navy 1949). Laboratory analytical soil samples and reconnaissance groundwater samples were collected from both GP-31 and GP-32. Boring locations are shown on Figure 2.3 and logs are included in Appendix B.

2.2.10 Groundwater Quality and Hydrogeologic Characterization Downgradient of AOPCs

During the Phase II activities, two additional monitoring wells, MW-35 and MW-36, were installed along the western and southern boundary of known Site impacts to delineate the downgradient extent of groundwater contamination. Both wells will provide important data points for monitoring gradients and flow directions and help to further define the extent of groundwater impacts. Monitoring wells MW-35 and MW-36 were advanced with a hollow-stem auger drill rig, and soil samples were collected and submitted for laboratory analysis. Well logs, including soil sample descriptions and as-built construction details, are included in Appendix B.

2.3 GROUNDWATER MONITORING AND SAMPLING ACTIVITIES

Four consecutive quarters of groundwater monitoring and sampling will be performed in accordance with the Work Plan. Two quarters of groundwater sampling have been completed to date and were performed in May and August 2020. These two groundwater sampling events are summarized in the following sections.

2.3.1 May 2020 Groundwater Monitoring and Sampling Event

The first round of groundwater sampling was conducted between May 6 and 7, 2020. Prior to collecting groundwater samples, depth-to-water (DTW) measurements were collected in all accessible wells and wells were checked for the presence of LNAPL. Due to rail activities, DTW measurements were not collected for all the wells on the first day.

Groundwater samples were collected from 35 of the 40 monitoring wells that were planned to be sampled in the Work Plan. LNAPL was observed in MW-09. MW-05 and MW-28 contained an insufficient volume of groundwater to be sampled. Monitoring wells MW-04 and MW-30, which are located within a locked fenced area on Washington State Department of Transportation (WSDOT) property, were inaccessible during the May 2020 event.

Groundwater samples were collected in accordance with the Work Plan and SAP/QAPP and submitted to FBI for chemical analyses, with the exception of monitored natural attenuation (MNA) parameters, which were analyzed by Fremont Analytical, Inc. (Fremont). Field forms are provided in Appendix D.

2.3.2 August 2020 Groundwater Monitoring and Sampling Event

The second groundwater sampling event was conducted on August 10 and 11, 2020. Prior to collecting groundwater samples, DTW was collected, wells were checked for the presence of LNAPL, and monitoring wells MW-30 and T-2 (which were not sampled during the previous event) were redeveloped. T-2 was included in the groundwater monitoring and sampling network to assess dissolved-phase hydrocarbon impacts in the vicinity of the former 80,000-barrel AST (AOPC 2; refer to Figure 2.3).

Groundwater samples were collected from 36 of the 41 monitoring wells that were planned to be sampled in the Work Plan. LNAPL was observed in MW-09, and monitoring wells MW-04, MW-05, MW-11, MW-16, and MW-20 contained an insufficient volume of groundwater to be sampled. Due to the presence of reddish-brown sediment and bacterial growth (potentially iron-reducing bacteria), monitoring well MW-30 was redeveloped by surging and purging until 11 gallons were purged and the water was visibly clear. Sampling and redevelopment field forms are included in Appendix D. Groundwater samples were collected in accordance with the Work Plan and SAP/QAPP and submitted to FBI for chemical analyses with the exception of MNA parameters, which were analyzed by Fremont. Field forms are provided in Appendix D.

2.4 SOIL VAPOR SAMPLING ACTIVITIES

The first round of soil vapor sampling was conducted on May 8, 2020. Samples were collected in accordance with the Work Plan and Ecology guidance for VI assessment (Ecology 2018) using laboratory-certified 1-liter evacuated Summa canisters equipped with a flow control device and laboratory-provided manifolds and polytetrafluoroethylene tubing. Prior to sample collection, a shut-in (or closed valve) test was performed to assess the sampling train for air leaks. The closed-valve test was conducted for a period of 5 minutes. All canisters maintained their vacuum for the duration of the test.

Helium was used as a trace gas during sampling to test for leaks in the vapor point seal and connections in the manifold during the filling of the Summa canisters. Samples were collected after purging the tubing and vapor screen of at least three volumes of vapor within the sampling train at a flow rate less than 200 milliliters per minute (mL/min). A 6-liter Summa canister was used to purge the tubing. After the sampling train was purged, soil gas samples were collected over a 5-minute period at a flow rate of less than 150 mL/min. Sample collection was stopped before the vacuum in the canister was fully depleted. A field duplicate sample was collected at location VP-1 using a laboratory-supplied flow splitter.

Once the sampling period was completed, the inlet port of the canister was tightly sealed for transportation to the analytical laboratory. The initial canister vacuums, vacuum testing times, purging times, purged volumes, sampling start and end times, and final vacuum readings were recorded on soil vapor sampling sheets, which are included in Appendix D. Soil vapor samples were submitted to FBI for analysis on May 8, 2020.

2.5 HYDROGEOLOGIC EVALUATIONS: PRESSURE TRANSDUCER MEASUREMENTS

Six unvented pressure transducer dataloggers were installed on May 8, 2020, in monitoring wells MW-01, MW-17, MW-23, MW-29, MW-31, and MW-33. These wells were instrumented with Solinst Levelogger Junior transducers in accordance with the Work Plan. A Solinst barologger was deployed to measure ambient atmospheric pressure. Transducers were installed to obtain data necessary for evaluation of the following objectives in the RI (refer to the Work Plan):

- Effects from the Oregon Way pump station north of the Site (refer to Figure 1.1) on the alluvial aquifer and perched water-bearing zone
- Effects of the Columbia River tidal fluctuations on the alluvial aquifer and perched water-bearing zone
- Evaluation of the perched water-bearing zone to determine if it is a substantial water-bearing zone or an ephemeral accumulation
- Determine the vertical gradient between the perched water-bearing zone and the alluvial aquifer over a multi-month period

To assist in answering these questions, transducers were placed in wells MW-01 and MW-31 located in the northernmost portion of the Site and in wells MW-23 and MW-29 located in the south-central portion of the Site. There are wells located farther to the south; however, any farther south would be beyond the perched water-bearing zone and the majority of the dissolved-phase plume. Transducers were placed in paired wells MW-33 and MW-17. MW-17 is screened within the perched water-bearing zone, and MW-33 is screened within the deeper alluvial aquifer. The monitoring wells MW-29 (screened within the perched water-bearing zone) and MW-23 (screened within the alluvial aquifer) also serve as a pair suitable for comparing water level elevations. Manual water levels were collected at the time of transducer deployment. On

August 10, 2020, the transducer and barologger data were uploaded. Manual water levels were measured at the time of uploading, and the transducers were returned to the wells. Transducers are expected to be left in the wells for approximately 1 year.

2.6 MINOR DEVIATIONS FROM THE WORK PLAN AND SAP/QAPP

2.6.1 AOPC 2: Former AST Area

Groundwater analytical data collected during the Phase II activities show ORO and DRO detections in OIP-04 at concentrations that exceed the screening levels. As a result, an effort was made to locate historical monitoring wells T-1 and T-2 to further delineate TPH impacts within AOPC 2. Monitoring well T-1 could not be located; however, well T-2 was located (refer to Figure 2.3), redeveloped, and added to the list of the wells to be sampled during the quarterly monitoring and sampling events. Sampling and redevelopment field forms are included in Appendix D.

2.6.2 AOPC 4: Monitoring Well MW-19

The installation of monitoring well MW-39 was not in the Work Plan. However, its installation was proposed during a January 21, 2020, meeting with Ecology and the Site PLPs. During the Phase I activities, OIP/HPT results within AOPC 4 and groundwater elevation data for monitoring well MW-19 indicated that the screened interval for MW-19, which is 13.5 to 19.5 feet bgs, does not capture impacts observed in OIP results between 11.5 to 14 feet bgs and is not screened across the top of the groundwater table. Depth to groundwater measurements indicate that groundwater rises to a depth of 12 feet bgs during the wet season. Therefore, monitoring well MW-39 was installed to investigate shallow groundwater elevations and conditions. Additionally, monitoring well MW-39 was advanced and installed using a direct-push, track-mounted drill rig due to limited access and proximity to the rail line. Holt Drilling, Inc., used a larger 3-inch-diameter casing to advance the well to depth and installed MW-39 with a pre-pack of clean 12-20 silica sand to be consistent with the other well locations. The well was installed in compliance with Ecology's minimum standards for direct-push resource protection wells (WAC 173-160-451).

2.6.3 AOPC 5: Former Fuel Loading Racks

The installation of monitoring well MW-40 was not in the Work Plan. However, the installation of MW-40 was proposed during the January 21, 2020, meeting with Ecology and the PLPs. OIP results indicated that TPH impacts may be present at depths deeper than existing well screen intervals within this area of the Site. Therefore, MW-40 was installed to evaluate dissolved-phase hydrocarbon conditions within the deeper alluvial aquifer in this area.

2.6.4 AOPC 8: Soil Vapor Quality

As stated in Section 2.2.8, two soil vapor points were installed instead of vapor pins as planned in the Work Plan. The former Warehouse 9 slab consists of asphalt, not concrete. There is a chance that ambient air can enter the samples, via short-circuiting from the surface, when vapor pins are installed within asphalt. Therefore, two vapor points were installed at a bottom depth of 5.25 feet bgs to prevent short circuiting of ambient air.

2.6.5 AOPC 9: U.S. Army Reserve Building

A GPR survey was proposed in the Work Plan for the purposes of locating a former heating oil UST (and any other potential USTs in the area of the former U.S. Army Reserve building). Prior to completion of the investigation, the Port located and provided building plans that showed the location of the former heating oil UST, so the GPR survey was not conducted.

2.6.6 Monitoring Well Sampling and Survey

MW-04 and MW-30 were not accessible and were not sampled or professionally surveyed during the May 2020 groundwater monitoring and sampling event. Access to this WSDOT-owned property was subsequently obtained by the Port. These wells were sampled during the August 2020 monitoring event and will be included in future monitoring events. Survey data will be collected prior to completion of the RI if determined necessary for evaluation of groundwater conditions.

2.6.7 Transducer Study

The Work Plan proposed a 3-day transducer study to determine if the Oregon Way pump station, to the north, could potentially influence the alluvial aquifer and perched water bearing zone due to its high flow rate (up to 70,000 gallons per minute). This 3-day transducer study would have occurred in coordination with the Consolidated Diking Improvement District during pumping operations of the Oregon Way pump station. However, pumping operations are not on a set schedule and are influenced by weather conditions. Therefore, transducers were installed immediately after the May 2020 groundwater sampling event and will be deployed for multiple months, rather than the proposed 3 days.

2.7 DATA MANAGEMENT AND VALIDATION

Following each sampling event, a Compliance Screening (Stages 1 & 2A) data quality review was performed on the collected data. Data were validated in accordance with the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2017a) and/or *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2017b). Data validation resulted in assignment of qualifiers to select samples/analyses, as detailed in the Data Validation Summary Memorandum provided in Appendix E. The data validation determined that all data were of acceptable quality for use, as reported by the laboratory, unless specifically qualified in the data validation process detailed in Appendix E.

Following validation, all data collected during Phase I and Phase II RI field events and the quarterly groundwater monitoring events were uploaded into Floyd|Snider's electronic project database and submitted to Ecology's Environmental Information Management (EIM) system. All data submitted to date have been accepted into the EIM system.

2.8 INVESTIGATION-DERIVED WASTE

Phase I, Phase II, and the first round of groundwater sampling generated investigation-derived waste (IDW) consisting of the following liquids and solids:

- Purge water.
- Decontamination wash water.
- Soil drill cuttings, including non-soil debris that may be removed from the subsurface during drilling.
- Disposable materials used during fieldwork that may be impacted by contaminated media or decontamination wash water (e.g., disposable personal protective equipment [PPE], used filters, plastic sheeting, paper towels, and tubing).

IDW was managed and disposed of in accordance with applicable waste management regulations. IDW soil and liquids were placed in 55-gallon drums and appropriately labeled. Drums containing IDW were transported offsite for disposal at PRS Group, Inc., in Tacoma, Washington, as non-hazardous petroleum-contaminated media. The drums were picked up prior to generating IDW from the second groundwater sampling event.

All disposable sampling material and PPE (e.g., paper towels, disposable coveralls, and gloves) used in sample processing were placed in heavyweight garbage bags or other appropriate containers. Disposable supplies were removed from the Site by sampling personnel and placed in a municipal solid waste refuse container for disposal at a solid waste landfill.

3.0 Results

This section summarizes soil, groundwater, and soil vapor results for each AOPC and preliminary transducer and hydrogeology study results for the Site. The data discussed in this section reflect samples collected during Phase I, Phase II, and May 2020 and August 2020 soil vapor and/or groundwater sampling events.

Phase I and II OIP/HPT and soil results are discussed in Section 3.1 and Phase II groundwater results are discussed in Section 3.2. Soil and groundwater data are presented in Tables 3.1 through 3.8 and Figures 3.1 through 3.12. Columbia's High-Resolution Fluorescence/Hydraulic Profile Characterization Report (Columbia Report) is included as Appendix A, the laboratory reports are included as Appendix E, the soil parameters analyzed for MW-33 and MW-34 are included as Appendix F.

In the following sections, TPH impacts at the Site are discussed relative to screening levels established in the Work Plan for comparison purposes only. Soil analytical results from select boring locations (OIP-20, OIP-23, OIP-30, OIP-42, OIP-47, OIP-66, OIP-67, and MW-39) across the Site were used to calculate preliminary TPH MTCA Method B and Method C CULs for protection of human health through direct contact. These calculations are included in Appendix G. MTCA Method B CULs for TPH across the Site range between 2,157 and 2,849 mg/kg, and MTCA Method C CULs for TPH range between 32,840 and 47,031 mg/kg. The CULs vary based on location and petroleum product type and will be further evaluated in the RI report.

The Columbia Report contains the OIP/HPT logs, which show the results for each OIP/HPT location. The OIP results or petroleum hydrocarbon response show the vertical distribution and relative concentration of impacts in the subsurface from 0% to 100% at a centimeter scale. In other words, the percentage scale in the Columbia Report shows the percentage of the area of the camera lens that displays a fluorescence at a centimeter scale. The greater the percentage, the greater fluorescence response observed through the camera lens. The HPT and electrical conductivity (EC) tool evaluate the subsurface hydrostratigraphy. The HPT identifies soil intervals exhibiting higher hydraulic permeability or heterogeneities. The result is a vertical profile recording changes in hydraulic pressure measured directly as water is pumped into the formation at a constant rate, which reveals the variability and relative hydraulic conductivity of the soil. The EC dipole measures the EC of soil and groundwater. EC measurements can be used to identify changes in the lithology. Typically, as EC increases the grain size decreases. Therefore, an increase in EC could be a result of the EC probe advancing past a coarse-grained sand to a very fine-grained sand or from a silty sand to a clayey silt. Therefore, "increasing fines" is used, rather than soil types such as sand, silt, or clay, when discussing an increase in EC data. Direct-push soil borings were advanced during the Phase I activities to compare the OIP/HPT results with field and lithology observations.

3.1 SOIL RESULTS: PHASE I AND PHASE II SAMPLING EVENTS

A summary of the Phase I OIP/HPT results and subsequent Phase II soil results are discussed in the following sections for each AOPC. During Phase I and Phase II activities, soil samples were initially screened by the laboratory using hydrocarbon identification (HCID) by NWTPH-HCID. If the value of the HCID screening analysis for DRO, ORO, or GRO exceeded the reporting limits, then the appropriate analytical method was used to quantify the product type detected, including the following:

- DRO and ORO by NWTPH-Dx
- GRO by NWTPH-Gx
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by USEPA Method 8260 (when GRO exceedances of Work Plan screening levels were detected)

Additional analyses were conducted on selected soil samples if substantial petroleum impacts to soil were encountered, based on field screening observations. Additional analyses included the following:

- BTEX, methyl *tert*-butyl ether (MTBE), hexane, 1,2-dibromoethane (EDB), and 1,2-dichloroethane (EDC) by USEPA Method 8260C
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and naphthalenes by USEPA Method 8270D SIM
- Total lead by USEPA Method 6020
- Extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) by Methods NWEPH and NWVPH

The results from the additional analyses will be used to calculate MTCA Method B and Method C CULs for TPH in the RI.

3.1.1 AOPC 1: Soil and Groundwater Near Southern Pipelines

Fluorescence responses were not observed in the two OIP/HPT locations OIP-05 and OIP-06 within AOPC 1, which indicates that TPH impacts are not present. No other OIP/HPT borings were advanced in this area.

HPT and EC data showed that soils in AOPC 1 are generally permeable with a 3-foot layer of increasing fines, lower permeability soils at depths between 24 and 27 feet bgs. No dissipation tests were conducted within AOPC 1.

No soil samples were collected from AOPC 1 during Phase I. During the Phase II activities, soil samples were collected at the groundwater table from direct-push borings at OIP-05 and OIP-06 to delineate the lateral extent of impacts observed in GP-18, and a groundwater sample was collected from OIP-06. Soil analytical results for OIP-05 and OIP-06 show that TPH concentrations were either less than their respective laboratory quantitation limits or less than their respective screening levels.

Surface samples P3 and P4, beneath the decking of Berth 2, were collected near historical surface samples (P-1 and P-2) and below the eastern pipelines that daylight beneath Berth 2. Surface samples P5 and P6 were collected beneath the westernmost pipelines beneath Berth 1. Soil results show ORO detections in P3 and P6 at concentrations of 4,200 and 2,300 mg/kg, respectively, which exceed the screening level. GRO and DRO concentrations were either less than reporting limits or less than their respective screening levels. cPAHs were detected in P3 and P4 at toxic equivalents (TEQs) of 2.3 and 0.51 mg/kg, respectively.

Soil samples were collected during the installation of MW-37 and MW-38. Field screening did not indicate TPH impacts during their advancement; therefore, soil samples were collected from the capillary fringe at depths of 27.5 feet and 23.5 feet, respectively. Soil analytical results from MW-37 and MW-38 indicate that all constituents were less than their respective laboratory quantitation limits. Soil analytical results for AOPC 1 are presented in Tables 3.1 and 3.2 and Figures 3.1 through 3.4.

3.1.2 AOPC 2: Former AST Area

Four OIP/HPT boring locations, OIP-01 through OIP-04, were advanced within the vicinity of the former 80,000-barrel AST. OIP results showed a slight fluorescence response (less than 10%) in the top 5 feet bgs and no fluorescence response at depths greater than 5 feet bgs in all four locations.

HPT and EC data indicate that soils with increasing fines and low permeability are located approximately between 0 and 13 feet bgs at locations OIP-01 through OIP-03 toward the south end of AOPC 2. Dissipation tests in AOPC 2 were conducted at OIP-03 and OIP-04. The dissipation tests show that DTW was approximately 15.7 feet bgs at the time of drilling with a hydraulic permeability ranging from less than 10 feet per day in soils with an increase in fines to greater than 75 feet per day in soils with less fines.

During the second mobilization, soil samples were collected at locations OIP-02 and OIP-04 using a direct-push drill rig. Soil analytical data indicate that DRO and ORO are present in OIP-02 at 5 feet bgs at concentrations of 1,900 and 3,400 mg/kg, respectively. No other petroleum compounds were detected in soil samples at concentrations greater than their respective laboratory quantitation limits within AOPC 2. Soil analytical results for AOPC 2 are presented in Table 3.1 and Figures 3.1 through 3.3.

3.1.3 AOPC 3: Former Mechanic's Shop USTs

Four OIP/HPT borings (OIP-18 through OIP-21) were advanced within the vicinity of the former mechanic's shop and former USTs. OIP results show a fluorescence response (approximately 75%) in OIP-20 between approximately 11 and 12 feet bgs. No other location within AOPC 3 showed a measurable fluorescence response, indicating no hydrocarbon impacts are expected to be present.

HPT and EC data indicate that the fluorescence response observed at 11 to 12 feet bgs is present within a higher permeability zone immediately between lenses of increasing fines, lower permeability material. Data also indicate that soil with an increase in fines and low permeability are present throughout AOPC 3 between 22 and 26 feet bgs.

Dissipation tests conducted at OIP-18 and OIP-19 indicate that groundwater was present at depths of 26 and 19 feet bgs, respectively, and hydraulic permeability ranged from less than 5 feet per day in soils with increasing fines to greater than 75 feet per day in coarse-grained soils.

During the second mobilization, a direct-push rig was used to obtain quantitative soil analytical results at locations OIP-18 through OIP-21. Lithology observations and field screening results indicated a thin zone of impacted soil from 10.5 to 12 feet bgs between silty sand and silt layers in OIP-20, which corresponds to the observed OIP/HPT fluorescence response. Therefore, an additional step-out location, GP-38, was advanced downgradient to the west of OIP-20, and a soil sample was collected at the same depth as TPH impacts encountered in OIP-20 (Figure 2.3). GRO exceeding the screening level was detected in OIP-20 between 11 and 11.5 feet bgs at a concentration of 630 mg/kg. All other soil samples collected within AOPC 3, including from GP-38, resulted in concentrations less than laboratory quantitation limits. Soil analytical results for AOPC 3 are presented in Table 3.1 and Figures 3.1 through 3.3.

3.1.4 AOPC 4: Monitoring Well MW-19

Eleven OIP/HPT borings (OIP-57 through OIP-63, OIP-69 through OIP-71, and OIP-73) were advanced within AOPC 4. OIP results show up to 100% fluorescence response at the locations toward the center of AOPC 4, near MW-19, at depths between approximately 6 feet bgs and 15 feet bgs, depending on the location. Fluorescence responses in the outermost locations (OIP-57, OIP-69, OIP-70, and OIP-73) were limited to smaller unsustained responses at less than 10% and 60% immediately at the surface at locations OIP-57 and OIP-73, respectively.

HPT and EC data indicate that soils throughout AOPC 4 generally have lower permeability with an increase in fine-grained material with pockets of coarse-grained, higher permeability soil between 2 and 13 feet bgs. The lenses of coarse-grained soil are interbedded within the fine-grained soils. The lenses of shallower, coarse-grained soil typically correspond with the zones of fluorescence response.

A dissipation test conducted at OIP-58 indicates that groundwater was present at a depth of 13.75 feet bgs, and hydraulic permeability ranged from less than 5 feet per day in soils with increasing fines to greater than 75 feet per day in soils with less fines.

During the second mobilization, a direct push rig was used to obtain soil samples at OIP-57, OIP-69, OIP-70, and OIP-73 to confirm that the lateral extent of impacted soil had been defined as reflected in the OIP/HPT results. All soil samples collected within AOPC 4 resulted in GRO, DRO, and ORO concentrations less than laboratory quantitation limits. Laboratory results corresponded well with OIP/HPT fluorescence responses. Additionally, four soil samples were collected at varying depths during the installation of MW-39. Soil samples collected at MW-39 resulted in TPH concentrations with exceedances of screening levels for GRO and DRO within the 8 to 9 feet and 13 to 14 feet interval samples. The 13 to 14 feet sample at MW-39 had the greatest TPH impacts with a GRO concentration of 990 mg/kg and a DRO concentration of 18,000 mg/kg. GRO and DRO results were less than laboratory quantitation limits in the surface sample and the deepest sample at 18.5 feet bgs. Samples collected at MW-39 for cPAH and volatile organic compound (VOC) analysis resulted in concentrations either less than laboratory quantitation limits or less than their respective screening levels for all other analytes. Soil analytical results for AOPC 4 are presented in Tables 3.1 and 3.2 and Figures 3.1 through 3.4.

3.1.5 AOPC 5: Former Fuel Loading Racks

Twenty-six OIP/HPT borings (OIP-15 through OIP-17, OIP-33 through OIP-51, OIP-55, OIP-56, OIP-64, and OIP-72) were completed within AOPC 5 (Figure 2.2). OIP results throughout AOPC 5 show up to 100% fluorescence response at the surface down to 24 feet bgs, with an unsustained response with less than 75% fluorescence at the surface in some locations and the greatest response between 9 and 22 feet bgs. The thickest fluorescence response was observed beneath the rail lines and immediately adjacent to the former pipelines in the area between OIP-38 and OIP-44. OIP results indicate that fluorescence response decreases in percentage and thickness to the northeast and southwest and is not present to the south at OIP-33 and to the north at OIP-56.

Three OIP/HPT transects were completed perpendicular to the rail lines within AOPC 5:

- OIP results along the southernmost transect from OIP-17 to OIP-46 show no fluorescence response to the east at OIP-46; soil analytical data from the 2015 direct-push boring GP-2 show that TPH impacts are bounded to the west (Floyd|Snider 2015). Fluorescence response along this transect is present at depths between 9 and 16 feet bgs.
- The central transect is located within both AOPC 5 and AOPC 6 from west to east at locations OIP-09 to OIP-49, respectively. OIP-09 was advanced immediately adjacent to GP-01 to compare fluorescence response and HPT results with soil analytical data and subsurface observations. A small fluorescence response was observed at the same depth (17 to 19 feet bgs) that field screening observations and analytical data in GP-01 detected slight TPH impacts at concentrations less than their respective screening levels (Floyd|Snider 2015). The fluorescence response at OIP-09 was used as a comparison to help determine when TPH are bounded using OIP results. OIP results from OIP-49 to the northeast show two narrow fluorescence responses similar to OIP-09 at 13 and 18 feet bgs, indicating that OIP-49 is at or close to the lateral extent of impacts in this area. Fluorescence response along the central transect shows petroleum hydrocarbon impacts within the top 2 feet in some locations, with the majority of impacts at depths between 10 and 23 feet bgs.

- The northernmost transect is located across both AOPC 5 and AOPC 6 from west to east at locations OIP-14 and OIP-72. These locations appear to bound the extent of impacts in this area; there was no fluorescence response in OIP-14 to the west and only a narrow fluorescence response in OIP-72 between 10 and 11 feet bgs. Across the northern transect, fluorescence response is within the top 3 feet in some locations, with the majority of OIP/HPT response present between 11 and 21 feet bgs.

HPT and EC data show thin zones with increasing fines and low permeability extending continuously across AOPC 5 at various depths with prominent shallow fine-grained layers and deeper layers of increasing fines within the subsurface extending to approximately 10 to 15 feet bgs. Fluorescence response is generally observed between the layers of increasing fines within the vadose zone and below the deeper fine-grained layers within the higher permeability zones and alluvial aquifer.

Dissipation tests conducted in select locations within AOPC 5 show that DTW ranges between 13 and 18 feet bgs at the time of drilling, and hydraulic permeability ranges from less than 10 feet per day in soils with an increase in fines to greater than 75 feet per day in soils with less fines.

Soil samples were collected during both Phase I and Phase II activities from 10 direct-push locations and during installation of monitoring wells MW-33 and MW-40. Soil analytical data indicate that the lateral extent of hydrocarbon impacts within AOPC 5 is delineated to the northeast at locations OIP-39 and GP-35, to the southeast at OIP-46, to the southwest at OIP-64, and to the west at locations GP-1, GP-2, and GP-30 (installed in 2015). Soil analytical results at locations OIP-49 and OIP-72 to the east show detections of GRO at concentrations exceeding the screening level, indicating that the extent of contamination in this area expands slightly outside the investigated area. The GRO detections in OIP-49 and OIP-72 were at concentrations of 960 mg/kg and 520 mg/kg, respectively.

Within AOPC 5, the following analytical results were obtained:

- GRO was detected in soil at depths between 10.5 and 17.5 feet bgs in OIP-15, OIP-42, OIP-47, OIP-49, OIP-72, GP-36, MW-33, and MW-40 at concentrations exceeding the screening level.
    - The greatest GRO concentration was detected in GP-36 at 4,100 mg/kg between 13 and 14 feet bgs.
- DRO was detected at depths between 10.5 and 17.5 feet bgs in OIP-15, OIP-42, GP-36, MW-33, and MW-40 at concentrations exceeding the screening level.
    - The greatest DRO concentration was detected in MW-40 at 18,000 mg/kg between 10.5 and 11 feet bgs.
- ORO was detected at concentrations exceeding the screening level in MW-40 at depths of 1 to 1.5 feet bgs and 10.5 to 11 feet bgs.
    - The greatest ORO concentration was detected in MW-40 at 7,900 mg/kg between 10.5 and 11 feet bgs.

- Benzene was detected at concentrations exceeding the screening level at depths between 10.5 and 17.5 feet bgs at OIP-42, GP-36, and MW-40.
    - The greatest benzene concentration was detected in MW-40 at 12 mg/kg between 10.5 and 11 feet bgs.
- Ethylbenzene was detected at concentrations exceeding the screening level at depths between 10.5 and 17.5 feet bgs at OIP-42, OIP-47, GP-36, and MW-40.
    - The greatest ethylbenzene concentration was detected in OIP-42 at 41 mg/kg between 17 and 17.5 feet bgs.
- Toluene was detected at concentrations exceeding the screening level at depths between 10 and 17 feet bgs at OIP-49 and OIP-72.
    - The greatest toluene concentration was detected in OIP-49 at 14 mg/kg at 17 feet bgs.
- Total xylenes were detected at concentrations exceeding the screening level at depths between 10.5 and 17 feet bgs at OIP-40 and MW-40.
    - The greatest total xylenes concentration was detected in MW-40 at 15 mg/kg between 10.5 and 11 feet bgs.
- No other VOCs or cPAHs were detected in soil at concentrations greater than their respective screening levels.

Soil analytical results for AOPC 5 are presented in Tables 3.1 and 3.2 and Figures 3.1 through 3.4.

Soil parameter data, such as grain size, porosity, fraction organic carbon, and bulk density, collected from monitoring well MW-33 are included in Appendix F. As stated previously, these data will be evaluated in the RI report to support the preliminary CSM for the perched area in the center of the Site.

3.1.6 AOPC 6: Former Calloway Ross Parcel

Eleven OIP/HPT borings (OIP-07 through OIP-14 and OIP-66 through OIP-68) were advanced within AOPC 6 during the Phase I mobilization. OIP/HPT borings are not labeled with the correct AOPC in Appendix A. OIP results show fluorescence response at the OIP locations throughout the south to north and west to east transect between 9 and 23 feet bgs. Fluorescence response in AOPC 6 is typically represented by multiple fluorescence spikes up to 100% within high-permeability areas located above and below zones of increasing fines with low-permeability.

HPT and EC data show interbedded finer- and coarser-grained lenses approximately between 4 and 17 feet bgs within AOPC 6. Multiple fluorescence spikes up to 100% were observed within the deeper coarser-grained layers between the layers of increasing fines. These observations are especially evident in the OIP/HPT results for OIP-07 (Appendix A). Several dissipation tests were conducted across AOPC 6 and indicate that perched groundwater is present at a depth of approximately 14 to 17 feet bgs and water in the alluvial aquifer (characterized by consistently greater conductivity) is at a depth of approximately 22 to 24 feet bgs. Hydraulic permeability ranges from less than 10 feet per day in soils with an increase in fines to greater than 75 feet per day in coarse-grained soils.

During both phases, select soil samples from GP-37, OIP-08, OIP-66, OIP-67, and OIP-68 were submitted for laboratory analyses to delineate the lateral and vertical extent of TPH impacts, to assist in determining volume of TPH impacts present, and to help in identifying product type. Soil analytical data indicate that the lateral extent of hydrocarbon impacts within AOPC 6 is delineated to the west at location GP-37 and to the north at OIP-68, with TPH concentrations in these locations less than their respective screening levels. AOPC 6 is adjacent to AOPC 5 to the east and south.

Soil samples were collected from OIP-08, OIP-66, and OIP-67 to confirm the results of the OIP/HPT borings. At OIP-08, the sample collected from the 19 to 20 feet bgs interval resulted in GRO and DRO concentrations of 4,900 mg/kg and 12,000 mg/kg, respectively. Benzene and ethylbenzene exceeding the screening levels were detected at 1.1 mg/kg and 27 mg/kg, respectively, in the sample collected from 19 to 20 feet bgs at OIP-08. At OIP-66, the sample collected from the 12 to 12.5 feet bgs interval resulted in a GRO concentration of 2,000 mg/kg. The analytical results at both OIP-08 and OIP-66 exceeded the screening levels as expected based on the high fluorescence response during OIP/HPT advancement. Soil samples from OIP-67 show GRO and DRO screening level exceedances between 11 and 14.5 feet bgs with the greatest GRO concentration, 2,200 mg/kg, detected between 14.5 and 15 feet bgs and the greatest DRO concentration, 4,300 mg/kg, between 11 and 12 feet bgs. TPH impacts are vertically delineated at 18 feet in OIP-67, with TPH concentrations less than respective laboratory quantitation limits. Other analytes including BTEX and cPAHs did not exceed their respective screening levels in any other samples collected from AOPC 6. Soil analytical results for AOPC 6 are presented in Tables 3.1 and 3.2 and Figures 3.1 through 3.4.

3.1.7 AOPC 7: Monitoring Wells MW-26 and MW-28

Seventeen OIP/HPT borings (OIP-22 through OIP-32, OIP-52 through OIP-54, and OIP-65) were completed, seven direct-push borings (OIP-23, OIP-30, OIP-31, OIP-52, OIP-53, GP-33 and GP-34) were advanced to collect soil samples, and one monitoring well (MW-34) was installed within AOPC 7.

OIP locations ran in two transects, one parallel to the rail lines from northeast to southwest and one perpendicular to the rail lines from approximately west to east. Results throughout AOPC 7 show up to 100% fluorescence response at the surface down to 24 feet bgs, with a slight, less than 60%, unsustained response at the surface in some locations and with the greatest response between 11 and 24 feet bgs. The thickest fluorescence response was observed beneath the rail lines, adjacent to the former pipelines in the area between OIP-24 and OIP-27. OIP results indicate that TPH impacts are bounded along the parallel transect to the southwest and northeast by OIP-54 and OIP-55. OIP results along the perpendicular transect show no fluorescence response to the west at OIP-53 and to the east at OIP-31. The majority of elevated fluorescence response along this transect is present at depths between approximately 11 and 24 feet bgs. A slight fluorescence response was present within the top 2 feet in OIP-30 and OIP-52 with responses of less than 20% and less than 60%, respectively.

HPT and EC data show thin zones of increasing fines with low-permeability extending continuously across AOPC 7 at various depths with prominent shallow, fine-grained layers and a deeper layer of increasing fines. The majority of fluorescence responses are present within the higher permeability zones just above and below the shallower layers with an increase in fines and above and within the first few feet of the deeper fine-grained layer as it transitions to a more consistent zone of fine-grained soils within the deeper alluvial aquifer.

Dissipation tests conducted at select locations within AOPC 7 show that DTW was between 20 and 22 feet bgs at the time of drilling, and hydraulic permeability ranges from less than 10 feet per day in soils that show an increase in fines to slightly greater than 75 feet per day in coarse-grained soils.

GRO was detected in soil at concentrations exceeding the screening level at depths between 14 and 24.5 feet bgs in OIP-23, OIP-30, OIP-51, GP-33 and MW-34. The greatest GRO concentration was detected in OIP-23 at 790 mg/kg between 19 and 20 feet bgs. DRO was detected at concentrations exceeding the screening level at depths between 14 and 24 feet bgs in OIP-23, OIP-30, OIP-51 and MW-34. The greatest DRO concentration was detected in OIP-23 at 48,000 mg/kg between 19 and 20 feet bgs. ORO was detected at concentrations exceeding the screening level at depths between 14 and 21 feet bgs in OIP-30 and GP-33. The greatest ORO concentration was detected in OIP-30 at 12,000 mg/kg from 20 to 21 feet bgs.

BTEX and other VOC concentrations did not exceed their respective screening levels in any samples collected from AOPC 7. A single cPAH TEQ concentration of 0.54 mg/kg detected in OIP-30 between 20 and 21 feet bgs exceeded the screening level.

Soil concentrations exceeding the screening levels are delineated in AOPC 7 to the east and west at OIP-31 and OIP-53, respectively, by samples with results less than the screening levels or the laboratory reporting limits. Soil analytical results for AOPC 7 are presented in Tables 3.1 and 3.2 and Figures 3.1 through 3.4.

Soil parameter data, such as grain size, porosity, fraction organic carbon, and bulk density, collected from monitoring MW-34 are included in Appendix F. As stated previously, these data will be evaluated in the RI report to support the preliminary CSM for the perched area in the center of the Site.

3.1.8 AOPC 9: U.S. Army Reserve Building

Although there were no OIP/HPT locations advanced in AOPC 9 during Phase I, two Geoprobe boring locations were drilled near the former U.S. Army Reserve building during Phase II (GP-31 and GP-32). Soils collected from both Geoprobe locations in AOPC 9 were analyzed for DRO, GRO, and ORO by NWTPH-HCID and resulted in concentrations less than laboratory quantitation limits. Soil analytical results for AOPC 9 are presented in Table 3.1 and Figures 3.1 through 3.3.

3.1.9 Downgradient of AOPCs

Soil samples for laboratory analysis were collected during installation of wells MW-35 and MW-36 located the presumed downgradient direction of the AOPCs. Soils collected from both locations were analyzed for DRO, GRO, and ORO by NWTPH-HCID and resulted in concentrations less than laboratory quantitation limits. Soil analytical results for these locations are presented in Table 3.1 and Figures 3.1 through 3.3.

3.2 GROUNDWATER RESULTS: PHASE II AND GROUNDWATER SAMPLING EVENTS

Groundwater samples were collected from direct-push locations during the Phase II activities and from permanent monitoring wells during the first two quarterly groundwater sampling events in May 2020 and August 2020.

Groundwater samples collected from all Geoprobe locations and monitoring wells were analyzed for DRO, ORO, GRO, BTEX, and cPAHs in accordance with the Work Plan and SAP/QAPP. Additional analyses were conducted in accordance with MTCA Table 830-1 of Required Testing for Petroleum Releases (WAC 173-340-900) in select Geoprobe locations and wells located near former USTs, which included naphthalenes, MTBE, EDB, EDC, and lead. Select groundwater samples from another subset of spatially representative monitoring wells were submitted for full suite of VOC analysis. Laboratory analytical results for these analyses are presented in Tables 3.4 and 3.5.

Select wells were analyzed for MNA parameters in accordance with WAC 173-340-820 and were based on source areas, well screen depths, and distance from source areas as summarized in Table 3.6. The following geochemical parameters were recorded in the field using a YSI Pro DSS multiparameter water quality meter and Hach Field Kits for MNA monitoring:

- Dissolved oxygen (YSI)
- Redox potential (YSI)
- pH (YSI)
- Conductivity (YSI)
- Temperature (YSI)
- Ferrous iron (Hach Field Kits)

Geochemical MNA indicators that were analyzed by the laboratory consisted of the following:

- Nitrate by USEPA Method 300.0
- Manganese (soluble) by USEPA Method 200.8
- Sulfate by USEPA Method 300.0
- Methane by RSK-175
- Alkalinity by SM 2320B

Groundwater analytical results are discussed for each AOPC in the following sections. Results are presented for Phase II and the May 2020 monitoring event in Figures 3.5 through 3.8 and for the August 2020 monitoring event in Figures 3.9 through 3.12.

3.2.1 AOPC 1: Soil and Groundwater Near Southern Pipelines

Groundwater samples were collected from OIP-06 during the Phase II activities and from monitoring wells MW-37 and MW-38 during the first two quarterly sampling events conducted in May and August 2020. No compounds were detected at concentrations greater than their respective screening levels or laboratory quantitation limits.

3.2.2 AOPC 2: Former AST Area

Discrete groundwater samples were collected from OIP-02 and OIP-04 during the Phase II activities. Groundwater samples were collected from monitoring well MW-32 during the first two quarterly sampling events conducted in May and August 2020, and from monitoring well T-2 during the August 2020 sampling event.

DRO and ORO were detected in the discrete groundwater sample for direct-push boring OIP-04 at concentrations of 660 micrograms per liter (µg/L) and 870 µg/L, respectively, which exceed the screening levels. The detections of DRO and ORO in OIP-04 resulted in the addition of monitoring well T-2 to the sampling program for future quarterly sampling events. A groundwater sample was collected from T-2 during the August 2020 groundwater sampling event. No other constituents were detected at concentrations greater than their respective screening levels or laboratory quantitation limits in groundwater samples during the sampling events.

3.2.3 AOPC 3: Former Mechanic's Shop USTs

Groundwater samples were collected from UST-4 during the first two consecutive quarterly sampling events conducted in May and August 2020. In addition to the typical analyses, EDB, EDC, MTBE, and naphthalenes were analyzed in accordance with the SAP/QAPP, Ecology's Table 830-1 of Required Testing for Petroleum Releases (WAC 173-340-900), and guidelines for UST decommissioning (WAC 173-360A).

DRO and ORO results detected in UST-4 during the May 2020 sampling event show that the sum of their concentrations 230 and 320 µg/L, respectively, slightly exceeds the screening level of 500 µg/L. However, the laboratory report flagged the May 2020 results noting that the sample chromatographic pattern does not resemble the fuel standard used for quantitation. All other constituents were either less than their respective screening levels or less than the laboratory reporting limit.

Results from the August 2020 sampling event show that all constituents analyzed at UST-4 were less than their respective screening levels or laboratory quantitation limits.

3.2.4 AOPC 4: Monitoring Well MW-19

During Phase II, temporary wells were utilized to collect discrete groundwater samples at OIP-69 and OIP-70. Samples collected from both locations were analyzed for GRO, DRO, ORO, VOCs, and select PAHs. Results indicate low-level detections for DRO at OIP-69 and OIP-7 of 140 µg/L and 220 µg/L, respectively. Sample results at both locations were below laboratory quantitation limits for all other analytes.

Groundwater samples were collected from MW-06, MW-19, and MW-39 during the first two consecutive quarterly sampling events conducted in May and August 2020. Samples collected at MW-19 did not exceed screening levels for any of the analyzed analytes during either sampling event.

Samples collected from MW-06 during May and August 2020 contained DRO exceedances of the screening level of 780 µg/L and 1,900 µg/L, respectively. DRO and ORO concentrations at MW-39 exceeded screening levels during both the May and August 2020 sampling events. The greatest DRO concentration in MW-39 was detected during the August 2020 sampling event at a concentration of 6,500 µg/L; the greatest ORO concentration detected in MW-39 was detected during the May 2020 sampling event at a concentration of 950 µg/L.

3.2.5 AOPC 5: Former Fuel Loading Racks

A discrete groundwater sample was collected from OIP-15 during the Phase II activities and analyzed for GRO, DRO, ORO, VOCs, and select PAHs. The DRO concentration of 1,300 µg/L at OIP-15 exceeded the screening level. No other analytes in OIP-15 were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits.

Monitoring wells MW-07, MW-09, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-17, MW-20, MW-25, MW-33, and MW-40 are considered within or adjacent to the former loading racks in AOPC 5. All of these wells were sampled during the May and August 2020 sampling events except for MW-09 during both events and MW-11, MW-16, and MW-20 during the August event. MW-09 was not sampled because it contained a measurable LNAPL thickness of 0.14 feet and 0.11 feet during the May and August 2020 sampling events, respectively. MW-11, MW-16, and MW-20 were not sampled during the August 2020 event because they had an insufficient volume of water.

May and August 2020 groundwater analytical results from monitoring wells MW-11, MW-13, MW-14, MW-16, MW-17, and MW-25 show that analytes were not detected at concentrations exceeding their respective screening levels or laboratory quantitation limits. The following analytes were detected at concentrations exceeding their respective screening levels within wells located in AOPC 5 during the May or August 2020 sampling events:

- GRO in monitoring wells MW-07, MW-12, MW-20, and MW-40, with the greatest concentration in MW-12 at 7,100 µg/L detected during the August event

- DRO in OIP-15 and monitoring wells MW-07, MW-12, MW-15, MW-20, MW-33, and MW-40, with the greatest concentration in MW-40 at 3,400 µg/L detected during the August event
- Benzene in monitoring wells MW-12 and MW-40, with the greatest concentration in MW-12 at 910 µg/L detected during the August event

No other analytes were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits.

3.2.6 AOPC 6: Former Calloway Ross Parcel

During Phase II, temporary wells were utilized to collect discrete groundwater samples at OIP-67 and OIP-68. Collected groundwater samples were analyzed for GRO, DRO, ORO, VOCs, and select PAHs. Samples collected at OIP-67 resulted in exceedances of the MTCA Method A screening levels for both GRO and DRO with concentrations of 3,200 µg/L and 2,000 µg/L, respectively. Samples collected at OIP-68 also resulted in exceedances of MTCA Method A screening levels for GRO and DRO; GRO was detected at a concentration of 860 µg/L, and DRO was detected at a concentration of 900 µg/L.

Monitoring wells MW-02, MW-03, MW-05, MW-08, and MW-10 are considered within or adjacent to the former Calloway Ross Parcel (AOPC 6). These wells were sampled during the May and August 2020 sampling events except for MW-05, which had an insufficient volume of water during both events. The following analytes were detected at concentrations exceeding their respective screening levels during the May or August 2020 sampling events:

- GRO in monitoring wells MW-08 and MW-10, with the greatest concentration in MW-10 at 4,100 µg/L detected during the August event
- DRO in monitoring wells MW-02, MW-03, MW-08, and MW-10, with the greatest concentration in MW-08 at 2,400 µg/L detected during the August event
- ORO in monitoring well MW-03, with the greatest concentration of 590 µg/L detected during the May event
- Benzene in monitoring well MW-10, with the greatest concentration of 120 µg/L detected during the August event

No other analytes were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits.

3.2.7 AOPC 7: Monitoring Wells MW-26 and MW-28

During Phase II, a temporary well was utilized to collect a reconnaissance groundwater sample at GP-34. Collected groundwater samples were analyzed for GRO, DRO, ORO, VOCs, and select PAHs. Groundwater analytical results in GP-34 show that no analytes were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits.

Monitoring wells MW-18, MW-24, MW-26, MW-27, MW-28, MW-29, and MW-34 are considered within or adjacent to AOPC 7. These wells were sampled during the May and August 2020 sampling events except for MW-28, which had an insufficient volume of water during the May 2020 sampling event.

May and August 2020 groundwater analytical results from monitoring wells MW-18, MW-24, MW-27, and MW-29 show that analytes were not detected at concentrations exceeding their respective screening levels or laboratory quantitation limits. The following analytes were detected at concentrations exceeding their respective MTCA Method A screening levels during the May or August 2020 sampling events:

- DRO in monitoring wells MW-26, MW-28, and MW-34, with the greatest concentration in MW-28 at 5,200 ug/L detected during the August event
- ORO in monitoring well MW-28, with a concentration of 890 µg/L detected during the August event

No other analytes were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits.

3.2.8 AOPC 9: U.S. Army Reserve Building

During Phase II activities, temporary wells were utilized to collect reconnaissance groundwater samples from GP-31 and GP-32. Collected samples were analyzed for GRO, DRO, ORO, VOCs, and select PAHs. Samples collected from both locations had low-level detections of DRO at concentrations of 55 µg/L and 150 µg/L, respectively; neither detection exceeds screening levels. Analytical results for all other analytes were detected at concentrations at or below laboratory reporting limits.

3.2.9 Upgradient and Downgradient Groundwater Results

Monitoring wells MW-01, MW-04, MW-22, MW-23, MW-30, MW-31, MW-35, and MW-36 are not closely associated with an AOPC. Analytical data from these wells are useful in defining the bounding edge of the dissolved-phase plume along the upgradient and downgradient extents of the Site. These wells were sampled during the May and August 2020 sampling events except for MW-04 and MW-30, which were inaccessible during the May event, and MW-04, which had an insufficient volume of water during the August 2020 sampling event.

May and August 2020 groundwater analytical results from monitoring wells MW-01, MW-22, MW-23, MW-31, and MW-36 show that analytes were not detected at concentrations exceeding their respective screening levels or laboratory quantitation limits.

The following analytes were detected at concentrations exceeding their respective screening levels during the May or August 2020 sampling events:

- DRO in monitoring well MW-30, with a concentration of 1,100 µg/L detected during the August event.

- DRO in monitoring well MW-35, with the greatest concentration of 670 µg/L detected during the August event.

The DRO detections for both MW-30 and MW-35 were flagged with a laboratory note indicating that the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

No other analytes at these locations were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits. Future monitoring events will determine if these results are a seasonal trend.

3.3 SOIL VAPOR RESULTS

Soil-gas samples were collected from locations VP-1 and VP-2 (refer to Figure 2.3) and were analyzed for the following:

- Air-phase petroleum hydrocarbons, BTEX, and naphthalene by USEPA Method TO-15
- Helium using ASTM D1946 by TO-15 for leak detection

Soil vapor results are presented in Table 3.7. Laboratory analytical reports are included in Appendix E. Soil vapor concentrations are compared to screening levels presented in the updated Table 1 of Ecology's guidance for VI assessment (Ecology 2018) and to the updated January 2020 MTCA Method B sub-slab soil gas screening levels listed on Ecology's Cleanup Levels and Risk Calculation website (Ecology 2020).

Laboratory analytical data show that TPH was detected at concentrations between 160 and 450 micrograms per cubic meter (µg/m^3) and total xylenes were detected in VP-2 at a concentration of 5.6 µg/m^3, compared to the soil gas screening levels of 4,700 µg/m^3 and 1,500 µg/m^3 respectively. Helium was not detected at or above the laboratory quantitation limit, indicating that there were no leaks in the sampling manifold or vapor point surface seal. The results indicate that there were no detected exceedances when compared to conservative residential MTCA Method B sub-slab soil vapor screening levels and that there is no influence from outside ambient air.

3.4 HYDROGEOLOGIC RESULTS

Water level elevations were measured manually during the May and August 2020 sampling events. Additionally, water level data collected between May 8 and August 10, 2020, by the six transducers installed in wells MW-01, MW-17, MW-23, MW-29, MW-31, and MW-33 were downloaded to assess preliminary trends. The results of these hydrogeologic measurements are discussed in the following sections, and groundwater elevations for the May and August 2020 events are included on Table 3.8.

3.4.1 Groundwater Elevations and Preliminary Flow Directions

Groundwater elevation contours for the perched water-bearing zone and alluvial aquiver interpolated from measurements collected during the May 2020 monitoring event are presented on Figure 3.13 and Figure 3.14, respectively. Groundwater elevation contours for the August 2020 monitoring event are presented on Figures 3.15 and 3.16.

3.4.1.1 Perched Water-Bearing Zone

In the perched water-bearing zone, groundwater elevations ranged between 12.75 and 17.34 feet NAVD 88 during the May 2020 event and between 9.56 and 15.26 feet NAVD 88 during the August 2020 event. Perched groundwater was encountered in all wells gauged during both events, suggesting that this water-bearing zone is saturated into the dry season. The results are generally consistent with prior findings of radially outward apparent groundwater flow directions from the center of the site, although the actual flux of perched water-bearing zone groundwater has not been demonstrated.

In May 2020, a localized high elevation point was present at MW-14, with apparent flow direction to the north from this location. During the May monitoring event, the apparent groundwater flow direction from the southern portion of the perched water-bearing zone (between approximately MW-13 and MW-29) was westerly. This is generally consistent with the apparent flow directions based on August results, with a radial flow outward from MW-14 in the northern portion of the perched water-bearing zone and generally northwesterly flow from the southern portion of the perched zone. This variation in heads and apparent flow directions in the perched water-bearing zone is consistent with a thin saturated thickness and sensitivity to local recharge and may indicate insubstantial flux of groundwater.

3.4.1.2 Alluvial Aquifer

In the alluvial aquifer, groundwater elevations ranged between 6.79 and 8.77 feet NAVD 88 during the May 2020 monitoring event and between 6.13 and 7.22 feet NAVD 88 during the August 2020 monitoring event. During both events, the overall groundwater flow direction was to the north-northwest. During the May monitoring event, the groundwater flow direction away from the Columbia River and across the site was primarily northwesterly, with groundwater elevations slightly lower in wells along the railway and former Standard Pipeline in the central portion of the Site relative to wells to the east and west of the railway. During the August event, the northwesterly flow direction at the north of the Site was consistent with May measurements. However, there was an apparent component of southerly flow from the center of the Site, and the groundwater flow direction at the southern edge of the Site near the Columbia River was northeasterly (away from the Columbia River) in August. Measurements for both May and August were collected while the tidally influenced elevation of the Columbia River was ebbing as it approached lows of 2.7 feet mean lower low water in May and -0.6 feet mean lower low water in August, suggesting that the groundwater flow direction is consistently away from the Columbia River.

Groundwater elevations measured during the August 2020 monitoring event are also shown on cross-sections A-A', B-B', and C-C' presented in Figures 3.17, 3.18, and 3.19, respectively. Perched groundwater was typically encountered immediately above and within shallow low-permeability silt layers encountered between elevations of approximately 10 to 15 feet NAVD 88.

3.4.2 Transducer Results

Water level data collected from transducers between May and August 2020 were evaluated to make preliminary determinations of influence due to Columbia River tidal fluctuations, the saturated thickness of the perched water-bearing zone throughout the seasonal variation, and vertical gradients between perched and alluvial aquifer groundwater. The other objective of the transducer study, to determine influence due to the Oregon Way pump station, will be evaluated based on future wet season monitoring. Preliminary hydrographs are presented in Figures 3.20a through 3.20i.

3.4.2.1 Tidal Influence

A hydrograph of barometer-corrected water level elevations at all Site wells selected for transducer study along with the tide elevation of the Columbia River is presented in Figure 3.20a. An overall similar seasonal pattern of elevation change relative to the tide elevation during the course of the approximately 3-month data collection period was apparent in alluvial aquifer wells MW-01, MW-23, MW-31, and MW-33. Seasonal fluctuations in the elevation of groundwater observed in perched water-bearing zone well MW-17 were also apparent, with water levels generally rising in the spring and decreasing in the later summer, although these changes did not closely match elevation trends in the Columbia River or alluvial aquifer.

The groundwater elevations at individual wells relative to Columbia River tidal elevations are plotted for June 21 to 27, 2020, on Figures 3.20b through 3.20g. This period was selected for tide elevations that were clustered around the approximate average for the total study period and did not exhibit extreme high or low elevations. Comparison of groundwater levels to Columbia River water levels indicates measurable tidal influence in five of six monitoring wells measured. Tidal influence was observed in three of four alluvial aquifer monitoring wells (MW-1, MW-33, and MW-23) including the north, central, and south-central areas of the Site, extending up to approximately 1,600 feet from the Columbia River. Modest tidal influence was measured in both perched water-bearing zone monitoring wells in the central (MW-17) and south-central (MW-29) portions of the Site. No tidal influence was observed in water levels at MW-31, located near the northwest corner of the Site.

These findings build on the results of the previous tidal study (Golder 1999), which identified tidal influence in wells from the northern portion of the Site, MW-1 and MW-31, and a minor but measurable influence on perched water-bearing zone wells MW-14 and MW-16, suggesting the low permeability silt reduces the transmissivity between the units. The measurement of changes (up to approximately 0.4 feet) in water level in response to tidal variation in perched water-bearing zone wells MW-17 and MW-29 is consistent with the previous findings demonstrating reduced transmissivity, but it also indicates that the low permeability silt unit between the perched water-bearing zone and alluvial aquifer is saturated and that groundwater is transmitted between the units, which is typical of a silt aquitard, and expected to amount to minimal flux of groundwater because of the low permeability.

Data for individual wells are discussed in geographic order from the northern portion of the Site to the south-central portion of the Site.

In the northern portion of the Site, the groundwater elevation in alluvial aquifer wells MW-01 and MW-31 exhibited moderate fluctuations between approximately 7.0 and 7.3 feet NAVD 88 (refer to Figures 3.20b and 3.20c). A slight pattern of fluctuation consistent with the period of the tidal cycle was observed at MW-01; however, this pattern was not apparent at MW-31, which is further west and approximately 200 feet closer to the river than MW-01.

In the central portion of the Site, the groundwater elevation in alluvial aquifer well MW-33 exhibited moderate elevations similar to the more northerly alluvial wells, ranging from approximately 7.8 to 8.2 feet NAVD 88 (refer to Figure 3.20d). These fluctuations also exhibited a period consistent with the tide cycle. Elevations at perched water-bearing zone well MW-17 had a similar magnitude of fluctuation (from approximately 16.2 to 16.6 feet NAVD 88; refer to Figure 3.20e), consistent with a lag relative to the daily tidal cycle.

In the south-central portion of the Site, groundwater elevations at alluvial aquifer well MW-23 exhibited significantly greater variation, ranging from approximately 7.9 to 9.2 feet NAVD 88 (refer to Figure 3.20f). The periodic nature of the variations at MW-23 was also more pronounced, with maximum and minimum elevations lagging behind the high and low Columbia River tides by approximately 80 to 90 minutes. Groundwater elevations in perched water-bearing zone well MW-29 fluctuated between approximately 13.6 and 13.7 feet NAVD 88 (refer to Figure 3.20g) and, similar to the more northerly perched water-bearing zone well, exhibited an apparent pattern of fluctuation consistent with a time lag relative to the daily tidal cycle.

3.4.2.2 Saturated Thickness of the Perched Water-Bearing Zone

Measurable perched groundwater was present throughout the study period, which extended into the dry month of August, in the two perched water-bearing zone wells MW-17 and MW-29, suggesting that this perched water-bearing zone is persistent in these areas of the Site. The saturated thickness in MW-17 ranged from approximately 5.1 to 9.2 feet during the data collection period, and the saturated thickness of MW-29 ranged from approximately 9.8 to 10.5 feet during this period. Additional data collection, including from the remainder of August and September 2020, will be useful in further evaluation.

3.4.2.3 Head Differences between the Perched Water-Bearing Zone and Alluvial Aquifer

Head differences for selected well pairs in the central (MW-17 and MW-33) and south-central MW-23 and MW-29) portions of the Site are presented in Figures 3.20h and 3.20i, respectively. Head differences between paired wells indicate the direction and magnitude of vertical gradients. Head differences were significant in both well pairs, averaging approximately 8.4 feet higher in MW-17 than MW-33 (refer to Figure 3.20h) and approximately 5 feet higher in MW-29 than MW-23 (refer to Figure 3.20i). It should also be noted that MW-23 and MW-29 are farther apart laterally than MW-17 and MW-33 and their respective elevations may, therefore, be influenced by other factors as compared to a more geographically proximal well pair. However, at both locations in the central and south-central portions of the Site, vertical gradients were strongly downward between the perched water-bearing zone and alluvial aquifer. Downward gradients indicate the potential for downward flow of groundwater, although the actual flux of groundwater depends on other factors, including the permeability of the material. The pronounced head difference is consistent with the preliminary CSM that there is limited hydraulic connection between the two zones and that flow between the units generally resembles slow leakage through a low-permeability aquitard.

4.0 Conclusions

This section provides a brief summary of the results collected to date, incorporating data from previous investigations where appropriate to evaluate the understanding of nature and extent of impacts at the Site.

4.1 SOIL DATA SUFFICIENCY

As discussed in previous sections, data collected is being screened relative to the screening levels based on MTCA Method A CULs included in the Work Plan because these provide a conservative metric for determining data sufficiency for confirmation of contaminant nature and extent. These CULs are used for screening purposes only. During development of the RI report, MTCA Method B and Method C CULs for protection of human health through direct contact will be calculated and considered for applicability at the Site. To understand the potential range of these MTCA Method B and Method C CULs, preliminary calculations were conducted for a select set of locations analyzed for the appropriate constituents (preliminary calculations are included in Appendix G). The preliminary MTCA Method B calculated values for TPH across the Site range between 2,157 and 2,849 mg/kg, and the preliminary MTCA Method C calculated values for TPH range between 32,840 and 47,031 mg/kg.

When evaluating data compared to the values discussed above, the collected data are sufficient to bound the extent of contamination in soil. The only two areas with a less robust delineation of the extent of soil contamination are the following:

- In the vicinity of OIP-49 and OIP-72 on the eastern side of AOPC 5 where GRO was detected at concentrations of 960 and 520 mg/kg, respectively. Given the magnitude of these detections compared to the preliminary MTCA Method B and C calculated values, the limited extent of the exceedances (both located within thin zones less than 1 to 2 feet thick) and the presence of soil borings with GRO concentrations less than screening levels further to the east (GP-31 and GP-32), no additional data collection is warranted in this area for completion of an RI.
- In the vicinity of OIP-02 on the eastern side of AOPC 2 where DRO and ORO were detected at concentrations of 1,900 mg/kg and 3,400 mg/kg, respectively, in a sample collected from 5 feet bgs. Similarly, given the magnitude of these detections compared to the preliminary MTCA Method B and C calculated values, the adjacent borings to the north, west, and south with no detections of TPH constituents, and the presence of OIP-01 to the east that did not contain a fluorescence response, no additional data collection is warranted in this area for completion of an RI.

Therefore, soil impacts are considered to be delineated in all directions at the Site.

Soil impacts are present in shallow vadose soils at concentrations exceeding screening levels in some locations, such as within the former loading racks area and beneath the berths. However, the majority of TPH present in shallow soils consist of mixtures of heavily weathered diesel and oils based on age and analytical data. EPH, VPH, VOC, and cPAH data at the Site (Tables 3.2 and 3.3) indicate that the mixtures have low toxicity, indicated by the lowest preliminary MTCA Method C calculated value of 32,840 mg/kg. This will be evaluated further in the RI report.

The majority of TPH impacts in soil are encountered within the central portion of the Site and are present within the vadose zone, perched water-bearing zone, and within the deeper alluvial aquifer. The greatest TPH (sum of GRO, DRO, and ORO) concentration detected at the Site is in OIP-23 at 19 feet bgs with a concentration of 51,000 mg/kg. This concentration is consistent with the historical soil data in the adjacent monitoring well MW-26, where DRO and GRO were detected at similar elevated concentrations in soil.

4.2 GROUNDWATER DATA SUFFICIENCY

Groundwater data show DRO impacts with concentrations exceeding screening levels from MW-06 in the north to MW-30 and MW-35 to the south and southwest. Like with soil, the majority of impacts are located within the central portion of the Site. The extent of groundwater impacts is largely defined in all directions with slight screening level exceedances in MW-30 and MW-35 to the west of AOPC 3. Historical groundwater concentrations show that DRO detections in MW-30 fluctuate at concentrations greater than and less than screening levels, so this is not considered a concern for preparation of the RI report, and no additional monitoring locations are proposed.

GRO impacts in groundwater are delineated in all directions with screening level exceedances only beneath the former Calloway Ross Parcel (AOPC 6) and former loading racks (AOPC 5).

ORO impacts are defined in all directions with exceedances only in the north at MW-39 and within the central portion of the Site. Analytical data from monitoring wells MW-37 and MW-38 indicate that Site TPH impacts do not extend to the bank of the Columbia River.

4.2.1 Proposed Revisions to Sampling Program

Groundwater analytical data from the temporary wells, and the first two quarterly events—one conducted at the end of the wet season and one during a dry season—confirm that cPAHs, select VOCs, and lead are not present in groundwater at detectable concentrations. The Work Plan proposes that after two quarters of groundwater sampling results, the number of monitoring wells to be sampled may be reduced (after request to and approval by Ecology) pending consecutive results of non-detect or less than screening levels. Given the expansive non-detect results during both wet and dry season sampling events and Site-wide non-detect results for select analytes, a list of monitoring wells proposed for removal from the sampling program as well as analytes proposed for removal from future laboratory analyses is included in Table 4.1.

4.3 SOIL VAPOR DATA SUFFICIENCY

Soil vapor results from the first sampling event are sufficient for evaluation of the VI pathway in the RI report. However, a second sampling event will be performed in November 2020, as per the Work Plan, at the same two soil vapor locations. No additional soil vapor data are expected to be required for completion of the RI report.

4.4 HYDROGEOLOGIC DATA SUFFICIENCY

Transducer data collected over the past 3 months indicate measurable tidal influence in five of six monitoring wells measured. Tidal influence was observed in and three of four alluvial aquifer monitoring wells (MW-1, MW-33, and MW-23), with tidal influence in both perched water-bearing zone monitoring wells in the central (MW-17) and south-central (MW-29) portions of the Site. During the first three months, no tidal influence was observed in water levels at MW-31, located near the northwest corner of the Site. The transducers will remain in place throughout the quarterly groundwater monitoring schedule to collect data and evaluate tidal influence through the wet season.

4.5 CONCLUSIONS AND NEXT STEPS

Overall, soil and groundwater impacts have largely been defined at the Site. Two more quarterly groundwater sampling events will be performed in November 2020 and February 2021, and the hydrogeologic aquifer pumping test is expected to be performed in November 2020. The pump test will be performed to further evaluate the hydraulic connection between the perched water-bearing zone and alluvial aquifer and their hydraulic properties for assessment of potential remedial action alternatives. The soil data collected during the 2015 data gaps activities and RI activities, future hydrogeologic testing, and vapor and groundwater sampling events will be sufficient for understanding Site conditions and to adequately characterize the Site. The next steps will include development of the RI report which will include cleanup standards for the Site, define the COCs, document the nature and extent of contamination and overall site compliance status, and prepare a comprehensive CSM to reflect Site-wide information.

5.0 References

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Port of Longview TPH Site

Interim Data Report

Tables

Table 3.1

Soil Analytical Data—GRO, DRO, ORO, and BTEX

			AOPC 1										AOPC 2			
		Location	OIP-05	OIP-06	P3	P4	P5	P6		MW-37		MW-38	OIP-02		OIP-04	
		Sample ID	OIP-05-27-28	OIP-06-27-28	P3-0-0.5	P4-0-0.5	P5-0-0.5	P6-0.5-1.0	P6-0.5-1.0D	MW-37-27.5-28	MW-37-27.5-28D	MW-38-23.5-24	OIP-02-5-5.5	OIP-02-14-15	OIP-04-4-5	OIP-04-15-16
		Date	03/13/2020	03/13/2020	03/12/2020	03/12/2020	03/12/2020	03/12/2020	03/12/2020	03/12/2020	03/12/2020	03/11/2020	03/11/2020	03/11/2020	03/10/2020	03/10/2020
		Sample Depth	27-28 feet	27-28 feet	0-0.5 feet	0-0.5 feet	0-0.5 feet	0.5-1 feet	0.5-1 feet	27.5-28 feet	27.5-28 feet	23.5-24 feet	5-5.5 feet	14-15 feet	4-5 feet	15-16 feet
Analyte	Units	Preliminary Screening Level														
Total Petroleum Hydrocarbons																
Gasoline Range Organics	mg/kg	30	20 U	20 U	25 U	25 U	25 U	25 U	25 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diesel Range Organics	mg/kg	2,000	50 U	50 U	620 (1)	300 (1)	860	580	560	50 U	50 U	50 U	1,900 (1)	50 U	50 U	50 U
Oil Range Organics	mg/kg	2,000	250 U	250 U	4,200	1,900	1,200	2,300	2,100	250 U	250 U	250 U	3,400	250 U	250 U	250 U
Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) Compounds																
Benzene	mg/kg	0.03			0.030 U	0.030 U	0.030 U	0.030 U	0.030 U							
Ethylbenzene	mg/kg	7			0.050 U	0.050 U	0.050 U	0.050 U	0.050 U							
Toluene	mg/kg	6			0.050 U	0.050 U	0.050 U	0.050 U	0.050 U							
Xylene (meta & para)	mg/kg	--			0.10 U	0.10 U	0.10 U	0.10 U	0.10 U							
Xylene (ortho)	mg/kg	--			0.050 U	0.050 U	0.050 U	0.050 U	0.050 U							
Xylene (total)	mg/kg	9			0.10 U	0.10 U	0.10 U	0.10 U	0.10 U							

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

Abbreviations:

DRO	Diesel-range organics
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
ORO	Oil-range organics

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.1
Soil Analytical Data—GRO, DRO, ORO, and BTEX

			AOPC 3						AOPC 4				
		Location	**OIP-18**	**OIP-19**	**OIP-20**		**OIP-21**	**GP-38**	**OIP-57**	**OIP-69**		**OIP-70**	
		Sample ID	**OIP-18-19-19.5**	**OIP-19-19-20**	**OIP-20-11-11.5**	**OIP-20-19-19.5**	**OIP-21-18-19**	**GP-38-11-11.5**	**OIP-57-14**	**OIP-69-11-12**	**OIP-69-14.5-15**	**OIP-70-8**	**OIP-70-12-14**
		Date	**03/13/2020**	**03/13/2020**	**03/13/2020**	**03/13/2020**	**03/13/2020**	**03/13/2020**	**03/10/2020**	**03/11/2020**	**03/11/2020**	**03/10/2020**	**03/10/2020**
		Sample Depth	**19-19.5 feet**	**19-20 feet**	**11-11.5 feet**	**19-19.5 feet**	**18-19 feet**	**11-11.5 feet**	**14-14 feet**	**11-12 feet**	**14.5-15 feet**	**8-8 feet**	**12-14 feet**
Analyte	**Units**	**Preliminary Screening Level**											
Total Petroleum Hydrocarbons													
Gasoline Range Organics	mg/kg	30	20 U	20 U	630	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diesel Range Organics	mg/kg	2,000	50 U	50 U	440 (1)	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Oil Range Organics	mg/kg	2,000	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Benzene, Toluene, Ethylbenzene, and Xylene Compounds													
Benzene	mg/kg	0.03			0.030 U								
Ethylbenzene	mg/kg	7			0.11								
Toluene	mg/kg	6			0.050 U								
Xylene (meta & para)	mg/kg	--			0.11								
Xylene (ortho)	mg/kg	--			0.050 U								
Xylene (total)	mg/kg	9			0.11								

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
1 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Abbreviations:

DRO	Diesel-range organics
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
ORO	Oil-range organics

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.1
Soil Analytical Data—GRO, DRO, ORO, and BTEX

			AOPC 4 (cont.)							AOPC 5					
		Location	**OIP-73**			**MW-39**				**OIP-15**			**OIP-39**		
		Sample ID	**OIP-73-9-10**	**OIP-73-13-14**	**OIP-73-13-14D**	**MW-39-2-4**	**MW-39-8-9**	**MW-39-13-14**	**MW-39-18.5-20**	**OIP-15-15-16**	**OIP-15-20-21**	**OIP-15-23-24**	**OIP-39-15-15.5**	**OIP-39-16.5-17**	**OIP-39-21-22**
		Date	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/10/2020**	**03/10/2020**	**03/10/2020**
		Sample Depth	**9-10 feet**	**13-14 feet**	**13-14 feet**	**2-4 feet**	**8-9 feet**	**13-14 feet**	**18.5-20 feet**	**15-16 feet**	**20-21 feet**	**23-24 feet**	**15-15.5 feet**	**16.5-17 feet**	**21-22 feet**
Analyte	**Units**	**Preliminary Screening Level**													
Total Petroleum Hydrocarbons															
Gasoline Range Organics	mg/kg	30	20 U	20 U	20 U	20 U	150	990	5 U	35	5 U	20 U	5 U	7.3	20 U
Diesel Range Organics	mg/kg	2,000	50 U	50 U	50 U	50 U	4,400	18,000	50 U	2,300	50 U	50 U	50 U	50 U	50 U
Oil Range Organics	mg/kg	2,000	250 U	250 U	250 U	250 U	250 U	340 (1)	250 U	370 (1)	250 U	250 U	250 U	250 U	250 U
Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) Compounds															
Benzene	mg/kg	0.03					0.030 U	0.030 U	0.030 U	0.030 U	0.030 U		0.030 U	0.030 U	
Ethylbenzene	mg/kg	7					0.050 U	0.050 U	0.050 U	0.050 U	0.050 U		0.050 U	0.050 U	
Toluene	mg/kg	6					0.050 U	0.050 U	0.050 UJ	0.050 U	0.050 U		0.050 U	0.050 U	
Xylene (meta & para)	mg/kg	--					0.10 U	0.10 U	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	
Xylene (ortho)	mg/kg	--					0.050 U	0.050 U	0.050 U	0.050 U	0.050 U		0.050 U	0.050 U	
Xylene (total)	mg/kg	9					0.10 U	0.10 U	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

--	Not established.
▨	Indicates a result that exceeds the applicable screening level.
1	The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Abbreviations:

DRO	Diesel-range organics
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
ORO	Oil-range organics

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.1
Soil Analytical Data—GRO, DRO, ORO, and BTEX

			AOPC 5 (cont.)													
		Location	**OIP-42**	**OIP-46**		**OIP-47**				**OIP-49**		**OIP-64**	**OIP-72**		**GP-35**	
		Sample ID	**OIP42-17-17.5-112119**	**OIP-46-10-11**	**OIP-46-14**	**OIP-47-2-3**	**OIP-47-11-12**	**OIP-47-17**	**OIP-47-25**	**OIP-49-10**	**OIP-49-17**	**OIP-64-14-15**	**OIP-72-10-11**	**OIP-72-16-17**	**GP-35-7-8**	**GP-35-16-17**
		Date	**11/21/2019**	**03/10/2020**	**03/10/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/12/2020**	**03/11/2020**	**03/11/2020**	**03/10/2020**	**03/10/2020**
		Sample Depth	**17-17.5 feet**	**10-11 feet**	**14-14 feet**	**2-3 feet**	**11-12 feet**	**17-17 feet**	**25-25 feet**	**10-10 feet**	**17-17 feet**	**14-15 feet**	**10-11 feet**	**16-17 feet**	**7-8 feet**	**16-17 feet**
Analyte	**Units**	**Preliminary Screening Level**														
Total Petroleum Hydrocarbons																
Gasoline Range Organics	mg/kg	30	3,600	20 U	20 U	20 U	5,700	49	20 U	22	960	20 U	520	270	20 U	20 U
Diesel Range Organics	mg/kg	2,000	17,000	50 U	50 U	50 U	210 (1)	360	50 U	50 U	50 U	50 U	50 U	50 U	590	50 U
Oil Range Organics	mg/kg	2,000	1,500 (1)	250 U	250 U	250 U	250 U	250 U	250 U	360	250 U	250 U	250 U	250 U	250 U	250 U
Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) Compounds																
Benzene	mg/kg	0.03	2.4				0.030 U	0.030 U		0.020 U	0.020 UJ		0.020 UJ	0.020 U		
Ethylbenzene	mg/kg	7	41				27	7.0		0.16	0.020 UJ		0.020 UJ	0.020 U		
Toluene	mg/kg	6	0.99				0.12	0.089		0.020 U	14 J		6.1 J	2.1		
Xylene (meta & para)	mg/kg	--	4.1				1.9	1.6								
Xylene (ortho)	mg/kg	--	0.50 U				0.30	0.15								
Xylene (total)	mg/kg	9	4.1				2.2	1.8		0.41	14 J		7.0 J	2.3		

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

Abbreviations:

DRO	Diesel-range organics
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
ORO	Oil-range organics

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.1
Soil Analytical Data—GRO, DRO, ORO, and BTEX

			AOPC 5 (cont.)										
		Location	**GP-36**			**MW-33**			**MW-40**				
		Sample ID	**GP-36-13-14**	**GP-36-16-17**	**GP-36-22-23**	**MW-33-12-12.5**	**MW-33-19.5-20**	**MW-33-22.5-23**	**MW-40-1.0-1.5**	**MW-40-10.5-11**	**MW-40-17**	**MW-40-17D**	**MW-40-24-24.5**
		Date	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**
		Sample Depth	**13-14 feet**	**16-17 feet**	**22-23 feet**	**12-12.5 feet**	**19.5-20 feet**	**22.5-23 feet**	**1-1.5 feet**	**10.5-11 feet**	**17-17 feet**	**17-17 feet**	**24-24.5 feet**
Analyte	**Units**	**Preliminary Screening Level**											
Total Petroleum Hydrocarbons													
Gasoline Range Organics	mg/kg	30	4,100	950	20 U	230	5 U	20 U	20 U	2,000	170	1,700	20 U
Diesel Range Organics	mg/kg	2,000	3,500	15,000	50 U	15,000	50 U	50 U	200 (1)	18,000	2,400	2,100	50 U
Oil Range Organics	mg/kg	2,000	250 U	970 (1)	250 U	600 (1)	250 U	250 U	2,400	7,900 (1)	250 U	320 (1)	250 U
Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) Compounds													
Benzene	mg/kg	0.03	0.25	0.61		0.030 U	0.030 U			12	0.33	0.088	
Ethylbenzene	mg/kg	7	4.7	7.6		0.050 U	0.050 U			7.4	0.14	0.19	
Toluene	mg/kg	6	0.27	0.47		0.050 U	0.050 U			5.4	0.050 U	0.050 U	
Xylene (meta & para)	mg/kg	--	1.5	2.5		0.10 U	0.10 U				0.13	0.12	
Xylene (ortho)	mg/kg	--	0.050 U	0.056		0.050 U	0.050 U				0.050 U	0.050 U	
Xylene (total)	mg/kg	9	1.5	2.6		0.10 U	0.10 U			15	0.13	0.12	

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

--	Not established.
▨	Indicates a result that exceeds the applicable screening level.
1	The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Abbreviations:

DRO	Diesel-range organics
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
ORO	Oil-range organics

Qualifier:

U	Analyte was not detected at the given reporting limit.

Table 3.1
Soil Analytical Data—GRO, DRO, ORO, and BTEX

			AOPC 6											
		Location	**OIP-08**	**OIP-66**		**OIP-67**				**OIP-68**			**GP-37**	
		Sample ID	**OIP08-19-20-112219**	**OIP166-12-12.5D**	**OIP66-12-12.5-1112219**	**OIP-67-11-12**	**OIP-67-14.5-15**	**OIP-67-18-19**	**OIP-67-7-8**	**OIP-68-10-11**	**OIP-68-10-11D**	**OIP-68-13.5-14**	**GP-37-12-14**	**GP-37-12-14D**
		Date	**11/22/2019**	**11/22/2019**	**11/22/2019**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/11/2020**	**03/11/2020**	**03/11/2020**	**03/12/2020**	**03/12/2020**
		Sample Depth	**19-20 feet**	**12-12.5 feet**	**12-12.5 feet**	**11-12 feet**	**14.5-15 feet**	**18-19 feet**	**7-8 feet**	**10-11 feet**	**10-11 feet**	**13.5-14 feet**	**12-14 feet**	**12-14 feet**
Analyte	**Units**	**Preliminary Screening Level**												
Total Petroleum Hydrocarbons														
Gasoline Range Organics	mg/kg	30	4,900	2,000	1,500	1,500	2,200	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diesel Range Organics	mg/kg	2,000	12,000	490	760	4,300	2,100	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Oil Range Organics	mg/kg	2,000	1,000 (1)	250 U	250 U	310 (1)	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) Compounds														
Benzene	mg/kg	0.03	1.1	0.030 U	0.030 U	0.030 U	0.030 U							
Ethylbenzene	mg/kg	7	27	0.25	0.12	0.062	0.050 U							
Toluene	mg/kg	6	0.74	0.050 U	0.050 U	0.050 U	0.050 U							
Xylene (meta & para)	mg/kg	--	3.2	0.10 U	0.10 U	0.10 U	0.10 U							
Xylene (ortho)	mg/kg	--	0.25 U	0.050 U	0.050 U	0.050 U	0.050 U							
Xylene (total)	mg/kg	9	3.2	0.10 U	0.10 U	0.10 U	0.10 U							

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

Abbreviations:

DRO	Diesel-range organics
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
ORO	Oil-range organics

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.1
Soil Analytical Data—GRO, DRO, ORO, and BTEX

			AOPC 7										
		Location	**OIP-23**				**OIP-30**	**OIP-31**		**OIP-52**		**OIP-53**	**OIP-54**
		Sample ID	**OIP-23-14-15**	**OIP-23-19-20**	**OIP-23-23-24**	**OIP-23-29.5-30**	**OIP30-20-21-111919**	**OIP-31-17**	**OIP-31-20**	**OIP52-19-19.5-112219**	**OIP52-22-22.5-112219**	**OIP53-22-22.5-112219**	**OIP-54-15-16**
		Date	**03/10/2020**	**03/10/2020**	**03/10/2020**	**03/10/2020**	**11/19/2019**	**03/09/2020**	**03/09/2020**	**11/22/2019**	**11/22/2019**	**11/22/2019**	**03/11/2020**
		Sample Depth	**14-15 feet**	**19-20 feet**	**23-24 feet**	**29.5-30 feet**	**20-21 feet**	**17-17 feet**	**20-20 feet**	**19-19.5 feet**	**22-22.5 feet**	**22-22.5 feet**	**15-16 feet**
Analyte	**Units**	**Preliminary Screening Level**											
Total Petroleum Hydrocarbons													
Gasoline Range Organics	mg/kg	30	420	790	200	20 U	61	20 U	20 U	86	260	5 U	20 U
Diesel Range Organics	mg/kg	2,000	13,000	48,000	5,700	50 U	11,000	50 U	50 U	530	2,200	50 U	50 U
Oil Range Organics	mg/kg	2,000	250 U	1,300 (1)	250 U	250 U	12,000	250 U	250 U	250 U	250 U	250 U	660
Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) Compounds													
Benzene	mg/kg	0.03	0.030 U	0.030 U	0.030 U		0.030 U			0.030 U	0.030 U	0.030 U	
Ethylbenzene	mg/kg	7	0.050 U	0.050 U	0.050 U		0.050 U			0.050 U	0.050 U	0.050 U	
Toluene	mg/kg	6	0.050 U	0.050 U	0.050 U		0.050 U			0.050 U	0.050 U	0.050 U	
Xylene (meta & para)	mg/kg	--	0.10 U	0.10 U	0.10 U		0.10 U			0.10 U	0.10 U	0.10 U	
Xylene (ortho)	mg/kg	--	0.050 U	0.081	0.050 U		0.063			0.050 U	0.050 U	0.050 U	
Xylene (total)	mg/kg	9	0.10 U	0.081	0.10 U		0.063			0.10 U	0.10 U	0.10 U	

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
1 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Abbreviations:

DRO Diesel-range organics
GRO Gasoline-range organics
mg/kg Milligrams per kilogram
MTCA Model Toxics Control Act
ORO Oil-range organics

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.1
Soil Analytical Data—GRO, DRO, ORO, and BTEX

			AOPC 7 (cont.)									AOPC 9		Downgradient of AOPCs	
		Location	**GP-33**				**GP-34**	**MW-34**				**GP-31**	**GP-32**	**MW-35**	**MW-36**
		Sample ID	**GP-33-14-14.5**	**GP-33-19.5-20**	**GP-33-24-25**	**GP-33-28-29**	**GP-34-14-15**	**MW-34-15-15.5**	**MW-34-20-20.5**	**MW-34-24-24.5**	**MW-34-28-28.5**	**GP-31-14-15**	**GP-32-17.5-18.5**	**MW-35-15.5-16**	**MW-36-25.5-26**
		Date	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/09/2020**	**03/10/2020**	**03/10/2020**	**03/10/2020**	**03/10/2020**	**03/11/2020**	**03/11/2020**	**03/10/2020**	**03/11/2020**
		Sample Depth	**14-14.5 feet**	**19.5-20 feet**	**24-25 feet**	**28-29 feet**	**14-15 feet**	**15-15.5 feet**	**20-20.5 feet**	**24-24.5 feet**	**28-28.5 feet**	**14-15 feet**	**17.5-18.5 feet**	**15.5-16 feet**	**25.5-26 feet**
Analyte	**Units**	**Preliminary Screening Level**													
Total Petroleum Hydrocarbons															
Gasoline Range Organics	mg/kg	30	170	20 U	20 U	20 U	20 U	760	280	46	20 U	20 U	20 U	20 U	20 U
Diesel Range Organics	mg/kg	2,000	830 (1)	50 U	50 U	50 U	50 U	23,000	17,000	300	50 U	50 U	50 U	50 U	50 U
Oil Range Organics	mg/kg	2,000	3,800	250 U	250 U	250 U	250 U	540 (1)	480 (1)	250 U	250 U	250 U	250 U	250 U	250 U
Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) Compounds															
Benzene	mg/kg	0.03	0.020 U					0.030 U	0.030 U	0.030 U					
Ethylbenzene	mg/kg	7	0.11					0.050 U	0.050 U	0.050 U					
Toluene	mg/kg	6	0.58					0.050 U	0.050 U	0.050 U					
Xylene (meta & para)	mg/kg	--						0.10 U	0.10 U	0.10 U					
Xylene (ortho)	mg/kg	--						0.050 U	0.050 U	0.050 U					
Xylene (total)	mg/kg	9	1.7					0.10 U	0.10 U	0.10 U					

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
1 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Abbreviations:

DRO	Diesel-range organics
GRO	Gasoline-range organics
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
ORO	Oil-range organics

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.2
Soil Analytical—VOCs, SVOCs, and Metals

			AOPC 1					AOPC 3	AOPC 4				AOPC 5			
Location			**P3**	**P4**	**P5**	**P6**		**OIP-20**	**OIP-69**	**MW-39**			**OIP-15**		**OIP-39**	
Sample ID			**P3-0-0.5**	**P4-0-0.5**	**P5-0-0.5**	**P6-0.5-1.0**	**P6-0.5-1.0D**	**OIP-20-11-11.5**	**OIP-69-14.5-15**	**MW-39-8-9**	**MW-39-13-14**	**MW-39-18.5-20**	**OIP-15-15-16**	**OIP-15-20-21**	**OIP-39-15-15.5**	**OIP-39-16.5-17**
Date			**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/13/2020**	**03/11/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/12/2020**	**03/10/2020**	**03/10/2020**
Sample Depth			**0-0.5 feet**	**0-0.5 feet**	**0-0.5 feet**	**0.5-1 feet**	**0.5-1 feet**	**11-11.5 feet**	**14.5-15 feet**	**8-9 feet**	**13-14 feet**	**18.5-20 feet**	**15-16 feet**	**20-21 feet**	**15-15.5 feet**	**16.5-17 feet**
Analyte	**Units**	**Preliminary Screening Level**														
Conventionals																
Total organic carbon	%	--							0.075 U							
Metals																
Lead	mg/kg	--						8.2					1.1	1.9		1.2
Semivolatile Organic Compounds (SVOCs)																
cPAHs (MTCA TEQ-HalfND)	mg/kg	0.1	2.3	0.51	*0.76 U*	*0.76 U*	*7.1 U*	0.0076 U		0.0077 J	0.038	0.0076 U	0.038 U	0.0076 U	0.0076 U	0.0076 U
cPAHs (MTCA TEQ-ZeroND)	mg/kg	--	2.3	0.51	0 U (1)	0 U (1)	0 U (1)	0 U (1)		0.00023 J	0.00071	0 U (1)	0 U (1)	0 U (1)	0 U (1)	0 U (1)
Naphthalene	mg/kg	--						1.5						0.050 U		
1-Methylnaphthalene	mg/kg	--														
2-Methylnaphthalene	mg/kg	--														
Acenaphthene	mg/kg	--														
Acenaphthylene	mg/kg	--														
Anthracene	mg/kg	--														
Benzo(a)anthracene	mg/kg	--	1.8	0.46	1.0 U	1.0 U	1.0 U	0.010 U		0.010 U	0.050 U	0.010 U	0.050 U	0.010 U	0.010 U	0.010 U
Benzo(a)pyrene	mg/kg	--	1.5	0.35	1.0 U	1.0 U	10 U	0.010 U		0.010 U	0.050 U	0.010 U	0.050 U	0.010 U	0.010 U	0.010 U
Benzo(b)fluoranthene	mg/kg	--	3.5	0.66	1.0 U	1.0 U	10 U	0.010 U		0.010 U	0.050 U	0.010 U	0.050 U	0.010 U	0.010 U	0.010 U
Benzo(g,h,i)perylene	mg/kg	--														
Benzo(k)fluoranthene	mg/kg	--	1.0	0.22	1.0 U	1.0 U	10 U	0.010 U		0.010 U	0.050 U	0.010 U	0.050 U	0.010 U	0.010 U	0.010 U
Chrysene	mg/kg	--	3.1	0.63	1.0 U	1.0 U	1.0 U	0.010 U		0.023	0.071	0.010 U	0.050 U	0.010 U	0.010 U	0.010 U
Dibenzo(a,h)anthracene	mg/kg	--	1.0 U	0.10 U	1.0 U	1.0 U	10 U	0.010 U		0.010 UJ	0.050 U	0.010 U	0.050 U	0.010 U	0.010 U	0.010 U
Fluoranthene	mg/kg	--														
Fluorene	mg/kg	--														
Indeno(1,2,3-c,d)pyrene	mg/kg	--	1.3	0.19	1.0 U	1.0 U	10 U	0.010 U		0.010 U	0.050 U	0.010 U	0.050 U	0.010 U	0.010 U	0.010 U
Naphthalene	mg/kg	--														
Phenanthrene	mg/kg	--														
Pyrene	mg/kg	--														
Volatile Organic Compounds (VOCs)																
1,2-Dibromoethane (EDB)	mg/kg	--						0.050 U			0.050 U		0.050 U	0.050 U		0.050 U
1,2-Dichloroethane (EDC)	mg/kg	--						0.050 U			0.050 U		0.050 U	0.050 U		0.050 U
Methyl-Tert-Butyl Ether	mg/kg	--						0.050 U			0.050 U		0.050 U			0.050 U
n-Hexane	mg/kg	--						0.25 U			0.25 U		0.25 U	0.25 U		0.25 U

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
Italics Indicates a nondetect result with a practical quantitation limit that exceeds the applicable screening level.
1 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

cPAH	Carcinogenic polycyclic aromatic hydrocarbon
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
TEQ	Toxic equivalent

Qualifier:

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

Table 3.2
Soil Analytical—VOCs, SVOCs, and Metals

			AOPC 5 (cont.)										AOPC 6		
		Location	OIP-42	OIP-46	OIP-47		GP-36		MW-33		MW-40		OIP-08	OIP-66	
		Sample ID	OIP42-17-17.5-112119	OIP-46-8	OIP-47-11-12	OIP-47-17	GP-36-13-14	GP-36-16-17	MW-33-12-12.5	MW-33-19.5-20	MW-40-17	MW-40-17D	OIP08-19-20-112219	OIP166-12-12.5D	OIP66-12-12.5-1112219
		Date	11/21/2019	03/10/2020	03/09/2020	03/09/2020	03/12/2020	03/12/2020	03/09/2020	03/09/2020	03/09/2020	03/09/2020	11/22/2019	11/22/2019	11/22/2019
		Sample Depth	17-17.5 feet	8-8 feet	11-12 feet	17-17 feet	13-14 feet	16-17 feet	12-12.5 feet	19.5-20 feet	17-17 feet	17-17 feet	19-20 feet	12-12.5 feet	12-12.5 feet
Analyte	Units	Preliminary Screening Level													
Conventionals															
Total organic carbon	%	--		0.075 U											
Metals															
Lead	mg/kg	--			3.3	2.6	2.7	3.8	1.1	3.6	2.1	1.5		3.8	3.0
Semivolatile Organic Compounds (SVOCs)															
cPAHs (MTCA TEQ-HalfND)	mg/kg	0.1	0.052		0.0076 U	0.0076 U	0.038	0.045	0.039	0.0076 U	0.038	0.038	0.042	0.038 U	0.038 U
cPAHs (MTCA TEQ-ZeroND)	mg/kg	--	0.017		0 U (1)	0 U (1)	0.00064	0.010	0.0010	0 U (1)	0.00068	0.00088	0.0073	0 U (1)	0 U (1)
Naphthalene	mg/kg	--				6.3	1.1	2.0							
1-Methylnaphthalene	mg/kg	--	38										32	1.4	1.7
2-Methylnaphthalene	mg/kg	--	27										27	1.6	1.9
Acenaphthene	mg/kg	--	1.3										1.0	0.050 U	0.053
Acenaphthylene	mg/kg	--	0.050 U										0.050 U	0.050 U	0.050 U
Anthracene	mg/kg	--	0.050 U										0.050 U	0.050 U	0.050 U
Benzo(a)anthracene	mg/kg	--	0.13		0.010 U	0.010 U	0.050 U	0.091	0.050 U	0.010 U	0.050 U	0.050 U	0.057	0.050 U	0.050 U
Benzo(a)pyrene	mg/kg	--	0.050 U		0.010 U	0.010 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Benzo(b)fluoranthene	mg/kg	--	0.050 U		0.010 U	0.010 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Benzo(g,h,i)perylene	mg/kg	--	0.050 U										0.050 U	0.050 U	0.050 U
Benzo(k)fluoranthene	mg/kg	--	0.050 U		0.010 U	0.010 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Chrysene	mg/kg	--	0.40		0.010 U	0.010 U	0.064	0.11	0.10	0.010 U	0.068	0.088	0.16	0.050 U	0.050 U
Dibenzo(a,h)anthracene	mg/kg	--	0.050 U		0.010 U	0.010 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Fluoranthene	mg/kg	--	0.24										0.16	0.050 U	0.050 U
Fluorene	mg/kg	--	8.0										6.8	0.24	0.28
Indeno(1,2,3-c,d)pyrene	mg/kg	--	0.050 U		0.010 U	0.010 U	0.050 U	0.050 U	0.050 U	0.010 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Naphthalene	mg/kg	--	0.050 U										0.050 U	0.050 U	0.050 U
Phenanthrene	mg/kg	--	11										8.8	0.30	0.32
Pyrene	mg/kg	--	0.71										0.43	0.050 U	0.050 U
Volatile Organic Compounds (VOCs)															
1,2-Dibromoethane (EDB)	mg/kg	--	0.50 U		0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U			0.25 U		0.050 U
1,2-Dichloroethane (EDC)	mg/kg	--	0.50 U		0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U			0.25 U		0.050 U
Methyl-Tert-Butyl Ether	mg/kg	--	0.50 U		0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U			0.25 U		0.050 U
n-Hexane	mg/kg	--	45		3.6	1.3	18	32	0.25 U	0.25 U			23		1.1

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
Italics Indicates a nondetect result with a practical quantitation limit that exceeds the applicable screening level.
1 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

cPAH Carcinogenic polycyclic aromatic hydrocarbon
mg/kg Milligrams per kilogram
MTCA Model Toxics Control Act
TEQ Toxic equivalent

Qualifier:

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

Table 3.2
Soil Analytical—VOCs, SVOCs, and Metals

			AOPC 6 (cont.)			AOPC 7							
		Location	**OIP-67**		**OIP-68**	**OIP-23**			**OIP-30**	**OIP-52**		**OIP-53**	**OIP-54**
		Sample ID	**OIP-67-11-12**	**OIP-67-14.5-15**	**OIP-68-14-14.5**	**OIP-23-14-15**	**OIP-23-19-20**	**OIP-23-23-24**	**OIP30-20-21-111919**	**OIP52-19-19.5-112219**	**OIP52-22-22.5-112219**	**OIP53-22-22.5-112219**	**OIP-54-18-19**
		Date	**03/12/2020**	**03/12/2020**	**03/11/2020**	**03/10/2020**	**03/10/2020**	**03/10/2020**	**11/19/2019**	**11/22/2019**	**11/22/2019**	**11/22/2019**	**03/11/2020**
		Sample Depth	**11-12 feet**	**14.5-15 feet**	**14-14.5 feet**	**14-15 feet**	**19-20 feet**	**23-24 feet**	**20-21 feet**	**19-19.5 feet**	**22-22.5 feet**	**22-22.5 feet**	**18-19 feet**
Analyte	**Units**	**Preliminary Screening Level**											
Conventionals													
Total organic carbon	%	--			0.16							0.075 U	0.075 U
Metals													
Lead	mg/kg	--	5.0	1.6						1.0 U	1.2	1.0 U	
Semivolatile Organic Compounds (SVOCs)													
cPAHs (MTCA TEQ-HalfND)	mg/kg	0.1	0.048	0.038 U		0.038	0.053	0.038 U	0.54	0.0076 U	0.0076	0.0076 U	
cPAHs (MTCA TEQ-ZeroND)	mg/kg	--	0.015	0 U (1)		0.00058	0.018	0 U (1)	0.53	0 U (1)	0.00010	0 U (1)	
Naphthalene	mg/kg	--		0.15									
1-Methylnaphthalene	mg/kg	--							13	0.55	8.1	0.010 U	
2-Methylnaphthalene	mg/kg	--							15	0.010 U	0.010 U	0.010 U	
Acenaphthene	mg/kg	--							0.94	0.077	0.39	0.010 U	
Acenaphthylene	mg/kg	--							0.10 U	0.010 U	0.010 U	0.010 U	
Anthracene	mg/kg	--							2.1	0.010 U	0.010 U	0.010 U	
Benzo(a)anthracene	mg/kg	--	0.080	0.050 U		0.050 U	0.16	0.050 U	0.81	0.010 U	0.010 U	0.010 U	
Benzo(a)pyrene	mg/kg	--	0.050 U	0.050 U		0.050 U	0.050 U	0.050 U	0.40	0.010 U	0.010 U	0.010 U	
Benzo(b)fluoranthene	mg/kg	--	0.063	0.050 U		0.050 U	0.050 U	0.050 U	0.24	0.010 U	0.010 U	0.010 U	
Benzo(g,h,i)perylene	mg/kg	--							0.11	0.010 U	0.010 U	0.010 U	
Benzo(k)fluoranthene	mg/kg	--	0.050 U	0.050 U		0.050 U	0.050 U	0.050 U	0.10 U	0.010 U	0.010 U	0.010 U	
Chrysene	mg/kg	--	0.093	0.050 U		0.058	0.23	0.050 U	2.0	0.010 U	0.010	0.010 U	
Dibenzo(a,h)anthracene	mg/kg	--	0.050 U	0.050 U		0.050 U	0.050 U	0.050 U	0.10 U	0.010 U	0.010 U	0.010 U	
Fluoranthene	mg/kg	--							0.58	0.011	0.045	0.010 U	
Fluorene	mg/kg	--							4.3	0.57	3.5	0.010 U	
Indeno(1,2,3-c,d)pyrene	mg/kg	--	0.050 U	0.050 U		0.050 U	0.050 U	0.050 U	0.10 U	0.010 U	0.010 U	0.010 U	
Naphthalene	mg/kg	--							0.10 U	0.010 U	0.010 U	0.010 U	
Phenanthrene	mg/kg	--							8.4	0.87	4.0	0.010 U	
Pyrene	mg/kg	--							3.4	0.026	0.10	0.010 U	
Volatile Organic Compounds (VOCs)													
1,2-Dibromoethane (EDB)	mg/kg	--	0.050 U	0.050 U		0.050 U	0.050 U	0.050 U	0.050 U				
1,2-Dichloroethane (EDC)	mg/kg	--	0.050 U	0.050 U		0.050 U	0.050 U	0.050 U	0.050 U				
Methyl-Tert-Butyl Ether	mg/kg	--	0.050 U	0.050 U		0.050 U	0.050 U	0.050 U	0.050 U				
n-Hexane	mg/kg	--	0.32	1.0		0.25 U	0.42	0.25 U	0.25 U				

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
Italics Indicates a nondetect result with a practical quantitation limit that exceeds the applicable screening level.
1 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

cPAH	Carcinogenic polycyclic aromatic hydrocarbon
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
TEQ	Toxic equivalent

Qualifier:

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

Table 3.2
Soil Analytical—VOCs, SVOCs, and Metals

			AOPC 7 (cont.)		
		Location	MW-34		
		Sample ID	MW-34-15-15.5	MW-34-20-20.5	MW-34-24-24.5
		Date	03/10/2020	03/10/2020	03/10/2020
		Sample Depth	15-15.5 feet	20-20.5 feet	24-24.5 feet
Analyte	Units	Preliminary Screening Level			
Conventionals					
Total organic carbon	%	--			
Metals					
Lead	mg/kg	--	1.1	1.3	1.0 U
Semivolatile Organic Compounds (SVOCs)					
cPAHs (MTCA TEQ-HalfND)	mg/kg	0.1	0.039	0.038	0.0076 U
cPAHs (MTCA TEQ-ZeroND)	mg/kg	--	0.0014	0.00072	0 U (1)
Naphthalene	mg/kg	--			
1-Methylnaphthalene	mg/kg	--			
2-Methylnaphthalene	mg/kg	--			
Acenaphthene	mg/kg	--			
Acenaphthylene	mg/kg	--			
Anthracene	mg/kg	--			
Benzo(a)anthracene	mg/kg	--	0.050 U	0.050 U	0.010 U
Benzo(a)pyrene	mg/kg	--	0.050 U	0.050 U	0.010 U
Benzo(b)fluoranthene	mg/kg	--	0.050 U	0.050 U	0.010 U
Benzo(g,h,i)perylene	mg/kg	--			
Benzo(k)fluoranthene	mg/kg	--	0.050 U	0.050 U	0.010 U
Chrysene	mg/kg	--	0.14	0.072	0.010 U
Dibenzo(a,h)anthracene	mg/kg	--	0.050 U	0.050 U	0.010 U
Fluoranthene	mg/kg	--			
Fluorene	mg/kg	--			
Indeno(1,2,3-c,d)pyrene	mg/kg	--	0.050 U	0.050 U	0.010 U
Naphthalene	mg/kg	--			
Phenanthrene	mg/kg	--			
Pyrene	mg/kg	--			
Volatile Organic Compounds (VOCs)					
1,2-Dibromoethane (EDB)	mg/kg	--			
1,2-Dichloroethane (EDC)	mg/kg	--			
Methyl-Tert-Butyl Ether	mg/kg	--			
n-Hexane	mg/kg	--			

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
Italics Indicates a nondetect result with a practical quantitation limit that exceeds the applicable screening level.
1 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Abbreviations:

cPAH Carcinogenic polycyclic aromatic hydrocarbon
mg/kg Milligrams per kilogram
MTCA Model Toxics Control Act
TEQ Toxic equivalent

Qualifier:

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

Table 3.3
Soil Analytical Data—VPH/EPH

	Location	OIP-08	OIP-15		OIP-20	OIP-23			OIP-30	OIP-39	OIP-42
	Sample ID	**OIP08-19-20-112219**	**OIP-15-15-16**	**OIP-15-20-21**	**OIP-20-11-11.5**	**OIP-23-14-15**	**OIP-23-19-20**	**OIP-23-23-24**	**OIP30-20-21-111919**	**OIP-39-16.5-17**	**OIP42-17-17.5-112119**
	Date	**11/22/2019**	**03/12/2020**	**03/12/2020**	**03/13/2020**	**03/10/2020**	**03/10/2020**	**03/10/2020**	**11/19/2019**	**03/10/2020**	**11/21/2019**
	Sample Depth	**19-20 feet**	**15-16 feet**	**20-21 feet**	**11-11.5 feet**	**14-15 feet**	**19-20 feet**	**23-24 feet**	**20-21 feet**	**16.5-17 feet**	**17-17.5 feet**
Analyte	**Units**										
Petroleum Fractionation Data											
EPH Aliphatic C10-C12	mg/kg	1,100	150	13 U	64	630	2800	300	150	12 U	1,300
EPH Aliphatic C12-C16	mg/kg	3,300	1,100	13 U	32	2,900	12,000	1,600	1,300	12 U	4,100
EPH Aliphatic C16-C21	mg/kg	2,800	1,100	13 U	14 U	3,100	11,000	1,800	1,700	12 U	3,500
EPH Aliphatic C21-C34	mg/kg	870	310 J	13 U	14 U	470 J	1,600 J	260 J	2,000	12 U	990
EPH Aliphatic C8-C10	mg/kg	820 J	23 UJ	26 UJ	71 J	140 J	620 J	70 J	33 J	37 J	920 J
EPH Aromatic C10-C12	mg/kg	290	11 U	13 U	130	98	480	49	56	12 U	400
EPH Aromatic C12-C16	mg/kg	890	120	13 U	110	910	3,600	490	560	12 U	1,300
EPH Aromatic C16-C21	mg/kg	2,000	740	13 U	20	2,700	9,500	1500	1,700	12 U	2,600
EPH Aromatic C21-C34	mg/kg	390	270	13 U	20	320	910	160	2,300	12 U	500
EPH Aromatic C8-C10	mg/kg	80 J	11 UJ	13 UJ	14 UJ	13 UJ	44 J	12 UJ	16 J	12 UJ	110 J
VPH Aliphatic C10-C12	mg/kg	620	13	1.5 U	120	110	310	84	39	1.1 U	220
VPH Aliphatic C5-C6	mg/kg	16 U	1.1 U	1.8 U	1.7 U	17 U	16 U	27 U	1.6 U	1.3 U	280
VPH Aliphatic C6-C8	mg/kg	270	1.6 U	2.5 U	26	24 U	39	38 U	6.2	2.1	600
VPH Aliphatic C8-C10	mg/kg	290	0.88 U	1.4 U	56	35	65	22 U	9.5	1.0 U	120
VPH Aromatic C10-C12	mg/kg	1,400	31	0.61 U	270	470	1,000	320	44	0.85	540
VPH Aromatic C12-C13	mg/kg	2,200	200	7.1 U	280	900 J	4,000	1,700 J	140	5.2 U	560
VPH Aromatic C8-C10	mg/kg	430	1.9 U	3.1 U	51	34 J	110 J	46 U	18	2.2 U	200

Note:

All results rounded to two significant figures.

Abbreviations:

EPH Extractable petroleum hydrocarbons
mg/kg Milligrams per kilogram
VPH Volatile petroleum hydrocarbons

Qualifier:

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

Table 3.3
Soil Analytical Data—VPH/EPH

Location		OIP-47		OIP-66	OIP-67		GP-36		MW-33		MW-39
Sample ID		OIP-47-11-12	OIP-47-17	OIP66-12-12.5-1112219	OIP-67-11-12	OIP-67-14.5-15	GP-36-13-14	GP-36-16-17	MW-33-12-12.5	MW-33-19.5-20	MW-39-13-14
Date		03/09/2020	03/09/2020	11/22/2019	03/12/2020	03/12/2020	03/12/2020	03/12/2020	03/09/2020	03/09/2020	03/12/2020
Sample Depth		11-12 feet	17-17 feet	12-12.5 feet	11-12 feet	14.5-15 feet	13-14 feet	16-17 feet	12-12.5 feet	19.5-20 feet	13-14 feet
Analyte	**Units**										
Petroleum Fractionation Data											
EPH Aliphatic C10-C12	mg/kg	17	19	200	580	62 J	350	820	690	15 U	890
EPH Aliphatic C12-C16	mg/kg	13 U	15 U	270	1,500	210 J	1,200	2,400	3,300	20	4,300
EPH Aliphatic C16-C21	mg/kg	13 U	15 U	200	1,500	230 J	1,200	2,300	3,000	15 U	4,600
EPH Aliphatic C21-C34	mg/kg	13 U	15 U	45	330 J	22 J	250 J	520 J	720 J	15 U	630 J
EPH Aliphatic C8-C10	mg/kg	27 UJ	32 J	240 J	320 J	42 J	170 J	440 J	110 J	30 UJ	200 J
EPH Aromatic C10-C12	mg/kg	16	28	69	180	14 J	120	240	110	15 U	130
EPH Aromatic C12-C16	mg/kg	16	15 U	96	610	57 J	450	880	850	15 U	1,000
EPH Aromatic C16-C21	mg/kg	13 U	18	180	1,200	190 J	970	1,800	2,400	15 U	3,300
EPH Aromatic C21-C34	mg/kg	13 U	27	93	250	19 J	170	400	490	15 U	410
EPH Aromatic C8-C10	mg/kg	13 UJ	15 UJ	13 UJ	12 UJ	12 UJ	13 UJ	22 J	13 UJ	15 UJ	10 UJ
VPH Aliphatic C10-C12	mg/kg	470	110	60	800	230 J	53 U	240	210	1.3 U	260
VPH Aliphatic C5-C6	mg/kg	270	8.5	1.3 U	35 U	5.4 J	62 U	63	7.7	1.5 U	15 U
VPH Aliphatic C6-C8	mg/kg	830	110	36	250	120 J	89 U	400	12	2.1 U	33
VPH Aliphatic C8-C10	mg/kg	330	100	35	540	150 J	50 U	170	40	1.2 U	57
VPH Aromatic C10-C12	mg/kg	1,100	360	200	1,900 J	440 J	79	560	760	14	520
VPH Aromatic C12-C13	mg/kg	1,200	420	170	4,300 J	780 J	610	820	2,200 J	20 J	2,700 J
VPH Aromatic C8-C10	mg/kg	330	130 J	57	510	120 J	110 U	190	53 J	2.5 U	63

Note:

All results rounded to two significant figures.

Abbreviations:

EPH	Extractable petroleum hydrocarbons
mg/kg	Milligrams per kilogram
VPH	Volatile petroleum hydrocarbons

Qualifier:

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

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			AOPC 1					AOPC 2							
		Location	OIP-06	MW-37		MW-38		OIP-02		OIP-04	MW-32		T-2	UST-4	UST-4
		Sample ID	OIP-06-GW-25-30	MW-37-050720	MW-37-081020	MW-38-050720	MW-38-081020	OIP-02-GW-14.5-19.5	OIP-02-GW-14.5-19.5D	OIP-04-GW-15-20	MW-32-050720	MW-32-081120	T-2-081120	UST-104-022819	UST-4-022819
		Date	03/13/2020	05/07/2020	08/10/2020	05/07/2020	08/10/2020	03/11/2020	03/11/2020	03/10/2020	05/07/2020	08/11/2020	08/11/2020	02/28/2019	02/28/2019
Analyte	Units	Preliminary Screening Level													
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx															
Gasoline-range organics (GRO)	µg/L	800	100 U	100 U	120	100 U	100 U	100 U	100 U	130	100 U	100 U	100 U	100 U	100 U
Diesel-range organics (DRO)	µg/L	500	200 $^{(1)}$	210 $^{(1)}$	50 U	74 $^{(1)}$	57 $^{(1)}$	110 $^{(1)}$	94 $^{(1)}$	660 $^{(1)}$	50 U	50 U	50 U	140 $^{(1)}$	140 $^{(1)}$
Oil-range organics (ORO)	µg/L	500	250 U	250 U	250 UJ	250 U	250 U	250 U	250 U	870 $^{(1)}$	250 U	250 U	250 U	300 U	300 U
Total diesel-range and oil-range organics	µg/L	500	200 $^{(1)}$	210 $^{(1)}$	250 UJ	74 $^{(1)}$	57 $^{(1)}$	110 $^{(1)}$	94 $^{(1)}$	1,500 $^{(1)}$	250 U	250 U	250 U		
Total Petroleum Hydrocarbons by NWTPH-HCID															
Diesel Range Organics	µg/L	500												60 U	60 U
Oil Range Organics	µg/L	500												300 U	300 U
BTEX Compounds by USEPA 8021B/8260D															
Benzene	µg/L	5	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	1.0 U
Ethylbenzene	µg/L	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	1.0 U	1.0 U	2.5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U		
Xylene (ortho)	µg/L	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		
Xylene (total)	µg/L	1,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	3.0 U	3.0 U
Semivolatile Organic Compounds (SVOCs)															
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1	0.030 U	0.030	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U		
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U $^{(2)}$	0.00045	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$		
Total HPAH	µg/L	--		0.20		0.040 U					0.040 U				
Total LPAH	µg/L	--		0.89 J		0.40 UJ					0.40 UJ				
Total PAH	µg/L	--		1.1 J		0.40 UJ					0.40 UJ				
1-Methylnaphthalene	µg/L	--		0.40 U		0.40 U					0.40 U				
2-Methylnaphthalene	µg/L	--		0.40 U		0.40 U					0.40 U				
Acenaphthene	µg/L	--		0.82		0.040 U					0.040 U				
Acenaphthylene	µg/L	--		0.040 U		0.040 U					0.040 U				
Anthracene	µg/L	--		0.040 U		0.040 U					0.040 U				
Benzo(a)anthracene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		
Benzo(a)pyrene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		
Benzo(b)fluoranthene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		
Benzo(g,h,i)perylene	µg/L	--		0.040 U		0.040 U					0.040 U				
Benzo(k)fluoranthene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		
Chrysene	µg/L	--	0.040 U	0.045	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		
Dibenzo(a,h)anthracene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		
Fluoranthene	µg/L	--		0.043		0.040 U					0.040 U				
Fluorene	µg/L	--		0.073 J		0.040 UJ					0.040 UJ				
Hexachlorobutadiene	µg/L	--											1.0 U		
Indeno(1,2,3-c,d)pyrene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		
Naphthalene	µg/L	--	1.0 U	0.40 U		0.40 U		1.0 U	1.0 U	1.0 U	0.40 U		1.0 U		
Phenanthrene	µg/L	--		0.060 U		0.060 U					0.060 U				
Pyrene	µg/L	--		0.11		0.040 U					0.040 U				

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.

U Analyte was not detected at the given reporting limit.

UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes	MTCA	Model Toxics Model Toxics Control Act
cPAH	Carcinogenic polycyclic aromatic hydrocarbon	PAH	Polycyclic arc Polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter	TEQ	Toxic equival Toxic equivalent

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			APOC 3		AOPC 4									
		Location	**UST-4**		**OIP-69**	**OIP-70**	**MW-06**	**MW-06**		**MW-19**	**MW-19**		**MW-39**	
		Sample ID	**UST-4-050620**	**UST-4-081020**	**OIP-69-GW-12-17**	**OIP-70-GW-10-15**	**MW-06-022719**	**MW-06-050620**	**MW-06-081020**	**MW-19-022719**	**MW-19-050720**	**MW-19-081020**	**MW-39-050720**	**MW-39-081020**
		Date	**05/06/2020**	**08/10/2020**	**03/11/2020**	**03/10/2020**	**02/27/2019**	**05/06/2020**	**08/10/2020**	**02/27/2019**	**05/07/2020**	**08/10/2020**	**05/07/2020**	**08/10/2020**
Analyte	**Units**	**Preliminary Screening Level**												
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx														
Gasoline-range organics (GRO)	µg/L	800	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	380	510
Diesel-range organics (DRO)	µg/L	500	230 (1)	57 (1)	140	220 (1)	800 (1)	780 (1)	1,900 (1)	67 (1)	50 U	76 (1)	5,700	6,500 (1)
Oil-range organics (ORO)	µg/L	500	320 (1)	250 U	250 U	250 U	300 U	250 U	360 (1)	300 U	250 U	250 U	950 (1)	790 (1)
Total diesel-range and oil-range organics	µg/L	500	550 (1)	57 (1)	140	220 (1)	800 (1)	780 (1)	2,300 (1)		250 U	76 (1)	6,700 (1)	7,300 (1)
Total Petroleum Hydrocarbons by NWTPH-HCID														
Diesel Range Organics	µg/L	500					140			60 U				
Oil Range Organics	µg/L	500					300 U			300 U				
BTEX Compounds by USEPA 8021B/8260D														
Benzene	µg/L	5	0.35 U	0.35 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U
Ethylbenzene	µg/L	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--	2.0 U	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U
Xylene (ortho)	µg/L	--	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	µg/L	1,000	2.0 U	2.0 U	2.0 U	2.0 U	3.0 U	2.0 U	2.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Semivolatile Organic Compounds (SVOCs)														
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1	0.030 U	0.030 U	0.030 U	0.030 U		0.030 U	0.030 U		0.030 U	0.030 U	0.030 U	0.030 U
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)
Total HPAH	µg/L	--	0.040 U					0.040 U			0.040 U		0.040 U	
Total LPAH	µg/L	--	0.40 UJ					0.80 J			0.40 UJ		10 J	
Total PAH	µg/L	--	0.40 UJ					0.80 J			0.40 UJ		10 J	
1-Methylnaphthalene	µg/L	--	0.40 U					0.40 U			0.40 U		11	
2-Methylnaphthalene	µg/L	--	0.40 U					0.40 U			0.40 U		0.40 U	
Acenaphthene	µg/L	--	0.040 U					0.15			0.040 U		1.7	
Acenaphthylene	µg/L	--	0.040 U					0.040 U			0.040 U		0.040 U	
Anthracene	µg/L	--	0.040 U					0.040 U			0.040 U		0.040 U	
Benzo(a)anthracene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U
Benzo(a)pyrene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U
Benzo(b)fluoranthene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U
Benzo(g,h,i)perylene	µg/L	--	0.040 U					0.040 U			0.040 U		0.040 U	
Benzo(k)fluoranthene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U
Chrysene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U
Dibenzo(a,h)anthracene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U
Fluoranthene	µg/L	--	0.040 U					0.040 U			0.040 U		0.040 U	
Fluorene	µg/L	--	0.040 UJ					0.65 J			0.040 UJ		7.2 J	
Hexachlorobutadiene	µg/L	--									1.0 U	1.0 U		1.0 U
Indeno(1,2,3-c,d)pyrene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U
Naphthalene	µg/L	--	0.40 U	1.0 U	1.0 U	1.0 U		0.40 U			0.40 U	1.0 U	0.40 U	1.0 U
Phenanthrene	µg/L	--	0.060 U					0.060 U			0.060 U		1.5	
Pyrene	µg/L	--	0.040 U					0.040 U			0.040 U		0.040 U	

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.

U Analyte was not detected at the given reporting limit.

UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
MTCA	Model Toxics Model Toxics Control Act
PAH	Polycyclic arc Polycyclic aromatic hydrocarbon
TEQ	Toxic equival Toxic equivalent

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			AOPC 5													
		Location	**OIP-15**	**MW-07**	**MW-07**			**MW-11**	**MW-11**	**MW-12**	**MW-12**		**MW-13**	**MW-13**		**MW-14**
		Sample ID	**OIP-15-GW-14-19**	**MW-07-022719**	**MW-07-050620**	**MW-07-081120**	**MW-107-081120**	**MW-11-022819**	**MW-11-050720**	**MW-12-022719**	**MW-12-050720**	**MW-12-081120**	**MW-13-022819**	**MW-13-050720**	**MW-13-081020**	**MW-14-022719**
		Date	**03/12/2020**	**02/27/2019**	**05/06/2020**	**08/11/2020**	**08/11/2020**	**02/28/2019**	**05/07/2020**	**02/27/2019**	**05/07/2020**	**08/11/2020**	**02/28/2019**	**05/07/2020**	**08/10/2020**	**02/27/2019**
Analyte	**Units**	**Preliminary Screening Level**														
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																
Gasoline-range organics (GRO)	µg/L	800	380	1,100	560	1,200	1,300	100 U	100 U	600	470	7,100	100 U	100 U	100 U	100 U
Diesel-range organics (DRO)	µg/L	500	1,300	780 (1)	820	1,200	1,200	60 ^{U}	66 (1)	490 (1)	130 (1)	2,100	60 U	50 U	60 (1)	150 (1)
Oil-range organics (ORO)	µg/L	500	380 (1)	300 U	250 U	250 U	250 U	300 U	250 U	300 U	250 U	250 U	300 U	250 U	250 U	300 U
Total diesel-range and oil-range organics	µg/L	500	1,700 (1)		820	1,200	1,200	60 ^{U}	66 (1)		130 (1)	2,100		250 U	60 (1)	150 (1)
Total Petroleum Hydrocarbons by NWTPH-HCID																
Diesel Range Organics	µg/L	500		340 (1)				60 U		100 (1)			60 U			81
Oil Range Organics	µg/L	500		300 U				300 U		300 U			300 U			300 U
BTEX Compounds by USEPA 8021B/8260D																
Benzene	µg/L	5	0.35 U	2.0	0.45	0.56	0.58	1.0 U	0.35 U	61	81	910	1.0 U	0.35 U	0.35 U	1.0 U
Ethylbenzene	µg/L	700	1.0 U	2.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.5	2.0	46	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	1.0 U	9.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	6.4	2.8	42	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--	2.0 U		2.0 U	2.0 U	2.0 U		2.0 U		3.6	57		2.0 U	2.0 U	
Xylene (ortho)	µg/L	--	1.0 U		1.0 U	1.0 U	1.0 U		1.0 U		1.0 U	1.3		1.0 U	1.0 U	
Xylene (total)	µg/L	1,000	2.0 U	6.0	2.0 U	2.0 U	2.0 U	3.0 U	2.0 U	6.2	3.6	58	3.0 U	2.0 U	2.0 U	3.0 U
Semivolatile Organic Compounds (SVOCs)																
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1	0.030 U		0.030 U	0.030 U	0.030 U		0.030 U		0.030 U	0.030 U		0.030 U	0.030 U	
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)
Total HPAH	µg/L	--			0.040 U				0.040 U		0.040 U			0.040 U		
Total LPAH	µg/L	--			0.40 UJ				0.40 UJ		0.40 UJ			0.40 UJ		
Total PAH	µg/L	--			0.40 UJ				0.40 UJ		0.40 UJ			0.40 UJ		
1-Methylnaphthalene	µg/L	--			0.40 U				0.40 U		0.40 U			0.40 U		
2-Methylnaphthalene	µg/L	--			0.40 U				0.40 U		0.40 U			0.40 U		
Acenaphthene	µg/L	--			0.040 U				0.040 U		0.040 U			0.040 U		
Acenaphthylene	µg/L	--			0.040 U				0.040 U		0.040 U			0.040 U		
Anthracene	µg/L	--			0.040 U				0.040 U		0.040 U			0.040 U		
Benzo(a)anthracene	µg/L	--	0.040 U		0.040 U	0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Benzo(a)pyrene	µg/L	--	0.040 U		0.040 U	0.040 U	0.040 U		0.040 U		0.040 UJ	0.040 U		0.040 U	0.040 U	
Benzo(b)fluoranthene	µg/L	--	0.040 U		0.040 U	0.040 U	0.040 U		0.040 U		0.040 UJ	0.040 U		0.040 U	0.040 U	
Benzo(g,h,i)perylene	µg/L	--			0.040 U				0.040 U		0.040 UJ			0.040 U		
Benzo(k)fluoranthene	µg/L	--	0.040 U		0.040 U	0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Chrysene	µg/L	--	0.040 U		0.040 U	0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Dibenzo(a,h)anthracene	µg/L	--	0.040 U		0.040 U	0.040 U	0.040 U		0.040 U		0.040 UJ	0.040 U		0.040 U	0.040 U	
Fluoranthene	µg/L	--			0.040 U				0.040 U		0.040 U			0.040 U		
Fluorene	µg/L	--			0.040 UJ				0.040 UJ		0.040 UJ			0.040 UJ		
Hexachlorobutadiene	µg/L	--									1.0 U	1.0 U				
Indeno(1,2,3-c,d)pyrene	µg/L	--	0.040 U		0.040 U	0.040 U	0.040 U		0.040 U		0.040 UJ	0.040 U		0.040 U	0.040 U	
Naphthalene	µg/L	--	1.0 U		0.40 U	1.0 U	1.0 U		0.40 U		0.40 U	1.0 U		0.40 U		
Phenanthrene	µg/L	--			0.060 U				0.060 U		0.060 U			0.060 U		
Pyrene	µg/L	--			0.040 U				0.040 U		0.040 U			0.040 U		

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.

U Analyte was not detected at the given reporting limit.

UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes	MTCA	Model Toxics Model Toxics Control Act
cPAH	Carcinogenic polycyclic aromatic hydrocarbon	PAH	Polycyclic aror Polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter	TEQ	Toxic equivale Toxic equivalent

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			AOPC 5 (cont.)														
		Location	MW-14		MW-15	MW-15		MW-16	MW-16	MW-17	MW-17		MW-20	MW-20	MW-25	MW-25	
		Sample ID	MW-14-050720	MW-14-081120	MW-15-022719	MW-15-050720	MW-15-081020	MW-16-022719	MW-16-050720	MW-17-02281	MW-17-050720	MW-17-081120	MW-20-022819	MW-20-05072	MW-25-0228	MW-25-050720	MW-25-081120
		Date	05/07/2020	08/11/2020	02/27/2019	05/07/2020	08/10/2020	02/27/2019	05/07/2020	02/28/2019	05/07/2020	08/11/2020	02/28/2019	05/07/2020	########	05/07/2020	08/11/2020
Analyte	Units	Preliminary Screening Level															
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																	
Gasoline-range organics (GRO)	µg/L	800	100 U	100 U	100 U	140	120	100 U	100 U	100 U	100 U	100 U	1,500	2,800	## U	100 U	100 U
Diesel-range organics (DRO)	µg/L	500	120 (1)	230 (1)	78 (1)	510 (1)	300 (1)	60 U	84 (1)	60 U	67 (1)	62 (1)	970 (1)	1,000 (1)	60 U	50 U	50 U
Oil-range organics (ORO)	µg/L	500	250 U	250 U	300 U	250 U	250 U	300 U	250 U	300 U	250 U	250 U	360 (1)	290 (1)	## U	250 U	250 U
Total diesel-range and oil-range organics	µg/L	500	120 (1)	230 (1)	78 (1)	510 (1)	300 (1)		84 (1)	60 U	67 (1)	62 (1)		1,300 (1)		250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-HCID																	
Diesel Range Organics	µg/L	500			60 U			60 U		65 U			370 (1)		60 U		
Oil Range Organics	µg/L	500			300 U			300 U		320 U			300 U		## U		
BTEX Compounds by USEPA 8021B/8260D																	
Benzene	µg/L	5	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	1.0 U	0.35 U	0.35 U	1.7	1.6	1.0 U	0.35 U	0.35 U
Ethylbenzene	µg/L	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	7.0	5.5	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.7	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--	2.0 U	2.0 U		2.0 U	2.0 U		2.0 U		2.0 U	2.0 U		4.3		2.0 U	2.0 U
Xylene (ortho)	µg/L	--	1.0 U	1.0 U		1.0 U	1.0 U		1.0 U		1.0 U	1.0 U		1.0 U		1.0 U	1.0 U
Xylene (total)	µg/L	1,000	2.0 U	2.0 U	3.0 U	2.0 U	2.0 U	3.0 U	2.0 U	3.0 U	2.0 U	2.0 U	9.1	4.3	3.0 U	2.0 U	2.0 U
Semivolatile Organic Compounds (SVOCs)																	
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1	0.030 U	0.030 U		0.030 U	0.030 U		0.030 U		0.030 U	0.030 U		0.030 U		0.030 U	0.030 U
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U (2)	0 U (2)		0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)
Total HPAH	µg/L	--	0.040 U			0.040 U			0.040 U		0.040 U			0.040 U		0.040 U	
Total LPAH	µg/L	--	0.40 UJ			0.66 J			0.40 UJ		0.40 UJ			0.40 UJ		0.40 UJ	
Total PAH	µg/L	--	0.40 UJ			0.66 J			0.40 UJ		0.40 UJ			0.40 UJ		0.40 UJ	
1-Methylnaphthalene	µg/L	--	0.40 U			0.40 U			0.40 U		0.40 U			7.4		0.40 U	
2-Methylnaphthalene	µg/L	--	0.40 U			0.40 U			0.40 U		0.40 U			0.40 U		0.40 U	
Acenaphthene	µg/L	--	0.040 U			0.38			0.040 U		0.040 U			0.040 U		0.040 U	
Acenaphthylene	µg/L	--	0.040 U			0.040 U			0.040 U		0.040 U			0.040 U		0.040 U	
Anthracene	µg/L	--	0.040 U			0.040 U			0.040 U		0.040 U			0.040 U		0.040 U	
Benzo(a)anthracene	µg/L	--	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U
Benzo(a)pyrene	µg/L	--	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U
Benzo(b)fluoranthene	µg/L	--	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U
Benzo(g,h,i)perylene	µg/L	--	0.040 U			0.040 U			0.040 U		0.040 U			0.040 U		0.040 U	
Benzo(k)fluoranthene	µg/L	--	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U
Chrysene	µg/L	--	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U
Dibenzo(a,h)anthracene	µg/L	--	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U
Fluoranthene	µg/L	--	0.040 U			0.040 U			0.040 U		0.040 U			0.040 U		0.040 U	
Fluorene	µg/L	--	0.040 UJ			0.19 J			0.040 UJ		0.040 UJ			0.040 UJ		0.040 UJ	
Hexachlorobutadiene	µg/L	--															
Indeno(1,2,3-c,d)pyrene	µg/L	--	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U
Naphthalene	µg/L	--	0.40 U			0.40 U			0.40 U		0.40 U			0.40 U		0.40 U	
Phenanthrene	µg/L	--	0.060 U			0.087			0.060 U		0.060 U			0.060 U		0.060 U	
Pyrene	µg/L	--	0.040 U			0.040 U			0.040 U		0.040 U			0.040 U		0.040 U	

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

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U Analyte was not detected at the given reporting limit.

UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
MTCA	Model Toxics Model Toxics Control Act
PAH	Polycyclic arc Polycyclic aromatic hydrocarbon
TEQ	Toxic equival Toxic equivalent

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			AOPC 5 (cont.)					AOPC 6								
		Location	MW-33			MW-40		OIP-67	OIP-68	MW-02	MW-02		MW-03	MW-03		MW-05
		Sample ID	MW-133-050620	MW-33-050620	MW-33-081120	MW-40-050620	MW-40-081120	OIP-67-GW-14-19	OIP-68-GW-13-18	MW-02-022719	MW-02-050620	MW-02-081020	MW-03-022719	MW-03-050620	MW-03-081020	MW-05-022719
		Date	05/06/2020	05/06/2020	08/11/2020	05/06/2020	08/11/2020	03/12/2020	03/11/2020	02/27/2019	05/06/2020	08/10/2020	02/27/2019	05/06/2020	08/10/2020	02/27/2019
Analyte	Units	Preliminary Screening Level														
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																
Gasoline-range organics (GRO)	µg/L	800	130	160	150	1,100	2,000	3,200	860	100 U	100 U	100 U	960	260	570	100 U
Diesel-range organics (DRO)	µg/L	500	850	1,100	930	2,900 (1)	3,400	2,000	900 (1)	60 U	310 (1)	640 (1)	1,700 (1)	1,500 (1)	1,100 (1)	82 (1)
Oil-range organics (ORO)	µg/L	500	250 U	250 U	250 U	320 (1)	330 (1)	250 U	290 (1)	300 U	250 U	330 (1)	450 (1)	590 (1)	410 (1)	300 U
Total diesel-range and oil-range organics	µg/L	500	850	1,100	930	3,200 (1)	3,700 (1)	2,000	1,200 (1)		560 (1)	970 (1)		2,100 (1)	1,500 (1)	
Total Petroleum Hydrocarbons by NWTPH-HCID																
Diesel Range Organics	µg/L	500				1,100	2,000			60 U			73 (1)			60 U
Oil Range Organics	µg/L	500								300 U			300 U			300 U
BTEX Compounds by USEPA 8021B/8260D																
Benzene	µg/L	5	0.35 U	0.35 U	0.35 U	430	310	1.3	0.35 U	1.0 U	0.35 U	0.35 U	13	1.1	1.2	1.0 U
Ethylbenzene	µg/L	700	1.0 U	1.0 U	1.0 U	7.4	1.1	1.3	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	1.0 U	1.0 U	1.0 U	11	6.3	2.3	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--	2.0 U	2.0 U	2.0 U	4.2	2.0	2.2	2.0 U		2.0 U	2.0 U		2.0 U	2.0 U	
Xylene (ortho)	µg/L	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U		1.0 U	1.0 U	
Xylene (total)	µg/L	1,000	2.0 U	2.0 U	2.0 U	4.2	2.0	2.2	2.0 U	3.0 U	2.0 U	2.0 U	15 U	2.0 U	2.0 U	3.0 U
Semivolatile Organic Compounds (SVOCs)																
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 UJ	0.030 U		0.030 U	0.030 U		0.030 U	0.030 U	
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 UJ (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)
Total HPAH	µg/L	--	0.040 U	0.040 U		0.040 U					0.040 U			0.040 U		
Total LPAH	µg/L	--	1.6 J	1.5 J		8.5 J					0.40 UJ			0.40 UJ		
Total PAH	µg/L	--	1.6 J	1.5 J		8.5 J					0.40 UJ			0.40 UJ		
1-Methylnaphthalene	µg/L	--	0.40 U	0.40 U		53					0.40 U			0.40 U		
2-Methylnaphthalene	µg/L	--	0.40 U	0.40 U		3.8					0.40 U			0.40 U		
Acenaphthene	µg/L	--	0.36	0.34		1.2					0.040 U			0.040 U		
Acenaphthylene	µg/L	--	0.040 U	0.040 U		0.040 U					0.040 U			0.040 U		
Anthracene	µg/L	--	0.040 U	0.040 U		0.040 U					0.040 U			0.040 U		
Benzo(a)anthracene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Benzo(a)pyrene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 UJ	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Benzo(b)fluoranthene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Benzo(g,h,i)perylene	µg/L	--	0.040 U	0.040 U		0.040 U					0.040 U			0.040 U		
Benzo(k)fluoranthene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Chrysene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Dibenzo(a,h)anthracene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 UJ	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Fluoranthene	µg/L	--	0.040 U	0.040 U		0.040 U					0.040 U			0.040 U		
Fluorene	µg/L	--	0.74 J	0.70 J		5.2 J					0.040 UJ			0.040 UJ		
Hexachlorobutadiene	µg/L	--				1.0 U	1.0 U									
Indeno(1,2,3-c,d)pyrene	µg/L	--	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U	
Naphthalene	µg/L	--	0.40 U	0.40 U		0.40 U	1.0 U	1.0 U	1.0 U		0.40 U			0.40 U	1.0 U	
Phenanthrene	µg/L	--	0.47	0.44		2.1					0.060 U			0.060 U		
Pyrene	µg/L	--	0.040 U	0.040 U		0.040 U					0.040 U			0.040 U		

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.

U Analyte was not detected at the given reporting limit.

UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter
MTCA	Model Toxics Model Toxics Control Act
PAH	Polycyclic aro Polycyclic aromatic hydrocarbon
TEQ	Toxic equivale Toxic equivalent

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			AOPC 6 (cont.)					AOPC 7									
		Location	MW-08		MW-10	MW-10		GP-34	MW-18	MW-18		MW-24	MW-24		MW-26	MW-26	
		Sample ID	MW-08-050620	MW-08-081020	MW-10-022719	MW-10-050620	MW-10-081020	GP-34-GW-14-19	MW-18-022819	MW-18-050720	MW-18-081120	MW-24-022819	MW-24-050720	MW-24-081120	MW-26-022819	MW-26-050720	MW-26-081020
		Date	05/06/2020	08/10/2020	02/27/2019	05/06/2020	08/10/2020	03/09/2020	02/28/2019	05/07/2020	08/11/2020	02/28/2019	05/07/2020	08/11/2020	02/28/2019	05/07/2020	08/10/2020
Analyte	**Units**	**Preliminary Screening Level**															
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx																	
Gasoline-range organics (GRO)	µg/L	800	2,300	3,000	100 U	450	4,100	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics (DRO)	µg/L	500	2,100 $^{(1)}$	2,400 $^{(1)}$	60 U	340 $^{(1)}$	1,400 $^{(1)}$	330 $^{(1)}$	60 U	50 U	50 U	60 U	50 U	50 U	140 $^{(1)}$	670 $^{(1)}$	610 $^{(1)}$
Oil-range organics (ORO)	µg/L	500	280 $^{(1)}$	370 $^{(1)}$	300 U	250 U	250 U	250 U	300 U	250 U	250 U	300 U	250 U	250 U	300 U	250 U	250 U
Total diesel-range and oil-range organics	µg/L	500	2,400 $^{(1)}$	2,800 $^{(1)}$		340 $^{(1)}$	1,400 $^{(1)}$	330 $^{(1)}$		250 U	250 U	300 U	250 U	250 U		670 $^{(1)}$	610 $^{(1)}$
Total Petroleum Hydrocarbons by NWTPH-HCID																	
Diesel Range Organics	µg/L	500			60 U				60 U			60 U			60 U		
Oil Range Organics	µg/L	500			300 U				300 U			300 U			300 U		
BTEX Compounds by USEPA 8021B/8260D																	
Benzene	µg/L	5	1.1	1.0	1.1	42	120	0.35 U	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U
Ethylbenzene	µg/L	700	1.0 U	1.0 U	1.0 U	7.6	60	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	2.0	1.8	1.0 U	5.0	19	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--	2.7	3.2		2.5	20	2.0 U		2.0 U	2.0 U		2.0 U	2.0 U		2.0 U	2.0 U
Xylene (ortho)	µg/L	--	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U		1.0 U	1.0 U		1.0 U	1.0 U		1.0 U	1.0 U
Xylene (total)	µg/L	1,000	2.7	3.2	3.0 U	2.5	20	2.0 U	3.0 U	2.0 U	2.0 U	3.0 U	2.0 U	2.0 U	3.0 U	2.0 U	2.0 U
Semivolatile Organic Compounds (SVOCs)																	
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1	0.030 U	0.038 U		0.030 U	0.030 U	0.030 U		0.030 U	0.030 U		0.030 U	0.030 U		0.030 U	0.030 U
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U $^{(2)}$	0 U $^{(2)}$		0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$	0 U $^{(2)}$
Total HPAH	µg/L	--	0.040 U			0.040 U				0.040 U			0.040 U			0.040 U	
Total LPAH	µg/L	--	2.2 J			0.075 J				0.40 UJ			0.40 UJ			0.40 UJ	
Total PAH	µg/L	--	2.2 J			0.075 J				0.40 UJ			0.40 UJ			0.40 UJ	
1-Methylnaphthalene	µg/L	--	20			2.1				0.40 U			0.40 U			0.40 U	
2-Methylnaphthalene	µg/L	--	0.40 U			0.40 U				0.40 U			0.40 U			0.40 U	
Acenaphthene	µg/L	--	0.46			0.040 U				0.040 U			0.040 U			0.040 U	
Acenaphthylene	µg/L	--	0.040 U			0.040 U				0.040 U			0.040 U			0.040 U	
Anthracene	µg/L	--	0.040 U			0.040 U				0.040 U			0.040 U			0.040 U	
Benzo(a)anthracene	µg/L	--	0.040 U	0.050 U		0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U
Benzo(a)pyrene	µg/L	--	0.040 U	0.050 U		0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U
Benzo(b)fluoranthene	µg/L	--	0.040 U	0.050 U		0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U
Benzo(g,h,i)perylene	µg/L	--	0.040 U			0.040 U				0.040 U			0.040 U			0.040 U	
Benzo(k)fluoranthene	µg/L	--	0.040 U	0.050 U		0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U
Chrysene	µg/L	--	0.040 U	0.050 U		0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U
Dibenzo(a,h)anthracene	µg/L	--	0.040 U	0.050 U		0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U
Fluoranthene	µg/L	--	0.040 U			0.040 U				0.040 U			0.040 U			0.040 U	
Fluorene	µg/L	--	1.5 J			0.075 J				0.040 UJ			0.040 UJ			0.040 UJ	
Hexachlorobutadiene	µg/L	--				1.0 U	1.0 U										
Indeno(1,2,3-c,d)pyrene	µg/L	--	0.040 U	0.050 U		0.040 U	0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U		0.040 U	0.040 U
Naphthalene	µg/L	--	0.40 U			0.40 U	1.0 U	1.0 U		0.40 U			0.40 U			0.40 U	
Phenanthrene	µg/L	--	0.28			0.060 U				0.060 U			0.060 U			0.060 U	
Pyrene	µg/L	--	0.040 U			0.040 U				0.040 U			0.040 U			0.040 U	

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
1 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

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

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes	MTCA	Model Toxics Model Toxics Control Act
cPAH	Carcinogenic polycyclic aromatic hydrocarbon	PAH	Polycyclic ar Polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter	TEQ	Toxic equival Toxic equivalent

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			AOPC 7 (cont.)											AOPC 8	
		Location	MW-27				MW-28	MW-28	MW-29	MW-29		MW-34		GP-31	GP-32
		Sample ID	MW-127-050720	MW-27-022819	MW-27-050720	MW-27-081020	MW-28-022819	MW-28-081120	MW-29-022819	MW-29-050620	MW-29-081120	MW-34-050620	MW-34-081020	GP-31-GW-13.5-18.5	GP-32-GW-14-19
		Date	05/07/2020	02/28/2019	05/07/2020	08/10/2020	02/28/2019	08/11/2020	02/28/2019	05/06/2020	08/11/2020	05/06/2020	08/10/2020	03/11/2020	03/11/2020
Analyte	Units	Preliminary Screening Level													
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx															
Gasoline-range organics (GRO)	µg/L	800	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	130	100 U	100 U
Diesel-range organics (DRO)	µg/L	500	190 (1)	60 U	150 (1)	110 (1)	5,500 (1)	5,200 (1)	60 U	54 (1)	50 U	1,300 (1)	1,500 (1)	55 (1)	150 (1)
Oil-range organics (ORO)	µg/L	500	250 U	300 U	250 U	250 U	1,600 (1)	890 (1)	300 U	250 U	250 U	250 U	290 (1)	250 U	250 U
Total diesel-range and oil-range organics	µg/L	500	190 (1)	60 U	150 (1)	110 (1)		6,100 (1)		54 (1)	250 U	1,300 (1)	1,800 (1)	55 (1)	150 (1)
Total Petroleum Hydrocarbons by NWTPH-HCID															
Diesel Range Organics	µg/L	500		60 U			610		60 U						
Oil Range Organics	µg/L	500		300 U			300 U		300 U						
BTEX Compounds by USEPA 8021B/8260D															
Benzene	µg/L	5	0.35 U	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
Ethylbenzene	µg/L	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--	2.0 U		2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Xylene (ortho)	µg/L	--	1.0 U		1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	µg/L	1,000	2.0 U	3.0 U	2.0 U	2.0 U	3.0 U	2.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Semivolatile Organic Compounds (SVOCs)															
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1	0.030 U		0.030 U	0.030 U		0.030 U		0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)		0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)
Total HPAH	µg/L	--	0.040 U		0.040 U					0.040 U		0.040 U			
Total LPAH	µg/L	--	0.40 UJ		0.40 UJ					0.40 UJ		0.24 J			
Total PAH	µg/L	--	0.40 UJ		0.40 UJ					0.40 UJ		0.24 J			
1-Methylnaphthalene	µg/L	--	0.40 U		0.40 U					0.40 U		0.40 U			
2-Methylnaphthalene	µg/L	--	0.40 U		0.40 U					0.40 U		0.40 U			
Acenaphthene	µg/L	--	0.040 U		0.040 U					0.040 U		0.095			
Acenaphthylene	µg/L	--	0.040 U		0.040 U					0.040 U		0.040 U			
Anthracene	µg/L	--	0.040 U		0.040 U					0.040 U		0.040 U			
Benzo(a)anthracene	µg/L	--	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Benzo(a)pyrene	µg/L	--	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Benzo(b)fluoranthene	µg/L	--	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Benzo(g,h,i)perylene	µg/L	--	0.040 U		0.040 U					0.040 U		0.040 U			
Benzo(k)fluoranthene	µg/L	--	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Chrysene	µg/L	--	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Dibenzo(a,h)anthracene	µg/L	--	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Fluoranthene	µg/L	--	0.040 U		0.040 U					0.040 U		0.040 U			
Fluorene	µg/L	--	0.040 UJ		0.040 UJ					0.040 UJ		0.14 J			
Hexachlorobutadiene	µg/L	--						1.0 U				1.0 U	1.0 U		
Indeno(1,2,3-c,d)pyrene	µg/L	--	0.040 U		0.040 U	0.040 U		0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Naphthalene	µg/L	--	0.40 U		0.40 U			1.0 U		0.40 U		0.40 U	1.0 U		
Phenanthrene	µg/L	--	0.060 U		0.060 U					0.060 U		0.060 U			
Pyrene	µg/L	--	0.040 U		0.040 U					0.040 U		0.040 U			

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

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

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes	MTCA	Model Toxics Model Toxics Control Act
cPAH	Carcinogenic polycyclic aromatic hydrocarbon	PAH	Polycyclic aroı Polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter	TEQ	Toxic equivale Toxic equivalent

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			Outside of AOPCs										
		Location	**MW-01**	**MW-01**		**MW-04**	**MW-22**	**MW-22**		**MW-23**	**MW-23**	
		Sample ID	**MW-01-022719**	**MW-01-050620**	**MW-01-081020**	**MW-04-022819**	**MW-22-022819**	**MW-22-050720**	**MW-22-081120**	**MW-23-022819**	**MW-23-050620**	**MW-23-081120**
		Date	**02/27/2019**	**05/06/2020**	**08/10/2020**	**02/28/2019**	**02/28/2019**	**05/07/2020**	**08/11/2020**	**02/28/2019**	**05/06/2020**	**08/11/2020**
Analyte	**Units**	**Preliminary Screening Level**										
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx												
Gasoline-range organics (GRO)	µg/L	800	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics (DRO)	µg/L	500	60 U	50 U	50 U	60 U	60 U	50 U	50 U	60 U	50 U	50 U
Oil-range organics (ORO)	µg/L	500	300 U	250 U	250 U	300 U	300 U	250 U	250 U	300 U	250 U	250 U
Total diesel-range and oil-range organics	µg/L	500		250 U	250 U	300 U	300 U	250 U	250 U	300 U	250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-HCID												
Diesel Range Organics	µg/L	500	60 U			60 U	60 U			60 U		
Oil Range Organics	µg/L	500	300 U			300 U	300 U			300 U		
BTEX Compounds by USEPA 8021B/8260D												
Benzene	µg/L	5	1.0 U	0.35 U	0.35 U	1.0 U	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U
Ethylbenzene	µg/L	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--		2.0 U	2.0 U			2.0 U	2.0 U		2.0 U	2.0 U
Xylene (ortho)	µg/L	--		1.0 U	1.0 U			1.0 U	1.0 U		1.0 U	1.0 U
Xylene (total)	µg/L	1,000	3.0 U	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	3.0 U	2.0 U	2.0 U
Semivolatile Organic Compounds (SVOCs)												
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1		0.030 U	0.030 U			0.030 U	0.030 U		0.030 U	0.030 U
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)
Total HPAH	µg/L	--		0.040 U				0.040 U			0.040 U	
Total LPAH	µg/L	--		0.40 UJ				0.40 UJ			0.40 UJ	
Total PAH	µg/L	--		0.40 UJ				0.40 UJ			0.40 UJ	
1-Methylnaphthalene	µg/L	--		0.40 U				0.40 U			0.40 U	
2-Methylnaphthalene	µg/L	--		0.40 U				0.40 U			0.40 U	
Acenaphthene	µg/L	--		0.040 U				0.040 U			0.040 U	
Acenaphthylene	µg/L	--		0.040 U				0.040 U			0.040 U	
Anthracene	µg/L	--		0.040 U				0.040 U			0.040 U	
Benzo(a)anthracene	µg/L	--		0.040 U	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U
Benzo(a)pyrene	µg/L	--		0.040 U	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U
Benzo(b)fluoranthene	µg/L	--		0.040 U	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U
Benzo(g,h,i)perylene	µg/L	--		0.040 U				0.040 U			0.040 U	
Benzo(k)fluoranthene	µg/L	--		0.040 U	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U
Chrysene	µg/L	--		0.040 U	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U
Dibenzo(a,h)anthracene	µg/L	--		0.040 U	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U
Fluoranthene	µg/L	--		0.040 U				0.040 U			0.040 U	
Fluorene	µg/L	--		0.040 UJ				0.040 UJ			0.040 UJ	
Hexachlorobutadiene	µg/L	--									1.0 U	1.0 U
Indeno(1,2,3-c,d)pyrene	µg/L	--		0.040 U	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U
Naphthalene	µg/L	--		0.40 U				0.40 U			0.40 U	1.0 U
Phenanthrene	µg/L	--		0.060 U				0.060 U			0.060 U	
Pyrene	µg/L	--		0.040 U				0.040 U			0.040 U	

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
1 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

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

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes	MTCA	Model Toxics Model Toxics Control Act
cPAH	Carcinogenic polycyclic aromatic hydrocarbon	PAH	Polycyclic arc Polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter	TEQ	Toxic equival Toxic equivalent

Table 3.4
Groundwater Analytical Data—GRO, DRO, ORO, SVOCs, and Metals

			Outside of AOPCs (cont.)										
		Location	MW-30	MW-31	MW-31	MW-31		MW-32	MW-35		MW-36		
		Sample ID	MW-30-081120	MW-131-022719	MW-31-022719	MW-31-050620	MW-31-081020	MW-32-022819	MW-35-050620	MW-35-081020	MW-136-081020	MW-36-050620	MW-36-081020
		Date	08/11/2020	02/27/2019	02/27/2019	05/06/2020	08/10/2020	02/28/2019	05/06/2020	08/10/2020	08/10/2020	05/06/2020	08/10/2020
Analyte	**Units**	**Preliminary Screening Level**											
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx													
Gasoline-range organics (GRO)	µg/L	800	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-range organics (DRO)	µg/L	500	1,100 (1)	60 U	60 U	50 U	50 U	60 U	630 (1)	670 (1)	50 U	50 U	50 U
Oil-range organics (ORO)	µg/L	500	480 (1)	300 U	300 U	250 U	250 U	300 U	250 U	260 (1)	250 U	250 U	250 U
Total diesel-range and oil-range organics	µg/L	500	1,600 (1)			250 U	250 U		630 (1)	930 (1)	250 U	250 U	250 U
Total Petroleum Hydrocarbons by NWTPH-HCID													
Diesel Range Organics	µg/L	500		60 U	60 U			60 U					
Oil Range Organics	µg/L	500		300 U	300 U			300 U					
BTEX Compounds by USEPA 8021B/8260D													
Benzene	µg/L	5	0.35 U	1.0 U	1.0 U	0.35 U	0.35 U	1.0 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
Ethylbenzene	µg/L	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1,000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (meta & para)	µg/L	--	2.0 U			2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Xylene (ortho)	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	µg/L	1,000	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Semivolatile Organic Compounds (SVOCs)													
cPAHs (MTCA TEQ-HalfND)	µg/L	0.1	0.030 U			0.030 U	0.030 U		0.030 U	0.030 U	0.030 U	0.030 U	0.030 U
cPAHs (MTCA TEQ-ZeroND)	µg/L	0.1	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)	0 U (2)
Total HPAH	µg/L	--				0.040 U			0.040 U			0.040 U	
Total LPAH	µg/L	--				0.40 UJ			0.40 UJ			0.40 UJ	
Total PAH	µg/L	--				0.40 UJ			0.40 UJ			0.40 UJ	
1-Methylnaphthalene	µg/L	--				0.40 U			0.40 U			0.40 U	
2-Methylnaphthalene	µg/L	--				0.40 U			0.40 U			0.40 U	
Acenaphthene	µg/L	--				0.040 U			0.040 U			0.040 U	
Acenaphthylene	µg/L	--				0.040 U			0.040 U			0.040 U	
Anthracene	µg/L	--				0.040 U			0.040 U			0.040 U	
Benzo(a)anthracene	µg/L	--	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Benzo(a)pyrene	µg/L	--	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Benzo(b)fluoranthene	µg/L	--	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Benzo(g,h,i)perylene	µg/L	--				0.040 U			0.040 U			0.040 U	
Benzo(k)fluoranthene	µg/L	--	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Chrysene	µg/L	--	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Dibenzo(a,h)anthracene	µg/L	--	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Fluoranthene	µg/L	--				0.040 U			0.040 U			0.040 U	
Fluorene	µg/L	--				0.040 UJ			0.040 UJ			0.040 UJ	
Hexachlorobutadiene	µg/L	--							1.0 U	1.0 U			
Indeno(1,2,3-c,d)pyrene	µg/L	--	0.040 U			0.040 U	0.040 U		0.040 U	0.040 U	0.040 U	0.040 U	0.040 U
Naphthalene	µg/L	--				0.40 U			0.40 U	1.0 U		0.40 U	
Phenanthrene	µg/L	--				0.060 U			0.060 U			0.060 U	
Pyrene	µg/L	--				0.040 U			0.040 U			0.040 U	

Notes:

Blank cells are intentional.
All results rounded to two significant figures.
-- Not established.
▨ Indicates a result that exceeds the applicable screening level.
1 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
2 None of the cPAH compounds were detected at reporting limits; therefore, the TEQ result was 0.

Qualifiers:

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

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes	MTCA	Model Toxics Model Toxics Control Act
cPAH	Carcinogenic polycyclic aromatic hydrocarbon	PAH	Polycyclic ar Polycyclic aromatic hydrocarbon
µg/L	Micrograms per liter	TEQ	Toxic equival Toxic equivalent

Table 3.5
Groundwater Analytical Data—VOCs

			AOPC 2	APOC 3		AOPC 4				AOPC 5				
		Location	T-2	UST-4		MW-19		MW-39		MW-07			MW-12	
		Sample ID	T-2-081120	UST-4-050620	UST-4-081020	MW-19-050720	MW-19-081020	MW-39-050720	MW-39-081020	MW-07-050620	MW-07-081120	MW-107-081120	MW-12-050720	MW-12-081120
		Date	08/11/2020	05/06/2020	08/10/2020	05/07/2020	08/10/2020	05/07/2020	08/10/2020	05/06/2020	08/11/2020	08/11/2020	05/07/2020	08/11/2020
Analyte	Units	Preliminary Screening Level												
Volatile Organic Compounds (VOCs) by EPA 8260D														
1,1,1,2-Tetrachloroethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,1,1-Trichloroethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,1,2-Trichloroethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,1-Dichloroethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,1-Dichloroethene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,1-Dichloropropene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,2,3-Trichlorobenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,2,3-Trichloropropane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,2,4-Trichlorobenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,2,4-Trimethylbenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0
1,2-Dibromo-3-chloropropane	µg/L	--	10 U			10 U	10 U		10 U				10 U	10 U
1,2-Dibromoethane	µg/L	--	1.0 U				1.0 U		1.0 U			1.0 U		1.0 U
1,2-Dibromoethane (EDB)	µg/L	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
1,2-Dichlorobenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,2-Dichloroethane (EDC)	µg/L	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,3,5-Trimethylbenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	3.3
1,3-Dichlorobenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,3-Dichloropropane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
1,4-Dichlorobenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
2,2-Dichloropropane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
2-Chlorotoluene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
2-Hexanone	µg/L	--	10 U			10 U	10 U		10 U				10 U	10 U
4-Chlorotoluene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Acetone	µg/L	--	50 U			50 U	50 U		50 U				50 U	50 U
Bromobenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Bromodichloromethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Bromoform	µg/L	--	5.0 U			5.0 U	5.0 U		5.0 U				5.0 U	5.0 U
Bromomethane	µg/L	--	5.0 U			5.0 U	5.0 U		5.0 U				5.0 U	5.0 U
Carbon tetrachloride	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Chlorobenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Chloroethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Chloroform	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Chloromethane	µg/L	--	10 U			10 U	10 U		10 U				10 U	10 U
cis-1,2-Dichloroethene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
cis-1,3-Dichloropropene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Cymene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Dibromochloromethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Dibromomethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Dichlorodifluoromethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
iso-Propylbenzene	µg/L	--	1.0 U			1.0 U	1.0 U		8.5				1.6	34
Methyl ethyl ketone	µg/L	--	20 U			20 U	20 U		20 U				20 U	20 U

Table 3.5
Groundwater Analytical Data—VOCs

			AOPC 2	**APOC 3**		**AOPC 4**				**AOPC 5**				
		Location	**T-2**	**UST-4**		**MW-19**		**MW-39**		**MW-07**			**MW-12**	
		Sample ID	**T-2-081120**	**UST-4-050620**	**UST-4-081020**	**MW-19-050720**	**MW-19-081020**	**MW-39-050720**	**MW-39-081020**	**MW-07-050620**	**MW-07-081120**	**MW-107-081120**	**MW-12-050720**	**MW-12-081120**
		Date	**08/11/2020**	**05/06/2020**	**08/10/2020**	**05/07/2020**	**08/10/2020**	**05/07/2020**	**08/10/2020**	**05/06/2020**	**08/11/2020**	**08/11/2020**	**05/07/2020**	**08/11/2020**
Analyte	**Units**	**Preliminary Screening Level**												
VOCs by EPA 8260D (cont.)														
Methyl iso butyl ketone	µg/L	--	10 U			10 U	10 U		10 U				10 U	10 U
Methylene chloride	µg/L	--	5.0 U			5.0 U	5.0 U		5.0 U				5.0 U	5.0 U
Methyl-tert-butyl ether	µg/L	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
n-Hexane	µg/L	--	5.0 U			1.0 U	5.0 U	1.0 U	5.0 U				10	190
n-Propylbenzene	µg/L	--	1.0 U			1.0 U	1.0 U		9.4				3.7	82
sec-Butylbenzene	µg/L	--	1.0 U			1.0 U	1.0 U		2.3				1.0 U	3.5
Styrene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
tert-Butylbenzene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Tetrachloroethene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
trans-1,2-Dichloroethene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
trans-1,3-Dichloropropene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Trichloroethene	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Trichlorofluoromethane	µg/L	--	1.0 U			1.0 U	1.0 U		1.0 U				1.0 U	1.0 U
Vinyl chloride	µg/L	--	0.20 U			0.20 U	0.20 U		0.20 U				0.20 U	0.20 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

Abbreviation:

µg/L Micrograms per liter

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.5
Groundwater Analytical Data—VOCs

			AOPC 5 (cont.)		AOPC 6				AOPC 7			Outside of AOPCs			
		Location	MW-40		MW-03		MW-10		MW-28	MW-34		MW-23		MW-35	
		Sample ID	MW-40-050620	MW-40-081120	MW-03-050620	MW-03-081020	MW-10-050620	MW-10-081020	MW-28-081120	MW-34-050620	MW-34-081020	MW-23-050620	MW-23-081120	MW-35-050620	MW-35-081020
		Date	05/06/2020	08/11/2020	05/06/2020	08/10/2020	05/06/2020	08/10/2020	08/11/2020	05/06/2020	08/10/2020	05/06/2020	08/11/2020	05/06/2020	08/10/2020
Analyte	Units	Preliminary Screening Level													
Volatile Organic Compounds (VOCs) by EPA 8260D															
1,1,1,2-Tetrachloroethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloropropene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichloropropane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	µg/L	--	10 U	10 U			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dibromoethane	µg/L	--		1.0 U				1.0 U	1.0 U		1.0 U		1.0 U		1.0 U
1,2-Dibromoethane (EDB)	µg/L	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
1,2-Dichlorobenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane (EDC)	µg/L	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3,5-Trimethylbenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,2-Dichloropropane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	µg/L	--	10 U	10 U			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorotoluene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	µg/L	--	50 U	50 U			50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Bromobenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	µg/L	--	5.0 U	5.0 U			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	µg/L	--	5.0 U	5.0 U			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	µg/L	--	10 U	10 U			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cymene	µg/L	--	1.0 U	1.0 U			1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
iso-Propylbenzene	µg/L	--	13	3.9			5.4	30	1.0 U	1.3	1.4	1.0 U	1.0 U	1.0 U	1.0 U
Methyl ethyl ketone	µg/L	--	20 U	20 U			20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U

Table 3.5
Groundwater Analytical Data—VOCs

			AOPC 5 (cont.)		AOPC 6				AOPC 7			Outside of AOPCs			
		Location	MW-40		MW-03		MW-10		MW-28	MW-34		MW-23		MW-35	
		Sample ID	MW-40-050620	MW-40-081120	MW-03-050620	MW-03-081020	MW-10-050620	MW-10-081020	MW-28-081120	MW-34-050620	MW-34-081020	MW-23-050620	MW-23-081120	MW-35-050620	MW-35-081020
		Date	05/06/2020	08/11/2020	05/06/2020	08/10/2020	05/06/2020	08/10/2020	08/11/2020	05/06/2020	08/10/2020	05/06/2020	08/11/2020	05/06/2020	08/10/2020
Analyte	Units	Preliminary Screening Level													
VOCs by EPA 8260D (cont.)															
Methyl iso butyl ketone	µg/L	--	10 U	10 U			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	µg/L	--	5.0 U	5.0 U			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl-tert-butyl ether	µg/L	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
n-Hexane	µg/L	--	22	10			3.7	49	5.0 U	1.0 U	5.0 U	1.0 U	5.0 U	1.0 U	5.0 U
n-Propylbenzene	µg/L	--	19	5.0			9.1	64	1.0 U	1.0 U	1.2	1.0 U	1.0 U	1.0 U	1.0 U
sec-Butylbenzene	µg/L	--	2.9	1.2			1.0 U	3.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	µg/L	--	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	µg/L	--	0.20 U	0.20 U			0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U

Notes:

Blank cells are intentional.

All results rounded to two significant figures.

-- Not established.

▨ Indicates a result that exceeds the applicable screening level.

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

Abbreviation:

µg/L Micrograms per liter

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.6
Groundwater Analytical Data—Monitored Natural Attenuation Parameters

			AOPC 1		AOPC 2		AOPC 3		AOPC 4			
		Location	MW-37	MW-38	MW-32	T-2	UST-4		MW-06	MW-19		MW-39
		Sample ID	MW-37-081020	MW-38-081020	MW-32-081120	T-2-081120	UST-4-050620	UST-4-081020	MW-06-081020	MW-19-050720	MW-19-081020	MW-39-081020
		Date	08/10/2020	08/10/2020	08/11/2020	08/11/2020	05/06/2020	08/10/2020	08/10/2020	05/07/2020	08/10/2020	08/10/2020
Analyte	**Units**	**Fraction**										
Conventionals												
Ferrous iron	mg/L	NA								0.02	0.50 U	
Nitrate (as nitrogen)	mg/L	Total								5.3 J	7.7 J	
Sulfate	mg/L	Total								10	16	
Alkalinity (as $CaCO_3$)	mg/L	Total								110	93	
Biochemical oxygen demand	mg/L	Total										
Chemical oxygen demand	mg/L	Total										
Conductivity	µS/cm	NA	1.267	0.381	0.403	0.333		0.211	239.4		422.8	562
Dissolved oxygen	mg/L	NA	0.4	0.43	0.5	2.63		4.48	0.1		0.97	0.01
ORP	mV	NA	-110.5	-83.6	-112.5	-65.5		127.4	-116.1		126.4	-144.4
pH	pH	NA	6.83	6.61	6.5	6.47		6.05	6.55		6.13	6.51
Temperature	°C	NA	18.5	17.2	16.1	14.4		17.5	16.3		15.4	16.1
Turbidity	NTU	NA	87.3	104.4	5.8	22.3		15.3	2.4		0	-0.4
Dissolved Gases												
Methane	mg/L	Total								0.0086 U	0.0086 U	
Metals												
Lead	µg/L	Dissolved					1.0 U					
Lead	µg/L	Total					1.0 U	1.0 U				
Manganese	µg/L	Dissolved								2.0 U	2.0 U	

Notes:

Blank cells are intentional.

All laboratory results are rounded to two significant figures. Field parameter results are not rounded.

Abbreviations:

°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
mV	Millivolt
NA	Not applicable
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 3.6

Groundwater Analytical Data—Monitored Natural Attenuation Parameters

			APOC 5										
		Location	**MW-07**			**MW-12**		**MW-13**	**MW-14**		**MW-15**	**MW-17**	
		Sample ID	**MW-07-050620**	**MW-07-081120**	**MW-107-081120**	**MW-12-050720**	**MW-12-081120**	**MW-13-081020**	**MW-14-050720**	**MW-14-081120**	**MW-15-081020**	**MW-17-050720**	**MW-17-081120**
		Date	**05/06/2020**	**08/11/2020**	**08/11/2020**	**05/07/2020**	**08/11/2020**	**08/10/2020**	**05/07/2020**	**08/11/2020**	**08/10/2020**	**05/07/2020**	**08/11/2020**
Analyte	**Units**	**Fraction**											
Conventionals													
Ferrous iron	mg/L	NA					2.5						0.50 U
Nitrate (as nitrogen)	mg/L	Total				0.92	0.10 U		3.0 J	0.10		0.88	0.27
Sulfate	mg/L	Total				0.50	0.31		7.3	2.4		3.3	2.0
Alkalinity (as $CaCO_3$)	mg/L	Total				54	200		210	220		210	170
Biochemical oxygen demand	mg/L	Total											
Chemical oxygen demand	mg/L	Total											
Conductivity	µS/cm	NA		494.9			554	533		0.426	643		296.3
Dissolved oxygen	mg/L	NA		0.03			0.02	0.53		0.56	0.03		5.38
ORP	mV	NA		-128			-108.8	-128.1		30.5	-132.5		107.8
pH	pH	NA		6.69			6.45	6.66		6.56	6.59		6.91
Temperature	°C	NA		14.1			14.6	16.4		18	14.8		14.5
Turbidity	NTU	NA		0.6			9	4.28		12.4	5.2		8.7
Dissolved Gases													
Methane	mg/L	Total				0.061	4.6		0.0086 U	1.6		0.0086 U	0.19
Metals													
Lead	µg/L	Dissolved	1.0 U										
Lead	µg/L	Total	1.0 U	1.0 U	1.0 U								
Manganese	µg/L	Dissolved				23	1800		6.0	88		2.5	2.7

Notes:

Blank cells are intentional.

All laboratory results are rounded to two significant figures. Field parameter results are not rounded.

Abbreviations:

°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
mV	Millivolt
NA	Not applicable
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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U	Analyte was not detected at the given reporting limit.
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Table 3.6
Groundwater Analytical Data—Monitored Natural Attenuation Parameters

			APOC 5 (cont.)						AOPC 6						
		Location	**MW-20**	**MW-25**		**MW-33**	**MW-40**		**MW-02**		**MW-03**		**MW-08**	**MW-10**	
		Sample ID	**MW-20-050720**	**MW-25-050720**	**MW-25-081120**	**MW-33-081120**	**MW-40-050620**	**MW-40-081120**	**MW-02-081020**	**MW-02-022321**	**MW-03-050620**	**MW-03-081020**	**MW-08-081020**	**MW-10-050620**	**MW-10-081020**
		Date	**05/07/2020**	**05/07/2020**	**08/11/2020**	**08/11/2020**	**05/06/2020**	**08/11/2020**	**08/10/2020**	**02/23/2021**	**05/06/2020**	**08/10/2020**	**08/10/2020**	**05/06/2020**	**08/10/2020**
Analyte	**Units**	**Fraction**													
Conventionals															
Ferrous iron	mg/L	NA			4.5										3.0
Nitrate (as nitrogen)	mg/L	Total	0.20 U	0.10 U	0.11									0.10 UJ	0.20 U
Sulfate	mg/L	Total	0.69	4.1	0.34									0.78	0.60 U
Alkalinity (as $CaCO_3$)	mg/L	Total	430	78	190									43	120
Biochemical oxygen demand	mg/L	Total	45				11 J								
Chemical oxygen demand	mg/L	Total	69				46								
Conductivity	µS/cm	NA			0.398	298.6		279.1	481.5			276.3	571		426.4
Dissolved oxygen	mg/L	NA			0.67	0.4		5.6	1.49	8.47		0.2	0.21		0.24
ORP	mV	NA			-101.7	88.4		104.3	119.2	195.9		-16.5	-85		-6.5
pH	pH	NA			6.47	6.3		6.37	6.28	6.68		6.32	6.47		6.34
Temperature	°C	NA			15.8	14.2		14.8	16.6	12.9		16.7	15.9		15.1
Turbidity	NTU	NA			3.9	19.33		5.89	4.22	2.51		6.95	7.36		4.15
Dissolved Gases															
Methane	mg/L	Total	5.9 J	2.1	4.6									1.6	2.4
Metals															
Lead	µg/L	Dissolved									1.0 U			1.0 U	
Lead	µg/L	Total									1.0 U	1.0 U		1.0 U	1.0 U
Manganese	µg/L	Dissolved	3,000	720	1,400									660	2,300

Notes:

Blank cells are intentional.

All laboratory results are rounded to two significant figures. Field parameter results are not rounded.

Abbreviations:

°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
mV	Millivolt
NA	Not applicable
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 3.6
Groundwater Analytical Data—Monitored Natural Attenuation Parameters

			AOPC 7									
		Location	**MW-18**		**MW-24**		**MW-26**	**MW-27**	**MW-28**	**MW-29**		**MW-34**
		Sample ID	**MW-18-050720**	**MW-18-081120**	**MW-24-050720**	**MW-24-081120**	**MW-26-081020**	**MW-27-081020**	**MW-28-081120**	**MW-29-050620**	**MW-29-081120**	**MW-34-081020**
		Date	**05/07/2020**	**08/11/2020**	**05/07/2020**	**08/11/2020**	**08/10/2020**	**08/10/2020**	**08/11/2020**	**05/06/2020**	**08/11/2020**	**08/10/2020**
Analyte	**Units**	**Fraction**										
Conventionals												
Ferrous iron	mg/L	NA		0.50 U		0.50 U					0.50 U	
Nitrate (as nitrogen)	mg/L	Total	0.96	0.54	0.88	0.95				2.4 J	2.2	
Sulfate	mg/L	Total	4.0	3.8	5.2	4.8				9.9	14	
Alkalinity (as $CaCO_3$)	mg/L	Total	88	110	110	130				47	49	
Biochemical oxygen demand	mg/L	Total										
Chemical oxygen demand	mg/L	Total										
Conductivity	µS/cm	NA		198.2		247.9	218.5	445	203.4		167	1.906
Dissolved oxygen	mg/L	NA		2.13		7.11	7.29	0.73	1.57		2.78	0.56
ORP	mV	NA		63.8		113.9	-67.7	-37.8	2.8		63.7	-25.5
pH	pH	NA		6.51		6.8	6.52	6.31	6.2		6.35	5.88
Temperature	°C	NA		14.6		14	22.2	16.3	17.5		14.1	17.3
Turbidity	NTU	NA		6.69		39.87	20.87	18.24	17.02		3.69	3.3
Dissolved Gases												
Methane	mg/L	Total	0.0086 U	0.025	0.016	0.0086 U				0.0097	0.017	
Metals												
Lead	µg/L	Dissolved										
Lead	µg/L	Total										
Manganese	µg/L	Dissolved	3.5	100	9.1	6.4				2.0 U	2.0 U	

Notes:

Blank cells are intentional.

All laboratory results are rounded to two significant figures. Field parameter results are not rounded.

Abbreviations:

°C Degrees Celsius
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg/L Milligrams per liter
mV Millivolt
NA Not applicable
NTU Nephelometric turbidity units
ORP Oxidation-reduction potential

Qualifiers:

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

Table 3.6
Groundwater Analytical Data—Monitored Natural Attenuation Parameters

			Outside of AOPCs										
		Location	**MW-01**	**MW-22**			**MW-23**		**MW-30**	**MW-31**		**MW-35**	**MW-36**
		Sample ID	**MW-01-081020**	**MW-122-081120**	**MW-22-050720**	**MW-22-081120**	**MW-23-050620**	**MW-23-081120**	**MW-30-081120**	**MW-31-050620**	**MW-31-081020**	**MW-35-081020**	**MW-36-081020**
		Date	**08/10/2020**	**08/11/2020**	**05/07/2020**	**08/11/2020**	**05/06/2020**	**08/11/2020**	**08/11/2020**	**05/06/2020**	**08/10/2020**	**08/10/2020**	**08/10/2020**
Analyte	**Units**	**Fraction**											
Conventionals													
Ferrous iron	mg/L	NA				4.0		2.5	0.50 U		0.50 U	0.50 U	
Nitrate (as nitrogen)	mg/L	Total		0.10 U	0.11	0.10 U	0.20 UJ	0.40 U	42 J	5.6 J	4.4	13 J	
Sulfate	mg/L	Total		0.30	0.30 U	0.31	3.3	7.3	130	17	18	8.3	
Alkalinity (as $CaCO_3$)	mg/L	Total		150	150	150	100	93	140	230	200	78	
Biochemical oxygen demand	mg/L	Total											
Chemical oxygen demand	mg/L	Total											
Conductivity	µS/cm	NA	274.6			0.266		712	1.167		0.386	0.433	0.232
Dissolved oxygen	mg/L	NA	-0.03			0.51		0.29	2.49		6.09	1.05	1.29
ORP	mV	NA	-93.2			-49.6		-385	127.3		127.3	74.9	61.1
pH	pH	NA	6.51			6.38		6.44	6.28		6.42	6.44	6.26
Temperature	°C	NA	15.1			15.4		15.5	15.5		16	18.4	17.1
Turbidity	NTU	NA	-2			6		3.35	4.2		6	9.6	9.3
Dissolved Gases													
Methane	mg/L	Total		2.8	0.98	4.0	0.77	0.75	0.0086 U	0.0086 U	0.0086 U	0.013	
Metals													
Lead	µg/L	Dissolved											
Lead	µg/L	Total											
Manganese	µg/L	Dissolved		1,100	790	1,100	2,100	2,600	130	2.0 U	2.0 U	26	

Notes:

Blank cells are intentional.

All laboratory results are rounded to two significant figures. Field parameter results are not rounded.

Abbreviations:

°C	Degrees Celsius
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
mV	Millivolt
NA	Not applicable
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential

Qualifiers:

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

Table 3.7
Soil Vapor Analytical Data

		Location	**VP-1**		**VP-2**
		Sample ID	**SVP-01-050820**	**SVP-101-050820**	**SVP-02-050820**
		Date	**05/08/2020 8:10**	**05/08/2020 8:10**	**05/08/2020 8:57**
Analyte	**Units**	**Screening Level**			
Conventionals					
Helium	µg/m³	--	6.0 U	6.0 U	6.0 U
Total Petroleum Hydrocarbons (TPH)					
TPH	µg/m³	4,700	180	160	450
Volatile Organic Compounds					
Benzene	µg/m³	11	0.96 U	1.0 U	0.99 U
Toluene	µg/m³	7,600	57 U	60 U	58 U
Ethylbenzene	µg/m³	15,000	1.3 U	1.4 U	1.3 U
Xylene (total)	µg/m³	1,500	2.6 U	2.8 U	5.6
Polycyclic Aromatic Hydrocabons					
Naphthalene	µg/m³	2.5	0.79 U	0.84 U	0.81 U

Notes:

All results rounded to two significant figures.

-- Not established.

Abbreviations:

µg/m³	Micrograms per cubic meter
MTCA	Model Toxics Control Act

Qualifier:

U Analyte was not detected at the given reporting limit.

Table 3.8
Groundwater Elevations

Well	Aquifer	TOC Elevation	Date	Time	Depth to Water	Depth to LNAPL	Groundwater Elevation
MW-01	Alluvial Aquifer	17.96	05/06/2020	11:34	11.17	--	6.79
			08/10/2020	10:08	11.70	--	6.26
MW-02	Perched	22.71	05/06/2020	10:59	9.76	--	12.95
			08/10/2020	10:19	10.17	--	12.54
MW-03	Alluvial Aquifer	20.93	05/06/2020	10:48	13.39	--	7.54
			08/10/2020	10:15	14.18	--	6.75
MW-04	Perched	24.22(1)	05/06/2020	--	--	--	--
			08/10/2020	09:30	17.12	--	7.10
MW-05	Alluvial Aquifer	22.69	05/06/2020	11:11	14.96	--	7.73
			08/10/2020	10:21	15.90	--	6.79
MW-06	Alluvial Aquifer	17.48	05/06/2020	11:45	10.62	--	6.86
			08/10/2020	10:15	11.35	--	6.13
MW-07	Alluvial Aquifer	22.21	05/06/2020	11:57	14.82	--	7.39
			08/10/2020	10:40	15.60	--	6.61
MW-08	Alluvial Aquifer	20.61	05/06/2020	10:25	13.19	--	7.42
			08/10/2020	10:08	13.93	--	6.68
MW-09	Perched	23.36	05/06/2020	14:30	16.19	16.05	7.283
			08/11/2020	10:05	16.96	16.85	6.489
MW-10	Alluvial Aquifer	22.89	05/06/2020	10:36	15.38	--	7.51
			08/10/2020	10:11	16.21	--	6.68
MW-11	Perched	25.07	05/7/2020 (2)	12:37	12.39	--	12.68
			08/10/2020	10:55	15.43	--	9.64
MW-12	Alluvial Aquifer	21.16	05/7/2020 (2)	13:58	13.60	--	7.56
			08/11/2020 (3)	12:28	14.60	--	6.56
MW-13	Perched	25.09	05/7/2020 (2)	11:01	11.03	--	14.06
			08/10/2020	11:06	11.46	--	13.63
MW-14	Perched	23.77	05/7/2020 (2)	13:44	6.43	--	17.34
			08/10/2020	10:42	8.51	--	15.26
MW-15	Alluvial Aquifer	21.75	05/7/2020 (2)	12:40	14.11	--	7.64
			08/10/2020	10:25	15.00	--	6.75
MW-16	Perched	22.94	05/7/2020 (2)	11:30	9.92	--	13.02
		22.06(4)	08/10/2020	10:31	12.41	--	10.53
MW-17	Perched	25.24	05/7/2020 (2)	09:48	10.07	--	15.17
			08/10/2020	11:12	12.62	--	12.62
MW-18	Perched	26.56	05/7/2020 (2)	12:37	12.50	--	14.06
			08/10/2020	11:40	13.40	--	13.16
MW-19	Alluvial Aquifer	20.20	05/7/2020 (2)	13:55	13.30	--	6.90
			08/10/2020	10:14	13.95	--	6.25
MW-20	Alluvial Aquifer	23.34	05/7/2020 (2)	12:13	15.55	--	7.79
			8/11/2020 (3)	10:00	16.78	--	6.56
MW-22	Alluvial Aquifer	31.40	05/06/2020	09:28	23.04	--	8.36
			08/10/2020	11:07	24.76	--	6.64
MW-23	Alluvial Aquifer	31.43	05/06/2020	08:53	22.93	--	8.50
			08/10/2020	10:43	24.72	--	6.71
MW-24	Perched	27.89	05/06/2020	10:02	12.58	--	15.31
			08/10/2020	11:36	13.31	--	14.58
MW-25	Alluvial Aquifer	21.45	05/7/2020 (2)	10:45	8.02	--	13.43
			08/11/2020 (3)	11:31	9.68	--	11.77
MW-26	Perched	27.14	05/06/2020	10:13	12.89	--	14.25
			08/10/2020	11:20	13.08	--	14.06
MW-27	Alluvial Aquifer	25.90	05/7/2020 (2)	10:01	18.10	--	7.80
			08/10/2020	11:27	18.50	--	7.40
MW-28	Perched	27.36	05/7/2020 (2)	15:50	17.91	--	9.45
			08/10/2020	11:35	13.60	--	13.76
MW-29	Perched	29.77	05/06/2020	15:05	15.82	--	13.95
			08/10/2020	11:31	16.20	--	13.57
MW-30 (5)	Perched	26.32	05/06/2020	--	--	--	--
			08/10/2020	08:45	16.80	--	9.52
MW-31	Alluvial Aquifer	19.89	05/06/2020	11:22	13.09	--	6.80
			08/10/2020	10:02	13.72	--	6.17
MW-32	Alluvial Aquifer	21.17	05/06/2020	12:08	13.38	--	7.79
			08/10/2020	09:45	14.31	--	6.86
MW-33	Alluvial Aquifer	25.91	05/06/2020	15:08	18.32	--	7.59
			08/10/2020	11:15	19.25	--	6.66
MW-34	Alluvial Aquifer	26.67	05/06/2020	08:30	18.74	--	7.93
			08/10/2020	10:21	20.27	--	6.40
MW-35	Perched	26.95	05/06/2020	08:41	14.20	--	12.75
			08/10/2020	10:36	15.08	--	11.87
MW-36	Alluvial Aquifer	31.59	05/06/2020	09:39	23.50	--	8.09
			08/10/2020	11:13	25.05	--	6.54
MW-37	Alluvial Aquifer	31.13	05/06/2020	09:05	22.54	--	8.59
			08/10/2020	10:59	23.91	--	7.22
MW-38	Alluvial Aquifer	31.09	05/06/2020	09:16	22.32	--	8.77
			08/10/2020	11:03	24.09	--	7.00
MW-39	Alluvial Aquifer	18.95	05/7/2020 (2)	13:18	12.08	--	6.87
			08/10/2020	10:30	12.80	--	6.15
MW-40	Alluvial Aquifer	24.65	05/06/2020	14:14	17.05	--	7.60
			08/10/2020	10:55	18.07	--	6.58
UST-4	NA	31.68	05/06/2020	09:51	17.34	--	14.34
			08/10/2020	11:19	17.67	--	14.01
T-2	NA	19.30(1)	08/10/2020	10:00	12.91	--	6.39

Notes:

-- Not applicable.

1 MW-04 was not accessible during surveying activities; T-2 location was not known during surveying activities.

2 Well not accessible on first day of depth to water measurements.

3 Groundwater elevation not used in contour figures due to depth to water measurement collected on a different day.

4 MW-16 was repaired by lowering the casing on 12/18/2020 and resurveyed on 12/30/2020.

5 Well not accessible during May 2020 sampling event and surveyed by Floyd|Snider on 8/11/2020.

Abbreviations:

LNAPL	Light non-aqueous phase liquid
TOC	Top of casing

Table 4.1
Proposed Revisions to Groundwater Monitoring Program

Proposed Change to Sampling Program	Rationale	Locations Affected
Limit VOCs analyses to BTEX compounds	The full suite of VOCs were analyzed in 10 wells across the Site, and another three wells were analyzed for MTBE, n-hexane, EDB, and EDC. No VOCs other than BTEX were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits during the February 2019, (1) May 2020, or August 2020 sampling events.	Full Suite: MW-10, MW-12, MW-19, MW-23, MW-28, MW-34, MW-35, MW-39, MW-40, T-2 EDB/EDC, MTBE, n-Hexane: UST-4, MW-3, MW-7
Limit SVOC analysis to naphthalenes, (2) eliminate cPAH analysis	Groundwater analytical results for cPAHs were either less than laboratory quantitation limits or less than screening levels for total TEQ concentrations in all groundwater samples. In addition, aside from naphthalenes (detected at concentrations exceeding laboratory quantitation limits, no screening levels included in Remedial Investigation Work Plan), no SVOCs were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits during the February 2019, (1) May 2020, and August 2020 sampling events.	All Locations
Remove seven wells from the sampling program where no analytes have been detected at concentrations exceeding screening levels	No analytes at these locations were detected at concentrations exceeding their respective screening levels or laboratory quantitation limits during the February 2019, (1) May 2020, and August 2020 sampling events. In addition, none of these locations are included in the MNA analysis program.	MW-01, MW-11, MW-13, MW-16, MW-19, MW-27, and MW-32
Eliminate lead analysis	Total and/or dissolved lead was not detected at concentrations exceeding screening levels or laboratory quantitation limits in any sample collected during the May 2020 and August 2020 sampling events.	All Locations

Notes:

1 Refer to the Remedial Investigation Work Plan for the February 2019 groundwater sampling results (Floyd|Snider 2019).
2 Naphthalenes include naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
EDB	1,2-Dibromoethane
EDC	1,2-Dichloroethane
MNA	Monitored natural attenuation
MTBE	Methyl tert-butyl ether
SVOC	Semivolatile organic compound
TEQ	Toxic equivalent
VOC	Volatile organic compound

Port of Longview TPH Site

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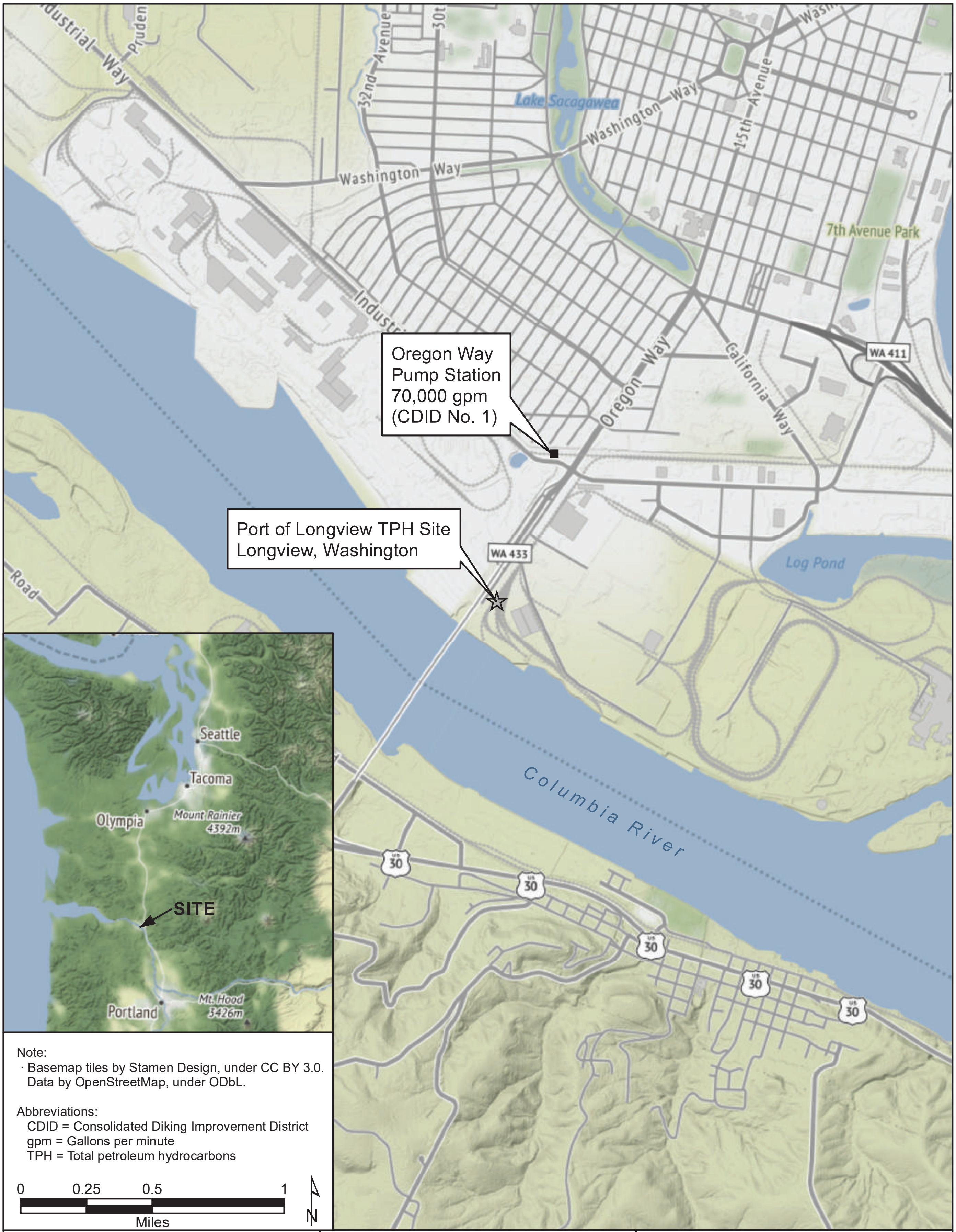
Figures



Oregon Way
Pump Station
70,000 gpm
(CDID No. 1)

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Longview, Washington

Note:
- Basemap tiles by Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

Abbreviations:
CDID = Consolidated Diking Improvement District
gpm = Gallons per minute
TPH = Total petroleum hydrocarbons

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Figure 1.1
Vicinity Map

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9/15/2020

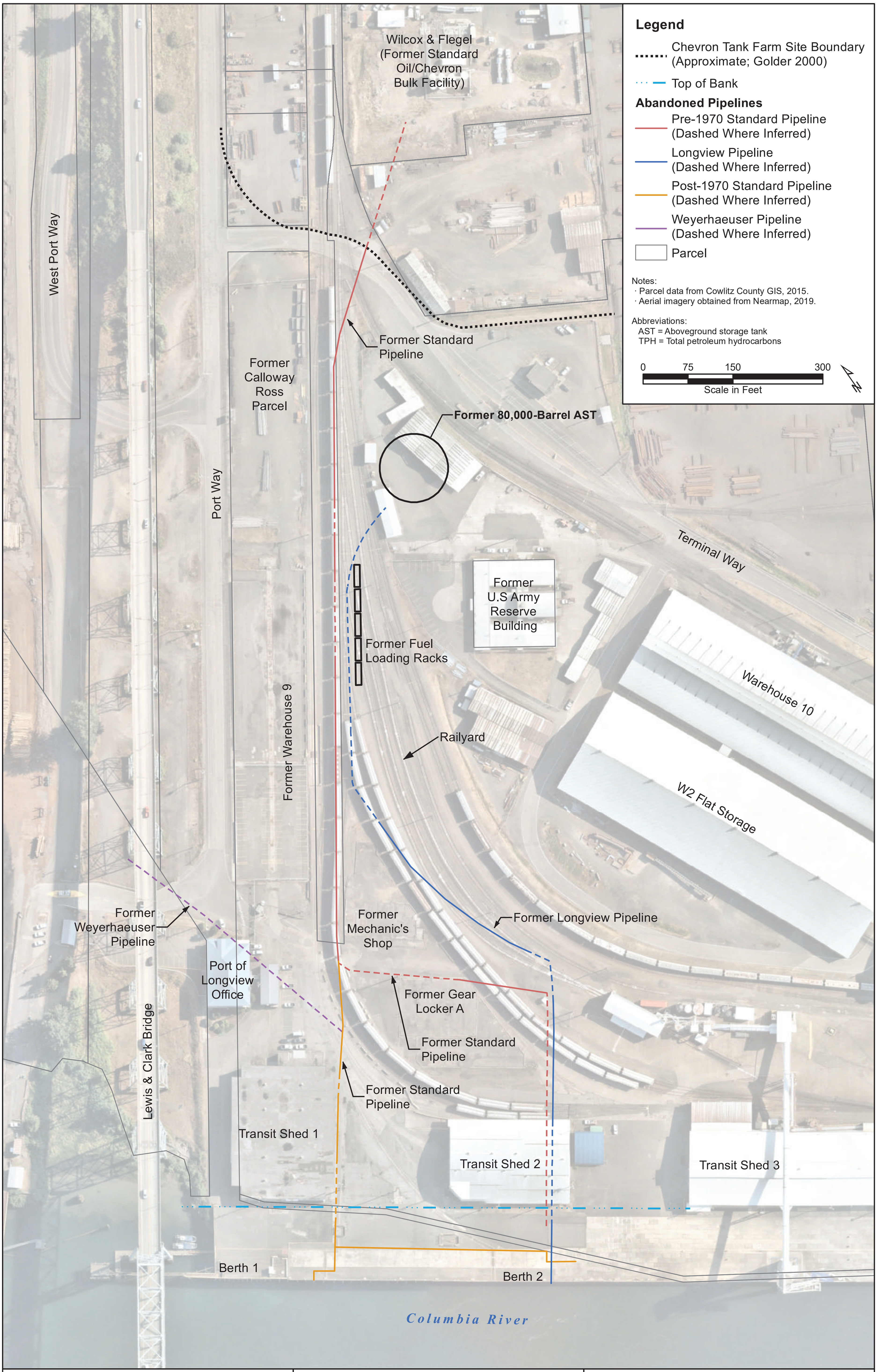

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Figure 1.2
Site Map

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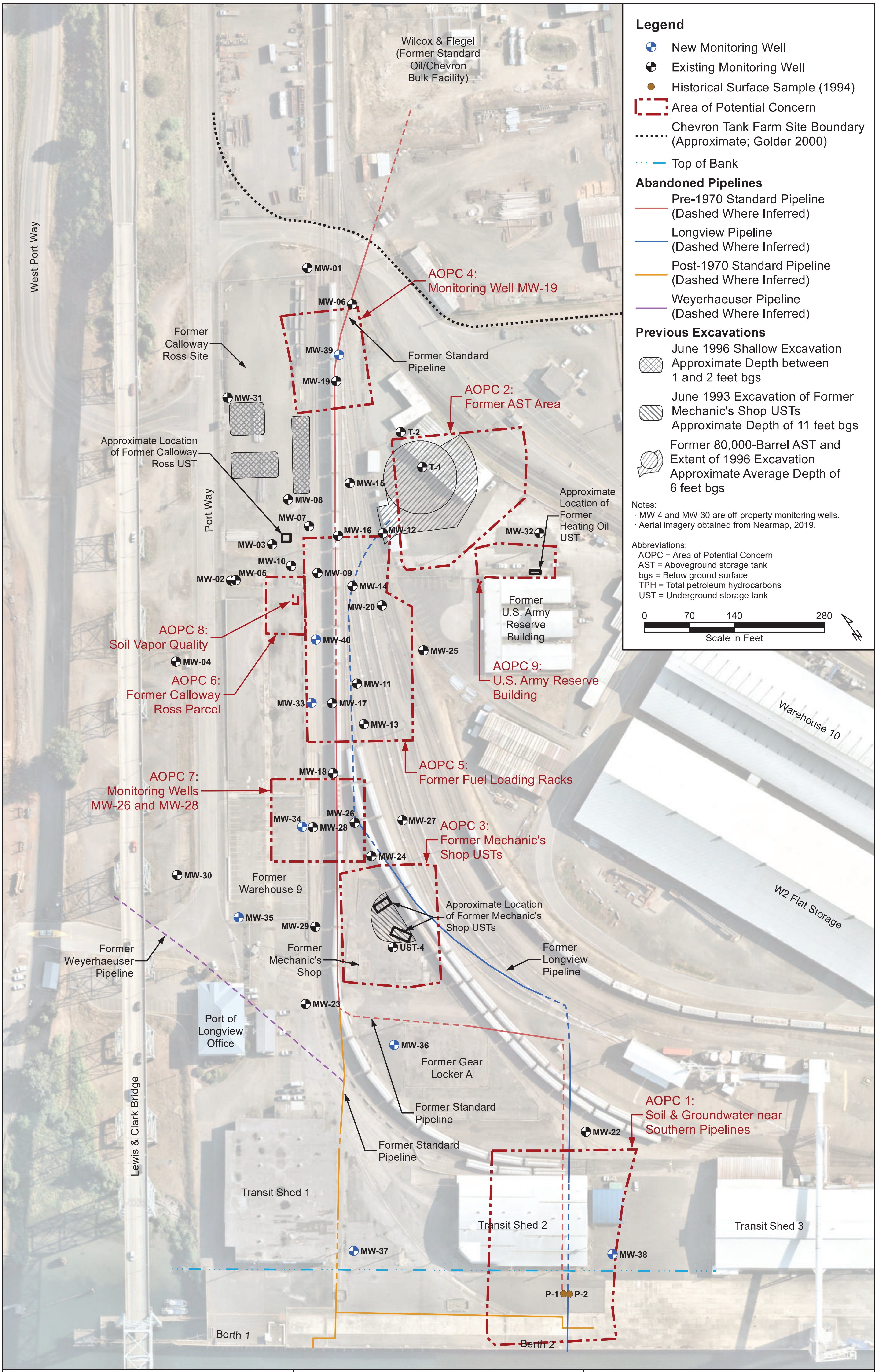
9/15/2020



Legend

- New Monitoring Well
- Existing Monitoring Well
- Historical Surface Sample (1994)
- Area of Potential Concern
- Chevron Tank Farm Site Boundary (Approximate; Golder 2000)
- Top of Bank

Abandoned Pipelines

- Pre-1970 Standard Pipeline (Dashed Where Inferred)
- Longview Pipeline (Dashed Where Inferred)
- Post-1970 Standard Pipeline (Dashed Where Inferred)
- Weyerhaeuser Pipeline (Dashed Where Inferred)

Previous Excavations

- June 1996 Shallow Excavation Approximate Depth between 1 and 2 feet bgs
- June 1993 Excavation of Former Mechanic's Shop USTs Approximate Depth of 11 feet bgs
- Former 80,000-Barrel AST and Extent of 1996 Excavation Approximate Average Depth of 6 feet bgs

Notes:
- MW-4 and MW-30 are off-property monitoring wells.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 2.1
Areas of Potential Concern

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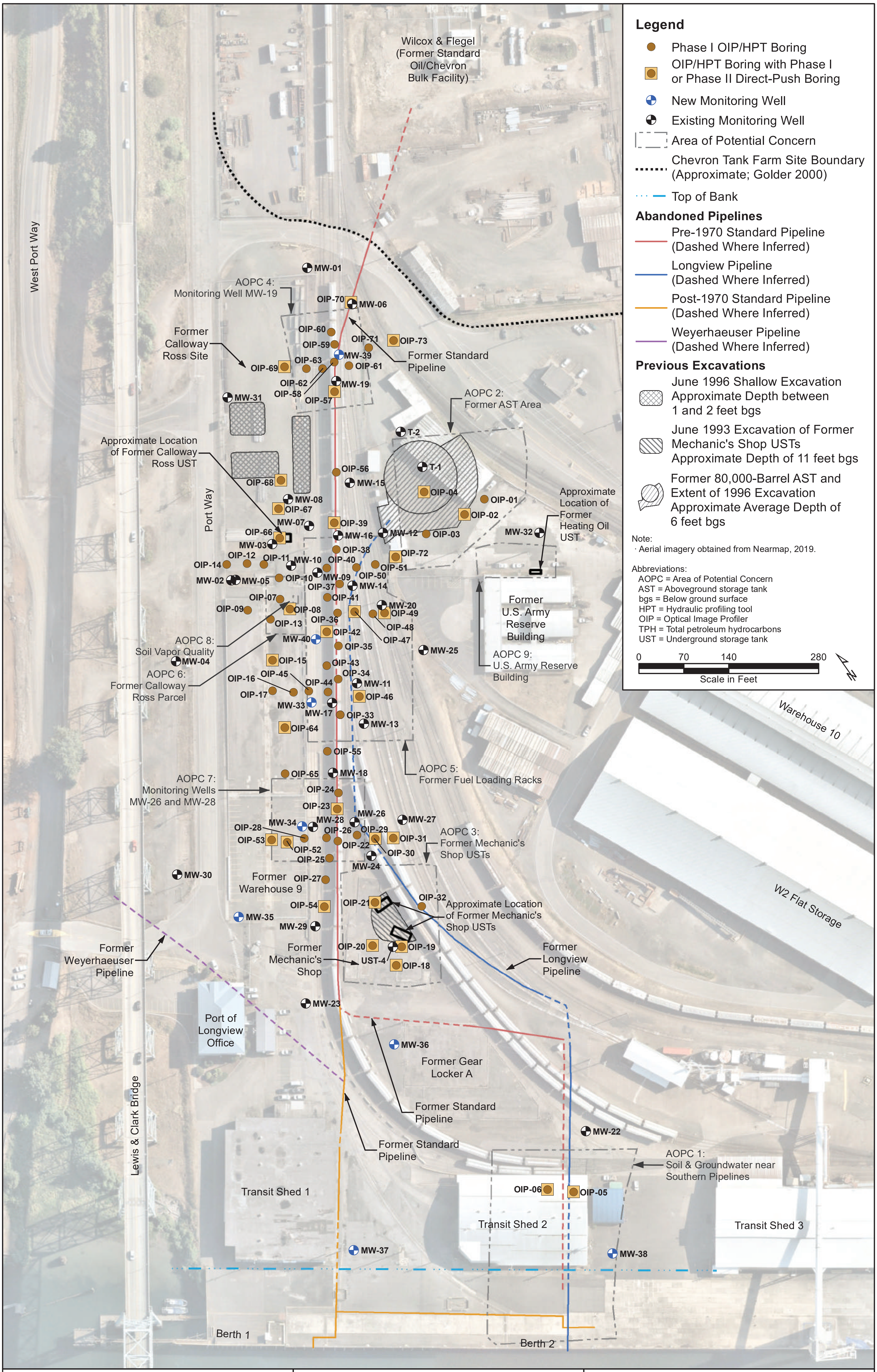
10/19/2020



Note:
· Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
HPT = Hydraulic profiling tool
OIP = Optical Image Profiler
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 2.2
Phase I OIP/HPT Boring Locations

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10/9/2020

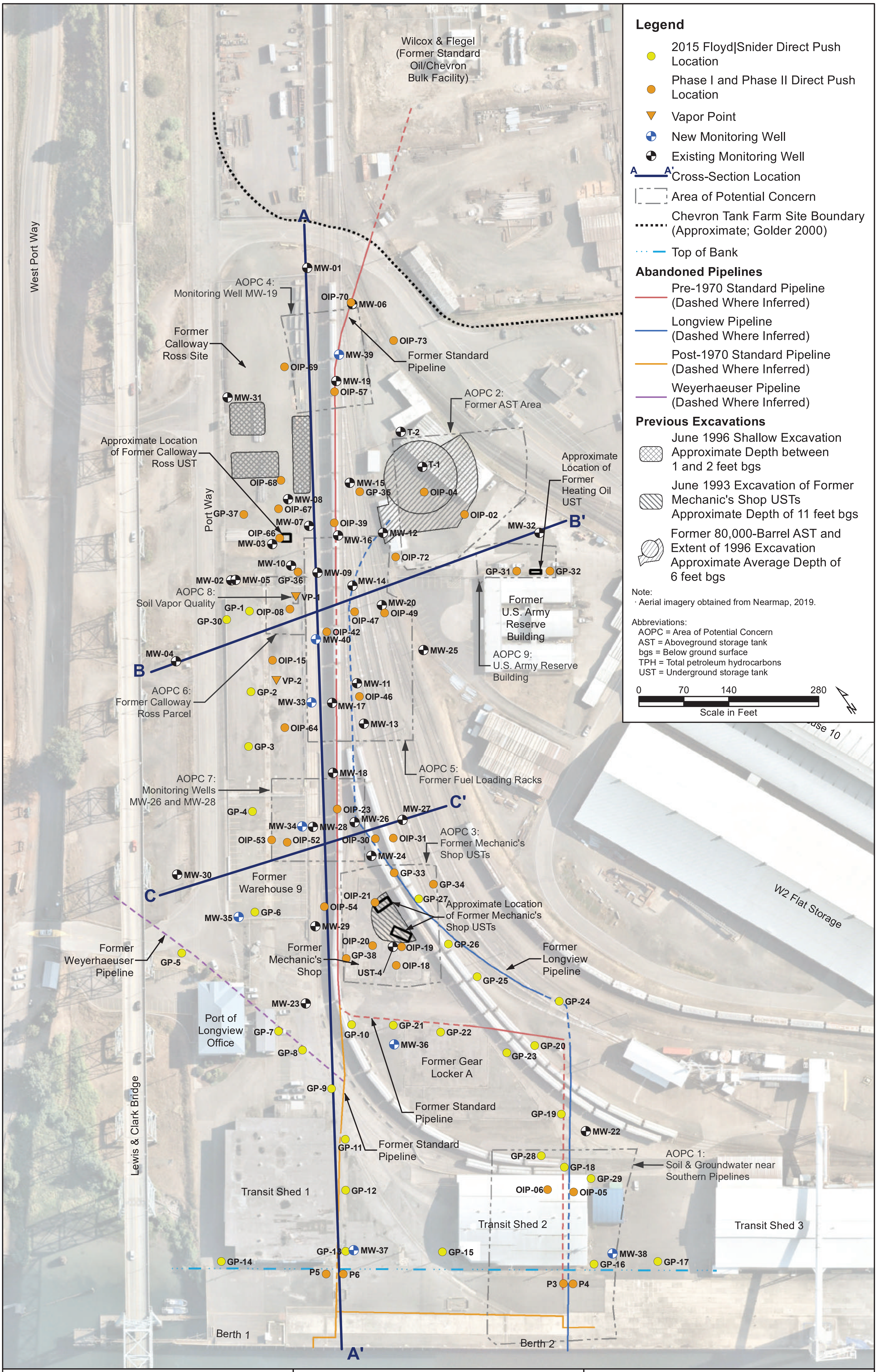

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Figure 2.3
Soil Boring and Monitoring Well Locations

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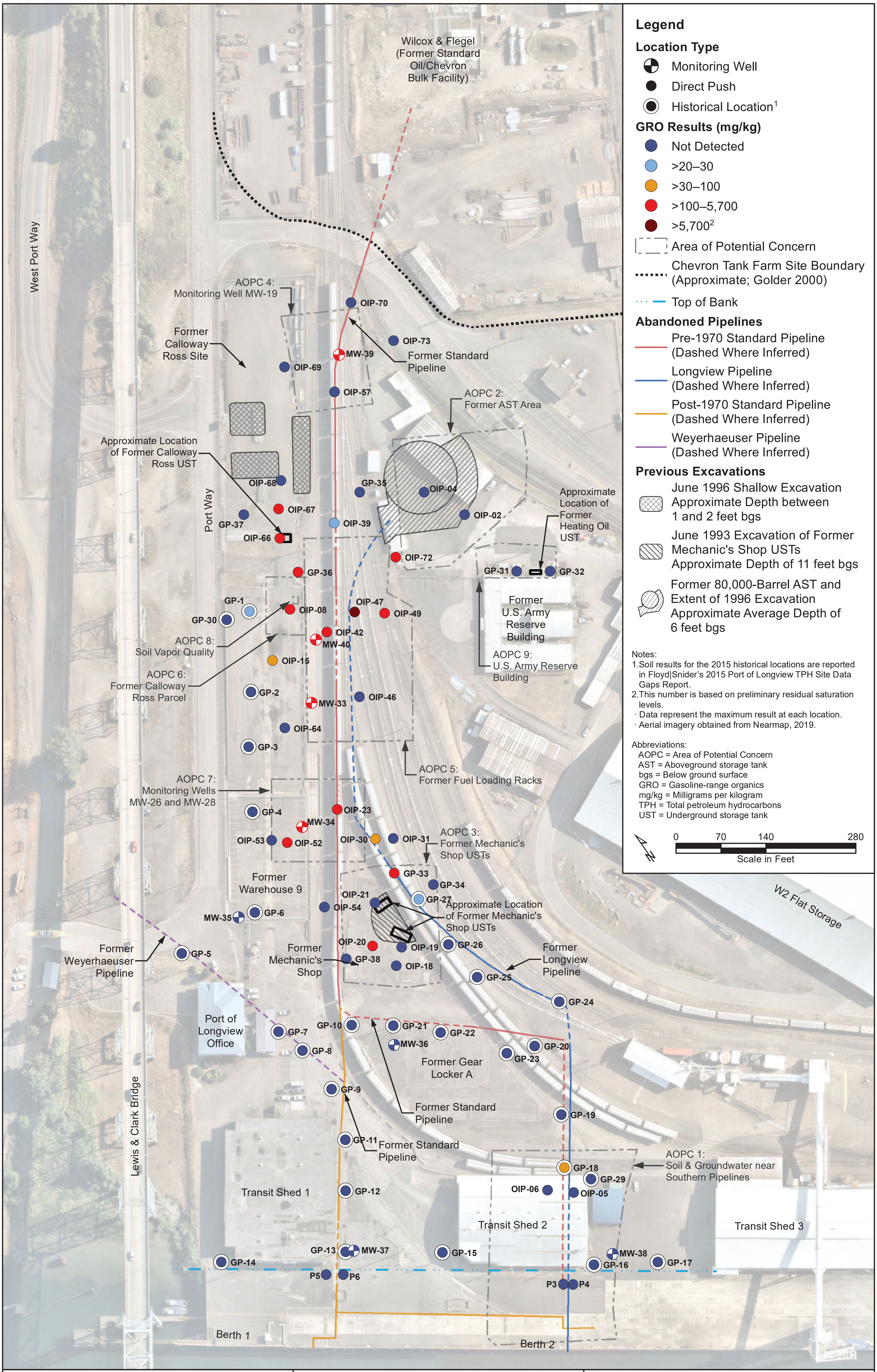
10/9/2020



Legend

Location Type

- Monitoring Well
- ● Direct Push
- Historical Location[1]

GRO Results (mg/kg)

- ● Not Detected
- ● >20–30
- ● >30–100
- ● >100–5,700
- ● >5,700[2]
- Area of Potential Concern
- Chevron Tank Farm Site Boundary (Approximate; Golder 2000)
- Top of Bank

Abandoned Pipelines

- Pre-1970 Standard Pipeline (Dashed Where Inferred)
- Longview Pipeline (Dashed Where Inferred)
- Post-1970 Standard Pipeline (Dashed Where Inferred)
- Weyerhaeuser Pipeline (Dashed Where Inferred)

Previous Excavations

- June 1996 Shallow Excavation Approximate Depth between 1 and 2 feet bgs
- June 1993 Excavation of Former Mechanic's Shop USTs Approximate Depth of 11 feet bgs
- Former 80,000-Barrel AST and Extent of 1996 Excavation Approximate Average Depth of 6 feet bgs

Notes:

1. Soil results for the 2015 historical locations are reported in Floyd|Snider's 2015 Port of Longview TPH Site Data Gaps Report.
2. This number is based on preliminary residual saturation levels.

- Data represent the maximum result at each location.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
GRO = Gasoline-range organics
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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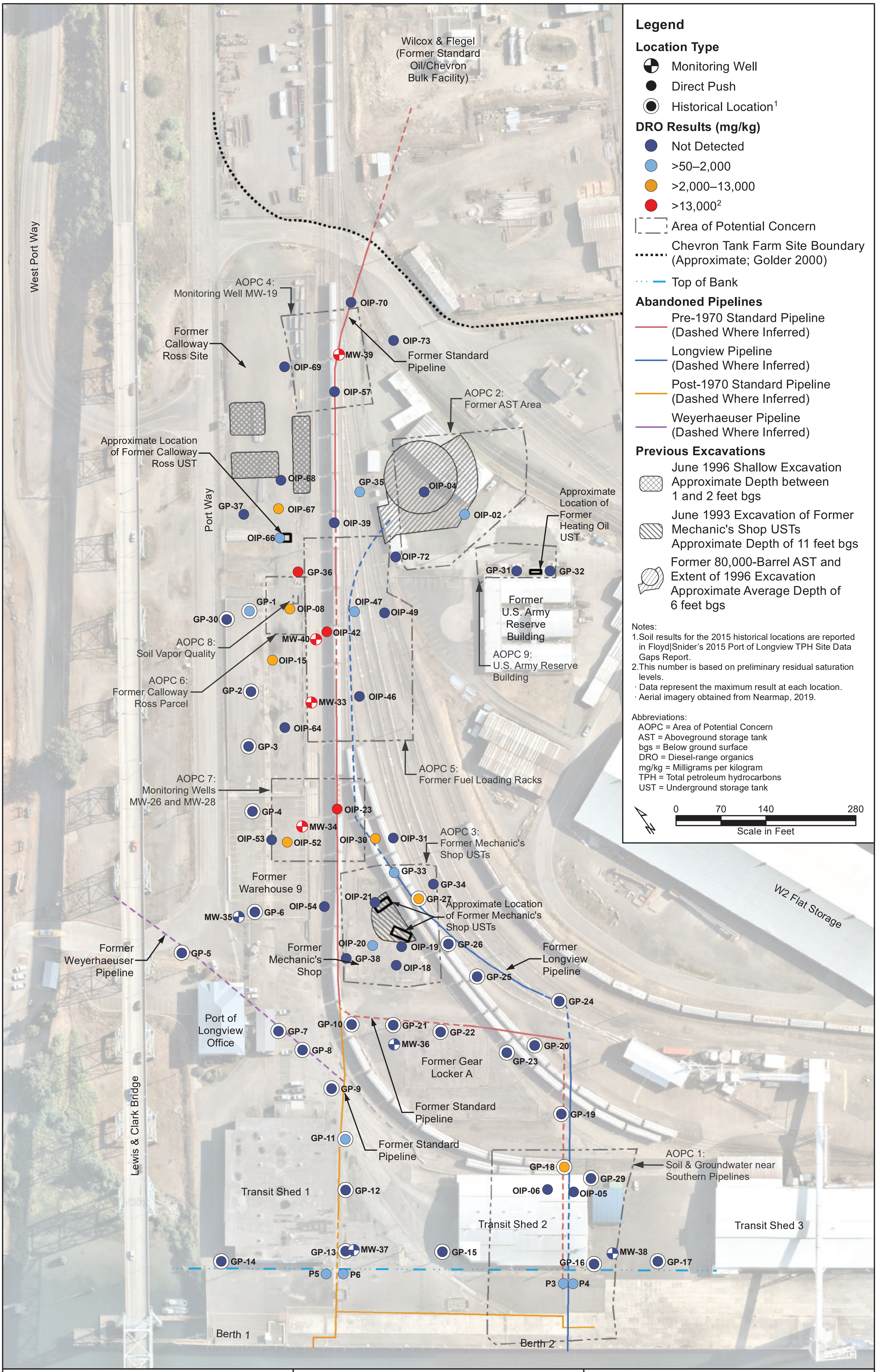
Figure 3.1
Concentrations of Gasoline-Range Organics in Soil

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.1 Concentrations of Gasoline-Range Organics in Soil.mxd
9/17/2020



Legend

Location Type

- Monitoring Well
- ● Direct Push
- ◉ Historical Location[1]

DRO Results (mg/kg)

- ● Not Detected
- ● >50–2,000
- ● >2,000–13,000
- ● >13,000[2]
- Area of Potential Concern
- Chevron Tank Farm Site Boundary (Approximate; Golder 2000)
- Top of Bank

Abandoned Pipelines

- Pre-1970 Standard Pipeline (Dashed Where Inferred)
- Longview Pipeline (Dashed Where Inferred)
- Post-1970 Standard Pipeline (Dashed Where Inferred)
- Weyerhaeuser Pipeline (Dashed Where Inferred)

Previous Excavations

- ▨ June 1996 Shallow Excavation Approximate Depth between 1 and 2 feet bgs
- ▨ June 1993 Excavation of Former Mechanic's Shop USTs Approximate Depth of 11 feet bgs
- Former 80,000-Barrel AST and Extent of 1996 Excavation Approximate Average Depth of 6 feet bgs

Notes:

1. Soil results for the 2015 historical locations are reported in Floyd|Snider's 2015 Port of Longview TPH Site Data Gaps Report.
2. This number is based on preliminary residual saturation levels.

- Data represent the maximum result at each location.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
DRO = Diesel-range organics
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 3.2
Concentrations of Diesel-Range Organics in Soil

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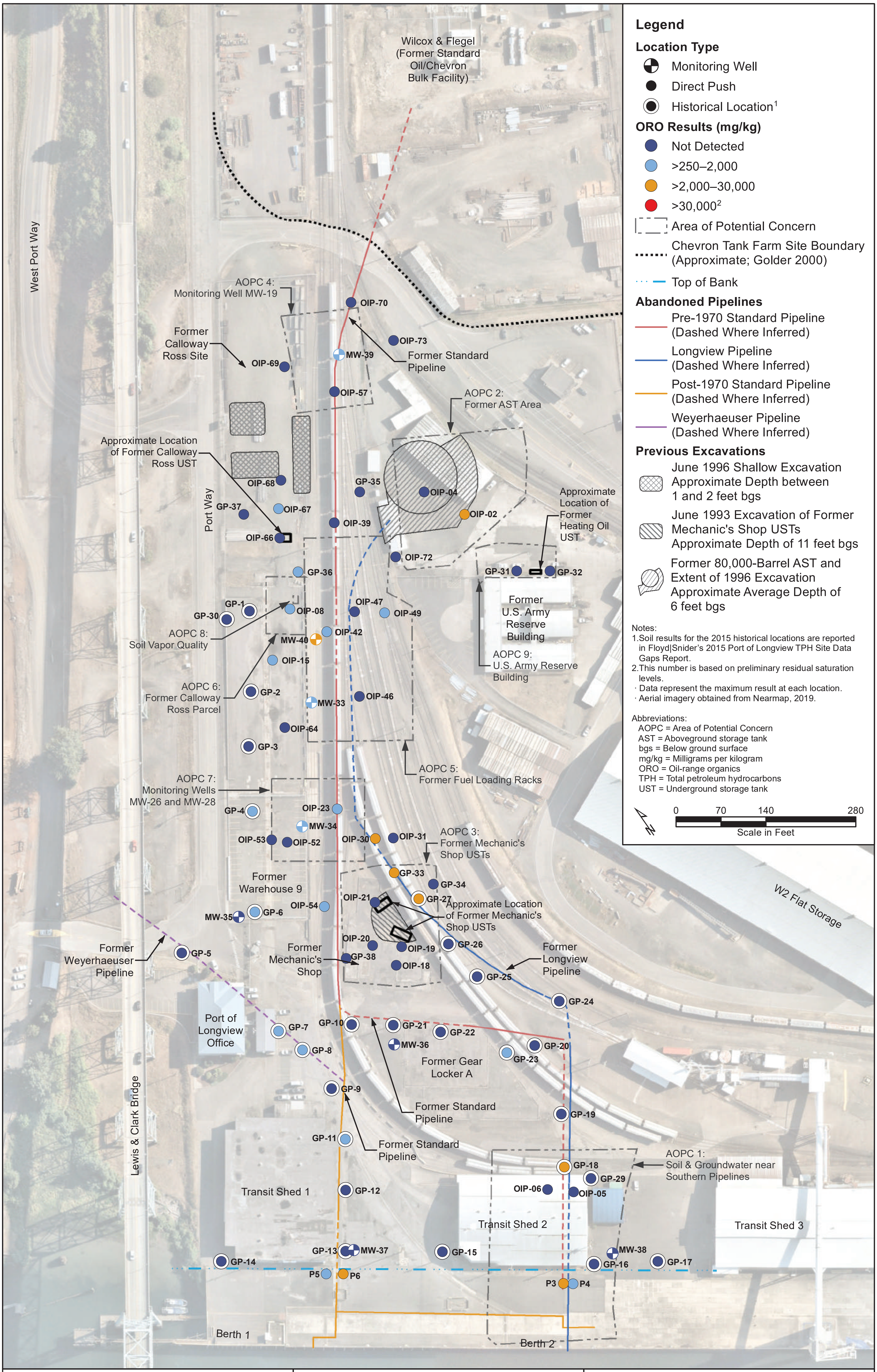
9/17/2020



Notes:
1. Soil results for the 2015 historical locations are reported in Floyd|Snider's 2015 Port of Longview TPH Site Data Gaps Report.
2. This number is based on preliminary residual saturation levels.
· Data represent the maximum result at each location.
· Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
mg/kg = Milligrams per kilogram
ORO = Oil-range organics
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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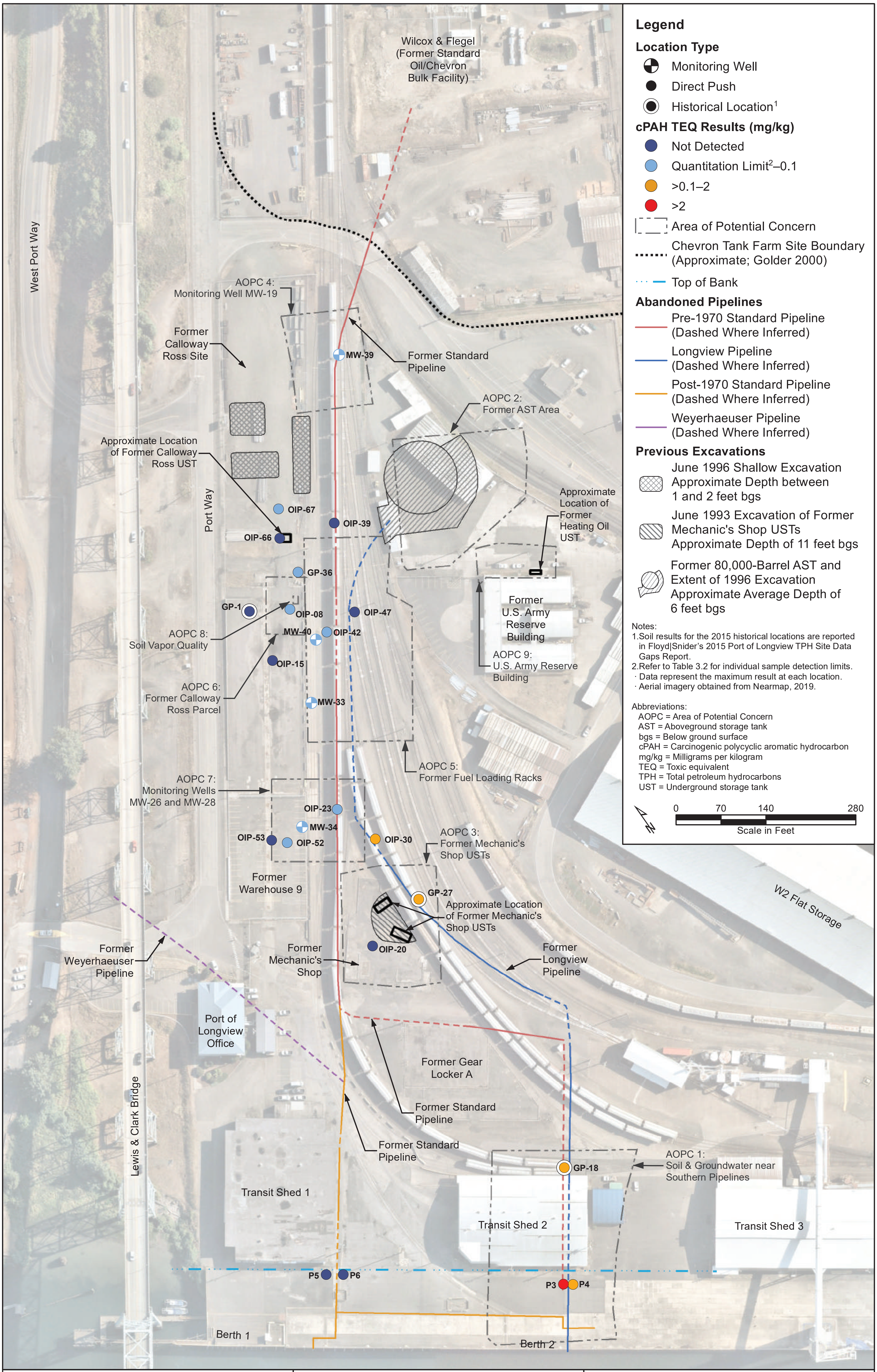
Figure 3.3
Concentrations of Oil-Range Organics in Soil

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.3 Concentrations of Oil-Range Organics in Soil.mxd
9/17/2020



Legend

Location Type

- Monitoring Well
- ● Direct Push
- ◉ Historical Location[1]

cPAH TEQ Results (mg/kg)

- ● Not Detected
- ● Quantitation Limit[2]–0.1
- ● >0.1–2
- ● >2
- Area of Potential Concern
- Chevron Tank Farm Site Boundary (Approximate; Golder 2000)
- Top of Bank

Abandoned Pipelines

- Pre-1970 Standard Pipeline (Dashed Where Inferred)
- Longview Pipeline (Dashed Where Inferred)
- Post-1970 Standard Pipeline (Dashed Where Inferred)
- Weyerhaeuser Pipeline (Dashed Where Inferred)

Previous Excavations

- ▨ June 1996 Shallow Excavation Approximate Depth between 1 and 2 feet bgs
- ▨ June 1993 Excavation of Former Mechanic's Shop USTs Approximate Depth of 11 feet bgs
- ▨ Former 80,000-Barrel AST and Extent of 1996 Excavation Approximate Average Depth of 6 feet bgs

Notes:

1. Soil results for the 2015 historical locations are reported in Floyd|Snider's 2015 Port of Longview TPH Site Data Gaps Report.
2. Refer to Table 3.2 for individual sample detection limits.

- Data represent the maximum result at each location.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
cPAH = Carcinogenic polycyclic aromatic hydrocarbon
mg/kg = Milligrams per kilogram
TEQ = Toxic equivalent
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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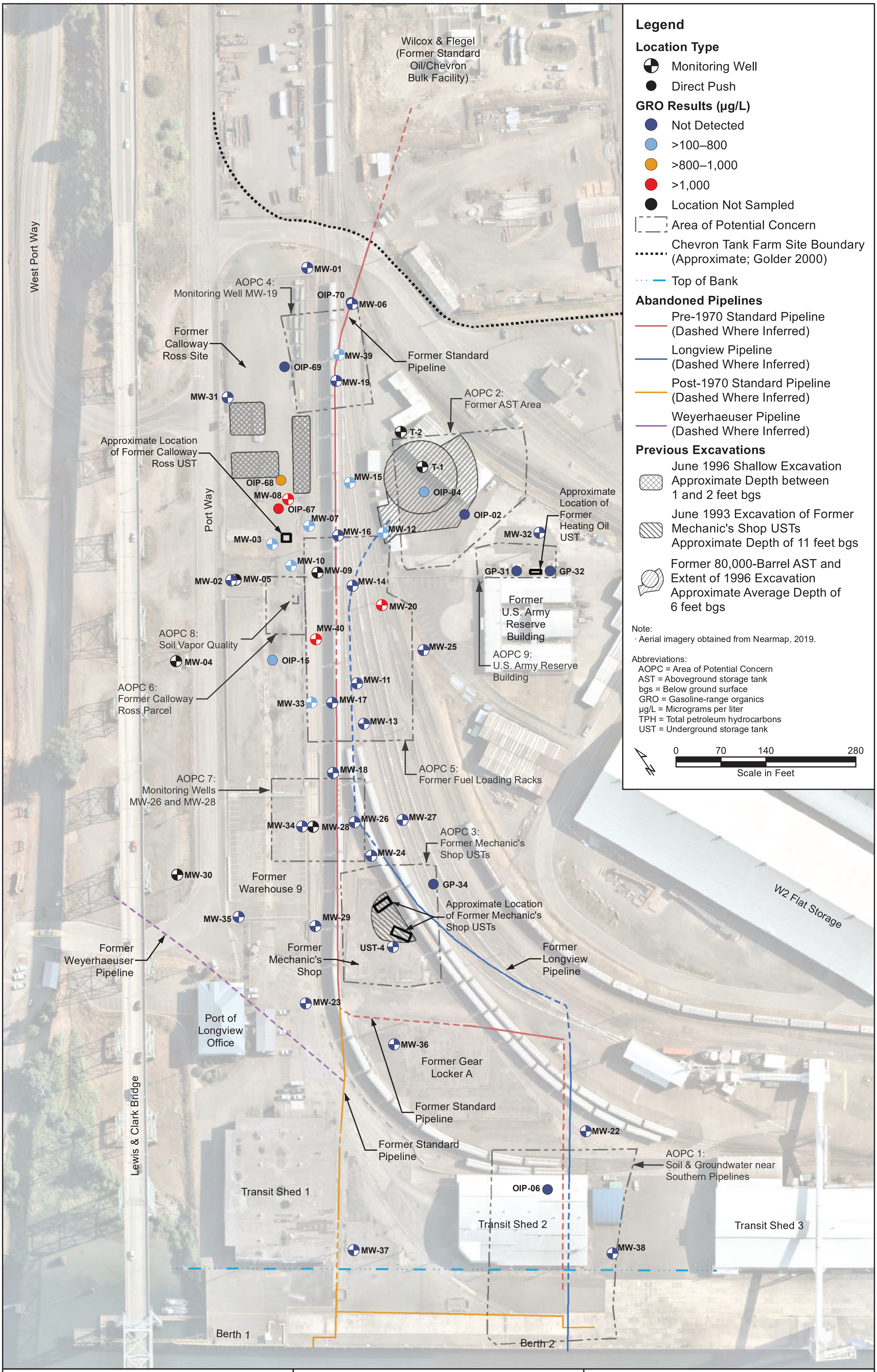
Figure 3.4
Concentrations of cPAH TEQ in Soil

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.4 Concentrations of cPAH TEQ in Soil.mxd
9/16/2020



Note:
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
GRO = Gasoline-range organics
µg/L = Micrograms per liter
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 3.5
Phase II and May 2020 Concentrations of Gasoline-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.5 Phase II and May 2020 Concentrations of Gasoline-Range Organics in Groundwater.mxd
9/16/2020

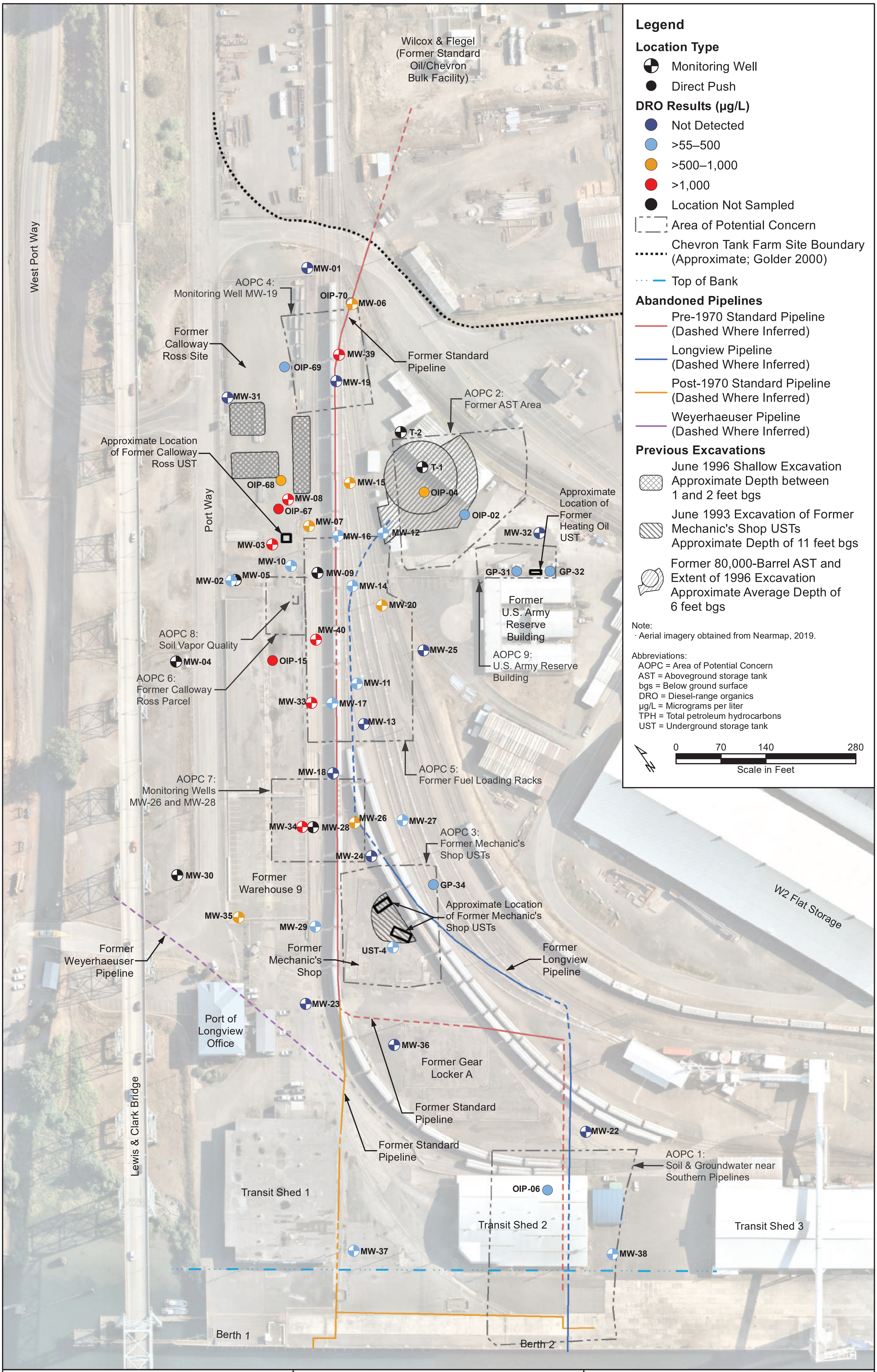

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Figure 3.6
Phase II and May 2020 Concentrations
of Diesel-Range Organics in
Groundwater

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.6 Phase II and May 2020 Concentrations of Diesel-Range Organics in Groundwater.mxd
9/16/2020

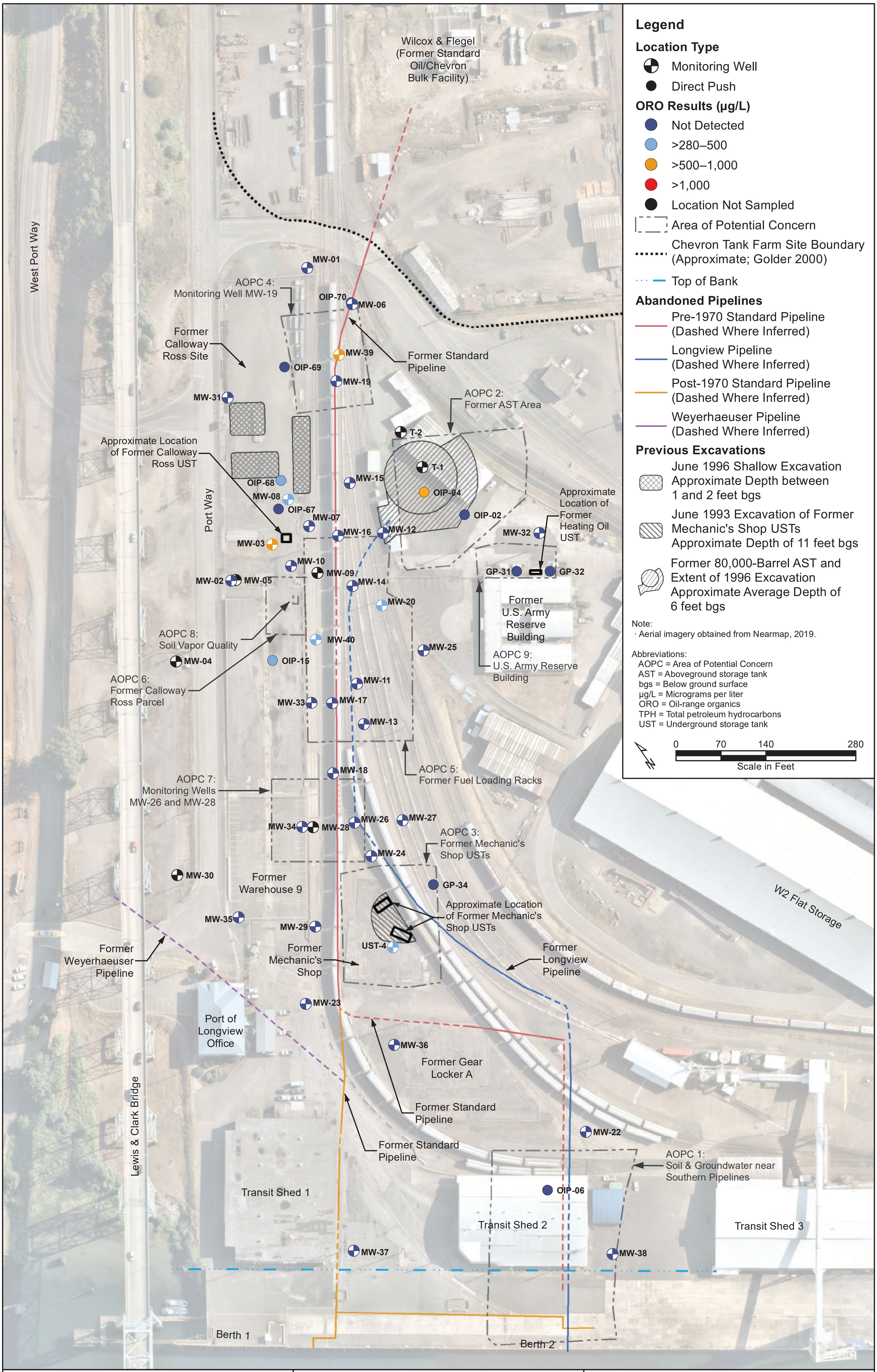

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Figure 3.7
Phase II and May 2020 Concentrations of Oil-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.7 Phase II and May 2020 Concentrations of Oil-Range Organics in Groundwater.mxd
9/16/2020

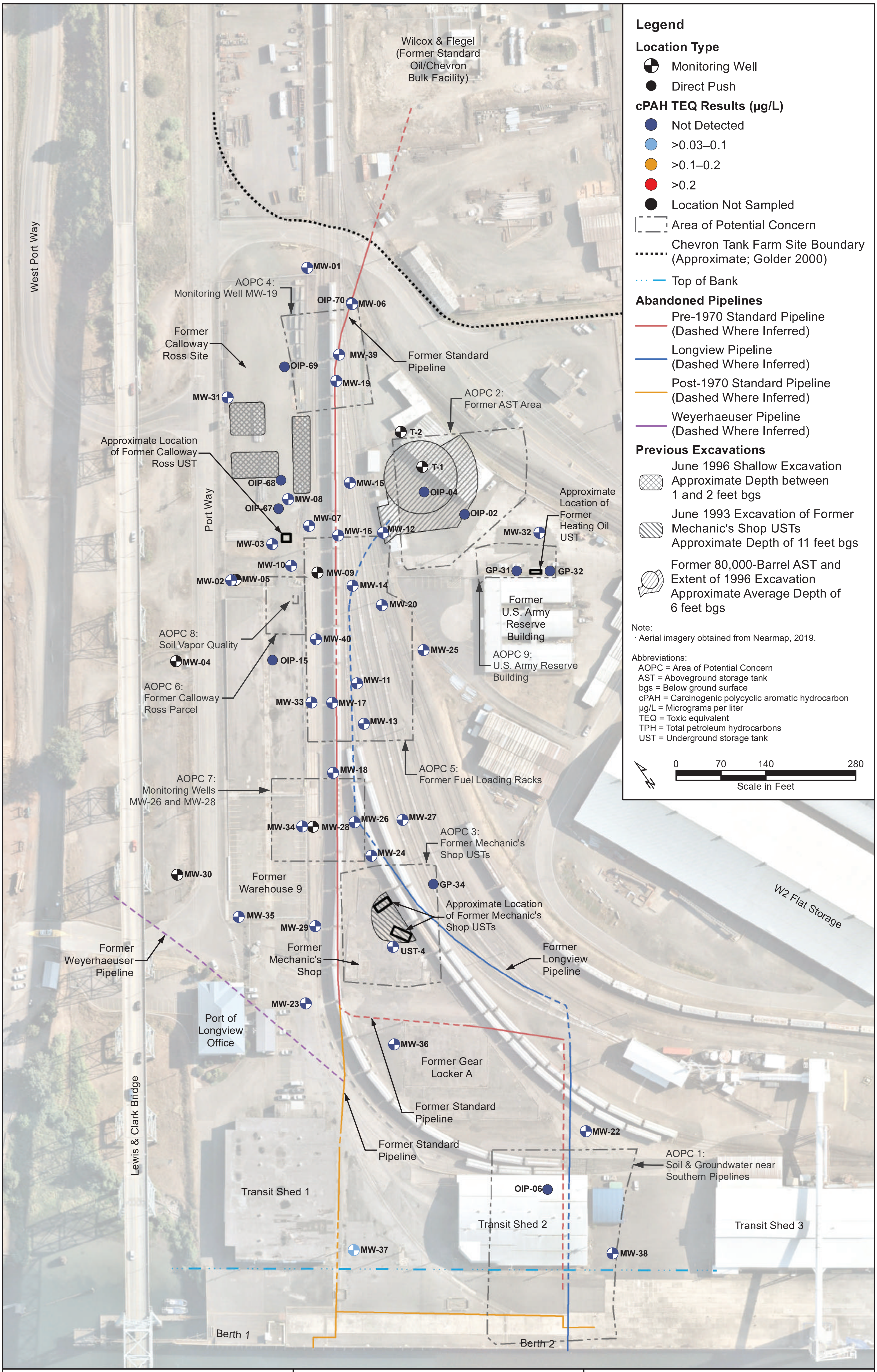

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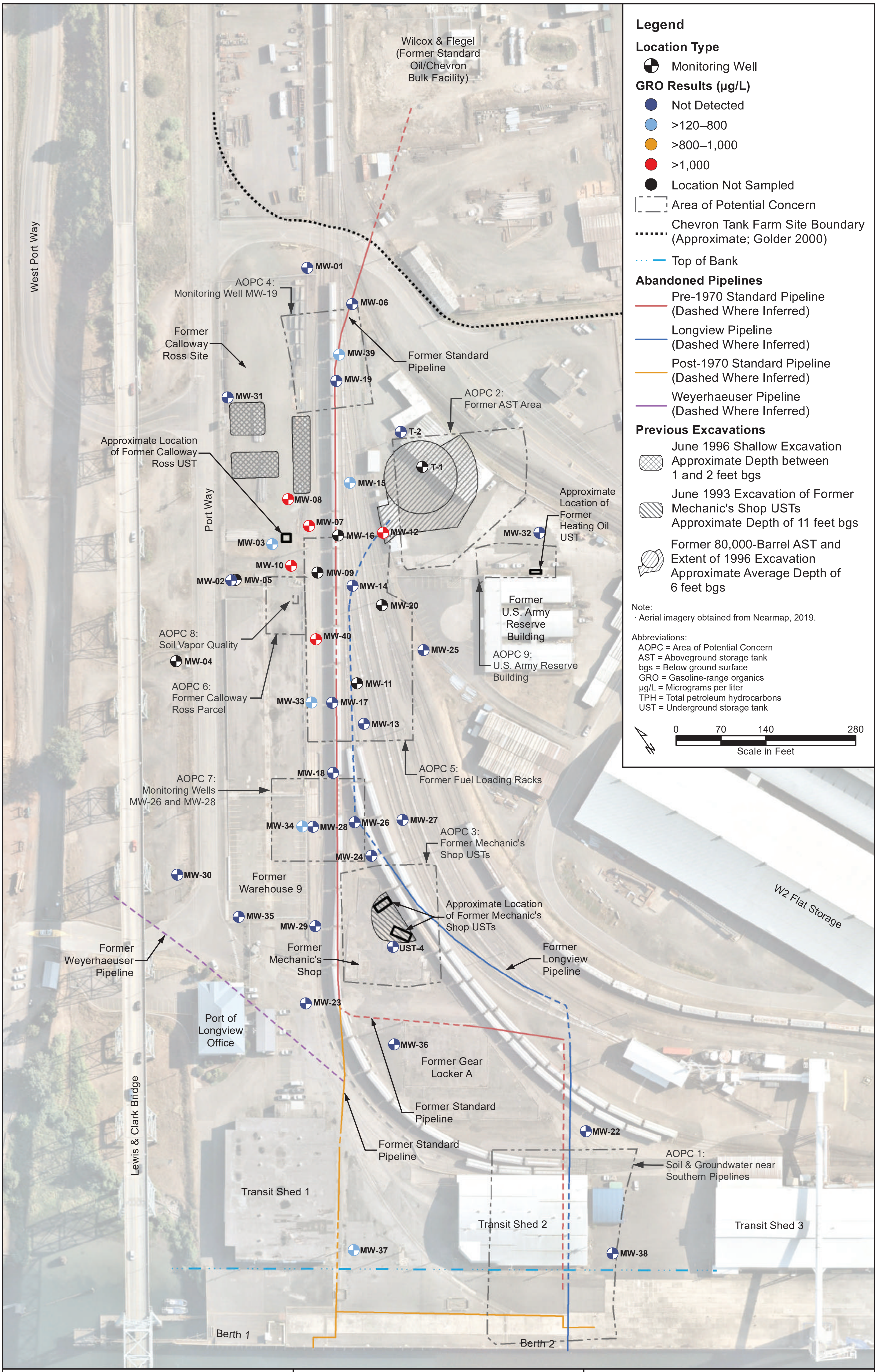
Figure 3.8
Phase II and May 2020 Concentrations of cPAH TEQ in Groundwater

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.8 Phase II and May 2020 Concentrations of cPAH TEQ in Groundwater.mxd
9/16/2020



Legend

Location Type

◐ Monitoring Well

GRO Results (µg/L)

● Not Detected

● >120–800

● >800–1,000

● >1,000

● Location Not Sampled

Area of Potential Concern

Chevron Tank Farm Site Boundary (Approximate; Golder 2000)

Top of Bank

Abandoned Pipelines

Pre-1970 Standard Pipeline (Dashed Where Inferred)

Longview Pipeline (Dashed Where Inferred)

Post-1970 Standard Pipeline (Dashed Where Inferred)

Weyerhaeuser Pipeline (Dashed Where Inferred)

Previous Excavations

▨ June 1996 Shallow Excavation Approximate Depth between 1 and 2 feet bgs

▨ June 1993 Excavation of Former Mechanic's Shop USTs Approximate Depth of 11 feet bgs

Former 80,000-Barrel AST and Extent of 1996 Excavation Approximate Average Depth of 6 feet bgs

Note:
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
GRO = Gasoline-range organics
µg/L = Micrograms per liter
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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Figure 3.9
August 2020 Concentrations of Gasoline-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.9 August 2020 Concentrations of Gasoline-Range Organics in Groundwater.mxd
9/16/2020

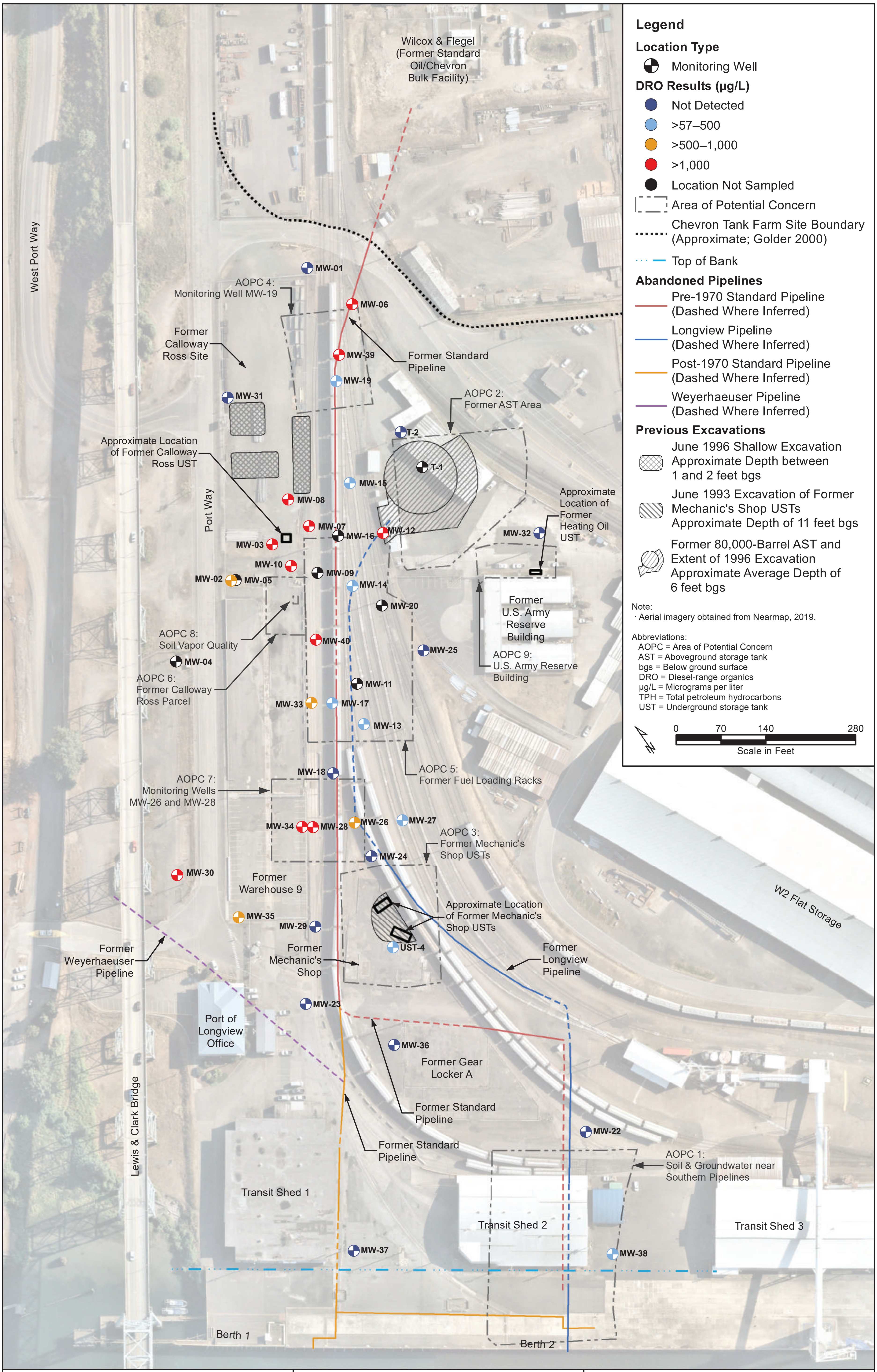

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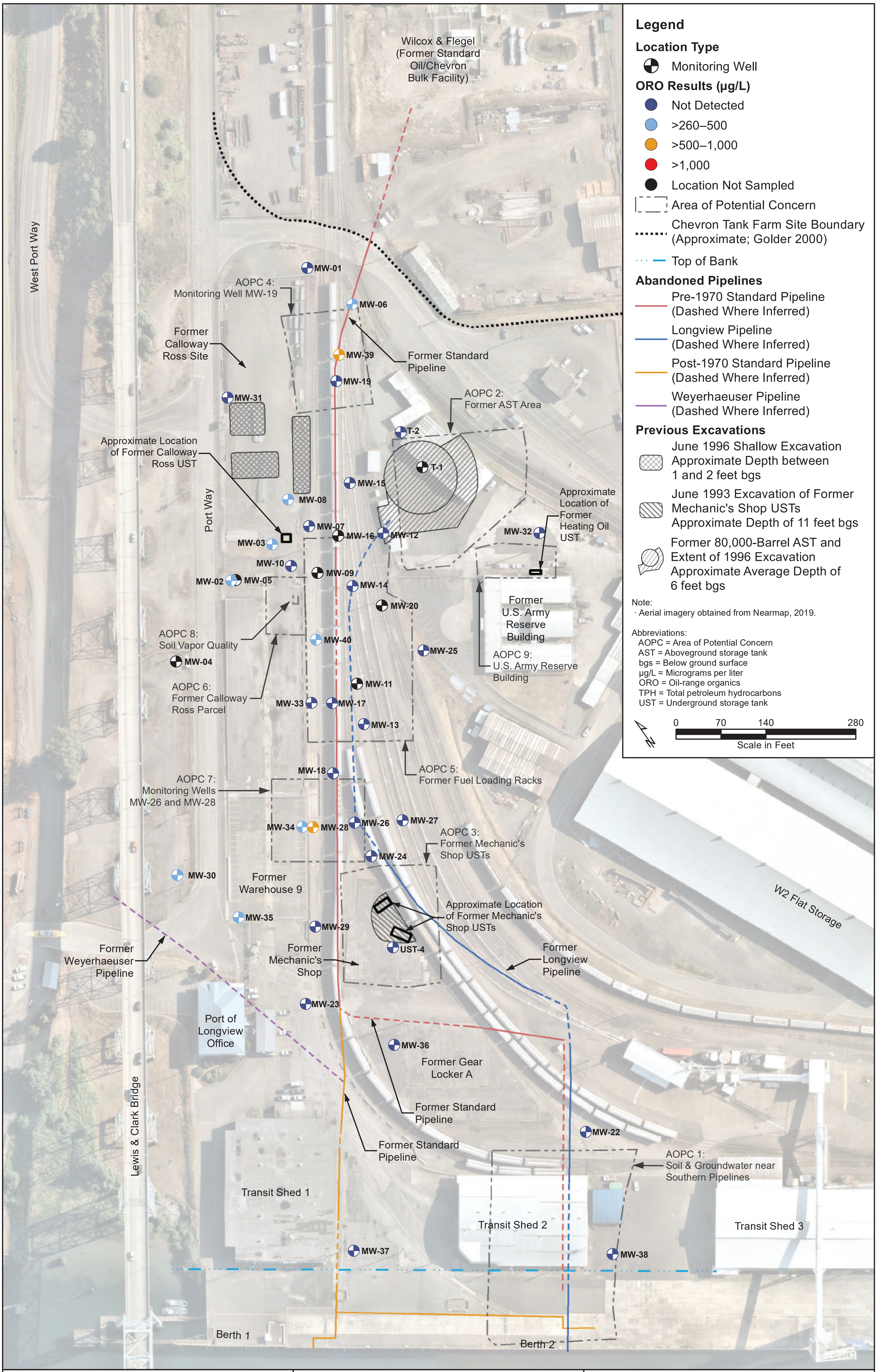
Figure 3.10
August 2020 Concentrations of Diesel-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.10 August 2020 Concentrations of Diesel-Range Organics in Groundwater.mxd
9/16/2020



Note:
· Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
µg/L = Micrograms per liter
ORO = Oil-range organics
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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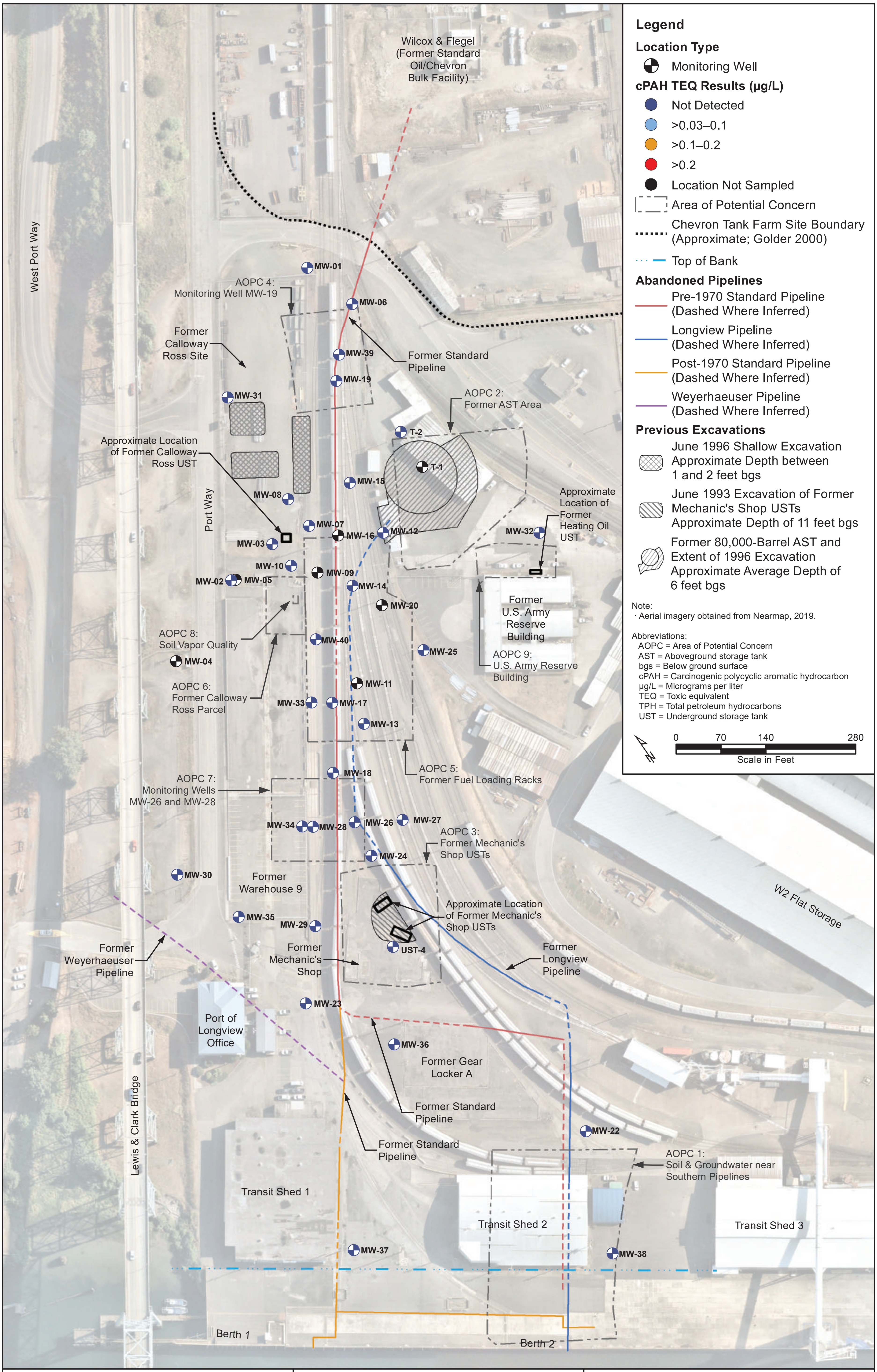
Figure 3.11
August 2020 Concentrations of Oil-Range Organics in Groundwater

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.11 August 2020 Concentrations of Oil-Range Organics in Groundwater.mxd
9/16/2020



Note:
· Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
cPAH = Carcinogenic polycyclic aromatic hydrocarbon
µg/L = Micrograms per liter
TEQ = Toxic equivalent
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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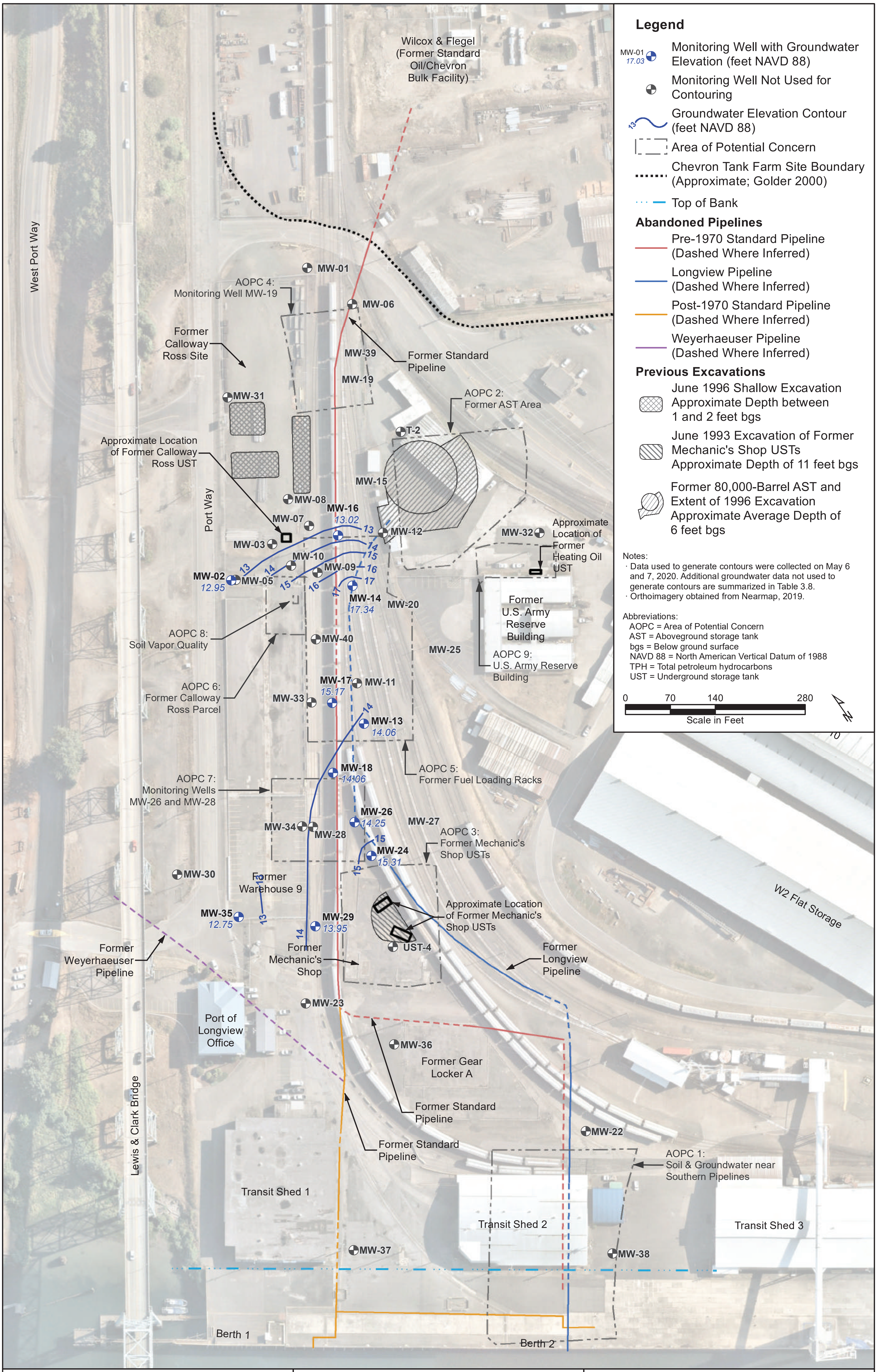
Figure 3.12
August 2020 Concentrations of cPAH TEQ in Groundwater

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.12 August 2020 Concentrations of cPAH TEQ in Groundwater.mxd
9/16/2020



Notes:
- Data used to generate contours were collected on May 6 and 7, 2020. Additional groundwater data not used to generate contours are summarized in Table 3.8.
- Orthoimagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
NAVD 88 = North American Vertical Datum of 1988
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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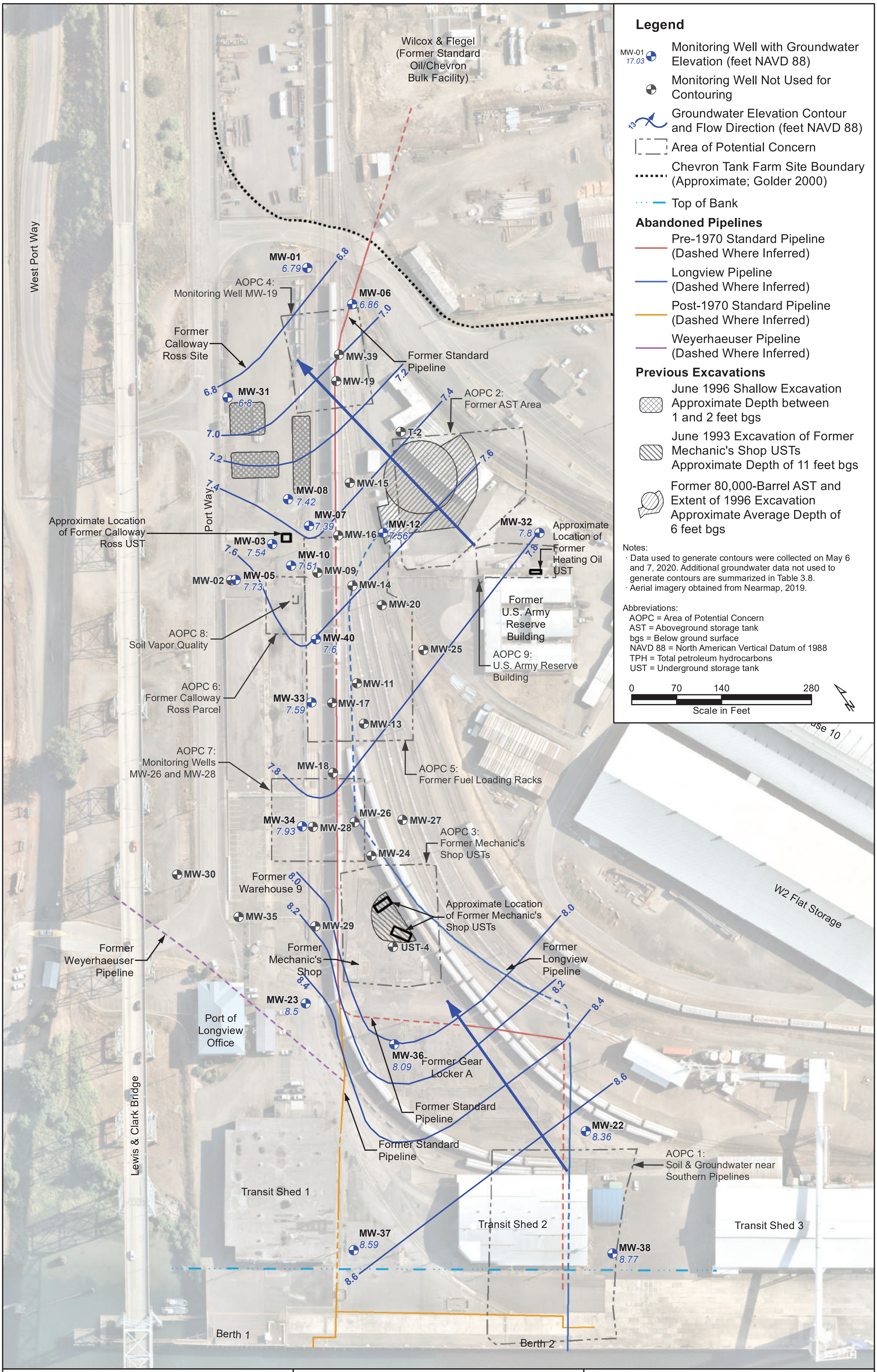
Figure 3.13
May 2020 Groundwater Contours—Perched Water-Bearing Zone

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.13 May 2020 Groundwater Contours - Perched Water-Bearing Zone.mxd
9/16/2020



Legend

- MW-01 17.03 Monitoring Well with Groundwater Elevation (feet NAVD 88)
- Monitoring Well Not Used for Contouring
- 13 Groundwater Elevation Contour and Flow Direction (feet NAVD 88)
- Area of Potential Concern
- Chevron Tank Farm Site Boundary (Approximate; Golder 2000)
- Top of Bank

Abandoned Pipelines

- Pre-1970 Standard Pipeline (Dashed Where Inferred)
- Longview Pipeline (Dashed Where Inferred)
- Post-1970 Standard Pipeline (Dashed Where Inferred)
- Weyerhaeuser Pipeline (Dashed Where Inferred)

Previous Excavations

- ▨ June 1996 Shallow Excavation Approximate Depth between 1 and 2 feet bgs
- ▨ June 1993 Excavation of Former Mechanic's Shop USTs Approximate Depth of 11 feet bgs
- Former 80,000-Barrel AST and Extent of 1996 Excavation Approximate Average Depth of 6 feet bgs

Notes:

- Data used to generate contours were collected on May 6 and 7, 2020. Additional groundwater data not used to generate contours are summarized in Table 3.8.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:

AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
NAVD 88 = North American Vertical Datum of 1988
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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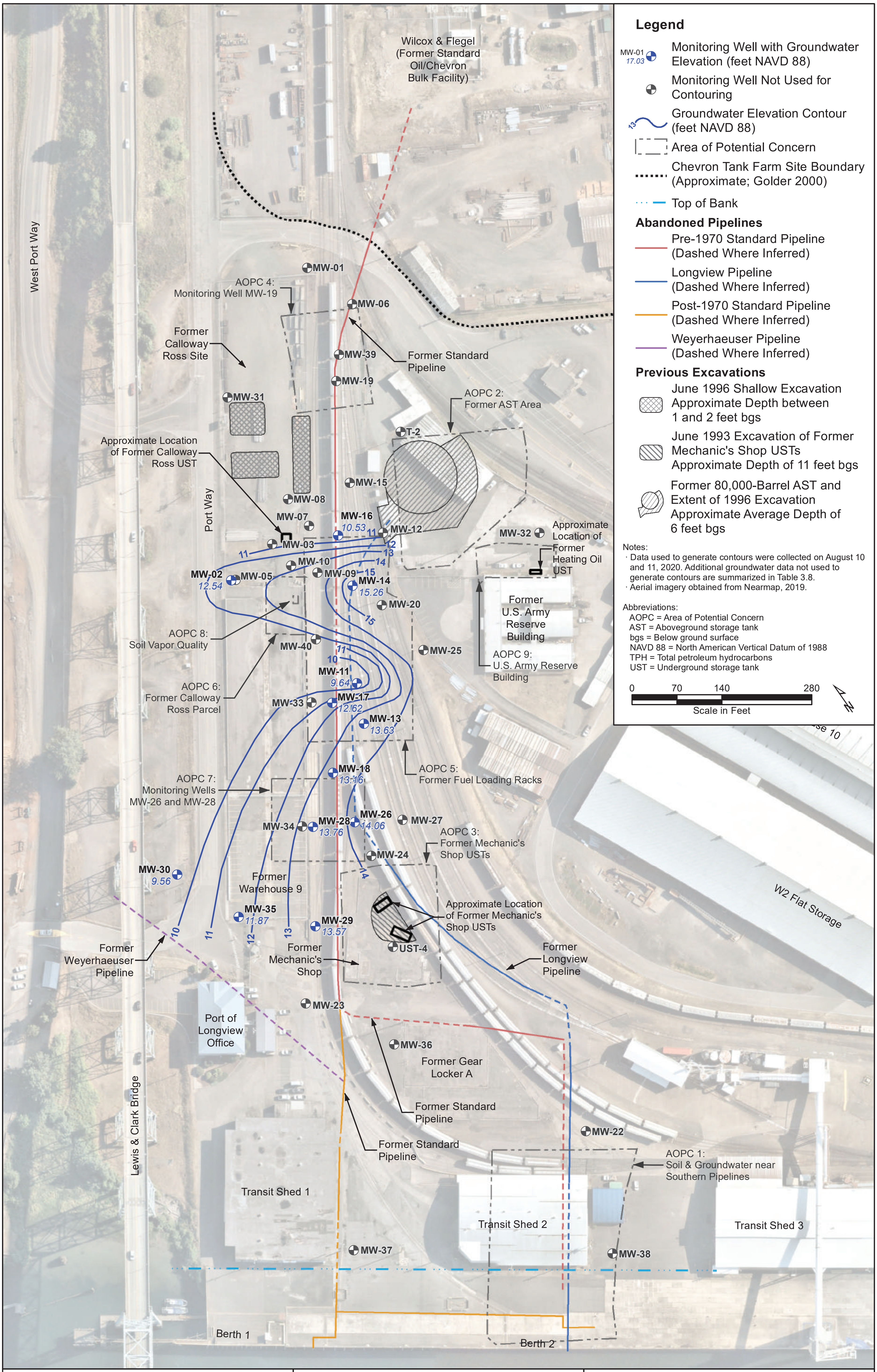
Figure 3.14
May 2020 Groundwater Contours—Alluvial Aquifer

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.14 May 2020 Groundwater Contours - Alluvial Aquifer.mxd
9/16/2020



Notes:
- Data used to generate contours were collected on August 10 and 11, 2020. Additional groundwater data not used to generate contours are summarized in Table 3.8.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
NAVD 88 = North American Vertical Datum of 1988
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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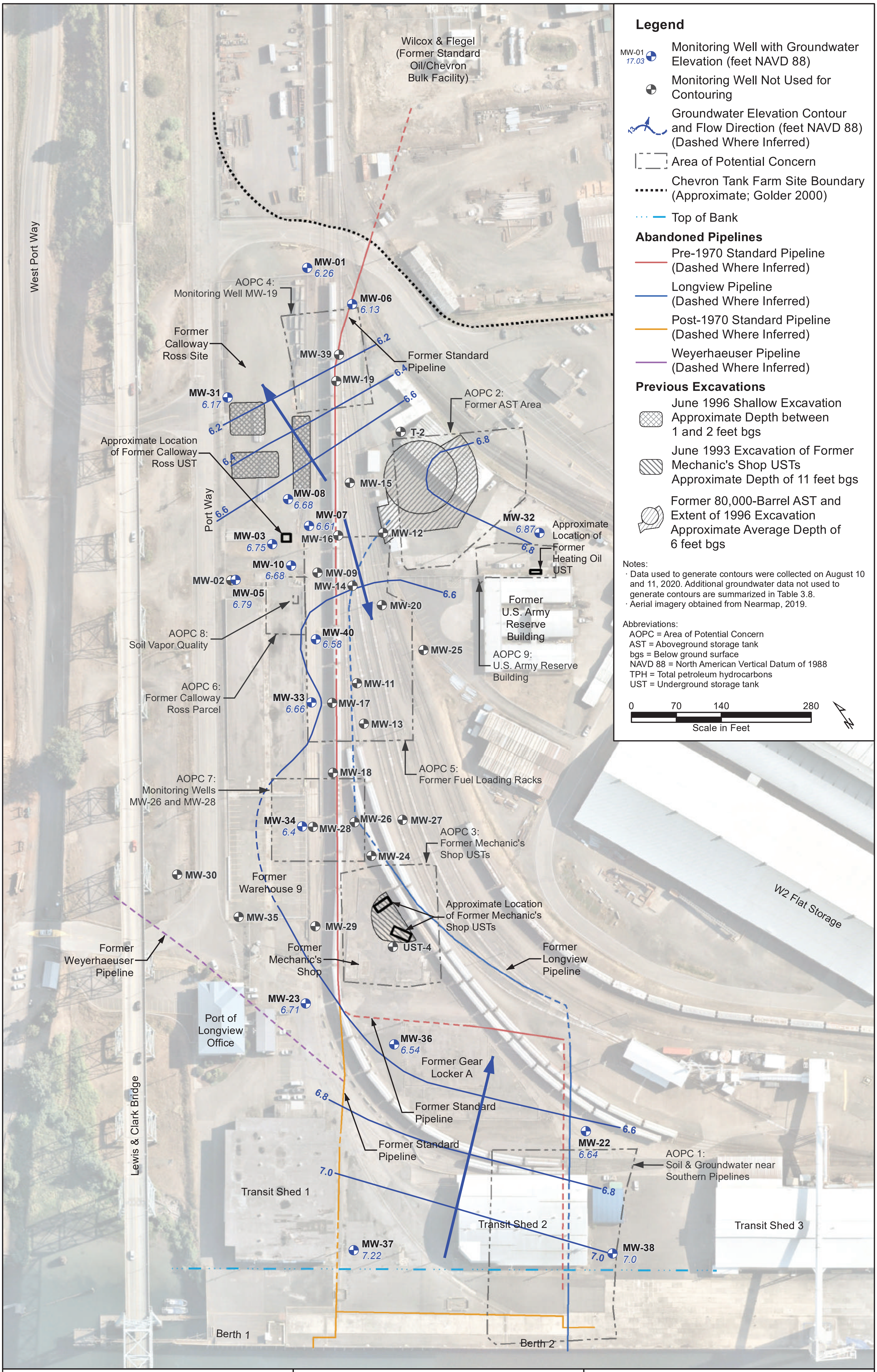
Figure 3.15
August 2020 Groundwater Contours—
Perched Water-Bearing Zone

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.15 August 2020 Groundwater Contours - Perched Water-Bearing Zone.mxd
9/16/2020



Notes:
- Data used to generate contours were collected on August 10 and 11, 2020. Additional groundwater data not used to generate contours are summarized in Table 3.8.
- Aerial imagery obtained from Nearmap, 2019.

Abbreviations:
AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
NAVD 88 = North American Vertical Datum of 1988
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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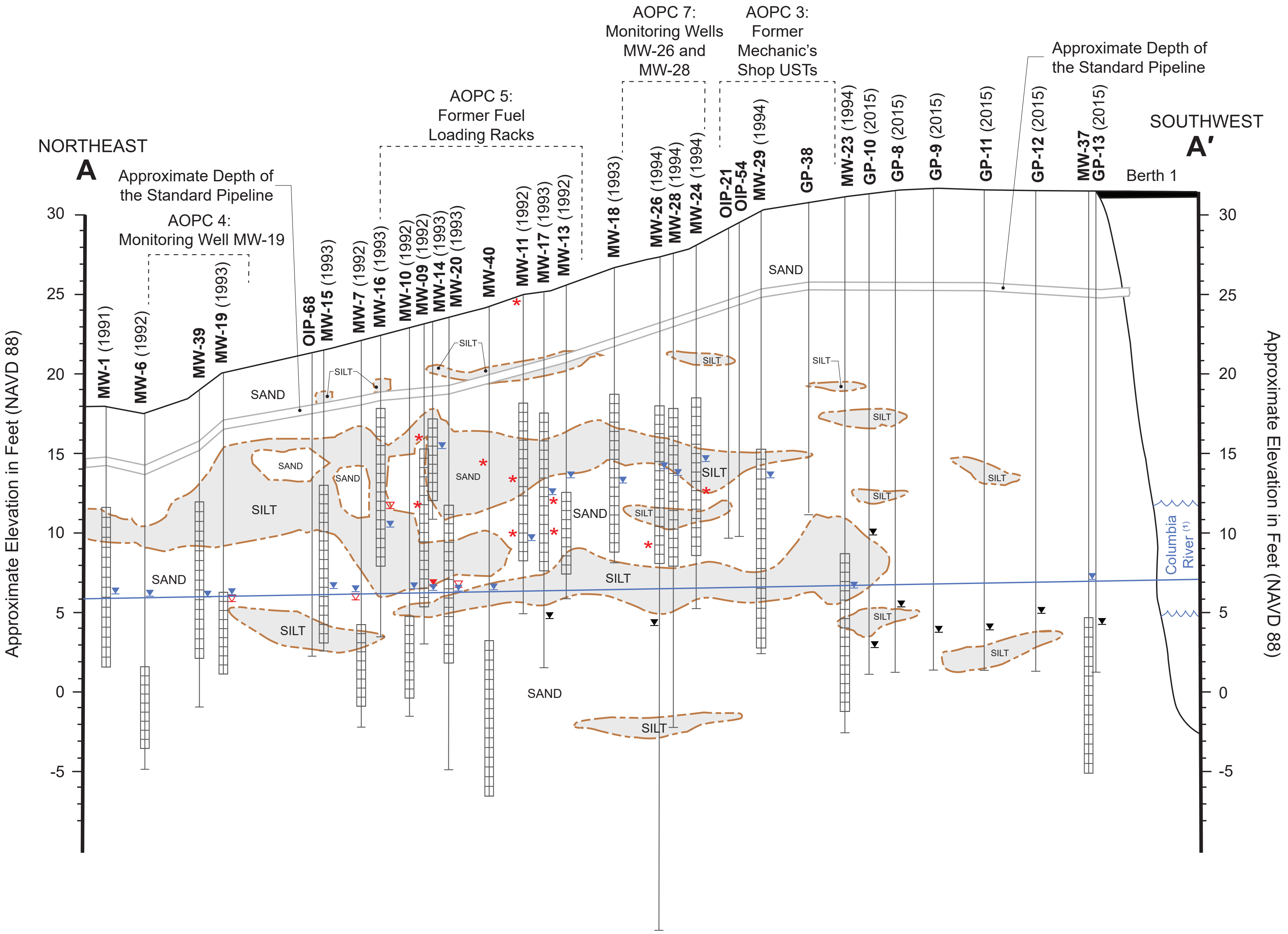
Figure 3.16
August 2020 Groundwater Contours—Alluvial Aquifer

I:\GIS\Projects\POL-TPH\MXD\Interim Data Report\Figure 3.16 August 2020 Groundwater Contours - Alluvial Aquifer.mxd
9/16/2020



Legend

MW-02 (1992) — Year Installed
Boring
* Soil sample with concentrations exceeding residual saturation levels for GRO or DRO
▼ Groundwater measured August 10 or 11, 2020
▯ Well Screen Interval
▼ Groundwater encountered at time of drilling
▽ LNAPL observed at least once during historical monitoring events
▼ LNAPL observed during the 2020 sampling events
— Approximate alluvial aquifer groundwater elevation measured on August 10 and 11, 2020
– – Contact boundary between lithologies
SAND Fine to medium SAND with little to some silt and occasional gravel
SILT SILT with low to high plasticity and little to some sand

Notes:

1 The Columbia River Stage has an approximate highest tide of 12 feet NAVD 88 and approximate lowest tide of 4.9 feet NAVD 88. Elevations represent the average of average monthly highest and lowest tide elevations from 2002 to 2020 at Station 9440422.

- Cross-section location shown on Figure 2.3. Locations shown are offset.
- Based on the lithology and using Table 15-14 (Residual Saturation Values) in Ecology's Concise Explanatory Statement, residual saturation values for GRO, DRO, and ORO are estimated to be approximately 5,625 mg/kg, 13,333 mg/kg, and 30,000 mg/kg, respectively (Ecology 2001). Residual saturation values will be re-evaluated in the Remedial Investigation Report.
- Existing cross-section uses lithology described in historical boring logs. Updates will be made during the preparation of the Remedial Investigation Report that uses lithology observed in the recent direct-push boring logs.

Abbreviations:
APOC = Area of Potential Concern
DRO = Diesel-range organics
GRO = Gasoline-range organics
LNAPL = Light non-aqueous-phase liquid
mg/kg = Milligrams per kilogram
NAVD 88 = North American Vertical Datum of 1988
ORO = Oil-range organics
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

Horizontal Scale in Feet
0′ 50′ 100′ 200′
0′ 2′ 4′ 8′
Vertical Scale in Feet
Vertical Exaggeration = 25x

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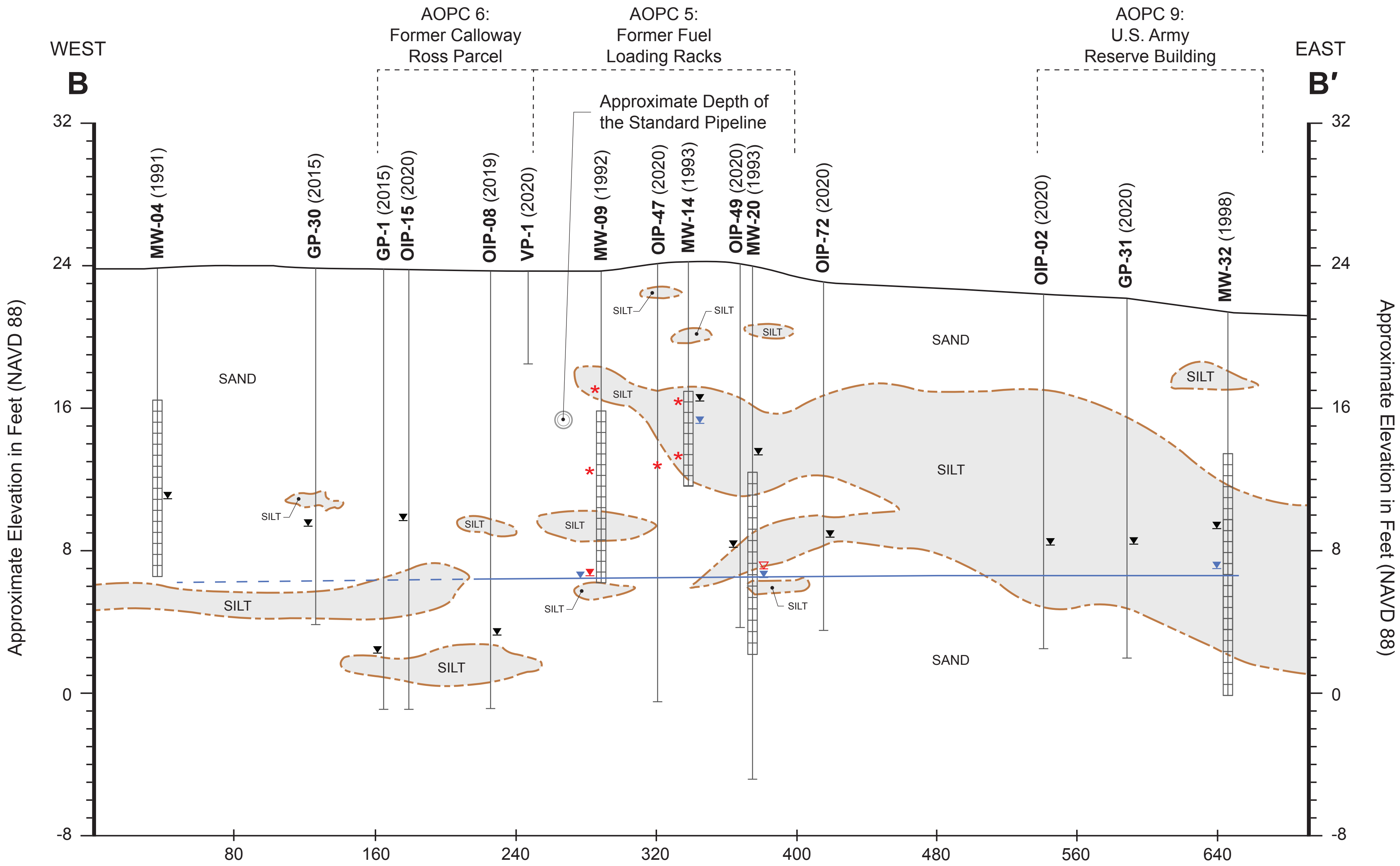
Figure 3.17
Cross-Section A-A′

I:\GIS\Projects\POL-TPH\AI\Interim Data Report\Figure 3.17 Cross-Section A-A'.ai
05/24/2021



Legend

MW-20 (1993) — Year Installed

Boring

* Soil sample with concentrations exceeding residual saturation levels for GRO or DRO

▼ Groundwater measured August 10 or 11, 2020

▯ Well Screen Interval

▼ Groundwater elevation measured at time of drilling

▽ LNAPL observed at least once during historical monitoring events

▼ LNAPL observed during the 2020 sampling events

— Approximate alluvial aquifer groundwater elevation measured on August 10 and 11, 2020 (dashed where inferred)

– – Contact boundary between lithologies

SAND Fine to medium SAND with little to some silt and occasional gravel

SILT SILT with low to high plasticity and little to some sand

Notes:

- Cross-section location shown on Figure 2.3. Locations shown are offset.
- Based on the lithology and using Table 15-14 (Residual Saturation Values) in Ecology's Concise Explanatory Statement, residual saturation values for GRO, DRO, and ORO are estimated to be approximately 5,625 mg/kg, 13,333 mg/kg, and 30,000 mg/kg, respectively (Ecology 2001). Residual saturation values will be re-evaluated in the Remedial Investigation Report.

Abbreviations:
AOPC = Area of Potential Concern
DRO = Diesel-range organics
GRO = Gasoline-range organics
LNAPL = Light non-aqueous-phase liquid
mg/kg = Milligrams per kilogram
NAVD 88 = North American Vertical Datum of 1988
ORO = Oil-range organics
TPH = Total petroleum hydrocarbons

Horizontal Scale in Feet
0′ 20′ 40′ 80′
0′ 2′ 4′ 8′
Vertical Scale in Feet
Vertical Exaggeration = 10x

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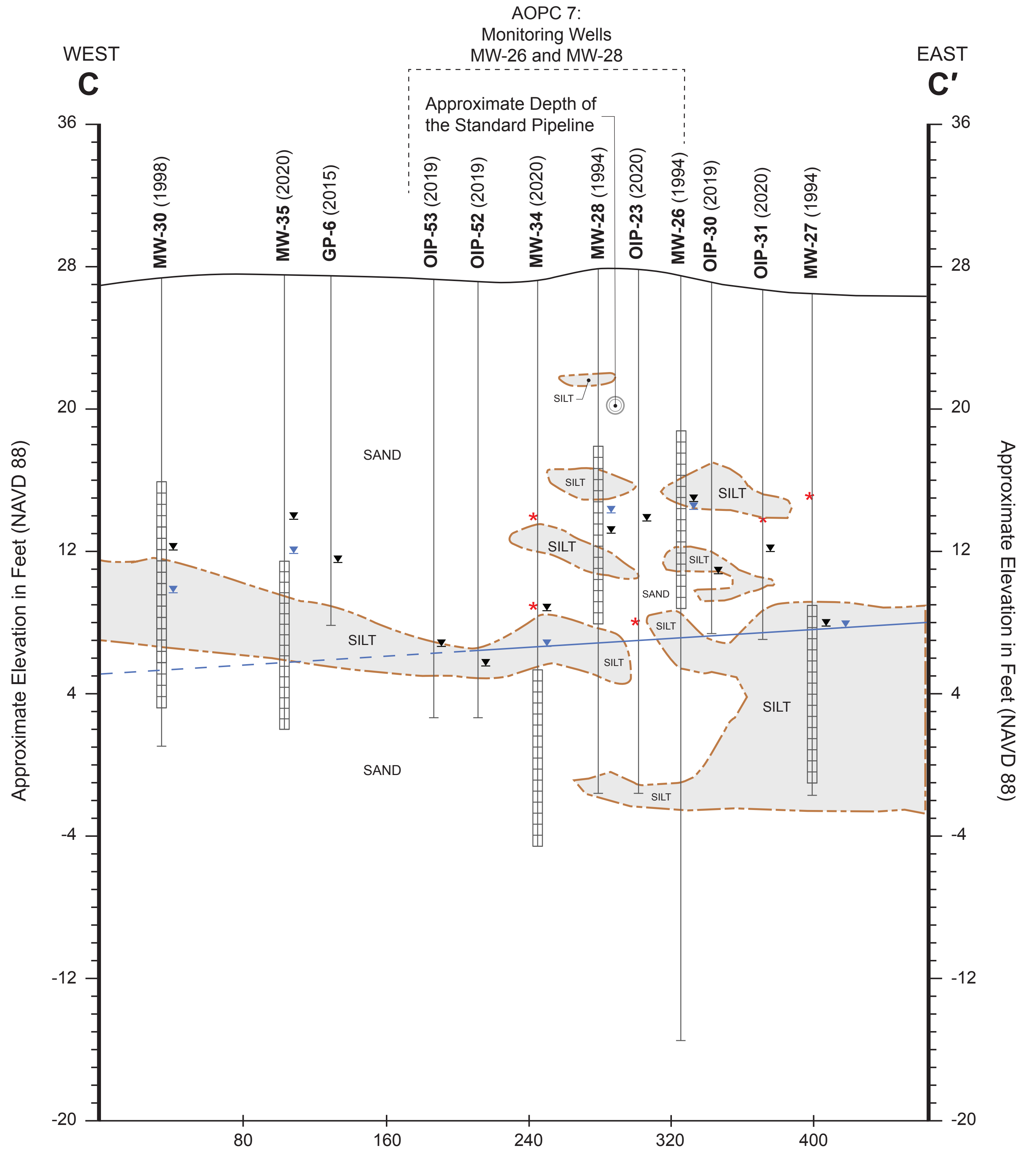
Figure 3.18
Cross-Section B-B′

I:\GIS\Projects\POL-TPH\AI\Interim Data Report\Figure 3.18 Cross-Section B-B'_2020-0916.ai
09/16/2020



Legend

MW-27 (1994) — Year Installed

Boring

* Soil sample with concentrations exceeding residual saturation levels for GRO or DRO

▼ Groundwater measured on August 10, 2020

▥ Well Screen Interval

▼ Groundwater elevation measured at time of drilling

— Approximate alluvial aquifer groundwater elevation measured on August 10, 2020 (dashed where inferred)

- - Contact boundary between lithologies

SAND	Fine to medium SAND with little to some silt and occasional gravel
SILT	SILT with low to high plasticity andlittle to some sand

Notes:

- Cross-section location shown on Figure 2.3. Locations shown are offset.
- Based on the lithology and using Table 15-14 (Residual Saturation Values) in Ecology's Concise Explanatory Statement, residual saturation values for GRO, DRO, and ORO are estimated to be approximately 5,625 mg/kg, 13,333 mg/kg, and 30,000 mg/kg, respectively (Ecology 2001). Residual saturation values will be re-evaluated in the Remedial Investigation Report.

Abbreviations:
AOPC = Area of Potential Concern
DRO = Diesel-range organics
GRO = Gasoline-range organics
LNAPL = Light non-aqueous-phase liquid
mg/kg = Milligrams per kilogram
NAVD 88 = North American Vertical Datum of 1988
ORO = Oil-range organics
TPH = Total petroleum hydrocarbons

Horizontal Scale in Feet
0′ 20′ 40′ 80′
0′ 2′ 4′ 8′
Vertical Scale in Feet
Vertical Exaggeration = 10x

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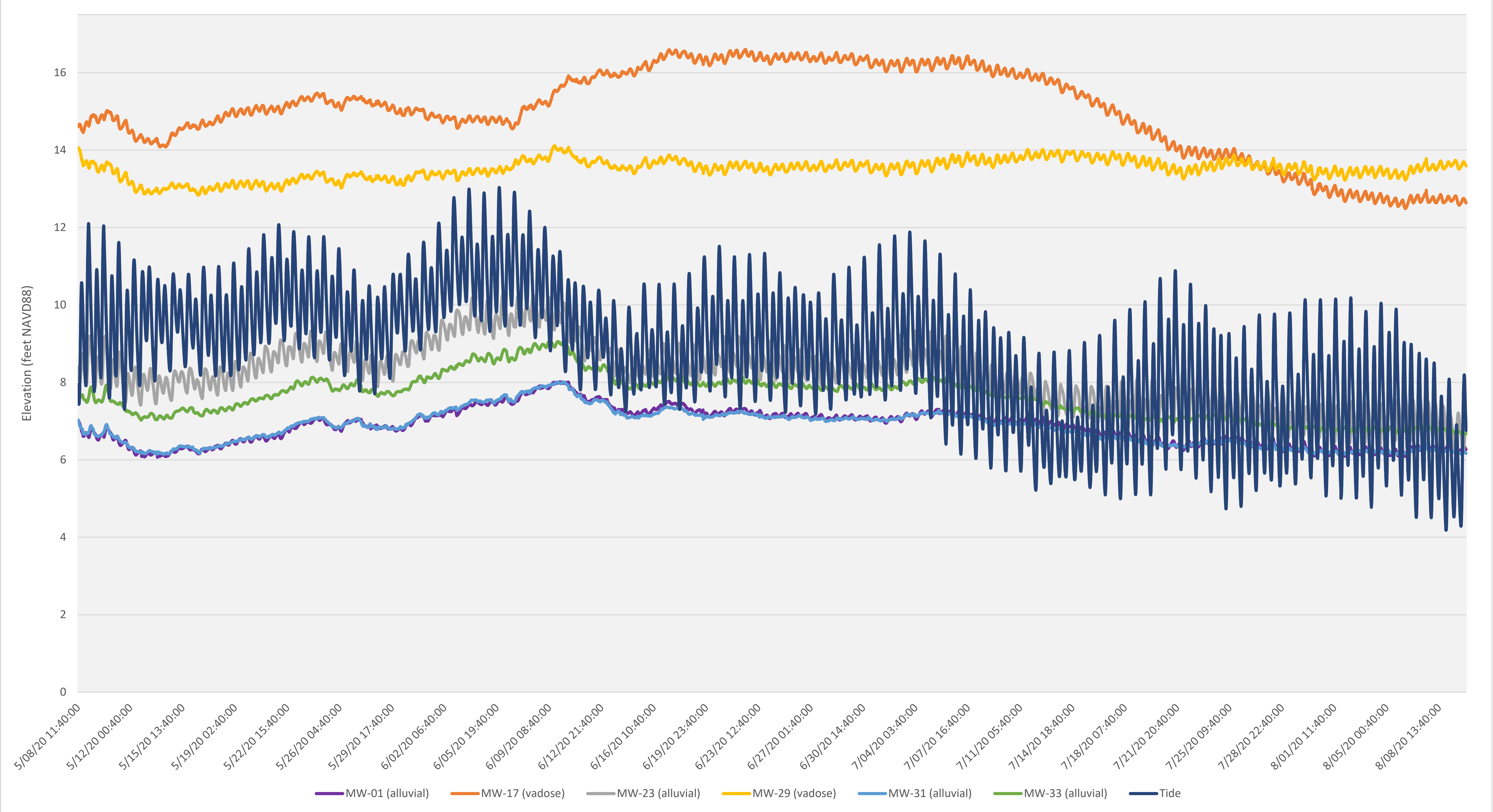
Figure 3.19
Cross-Section C-C′

I:\GIS\Projects\POL-TPH\AI\Interim Data Report\Figure 3.19 Cross-Section C-C'_2020-0916.ai
09/16/2020



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.

Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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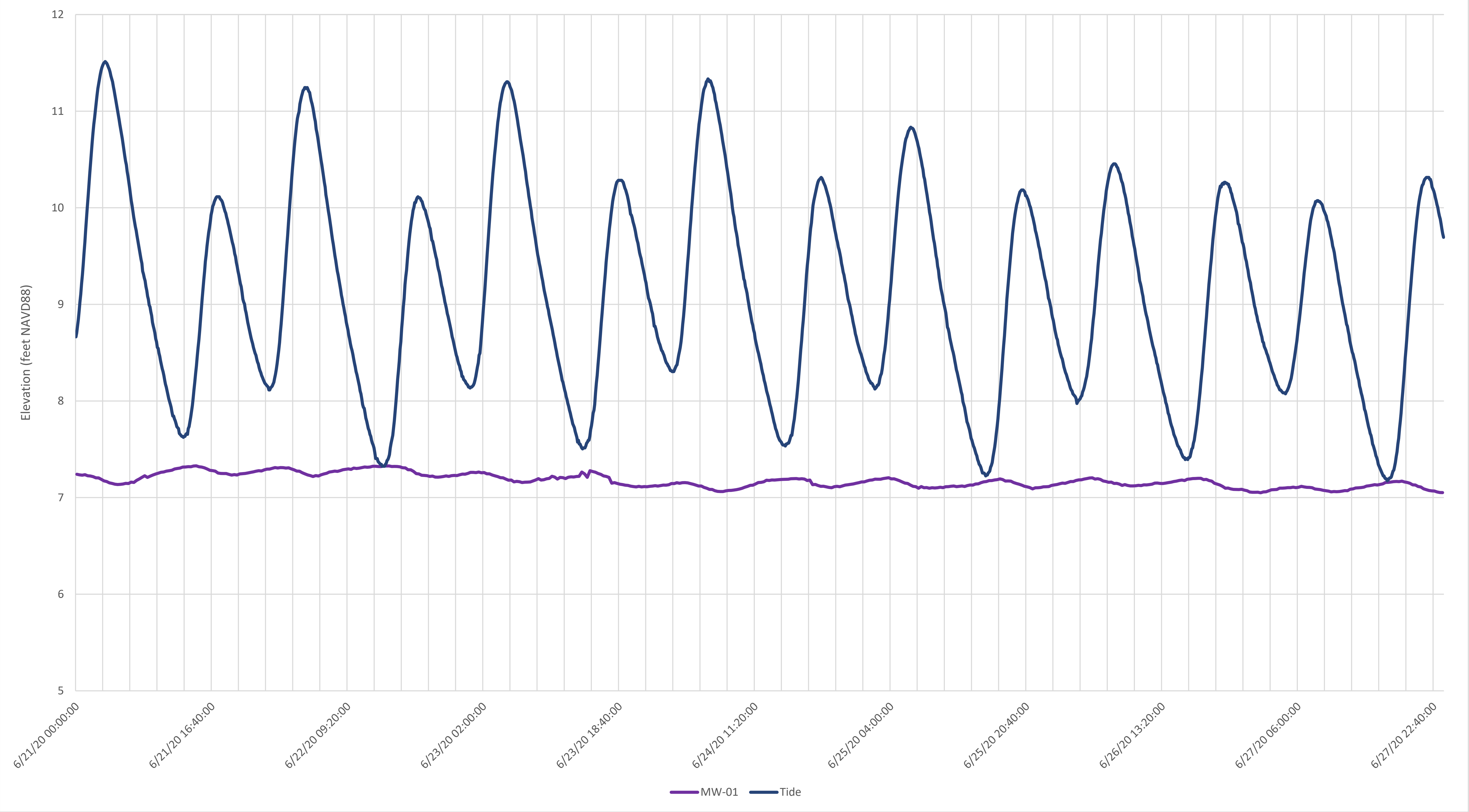
Figure 3.20a
Hydrograph of Selected Monitoring Wells and Columbia River, May–August 2020



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.

Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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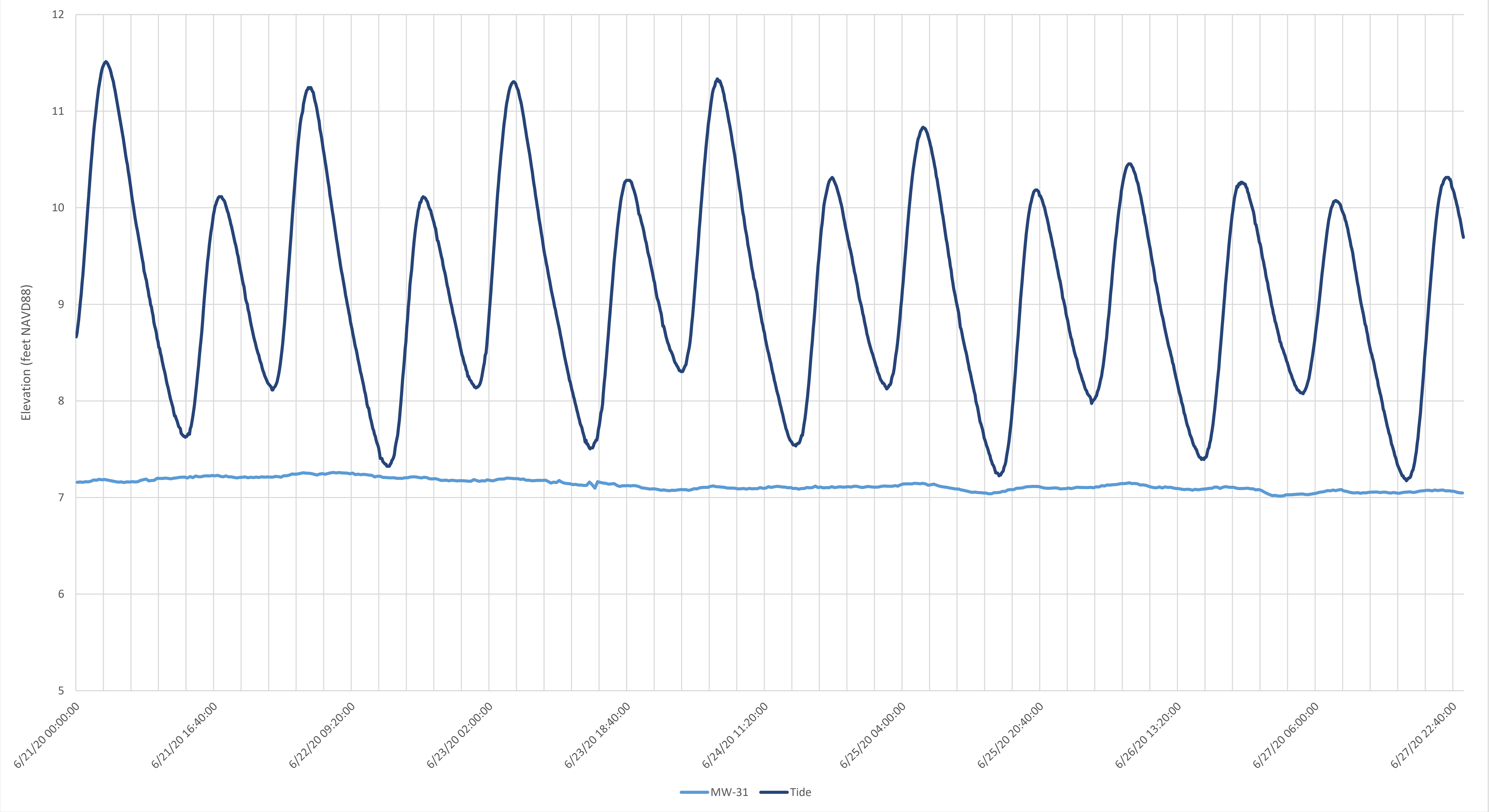
Figure 3.20b
Groundwater Elevation Relative to Columbia River Tidal Elevation at MW-01 (Alluvial, Northern Portion of Site), June 21–27, 2020

5/31/2021



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.

Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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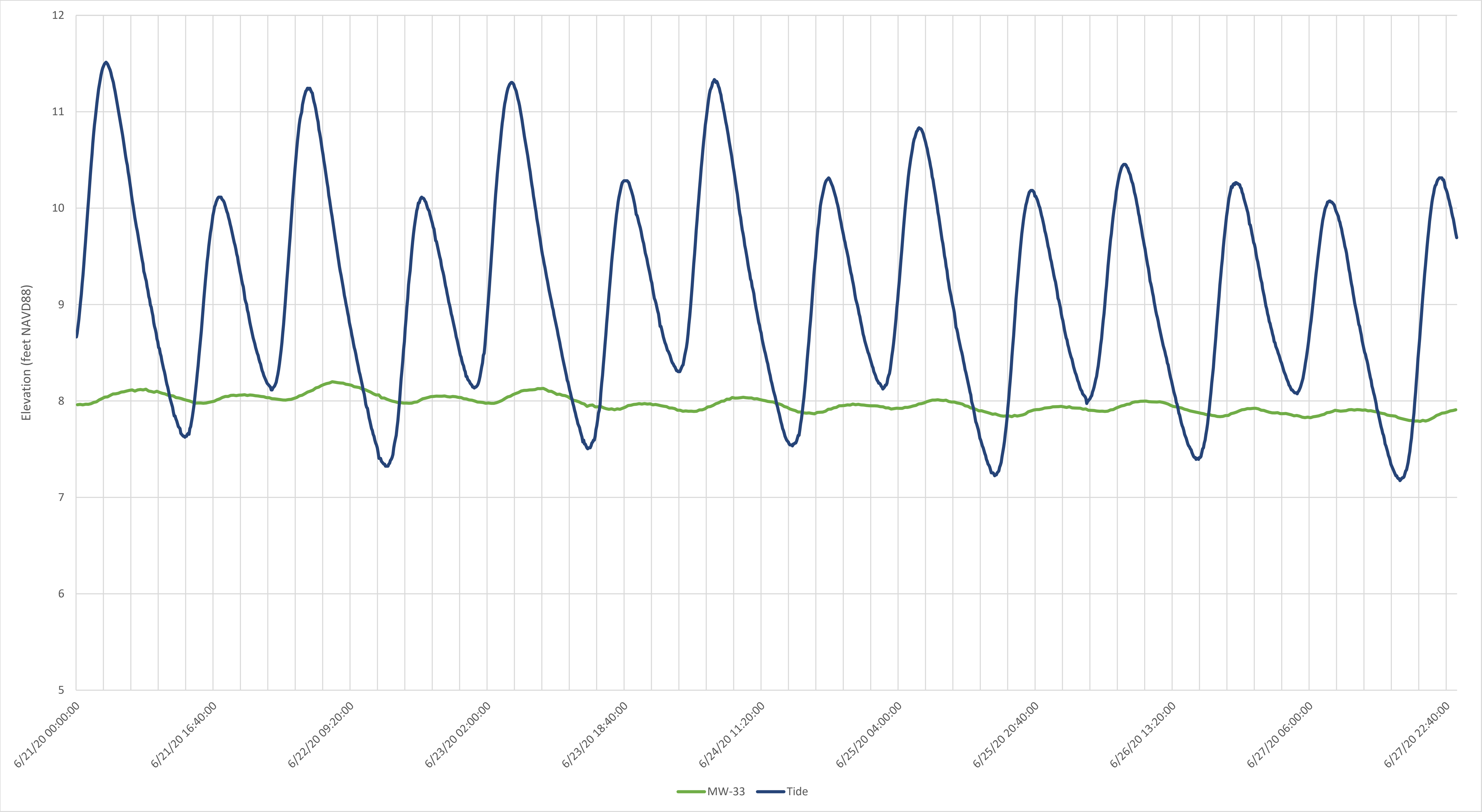
Figure 3.20c
Groundwater Elevation Relative to Columbia River Tidal Elevation at MW-31 (Alluvial, Northern Portion of Site), June 21–27, 2020



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.

Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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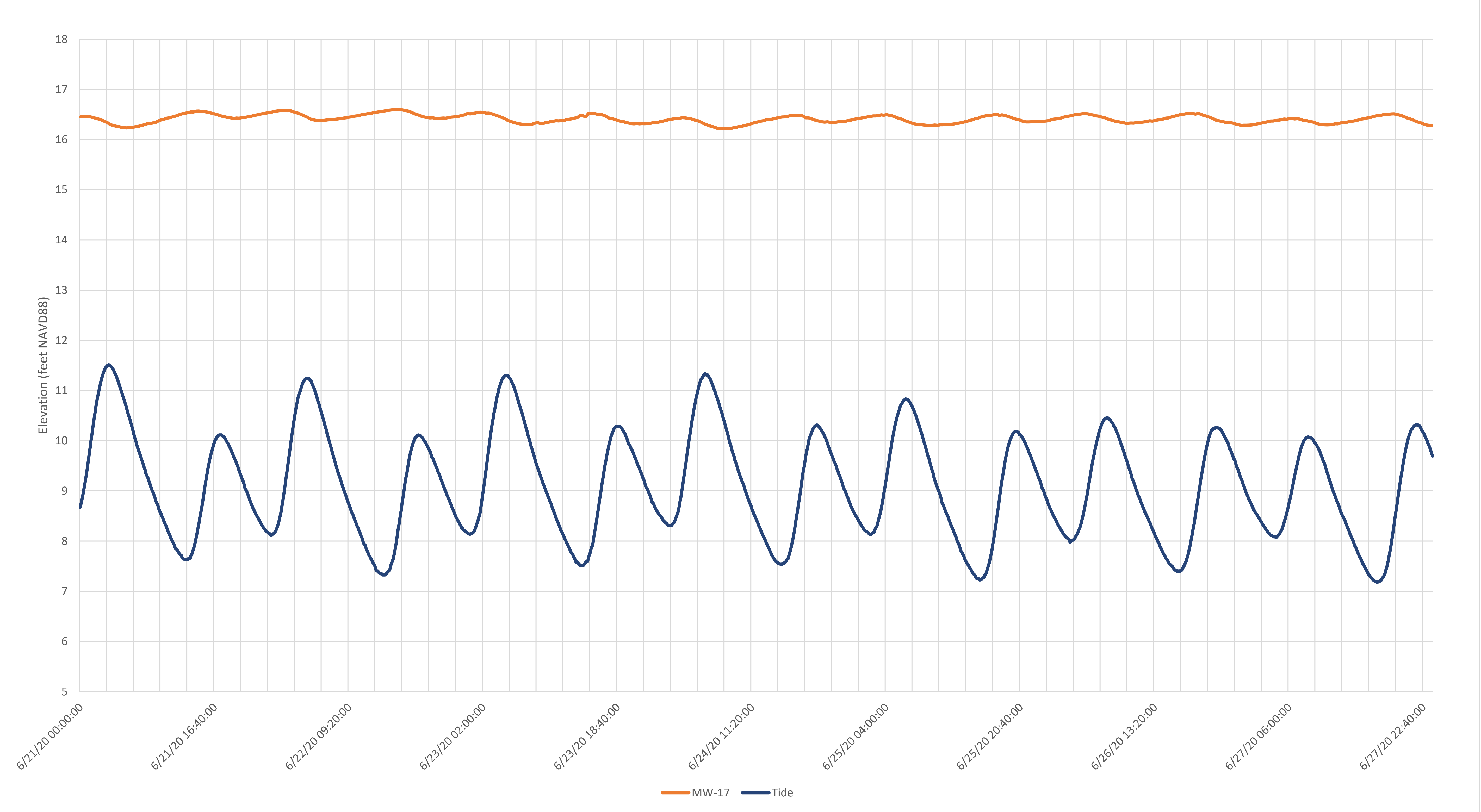
Figure 3.20d
Groundwater Elevation Relative to Columbia River Tidal Elevation at MW-33 (Alluvial, Central Portion of Site), June 21–27, 2020



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.

Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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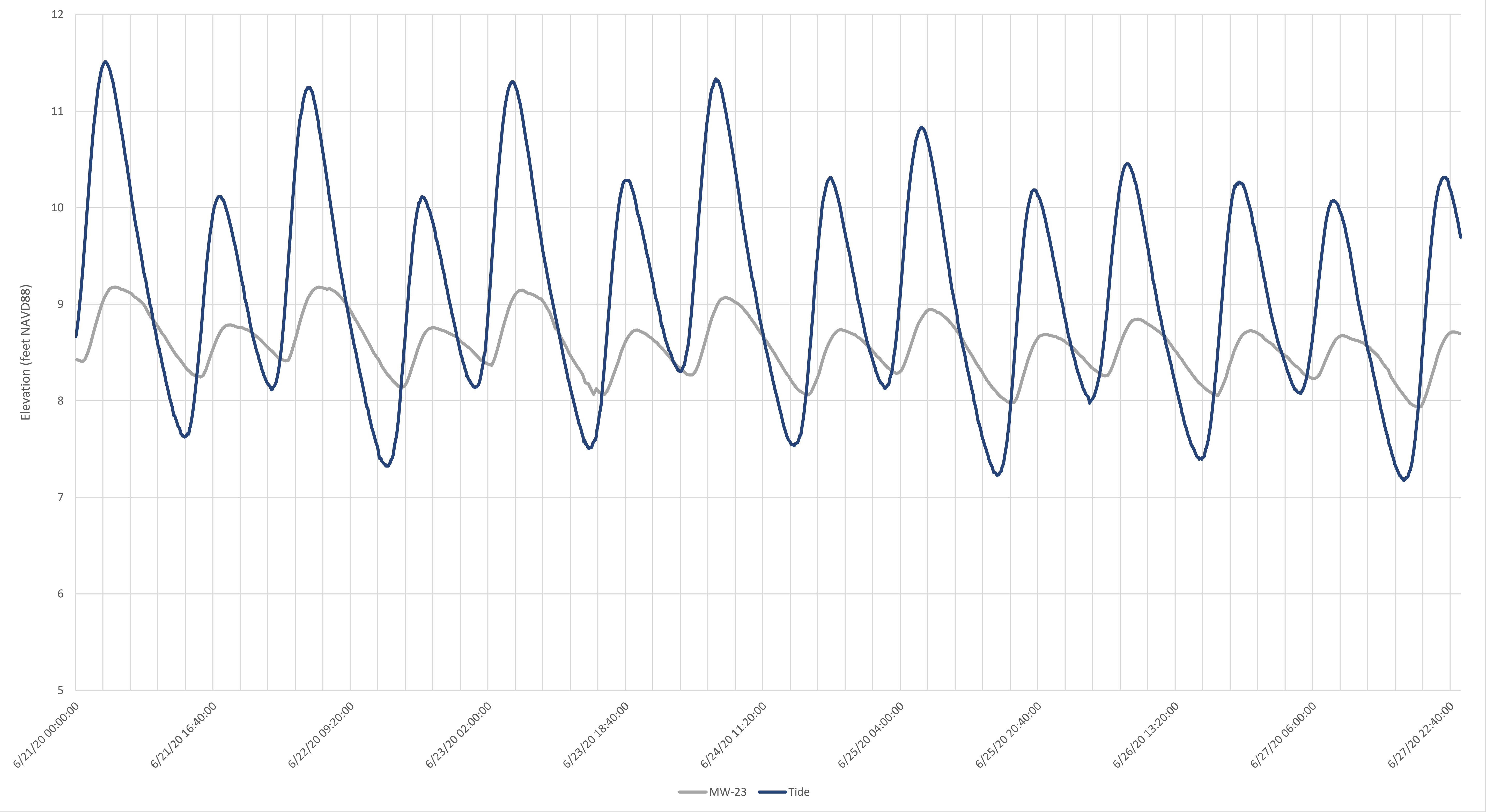
Figure 3.20e
Groundwater Elevation Relative to Columbia River Tidal Elevation at MW-17 (Vadose, Central Portion of Site), June 21–27, 2020



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.

Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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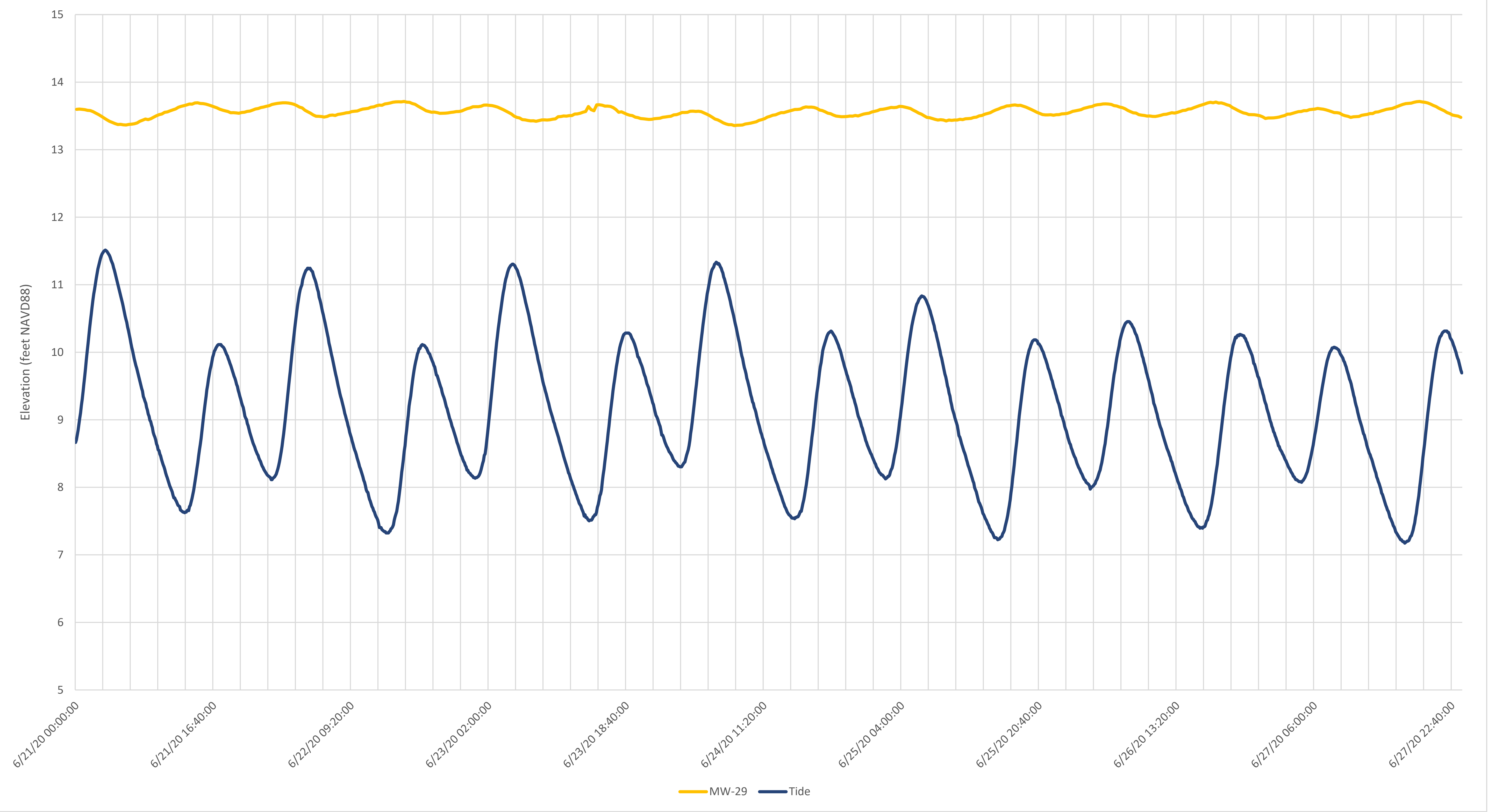
Figure 3.20f
Groundwater Elevation Relative to Columbia River Tidal Elevation at MW-23 (Alluvial, South-Central Portion of Site), June 21–27, 2020



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.

Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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Port of Longview TPH Site
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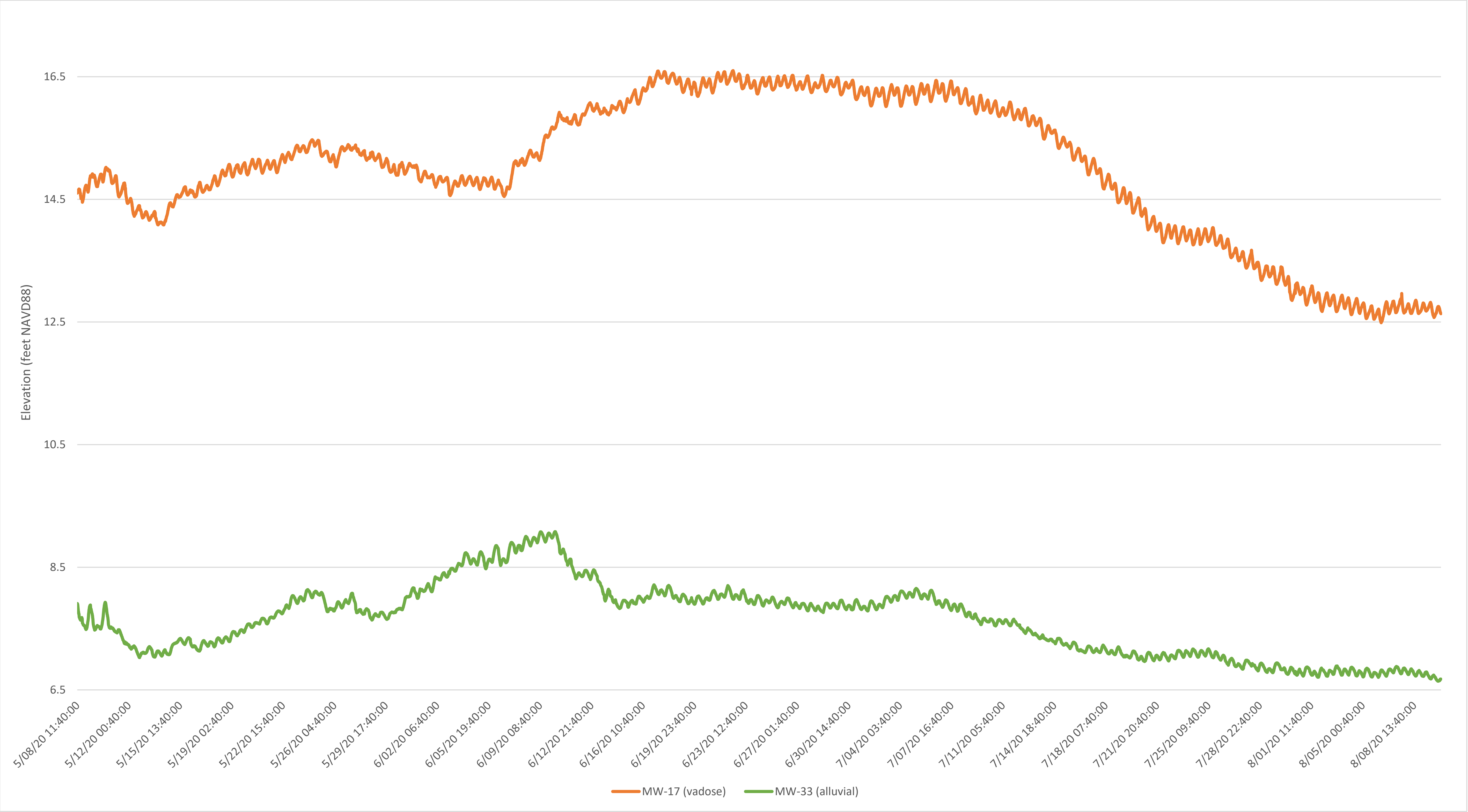
Figure 3.20g
Groundwater Elevation Relative to Columbia River Tidal Elevation at MW-29 (Vadose, South-Central Portion of Site), June 21–27, 2020

5/31/2021



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.
Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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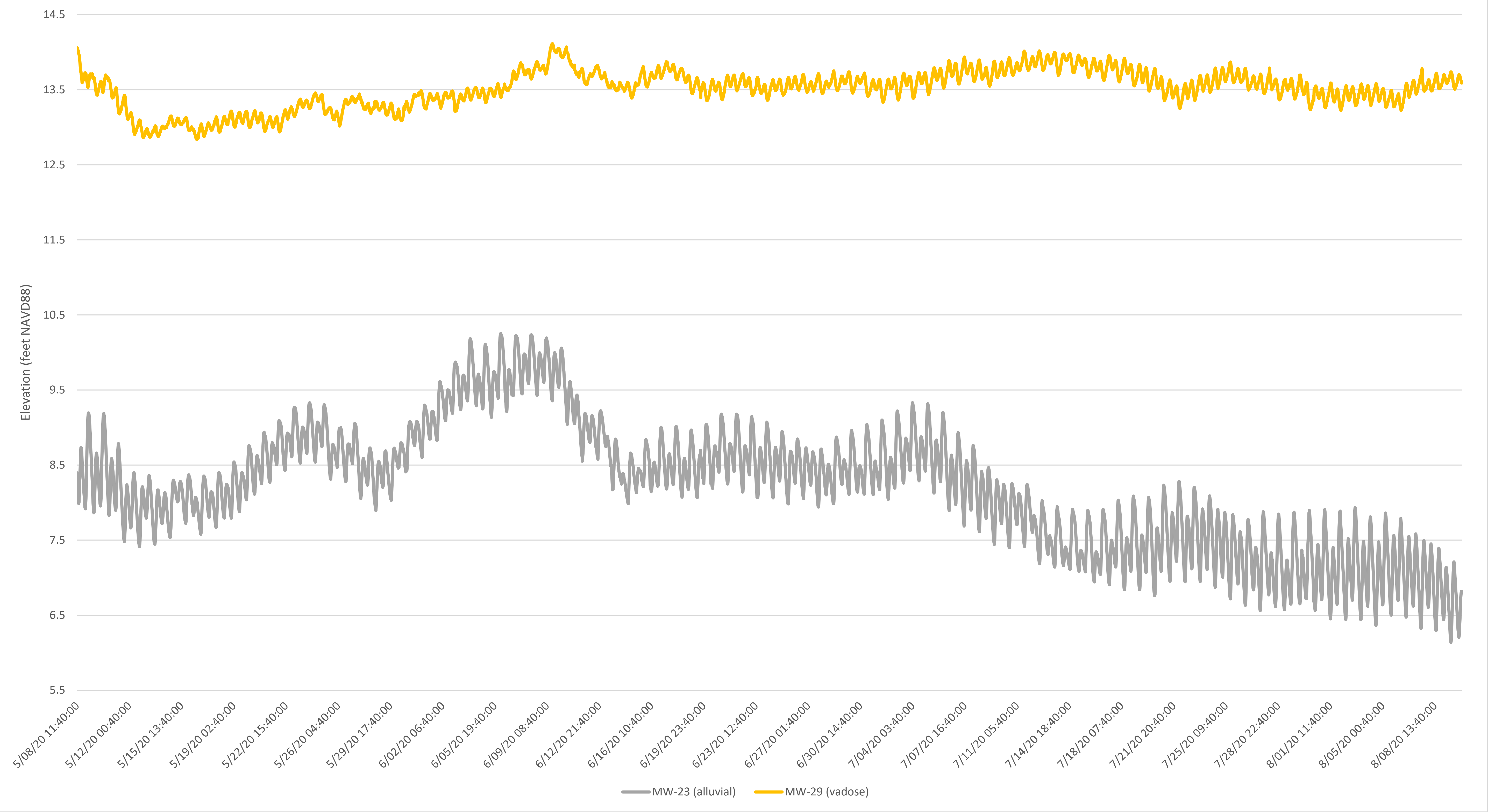
Figure 3.20h
Vertical Head Differences at Selected Well Pairs in Central Portion of Site, May–August 2020



Note: Columbia River Elevations shown are from NOAA Station 9440422 and were converted from feet MLLW to feet NAVD 88 using a datum conversion of +4.924 feet, obtained using NOAA's Online VDatum conversion tool (https://vdatum.noaa.gov/vdatumweb/) for the Site shoreline area.

Abbreviations: MLLW = Mean lower low water; NAVD 88 = North American Vertical Datum of 1988; NOAA = National Oceanic and Atmospheric Administration

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Figure 3.20i
Vertical Head Differences at Selected Well Pairs in South-Central Portion of Site, May–August 2020

Port of Longview TPH Site

Interim Data Report

Appendix A
Columbia Technologies, LLC's High-Resolution Fluorescence/Hydraulic Profile Characterization Report

Prepared for:

FLOYD SNIDER
601 Union Street, Suite 600
Seattle, WA 98101

High-Resolution Fluorescence/Hydraulic Profile Characterization, Port of Longview, WA November 2019

CT Project Number 3870-2019-05

Submitted by:

COLUMBIA Technologies
Rockville, Maryland

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For more information on COLUMBIA Technologies, SmartData Solutions®, and LNAPL assessment tools and protocols visit http://www.columbiatechnologies.com or call 1-888-344-2704.

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Conversion Factors

Inch/Ounce/Pound/PSI to International System of Units

Multiply	**By**	**To obtain**
	Length	
Inch (in.)	2.54	Centimeter (cm)
Inch (in.)	25.4	Millimeter (mm)
Foot (ft.)	0.3048	Meter (m)
	Volume	
Ounce (oz.)	29.6	Milliliters (ml)
Gallon (gal)	3.8	Liters (L)
	Pressure	
Pounds per Square Inch (psi)	6.89	Kilopascals (kPa)
	Hydraulic Conductivity	
Feet per day (ft/day)	0.0003527	Centimeters per second (cm/sec)

Temperature in degrees Celsius (^oC) is converted to degrees Fahrenheit (^oF) as

$$(^oF) = (1.8 \times (^oC)) + 32$$

Datum

Horizontal and vertical coordinates are referenced from the World Geodetic System 1984 [EPSG:4326].

Supplemental Information

Electrical conductivity (EC) is provided in millisiemens per meter (mS/meter).

Concentrations of chemical constituents in water are provided in either milligrams per liter (mg/L) or micrograms per liter (μg/L).

Concentrations of chemical constituents in soil are provided in either milligrams per kilogram (mg/kg) or micrograms per kilogram (μg/kg).

Concentrations of chemical constituents in vapor are provided in either milligrams per cubic meter (mg/m^3) or micrograms per cubic meter ($\mu g/m^3$).

High-Resolution Fluorescence/Hydraulic Profile Characterization, Port of Longview, WA November 2019

Summary

COLUMBIA Technologies, LLC, as a subcontractor to **Floyd Snider**, conducted a high-resolution fluorescence/hydraulic profile characterization of the Port of Longview, WA site located at 10 E Port Way, Longview, WA (the Site) during the period of November 13 to 22, 2019.

The primary objectives of this assessment were to characterize the extent and physical characteristics of the remaining hydrocarbon impacts and to identify the soil structure in which any residual hydrocarbon impacts resides for permeability.

To accomplish these objectives, a high-resolution fluorescence/hydraulic profile characterization was conducted to inform the Conceptual Site Model (CSM).

The information presented herein is based on high-resolution direct sensing measurements made by **COLUMBIA Technologies** and pertinent historic site data provided by **Floyd Snider.**

An overview of the site and the survey locations identified by **Floyd Snider** are presented in **Figure 3** (see end of this report). As discussed further, below, these survey locations were adjusted during the course of the survey, at the direction of **Floyd Snider** based on daily review of the results as they were developed.

The direct sensing data employed for this assessment are comprised of the Optical Imaging Profiler (OIP) combined with the Hydraulic Profiling Tool (HPT) measurements. This combined tool is referred to as OiHpt. Direcensing logs are presented in **Appendix D**.

Direct sensing survey stations are shown in **Figure 4**. Direct sensing survey locations consist of 73 OiHpt stations in and around eight (8) Areas of Potential Concern (AOPC) designated by **Floyd Snider**. OIP and HPT data were collected in each of the 73 OiHpt stations. Dissipation tests were conducted at 22 of the 73 OiHpt stations to identify the static water level and to estimate the hydraulic permeability (K) of the soils below the groundwater surface.

These direct-sensing stations were initially located at the Site adjacent to

existing monitoring wells exhibiting elevated concentrations of petroleum hydrocarbons (PHCs). Subsequent locations were added where needed to more completely define the fluorescence footprint.

Figures 5 and **6** provide a visualization of the residual hydrocarbon impacts in both plan and elevation views.

The HPT and EC data show the thin, finer grained, low permeability zones extending fairly continuously across the site, at different depths from 2 to 30 ft bgs. **Figures 7** and **8** provide visualizations of the soil layering and the residual hydrocarbon impacts.

The results of the dissipation tests and the calculated hydraulic permeability are shown in the logs in **Appendix D**.

Methods, Assumptions, and Procedures

Planning for this High-Resolution Fluorescence/Hydraulic Profile Characterization involved a review of available site documentation to develop an understanding of the site.

Direct sensing survey stations are shown in **Figure 4**. (AOPC1-05 and -06 at the Transit Shed on the SE corner of the investigation are omitted for graphical clarity. See **Figure 3**) Direct sensing survey locations consist of 73 OiHpt borings in and around eight (8) Areas of Potential Concern (AOPC) designated by **Floyd Snider**.

These direct-sensing stations were initially located at the Site near to existing monitoring wells exhibiting elevated concentrations of petroleum hydrocarbons (PHCs).

Optical Imaging Profiler (OIP)

Utilizing OIP, the vertical distribution and relative concentrations of hydrocarbon impacts in the subsurface can be discerned at the centimeter scale. Initial OIP stations were advanced in proximity to selected monitoring wells with known residual phase petroleum hydrocarbons. These first lines of evidence enabled the team to characterize the presence and depth interval of hydrocarbon impacts at the impacted locations. The observed response of the OIP system at these locations then served as a reference for complete delineation of hydrocarbon impacts present at the site.

The remaining OIP stations were planned to be advanced at selected locations stepping out from the responses discovered during the initial borings to delineate the lateral extent of hydrocarbon impacts.

COLUMBIA Technologies employed the OIP with the Hydraulic Profiling Tool (HPT) with the Electrical Conductivity (EC) system to evaluate subsurface hydrostratigraphy. The HPT identifies soil intervals exhibiting higher hydraulic permeability or heterogeneities.

The HPT pressure logs record changes in hydraulic pressure measured directly as water is pumped into the formation at a constant rate. These logs reveal the variability and relative hydraulic conductivity of the soil.

The combined OiHpt probe also contains an Electrical Conductivity dipole array at the tip of the probe that measures the electrical conductivity (EC) of soil and groundwater.

EC measurements identify changes in the soil's electrical conductivity that can be related to changes in stratigraphy, providing insight into contaminant pathways when viewed in relation to chemical detector response.

Low EC values generally indicate coarse-grained materials (sand and gravel), while higher EC values usually indicate elevated clay content, although water chemistry and other site-specific factors influence EC response as well.

General conductivity ranges for basic soil types are presented in **Figure 1,** below (Geoprobe, 2015).

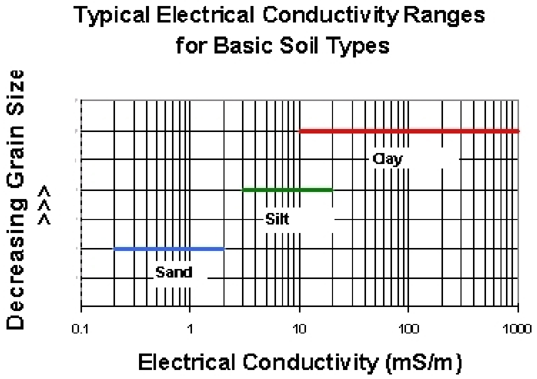

Figure 1

Results and Discussion

OIP Response

Figures 5 and **6** provide visualizations of the fluorescence in both plan and elevation views. The OiHpt logs are shown in **Appendix D.**

Significant OIP levels were found from the surface to 24 ft bgs. The greatest thickness of fluorescence response was identified in AOPC7 - from approximately 10 to 24 ft bgs. The area around the former Standard Oil Pipeline (AOPC4) also had fluorescence from six (6) to 15 ft bgs.

Hydrostratigraphy

High HPT pressure and low system flow are indicative of low permeability soils. Higher permeability is manifested by low hydraulic pressure and normal system flow.

For this site, HPT data identified highly complex soils indicative of interbedded high and low permeability as shown in the log for AOPC5-OIP43, **Figure 2**, below.

The HPT and EC data show one- to three-foot (1-3) thick, finer grained, low permeability zones extending fairly continuously across the site, at different depths from 2 to 30 ft bgs.

Stations AOPC8-OIP07, AOPC8-OIP13, and AOPC4-OIP58 have spikes in their EC readings, which likely are the result of some conductor in the soil and do not reflect changes in soil grain size. **Figures 7** and **8** provide visualizations of the soil layering and the residual hydrocarbon impacts.

The depth to groundwater and groundwater elevation was calculated from dissipation tests during this investigation and found to vary between 13 and 26-ft bgs across the site.

The hydraulic permeability (K) was calculated based on dissipation tests and HPT data for 22 stations. Hydraulic permeability was found to vary from very low (less than 10 ft/day) to high (over 75 ft/day).

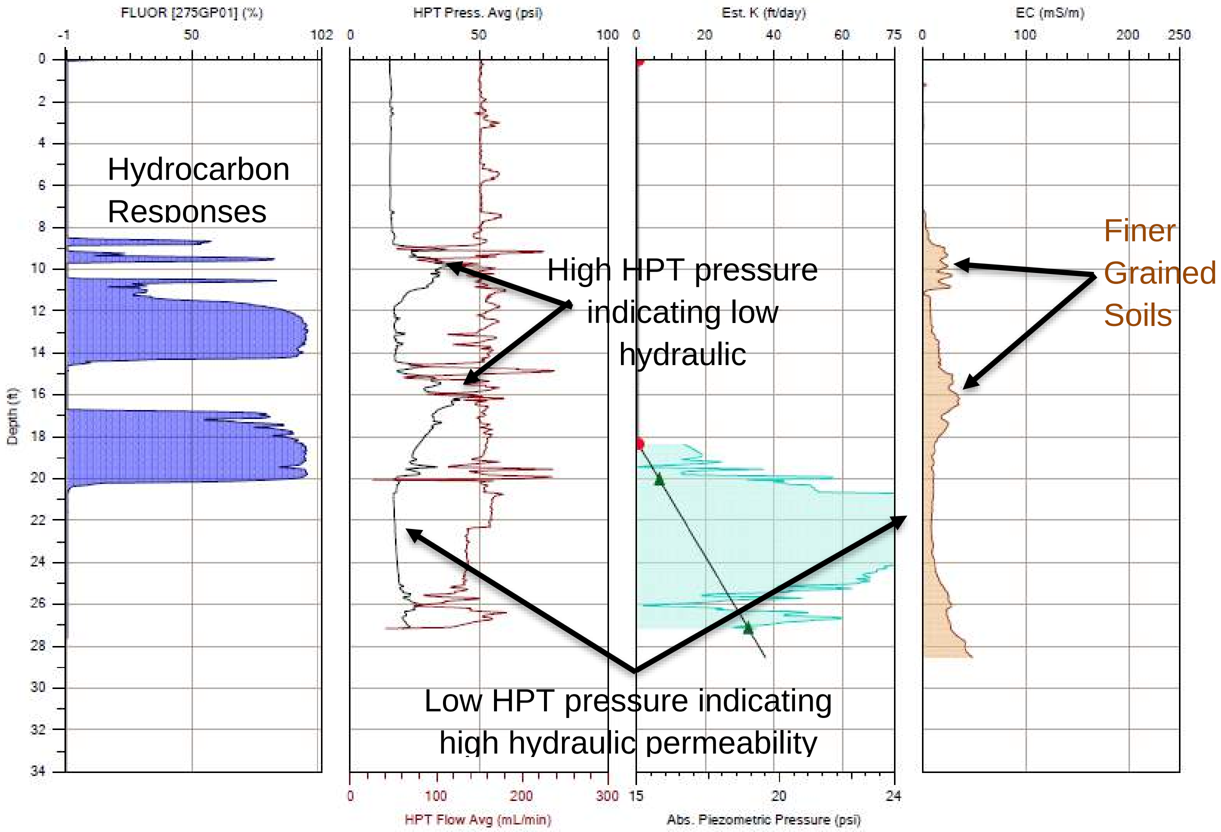

Figure 2 – Example OiHpt Log (AOPC5-OIP43)

Quality Control and Data Anomalies

Each direct sensing instrument was operated in accordance with the manufacturer's standard operating procedures and the *Standard Practice for Direct Push Technology for Volatile Contaminant Logging with the Membrane Interface Probe (MIP)* ASTM STANDARD D7352 – 07.

Performance testing was conducted on each system prior to and following each survey sounding. These procedures are outlined in **Appendix C.**

A QC review of the OiHpt logs for this project did not reveal any anomalies in the operation of the system that would have resulted in a lack of detection of petroleum hydrocarbon impacts.

The direct-sensing logs generated for this assessment are presented in **Appendix D**.

Conclusions

1. This high-resolution assessment of the Port of Longview site confirmed hydrocarbon impacts based on OIP response in AOPC4, AOPC5, AOPC6, AOPC7, and AOPC8. Fluorescence response was also found at one station in AOPC3. The OIP responses in AOPC1 and AOPC2 do not indicate hydrocarbon impacts in those areas.
2. Fluorescence response was found at the surface and to 24 ft bgs.
3. The HPT and EC data show the thin, finer grained, low permeability zones extending fairly continuously across the site, at different depths from two (2) to 30 ft bgs. Hydraulic permeability ranges from below 10 to greater than 75 ft/day.
4. The depth to groundwater was found (based on dissipation tests) to vary between 13 and 26-ft bgs across the site.

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List of Symbols, Abbreviations, and Acronyms

Symbol or Abbreviation	**Definition**
CSM	**Conceptual Site Model.** A **CSM** is a method to describe what is known or can be inferred about a site for the purpose of making a decision. A CSM generally will address physical, chemical and biological systems; contaminant release and transport; societal issues; policy, land use, and exposures.
DPT	**Direct-Push Technology** (DPT) refers to a group of techniques used for subsurface investigation by driving, pushing and/or vibrating small-diameter rods into the ground.
HPT	**Hydraulic Profiling Tool**. The **HPT** is a logging **tool** that measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface. In addition to measurement of injection pressure, the HPT can also be used to measure hydrostatic pressure under the zero flow condition.
LCSM	**LNAPL Conceptual Site Model.** A **LCSM** is a conceptual site model focused on the release and transport of LNAPL contaminants.
LIF	**Laser-induced fluorescence** is a spectroscopic method in which an atom or molecule is excited to a higher energy level by the absorption of laser light followed by spontaneous emission of light.
LNAPL	**Light Non-Aqueous Phase Liquids** are groundwater contaminants that are not soluble in water and have lower density than water, in contrast to a **DNAPL** which has higher density than water.
OIP	**Optical Image Profiler.** An **OIP** is a tool that uses laser light in the ultraviolet spectrum to excite fluorescent molecules that exist in the vast majority of hazardous non-aqueous phase liquids (NAPLs) such as petroleum fuels/oils, coal tars, and creosotes.
PHC	**Petroleum Hydrocarbons.** The presence of petroleum hydrocarbon fuels in any phase. **(PHC).**
UST	**Underground Storage Tank.** Under Federal law **UST** means any one or combination of tanks including connected underground pipes that is used to contain regulated substances, and the volume of which including the volume of underground pipes is 10 percent or more beneath the surface of the ground. This does not include, among other things, any farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes, tanks for storing heating oil for consumption on the premises, or septic tanks.

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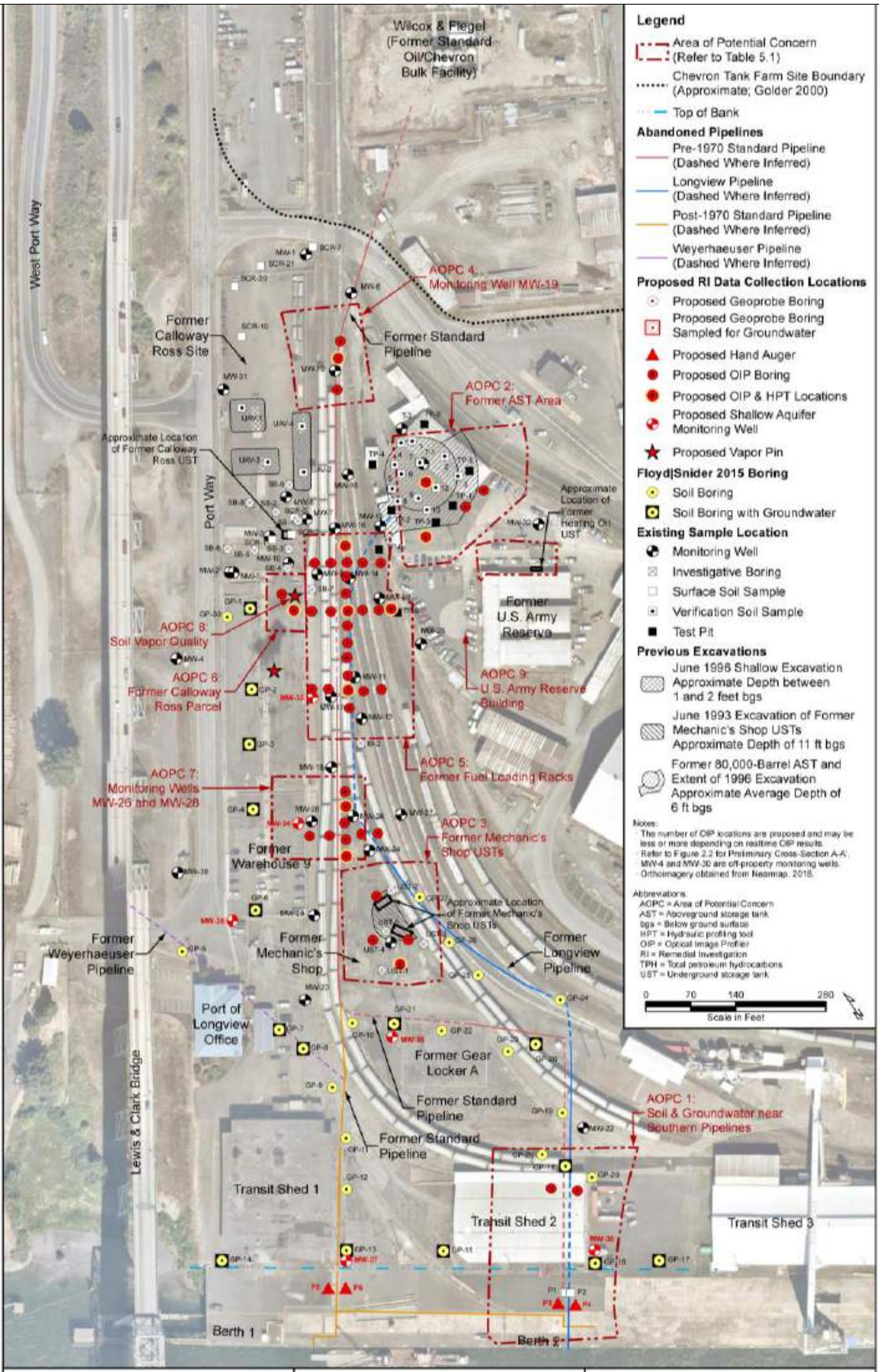
FIGURES



Notes:

- The number of OIP locations are proposed and may be less or more depending on realtime OIP results.
- Refer to Figure 2.2 for Preliminary Cross-Section A-A'.
- MW-4 and MW-30 are off-property monitoring wells.
- Orthoimagery obtained from Nearmap, 2018.

Abbreviations:

AOPC = Area of Potential Concern
AST = Aboveground storage tank
bgs = Below ground surface
HPT = Hydraulic profiling tool
OIP = Optical Image Profiler
RI = Remedial Investigation
TPH = Total petroleum hydrocarbons
UST = Underground storage tank

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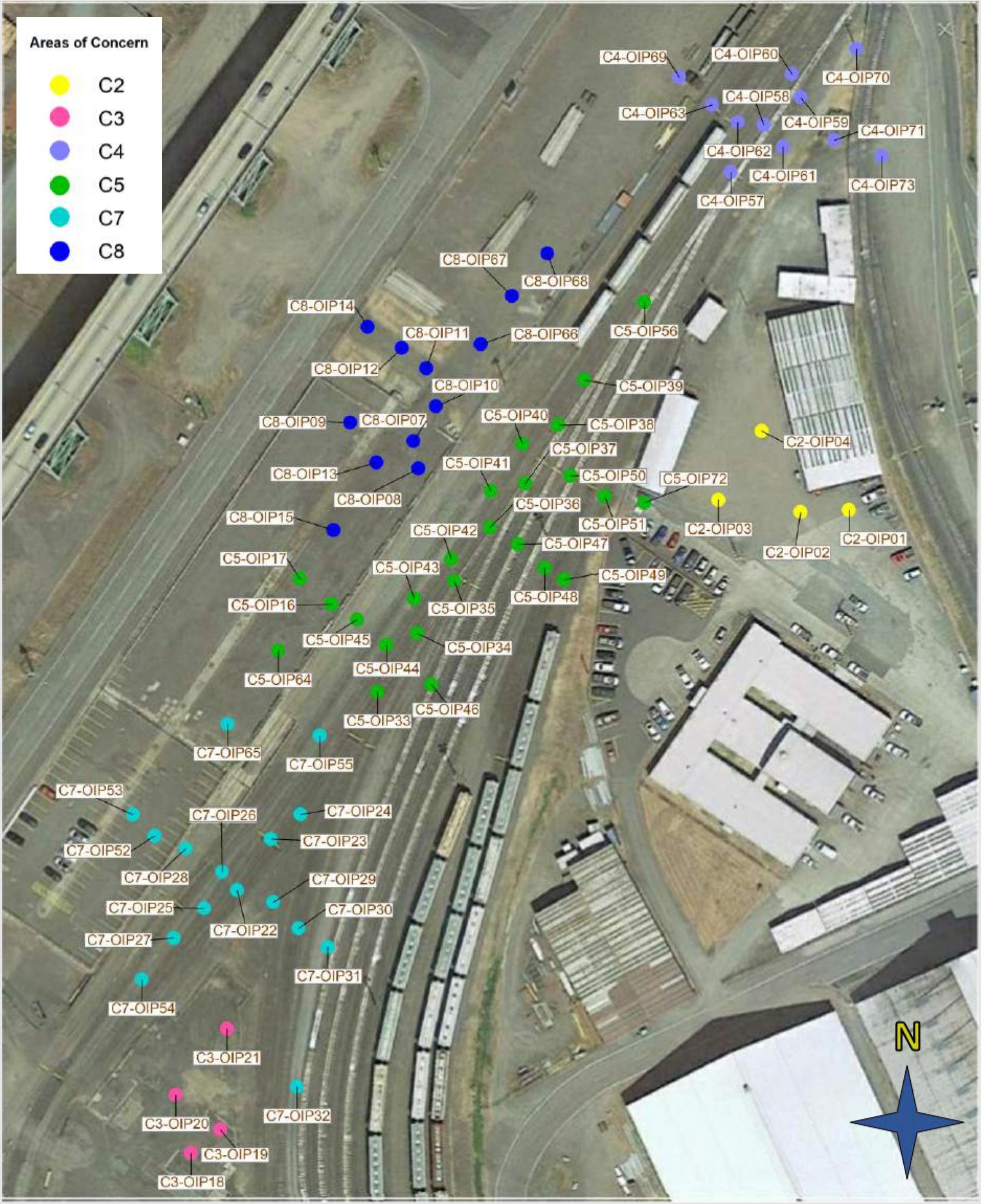
Remedial Investigation Work Plan
Port of Longview TPH Site
Longview, Washington

Figure 5.1
Areas of Potential Concern and
Proposed RI Data Collection Locations

COLUMBIA TECHNOLOGIES	**Port of Longview** Longview, WA		**Site Overview with Initial HRSC Stations**
	High-Resolution Site Characterization	November 2019	**Figure 3**



COLUMBIA
TECHNOLOGIES

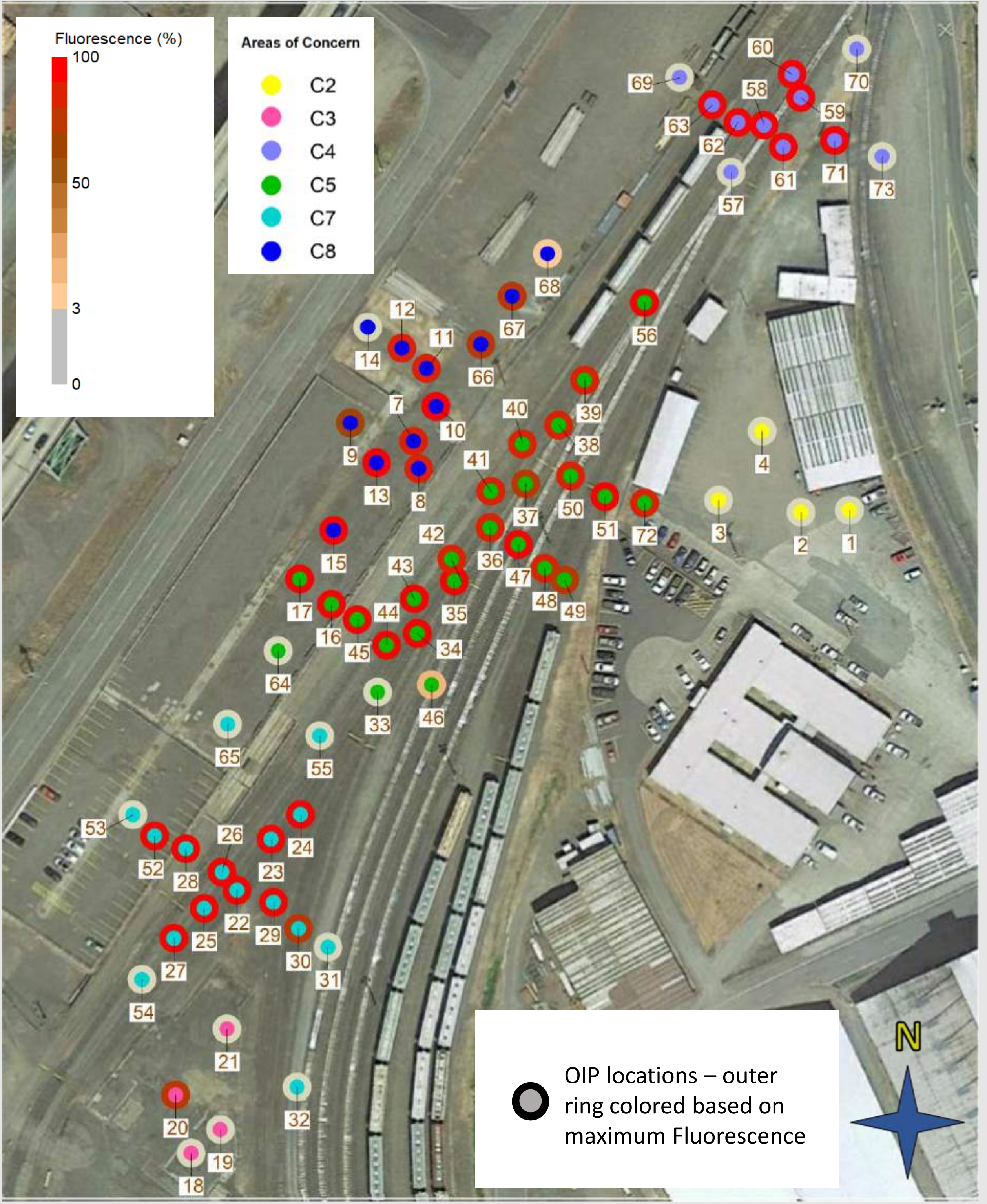
Port of Longview
Longview, WA

OiHpt Stations

High-Resolution Site Characterization

November 2019

Figure 4



COLUMBIA TECHNOLOGIES

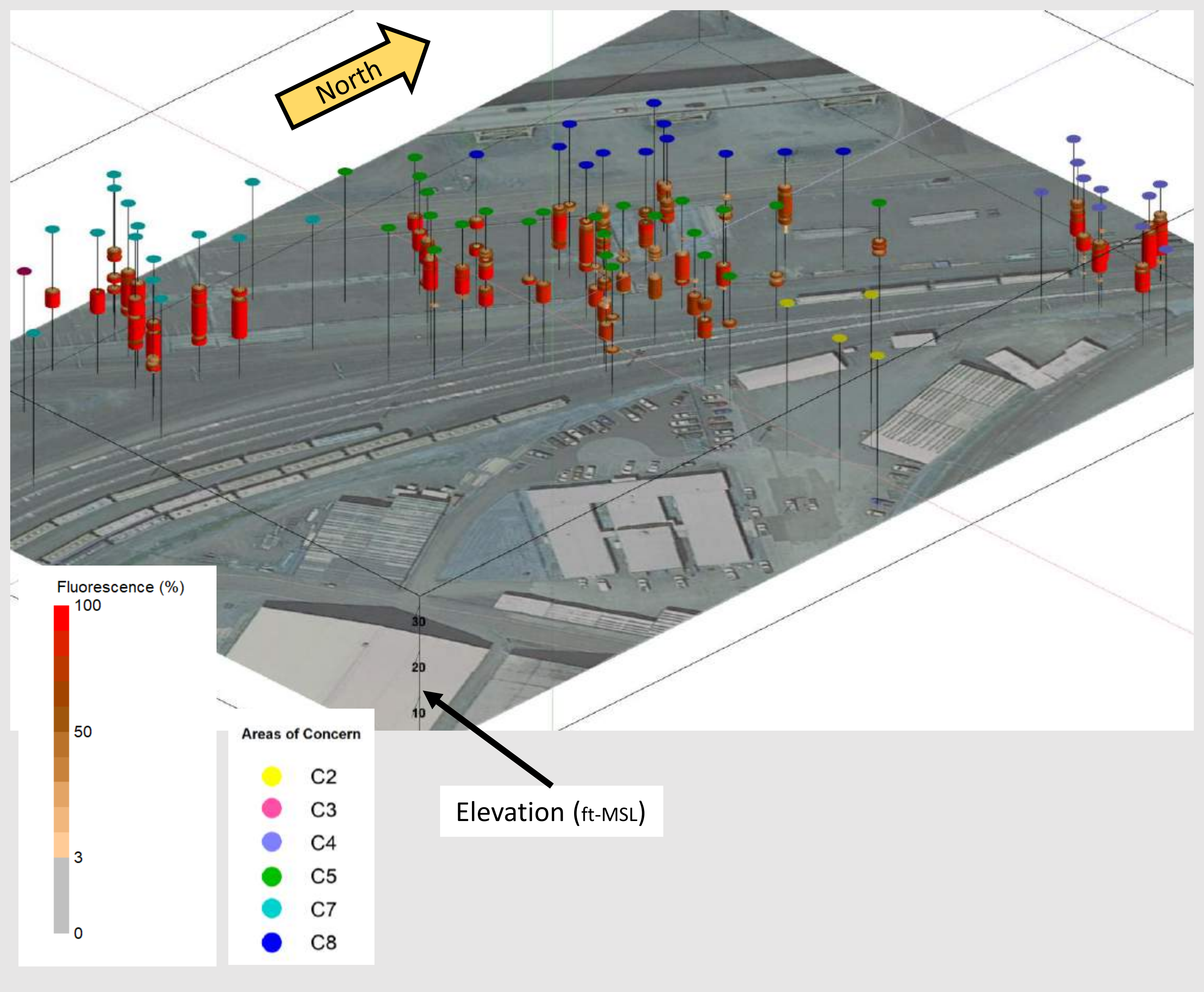
Port of Longview
Longview, WA

Hydrocarbon Impact Footprint Plan View

High-Resolution Site Characterization

November 2019

Figure 5



Hydrocarbon Impact Footprint Elevation View

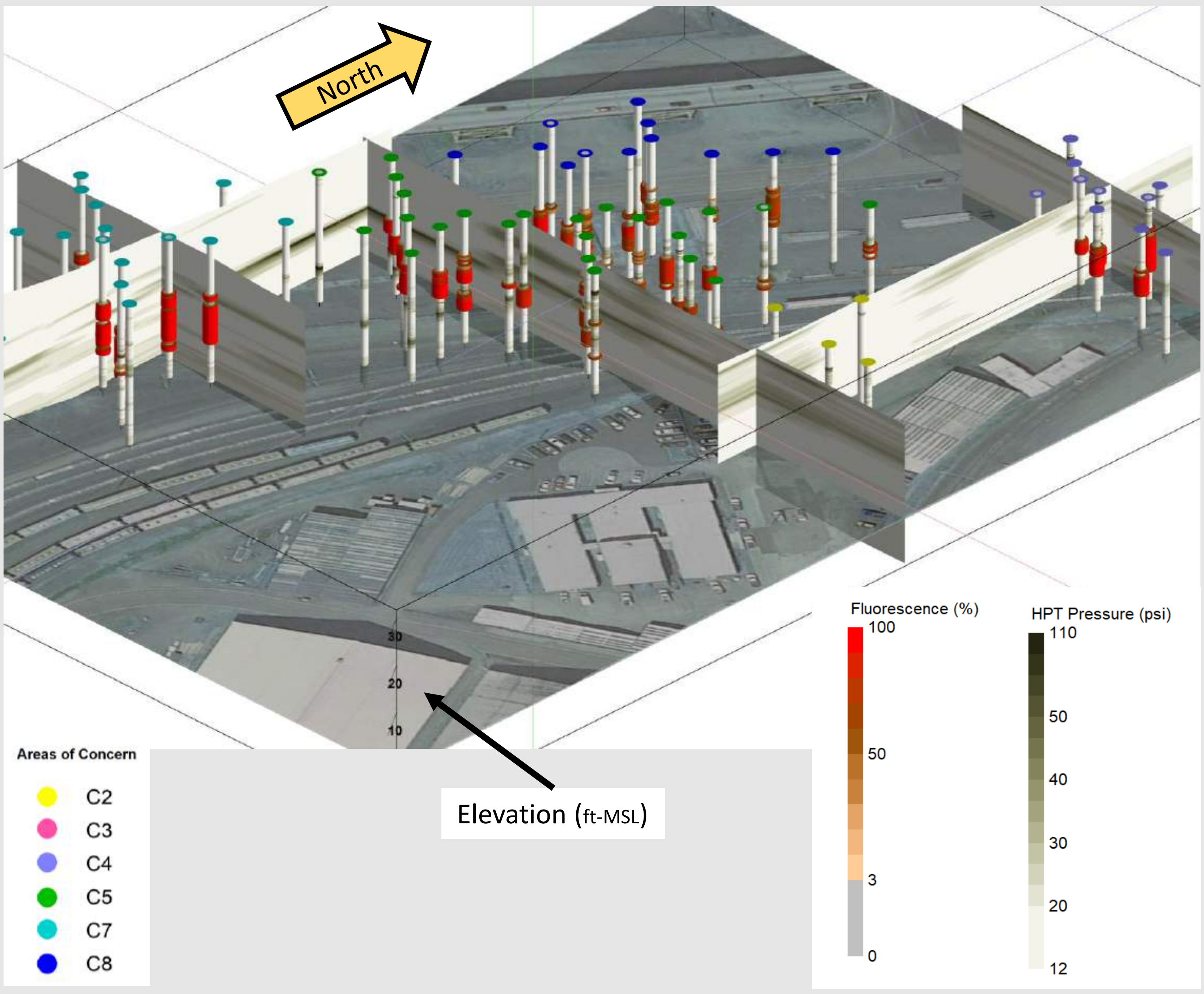
Figure 6

Port of Longview
Longview, WA

November 2019

High-Resolution Site Characterization

COLUMBIA TECHNOLOGIES



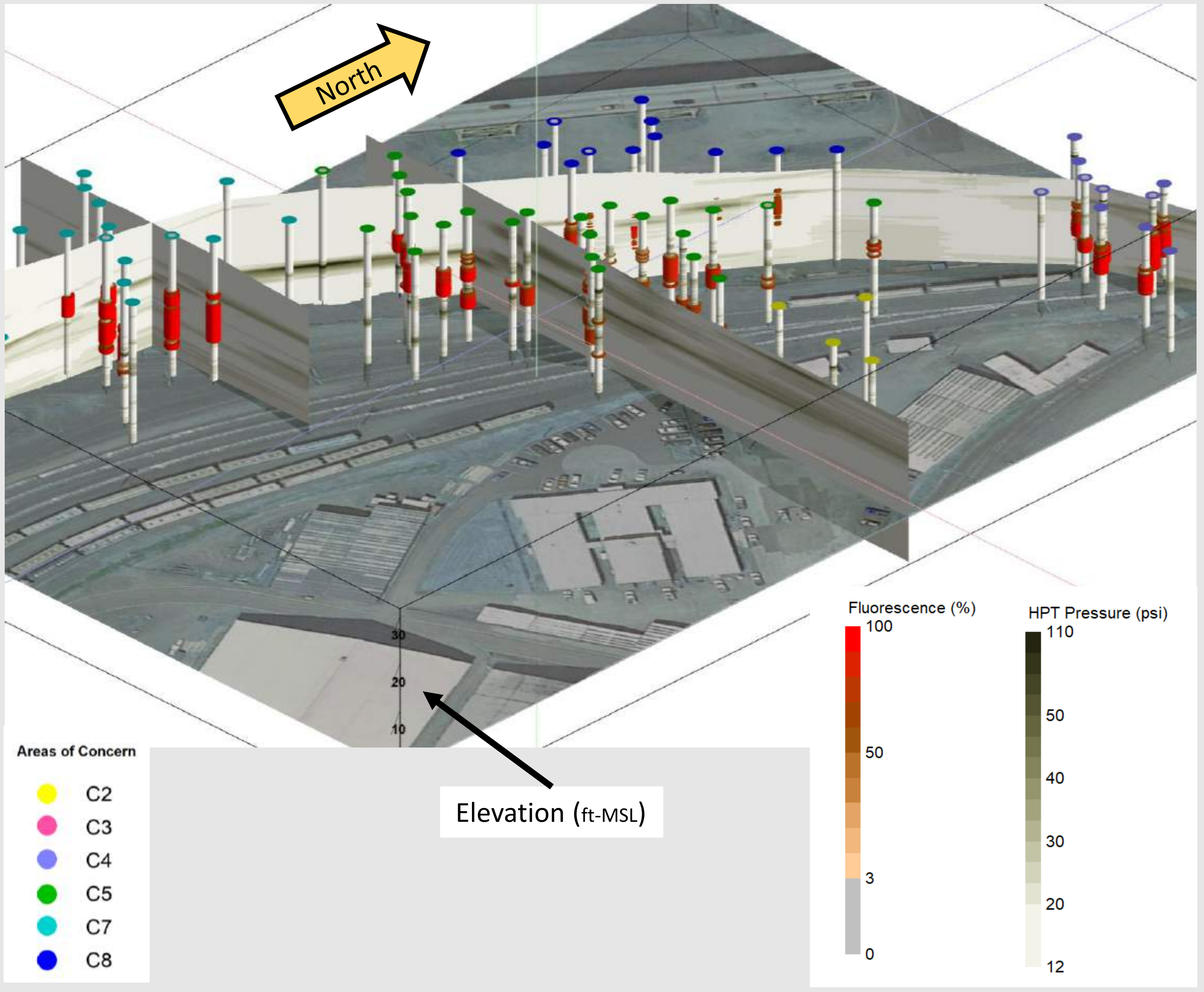
Fluorescence vs. HPT Pressure

Figure 7

Port of Longview
Longview, WA

November 2019

High-Resolution Site Characterization



Fluorescence vs. HPT Pressure

Figure 8

Port of Longview
Longview, WA

November 2019

High-Resolution Site Characterization

COLUMBIA TECHNOLOGIES

APPENDICES

APPENDIX A - Direct Sensing Equipment Description

Optical Imaging Profiler (OIP) Equipment Description

The OIP system utilized for this investigation is the latest generation developed by Geoprobe Systems. The OIP system uses a high-energy Light Emitting Diode (LED) to produce an ultraviolet light source for the detection of polycyclic aromatic hydrocarbons (PAHs).

The OIP system employs an excitation beam of light from an LED at 275 nanometers (nm). Any residual phase PAHs present in the soil matrix will absorb and then release this photon energy in the form of fluorescence.

This fluorescence is captured via a UV camera in the probe. Individual OIP logs consist of a primary graph of fluorescence as a % of the optical image recorded by the UV camera. Visible light images can also be captured if desired. The camera records the UV images at a rate of 30 frames per second.

OIP screening is performed by pushing or hammering the OIP probe into the soil at the target rate of two centimeters per second (0.8 inches per second). As the OIP is advanced, the fluorescence in each frame is captured and analyzed and displayed in real-time as a function of depth.

OIP system data is presented as a percentage of the optical window showing fluorescence. OIP system performance is checked using known compounds such as diesel, motor oil, and gasoline. Site specific products may be used as an additional performance check

Any fluorescence response is normally indicative of residual phase petroleum hydrocarbons, though some naturally occurring materials such as limestone will also fluoresce to a lesser and more monochromatic degree.

Hydraulic Profiling Tool (HPT) Equipment Description

The HPT probe is approximately 24 inches in length and 1.5-inches in diameter. The probe is driven into the ground at the nominal rate of 12 inches per minute using a DPT rig.

The HPT probe was developed by Geoprobe Systems® and contains two separate systems: soil EC and the HPT. EC, HPT parameters, and temperature are collected by the HPT Field Instrument and displayed continuously in real-time during each push of the probe.

EC: Soil electrical conductivity, the inverse of soil resistivity, is measured using a Werner array arrangement. In this process, an electrical current is transmitted through the soil from two electrodes on the probe body. This current is then passed back to the probe, and the voltage response of the imposed current to the soil is measured across these points. Conductivity is measured in Siemens/meter, and due to the low conductivity of earth materials, the EC probe uses mS/m. The probe is reasonably accurate in the range of 5 to 400 mS/m.

The electrical properties of soil vary by geological setting. Therefore, conductivity measurements will vary both in magnitude and the relative change from one soil type to another in each geological setting. In general, at a given location, lower conductivity values are characteristic of larger particles such as cobbles and sands, while higher conductivities are characteristic of finer sized particles such as finer sand, silts, and clays. Observed conductivities significantly higher than 400 mS/m are indicative of ionic materials other than soil. Examples include saltwater intrusion, the presence of ionic chemicals from storage or injection, or potentially soil mixtures with metallic compounds.

HPT: The HPT portion of the system is used to create high-resolution, real-time profiles of soil hydraulic properties, which can be used to infer permeability and hydraulic conductivity. The HPT system consists of a controller, a pump, a transfer line (trunkline) which is pre-strung through the DPT rods, a pressure transducer, a permeable screen, and a field computer.

HPT screening is performed simultaneously with the EC logging. As the tool is advanced, water is pumped through the trunkline and passes into the soil through the permeable screen. The flow is regulated as to be as constant as possible. The pressure required to inject the constant flow of water into the soil, known as the HPT pressure, is monitored by the pressure transducer and recorded on the field computer in pounds per square inch (psi) versus depth. The flow rate of the water into the soil formation is also measured and recorded in milliliters per minute (mL/min) versus depth.

Static pressure measurements (dissipation tests) can also be made by stopping at discrete intervals, allowing users to determine the static water level. The dissipation test provides an estimate of the static water level, based on the hydraulic head imposed on the probe at rest as compared to the pressure measured at the surface prior to starting each location push. Dissipation tests are best to run in coarse-grained materials (sands and gravels) to assure that the local ambient hydrostatic pressure is measured quickly and accurately.

To perform a dissipation test, the HPT probe is advanced to a depth below the water table and the water flow is stopped. The pressure dissipation (reduction of pressure gradient caused by forcibly pumping water into the formation) is monitored until a stable value is observed. The dissipation usually takes the shape of a curve approaching an inflection point or stable value. The stable value is then used for the hydraulic pressure at that depth and can be used to estimate static water depth. The HPT software can also provide an estimate of K (a value used in hydrogeologic calculations) to provide an interpretation of the hydraulic permeability of the formation.

Depth in feet is measured and recorded using a precision potentiometer with a 100-inch linear range. The potentiometer is mounted on the mast of the DPT rig and a counter-weight anchored to the foot of the rig. Measurements are recorded on the down stroke of the mast, as the tooling string is pushed into the ground, and is accurate within 1/10th of an inch. The reference elevation (depth) reported for each individual boring is established by setting the data logger to zero feet with the sensing window of the downhole probe aligned with the ground surface.

True boring elevations can be established with the addition of survey data if provided for in the scope of work.

APPENDIX B – Interpretation of Qualitative Direct Sensing Data

General OIP Log Interpretation

The OIP system utilized for this investigation is the latest generation developed by Geoprobe Systems. The OIP system uses a high-energy Light Emitting Diode (LED) to produce an ultraviolet light source for the detection of polycyclic aromatic hydrocarbons (PAHs).

The OIP system employs an excitation beam of light from an LED at 275 nanometers (nm). Any residual phase PAHs present in the soil matrix will absorb and then release this photon energy in the form of fluorescence.

This fluorescence is captured via a UV camera in the probe. Individual OIP logs consist of a primary graph of fluorescence as a % of the optical image recorded by the UV camera. Visible light images can also be captured if desired. The camera records the UV images at a rate of 30 frames per second.

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OIP system data is presented as a percentage of the optical window showing fluorescence. OIP system performance is checked using know compounds such as diesel, motor oil, and gasoline. Site specific products may be used as an additional performance check

Any fluorescence response is normally indicative of residual phase petroleum hydrocarbons, though some naturally occurring materials such as limestone will also fluoresce to a lesser and more monochromatic degree.

General HPT Log Interpretation

Each HPT log, presented on an individual scale, includes three separate graphs of data. The Y axis on all graphs is depth. The first graph displays HPT pressure in psi and flow rate measured in mL/min. In general, higher HPT pressure readings and lower flow rates indicate lower soil permeability, while lower HPT pressure readings and higher flow rate readings indicate higher soil permeability. The second graph shows estimated K value, in feet/day, indicating the hydraulic permeability of the formation. The static groundwater level is also displayed on the graphs. The third graph displays the EC, measured in mS/m. Lower soil conductivities are indicative of coarser grained particles, such as sands and silty sands, and higher soil conductivities are indicative of finer grained particles, such as clays and silty clays.

The HPT pressure and electrical conductivity can be used to identify hydraulic permeable layers, confining units and preferential migration pathways. This information is useful for creating contaminate fate and transport models, selecting monitoring well location and screen intervals, and targeting zones for remedial injections.

Interpreting OIP and Comparison to Laboratory Analyses

Generalized correlation between OIP and laboratory analytical results can be inferred but cannot be viewed as a linear comparison. OIP response and laboratory results are collected, analyzed and reported in different units and by different procedures, so correlation is not an exact one-to-one comparison. The OIP uses a process where a 2D soil surface is exposed to excitation light, and any fluorescent light emitted is analyzed at the ground surface. Soil and groundwater results involve the collection of a soil core, extraction of sub-sample at the surface, and then transporting them to a laboratory for extraction and analysis. These processes are different by definition.

APPENDIX C – Quality Control Procedures

System Quality Control Checks

Direct sensing technologies such as MIP and OIP provide qualitative or semi-quantitative direct contact measurements of conditions in the soil, water, and vapor matrix of the subsurface. Correct performance response of the instruments is determined using standards or mixtures of known values or concentrations. Before and after each measurement run, the instruments are tested with these known standards to ensure their response is within an acceptable range.

The nature of direct-sensing technology is different than a typical laboratory analysis. In the lab, a known volume of a known concentration is introduced to the system, the compounds are separated chromatographically, and the response for each individual compound is recorded. This process is highly reproducible, and precise standards exist for laboratory control limits.

These performance tests of direct sensing instruments are not calibrations, per se. While the instrument response can be expected to be linear for a single chemical compound or in the known matrix conditions of the performance test standards, matrix conditions and chemical mixtures will be highly variable throughout the measurement run in subsurface.

In MIP, for instance, subsurface compounds diffuse across the MIP membrane, enter the carrier gas stream, and are transported directly to the GC. There is no chromatographic separation, just total response with depth.

Several other factors affect direct-sensing responses.

For LIF and OIP, these factors include:

- Soil grain size
- Interferences from fluorescent minerals such as limestones
- Contaminant types
- Degree of saturation
- System performance

For these reasons, a "calibration" is not possible. The variables within compounds of interest, mixtures of compounds, and subsurface conditions cannot be standardized. However, system performance can. Therefore, COLUMBIA Technologies implements protocols to test and evaluate system performance to produce the highest quality data in the industry. The results of these performance tests are maintained with each project file and available upon request.

OIP System Performance Test

The optical testing is done to ensure that the camera and light sources are working properly. The visible target is used to verify the camera's functionality and image focus.

A black box test is used to verify that there are no objects or contaminants on the inside of the OIP window which could result in false positives. The measured fluorescence during the black box test should be less than 0.1%.

Diesel fuel and motor oil in test cuvettes are typically used to check the functionality of the UV light source and the camera detection. The measured fluorescence for diesel fuel should be greater than 70% and the measured fluorescence for non-synthetic motor oil should be greater than 80%.

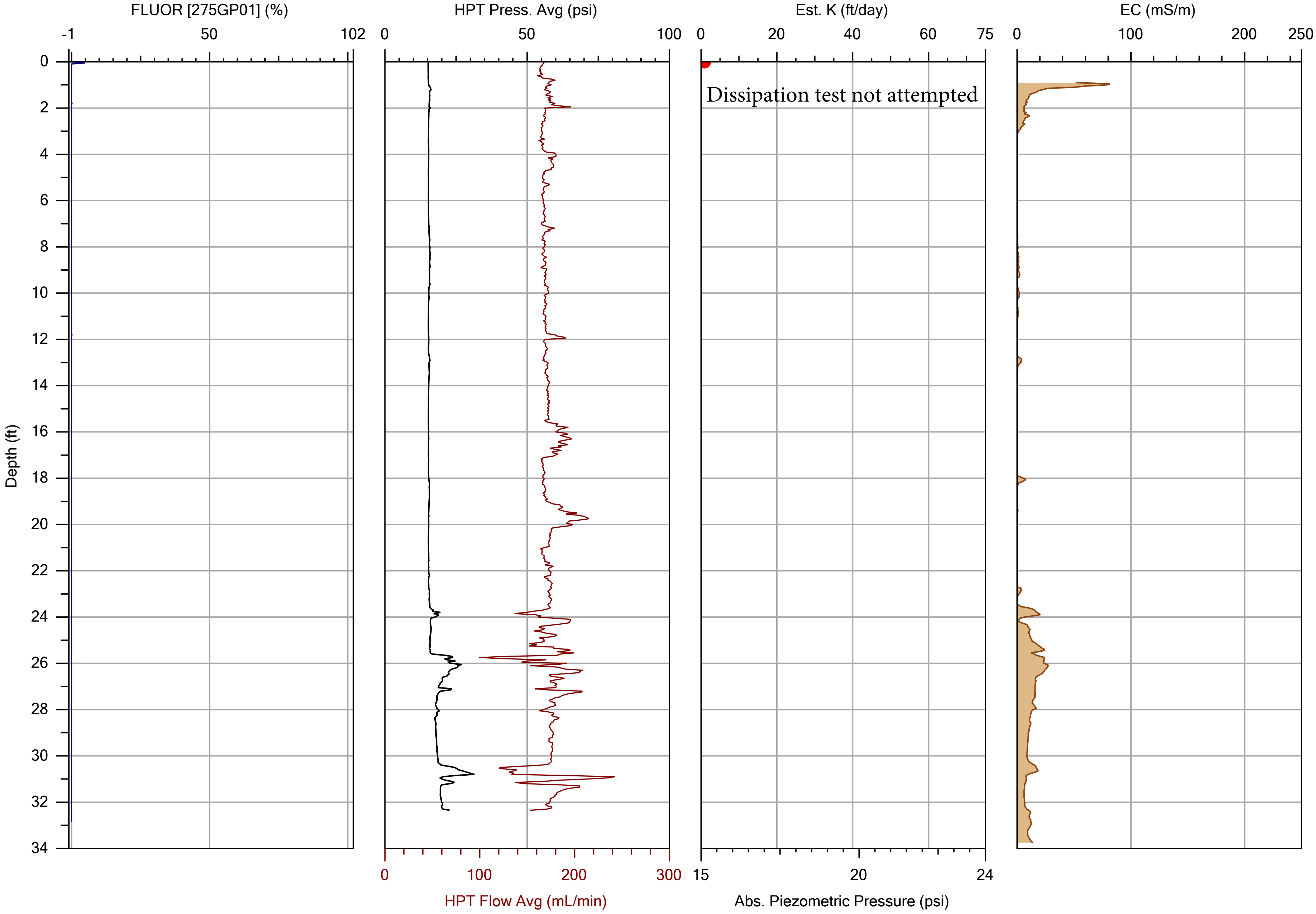
Note, the optical test recommended values are not pass-fail, and it is up to the operator to determine if the OIP probe is working properly.

HPT System Performance Test

The EC dipole is evaluated using a brass and stainless-steel test jig, resulting in known values of 55 and 290 millisiemens (mS). Results must fall within 10% of the expected values; otherwise corrective action must be performed.

The HPT pressure and flow sensors are also evaluated using static (no flow) and dynamic (flow at approximately 150 milliliters per minute) hydraulic pressure measurements at two different head elevations, 6.0 inches apart. The difference for each test must be 0.2 psi, +/- 10%; otherwise corrective action must be performed.

APPENDIX D – Data Logs for Optical Imaging Profiler with Hydraulic Profile Tool (OiHpt) – Collective Scale



COLUMBIA TECHNOLOGIES

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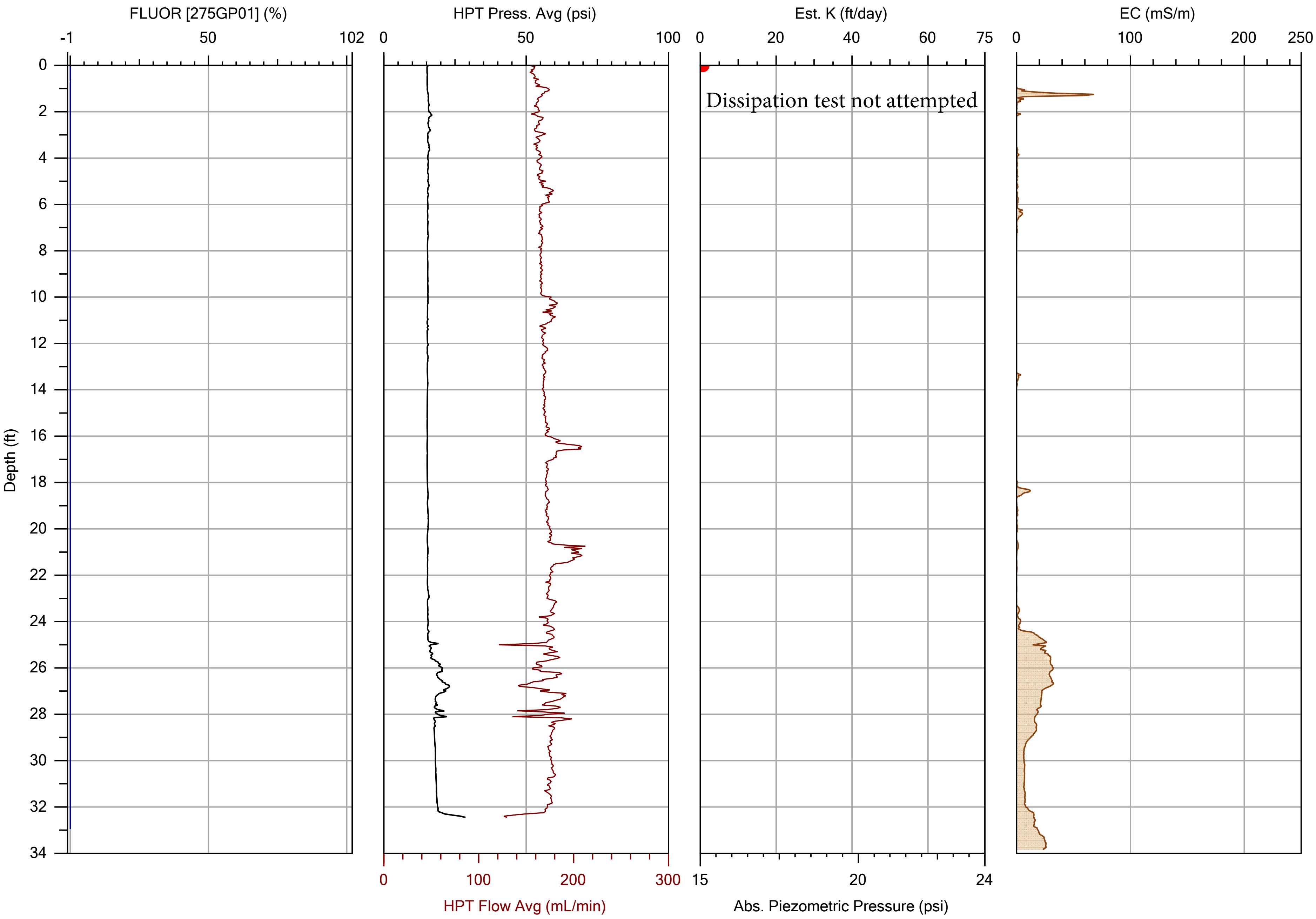
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/13/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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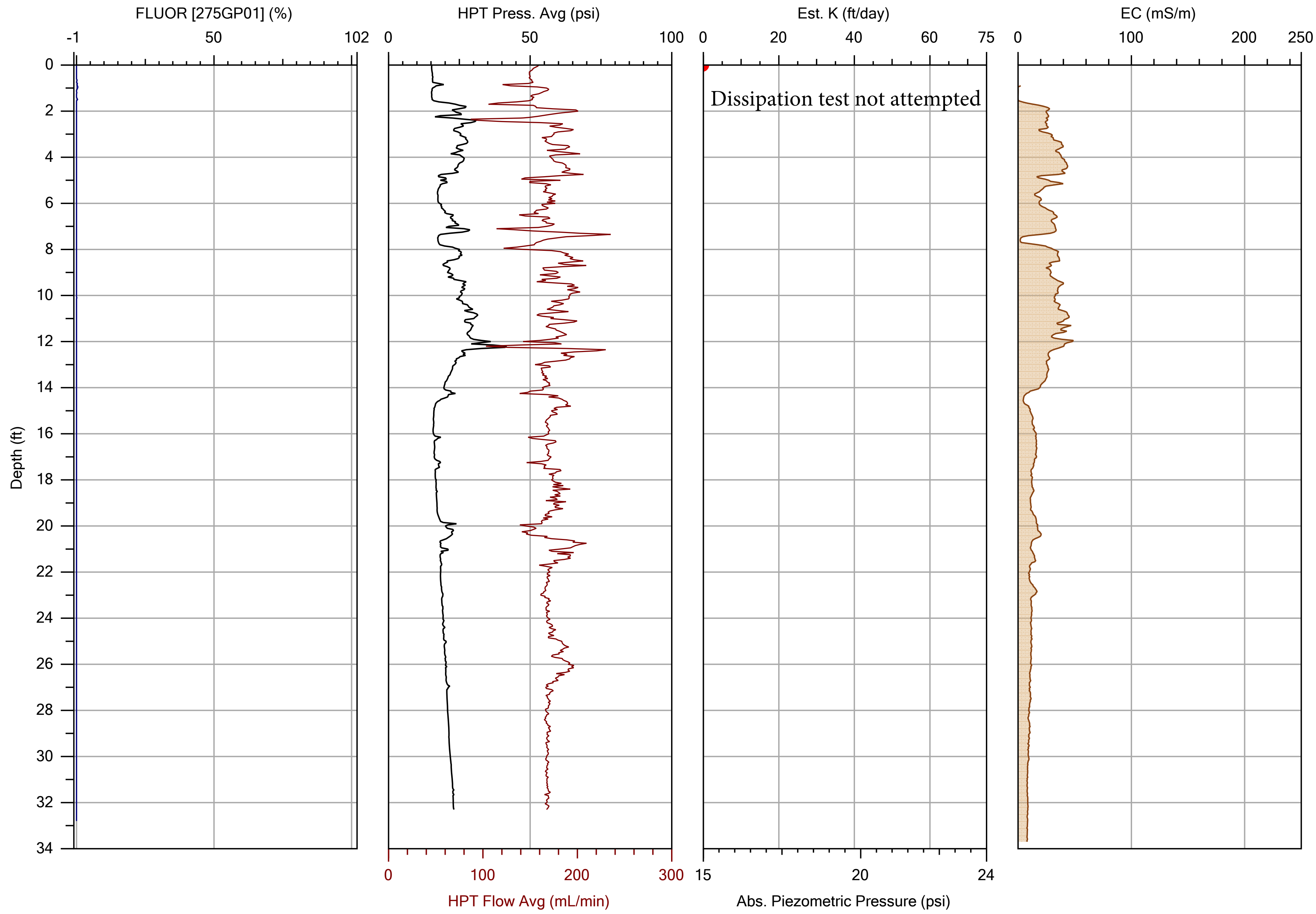
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/13/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



Dissipation test not attempted

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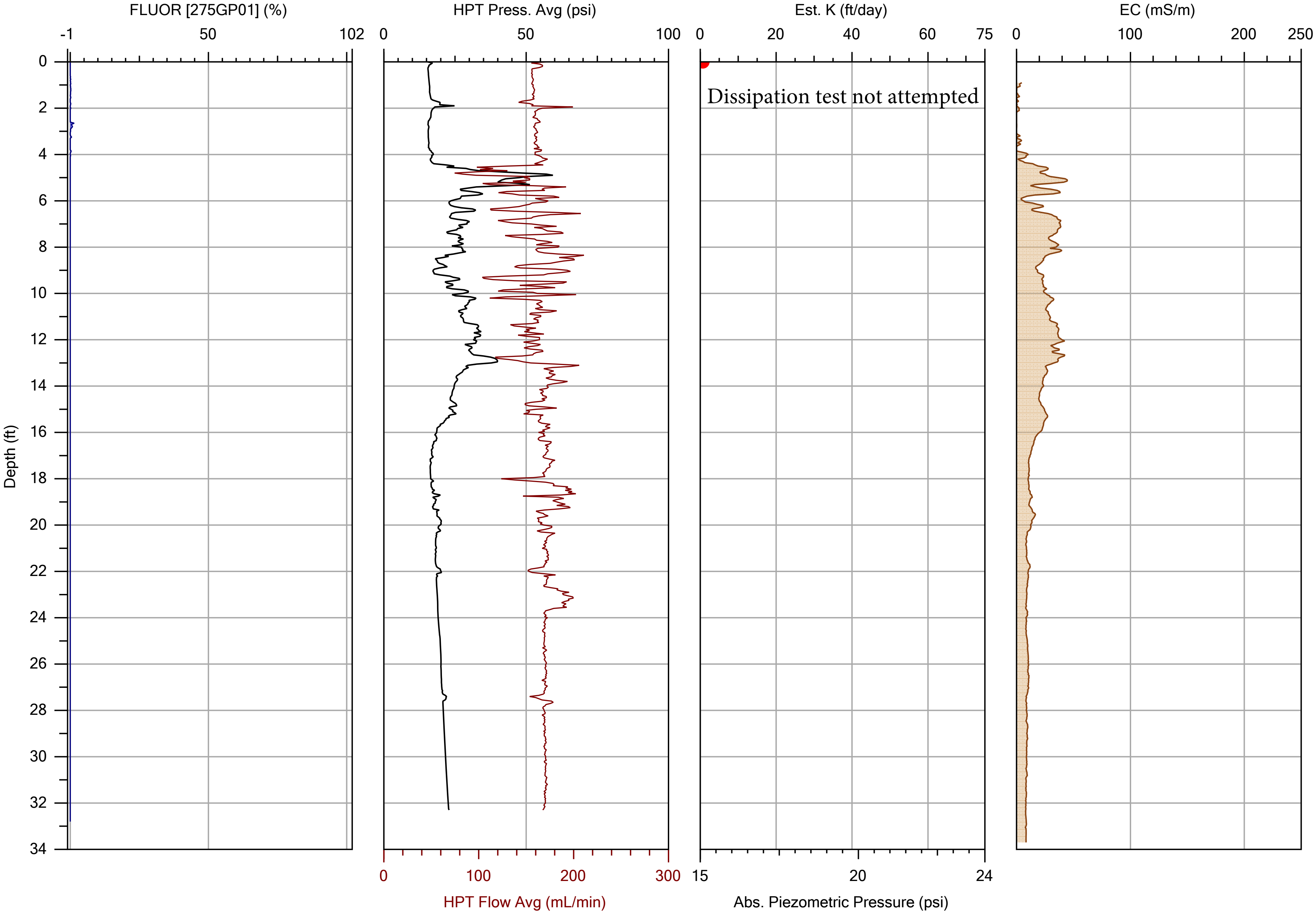
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/13/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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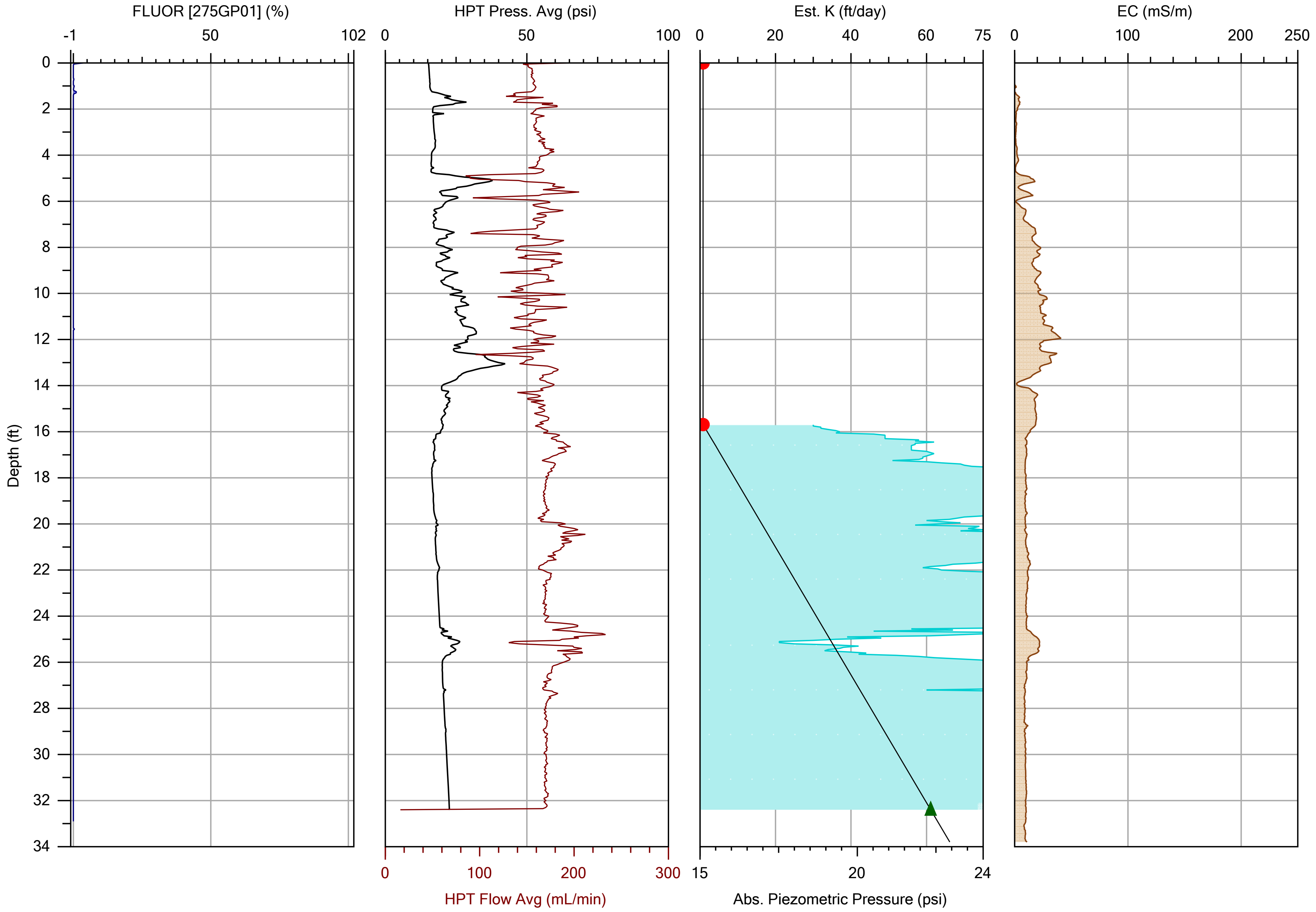
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/13/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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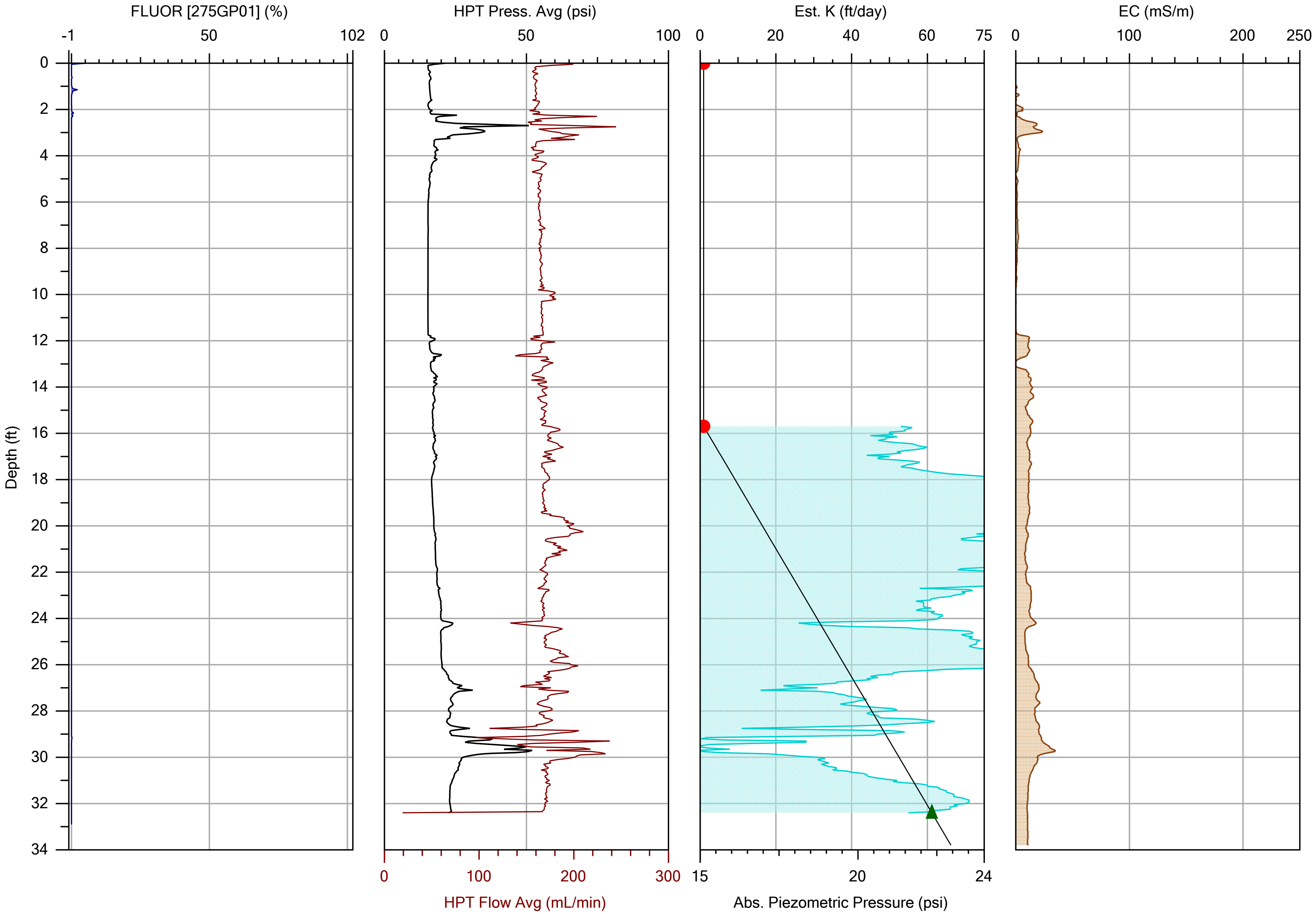
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/13/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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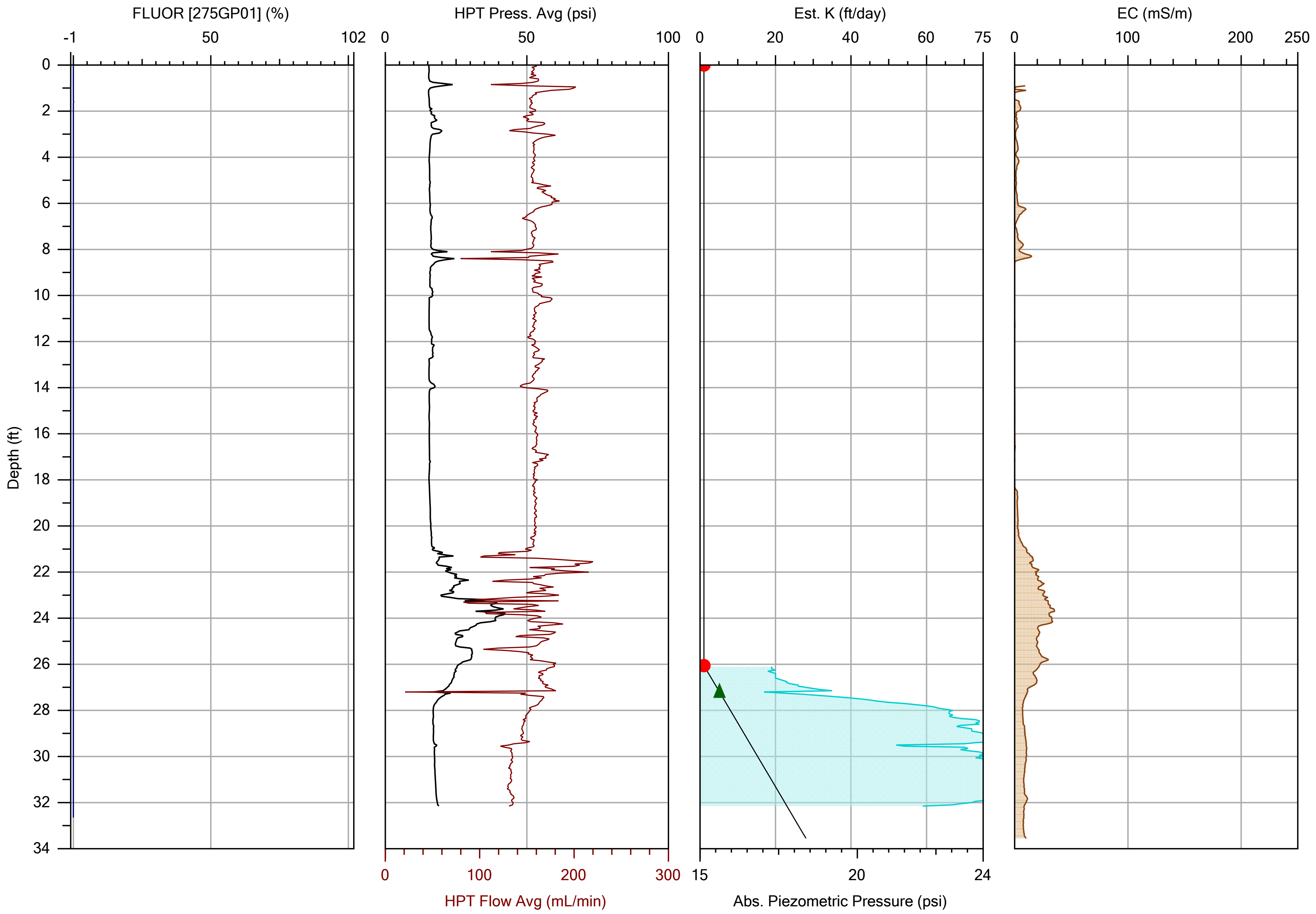
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/13/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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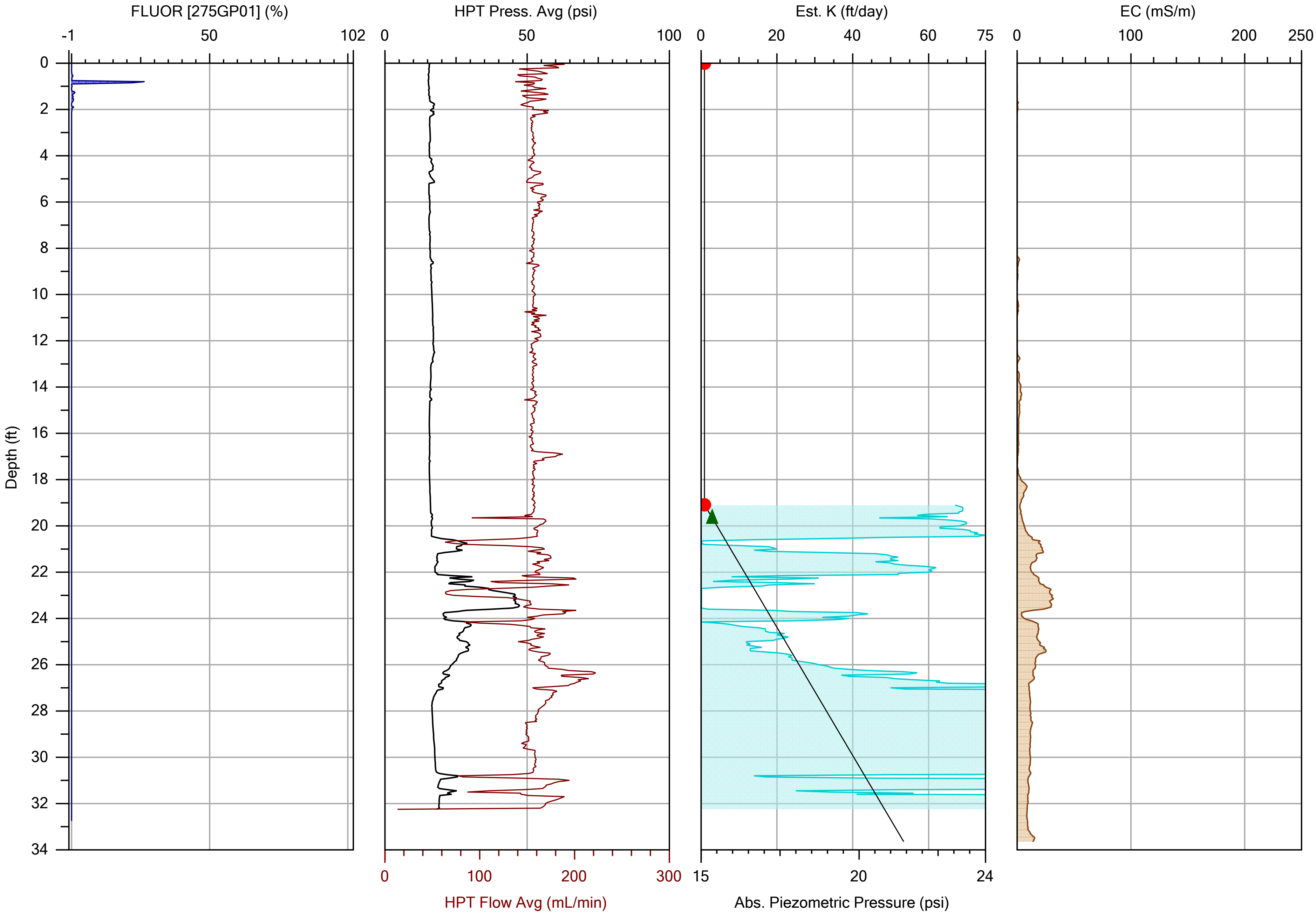
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/15/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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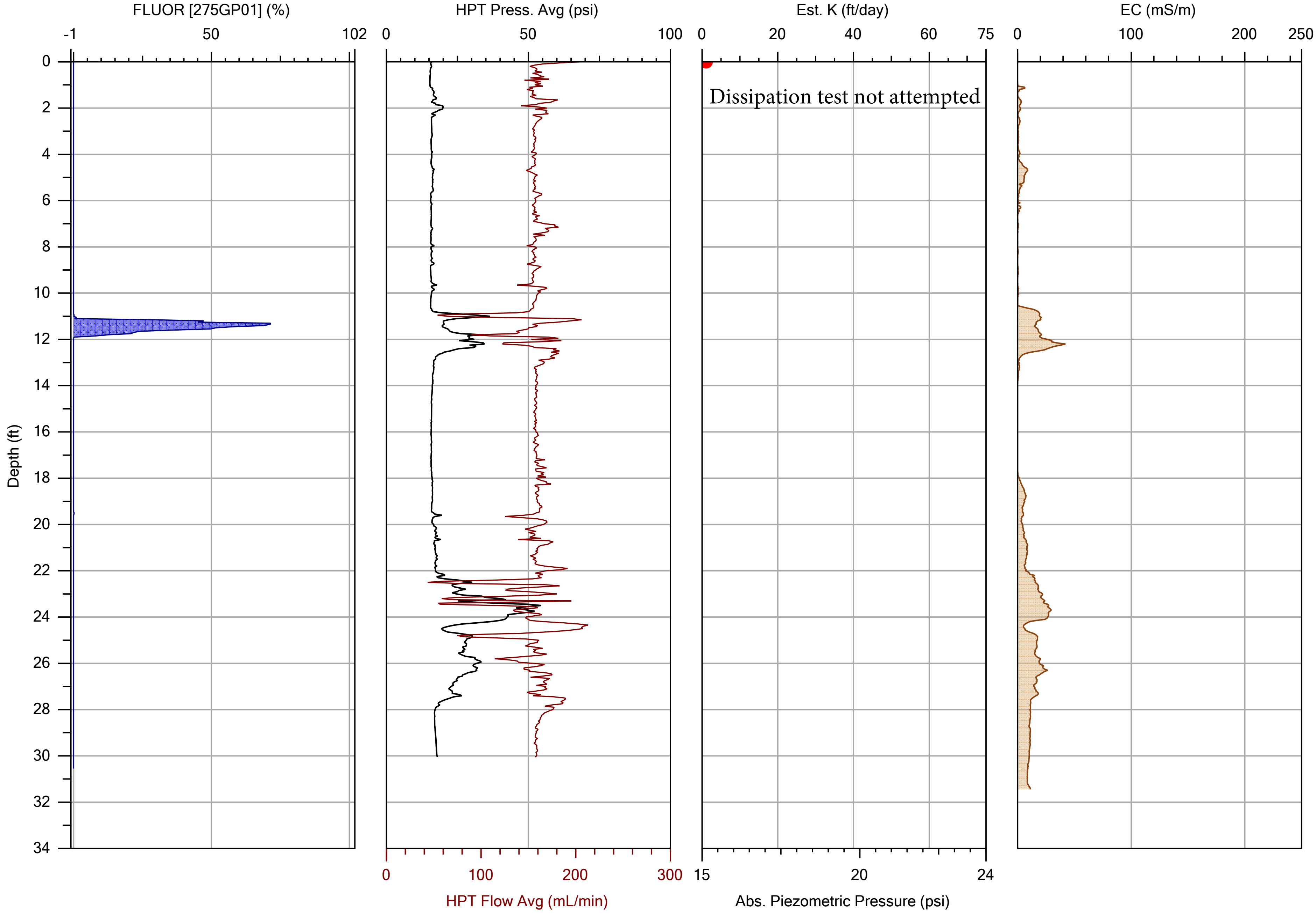
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/15/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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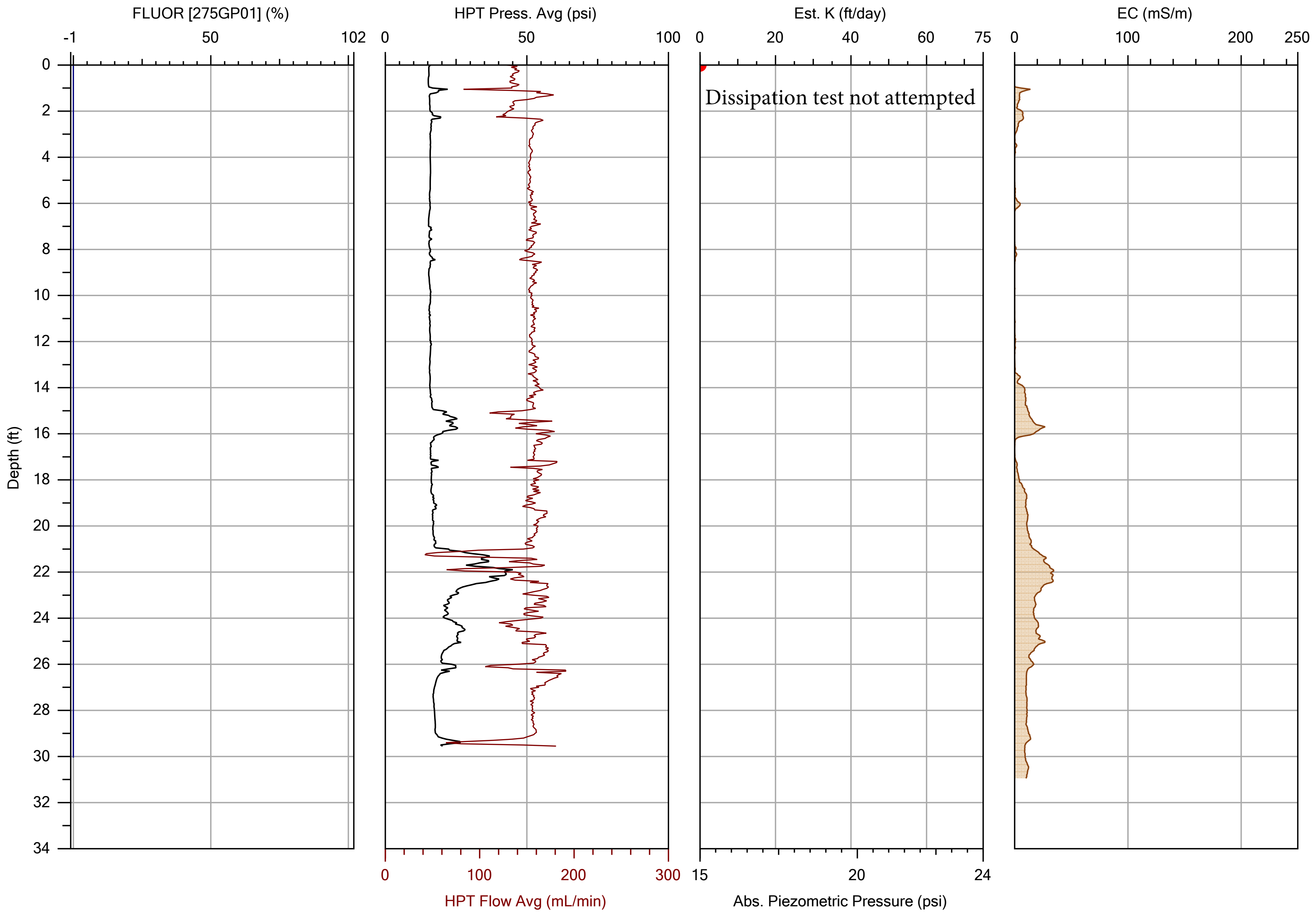
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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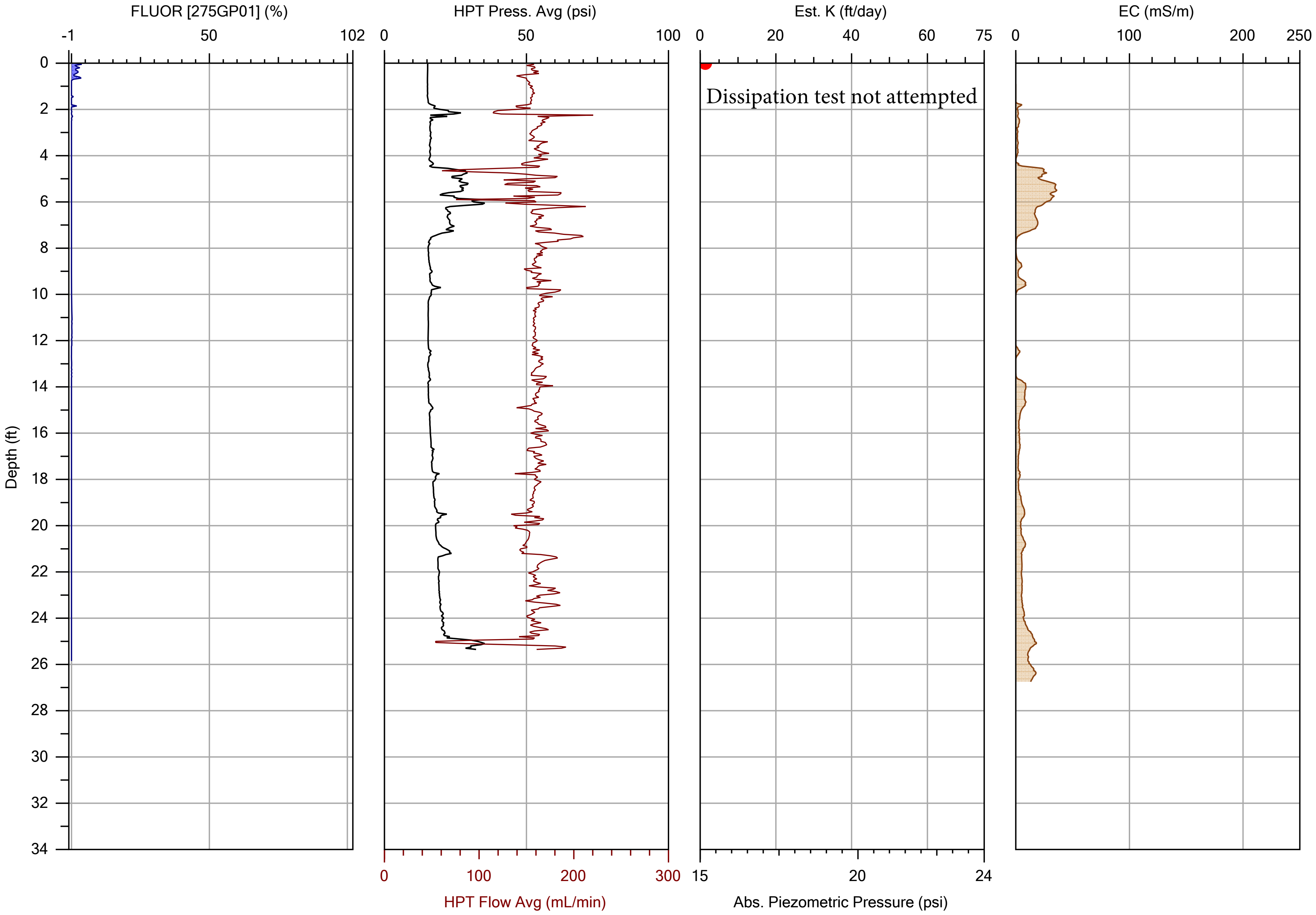
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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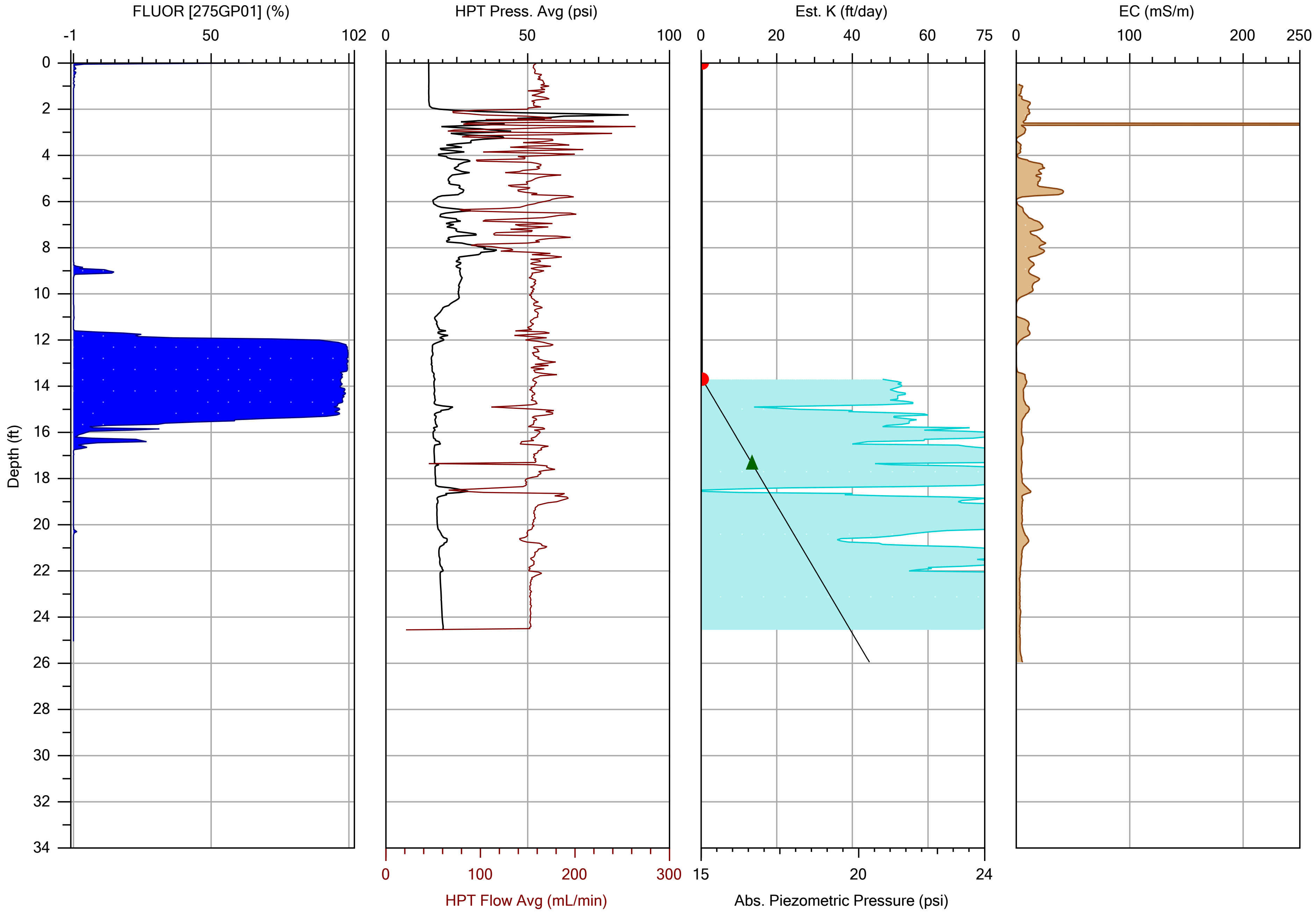
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/21/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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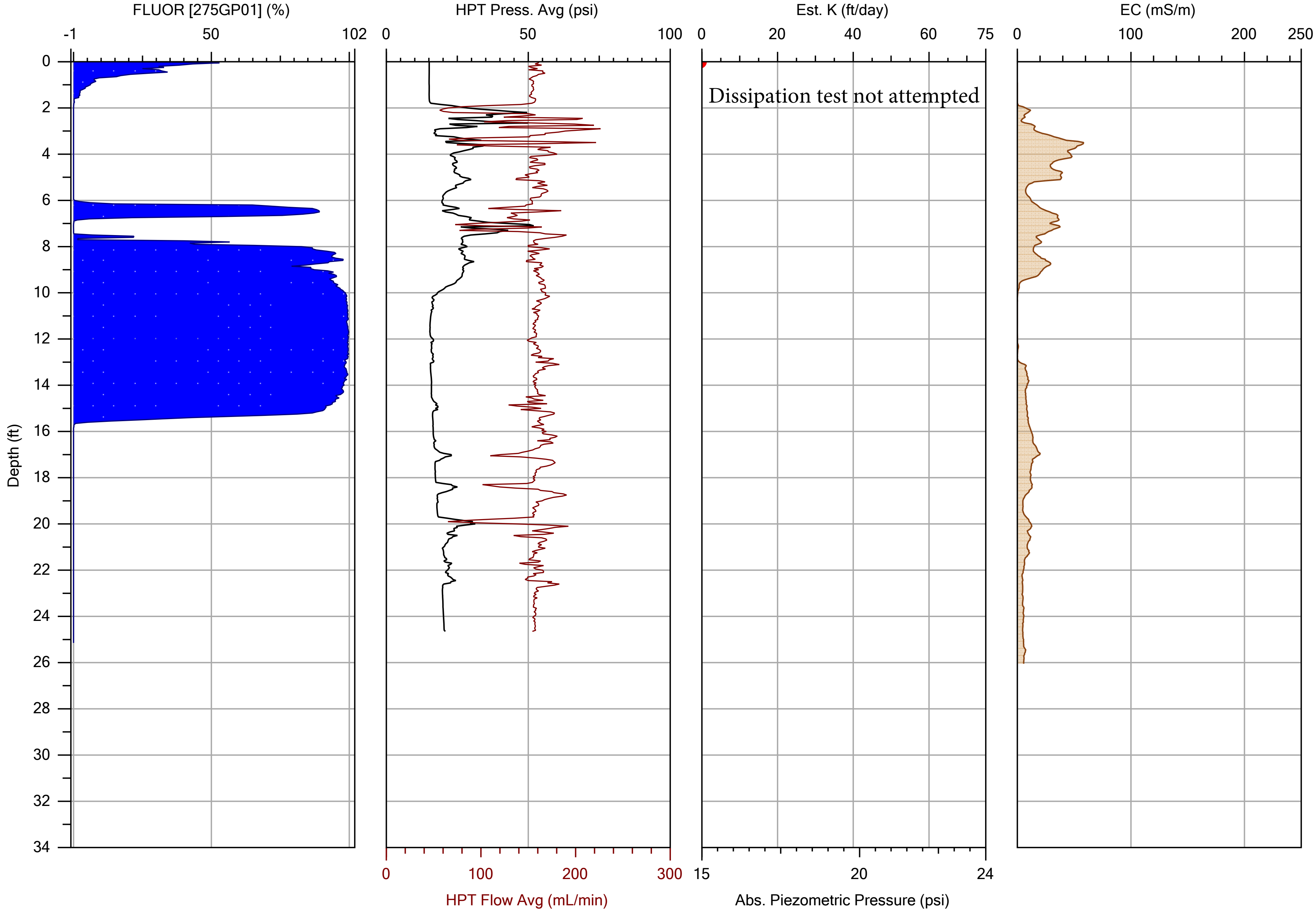
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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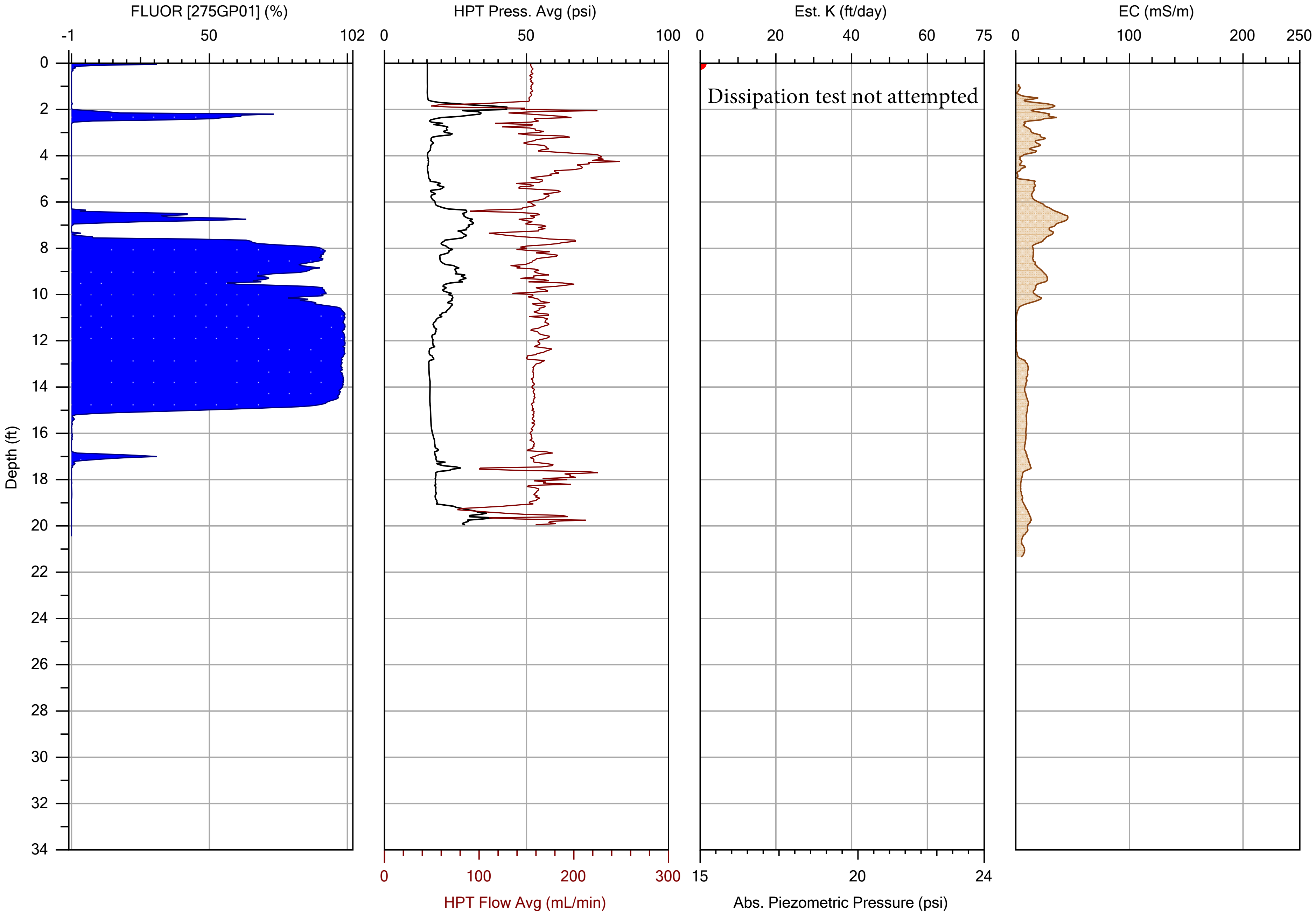
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



Dissipation test not attempted

COLUMBIA TECHNOLOGIES

File: AOPC4-OIP60.OIHP

Company: COLUMBIA Technologies

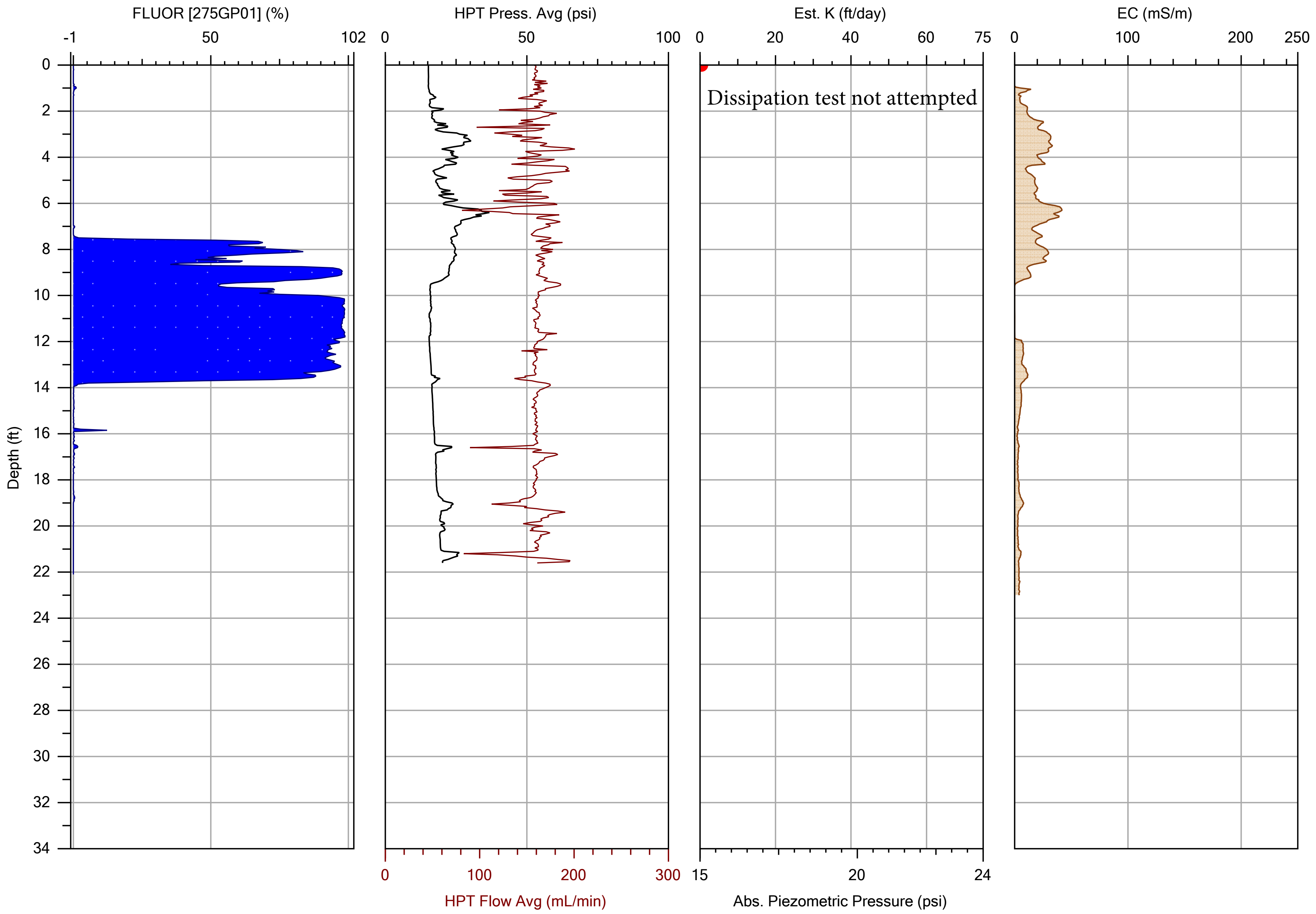
Operator: AJH

Date: 11/21/2019

Project ID: Port of Longview

Client: Floyd Snider

Location: Longview, WA



COLUMBIA TECHNOLOGIES

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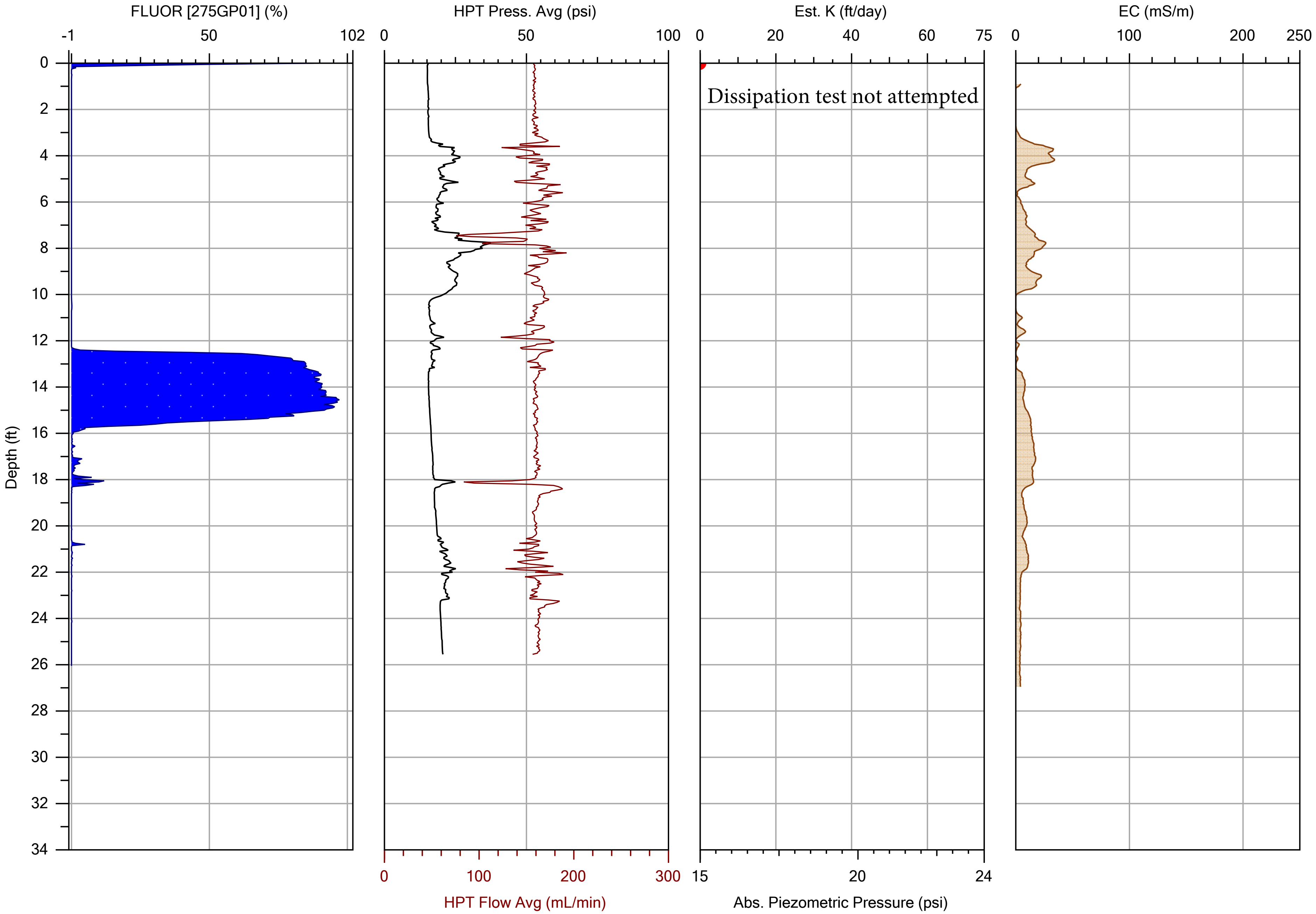
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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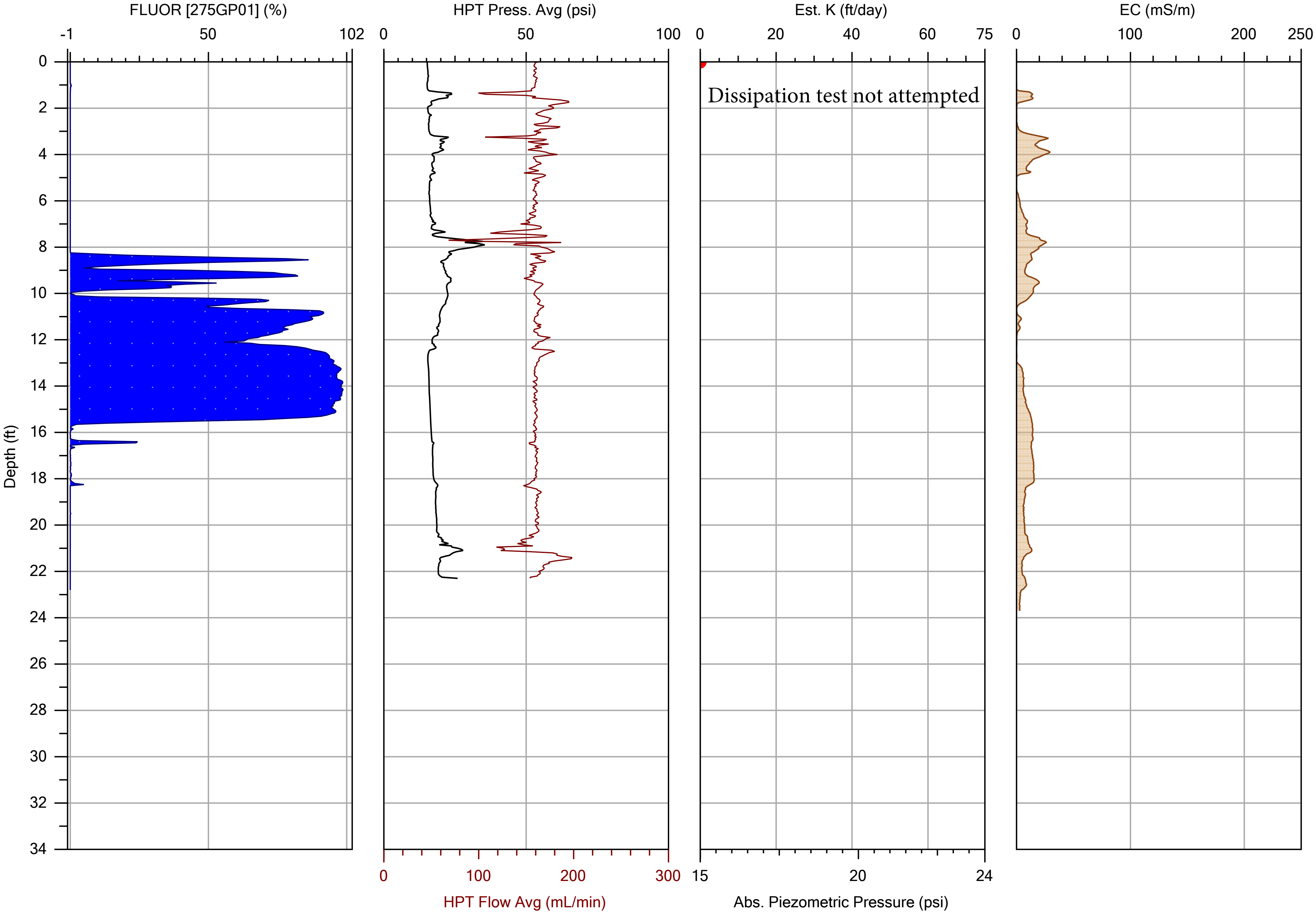
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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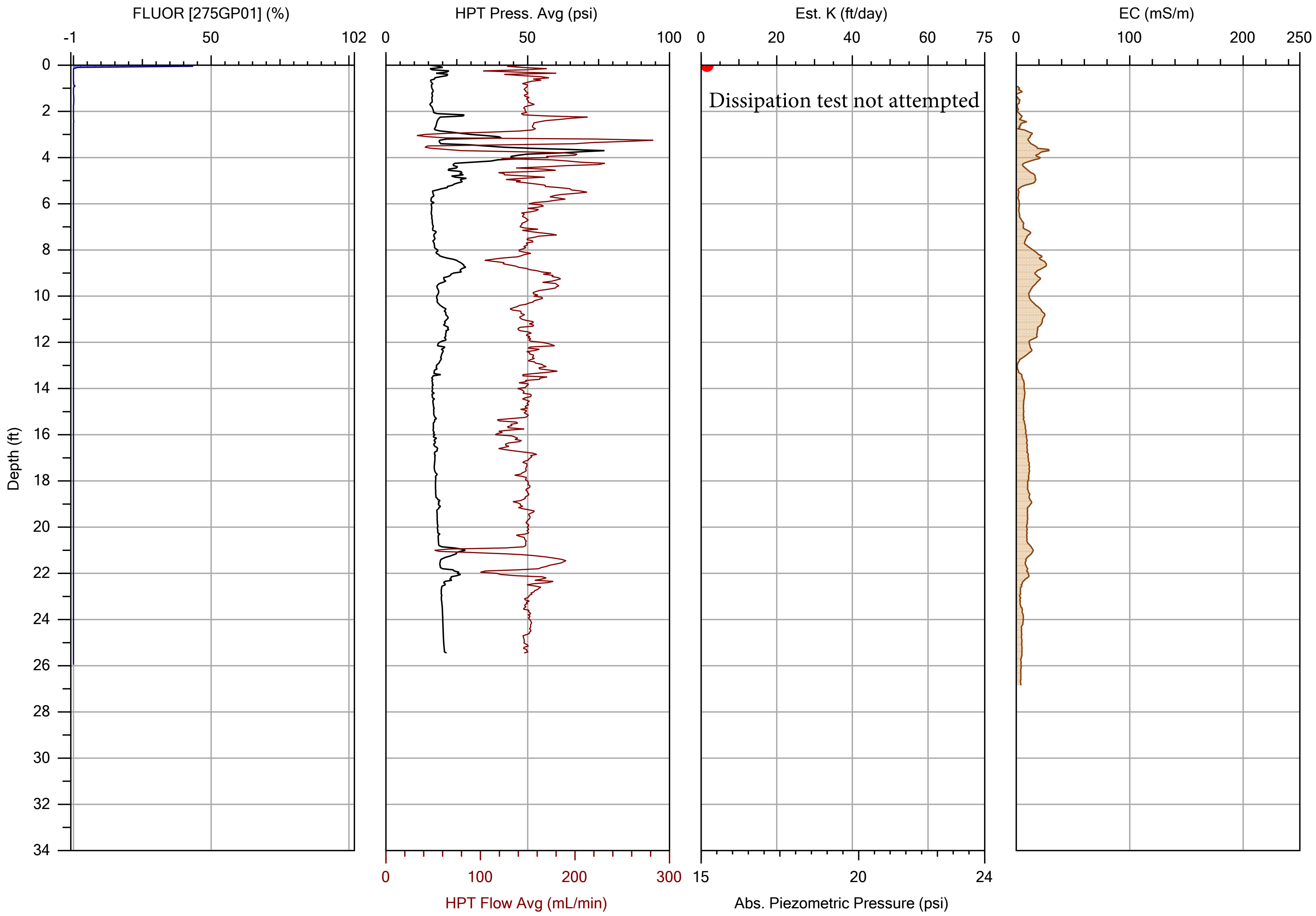
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



Dissipation test not attempted

File: AOPC4-OIP69.OIHP

Company: COLUMBIA Technologies

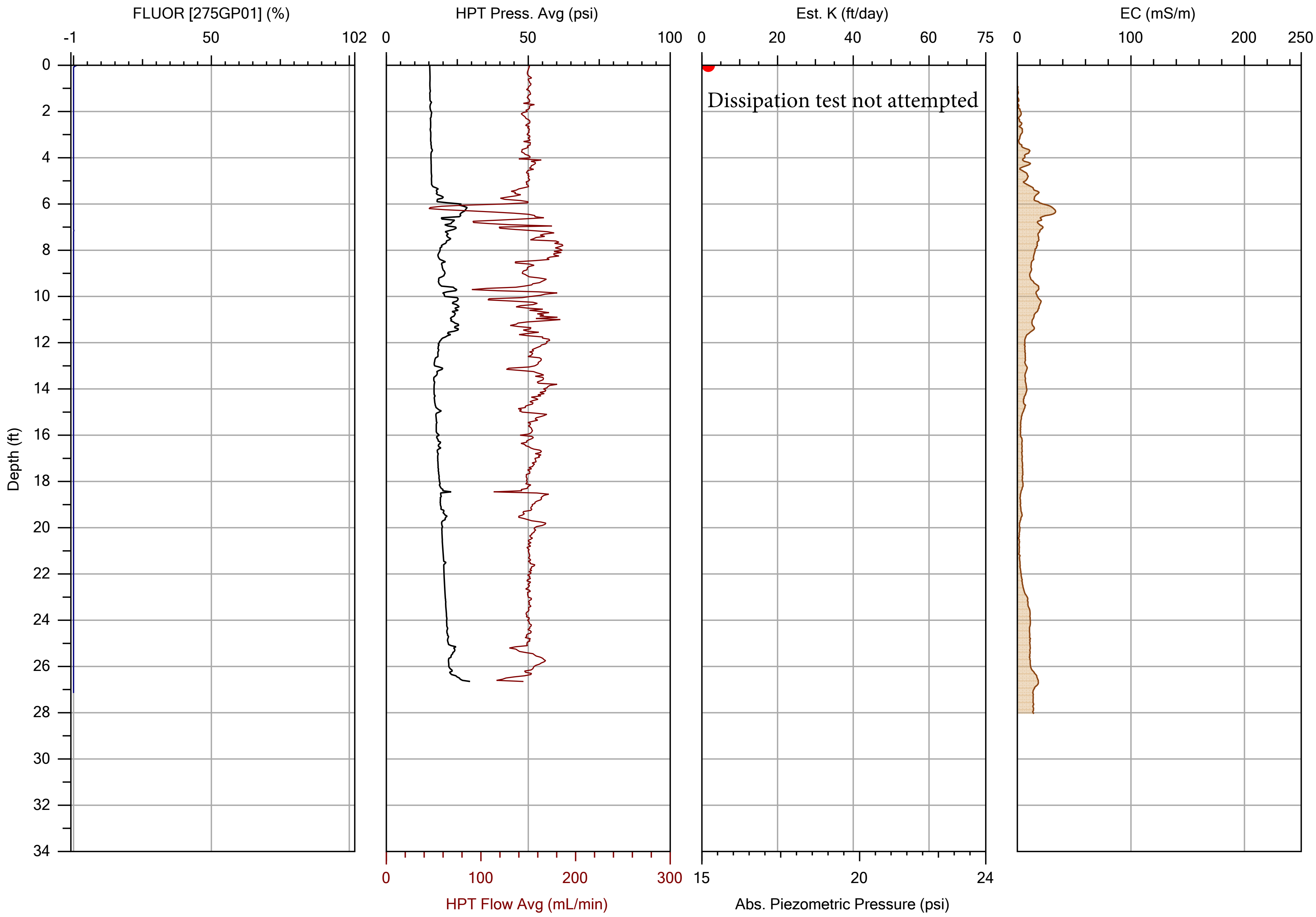
Operator: AJH

Date: 11/22/2019

Project ID: Port of Longview

Client: Floyd Snider

Location: Longview, WA



Dissipation test not attempted

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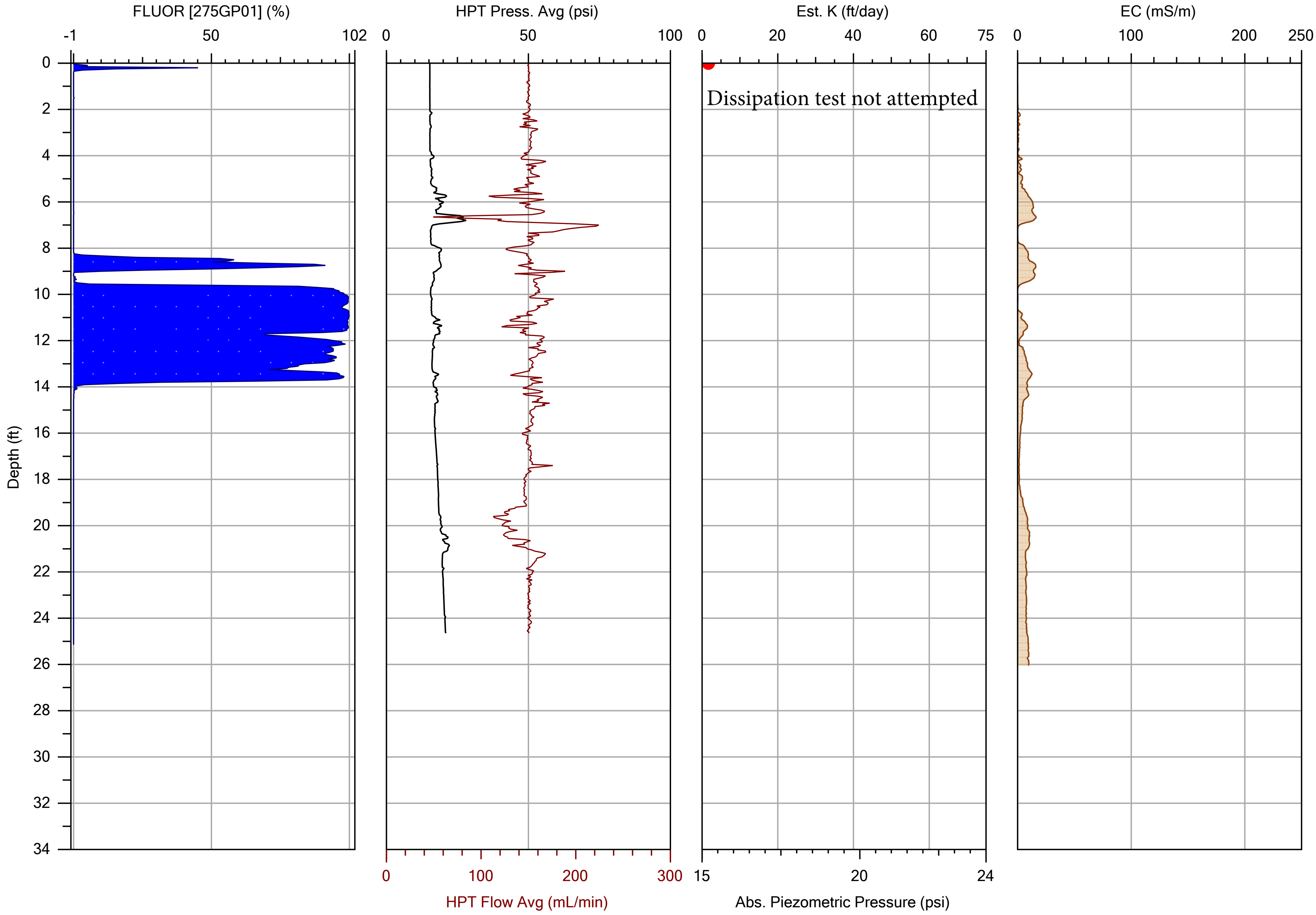
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

File: AOPC4-OIP71.OIHP

Company: COLUMBIA Technologies

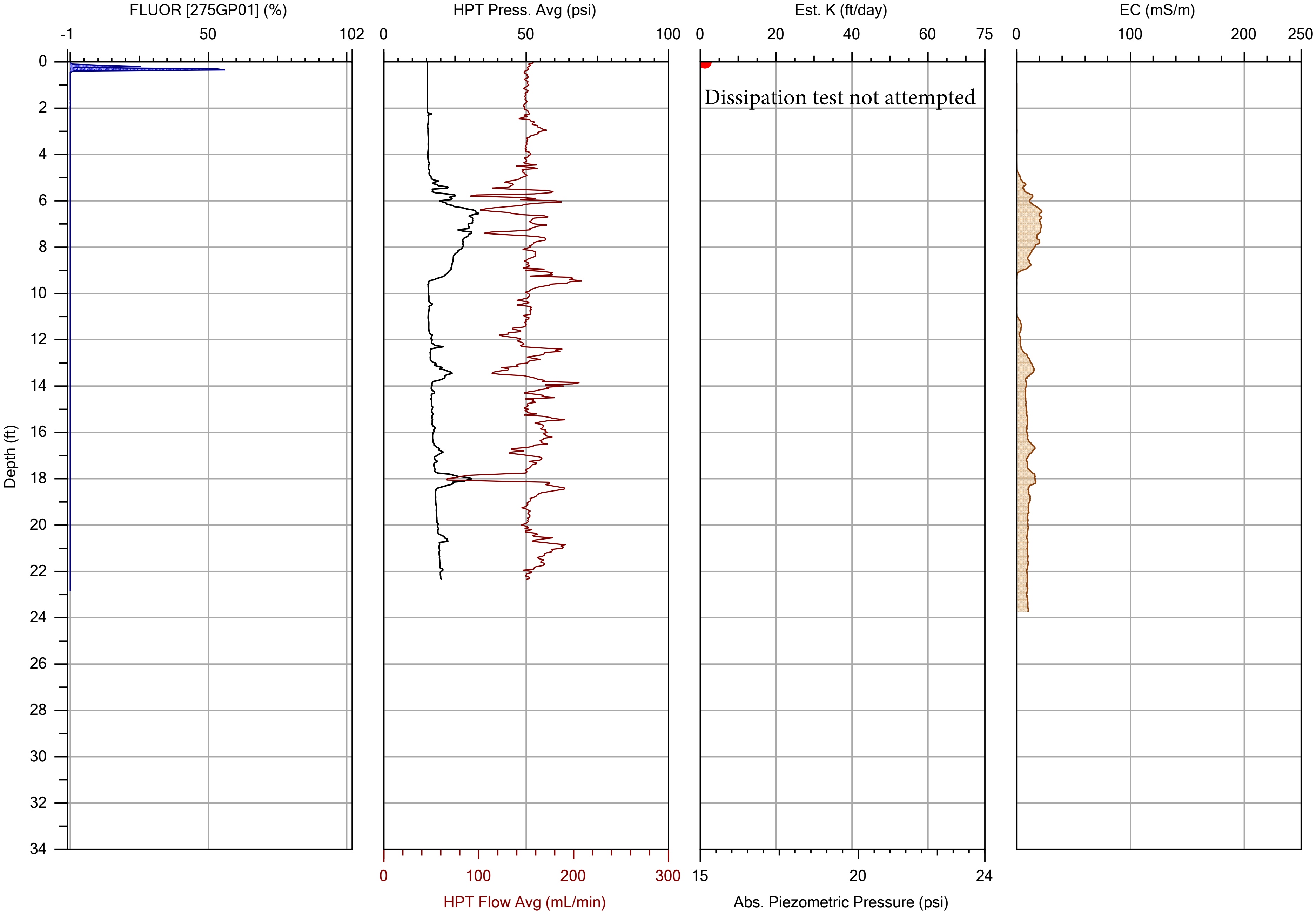
Operator: AJH

Date: 11/22/2019

Project ID: Port of Longview

Client: Floyd Snider

Location: Longview, WA



COLUMBIA TECHNOLOGIES

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Company: COLUMBIA Technologies	Operator: AJH	Date: 11/22/2019
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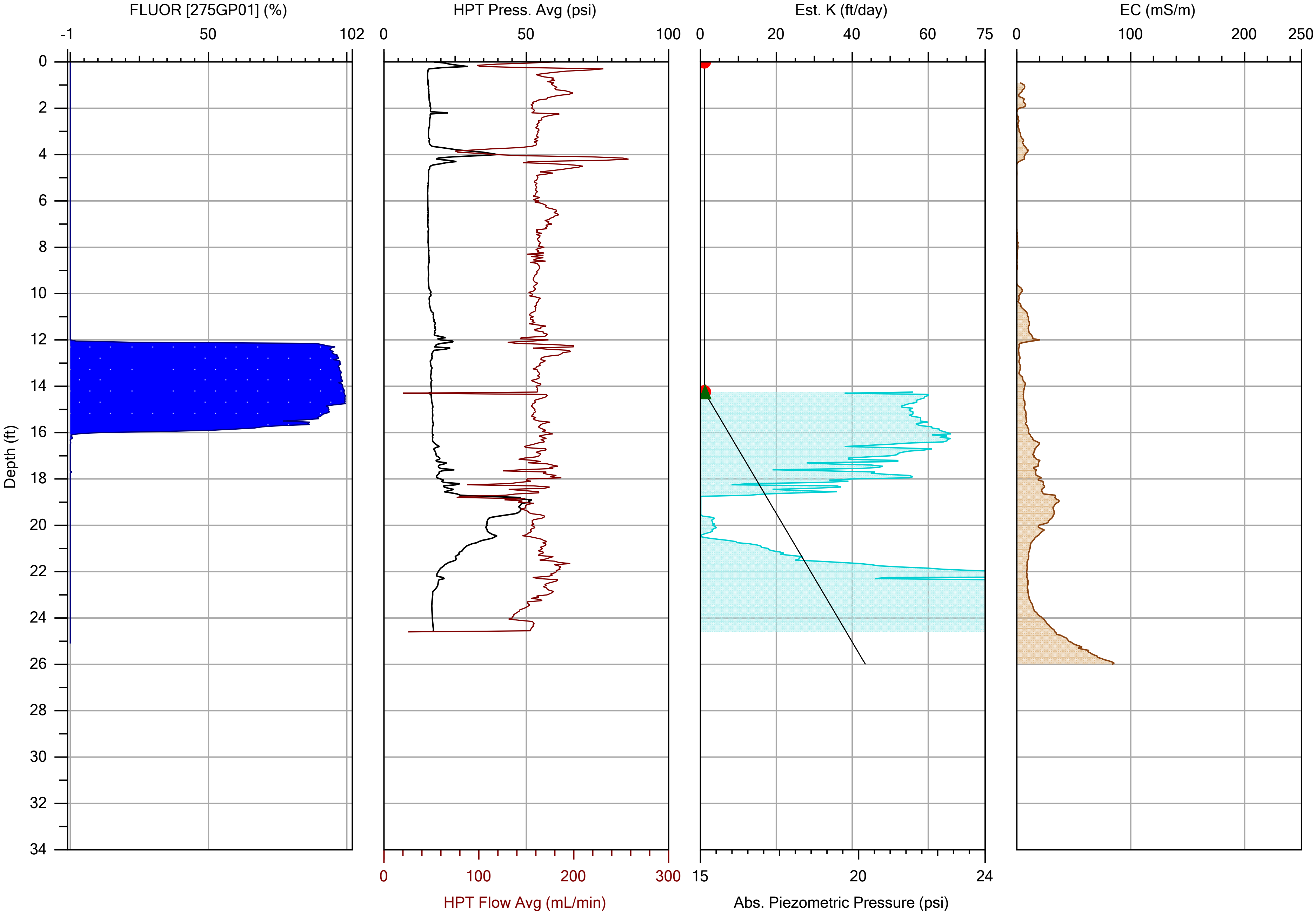

COLUMBIA TECHNOLOGIES

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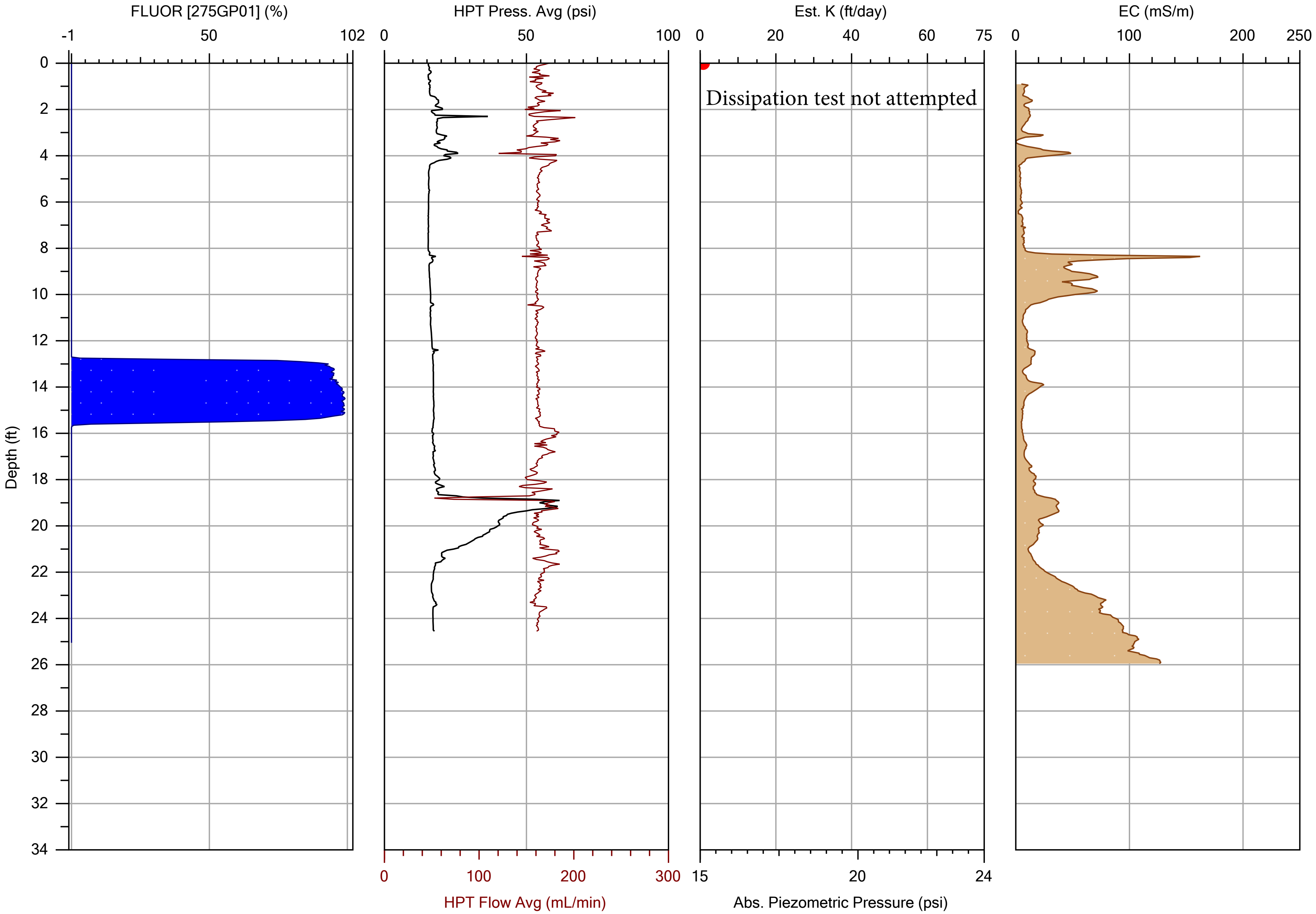
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/15/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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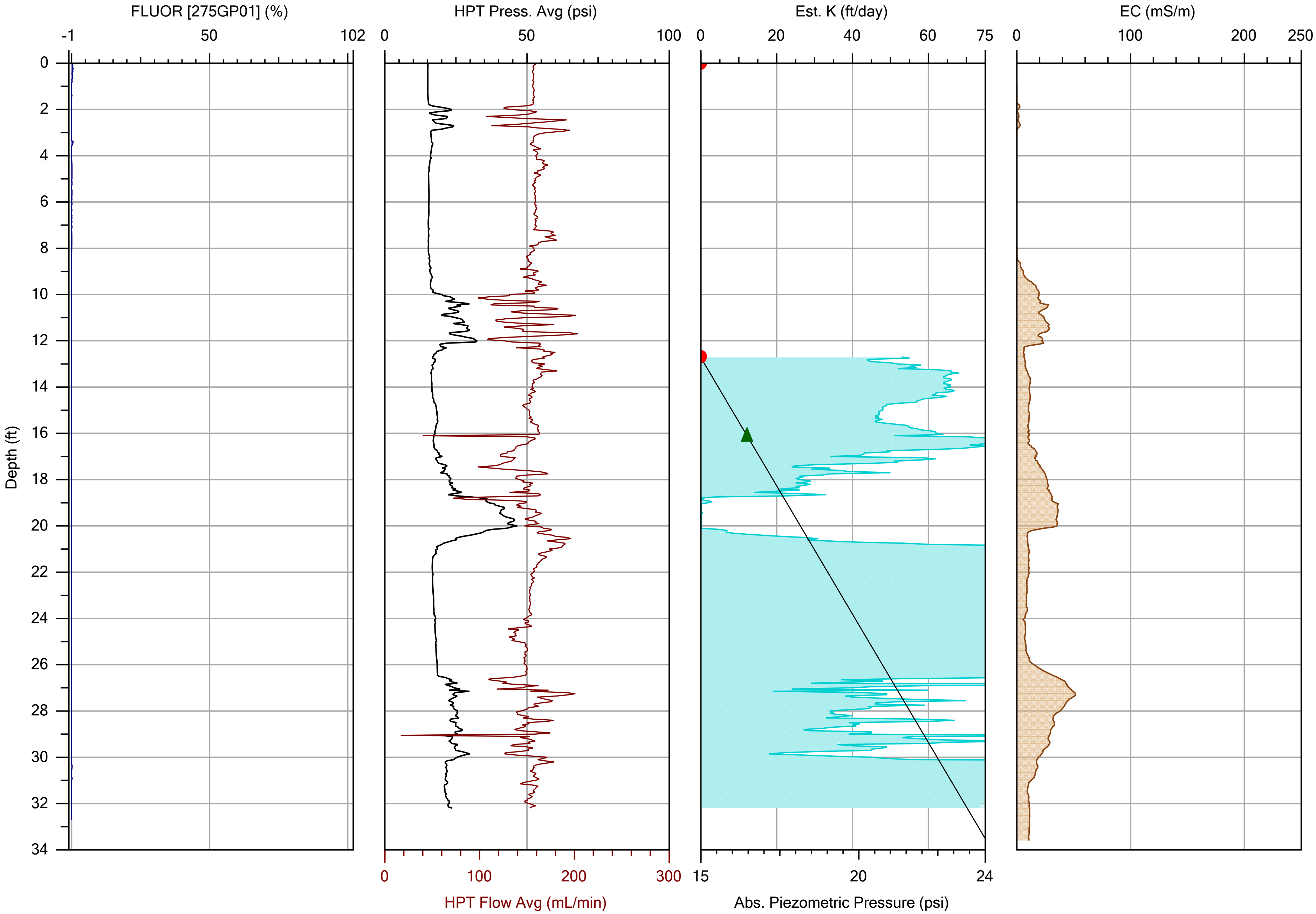
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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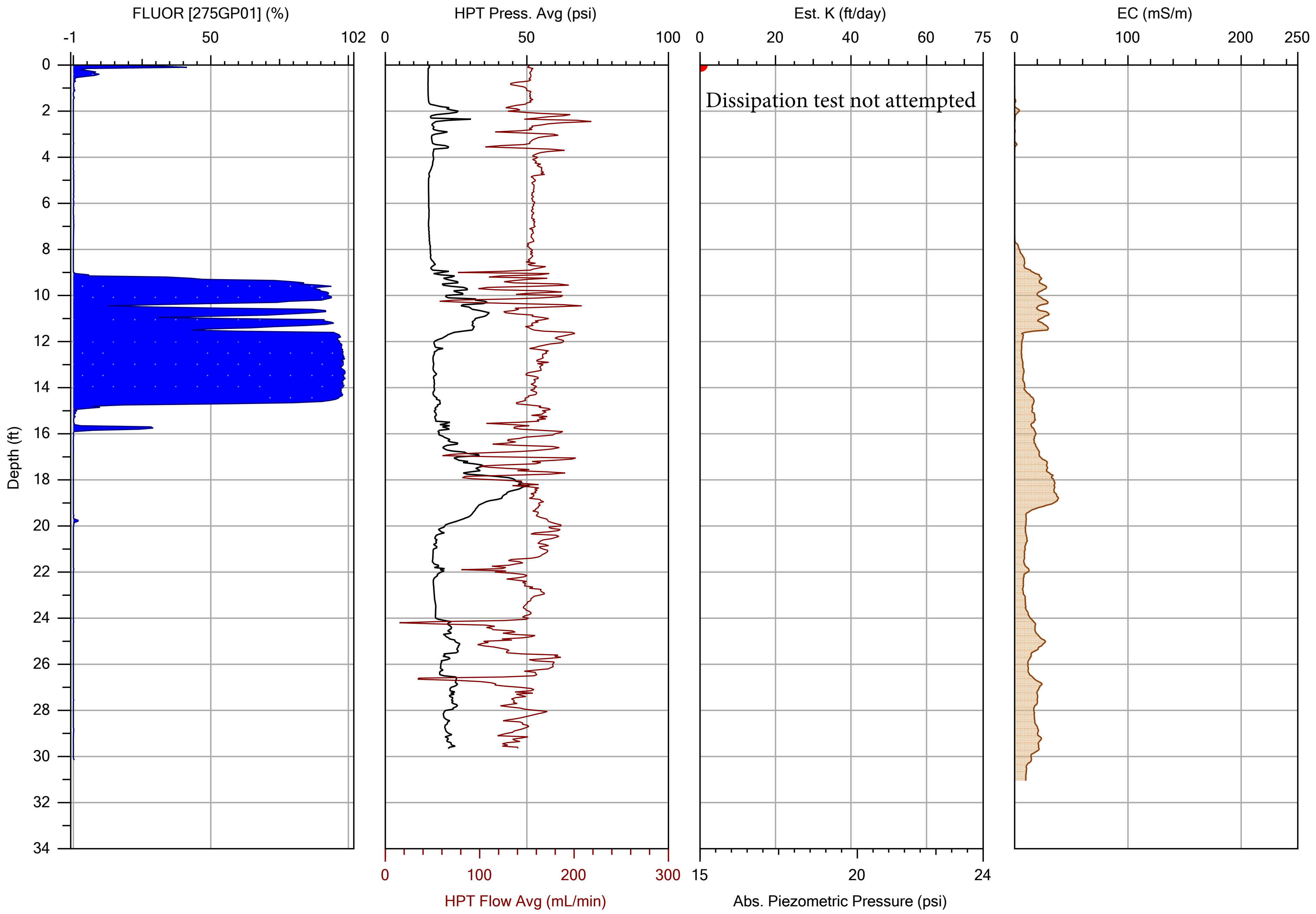
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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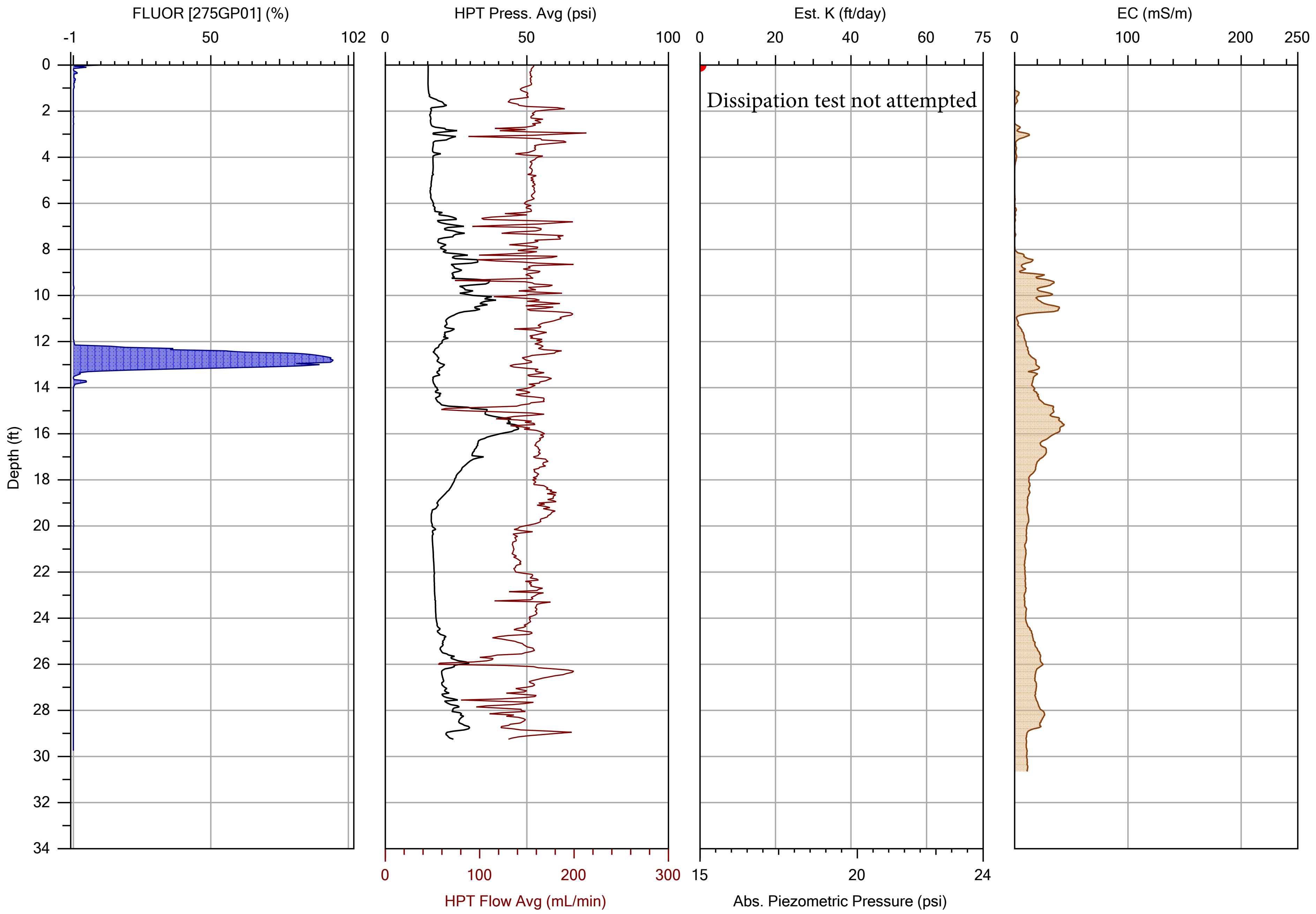
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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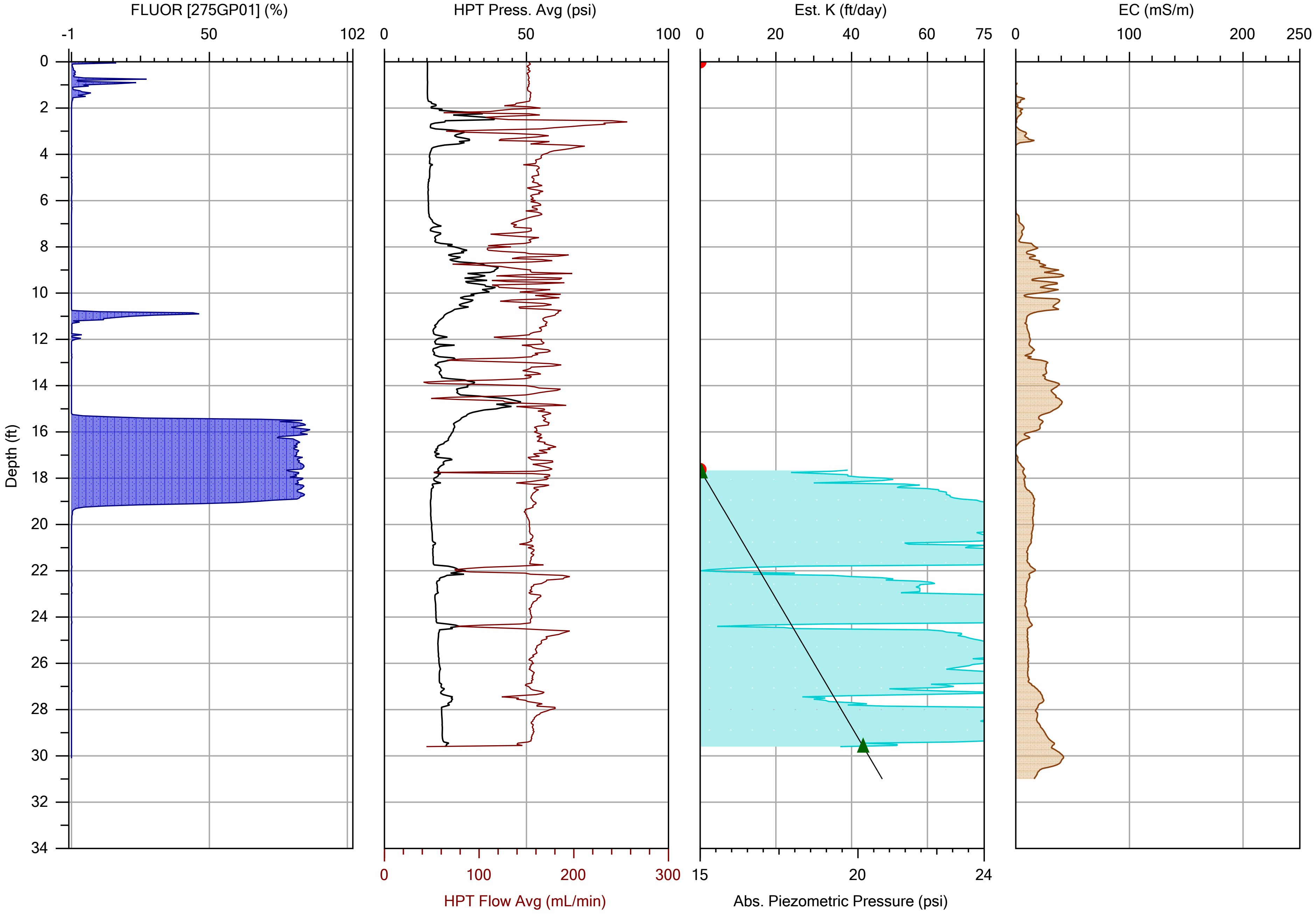
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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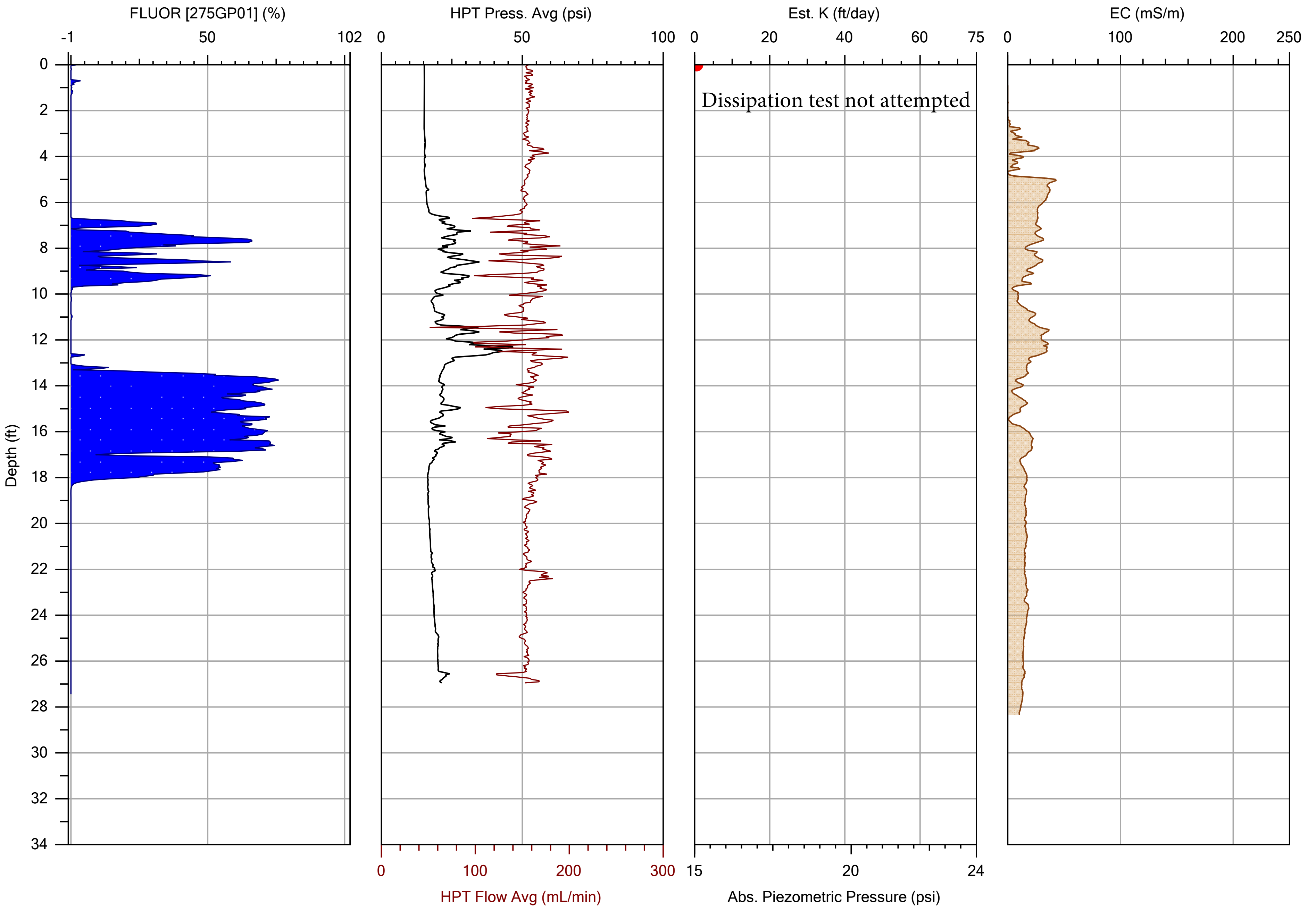
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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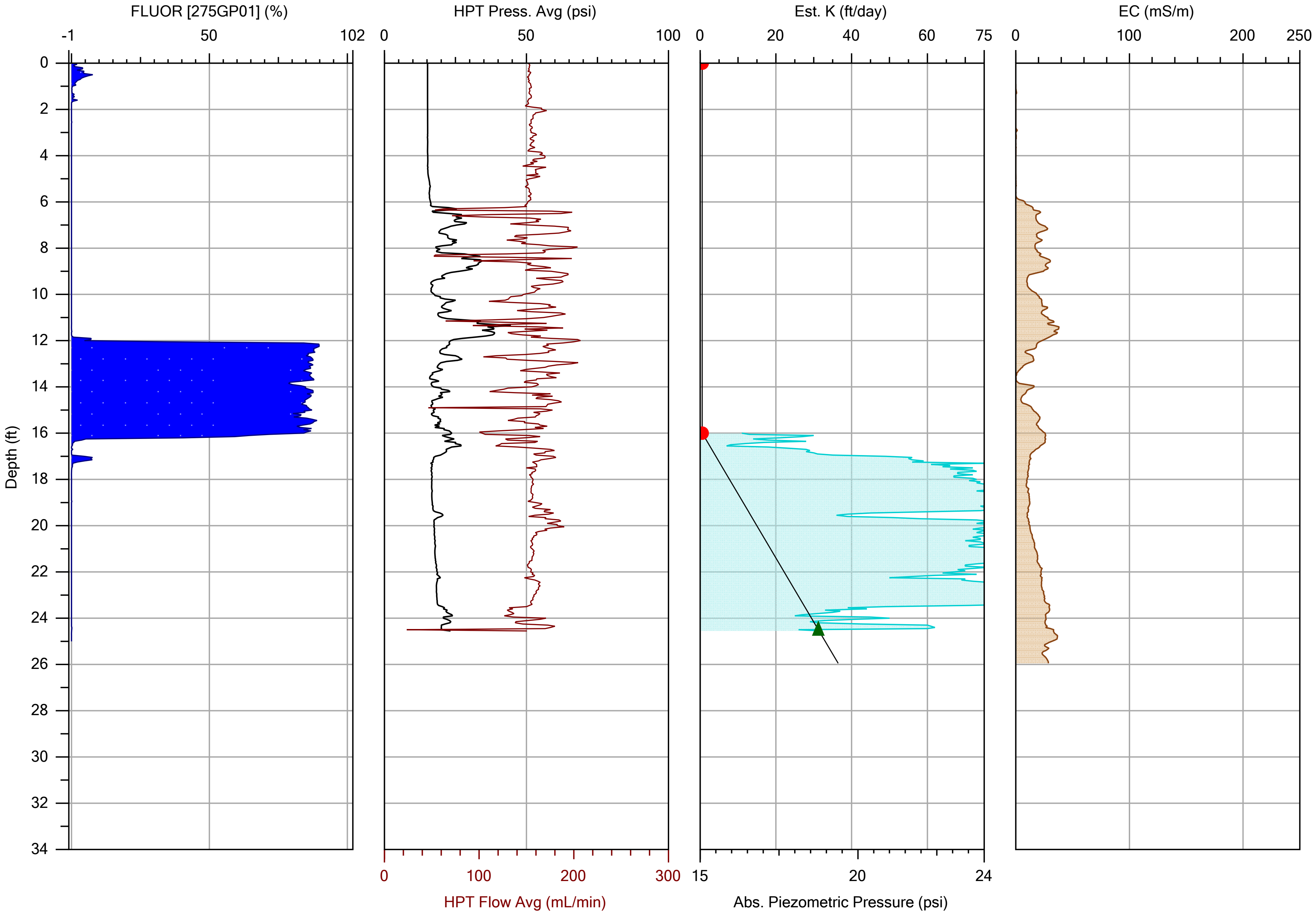
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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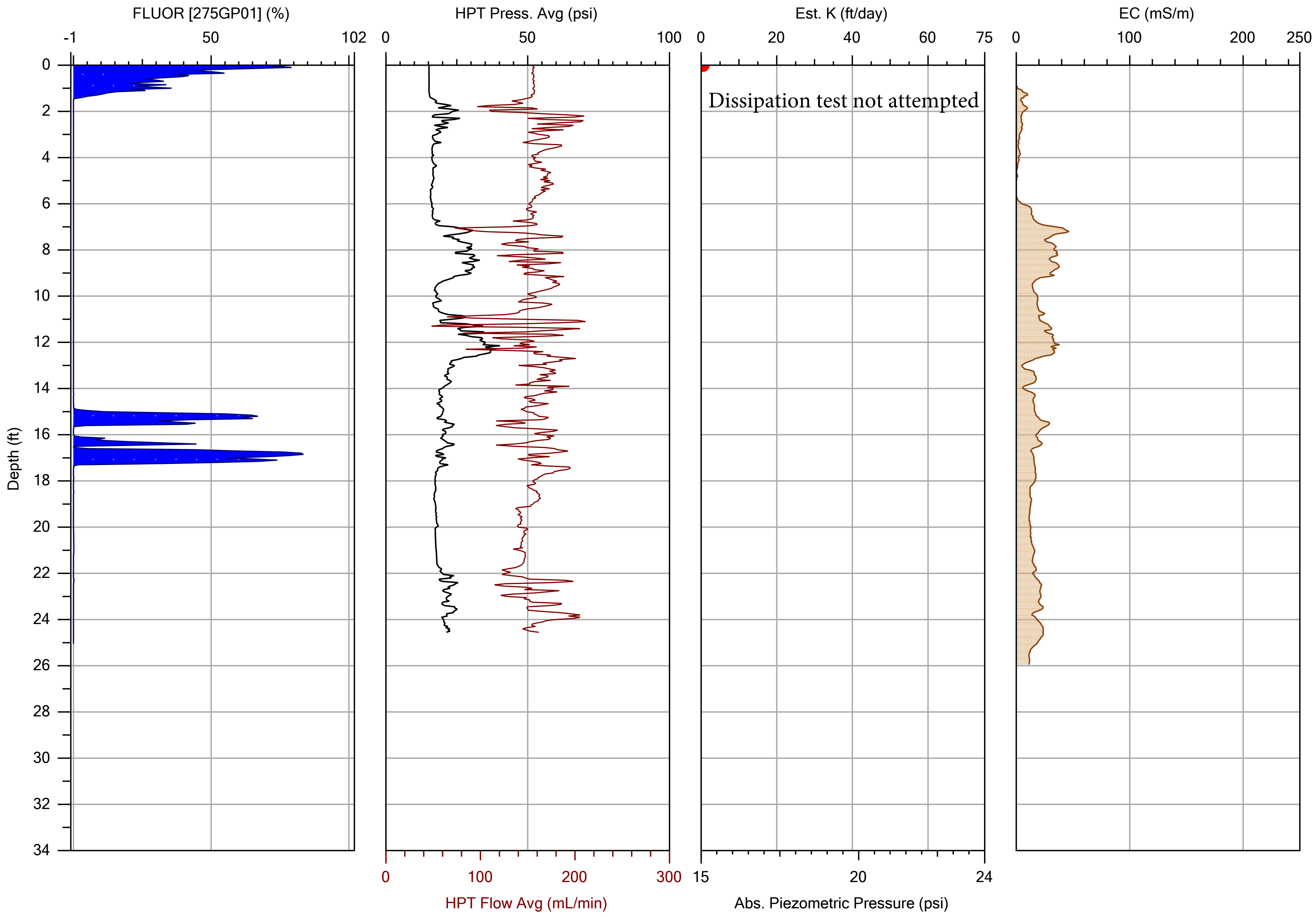
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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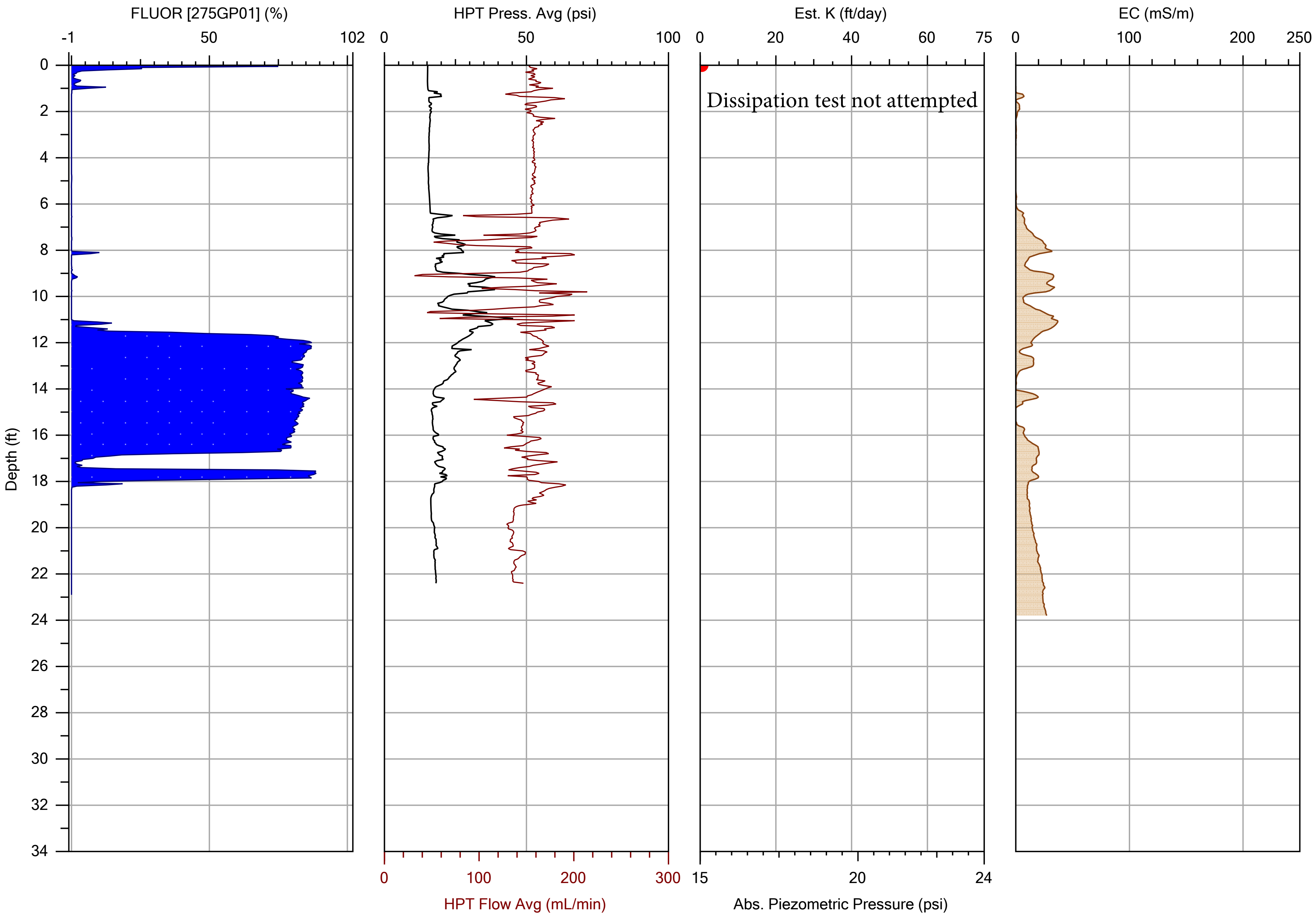
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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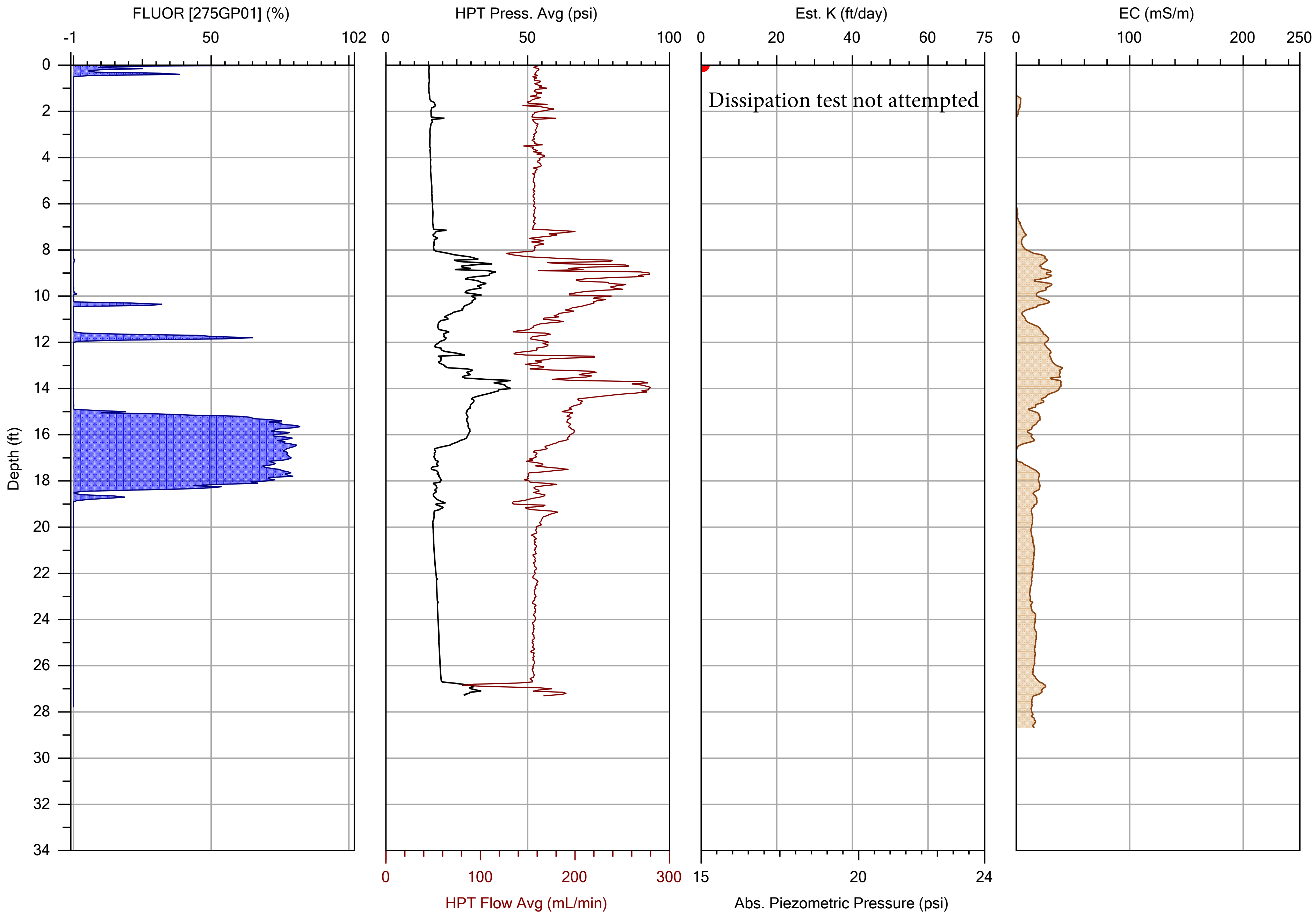
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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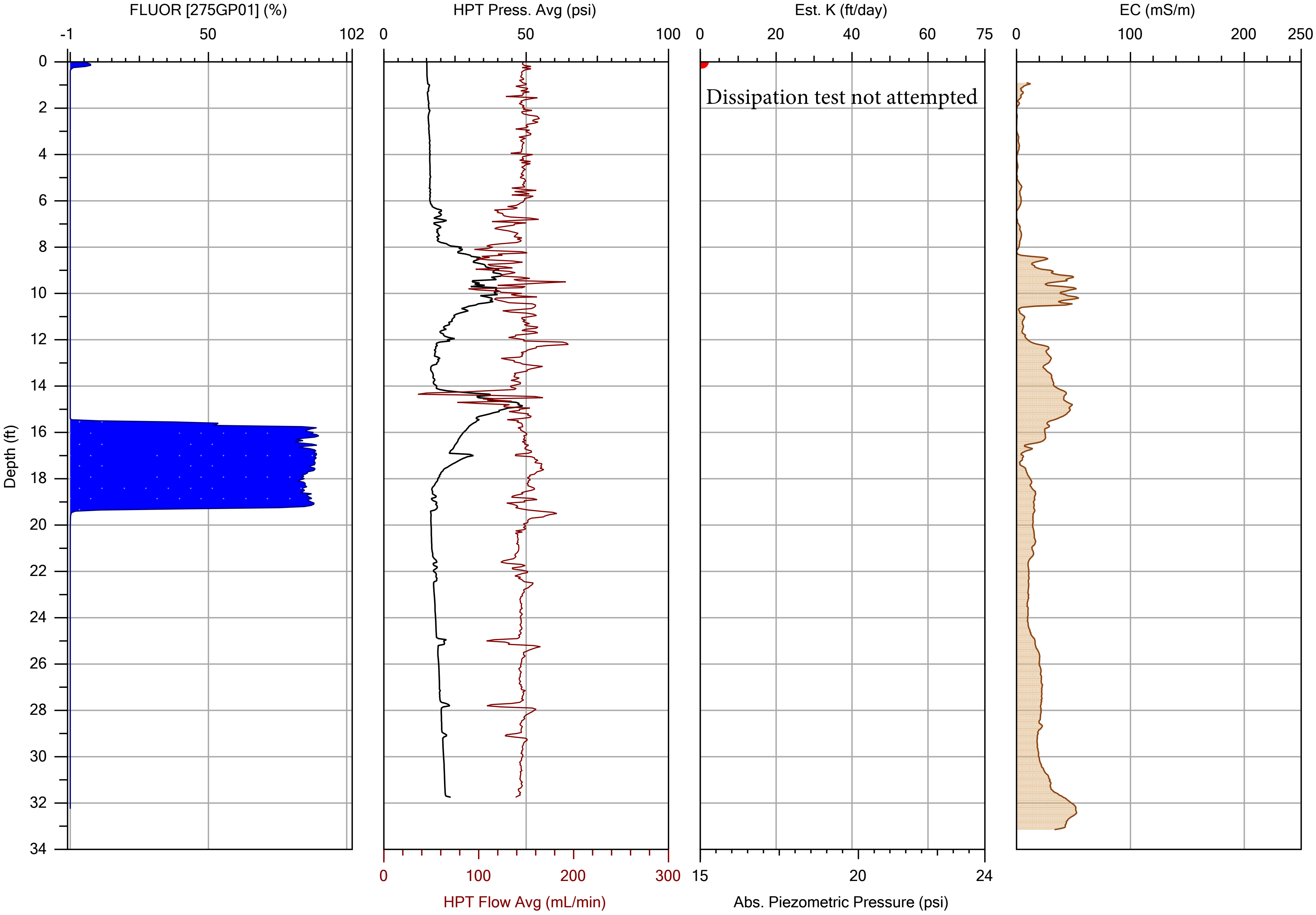
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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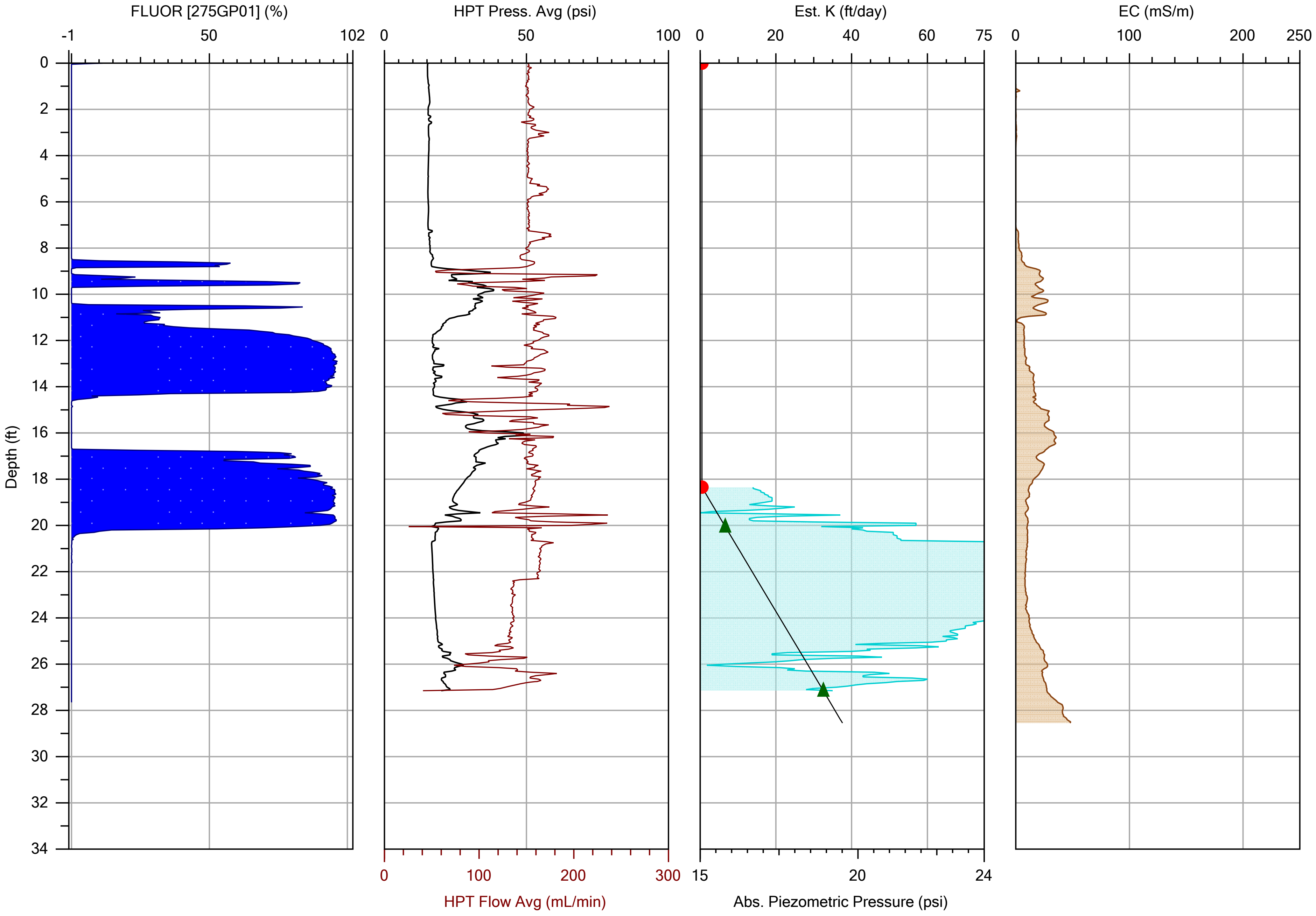
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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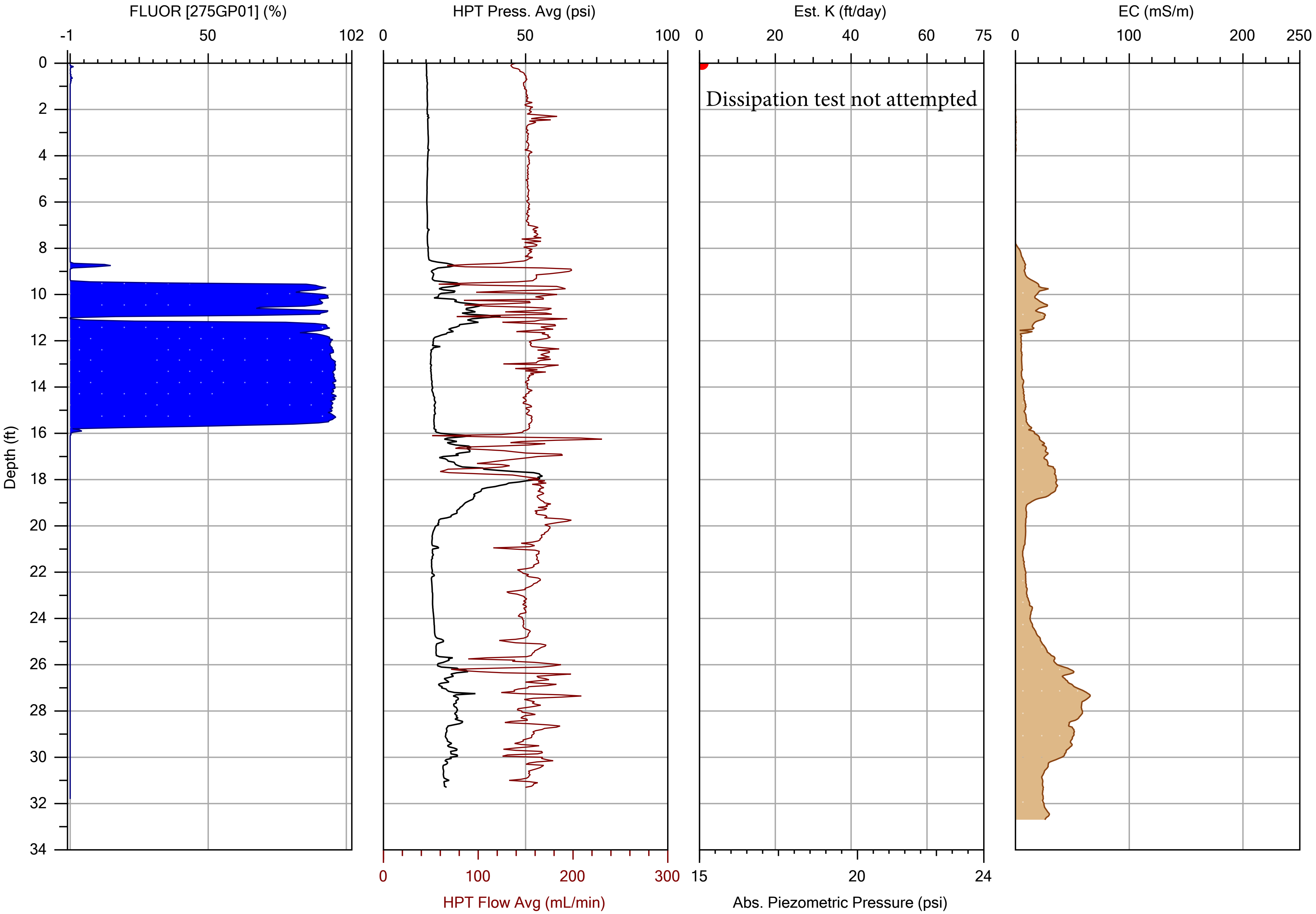
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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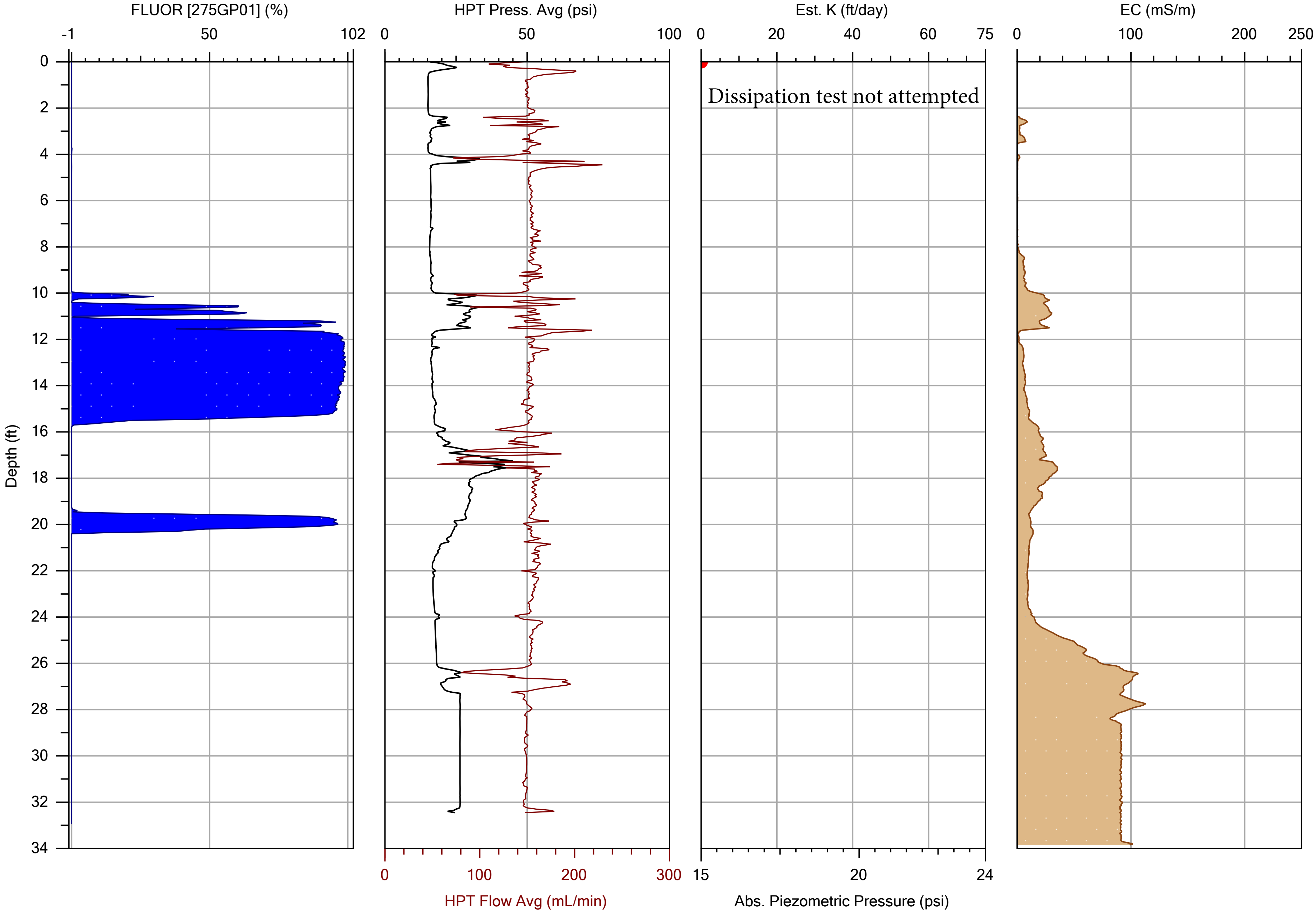
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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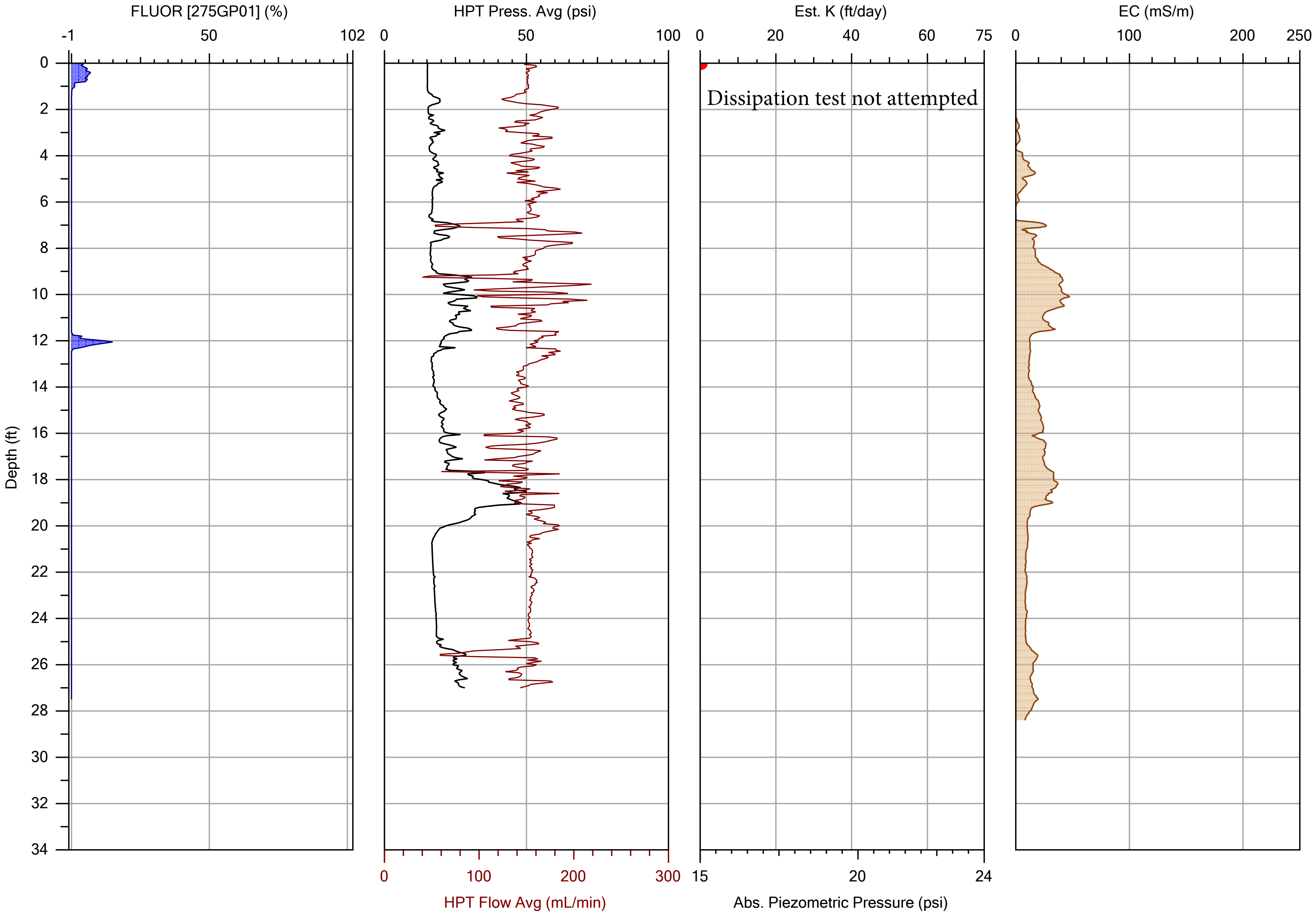
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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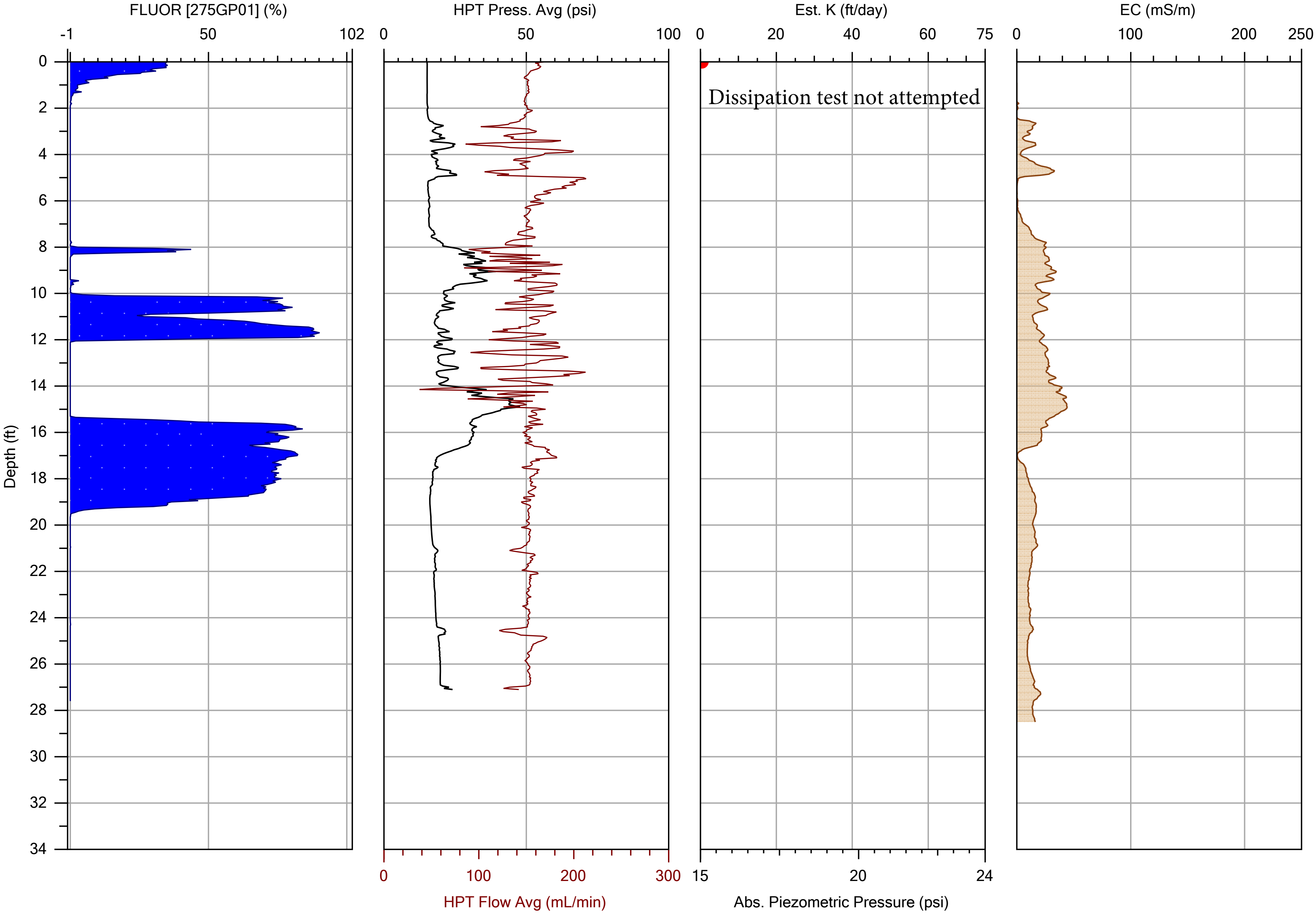
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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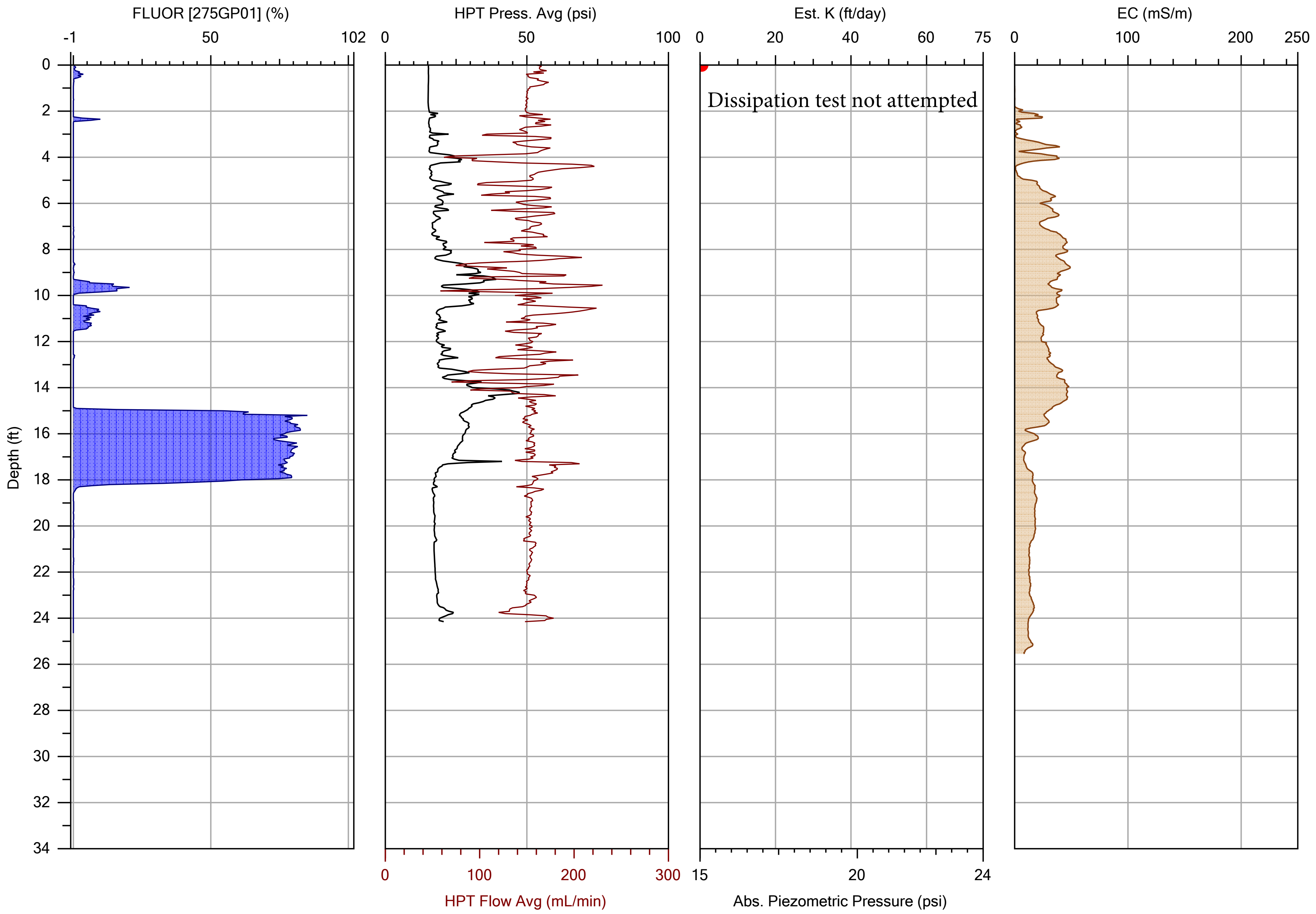
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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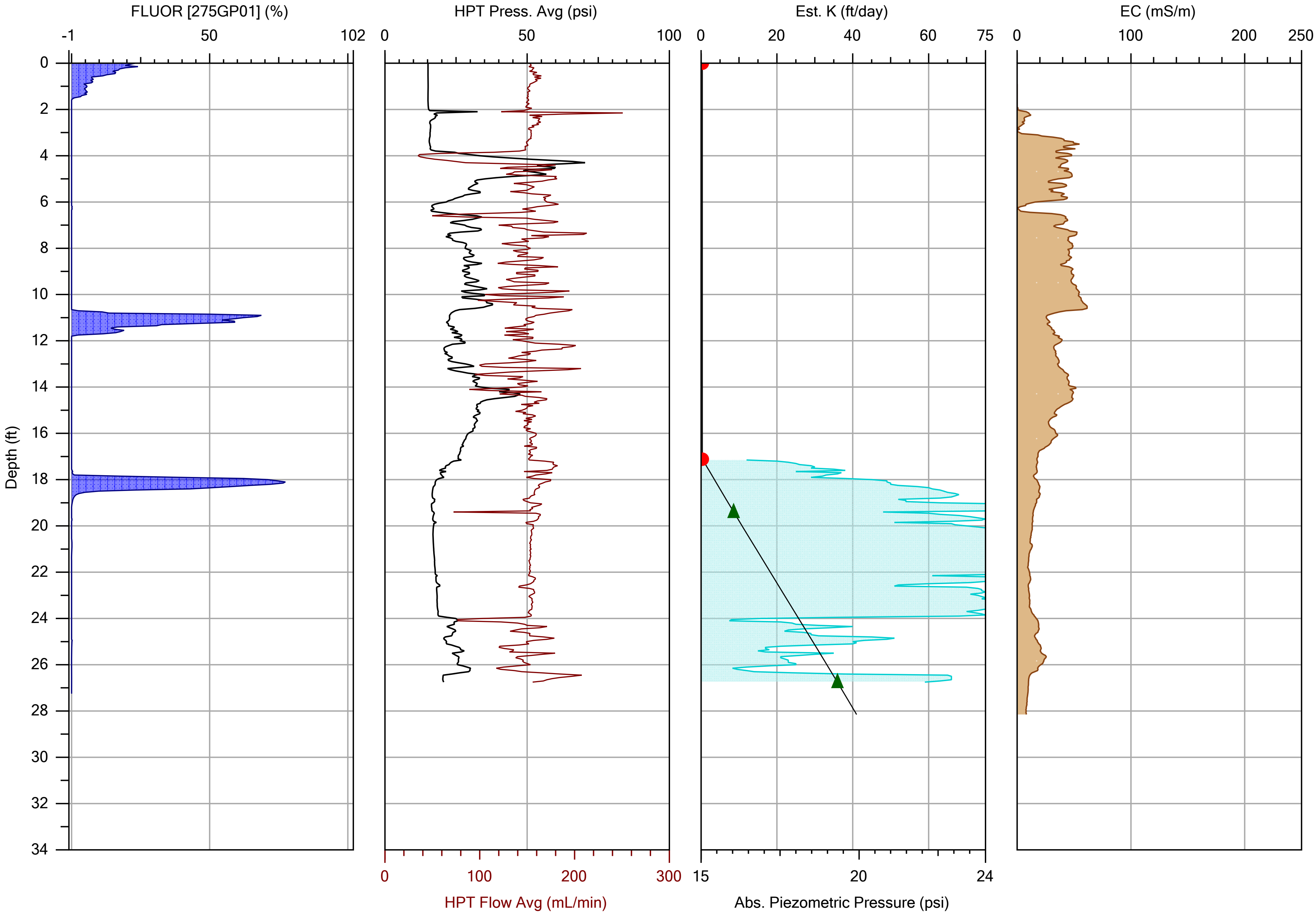
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/20/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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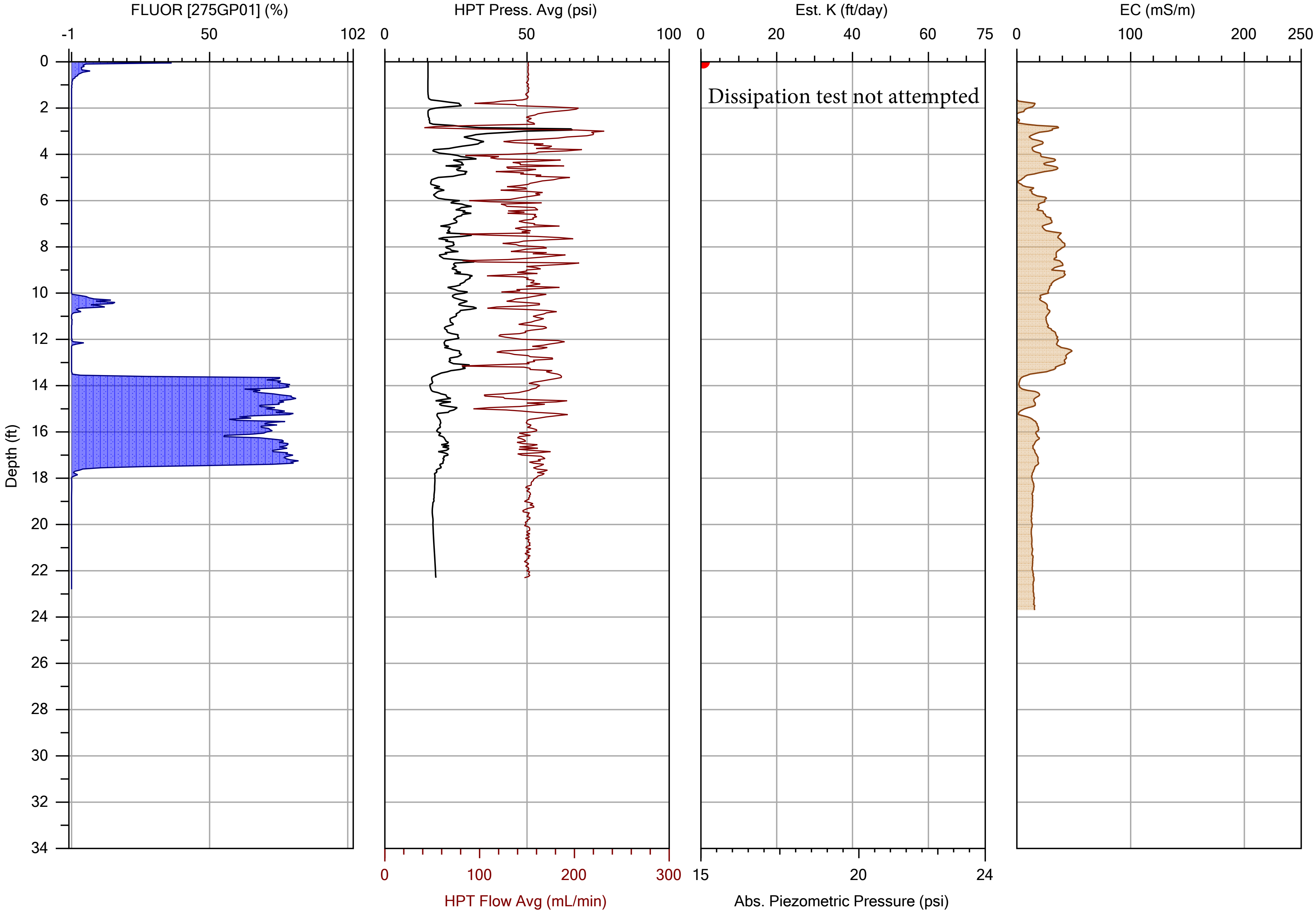
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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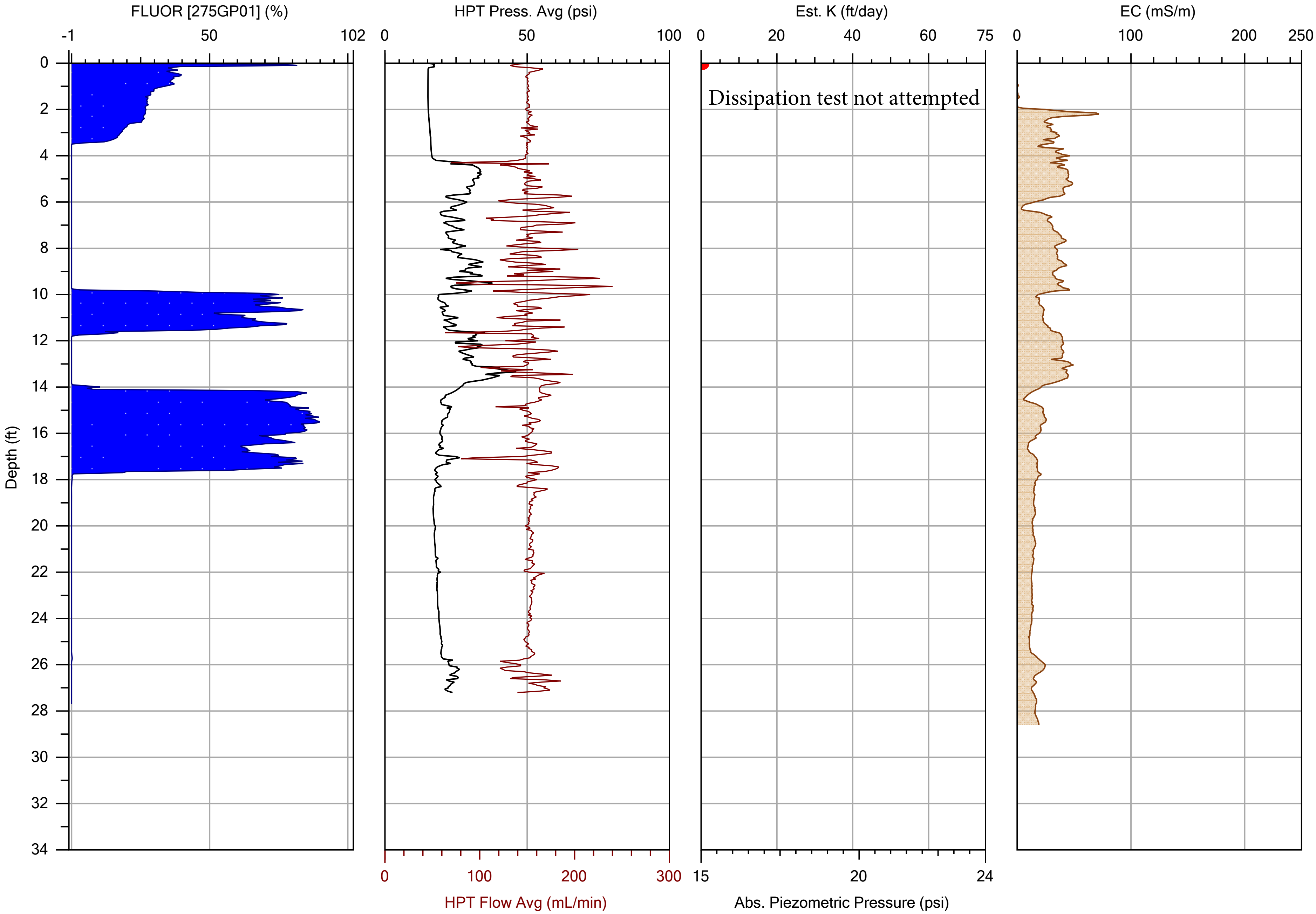

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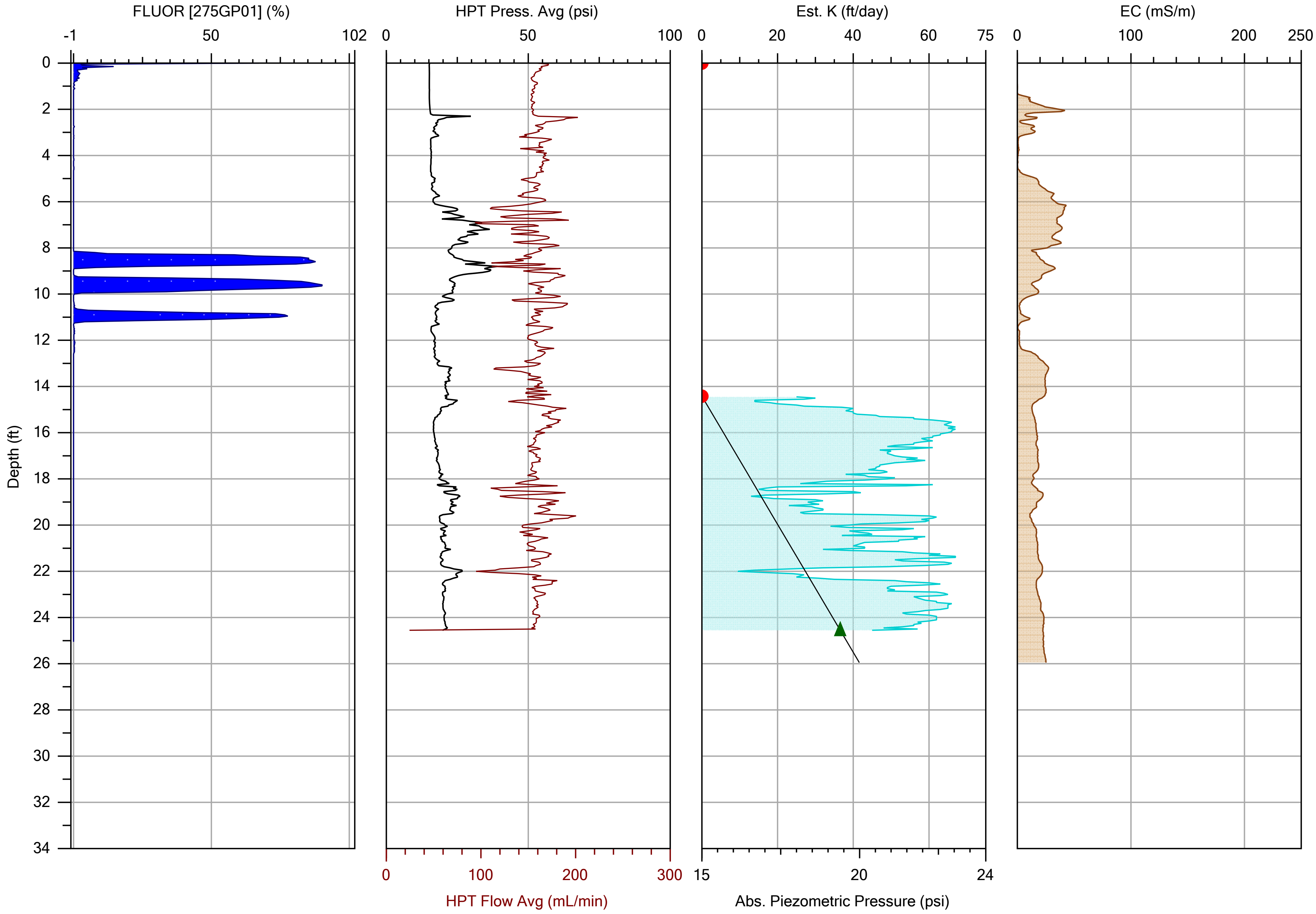


COLUMBIA TECHNOLOGIES

File: AOPC5-OIP56.OIHP

Company: COLUMBIA Technologies

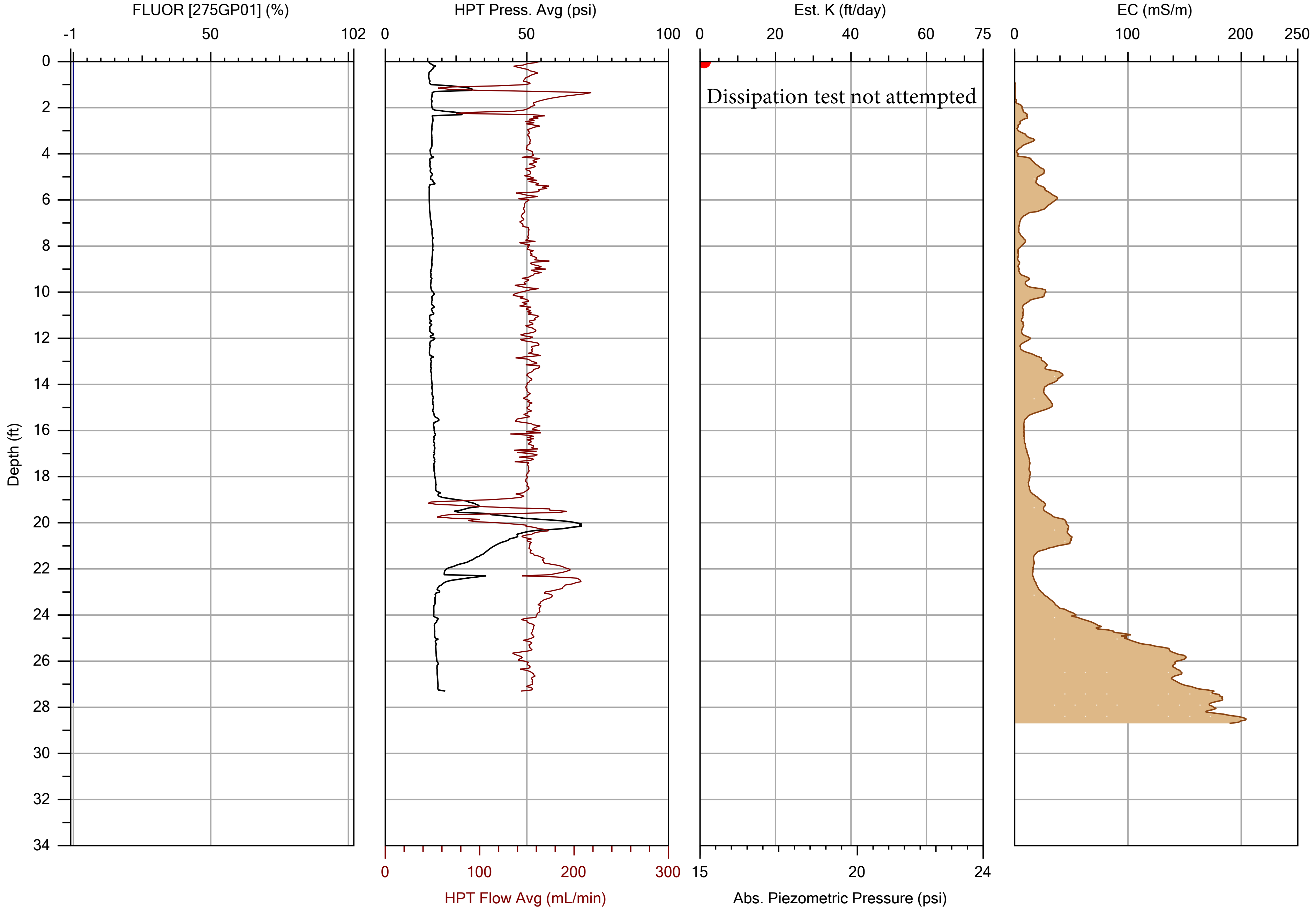
Operator: AJH

Date: 11/21/2019

Project ID: Port of Longview

Client: Floyd Snider

Location: Longview, WA



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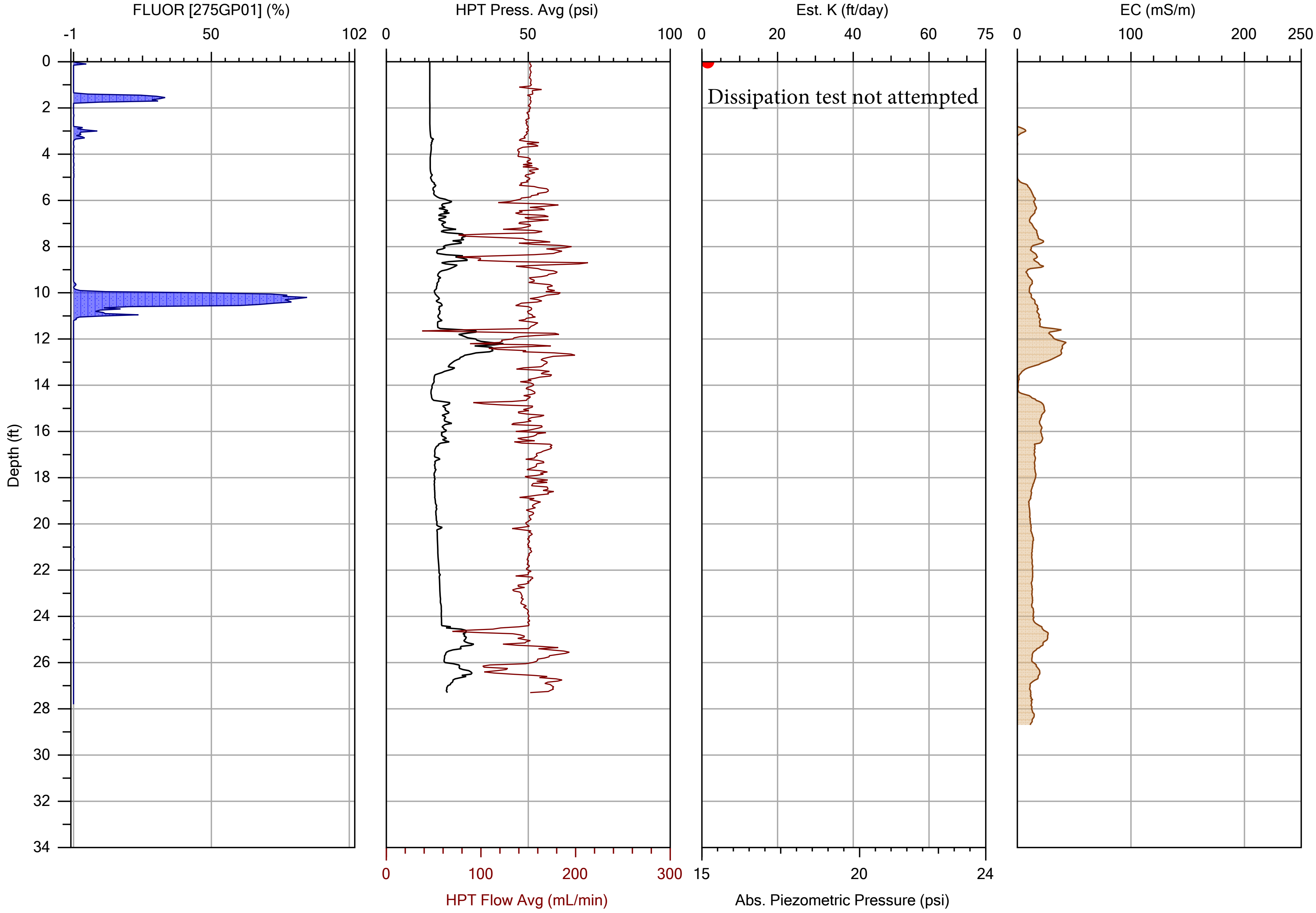
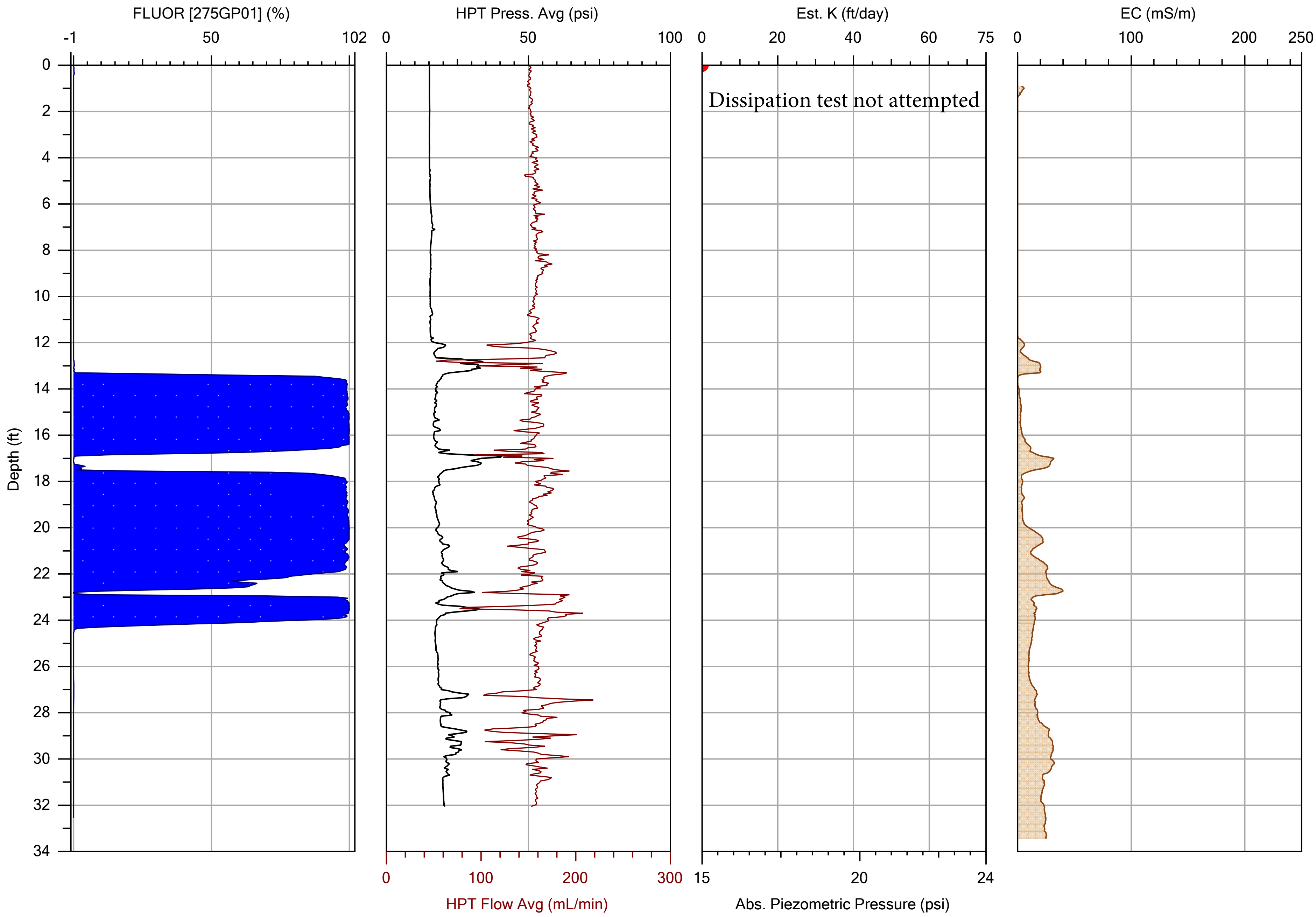
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/22/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

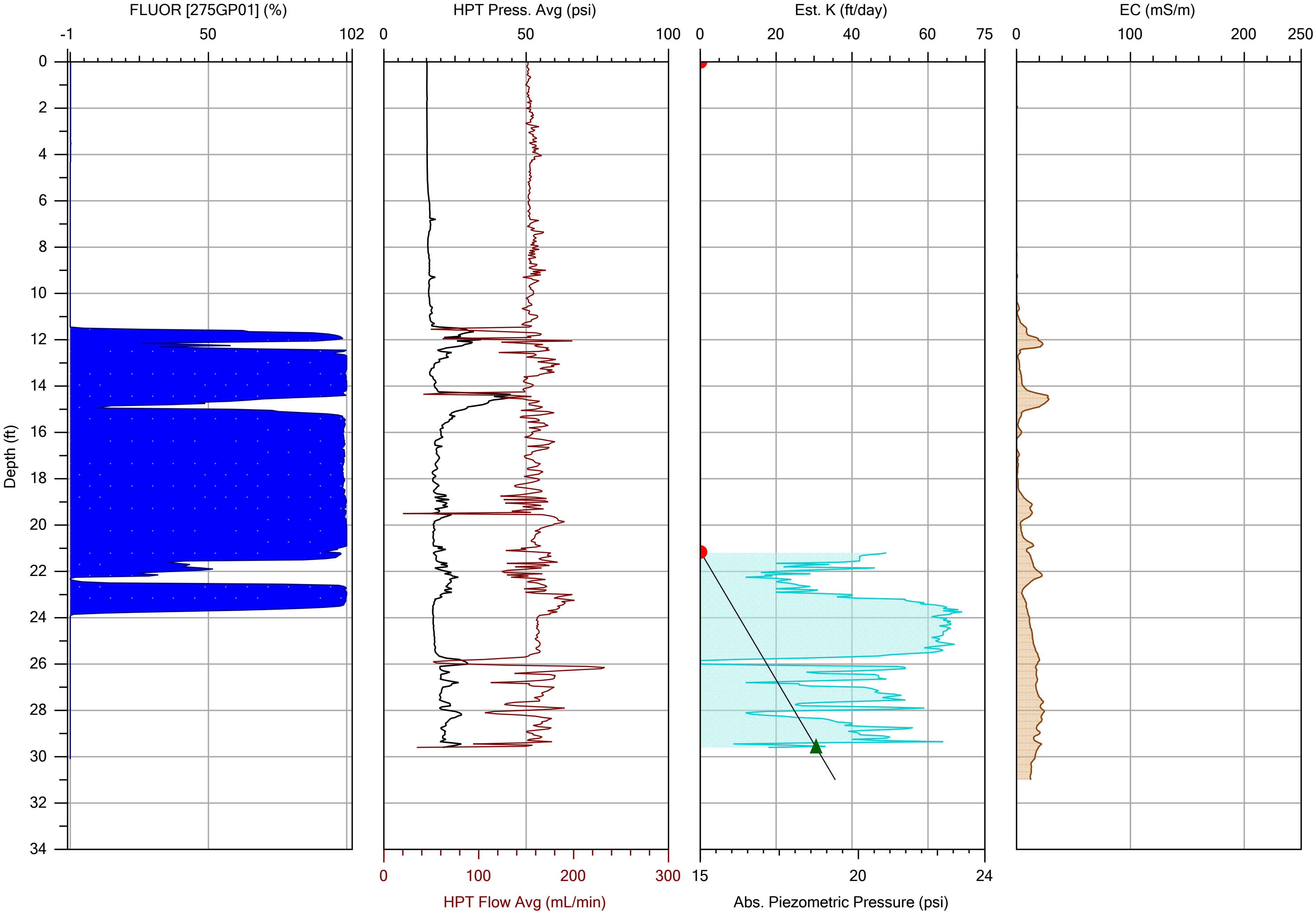
		File: AOPC5-OIP72.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/22/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



Dissipation test not attempted

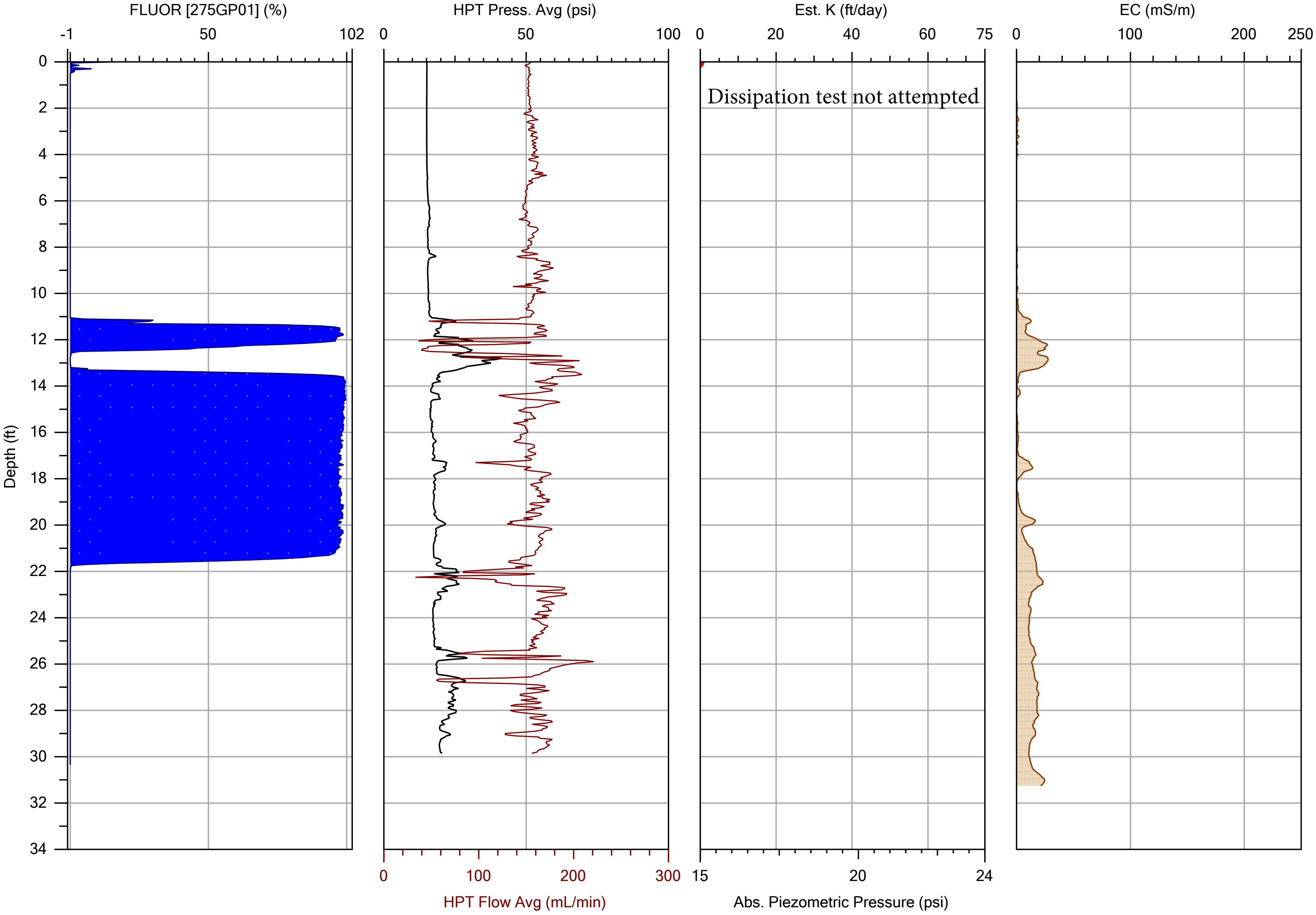
COLUMBIA TECHNOLOGIES

		File: AOPC7-OIP22.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/18/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

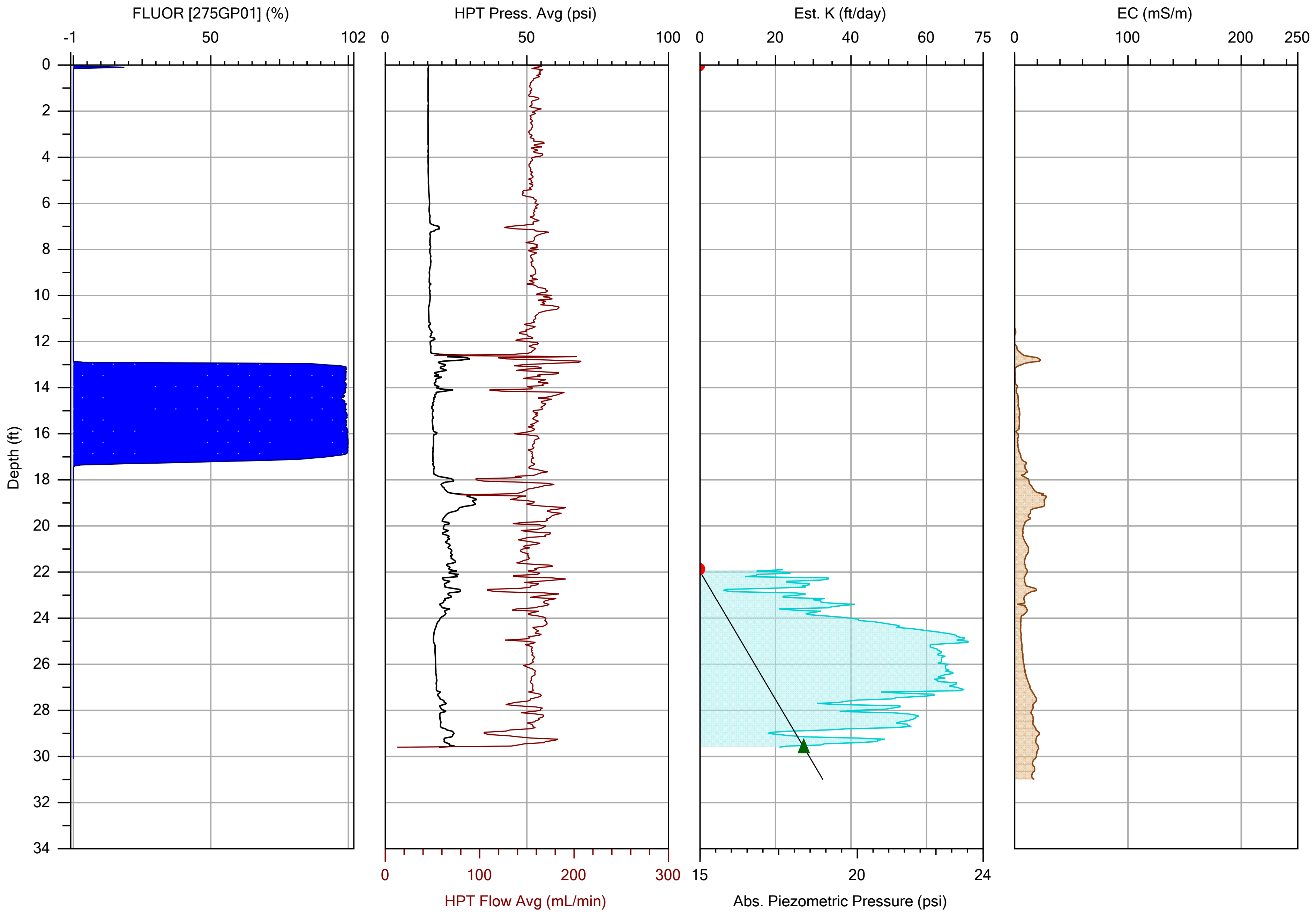


COLUMBIA TECHNOLOGIES

		File: AOPC7-OIP23.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/18/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

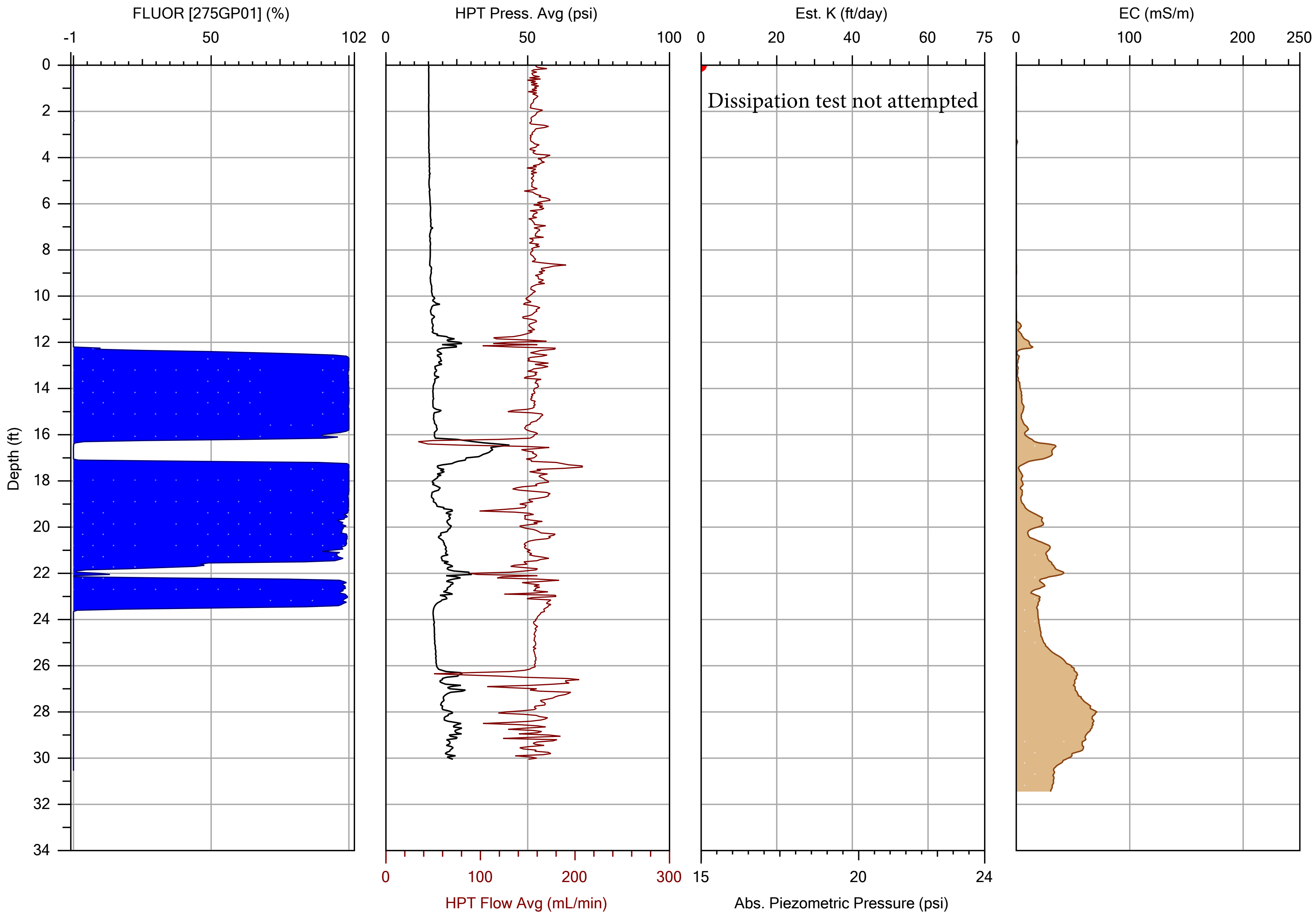


		File: AOPC7-OIP24.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/18/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

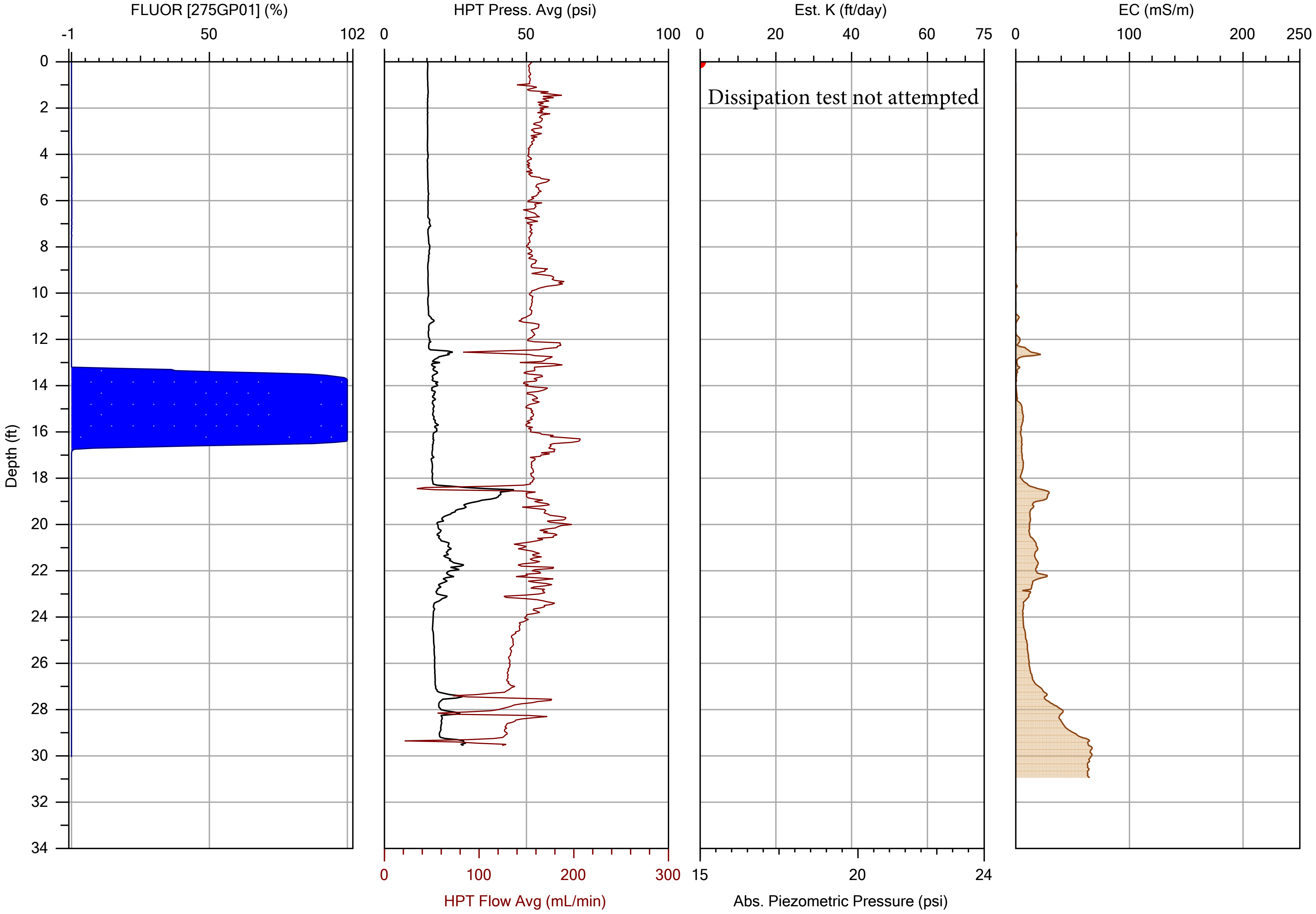


COLUMBIA TECHNOLOGIES

		File: AOPC7-OIP25.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/18/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

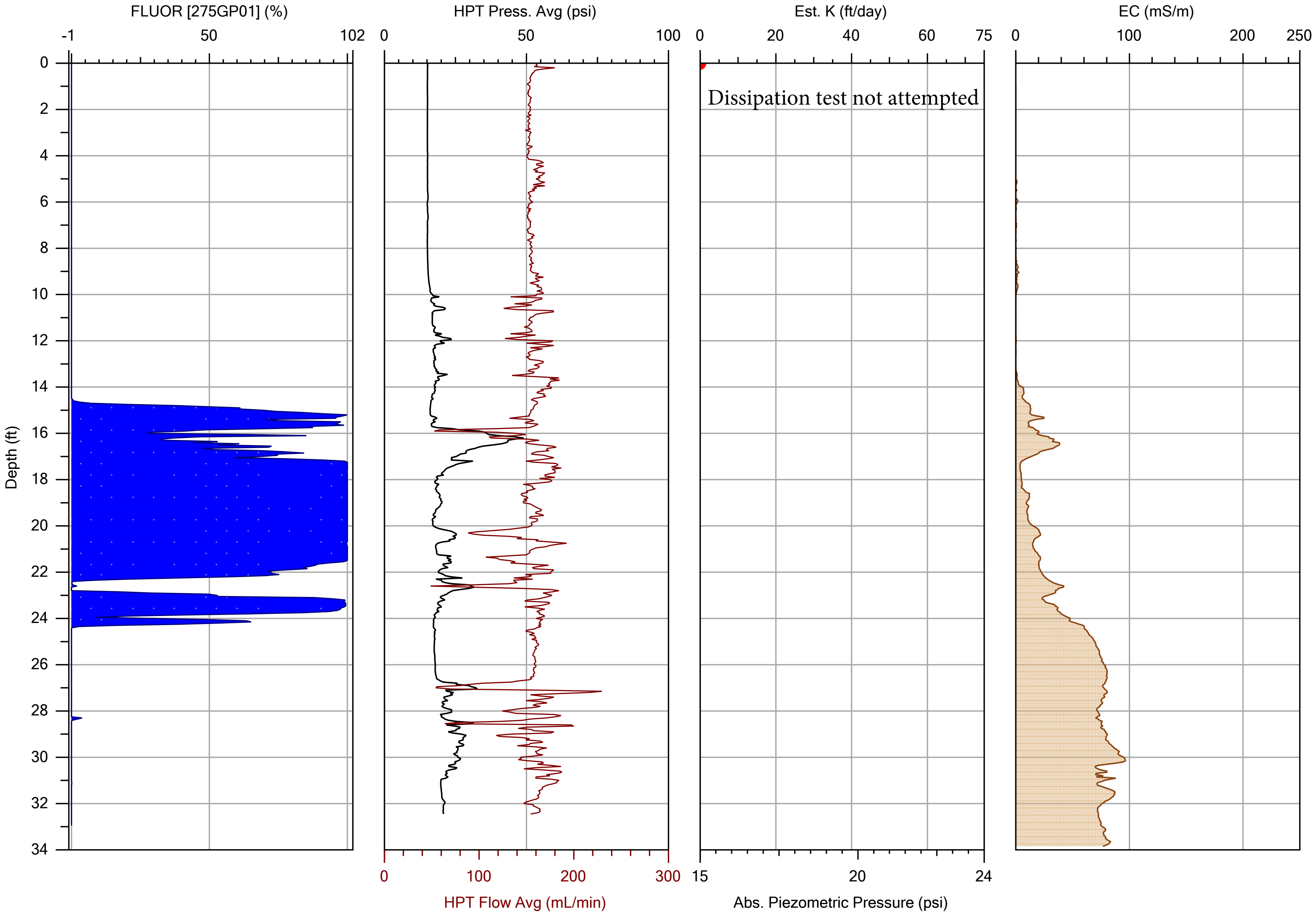


		File: AOPC7-OIP26.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/18/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

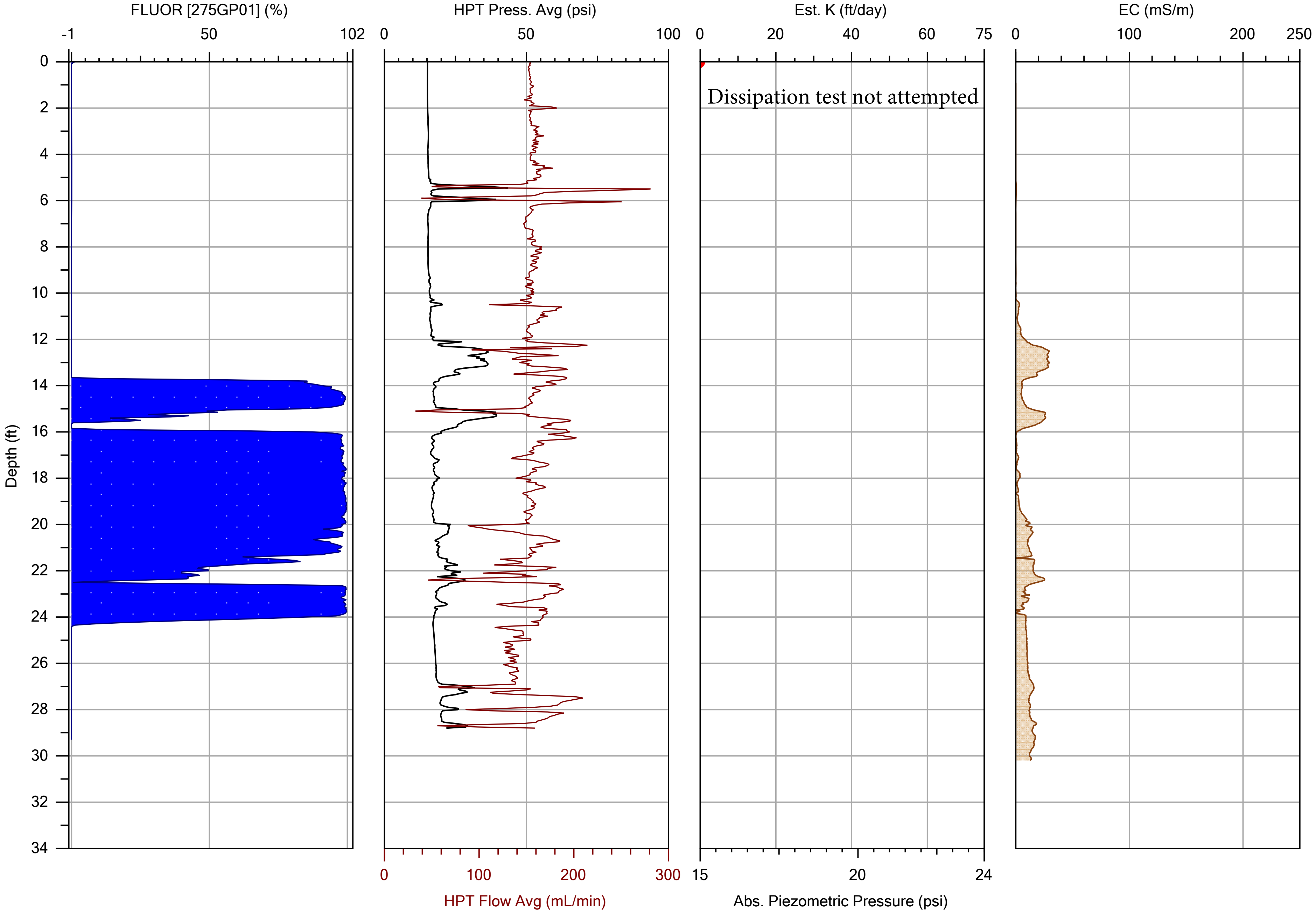


COLUMBIA TECHNOLOGIES

		File: AOPC7-OIP27.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

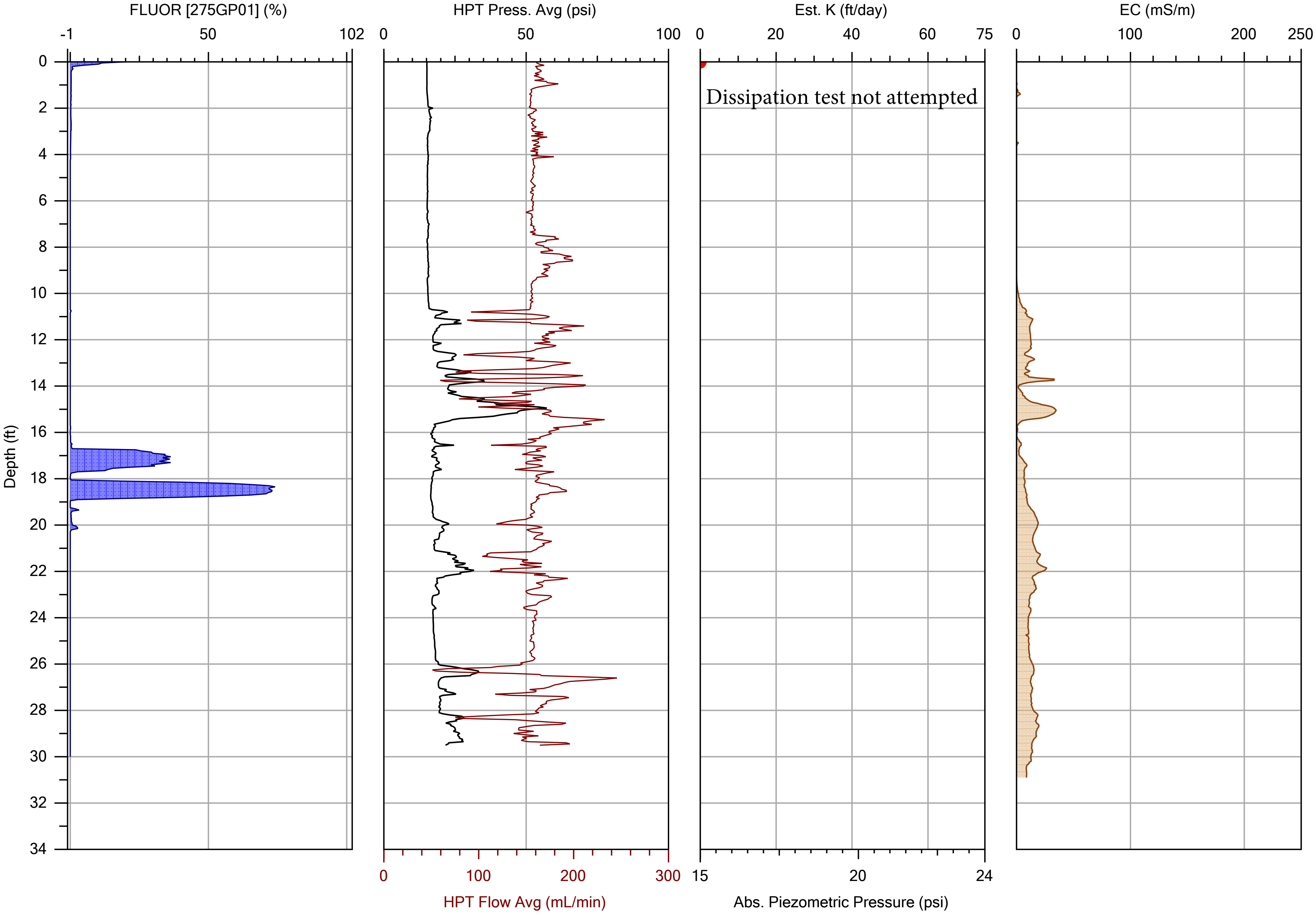


		File: AOPC7-OIP28.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



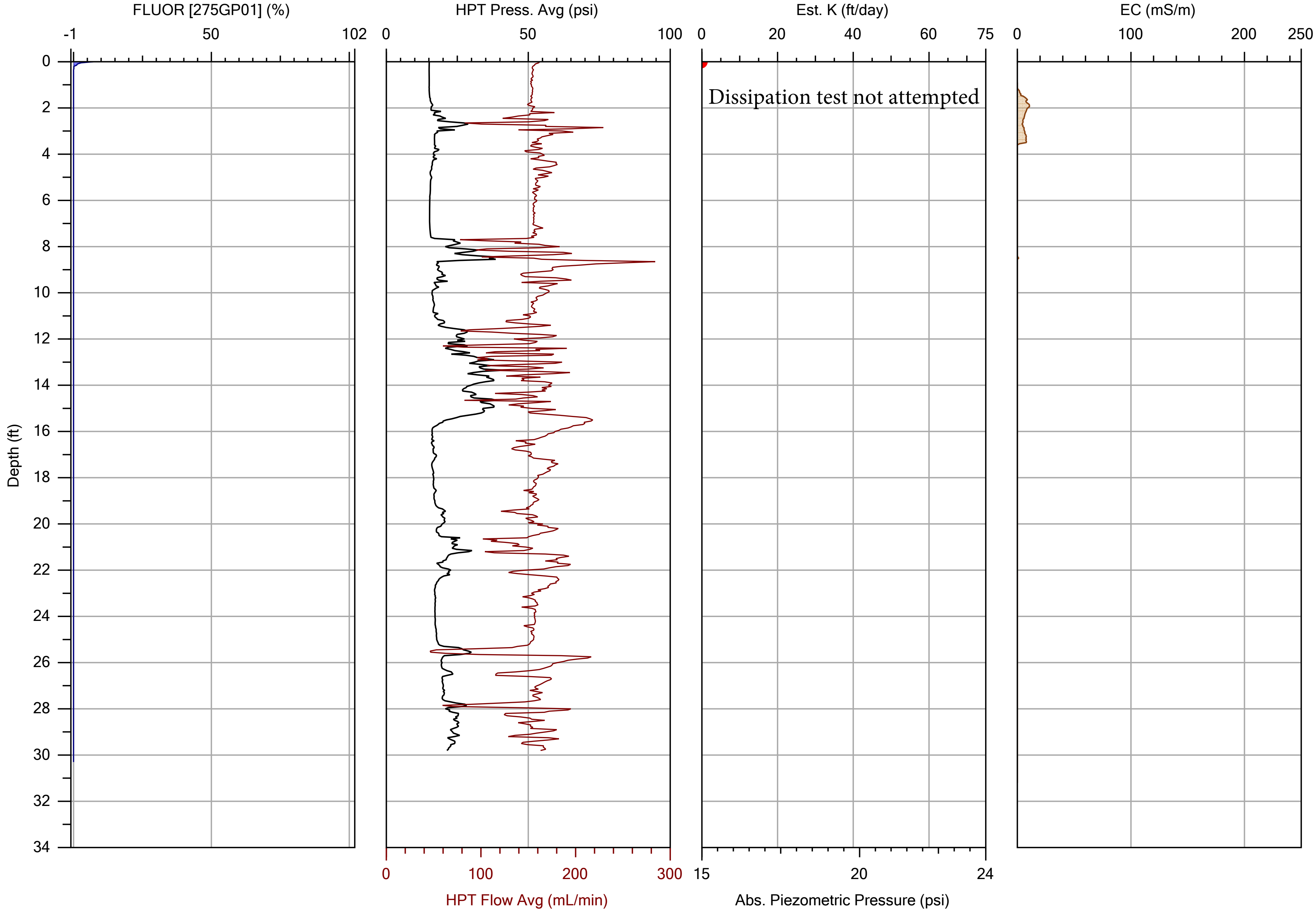
COLUMBIA TECHNOLOGIES

		File: AOPC7-OIP29.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



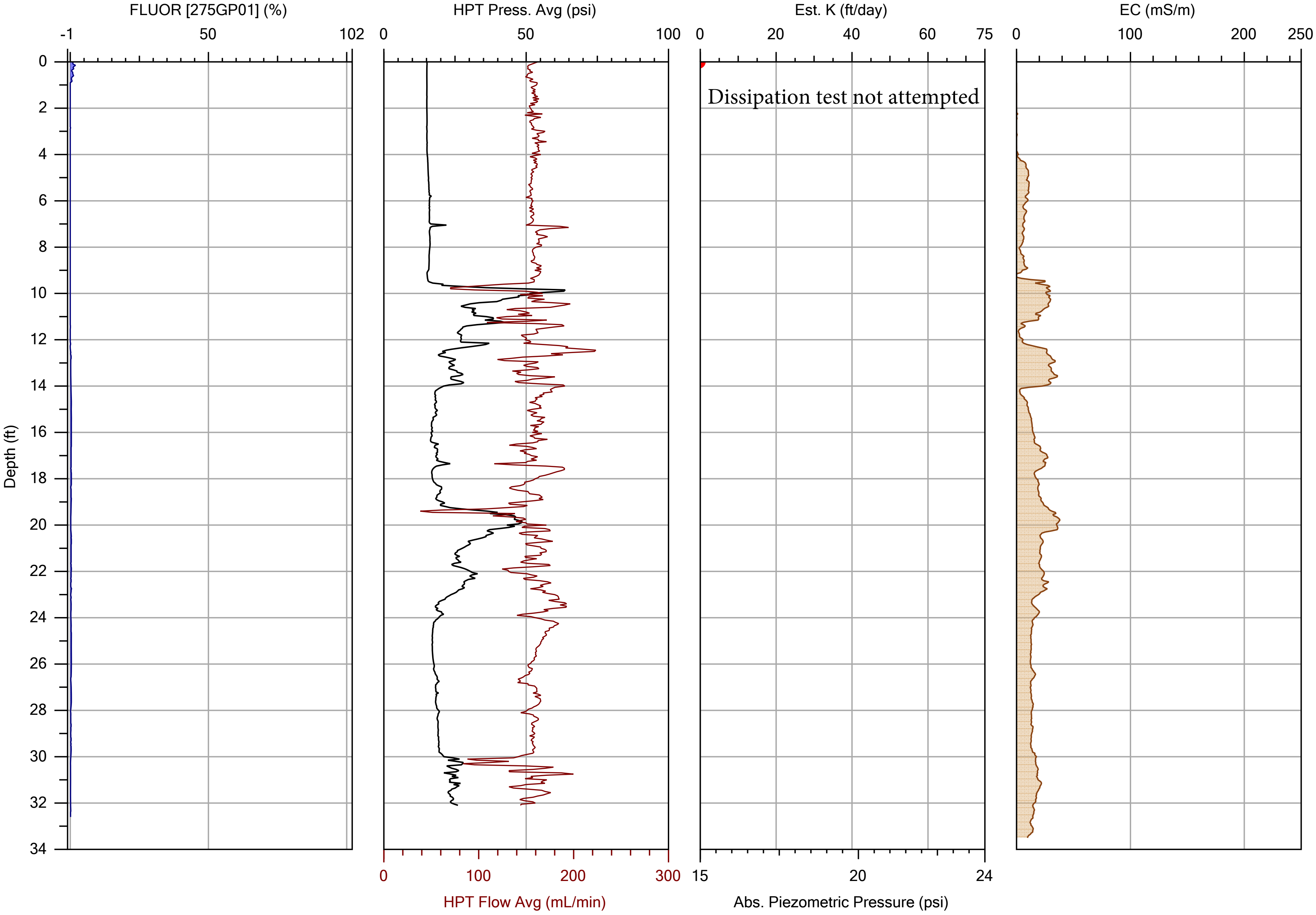
COLUMBIA TECHNOLOGIES

		File: AOPC7-OIP30.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

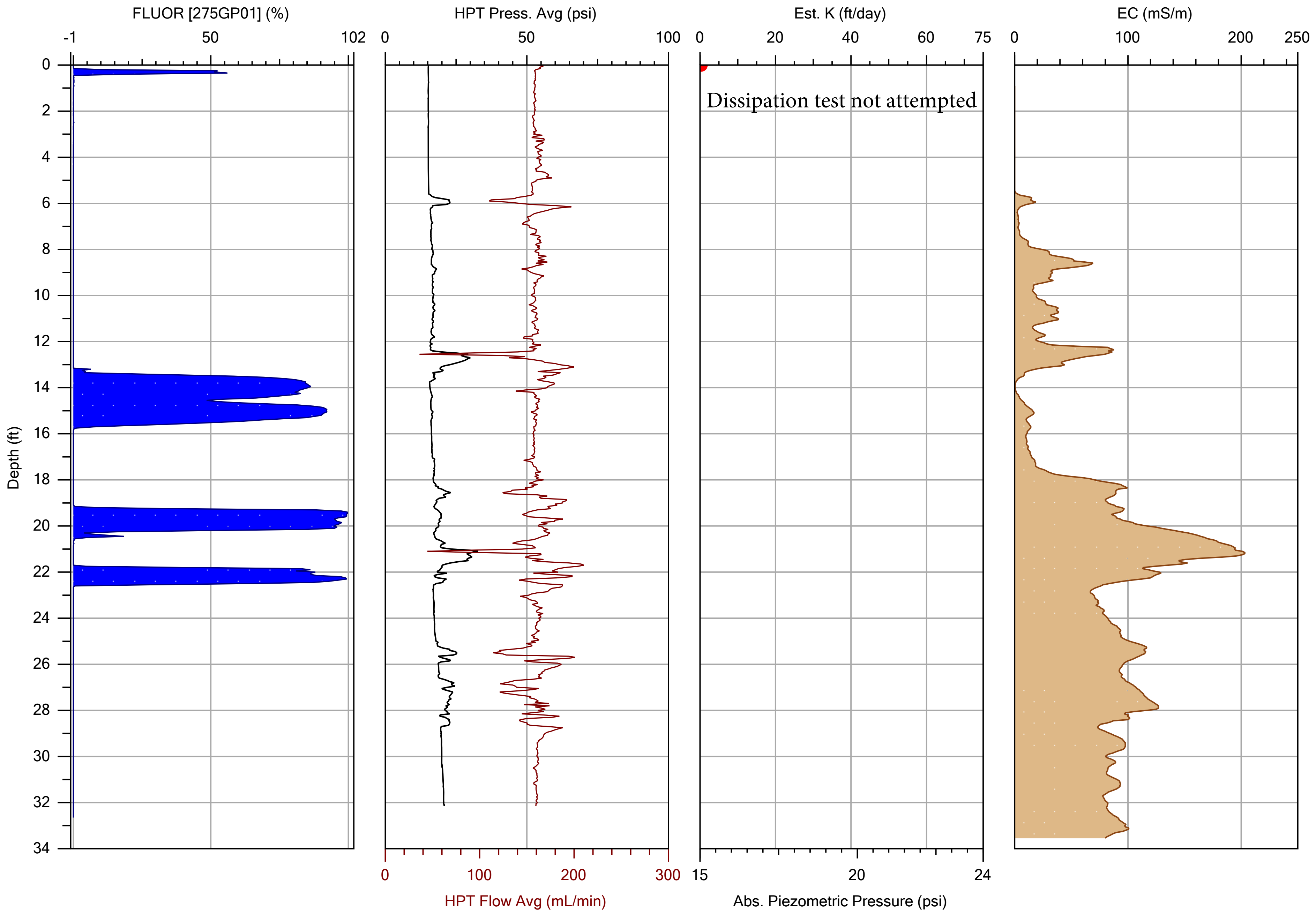


Dissipation test not attempted

		File: AOPC7-OIP31.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



		File: AOPC7-OIP32.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/19/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



Dissipation test not attempted

COLUMBIA TECHNOLOGIES

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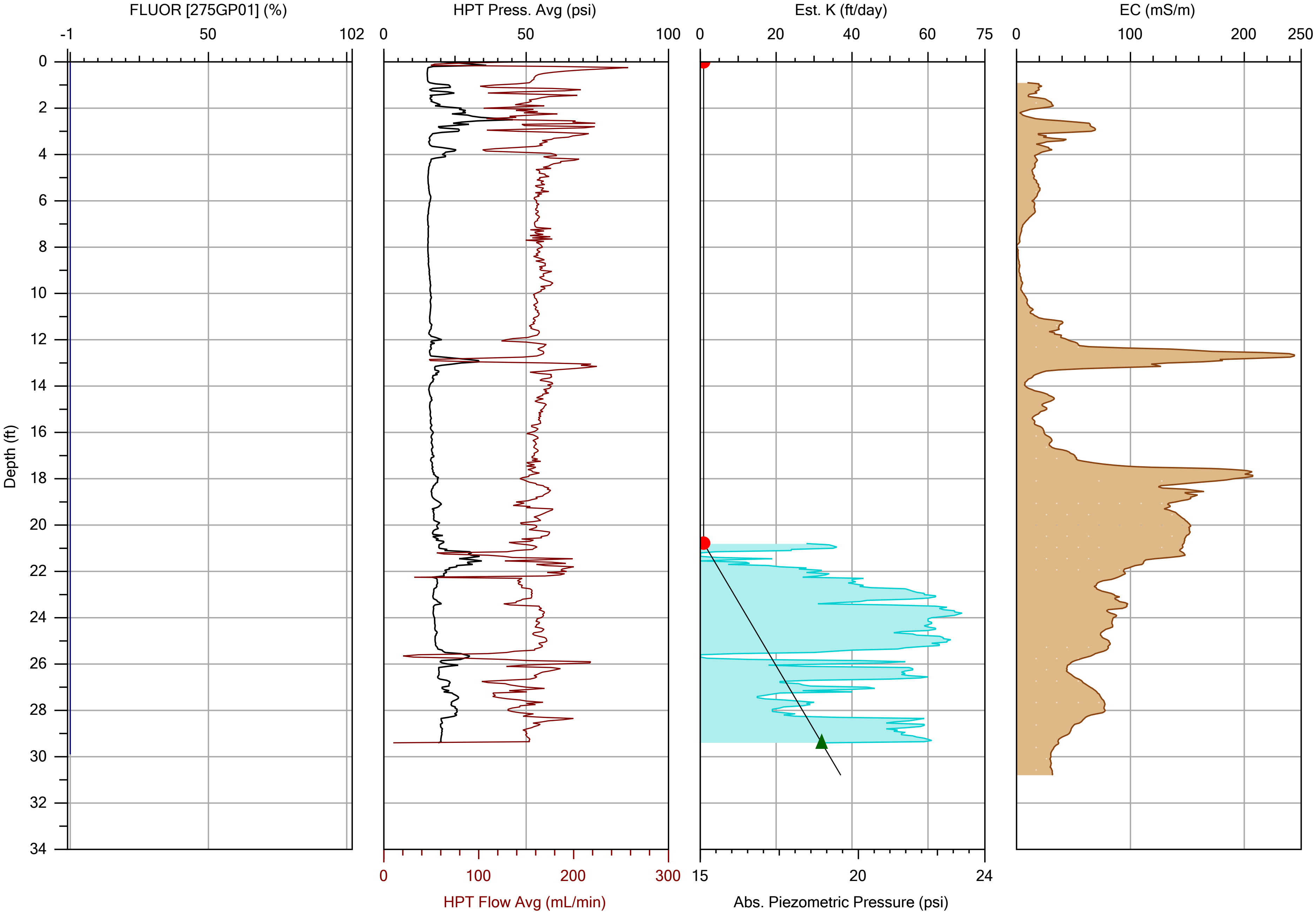
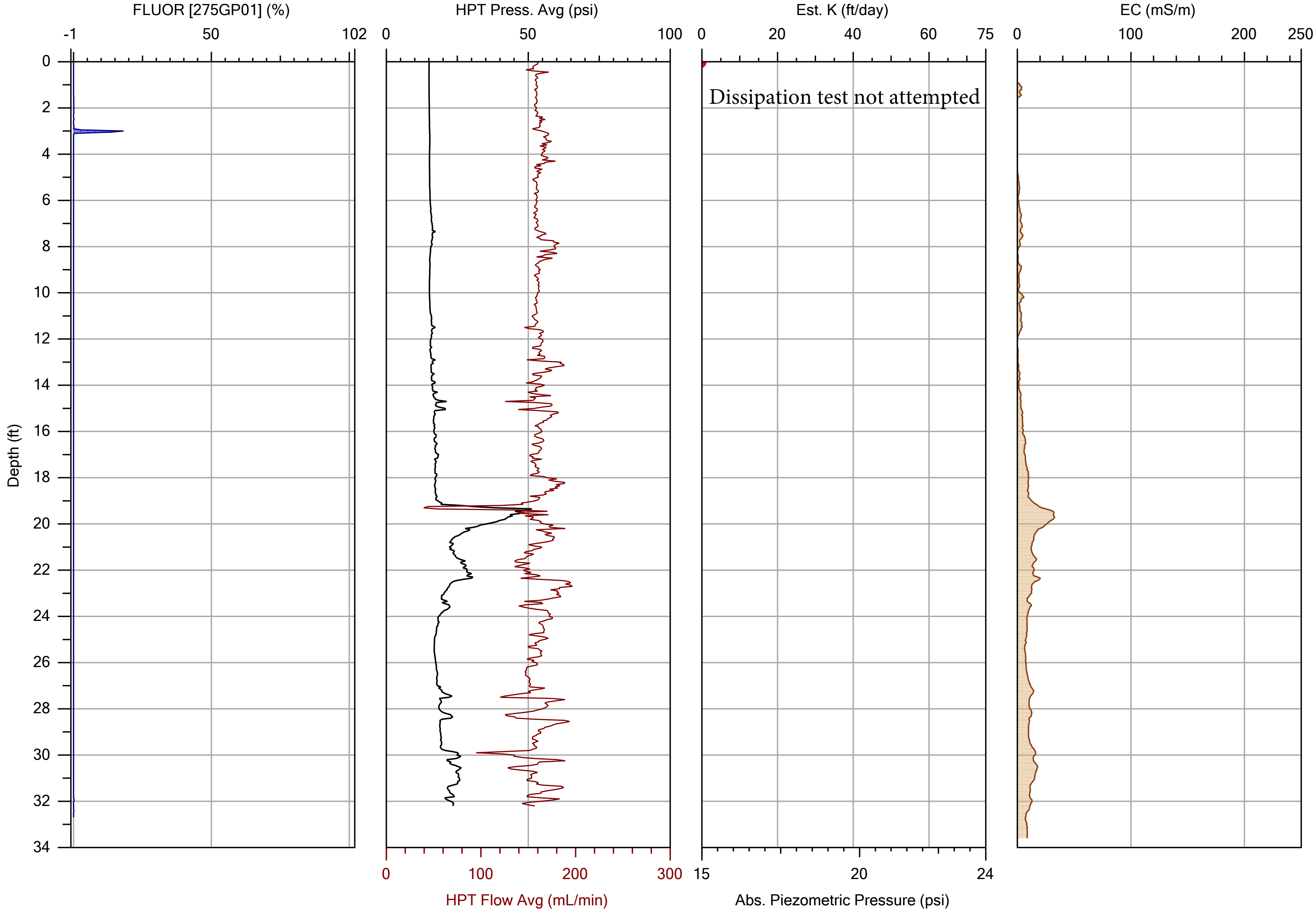
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/21/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



Company: COLUMBIA Technologies	Operator: AJH	File: AOPC7-OIP53.OIHP Date: 11/21/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA
TECHNOLOGIES

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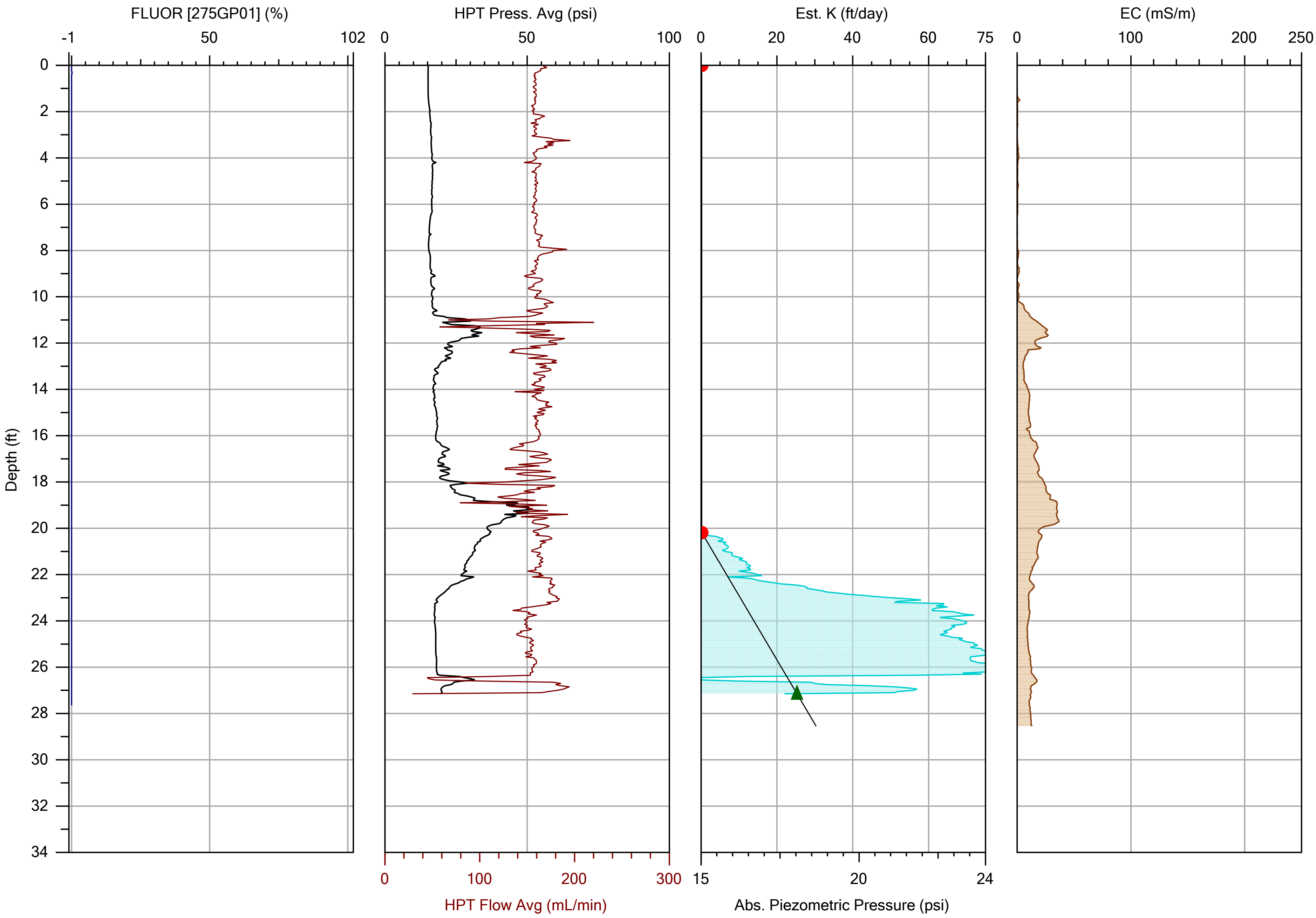
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/21/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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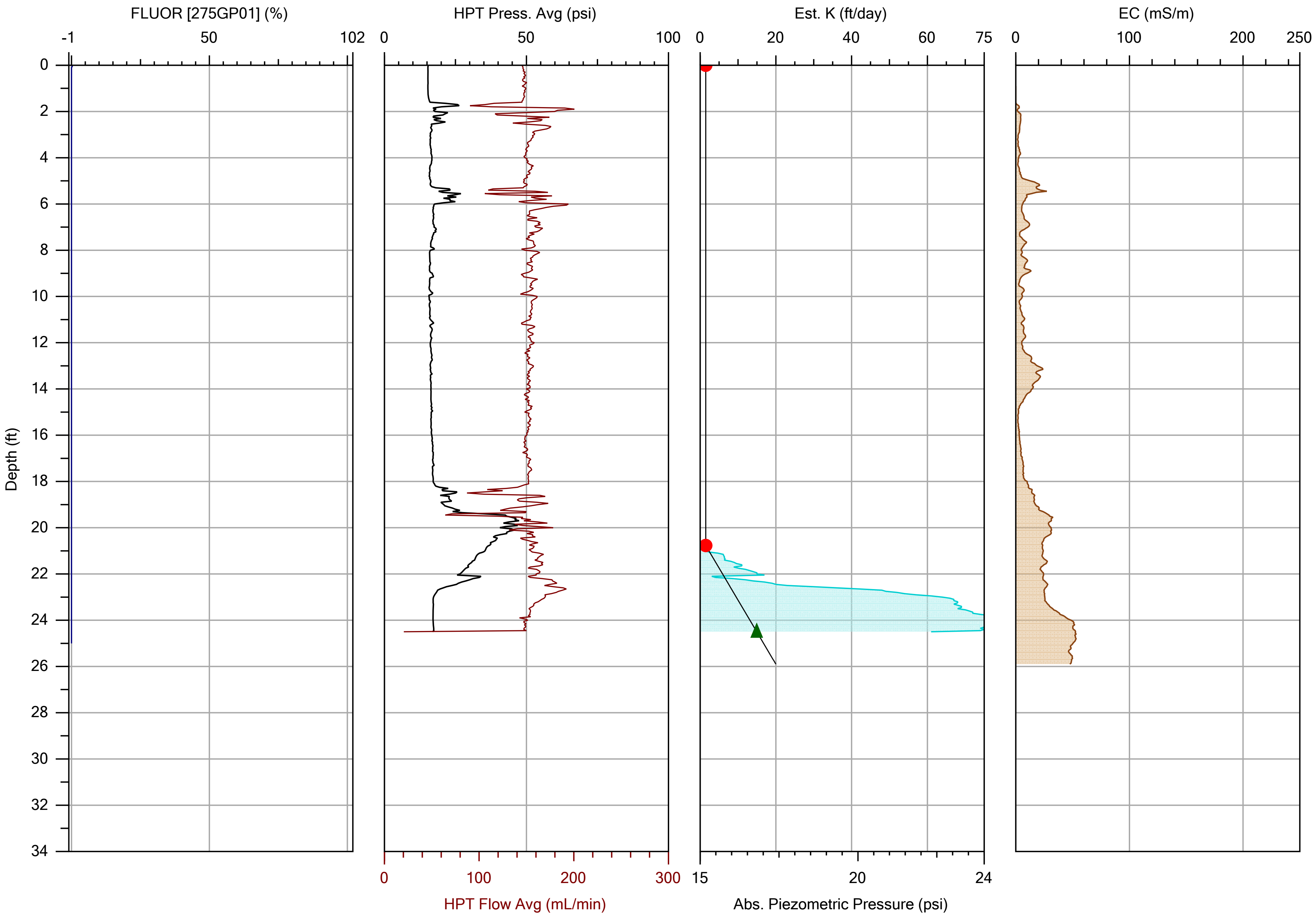
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/21/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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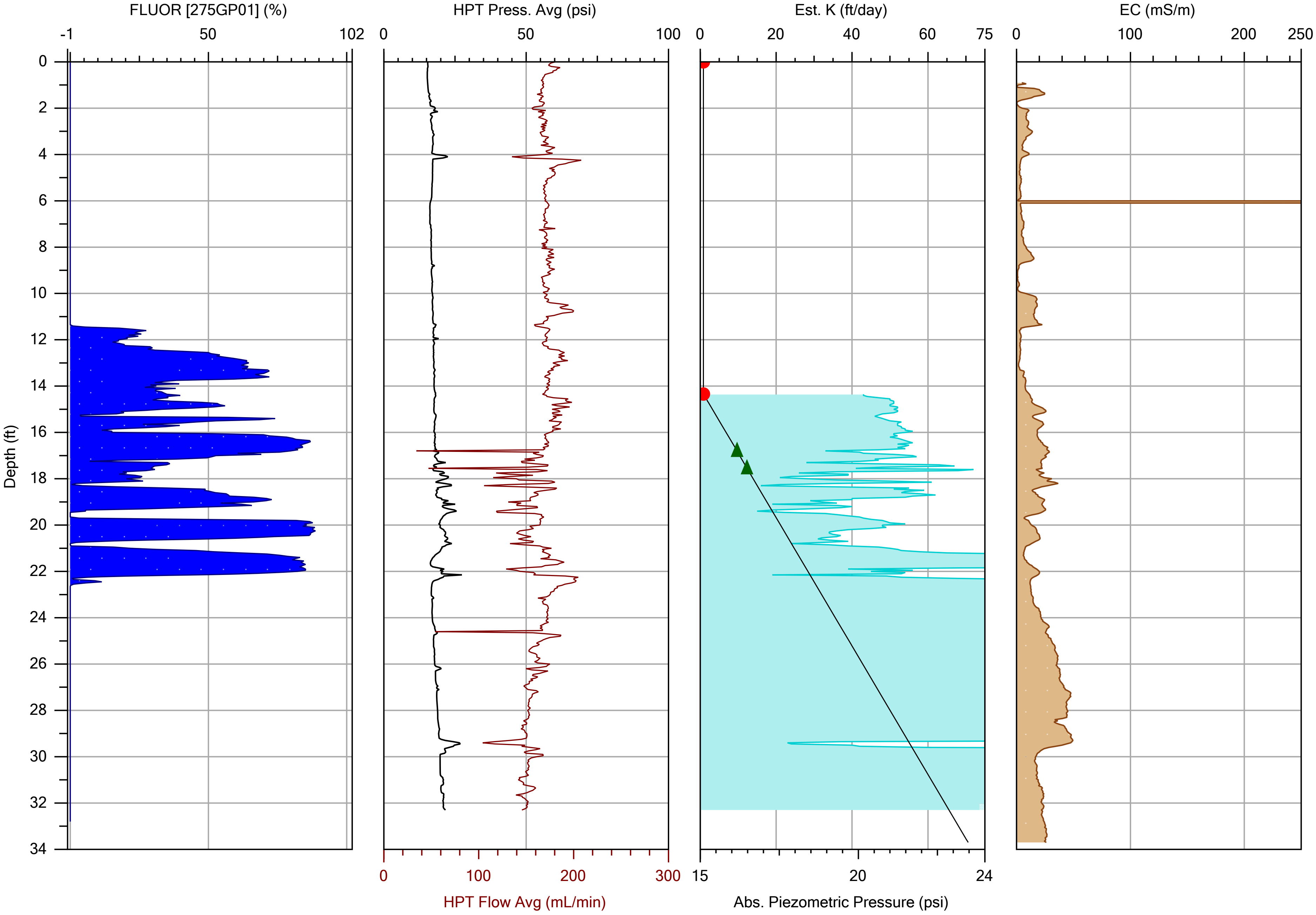
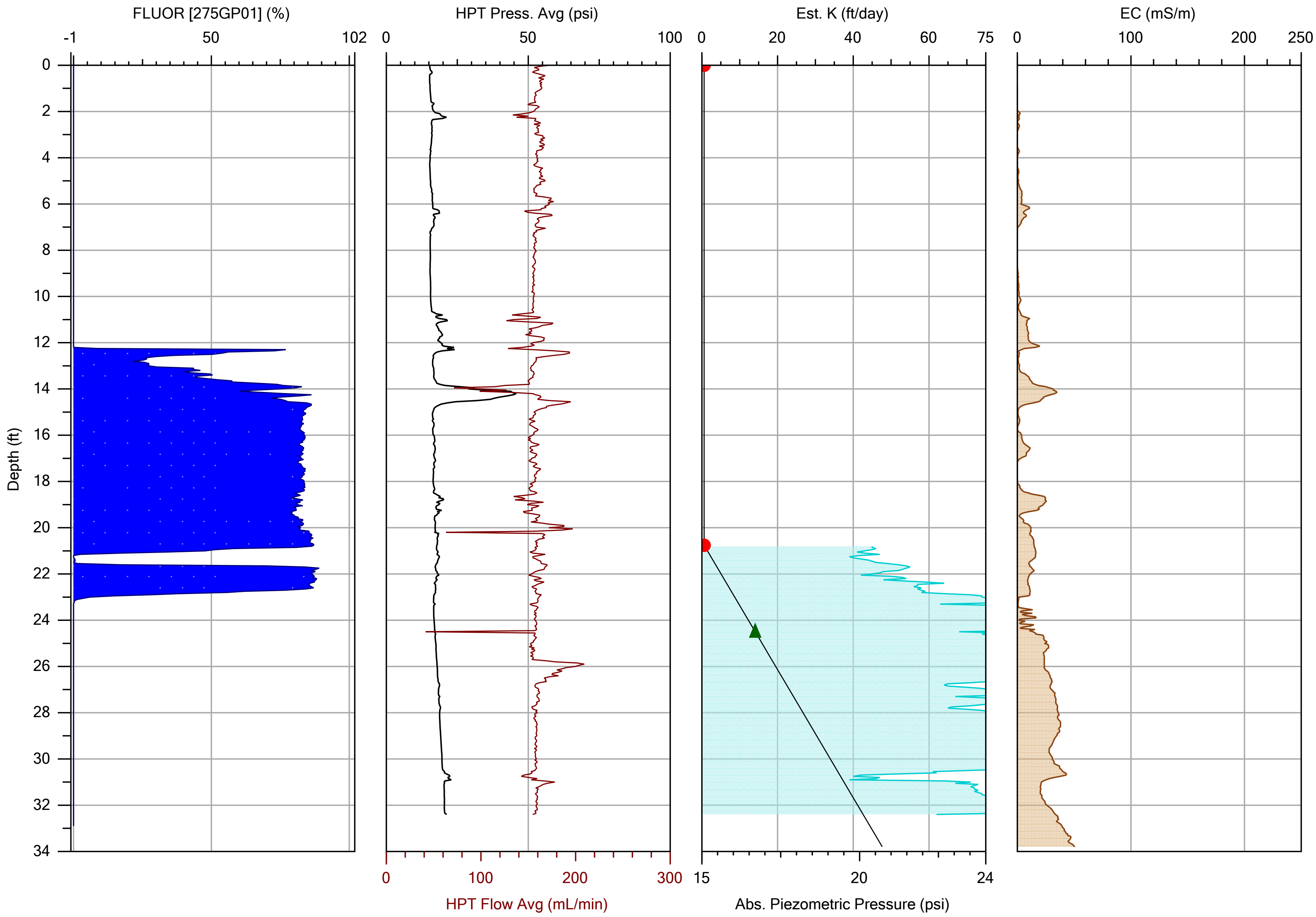
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/22/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

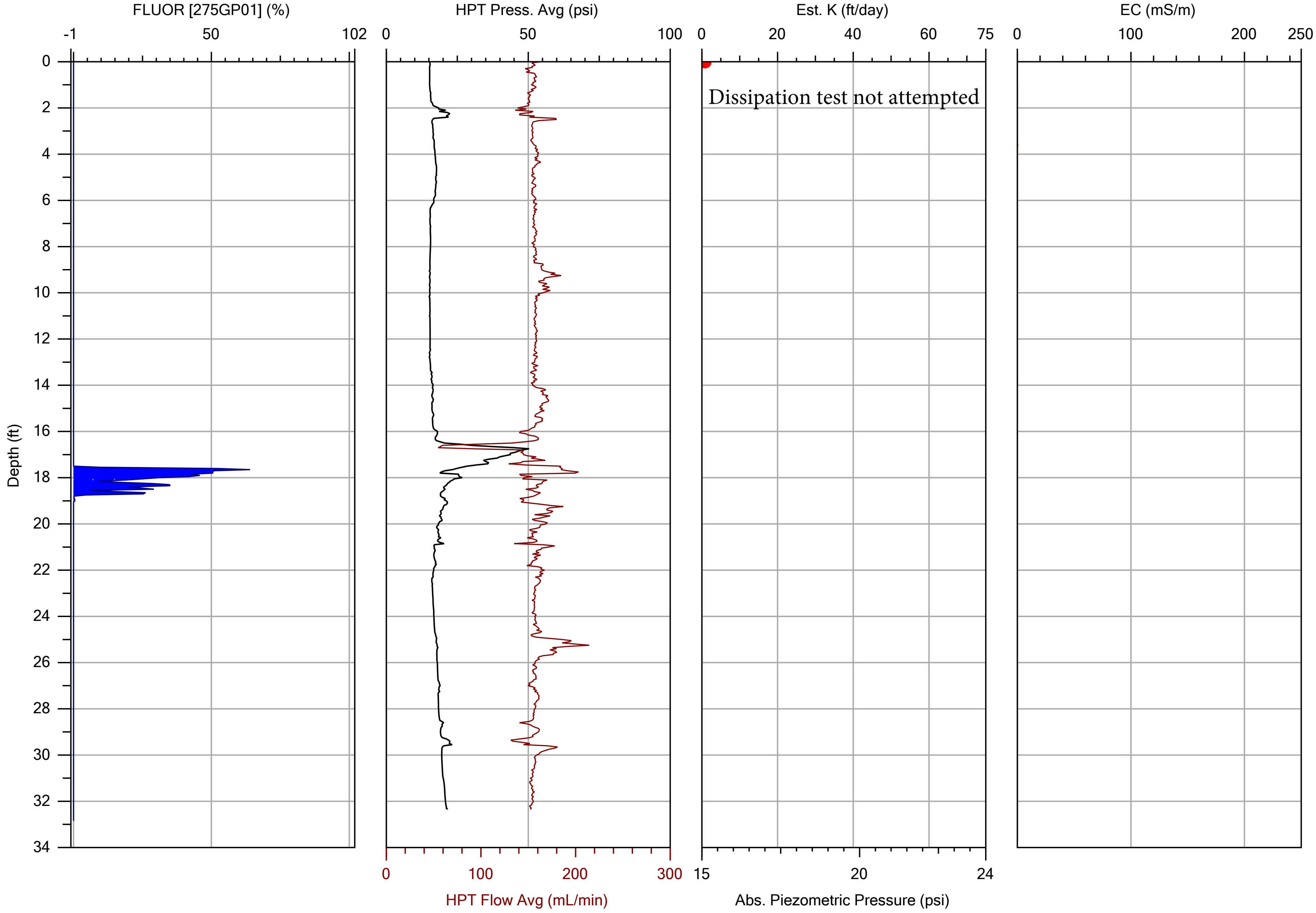


		File: AOPC8-OIP07.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/14/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



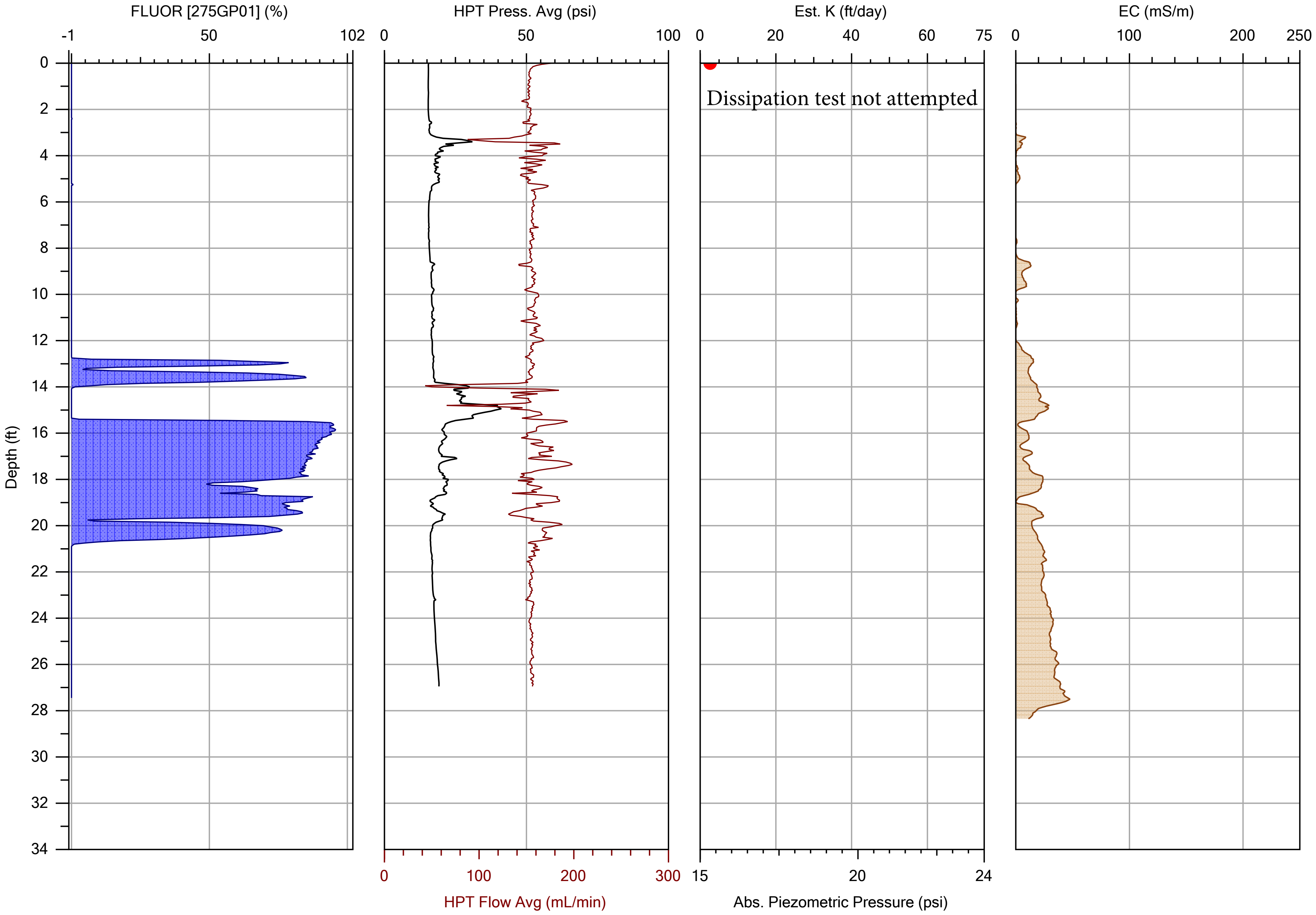
COLUMBIA TECHNOLOGIES

		File: AOPC8-OIP08.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/14/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

		File: AOPC8-OIP09.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/14/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



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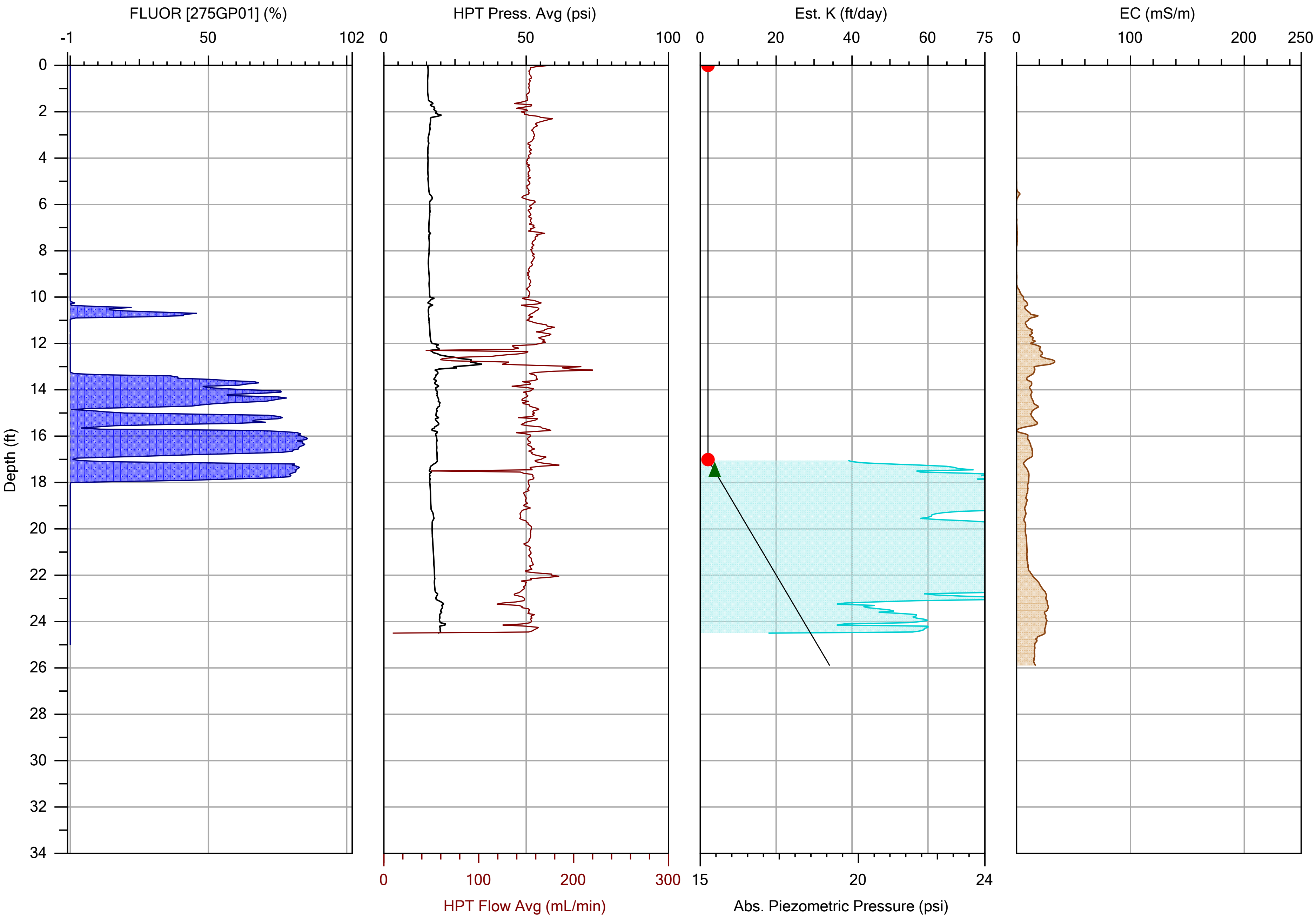
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/14/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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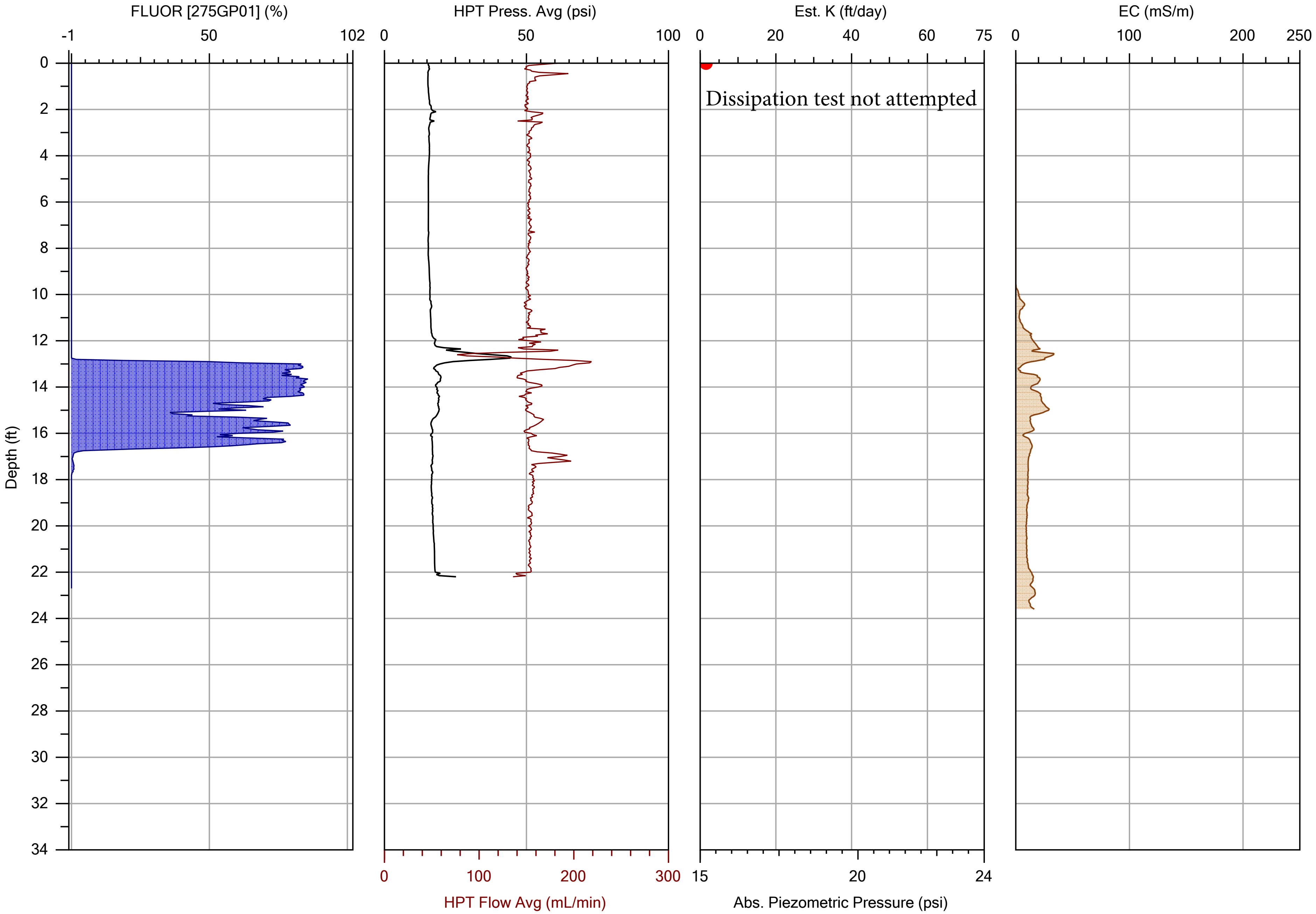
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/14/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



Dissipation test not attempted

COLUMBIA TECHNOLOGIES

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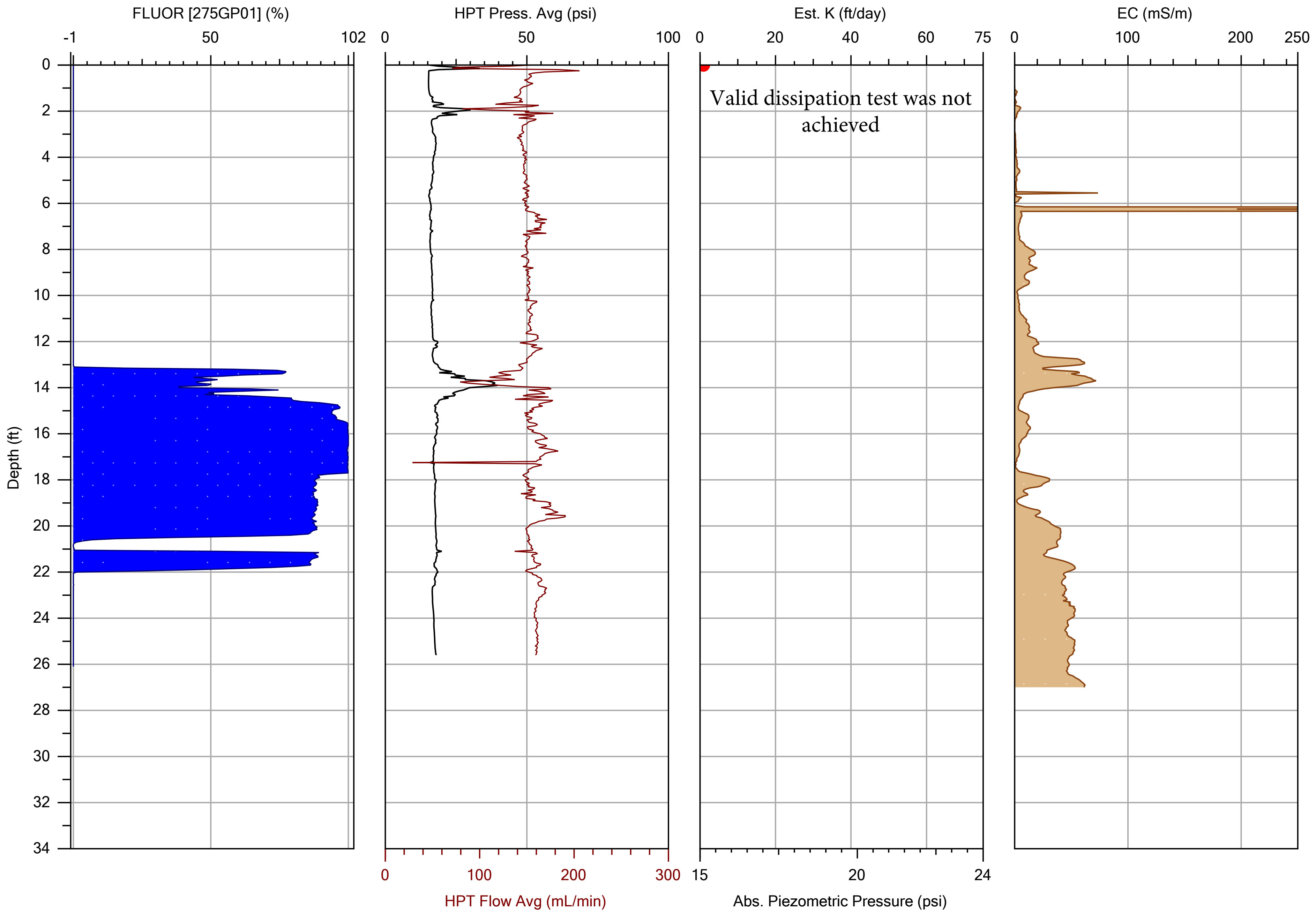
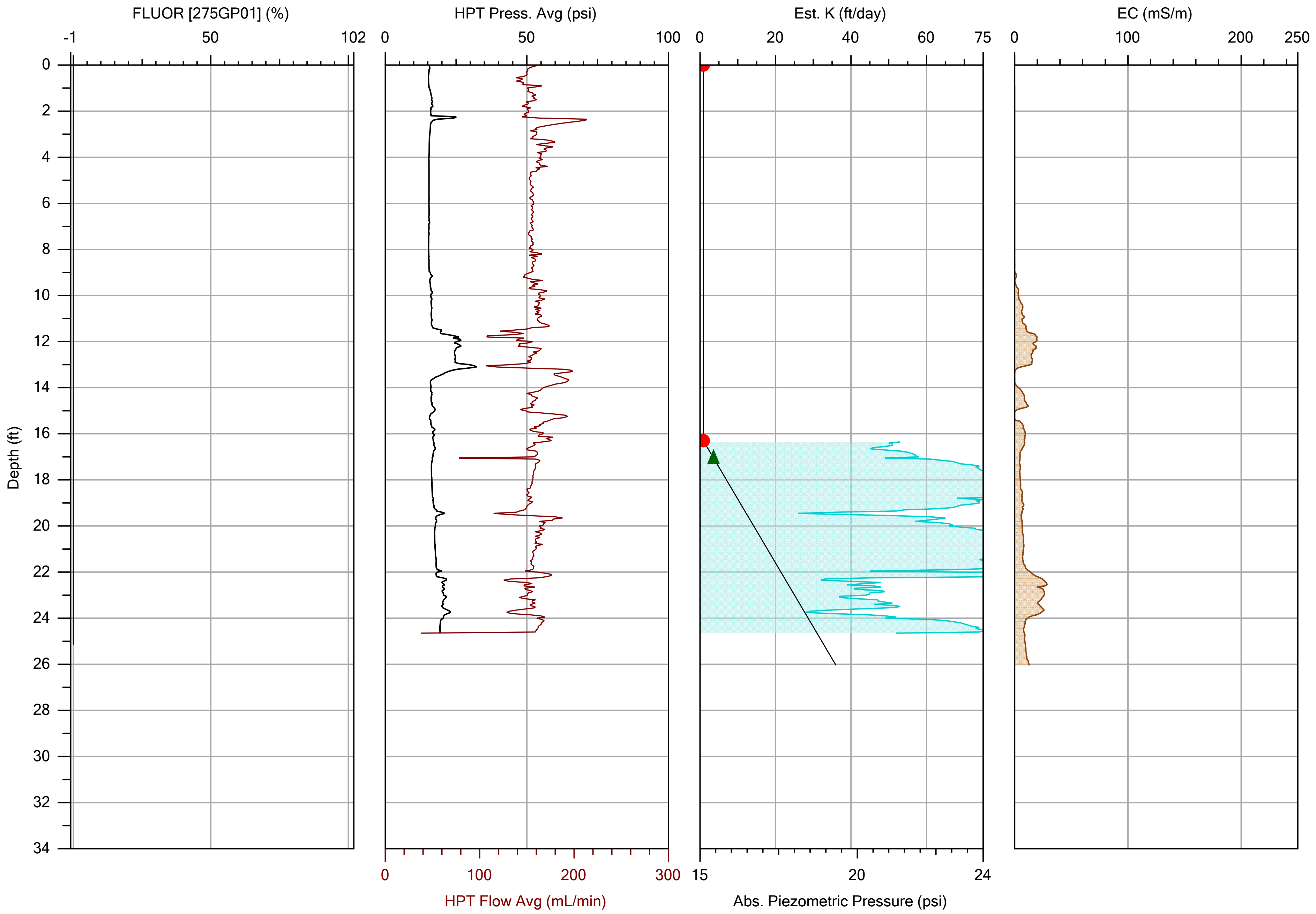
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/14/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



Valid dissipation test was not achieved

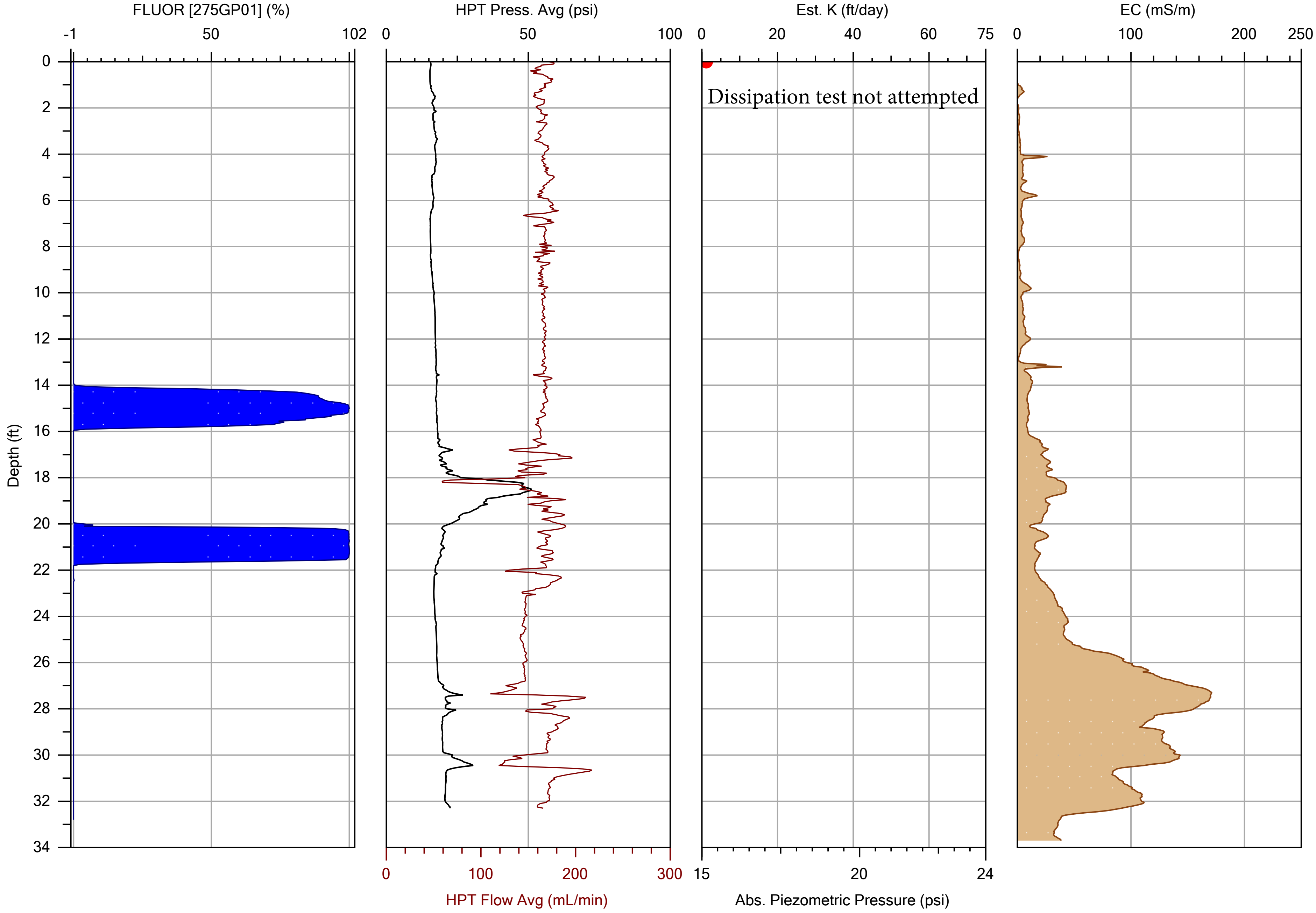
COLUMBIA TECHNOLOGIES

		File: AOPC8-OIP13.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/14/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



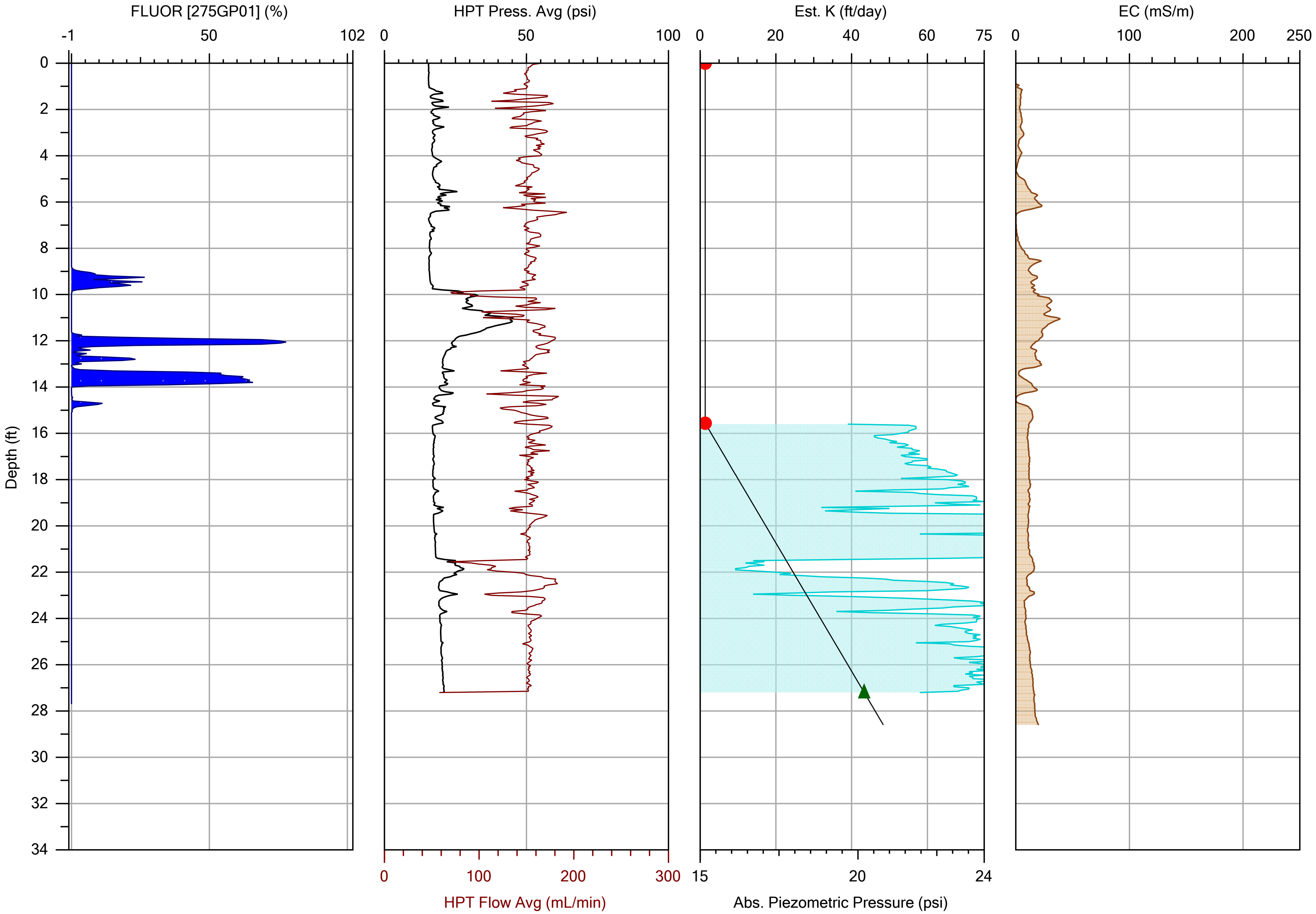
COLUMBIA TECHNOLOGIES

		File: AOPC8-OIP14.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/14/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



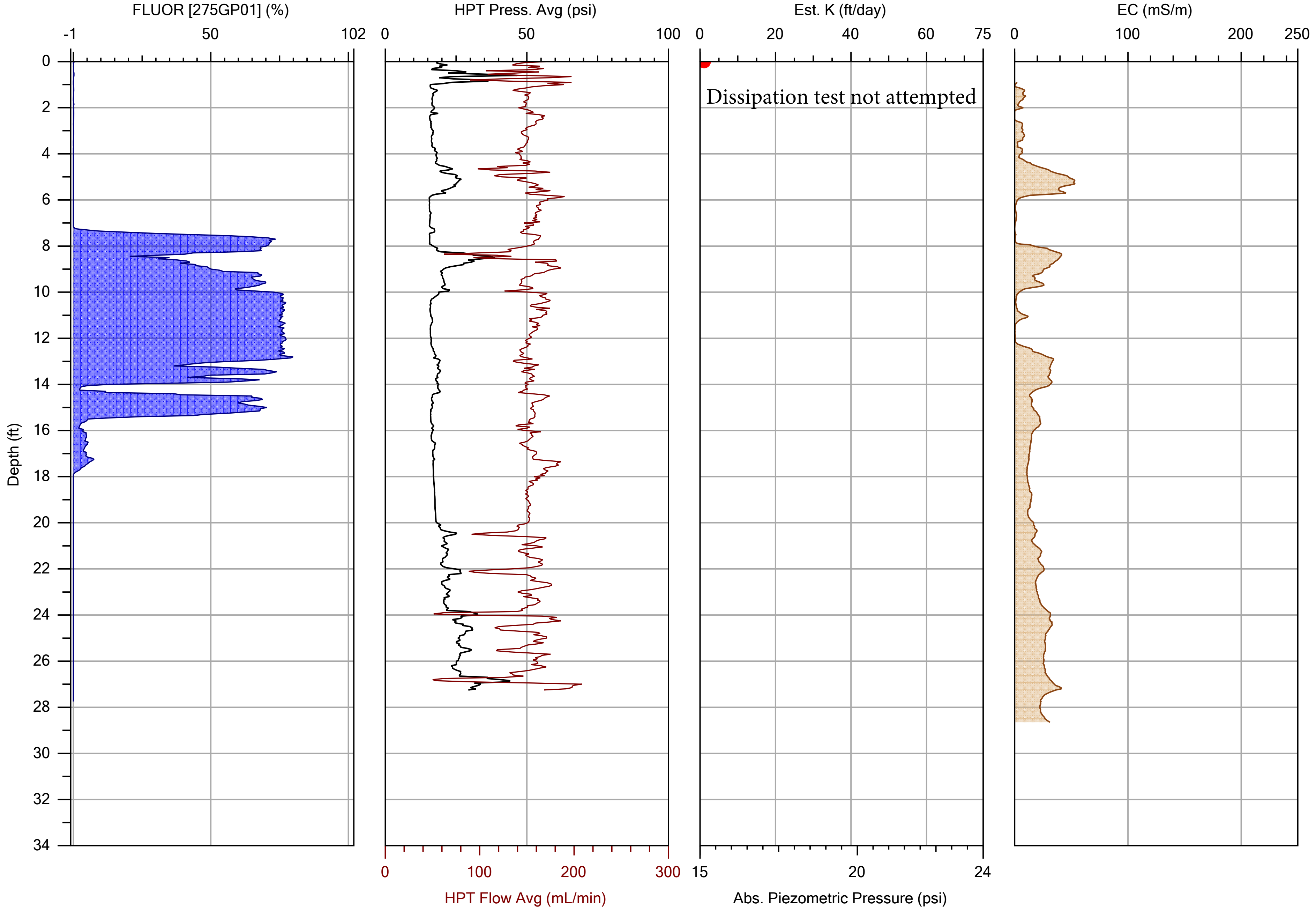
COLUMBIA TECHNOLOGIES

		File: AOPC8-OIP15.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/15/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

		File: AOPC8-OIP66.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/22/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

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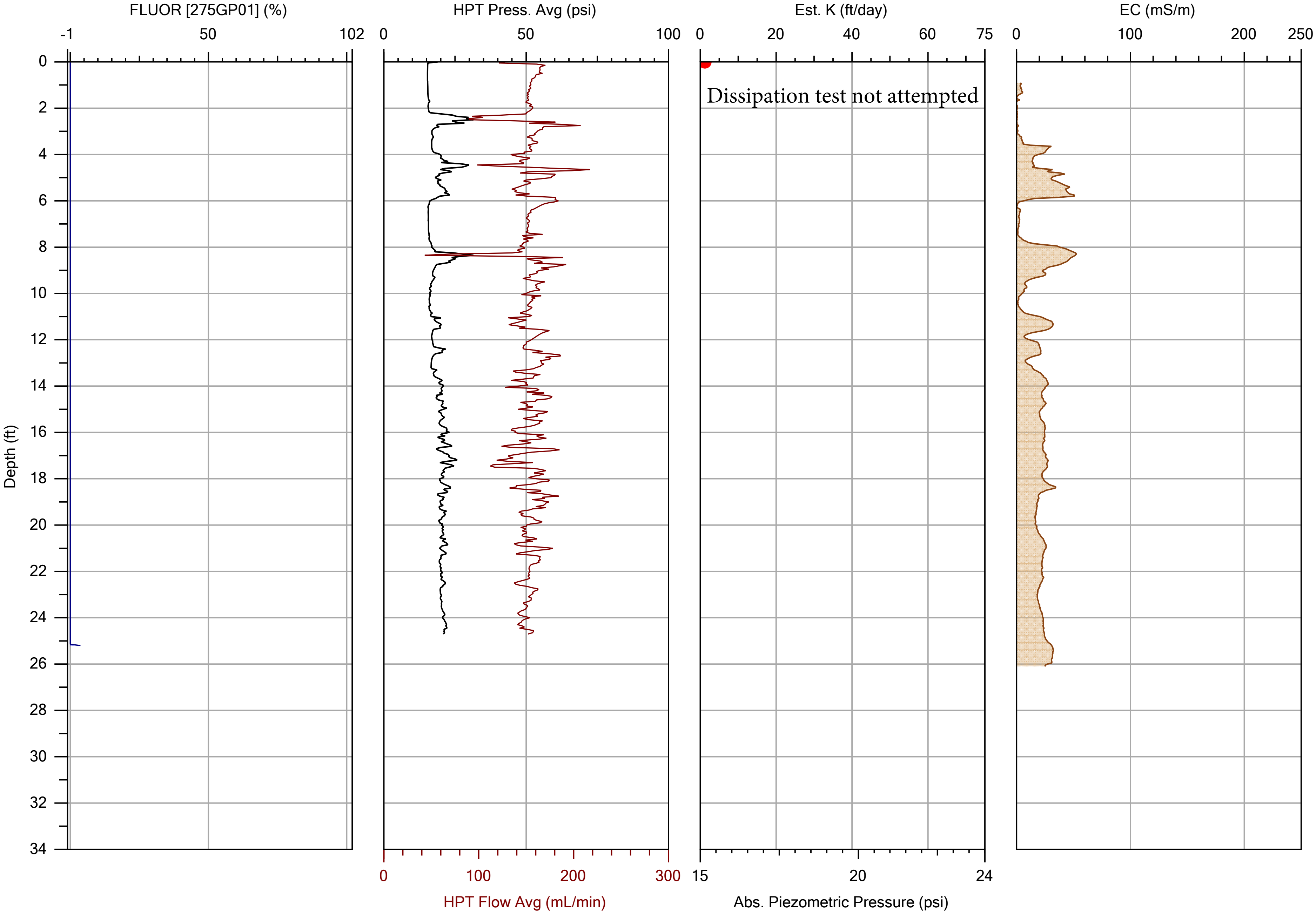
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/22/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA



COLUMBIA TECHNOLOGIES

		File: AOPC8-OIP68.OIHP
Company: COLUMBIA Technologies	Operator: AJH	Date: 11/22/2019
Project ID: Port of Longview	Client: Floyd Snider	Location: Longview, WA

Port of Longview TPH Site

Interim Data Report

Appendix B
Boring Logs, Well and Vapor Point Construction Details, and Surface Sample Logs

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-02
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-2	**DRILL DATE:** 3/11/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 292883.8583	**EASTING:** 1017969.462
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 14.5-19.5

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft.bgs.			
1					
2					
3					
4					
	OL	Dark brown, organic-rich, firm **SILT**; moist; mild odor; no sheen.			
5	CH	Dark brown, silty **CLAY**			OIP-02-5-5.5
6	ML	Gray-brown, sandy **SILT** with wood and grass; mild odor; metallic sheen.		2.3	
7		At 7 ft., becomes wet to saturated (perched); odor dissipates with depth. Interbedded with sandy **SILT** and clayey **SILT**; sheen only on outside of the core.		1.4	
8					
9				1.7	
10				1.5	
11					
12				1.2	
		At 12.5 ft., becomes firm and damp to moist.			
13		At 14 ft., becomes wet to saturated.			
14 ▼				1.1	
		At 14.5 ft., becomes soft and loose.			
15		At 15 ft., mild odor; sheen.			
16				1.1	
17					OIP-02-14-15 OIP-02-GW-14.5-19.5 OIP-02D-GW-14.5-19.5
18	SP	At 18 ft., grades to clean, loose, coarse **SAND**; saturated; no odor; no sheen.		1.1	
19					
20		Boring terminated at 20 ft. bgs.		1.4	

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: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-04**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-2	**DRILL DATE:** 3/10/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292948.9647	**EASTING:** 1017938.189	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 15-20	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0	GW	Hand auger to 5 ft. bgs; **GRAVEL** and cobbles observed during clearing.				
1						
2						
3						
4	SP	Hand auger sample collected from 4 to 5 ft. bgs. Gray, clean, loose, fine **SAND** with trace gravel and cobles; damp to dry; no odor.				OIP-04-4-5
5			■	■		
6			■	■	0.3	
7			■	■		
8		Same as above; no odor.	■		1.2	
9			■			
10			■	■	1.1	
11			■	■		
12	SP/SM	Interbedded clean **SAND** and silty **SAND** to **SAND** with silt; trace organics; moist; no odor.	■	■	1.0	
13			■			
14			■		1.0	
15 ▼		At 15 ft., becomes wet.	■	■		OIP-04-15-16 OIP-04-GW-15-20
16			■	■	1.0	
17			■	■		
18			■	■	0.4	
19		At 19.5 ft., very slight odor; no sheen.	■	■		
20		Boring terminated at 20 ft. bgs.			2.4	

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

NOTES:

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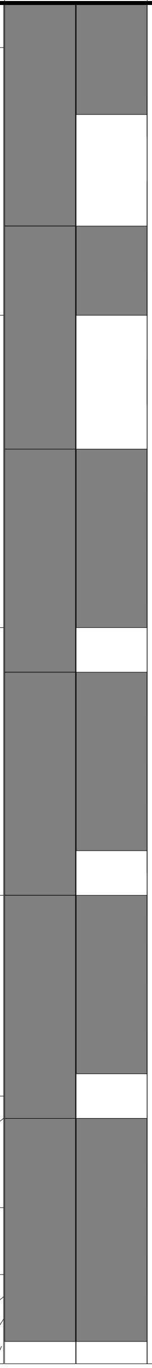
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-05**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-1	**DRILL DATE:** 3/12/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 291921.5893	**EASTING:** 1017503.128	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 30.5	**DEPTH TO WATER (ft bgs):** 29	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.		
	SW	Brown, loose, **SAND** with gravel; dry; no odor.		
2			1.7	
4			1.7	
6			1.6	
	SP	AT 7 ft., 6 inch layer of dark brown to black **SAND** with vitreous sand grains; no odor. Same as above below.		
8			1.3	
10			1.8	
12			1.6	
14		At 14 ft., becomes lighter in color.		
			1.6	
16				
			1.7	
18				
			1.6	
20		Same as above.	1.0	
			1.7	
22				
			1.9	
24				
		At 24.5 ft., becomes moist.		
		From 25 to 27 ft., potentially slough due to dryness.	1.9	
26			1.4	
		Brown, loose **SAND** with trace gravel; moist; no odor.		OIP-05-27-28
28			1.0	
	SP/ML	At 28.5 ft., becomes gray with lenses of silt and wood; dense; no odor.		
▼	SM	At 29 ft., becomes saturated.		OIP-05-28-29
	SP	Gray, medium **SAND**; dense; wet; no odor.		
30		Boring terminated at 30 ft. bgs.	0.9	



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

NOTES:

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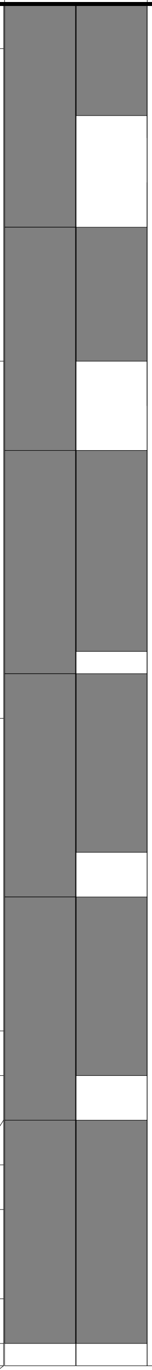
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-06	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-1	**DRILL DATE:** 3/13/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 291947.8346	**EASTING:** 1017471.699	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 30.5	**DEPTH TO WATER (ft bgs):** 25	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 25-30	



Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.			
		Gray/brown, loose, fine to coarse **SAND** with gravel; dry; no odor.			
2				0.9	
4				1.0	
6				1.2	
8		Same as above; no odor.		1.3	
10				2.5	
12	SW			1.0	
14				0.9	
16		At 16 ft., begins to fine with 5-10% gravel and coarse sand; dry; no odor.		1.0	
18				1.1	
20				1.4	
				1.6	
22					
	SP	Brown, poorly-graded, medium **SAND**; dry; no odor.		1.3	
24		Brown, well-graded **SAND** with <10% gravel; moist to wet; no odor; no sheen.			
▼		At 25 ft., becomes gray and saturated; no odor; no sheen.		1.2	
26	SW/SM	Brown, well-graded **SAND** with gravel; dry; no odor; no sheen.			
	SW	At 27 ft., becomes dense.		0.9	OIP-06-GW-25-30 OIP-06-27-28 OIP-06-29-30
28					
	SP/SM	At 29 ft., becomes gray with variable silt; wet; no odor.		1.5	
30		Boring terminated at 30 ft. bgs.			

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-08**
	LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC8	DRILL DATE: **11/22/19**
DRILLED BY: **HOLT (Mike)**		NORTHING: **292919**	EASTING: **1017662.15**
DRILLING EQUIPMENT: **Limited Access Drill Rig**		COORDINATE SYSTEM: **NAD 83 WA SP S**	
DRILLING METHOD: **Geoprobe**		TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **21**
SAMPLING METHOD: **5' Liners**		BORING DIAMETER: **2 inch**	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0	Fill	Subangular gravelly **FILL**	▨	▨		
	SP	Brown, fine **SAND**; no odor.	▨	▨		
2			▨	▨	0.9	
4			▨		1.0	
		Same as above; no odor; no sheen.	▨			
6			▨	▨	1.0	
8		At 8 ft., becomes medium to fine grained **SAND**.	▨	▨	0.0	
10			▨	▨	0.5	
12			▨	▨	1.0	
	SM	Silty **SAND**; very slight sheen; no odor.	▨			
14	ML	Low plasticity **SILT**; mild odor; no sheen.	▨		0.5	
	SP	Poorly graded **SAND**; with moderate odor; heavy rainbow sheen and droplets.	▨			
16			▨	▨	1723.0	
		At 16.5 ft., moderate sheen.	▨	▨		
18			▨		1985.0	
			▨			OIP08-19-20-112219
20			▨	▨	2260.0	
▼	ML	Olive gray, sandy **SILT**; strong odor; moderate sheen.	▨	▨		
22			▨	▨	2519.0	
	SP	Poorly graded **SAND**; slight sheen; mild odor.	▨			
24			▨		109.6	
		Bottom of Boring = 25 ft. bgs				

ABBREVIATIONS:

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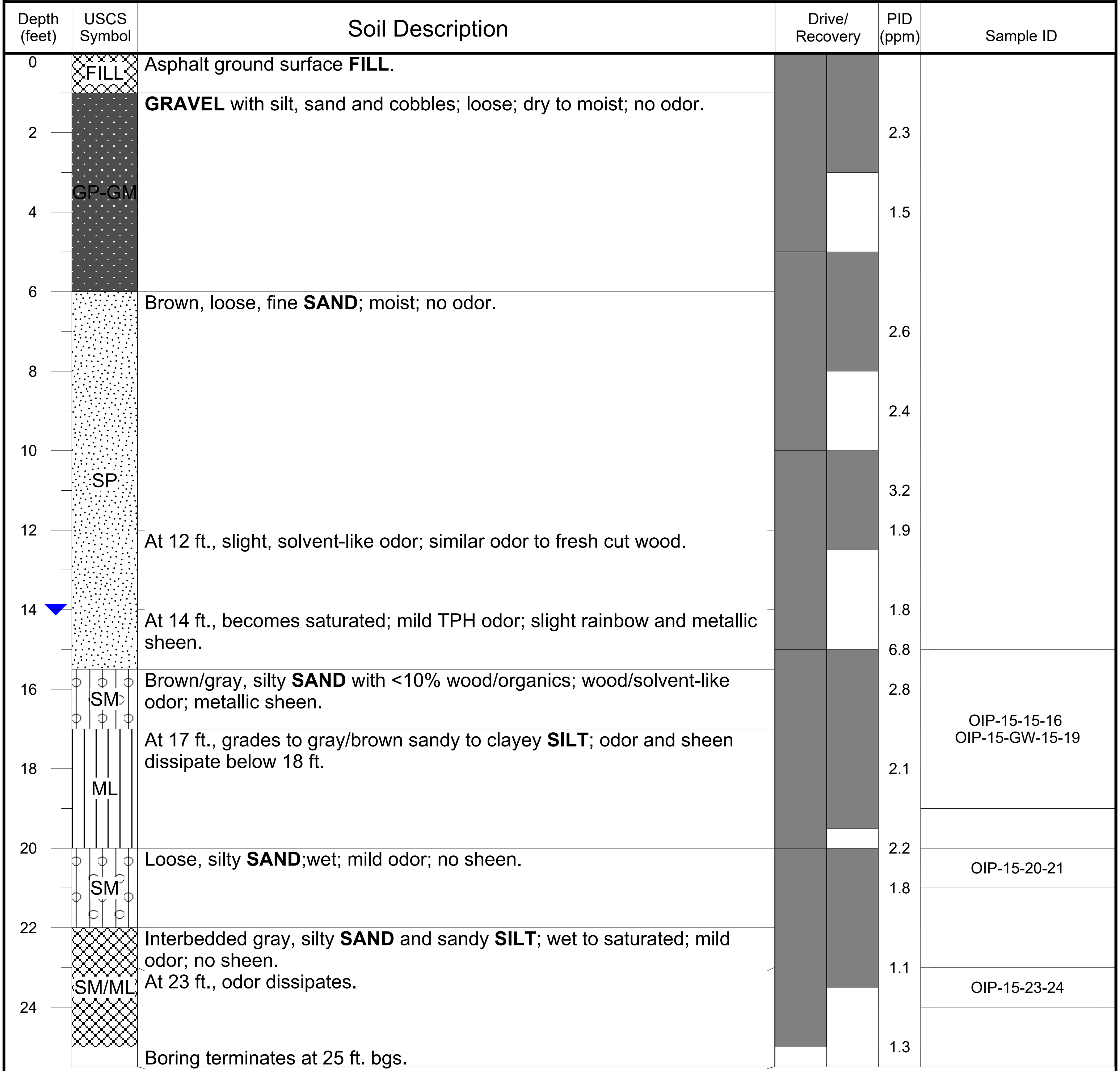
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-15	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/12/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292869.4791	**EASTING:** 1017593.993	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 19	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 14-19	



Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.		
1	GP-GM	**GRAVEL** with silt, sand and cobbles; loose; dry to moist; no odor.		
2			2.3	
4			1.5	
6	SP	Brown, loose, fine **SAND**; moist; no odor.		
7			2.6	
9			2.4	
11			3.2	
12		At 12 ft., slight, solvent-like odor; similar odor to fresh cut wood.	1.9	
14 ▼		At 14 ft., becomes saturated; mild TPH odor; slight rainbow and metallic sheen.	1.8	
15			6.8	OIP-15-15-16 OIP-15-GW-15-19
15.5	SM	Brown/gray, silty **SAND** with <10% wood/organics; wood/solvent-like odor; metallic sheen.		
16			2.8	
17	ML	At 17 ft., grades to gray/brown sandy to clayey **SILT**; odor and sheen dissipate below 18 ft.		
18			2.1	
20	SM	Loose, silty **SAND**;wet; mild odor; no sheen.	2.2	OIP-15-20-21
21			1.8	
22	SM/ML	Interbedded gray, silty **SAND** and sandy **SILT**; wet to saturated; mild odor; no sheen. At 23 ft., odor dissipates.		
23			1.1	OIP-15-23-24
25		Boring terminates at 25 ft. bgs.	1.3	

ABBREVIATIONS:
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-18**	
LOGGED BY: G. Cisneros	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292369.2061	**EASTING:** 1017479.331	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 19.5	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Airknifed to 5 feet bgs.				
1						
2						
3						
4						
5	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.	▨	▨		
6			▨	▨	0.5	
7			▨	▨		
8			▨	▨	0.1	
9			▨			
10			▨	▨		
11			▨	▨	0.2	
12			▨	▨	0.1	
13		Same as above; moist; no odor; no sheen.	▨	▨		
14			▨		0.2	
15			▨	▨		
16			▨	▨	0.2	
17			▨	▨	0.1	
18			▨	▨		
19		At 19 ft., becomes wet to saturated.	▨	▨	0.1	OIP-18-19-19.5
▼		At 19.75 ft., becomes saturated.	▨	▨		
20		Boring terminated at 20 ft. bgs.				

ABBREVIATIONS:
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-19**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292388.078	**EASTING:** 1017502.731	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 19.5	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.			
2					
4					
5	SP-SM	Brown, loose, fine to medium **SAND** with trace to 10% silt interbedded moist to dry; no odor.	▨		
6			▨	0.2	
8			▨	0.5	
10	SP	Brown, clean **SAND** with trace silt; no odor.	▨		
11			▨	0.5	
12			▨		
13			▨	0.8	
14			▨		
15			▨	0.7	
16			▨	0.5	
18			▨	0.7	
19		At 19 ft., becomes moist to wet.	▨		OIP-19-19-20
20			▨	0.4	
21			▨	1.2	
22	SP/SM	Gray, silty **SAND** interbedded with loose, coarse **SAND**; wet; no odor.	▨		
23			▨	0.6	
24	CH	Gray, firm, silty **CLAY**; wet; no odor.	▨		
24.5	SM	At 24.5 ft., becomes sandy.	▨		
25		Boring terminates at 25 ft. bgs.			

ABBREVIATIONS:
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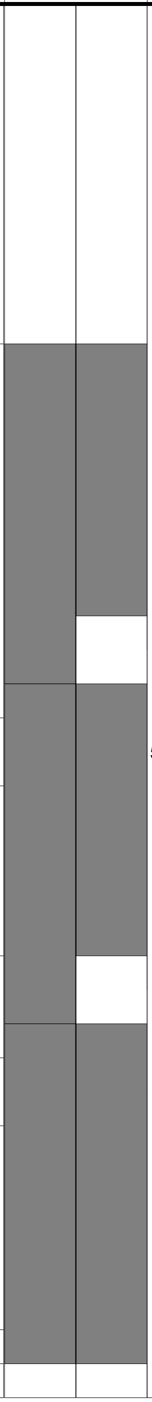
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-20	
LOGGED BY: G. Cisneros	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292415.8279	**EASTING:** 1017466.926	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 19.5	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	



Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.		
1				
2				
3				
4				
5	SP	Brown, fine to medium **SAND**; no odor; no sheen.		
6			0.3	
7				
8			0.5	
9				
10				
11	SM	Gray, silty, fine **SAND** with 30% silt; moderate odor; slight sheen.	505.0	OIP-20-11-11.5
12	ML	Olive-gray, stiff **SILT** with moderate plasticity; moderate odor; slight sheen.		
13				
14	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.	1.5	
15			1.5	
16	SM	Olive-gray, silty, fine **SAND**; moist; no odor; no sheen.	199.0	
17	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.		
18			0.4	
19				OIP-20-19-19.5
▼		At 19.5 ft., becomes wet to saturated.		
20		Boring terminated at 20 ft. bgs.	0.0	

ABBREVIATIONS:
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	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-21**
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292468.7798	**EASTING:** 1017508.17
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 18
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.				
1						
2						
3						
4						
5	SP	Brown, loose, fine, clean **SAND**; moist; no odor.	■	■		
6			■	■	1.6	
7			■	■		
8		At 8 ft., becomes coppery in color.	■		1.8	
9	SP/ML	Gray **SAND** with interbedded silt; wet (perched aquifer?); no odor; no sheen.	■		1.8	
	SP	Gray/brown, loose, poorly-graded **SAND**; moist; no odor.	■			
10	ML	Gray, **SILT** to sandy **SILT**; saturated; no odor.	■	■	1.9	
11	SP	Gray/brown, loose, poorly-graded **SAND**.	■	■		
12			■	■	2.2	
13			■			
14			■			
15			■	■	2.1	
16			■	■	1.3	
	SM	At 16.5 ft., grades to silty **SAND**.	■	■		
17	ML	Gray **SILT**; wet; no odor; no sheen.	■	■		
18 ▼	SW	Brown, well-graded **SAND** with 15% gravel; wet; no odor.	■	■	1.4	OIP-21-18-19
19		At 20 ft., becomes gray; wet; no odor; no sheen.	■			
20		Boring terminated at 20 ft. bgs.			1.3	

ABBREVIATIONS:
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NOTES:

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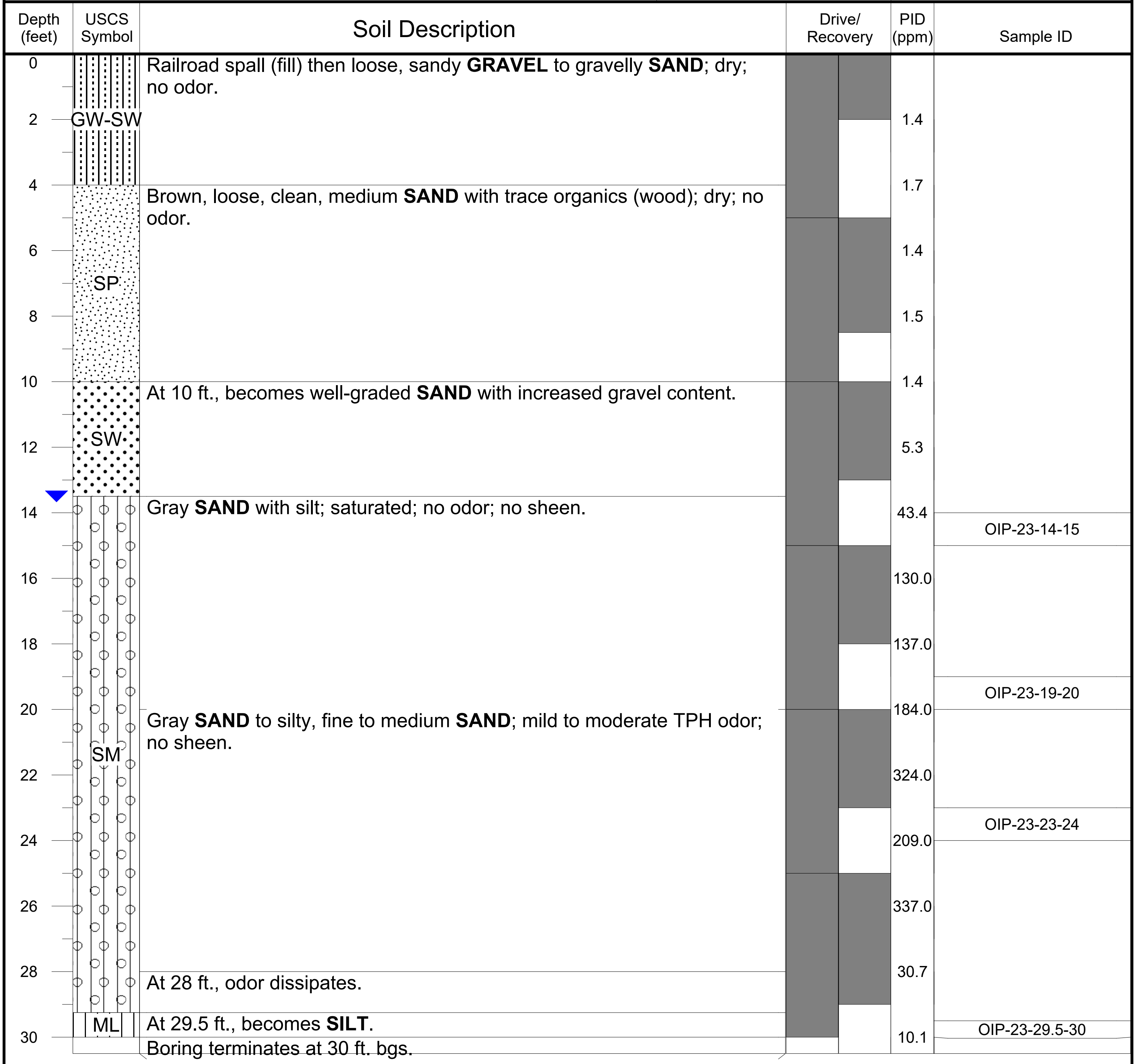
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-23	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/10/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292621.408	**EASTING:** 1017543.662	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 30.5	**DEPTH TO WATER (ft bgs):** 13.5	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	



Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	GW-SW	Railroad spall (fill) then loose, sandy **GRAVEL** to gravelly **SAND**; dry; no odor.			
2				1.4	
4	SP	Brown, loose, clean, medium **SAND** with trace organics (wood); dry; no odor.		1.7	
6				1.4	
8				1.5	
10	SW	At 10 ft., becomes well-graded **SAND** with increased gravel content.		1.4	
12				5.3	
▼	SM	Gray **SAND** with silt; saturated; no odor; no sheen.			
14				43.4	OIP-23-14-15
16				130.0	
18				137.0	
					OIP-23-19-20
20		Gray **SAND** to silty, fine to medium **SAND**; mild to moderate TPH odor; no sheen.		184.0	
22				324.0	
					OIP-23-23-24
24				209.0	
26				337.0	
28		At 28 ft., odor dissipates.		30.7	
	ML	At 29.5 ft., becomes **SILT**.			OIP-23-29.5-30
30		Boring terminates at 30 ft. bgs.		10.1	

ABBREVIATIONS:
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PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-30**	
LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC7	DRILL DATE: **11/19/19**	
DRILLED BY: **HOLT (Mike)**	NORTHING: **292549.47**	EASTING: **1017565.76**	
DRILLING EQUIPMENT: **Limited Access Drill Rig**	COORDINATE SYSTEM: **NAD 83 WA SP S**		
DRILLING METHOD: **Geoprobe**	TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **21**	
SAMPLING METHOD: **5' Liners**	BORING DIAMETER: **2 inch**		

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	Fill	Railroad, angular gravelly **FILL**.			
		Brown-gray, fine to medium **SAND**; moist; no odor; no sheen			
2				1.4	
4				6.4	
6	SP	Same as above; no odor; no sheen.			
8				0.3	
10				0.2	
12	SM	Dark gray to black, silty, fine to medium **SAND**; moist; strong hydrocarbon odor; moderately heavy sheen.			
14	ML	Olive gray to black, sandy **SILT** ; moist; strong odor; heavy sheen.		34.0	
		Brown, medium to coarse **SAND**; moist; slight odor; no sheen.			
16	SP			19.0	
	ML	Olive gray, sandy **SILT**; moderate odor; slight sheen.			
18	SM	Olive, silty, fine **SAND**; moist to wet; moderate odor; slight sheen.		36.0	
	ML	Olive, sandy **SILT**; moist.			
20				43.0	OIP30-20-21-111919
▼	SP	Black, fine to medium **SAND** with visible LNAPL; wet to saturated; strong odor; heavy sheen.			
22	SM	Olive, silty **SAND**; moderate odor; moderate sheen.		19.2	
	ML	Olive **SILT** with low plasticity.			
24	SP	Gray, fine to medium **SAND**; saturated; strong odor; moderate sheen.		34.0	
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
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NOTES:

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	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/9/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292534.5724	**EASTING:** 1017589.368
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Airknifed to 5 ft bgs; railroad spall (fill) ground surface.				
1						
2						
3						
4						
5	SW	Brown, well-graded **SAND** with gravel; moist; no odor.	▨	▨		
6			▨	▨	0.8	
7			▨	▨		
	GM	At 7.5 ft., 1 inch lens of gray, silty **GRAVEL**; wet; no odor.	▨	▨		
8	SP	Fine, clean **SAND**; damp; organic odor.	▨		0.7	
9			▨		1.0	
10			▨	▨		
11			▨	▨		
12	GW-SW	At 12 ft., grades to gravelly **SAND** to sandy **GRAVEL**; moist; organic odor.	▨	▨	0.9	
13			▨			
	SP	Fine **SAND**; no odor.	▨			
14	ML	At 14 ft., grades to **SILT** with some mottling at 14.75 ft; no odor.	▨		0.8	
15 ▼	SW	Gravelly, fine to coarse **SAND**; no odor.	▨	▨		
16			▨	▨	0.8	
17			▨	▨		OIP-31-17
18	ML	At 18 ft., 2 inch **SILT** lens.	▨		1.1	
	SP	Gray, fine **SAND** with trace silt; moist to wet; no odor.	▨			
19			▨			
20		Boring terminated at 20 ft. bgs.			1.3	OIP-31-20

ABBREVIATIONS:
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-39	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/10/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292989.8741	**EASTING:** 1017795.581	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 9.75	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Railroad spall (fill) ground surface blocked any recovery.			
2					
4					
	SW	Brown, loose **SAND** with gravel, silt, and 1 inch black, organic lens at 6 ft. bgs; dry; organic odor.			
6				1.8	
8	ML	Brown, firm, mottled **SILT**; moist; no odor.		2.0	
▼		At 9 ft., becomes gray; no odor.			
10	SP	Gray **SAND**; saturated; mild TPH odor; no sheen.		2.1	
	SM/ML	Gray, silty **SAND** to **SILT** with organics (moist wood); no odor.			
12				3.2	
	SP	Clean **SAND**; mild odor; rainbow sheen.			
14	SM	Silty **SAND; mild to moderate odor; minor metallic sheen.**		3.7	
					OIP-39-15-15.5
16				4.1	
					OIP-39-16.5-17
18				2.1	
	SP	Interbedded clean **SAND** and silty **SAND** to **SAND**; very slight odor; no sheen. Gray, loose **SAND**; saturated; slight pesticide odor; no sheen.			
20				4.2	
					OIP-39-21-22
22				3.2	
	SM	Gray, silty **SAND**; saturated; no odor.			
24				2.9	
		Boring terminated at 25 ft. bgs.			

ABBREVIATIONS:
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NOTES:
Ambient PID = 1.7 ppm.

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	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-42**
	LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC5	DRILL DATE: **11/21/19**
DRILLED BY: **HOLT (Mike)**		NORTHING: **292857.39**	EASTING: **1017689.02**
DRILLING EQUIPMENT: **Limited Access Drill Rig**		COORDINATE SYSTEM: **NAD 83 WA SP S**	
DRILLING METHOD: **Geoprobe**		TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **18.5**
SAMPLING METHOD: **5' Liners**		BORING DIAMETER: **2 inch**	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	Fill	Railroad, angular gravelly **FILL**.			
	SP	Light brown, fine to medium **SAND**; slight odor at 1 ft. bgs; no sheen.			
2				0.2	
4				0.2	
6				0.8	
8		At 8 ft., color changes to dark brown; slight odor; slight sheen.		33.6	
	ML	Olive gray, organic **SILT**; strong odor; moderate sheen.			
10				460.5	
12	SM	Dark brown, silty, fine **SAND** with thick black product; strong odor; Bunker C-type sheen.		494.6	
	ML	Olive gray, sandy **SILT**; strong odor; heavy sheen.			
14				364.2	
	SP	Dark Brown, fine to medium **SAND**; strong odor; heavy sheen.			
16	ML	Olive gray **SILT**; strong odor; heavy sheen.		1180.0	
	SP	Brown to black, fine to medium **SAND** with visible product; wet; strong odor; heavy sheen.			OIP42-17-17.5-112119
18 ▼				1107.0	
		At 19.5 ft., grades to brown; saturated; slight odor; slight sheen.			
20				1207.0	
22				64.1	
		At 23 ft., no sheen.			
24				18.0	
		Bottom of Boring = 25 ft. bgs			

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: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-46
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/10/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 292745.5217	**EASTING:** 1017672.525
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 8
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft bgs.			
5	SW	Dark brown **SAND** with angular gravel (fill); no odor; no sheen.			
6				1.6	
7	SM/SP	Brown **SAND** and silty **SAND**; moist; no odor; no sheen.			
8	SM	At 8 ft., becomes wet. At 8.5 ft., becomes saturated.		0.7	OIP-46-8
10	SM/ML	Interbedded **SILT** and silty **SAND**.		1.4	OIP-46-10-11
13	SP	Gray, poorly-graded, medium **SAND**; saturated; mild odor; core is shiny, but no sheen.		11.6	
14	SM/SP	Gray to brown, poorly-graded **SAND** to silty **SAND**; no odor; no sheen.		8.6	OIP-46-14
16				1.4	
20		Boring terminated 20 ft. bgs.		1.5	

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-47**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/9/2020	
DRILLED BY: Holt: Mike Running		**NORTHING:** 292858.0696	**EASTING:** 1017742.196
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 20
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	FILL	Surficial railroad **FILL**.			
				3.2	
2	ML	Brown **SILT** with trace sand; moist; no odor.			
	SP	Gray-brown, clean, fine to medium **SAND**; no odor.			OIP-47-2-3
	ML	Brown **SILT** with trace sand; moist; no odor.			
4	SP	Brown, fine to medium, clean **SAND**; moist; no odor.			
				1.5	
6		From 6 to 8 ft. bgs, perched water zone.		6.3	
	SM	At 6.5 ft, becomes gray and silty.			
	ML	At 7 ft., grades to **SILT**; mild odor; sheen and droplets.			
8				91.0	
10	SP	Poorly-graded **SAND**; strong odor; sheen.		710.0	
				786.0	OIP-47-11-12
12	SM	At 11.5 ft., grades to silty **SAND**; strong odor.		76.0	
				114.0	
14					
	SP	At 15 ft., becomes saturated; strong odor.		133.0	
16					
	SM	Gray, soft, silty **SAND**; strong odor.		315.0	OIP-47-17
18		At 18 ft., becomes dense.		110.0	
20 ▼	SP	Clean **SAND**; mild odor.			
22				750.0	
		At 22.5 ft., strong odor; brown droplets.		45.0	
		At 23 ft., mild odor; no sheen.			
24				29.0	
		Boring terminated at 25 ft. bgs.		7.4	OIP-47-25

ABBREVIATIONS:
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NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-49
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/9/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292829.7502	**EASTING:** 1017779.565
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15.25
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Hand cleaed to 2.5 ft. bgs; railroad base fill.				
1						
2						
3	SP	Fine to medium **SAND** with trace grave; moist; no odor.	▨	▨	0.3	
4	GM	Well-graded, angular, silty **GRAVEL**; moist to dry; no odor.	▨		0.5	
5			▨	▨		
6			▨	▨		
7	SP/ML	Interbedded **SILT** and silty **SAND**; moist.	▨	▨	0.2	
8			▨		0.3	
9	SP	At 9 ft., becomes wet, poorly-graded **SAND**.	▨		168.0	
10	ML	At 9.5 ft., grades to **SILT** with wood debris. At 10 ft., mild odor.	▨		0.3	OIP-49-10
11			▨			
12			▨	▨	0.3	
13	SP	At 13 ft., 2 inch seam of fine to medium **SAND**; strong odor; brown droplets.	▨	▨	38.0 713.0	
14	ML	**SILT.** At 14 ft., piece of wood.	▨	▨	5.2	
15 ▼		At 15.25 ft., becomes saturated.	▨	▨	2.4	
16	SP	**SAND**; strong odor; brown droplets.	▨	▨	25.0	
17	ML	At 17 ft., grades to **SILT**; moist.	▨	▨	33.0	OIP-49-17
18	SM	At 18 ft., grades to silty **SAND**; wet; no odor.	▨	▨	161.0	
19	SP	At 19 ft., grades to clean **SAND**; wet; no odor.	▨	▨	2.5	
20		Boring terminated at 20 ft. bgs.				

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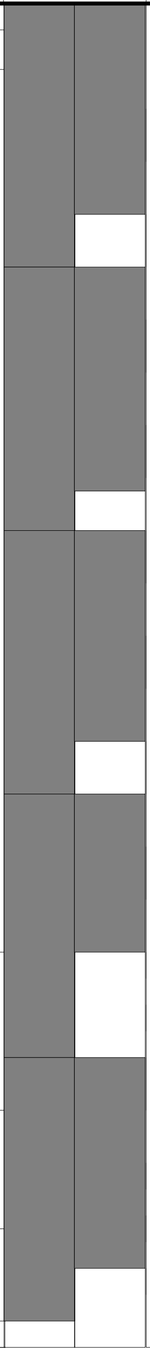
NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-52**
	LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC7	DRILL DATE: **11/22/19**
DRILLED BY: **HOLT (Mike)**		NORTHING: **292623.86**	EASTING: **1017450.06**
DRILLING EQUIPMENT: **Limited Access Drill Rig**		COORDINATE SYSTEM: **NAD 83 WA SP S**	
DRILLING METHOD: **Geoprobe**		TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **21.5**
SAMPLING METHOD: **5' Liners**		BORING DIAMETER: **2 inch**	

Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	ASPHALT	**ASPHALT** ground surface.		
	GW	Angular **GRAVEL** with some sand (fill).		
	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.		
2			0.2	
4			0.2	
6			4.0	
		Same as above; no odor; no sheen.		
8			0.6	
10	SP		0.6	
12			0.4	
14		Brown, poorly-graded **SAND**; no odor; no sheen.	19.6	
16			3.9	
		Gray, fine poorly graded **SAND**; moderate odor; moderate sheen.		
18	SM	At 18 ft., grades to silty **SAND**.	55.9	
			94.6	OIP52-19-19.5-112219
20			2.4	
	ML	At 21 ft., grades to **SILT**; moderate odor; heavy sheen.		
▼				
22			221.0	OIP52-22-22.5-112219
			220.0	
	SP	Gray **SAND**; moderate odor; moderate sheen.		
24		At 24 ft., color changes to brown; no odor; no sheen.	121.0	
		Bottom of Boring = 25 ft. bgs		

Drive/
Recovery



ABBREVIATIONS:
ft bgs = feet below ground surface
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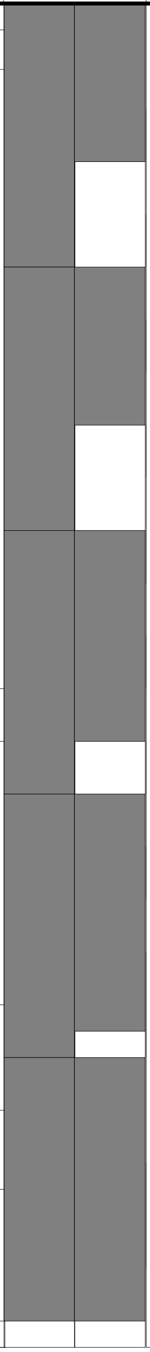
NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-53**
	LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC7	DRILL DATE: **11/22/19**
DRILLED BY: **HOLT (Mike)**		NORTHING: **292641.02**	EASTING: **1017432.46**
DRILLING EQUIPMENT: **Limited Access Drill Rig**		COORDINATE SYSTEM: **NAD 83 WA SP S**	
DRILLING METHOD: **Geoprobe**		TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **21**
SAMPLING METHOD: **5' Liners**		BORING DIAMETER: **2 inch**	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	ASPHALT	**ASPHALT** ground surface.			
	GW	Angular **GRAVEL** with some sand (fill).			
	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.			
2				2.4	
4				2.5	
6				2.4	
	SP	Same as above; no odor; no sheen.			
8				2.4	
10				3.1	
12				2.5	
	SM	Olive gray, silty, fine **SAND** with 30% silt; moist; no odor; no sheen.			
14				3.0	
	SP	Olive gray, fine **SAND**; no odor; no sheen.			
16				4.5	
18				3.2	
	SM	Olive gray, silty, **SAND**; wet; no odor; no sheen.			
20					
▼	ML	Olive gray, sandy **SILT** with moderate plasticity; saturated; no odor; no sheen.			OIP53-21-21.5-112219
22				0.5	
	SP	Gray to light brown, fine to medium **SAND**; saturated; no odor; no sheen.			
24					
		Bottom of Boring = 25 ft. bgs			



ABBREVIATIONS:
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	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-54
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/11/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292508.6819	**EASTING:** 1017439.913
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 18
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.				
1						
2						
3						
4						
5	SW	Brown, loose **SAND** with gravel and cobbles; damp; no odor.	▨	▨		
6			▨	▨	0.2	
7	SP	Clean, loose **SAND** with trace gravel; damp; no odor.	▨	▨		
8			▨		0.5	
9			▨			
10	SP/SW	Interbedded clean **SAND** and well-graded **SAND** with gravel and trace silt throughout; no odor.	▨	▨	0.4	
11			▨	▨		
12			▨	▨	0.4	
13			▨	▨		
14			▨	▨	0.6	
15			▨	▨		OIP-54-15-16
16			▨	▨	0.6	
17			▨	▨		
18 ▼		At 18 ft., becomes wet.	▨	▨	0.7	OIP-54-18-19
19		Becomes saturated at the bottom of the boring.	▨	▨		
20		Boring terminated at 20 ft. bgs.			0.7	

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-57**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-4	**DRILL DATE:** 3/10/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 293157.0647	**EASTING:** 1017913.226	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 15.5	**DEPTH TO WATER (ft bgs):** Not Discernible	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Hand augered to 6 ft. bgs; railroad spall ground surface over silt and sand.				
1						
2						
3						
4						
5						
6	ML	Brown, mottled **SILT**; moist; no odor.	▨	▨		
7			▨	▨	2.4	
8			▨	▨		
9	SP	Brown, loose medium, clean **SAND** with interbedded fine **SAND**; no odor.	▨		2.8	
10	ML	Brown, mottled **SILT**; moist; no odor.	▨	▨		
11			▨	▨	2.3	
12	SM/SP	Brown to gray, medium **SAND** with interbedded, fine, clean **SAND** and silty **SAND**.	▨	▨		
13			▨	▨	3.2	
14			▨	▨	3.8	OIP-57-14
15		Boring terminated at 15 ft. bgs.				

ABBREVIATIONS:
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NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-64**
	LOGGED BY: G. Cisneros	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/12/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292772.4434	**EASTING:** 1017549.348
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**. Brown, fine to medium **SAND**; moist; no odor; no sheen throughout boring.	▨	▨		
1			▨	▨		
2			▨	▨	1.0	
3			▨	▨		
4			▨		0.2	
5			▨	▨		
6			▨	▨	0.3	
7			▨	▨		
8			▨	▨	0.4	
9			▨			
10	SP		▨	▨		
11			▨	▨	1.3	
12			▨	▨		
13			▨	▨		
14 ▼		At 14 ft., becomes wet; no odor; no sheen.	▨	▨	1.3	OIP-64-14-15
15			▨	▨	0.2	
16			▨	▨		
17			▨	▨	0.2	
18		Gray, fine to medium **SAND** with 10% red grains; saturated; no odor; no sheen.	▨	▨	1.1	
19			▨	▨	2.2	
20		Boring terminated at 20 ft. bgs.				

ABBREVIATIONS:
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PROJECT: **POL-TPH**		LOCATION: **Longview, WA**	WELL ID: **OIP-66**
LOGGED BY: **G. Cisneros**		**BORING LOCATION:** AOPC8	DRILL DATE: **11/22/19**
DRILLED BY: **HOLT (Mike)**		NORTHING: **293018.87**	EASTING: **1017712.31**
DRILLING EQUIPMENT: **Limited Access Drill Rig**		COORDINATE SYSTEM: **NAD 83 WA SP S**	
DRILLING METHOD: **Geoprobe**		TOTAL DEPTH (ft bgs): **20**	DEPTH TO WATER (ft bgs): **17**
SAMPLING METHOD: **5' Liners**		BORING DIAMETER: **2 inch**	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	FILL	Gravel, rounded, base **FILL**.			
1	SP	Brown, fine to medium **SAND**; no odor; no sheen.			
6.5	ML	Olive gray **SILT** with moderate plasticity and some organics; moist; slight odor; moderate sheen.			
8.5	SP	Brown, medium to coarse **SAND**; slight odor.			
10	SM	Olive gray, silty **SAND**; moderate sheen.			
10.5	ML	Olive gray **SILT** with low plasticity; moist to wet; strong odor; moderate sheen.			OIP66-12-12.5-112219 OIP166D-12-12.5-112219
12.5	SP	Brown, medium to coarse **SAND**; moist; strong odor; heavy sheen.			
14.5	SM	Olive gray, silty, fine **SAND**; wet; slight odor; slight sheen.			
16	SP	Olive gray, fine to medium **SAND**; wet, slight odor, slight sheen.			
17 ▼					
20		Bottom of Boring = 20 ft. bgs			

ABBREVIATIONS:
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NOTES: No PID readings were recorded at this location.

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-67**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/12/2020	
DRILLED BY: Holt: Mike Running		**NORTHING:** 293057.3205	**EASTING:** 1017737.221
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 14-19

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	GP	Brown, loose, sandy **GRAVEL** ground surface; no odor.			
		No recovery.		2.0	
2					
4					
	SM	Dark brown, loose, silty **SAND**; dry; no odor.			
6	ML	At 6 ft., grades to brown **SILT** with trace organics; dry to moist; no odor; no sheen.		3.1	
					OIP-67-7-8
8	SM/SP	Gray/brown **SAND** and silty **SAND**; moist; moderate to strong odor; heavy sheen and slight brown droplets.		5.5	
10	SM/ML	Gray/brown, interbedded silty **SAND** and sandy **SILT**; moderate to strong odor; heavy sheen throughout.		188.0	
					OIP-67-11-12
12				573.0	
14 ▼				499.0	
					OIP-67-GW-14-19 OIP-67-14.5-15 OIP-67-18-19
16				268.0	
18		At 18 ft., odor dissipates; no sheen.		358.0	
20	SP	Clean **SAND**; no odor; no sheen.		5.2	
				1.5	
22					
	ML	SILT; no odor.		2.7	
24	SP	Clean, poorly-graded **SAND**; no odor; no sheen.			
		Boring terminated at 25 ft. bgs.			

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-68	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/11/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 293091.7803	**EASTING:** 1017765.909	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 14	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 13-18	

Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	GW	**GRAVEL** ground surface. Brown, loose, organic-rich, sandy, silty **GRAVEL**; dry; no odor.		
1				
2			2.1	
3				
3.5	SP	Gray, fine to medium, loose, clean **SAND** with trace gravels; moist; no odor.		
4			1.4	
5				
6	SM	At 6 ft., becomes silty **SAND**.	1.3	
7				
8			1.4	
9				
9.5	ML	Gray, clayey **SILT**; moist.		
10			1.2	OIP-68-10-11 OIP-68D-10-11
11				
12	SM	Gray, silty **SAND**; moist; no odor.	1.5	
13				OIP-68-GW-13-18 OIP-68-13.5-14 OIP-68-14-14.5
14 ▼		Gray, silty **SAND** and **SAND** with silt; wet to saturated; no odor; no sheen.	1.9	
15				
16			1.4	
17				
18			1.4	
19				
20		Boring terminated at 20 ft. bgs.	1.0	

ABBREVIATIONS:
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NOTES:

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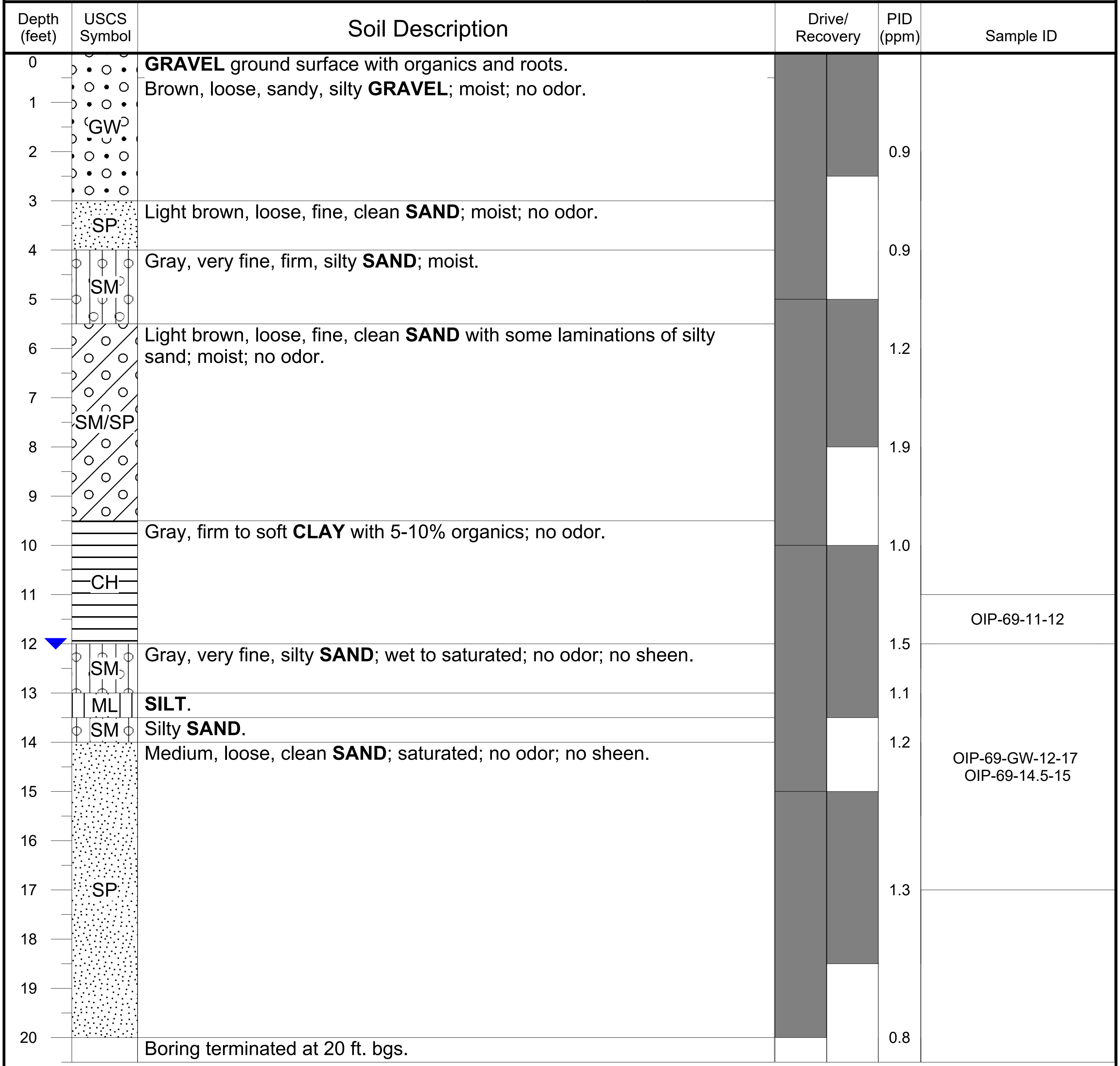
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-69	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-4	**DRILL DATE:** 3/11/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 293233.2984	**EASTING:** 1017871.838	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 12	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 12-17	



Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	GW	**GRAVEL** ground surface with organics and roots. Brown, loose, sandy, silty **GRAVEL**; moist; no odor.		
1				
2			0.9	
3	SP	Light brown, loose, fine, clean **SAND**; moist; no odor.		
4	SM	Gray, very fine, firm, silty **SAND**; moist.	0.9	
5				
6	SM/SP	Light brown, loose, fine, clean **SAND** with some laminations of silty sand; moist; no odor.	1.2	
7				
8			1.9	
9				
10	CH	Gray, firm to soft **CLAY** with 5-10% organics; no odor.	1.0	
11				OIP-69-11-12
12 ▼	SM	Gray, very fine, silty **SAND**; wet to saturated; no odor; no sheen.	1.5	OIP-69-GW-12-17 OIP-69-14.5-15
13	ML	**SILT**.	1.1	
14	SM SP	Silty **SAND**. Medium, loose, clean **SAND**; saturated; no odor; no sheen.	1.2	
15				
16				
17			1.3	
18				
19				
20		Boring terminated at 20 ft. bgs.	0.8	

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
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NOTES:
Turbidity of temp well at time of sample collection = 6.4 NTU

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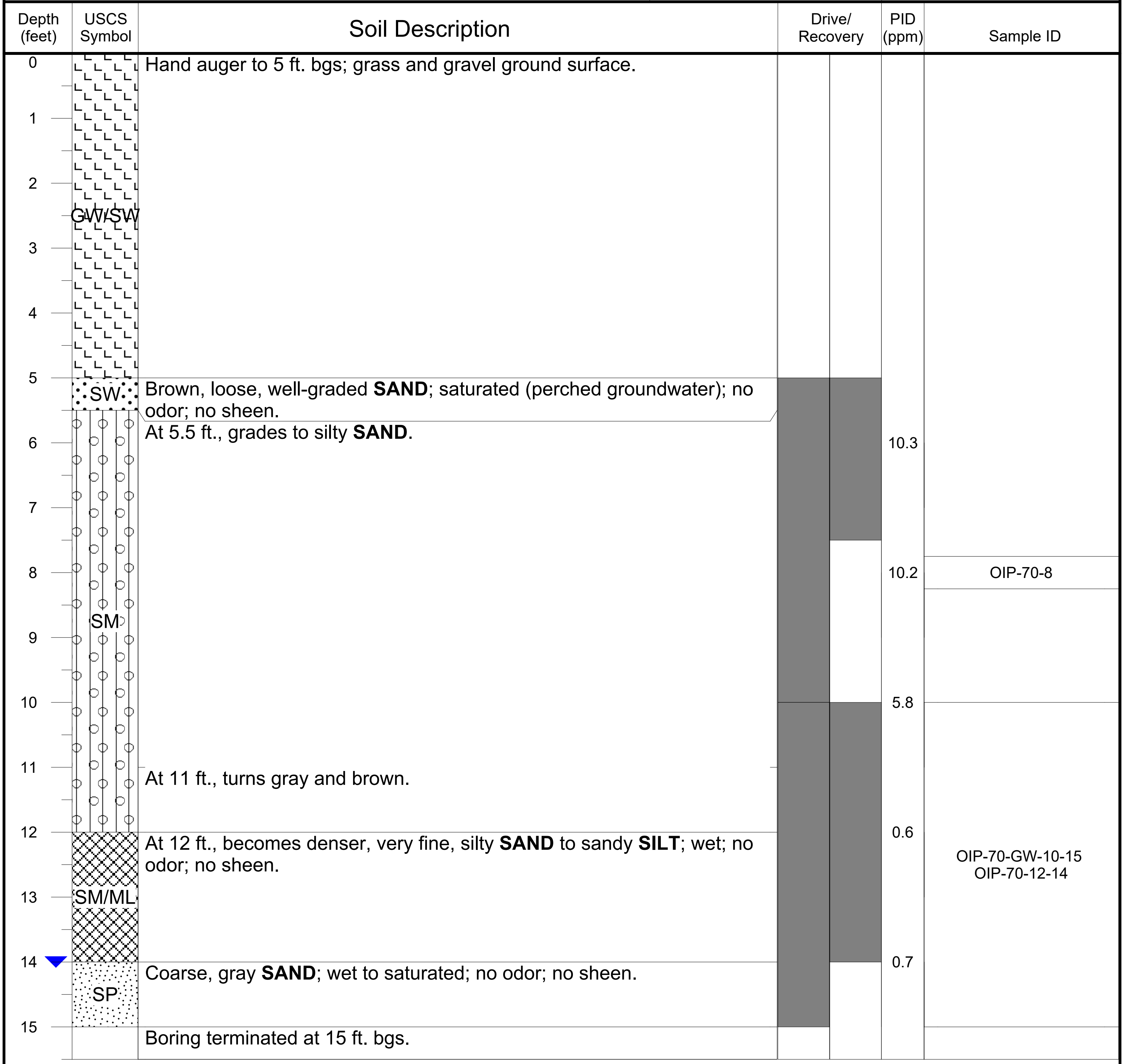
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-70
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-4	**DRILL DATE:** 3/10/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 293256.003	**EASTING:** 1018014.246
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 15.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable



Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	GW/SW	Hand auger to 5 ft. bgs; grass and gravel ground surface.			
5	SW	Brown, loose, well-graded **SAND**; saturated (perched groundwater); no odor; no sheen. At 5.5 ft., grades to silty **SAND**.			
6	SM			10.3	
8				10.2	OIP-70-8
10				5.8	
11		At 11 ft., turns gray and brown.			
12	SM/ML	At 12 ft., becomes denser, very fine, silty **SAND** to sandy **SILT**; wet; no odor; no sheen.		0.6	OIP-70-GW-10-15 OIP-70-12-14
14 ▼	SP	Coarse, gray **SAND**; wet to saturated; no odor; no sheen.		0.7	
15		Boring terminated at 15 ft. bgs.			

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-72
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/11/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 292891.335	**EASTING:** 1017843.702
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; concrete ground surface.			
5	SP	Clean, loose, medium **SAND**; moist; no odor; no sheen.		0.9	
6	SM/ML	Brown, fine to very fine, silty **SAND** interbedded with sandy to clayey **SILT** with <10% wood/organics; moist to saturated; no odor; no sheen. From 6 to 13 ft. bgs, perched aquifer.			
7				1.2	
9				8.2	
10	SM	Coarse **SAND** with silt; moderate odor; rainbow sheen.		11.2	OIP-72-10-11
11		At 11 ft., odor becomes mild; sheen becomes minimal.			
13				17.0	
13.5		At 13.5 ft., chunk of wood present; moderate odor; sheen visible on core.			
14	ML	Gray/brown, firm **SILT**; mild odor; no sheen.			
14.5	SM/SP	Interbedded **SAND** and silty **SAND**; wet to saturated; no odor; no sheen.			
15				2.3	
16				3.1	OIP-72-16-17
16.5		At 16.5 ft., becomes saturated; moderate odor; sheen on core.			
17				26.2	
18		At 18 ft., odor dissipates; slight sheen.		19.0	
20		Boring terminated at 20 ft. bgs.		1.3	

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH
LOCATION: Longview, WA
BORING ID: **OIP-73**
LOGGED BY: P. Osterhout
BORING LOCATION: AOPC-4
DRILL DATE: 3/12/2020
DRILLED BY: Holt: Mike Running
NORTHING: 293169.6157
EASTING: 1018034.585
DRILLING EQUIPMENT: LAR Geoprobe
COORDINATE SYSTEM: NAD 83 WA SP S
DRILLING METHOD: Direct Push
TOTAL DEPTH (ft bgs): 15.5
DEPTH TO WATER (ft bgs): 13
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner
BORING DIAMETER: 2 inch
TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0	GW/SW	Airknifed to 5 ft. bgs; Gravel ground surface.				
1						
2						
3						
4						
5	SW	Brown, loose, medium **SAND** with gravel; moist; no odor; no sheen.	▨	▨		
6			▨	▨	0.8	
7	ML	At 7 ft., 3 inches of brown **SILT**.	▨	▨		
	SW	At 7.25 ft., transitions to gray.	▨	▨		
8			▨	▨	0.7	
9	SM	Silty **SAND**.	▨			OIP-73-9-10
	SP	Brown, poorly-graded **SAND**; moist; no odor; no sheen.	▨			
10			▨	▨	0.9	
11			▨	▨		
12			▨	▨	0.3	
13 ▼		At 13 ft., becomes saturated.	▨			OIP-73-13-14 OIP-73D-13-14
14	SM	Lenses of silty **SAND**.	▨			
	SP	Clean **SAND**.	▨			
15		Boring terminated at 15 ft. bgs.				

ABBREVIATIONS:
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **GP-31**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-9	**DRILL DATE:** 3/11/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292765.1886	**EASTING:** 1017985.424	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 14	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 13.5-18.5	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	SP	Airknifed to 6.5 ft bgs; brown, loose **SAND** observed during clearing.			
1					
2					
3					
4					
5					
6				0.8	
7	SM/ML	Brown, silty **SAND**; moist, loose, no odor. Grades to brown **SILT** interbedded with silty, fine, medium **SAND** with 5-20% organics (wood).			
8		At 8 ft., becomes wet (perched).		1.1	
9					
10		At 10 ft., becomes saturated.		1.3	
11					
12				1.4	
13	CH	At 13 ft., 2 inch chunk of wood over gray, firm, silty **CLAY**; moist; no odor.			
14 ▼	SM/ML	At 14 ft., grades to silty **SAND** with interbedded sandy **SILT**; soft and loose; saturated; no odor; no sheen.		1.4	
15					
16				1.1	GP-31-14-15 GP-31-GW-13.5-18.5
17	SM	At 16.5 ft., fines decrease; wet; no odor.			
18					
19	SP	At 19 ft., grades to loose, clean **SAND**; wet; no odor.		0.9	
20		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **GP-32**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-9	**DRILL DATE:** 3/11/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292735.4444	**EASTING:** 1018027.903	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 14-19	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	SM	Airknifed to 6.5 ft bgs; grassy ground surface.			
1					
2					
3					
4					
5					
6					
7	OL	Brown, organic-rich, sandy **SILT**; moist; organic odor.		2.0	
8	ML	At 7.5 ft., organics decrease.		1.8	
	SM-ML	Silty **SAND** to sandy **SILT**.			
9	ML	Soft, brown, mottled **SILT**; moist to wet; no odor.			
	SM	At 12 ft., becomes gray, silty, soft to firm **SAND**; wet; no odor.			
10				1.8	
11					
12				2.6	
	ML	At 12.5 ft., grades to soft, gray **SILT**; moist.			
13					
14				1.8	
	CH	Gray, firm **CLAY** with organics; moist; no odor.			
15 ▼	ML	Soft **SILT**; saturated.			
16					
17					GP-32-GW-14-19 GP-32-17.5-18.5
18				2.5	
	SP	Clean, gray, loose, medium **SAND**; saturated; no odor; no sheen.			
19					
20				1.8	
		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:
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NOTES:

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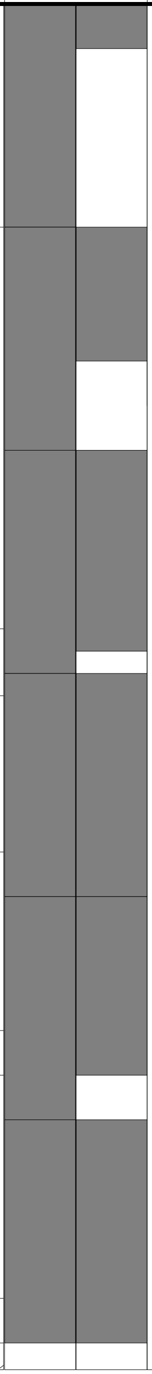
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **GP-33**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/9/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292489.2593	**EASTING:** 1017559.34	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 30.6	**DEPTH TO WATER (ft bgs):** 18.5	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	



Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	GP	Railroad ground road base.		
2				
4				
	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen to 14 ft.		
6			0.0	
8			0.7	
10			0.9	
12			1.2	
14	ML	Olive-gray **SILT** with moderate plasticity; moist; no odor; no sheen.	1.3	GP-33-14-14.5
	SP	Brown, fine to medium **SAND**; wet; no odor.		
16			0.9	
			1.2	
18			1.4	
▼				
		At 19 ft., becomes saturated; slight odor; slight sheen.		GP-33-19.5-20
20			80.6	
			0.6	
22				
	ML	Olive-gray, stiff **SILT** with low plasticity; wet; no odor; no sheen.	1.0	
24	SP	Brown, fine to medium **SAND**; saturated; no odor; no sheen.		GP-33-24-25
			0.7	
26			2.6	
28			0.6	GP-33-28-29
	SM	Olive-gray, silty **SAND**; no odor; no sheen.		
30			0.8	
		Boring terminated at 30 ft. bgs.		

ABBREVIATIONS:
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NOTES:
Soil Samples Only

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	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/9/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292439.7912	**EASTING:** 1017599.313
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** Not Encountered
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs.				
1						
2						
3						
4						
5	SP	Brown, medium **SAND** with trace gravel; damp; no odor.	▨	▨		
6			▨	▨	0.1	
7			▨	▨		
8	GM	Dark gray, silty **GRAVEL** with sand; moist; no odor; no sheen.	▨		0.3	
9	SP	Fine, gray **SAND**. At 9.5 ft., wood debris.	▨			
10			▨	▨	0.2	
11	SP	Gray, gravelly **SAND**.	▨	▨		
12		At 12 ft., fines downward to very fine **SAND**.	▨		0.6	
13	SM	At 13 ft., grades to silty, very fine **SAND**; wet.	▨			
14	ML	At 14 ft., grades to soft **SILT**; wet; no odor.	▨		0.4	GP-34-GW-14-19 GP-34-14-15
15	SP	Coarse **SAND**; wet; no odor. Fines downward	▨	▨		
16			▨	▨	0.2	
17	SP-SM	Gravelly, fine to coarse **SAND** with trace to 20% silt.	▨	▨	0.4	
18	ML	Gray **SILT** with trace to 20% fine sand; wet; no odor. Organics present below 18.75 ft.	▨	▨	0.5	
19			▨	▨		
20		Boring terminated at 20 ft. bgs.			0.5	

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NOTES:
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **GP-35**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/10/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 293006.4502	**EASTING:** 1017856.098	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** Not Encountered	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Hand Auger to 5 ft. bgs; no recovery.				
1						
2						
3						
4						
5	SP	Brown **SAND** with gravel.	■	■		
6	ML	Gray **SILT**; moderate odor; minor metallic sheen.	■	■	3.0	
7			■	■	2.2	GP-35-7-8
8			■		3.0	
9			■			
10			■	■	2.9	
11			■	■		
12		At 12 ft., wood chunk.	■	■	3.3	
13	SP-SM	Gray **SAND** with layers of sand and silty sand at the bottom of the core; mild to no odor throughout; no sheen.	■			
14			■			
15			■	■	2.9	
16			■	■		GP-35-16-17
17			■	■		
18			■	■		
19			■	■		
20		Boring terminated at 20 ft. bgs.			2.1	

ABBREVIATIONS:
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NOTES:
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	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** GP-36
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/12/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292959.6519	**EASTING:** 1017705.684
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; no recovery.			
2					
4					
	SP	Brown, loose, fine to medium, **SAND** with gravel,; dry to moist; no odor.			
6	ML	Brown, clayey **SILT** to fine, sandy **SILT** with 10% organics; moist to wet; no odor.		7.8	
8		At 8 ft., becomes gray; no odor.		25.6	
	SP	Clean **SAND**; strong odor; heavy rainbow sheen and brown droplets.			
10				7.6	
12	SM/CH	At 12 ft., grades to silty **SAND** then silty **CLAY** with 15% organics; rainbow sheen.		20.9	
					GP-36-13-14
	SM	Silty **SAND**; strong odor; sheen and some brown droplets.			
14 ▼		At 14 ft., becomes wet.		612.0	
16				397.0	GP-36-16-17
18				241.0	
20	ML	Gray **SILT**; strong odor; possibly slough.		13.1	
	SP	Gray, poorly-graded **SAND**; moderate odor; metallic sheen.			
22					GP-36-22-23
		At 23 ft., odor and sheen dissipate.		13.7	
24					
		Boring terminated at 25 ft. bgs.		3.4	

ABBREVIATIONS:
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NOTES:
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **GP-37**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/12/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 293081.2618	**EASTING:** 1017687.849	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 15.5	**DEPTH TO WATER (ft bgs):** 14	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; Gravel ground surface.				
1						
2						
3						
4						
5	SP	Brown, fine, loose, clean **SAND**; moist; no odor.	▨	▨		
6			▨	▨	0.3	
7			▨			
8			▨			
9	SM/SP	Brown, silty **SAND**; moist; no odor. Interbedded **SAND** and silty **SAND**.	▨			
10			▨	▨	0.2	
11			▨	▨	0.1	
12		At 12 ft., becomes gray.	▨	▨	0.1	GP-37-12-14 GP-37D-12-14
13			▨	▨		
14 ▼		At 14 ft., becomes saturated.	▨		0.3	
15		Boring terminated at 15 ft. bgs.				

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PROJECT: POL-TPH		**LOCATION:** Longview, WA	**BORING ID:** GP-38
LOGGED BY: P. Osterhout		**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292423.0772	**EASTING:** 1017421.518
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 19
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive	Recovery	PID (ppm)	Sample ID
0	GP	Railroad ground road base.				
1						
2	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.				
3						
4						
5			▨	▨		
6			▨	▨	1.5	
7			▨	▨		
8			▨		0.9	
9			▨			
10		Same as above; no odor; no sheen throughout the boring.	▨	▨	0.9	
11			▨	▨	0.5	GP-38-11-11.5
12			▨	▨	1.4	
13			▨	▨	1.1	
14			▨			
15			▨	▨		
16			▨	▨	0.8	
17			▨	▨		
18			▨	▨	1.4	
19 ▼		At 19 ft., becomes wet.	▨			
20		Boring terminated at 20 ft. bgs.				

ABBREVIATIONS:
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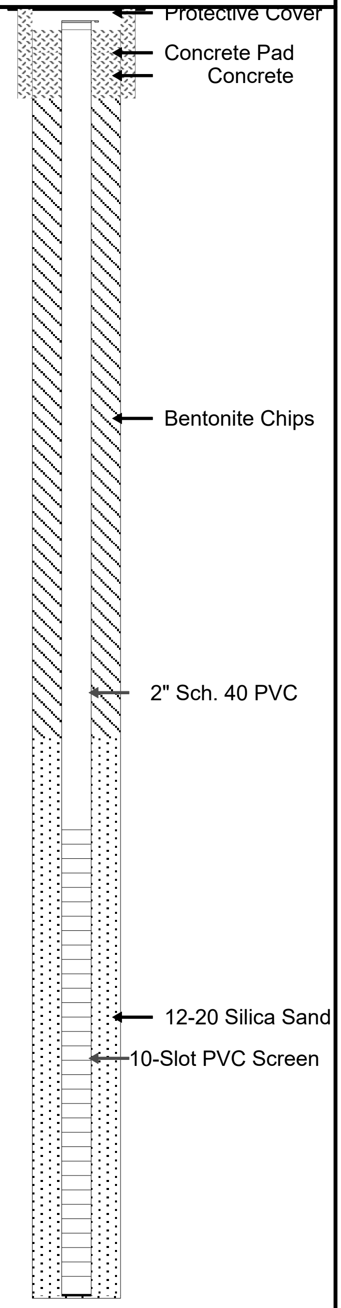
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-33**
	DRILL DATE: **3/9/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 942**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292780.64**	EASTING: **1017605.9**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **26.1**	TOC ELEVATION: **25.91**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **28.2**	DEPTH TO WATER (ft bgs): **18.18**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **18-28**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0	SP	Airknifed to 7 ft. bgs; clean **SAND** observed.				
2						
4						
6						
		Brown, fine to medium **SAND**; moist; no odor; no sheen.				
8				3 7 5	0.9 1.3	
10	ML	Olive-gray, sandy **SILT** with moderate plasticity; no odor; no sheen.		3 2 1	0.6 0.7	
12	SP	Gray, fine to medium **SAND**; wet; strong odor; heavy sheen,		3 6 9	194.0 102.0	MW-33-12-12.5
14				1 6 9	116.0 39.0	
16						
		At 17 ft., moderate odor and moderate sheen.			52.0	
18	ML	Olive-gray **SILT** with low plasticity; slight odor; no sheen.		2 4 5 3 2 1	20.0 22.8	
20					11.5	MW-33-19.5-20
	SP	Gray to brown, fine to medium **SAND**; wet; slight odor; no sheen.			11.9	
22				3 8 10 1 8 10	8.6 3.3	MW-33-22.5-23
24					3.1	
26						
28		Depth to bottom of well = 28.20 ft. bgs.				

Well Construction



ABBREVIATIONS:
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NOTES:

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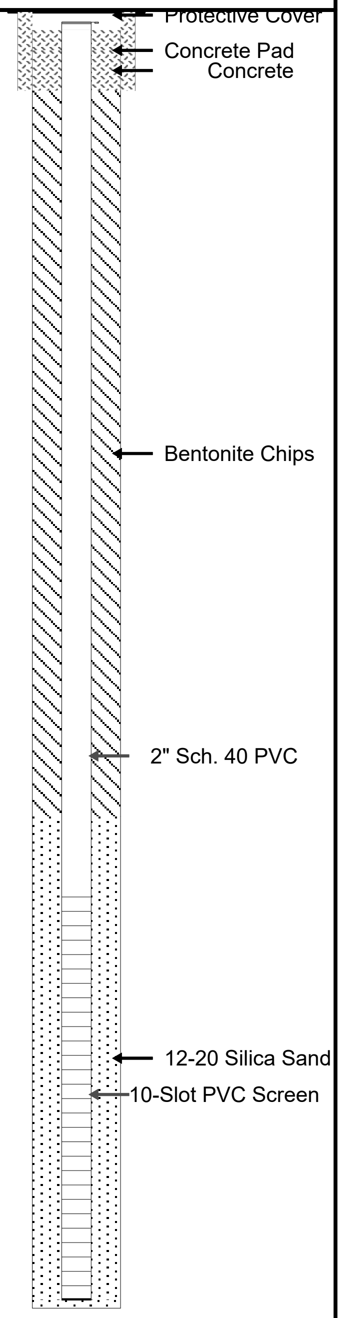
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-34**
	DRILL DATE: **3/10/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 944**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292630.78**	EASTING: **1017483.21**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **26.96**	TOC ELEVATION: **26.67**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **32**	DEPTH TO WATER (ft bgs): **18.92**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **22-32**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0		Airknifed to 10 ft. bgs; asphalt ground surface; road base fill to 0.5 ft.				
10	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.		9 15 15	0.1	
				9 5 6	0.3	
	ML	Olive, sandy **SILT** with low plasticity; moist; slight odor; no sheen.			63.0	
	SM	Gray, silty, fine **SAND**; moderate odor; slight sheen.		3 7 7	377.0 372.0	MW-34-15-15.5
	SP-SM	Gray, fine to medium **SAND** with 10% silt.		4 5 6	95.0 96.0	
18	SM/ML	From 18 to 20.5 ft., interbedded silty **SAND** and sandy **SILT**.		4 4 4	116.0 73.0	
20					315.0	MW-34-20-20.5
	ML	Olive-gray **SILT** with medium plasticity; moist; slight odor; no sheen.		2 2 2	23.0	
22	SM	Gray, silty, fine **SAND**; wet; slight odor; no sheen.				
	SP	Brown, fine to medium **SAND**; wet; slight odor; no sheen.		3 5 7 4 4 3	29.6 14.8 42.0 8.2	MW-34-24-24.5
	SM	Gray, silty, fine **SAND**; moist; slight odor; no sheen.		1 3 5	58.0	
28	SP	Gray, fine to medium **SAND**; wet; very slight odor; no sheen.			9.4	MW-34-28-28.5
32		Depth to bottom of well = 32 ft. bgs.				

Well Construction



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NOTES:

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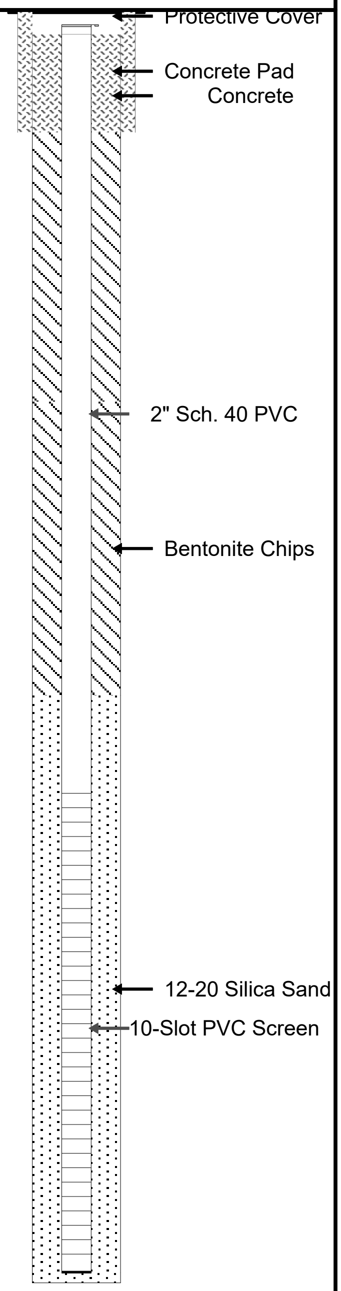
PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-35**	
DRILL DATE: **3/10/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 943**	
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292571.93**	EASTING: **1017321.65**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **27.4**	TOC ELEVATION: **26.95**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **25.8**	DEPTH TO WATER (ft bgs): **13.71**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **16-26**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0		Airknifed to 6 ft. bgs; asphalt ground surface.				
2						
4						
6	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.				
8						
10				4 12 12	1.2 1.0	
12	SP			3 10 10	2.1 1.3	
▼ 14		At 19 ft., becomes wet.		2 7 8	0.3 0.2	MW-35-15.5-16
16						
18				1 2 3	0.2 0.2	
20	ML	Olive-gray **SILT** with moderate plasticity; moist; no odor; no sheen.		2 3 4	0.2 0.2	
22						
24	SP	Brown to gray, fine to medium **SAND** with shell fragments; wet; no odor; no sheen.		2 5 9	0.3	
26		Depth to bottom of well = 25.80 ft. bgs.				

Well Construction



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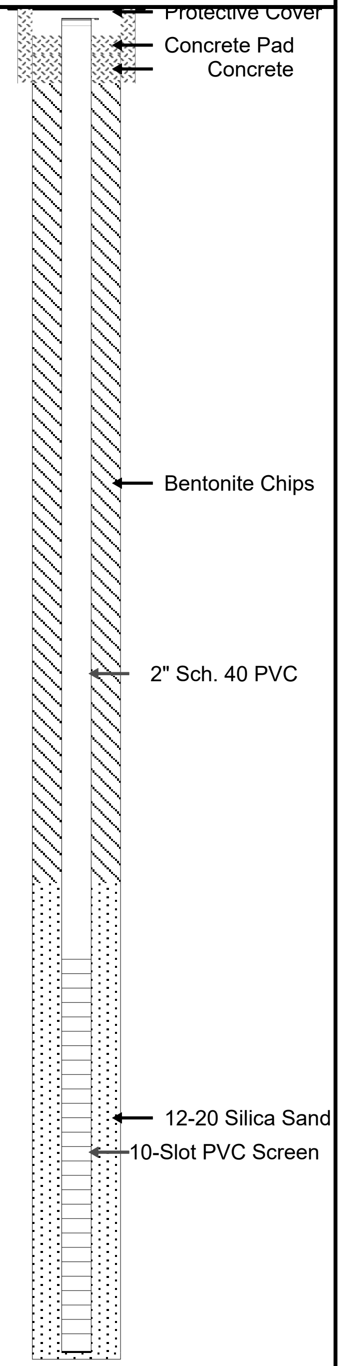
PROJECT: **POL-TPH**		LOCATION: **Longview, WA**	WELL ID: **MW-36**
DRILL DATE: **3/11/2020**		COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 945**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292270.4**	EASTING: **1017406**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **31.88**	TOC ELEVATION: **31.59**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **35.33**	DEPTH TO WATER (ft bgs): **24.45**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **25-35**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0		Airknifed to 8 ft. bgs.				
2						
4						
6						
8	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.				
10				7 4 5	0.0	
12	ML	Reddish-brown, stiff **SILT** with moderate plasticity; moist; no odor; no sheen.				
14	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.				
16				2 4 4	0.0	
18				3 5 5	0.0 0.0	
20				3 3 3	0.0 0.0	
22	ML	Brown to olive, stiff **SILT** with moderate to high plasticity; moist; no odor; no sheen.		0 0 0	0.1 0.1	
24 ▼						
26	SP-SM	Gray, fine to medium **SAND** with 10% silt; wet; no odor; no sheen.		1 2 1	0.2 0.3	
28	SP	Brown, fine to medium **SAND** with 10% fine red grains; saturated; no odor; no sheen.		1 2 2		MW-36-27.5-28
30						
32						
34						
		Depth to bottom of well = 35.33 ft. bgs.				

Well Construction



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NOTES:

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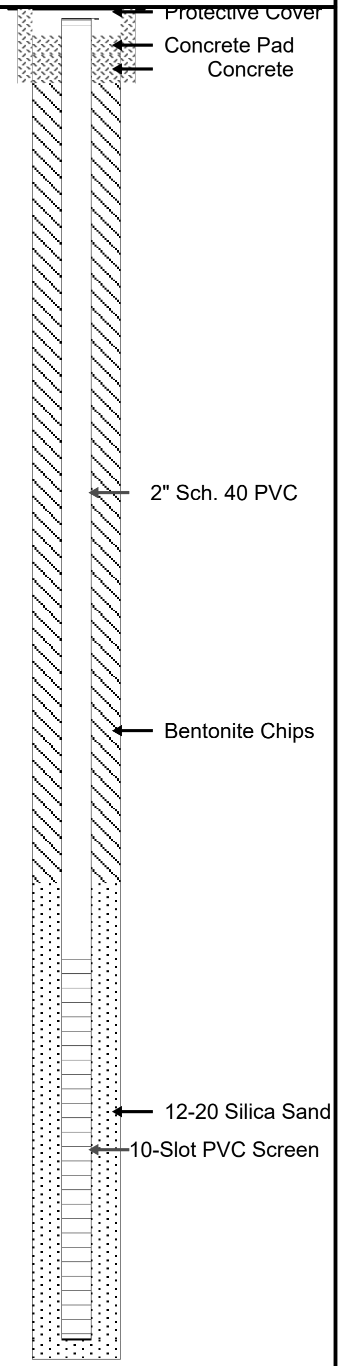
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-37**
	DRILL DATE: **3/12/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 947**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292043.9**	EASTING: **1017170.7**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **31.67**	TOC ELEVATION: **31.13**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **35**	DEPTH TO WATER (ft bgs): **27.5**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **25-35**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0		Airknifed to 8 ft. bgs; asphalt ground surface with sand and cobbles below.				
8	SP	Brownish-gray, fine to medium **SAND**; moist; no odor; no sheen.				
10				0 0 1	0.0	
15				0 0 0	0.0	
17.5				0 0 0	0.0	
20		Brown, very loose, fine to medium **SAND** with 10% red grains; moist; no odor; no sheen.		0 0 0	0.0	
22.5				0 0 0	0.0	
25				1 2 3	0.0	
26		At 26 ft., becomes moist to wet; no odor; no sheen.				
27.5 ▼		Gray, poorly-graded **SAND** with 10% red grains; moist; no odor; no sheen.		3 3 3	0.2	MW-37-27.5-28 and MW-37D-27.5-28
35		Depth to bottom of well = 35 ft. bgs.				

Well Construction



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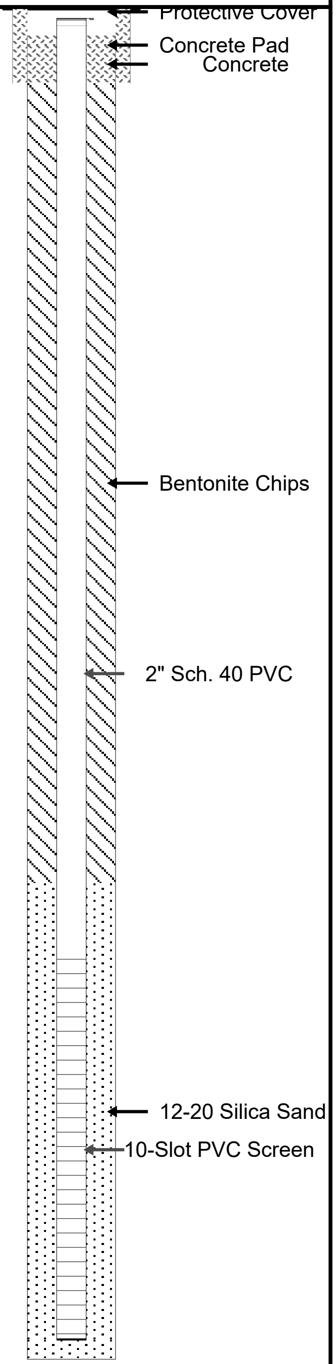
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-38**
	DRILL DATE: **3/11/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 946**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **291808.13**	EASTING: **1017497.79**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **31.46**	TOC ELEVATION: **31.09**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **35**	DEPTH TO WATER (ft bgs): **24**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **25-35**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.				
2	SW	**SAND** and cobbles.				
4		Brown-gray, loose **SAND**; no odor; no sheen.				
6						
8						
10		Brown to gray, fine to medium **SAND**; moist; no odor; no sheen.	■ ■	8 9 9	0.0 0.0	
12						
14						
16		Brown, fine to medium **SAND**; moist; no odor; no sheen.	■ ■	4 4 4	0.0 0.0	
18		At 18 ft., rock in sampler; no recovery.	■ □	3 2 2		
20	SP		■ ■	2 2 2	0.0 0.0	
22		Brown, fine to medium **SAND** with 10% fine red grains; moist; no odor; no sheen. At 23 ft., becomes moist to wet.	■ ■	4 7 7	0.0 0.0	MW-38-23.5-24
24 ▼						
26		At 25 ft., becomes saturated; no odor; no sheen.	■ ■	4 4 4	0.0 0.0	
28			■ ■	2 2 4	0.0	
30		Same as above.				
32						
34						
		Depth to bottom of well = 35 ft. bgs.				

Well Construction



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NOTES:

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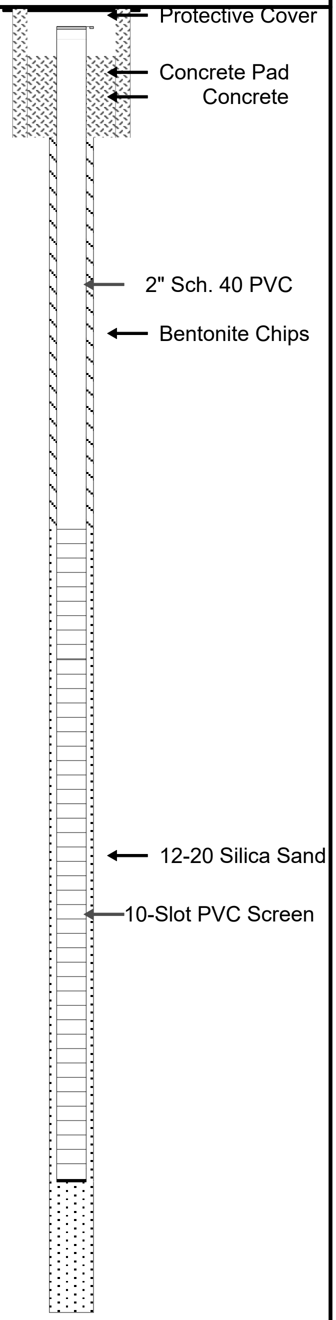
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-39**
	DRILL DATE: **3/12/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 948**
DRILLED BY: **Holt: Mike Running**	LOGGED BY: **P. Osterhout**	NORTHING: **293200.28**	EASTING: **1017952.25**
DRILLING EQUIPMENT: **LAR Geoprobe**		GROUND SURFACE ELEV.: **19.23**	TOC ELEVATION: **18.95**
DRILLING METHOD: **Direct Push**		TOTAL DEPTH (ft bgs): **20**	DEPTH TO WATER (ft bgs): **14.5**
SAMPLING METHOD: **5' x 2" Liner**		BORING DIAMETER: **3 inch**	SCREENED INTERVAL: **8-18**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0	FILL	Railroad spall, gravelly **FILL** ground surface.				
2	GM	Brown, silty, sandy **GRAVEL**; moist; no odor.				
3	SP	Brown, loose, clean **SAND**; dry; no odor.			2.8	MW-39-2-4
	SM/ML	Interbedded brown, silty **SAND** and mottled brown/coppery, sandy **SILT**; moist to wet; no odor; no sheen.				
5					2.1	
6					1.8	
	ML	Gray **SILT** and clayey **SILT** with < 10% organics (wood); dry to moist.				
8		At 8 ft., moderate odor; rainbow sheen.			4.8	MW-39-8-9
10					17.4	
11	SP	Gray, loose, fine to coarse, clean **SAND** with trace silt.; moist to wet; moderate odor; rainbow sheen.				
12					69.6	
13						MW-39-13-14
14					67.6	
▼		At 14.5 ft., becomes saturated.				
16					2.4	
18	SM/SP	Interbedded silty **SAND** and clean **SAND**.			1.2	
19	SP	Gray, clean **SAND**; moderate odor; rainbow sheen.				MW-39-18.5-20
20		Depth to bottom of well = 20 ft. bgs.			1.0	

Well Construction



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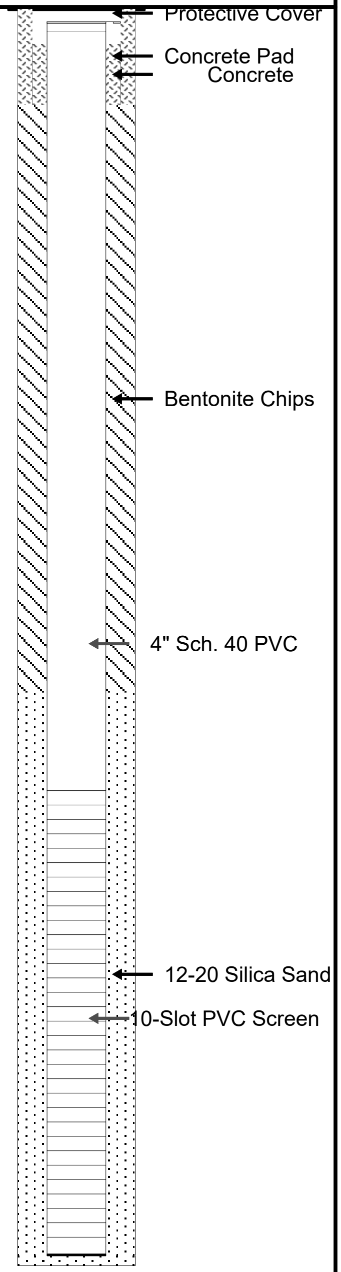
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-40**
	DRILL DATE: **3/9/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 941**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **P. Osterhout**	NORTHING: **292857.32**	EASTING: **1017668.47**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **24.77**	TOC ELEVATION: **24.65**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **26**	DEPTH TO WATER (ft bgs): **14.95**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **10 inch**	SCREENED INTERVAL: **16-26**

Depth (feet)	USCS Symbol	Description	# of Blows	PID (ppm)	Sample ID
0		Hand Augered to 2 ft. bgs.			
2		Airknifed to 5 ft. bgs.			
4					
6	SP	Fine **SAND** with angular, coarse gravel.			
8					
10	GM	Silty **GRAVEL**.			
	SP	Fine **SAND**; moist; strong odor; brown droplets.	0 3 6	351.0	MW-40-10.5-11
12		At 12 ft., trace gravel present and wood at the bottom of sampler.	2 3	460.0 172.0	MW-40-11-13
	SM	At 12.5 ft., grades to silty **SAND**.	3	36.0	
14	ML	At 13.5 ft., grades to dark brown **SILT** with 5 -10% sand and organics; slight odor.	0 0	47.0	
		At 15 ft., becomes gray; slight to moderate odor; no sheen.	1	86.0	
16					
18	SP-SM	Brown, fine **SAND** with 10% silt; wet; moderate odor; slight sheen.	5 6 11	650.0 391.0	MW-40-17 and MW-40D-17
20	SP	Gray, fine to medium **SAND**; slight odor; wet; slight sheen.	3 4 8	414.0 391.0 157.0 170.0	
22					
24		At 23.5 ft., odor dissipates.	2 4 7	10.7	MW-40-24-24.5
26		Depth to bottom of well = 25.70 ft. bgs.			

Well Construction



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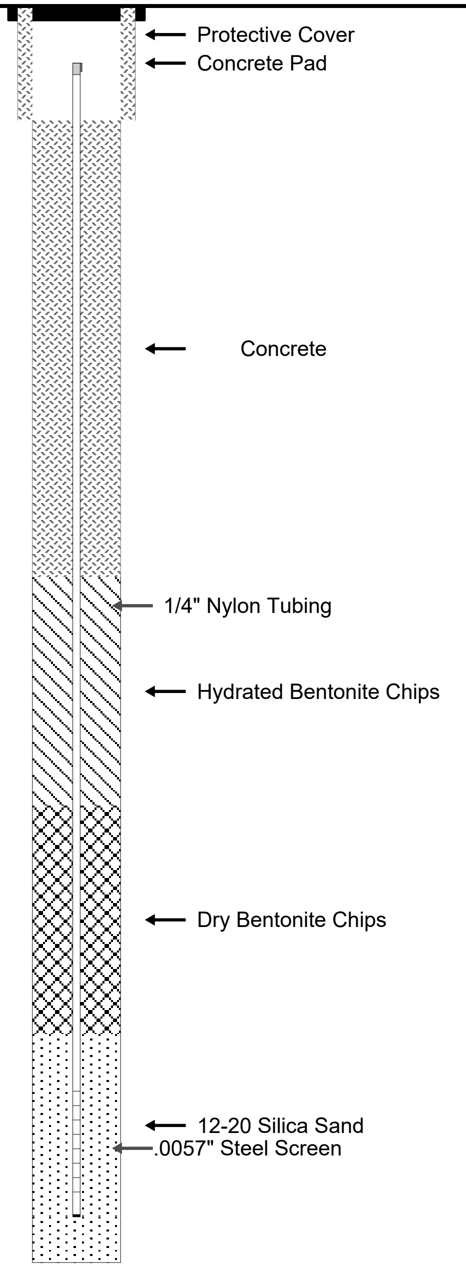
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **VP-1**
	DRILL DATE: **3/11/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 938**
DRILLED BY: **Holt: Mike Running**	LOGGED BY: **G. Cisneros**	NORTHING: **292929.39**	EASTING: **1017680.61**
DRILLING EQUIPMENT: **LAR Geoprobe**		GROUND SURFACE ELEV.: **27.05**	TOC ELEVATION: **26.69**
DRILLING METHOD: **Direct Push**		TOTAL DEPTH (ft bgs): **5.5**	DEPTH TO WATER (ft bgs): **Not Encountered**
SAMPLING METHOD: **Not Applicable**		BORING DIAMETER: **2 inch**	SCREENED INTERVAL: **4.75-5.25**

Depth (feet)	USCS Symbol	Description
0	FILL	Asphalt ground surface **FILL**.
0.4	SP	Brown, fine to medium **SAND**.
5.5		Bottom of vapor point = 5.5 ft. bgs.

Depth (feet): 0, 0.4, 0.8, 1.2, 1.6, 2, 2.4, 2.8, 3.2, 3.6, 4, 4.4, 4.8, 5.2, 5.6

Well Construction



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NOTES: No samples collected for drive/recovery, PID, or analytical sampling.

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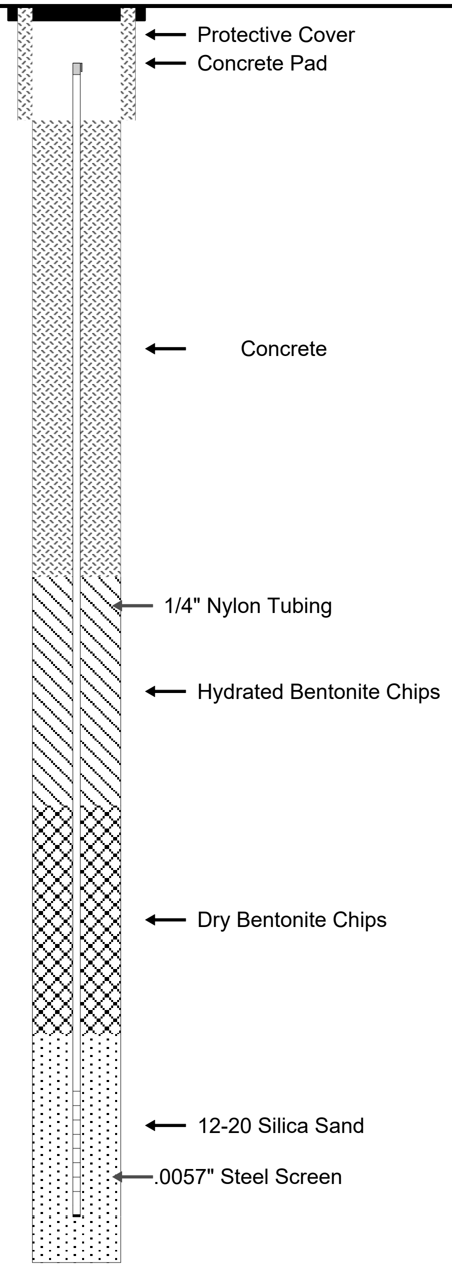
PROJECT: **POL-TPH**		LOCATION: **Longview, WA**	WELL ID: **VP-2**
	DRILL DATE: **3/11/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 939**
DRILLED BY: **Holt: Mike Running**	LOGGED BY: **G. Cisneros**	NORTHING: **292840.01**	EASTING: **1017581.2**
DRILLING EQUIPMENT: **LAR Geoprobe**		GROUND SURFACE ELEV.: **27**	TOC ELEVATION: **26.77**
DRILLING METHOD: **Direct Push**		TOTAL DEPTH (ft bgs): **5.5**	DEPTH TO WATER (ft bgs): **Not Encountered**
SAMPLING METHOD: **Not Applicable**		BORING DIAMETER: **2 inch**	SCREENED INTERVAL: **4.75-5.25**

Depth (feet)	USCS Symbol	Description
0	FILL	Asphalt ground surface **FILL**.
0.4		Brown, fine to medium **SAND**.
0.8		
1.2		
1.6		
2		
2.4		
2.8	SP	
3.2		
3.6		
4		
4.4		
4.8		
5.2		
5.6		Bottom of vapor point = 5.5 ft. bgs.

Well Construction



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NOTES: No samples collected for drive/recovery, PID, or analytical sampling.

Project: POL-TPH ~~Test Pit~~ Surface Sampling Sheet Date: 3/12/20

~~Test Pit #~~ Surface Sample	P3
Total Depth	6 inches
Lithology?	Brown, fine to coarse sand & gravel within rip rap; No odor; no sheen.
Depth to Native	No Native
Photo taken (list ID#)?	yes
Photo with ruler?	N/A
Presence of debris? Depth?	None
PID Concentration (ppm) & Depth?	0.1 ppm 0-6"
Sheen?	None
Odor?	None
GPS measurement taken?	No satallites available below Berth
Other Observations:	Just below Pipe E & within riprap ~21 feet South of Bulkhead
Samples Details (ID, depth, date, time, analyses) collected at depths of ..... Lead? cPAH? GRO/DRO?	P3-0-0.5 @ 1440

Project: POL-TPH ~~Test Pit~~ Surface Sampling Sheet Date: 3/12/20

~~Test Pit #~~ Surface Sample	P4
Total Depth	6 inches
Lithology?	Rip Rap Armor: Brown sand & gravel accumulated within riprap; No odor; No sheen
Depth to Native	N/A
Photo taken (list ID#)?	yes
Photo with ruler?	N/A
Presence of debris? Depth?	N/A - None except for riprap
PID Concentration (ppm) & Depth?	0.1 ppm 0-6"
Sheen?	None
Odor?	None
GPS measurement taken?	N/A
Other Observations:	East & below pipe E & within riprap of unknown thickness; ~21 feet south of Bulkhead
Samples Details (ID, depth, date, time, analyses) collected at depths of ..... Lead? cPAH? GRO/DRO?	P4-0-0.5 @ 1450

Project: POL-TPH ~~Test Pit~~ Surface Sampling Sheet Date: 3/12/20

~~Test Pit #~~ Surface Sample	P5
Total Depth	6 inches
Lithology?	Brown fine sand w/some gravel; no odor; No sheen
Depth to Native	N/A
Photo taken (list ID#)?	Yes
Photo with ruler?	No
Presence of debris? Depth?	N/A Some wood debris & soft disturbed soil @ top 1 inch
PID Concentration (ppm) & Depth?	0.0 ppm 0-6 inches
Sheen?	None
Odor?	None
GPS measurement taken?	N/A
Other Observations:	Soil disturbed @ top 1 inch. Adjacent to pipes A&B ~3 to 11 ft south of bulkhead.
Samples Details (ID, depth, date, time, analyses) collected at depths of ..... Lead? cPAH? GRO/DRO?	P5-0-0.5 @1455

3/12/20

Project: POL-TPH ~~Test Pit~~ Surface Sampling Sheet **Date:** 03/12/20

~~Test Pit #~~ Surface Sample	P6
Total Depth	6 - 12"
Lithology?	Brown, dense, fine to medium SAND; no odor; NO Sheen
Depth to Native	N/A
Photo taken (list ID#)?	yes
Photo with ruler?	no
Presence of debris? Depth?	yes, abundant wood, fabric & other debris in to 6 inches. Soft disturbed ~~soils~~ soil, that appears to be fresh soil in top 6 inches
PID Concentration (ppm) & Depth?	0.0 ppm
Sheen?	None
Odor?	None
GPS measurement taken?	N/A
Other Observations:	Abundant debris & soft disturbed soil in top 6 inches including cloth fabric Not in-place. Removed top 6 inches to collect a representative sample
Samples Details (ID, depth, date, time, analyses) collected at depths of ..... Lead? cPAH? GRO/DRO?	~~P6-6.0-12.0 @ 1~~ P6-0.5-1.0' @ 1315 P6-0.5-1.0D @ 1320 Duplicate

Port of Longview TPH Site

Interim Data Report

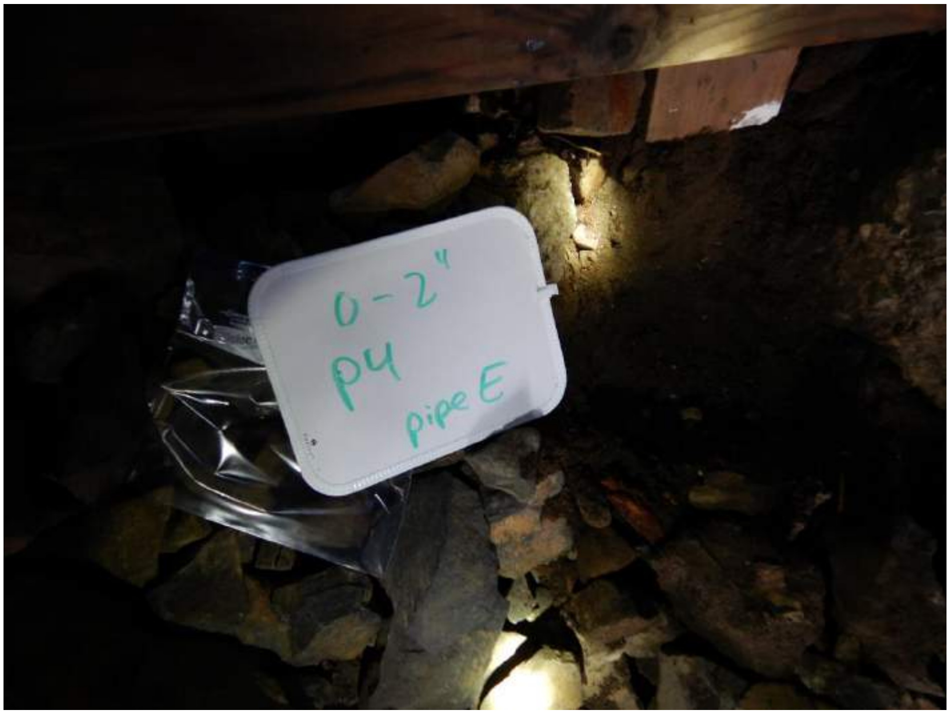
Appendix C
Photographs

Photograph 1. Direct-push and Optical Image Profiler (OIP)/hydraulic profiling tool (HPT) technology within former mechanic's shop building, looking west-southwest.

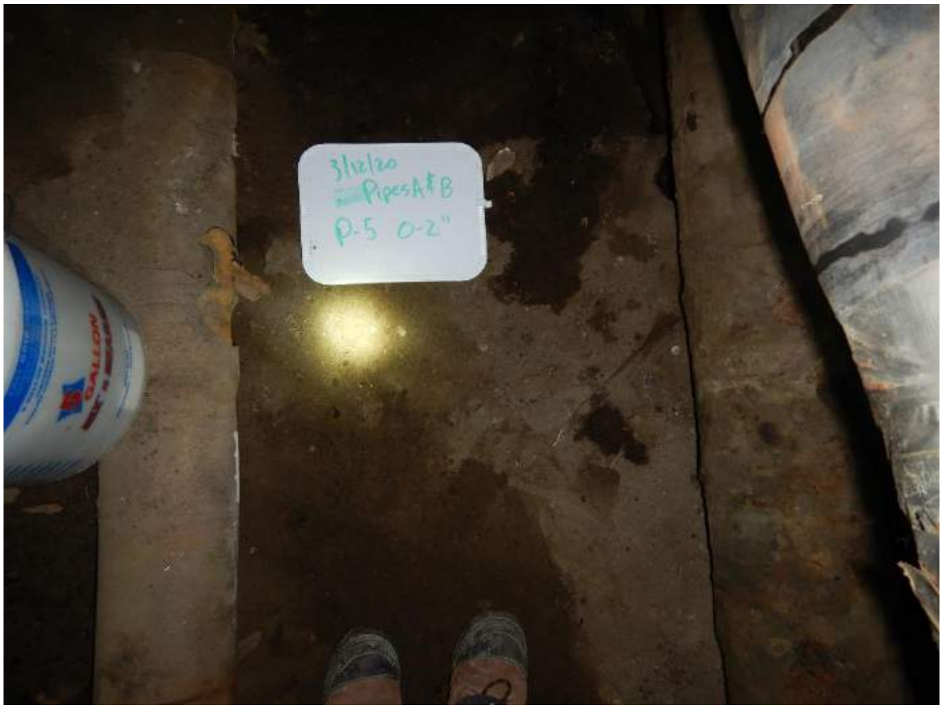
Photograph 2. OIP and HPT probe with rods.

Photograph 3. View of eastern pipeline beneath Berth 2 and locations of P3 and P4. Accumulated soil was sparce due to abundant riprap.

Photograph 4. P3 location collected from soil accumulated within the riprap.



Photograph 5. P4 location collected from soil accumulated within the riprap beneath Berth 2.



Photograph 6. P5 location adjacent to westernmost pipelines A and B.

Photograph 7. P6 located adjacent to the westernmost pipeline stubs (pipelines C and D). Collected from 6 to 12 inches below ground surface due to freshly disturbed soil in the top 6 inches.

Photograph 8. View of pipelines C and D and debris on soil surface.

Port of Longview TPH Site

Interim Data Report

Appendix D
Field Forms

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: ______ Date of Collection: ______

Project Number: ______ Field Personnel: G. Cisneros

Purge Data

Well ID: MW-01 Secure: ☐ Yes ☐ No Well Condition/Damage Description: Total = 12.70

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No

One Casing Volume (gal): ______

Depth of water (from top of well casing): 11.17

Well Casing Type/Diameter/Screened Interval: 4"

After 5 minutes of purging (from top of casing): 11.25

Begin purge (time): 1250

End purge (time): 1320

Volume purged: 5.2 Liters

Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged Liters	pH	DO mg/L	Sp. Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments cond mS/cm
1307	11.25	2.2	6.45	5.12	228.1	5.7	13.0	-29.5	0.190
1310	11.25	2.9	6.41	4.41	227.7	5.5	13.0	-33.3	0.189
1313	11.25	3.8	6.40	3.85	226.3	6.5	13.0	-36.4	0.188
1316	11.25	4.5	6.40	3.38	225.4	6.8	13.0	-39.3	0.187
1319	11.25	5.2	6.40	3.26	225.0	5.7	13.0	-38.8	0.187

Sampling Data

Sample No: MW-01-050620 Location and Depth: MW-01 N. Side of Site

Date Collected (mo/dy/yr): 5/6 Time Collected: 1321 Weather: Sunny

Type: ☑ Ground Water ☐ Surface Water Other: ______ Sample: ☐ Filtered ☐ Unfiltered Other: ______

Sample Collected with: ☐ Bailer ☑ Pump Other: ______ Type: Peristaltic

Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other: ______

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

TPH-D	(HCl) ☑	Chlor / Fluor.	(unpres) ☐	cPAHs COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	2		Ferrous Iron 3
40ml VOAs	6		

Signature: ______ **Date:** 5/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/6/20
Project Number:
Field Personnel: G. Cisneros

Purge Data

Well ID: MW-2
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: Total Depth = 11.90

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 9.76
Well Casing Type/Diameter/Screened Interval: 4"
After 5 minutes of purging (from top of casing): 9.76
Begin purge (time): 1142
End purge (time): 1208
Volume purged: 4.9 Liters
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO 7-26	µS/cm Sp. Conductivity	NTU Turbidity	°C Temp	mV ORP	mS/cm Comments Cond
1156	9.82	2.9L	6.52	7.32	536	13.0	13.6	81.1	0.449
1159	9.82	3.2	6.42	7.09	537	10.3	13.2	81.8	0.448
1202	9.82	3.8	6.36	~~7~~ 6.85	541	8.6	13.5	81.9	0.453
1205	9.82	4.3	6.32	6.73	541	8.5	13.5	83.2	0.454
1208	9.82	4.9	6.29	6.58	544	8.9	13.6	84.2	0.456

Sampling Data

Sample No: MW-02-GW-050620
Location and Depth: MW-02 4" well
Date Collected (mo/dy/yr): 5/6/20
Time Collected: 1208
Weather: Rainy/Sunny
Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other:
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltor
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

cPAHs

[✓ TPH-D]	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☒	[✓ BTEX]	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	2		
40ml VOAS	6		
	8		

Signature:

Date: 5/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 05/06/2020
Project Number:
Field Personnel: TS

Purge Data

Well ID: MW-3
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: OK, cap could use replacement soon.

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 13.43'
Well Casing Type/Diameter/Screened Interval: 4"
After 5 minutes of purging (from top of casing): 13.50'
Begin purge (time): 12:28
End purge (time): 13:08
Gallons purged: 5.5 Liters
Purge water disposal method: Drum on site

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water '	Vol. Purged L	pH	DO mg/L	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
12:33	13.50	.75	6.54	~~8.6~~	0.426	4.6	14.7	-196.7	Wrong DO unit (%
12:38	13.52	1.6	6.38	0.35	0.410	3.7	14.5	-177.6	
12:43	13.52	2.75	6.37	0.20	0.407	3.9	14.3	-175.5	
12:48	13.52	3.5	6.36	0.16	0.405	3.4	14.7	-175.7	
12:53	13.52	4.25	6.36	0.14	0.400	~~3.0~~3.5	14.7	-175.6	

Sampling Data

Sample No: MW-03-050620
Location and Depth:
Date Collected (mo/dy/yr): 05/06/20
Time Collected: 12:54 ☐ AM ☒ PM
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Slight yellow tint, small black flack, moderate odor

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOA	6		
1/2 L Amber	2		
Poly	2		

Signature:
Date: 05/06/2020

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL
Date of Collection: 5/6/20
Project Number:
Field Personnel: SL

Purge Data

Well ID: MW-05
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: Total Depth = 16.70

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 14.97
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing):
Begin purge (time): 1230
End purge (time): 1231
Volume purged: Dry in 1 min
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO	Conductivity	Turbidity	Temp	ORP	Comments
	Purged Dry No Sample								

Sampling Data

Sample No:
Location and Depth:
Date Collected (mo/dy/yr):
Time Collected:
Weather:
Type: ☐ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other:
Sample Collected with: ☐ Bailer ☐ Pump Other:
Type:
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other:
Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
	0		Purged Dry Instantly

Signature:
Date:

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GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL - TPH
Date of Collection: 5/6/20
Project Number:
Field Personnel: P.O.

Purge Data

Well ID: MW - 6
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: fine 2 of 3 bolt flanges are broken

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 10.61' @ 14:22
Well Casing Type/Diameter/Screened Interval: 4" PVC
After 5 minutes of purging (from top of casing): 10.62'
Begin purge (time): 14:23
End purge (time): 15:01
Gallons purged: 7 liters
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	SPC Conductivity µS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
14:31	10.62'	2L	6.65	1.16	186.3	13.62	13.1	-68.0	
14:36	10.63'	3L	6.62	0.36	184.7	11.52	13.0	-76.3	
14:41	10.63'	4L	6.62	0.27	184.6	11.43	13.0	-79.3	
14:46	10.63'	5L	6.62	0.19	184.8	12.42	13.0	-82.8	
14:51		6L	6.61	0.15	185.0	10.65	13.1	-86.4	

Sampling Data

Sample No: MW - 6 - 050620
Location and Depth:
Date Collected (mo/dy/yr): 5/6/20
Time Collected: 14:54 ☐ AM ☒ PM
Weather: partly cloudy
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: ~~peri~~ peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Clear (v. slight yellow), v. slight TPH odor, trace coppery flock.

Sample Analyses

cPAHs	✓									
TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:
1/2 L Amber	2	None
40 mL VOA w/ HCl	6	

Comments:
Total Depth = 20.69'

Some coppery flock in purge water, otherwise water is clear.
↳ may affect turbidity readings (biased high) in flow cell.

Signature:
Date: 5/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POC-TPH
Date of Collection: 5/6/20
Project Number:
Field Personnel: G. Cisneros

Purge Data

Well ID: MW-07
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: Good
Total 23.80

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 14.87
Well Casing Type/Diameter/Screened Interval: 4"
After 5 minutes of purging (from top of casing): 14.85
Begin purge (time): 1349
End purge (time):
Volume purged:
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Sp. Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments mS/cm cond
1407	14.85	1.8	6.75	6.00	461.5	50.3	14.9	25.9	0.396
1410	14.85	2.0	6.57	4.22	461.6	44.4	14.9	12.1	0.394
1413	14.85	2.4	6.56	3.81	457.7	45.9	14.6	8.0	0.391
1416	14.85	3.0	6.57	3.38	458.0	51.2	14.7	2.9	0.392
1419	14.85	3.5	6.57	3.19	457.9	41.9	14.6	1.2	0.391
1422	14.8	4.0	6.57	3.08	457.4	45.0	14.4	-0.3	0.385

Sampling Data

Sample No: MW-07-050620
Location and Depth: MW-07 by tracks
Date Collected (mo/dy/yr): 5/6/20
Time Collected: 1422
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other: Both (lead)
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type:
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Yellow color no odor; sock in well

Sample Analyses

cPAHs
Diss & Total Pb

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	[✓ Diss. Metals]	(HNO3) ☒
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	[✓ Total Metals]	(HNO3) ☒	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	2		
40ml VOAs	6		Filter in lab
250ml Poly HNO3	1		
250ml Poly	1		
			Sock in well
Total =	10		

Signature:
Date: 5/6/20

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GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/6/20
Project Number:
Field Personnel: P.O.

Purge Data

Well ID: MW-8
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: one bolt stripped, otherwise fine

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 13.15
Well Casing Type/Diameter/Screened Interval: 4" PVC / 14-24?
After 5 minutes of purging (from top of casing): 13.22'
Begin purge (time): 11:23
End purge (time): 7 Liters 5 ↙
Gallons purged: 12:06
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	spc Conductivity µS/cm	Turbidity NTU	Temp °C	ORP	Comments
11:38	13.20'	3L	6.49	0.39	544	15.10	13.8	-93.4	
11:43	13.20'	3.75L	6.51	0.17	544	13.87	13.8	-89.0	
11:48	13.20'	4.5L	6.51	0.11	544	15.15	13.9	-88.8	
11:53	13.20'	5.25L	6.51	0.08	543	11.17	13.9	-87.9	

Sampling Data

Sample No: MW-8-050620
Location and Depth:
Date Collected (mo/dy/yr): 5/6/20
Time Collected: 11:55 ☒ AM ☐ PM
Weather: partly cloudy, 55°F
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: peri pump
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): yellow, some small flock, minor to mod. TPH odor

Sample Analyses CPAHs ☒

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1/2 L Ambers	2	None	Total depth = 23.65'
40mL VOAs	6		
			Initial purge very turbid.
			Bio-Sheen in purge water.

Signature:
Date: 5/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection:
Project Number:
Field Personnel:

Purge Data

Well ID: MW-10 Secure: ☐ Yes ☑ No Well Condition/Damage Description: New well cap in replace old unsecure cap

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No

One Casing Volume (gal):

Depth of water (from top of well casing): 15.43

Well Casing Type/Diameter/Screened Interval:

After 5 minutes of purging (from top of casing): ~~15.44~~ 15.44

Begin purge (time): ~~11:32~~ 11:41

End purge (time): 12:27

Volume purged: 5 L

Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged L	pH	DO mg/L	Conductivity µS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
11:50	15.44	1	6.59	2.49	216.9	28.99	13.8	40.4	
11:55	15.44	1.5	5.99	0.64	192.7	28.71	13.7	55.4	
12:00	15.44	2	5.87	0.52	192.2	24.14	13.7	54.6	
12:05	15.44	2.5	5.84	0.43	193.0	23.55	13.7	52.8	
12:10	15.44	3	5.83	0.42	193.4	25.44	13.6	52.7	

Sampling Data

Sample No: MW-10-040620 Location and Depth:

Date Collected (mo/dy/yr): 4/6/20 Time Collected: 12:21 Weather: 60 and partly cloudy

Type: ☑ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☑ Unfiltered Other:

Sample Collected with: ☐ Bailer ☑ Pump Other: Type: peristaltic

Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon] and poly tubing Other:

Sample Description (Color, Turbidity, Odor, Other): Colorless, some floc, no apparent odor

Sample Analyses

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals lead (total + dissolved)	(HNO3) ☑	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOAs	6	NA	Missed MNA parameters during
1/2L amber	2		initial purge, returned & purged 10
250 mL poly	2		min prior to collecting MNA bottles
↳ preserved + unpreserved			
MNA VOAS	2		Ferrous Iron: 1.10 mg/L
1x 250 mL poly	Total = 14		
1x 500 mL poly			

Signature:

Date: 4/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: G. Cisneros

Purge Data

Well ID: MW-11
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: Total Depth = 15.60

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal): 2.1 gals
Depth of water (from top of well casing): 12.39
Well Casing Type/Diameter/Screened Interval: 4"
After 5 minutes of purging (from top of casing): 1269
Begin purge (time): 1209
End purge (time):
Volume purged: Liters
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Liters Vol. Purged	pH	mg/L DO	Sp. mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	Cond. mS/cm Comments
1223	12.95	1.5	6.97	8.49	534	32.0	14.5	51.3	0.454
1226	13.04	1.6	6.94	8.55	533	37.8	14.4	54.1	0.452
1229	13.11	1.8	6.92	8.60	535	37.0	14.4	57.3	0.455
1232	13.19	2.1	6.90	8.65	535	39.4	14.5	59.4	0.456
1235	13.25	2.5	6.90	8.66	535	39.8	14.6	61.6	0.458

Sampling Data

Sample No: MW-11-050720
Location and Depth: Middle of Tracks
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 1237
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other:
Sample Collected with: ☒ Bailer [✓ ☒ Pump] Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Slight Orange tint

Sample Analyses

cPAHs ☒

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	2		
40 ml VOAs	6		

Signature:

Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: AJ+PD+GC+TS

Purge Data

Well ID: MW-12 Secure: ☑ Yes ☐ No Well Condition/Damage Description: Rusted but decent

Depth Sounder decontaminated Prior to Placement in Well: ☑ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 13.60
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 13.60
Begin purge (time): 1358
End purge (time):
Gallons purged:
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged L	pH	DO mg/L	Conductivity uS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
1408	13.60	1	6.99	3.14	131.4	8.03	14.7	41.7	
1413	13.60	1.25	6.58	2.81	129.9	5.95	14.6	61.9	
1418	13.60	2.5	6.43	2.74	129.6	6.01	14.4	71.4	
1423	13.60	3.25	6.39	2.71	129.5	6.15	14.4	76.2	
1428	13.60	4	6.38	2.69	129.5	6.28	14.5	80.2	

Sampling Data

Sample No: MW-12-050720 Location and Depth:

Date Collected (mo/dy/yr): Time Collected: 1441 ☐ AM ☐ PM Weather:

Type: ☑ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☑ Unfiltered Other:

Sample Collected with: ☐ Bailer ☑ Pump Other: Type: Peristaltic

Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and] poly tubing Other:

Sample Description (Color, Turbidity, Odor, Other): Clear, colorless, no apparent odor

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1/2L amber	6	MS/MSD	Potential preservative leak
VOAs (F81)	18		of MNA poly
MNA			
VOAs	2		Ferrous Iron = 2.62 mg/L
250 mL poly	1		
500 mL poly	1		
Total: 28			

Signature: **Date:** 5/7/20

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GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number: 2020 GW Sampling
Field Personnel: G. Cisneros

Purge Data

Well ID: MW-13
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: No bolts
Total 16.85'

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal): 0.99 gals
Depth of water (from top of well casing): 11.03
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 11.56
Begin purge (time): 1101
End purge (time): 1138
Volume purged: 2.4 Liters
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Liters Vol. Purged	pH	mg/L DO	Sp uS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	mS/cm Comments Cond
~~1119~~	~~12.05~~	~~1.6~~	~~7.10~~	~~8.82~~	~~0.8~~	~~4.8~~			
1126	12.18	1.8	6.98	5.36	612	20.2	14.7	2.1	0.523
1129	12.20	1.9	6.91	4.24	605	20.1	14.6	-21.3	0.515
1132	12.21	2.05	6.90	3.76	593	24.2	14.7	-32.0	0.504
1135	12.22	2.2	6.89	3.42	575	26.1	14.7	-38.9	0.490
1138	12.23	2.4	6.88	3.36	568	27.0	14.5	-40.2	0.483

Sampling Data

Sample No: MW-13-050720
Location and Depth: Center of rails
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 1138
Weather: Sunny/Windy
Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other: N/A
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Brown & silty @ first but cleared up

Sample Analyses

cPAHs ☒

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Ambers	2		
40ml VOAs	6		

Signature:
Date: 5/7/20

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GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/2020
Project Number:
Field Personnel: P.O.

Purge Data

Well ID: MW-14
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: fine, rusty

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 6.43
Well Casing Type/Diameter/Screened Interval: 4" PVC
After 5 minutes of purging (from top of casing): 6.97 @ 13:44'
Begin purge (time): 13:36
End purge (time): 14:29
Gallons purged: 2 gals
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Spc Conductivity uS/cm	Turbidity	Temp °C	ORP mV	Comments
13:48	7.11'	2.5L	6.65	2.97	328.4	69.5	14.0	66.3	
13:53	7.15'	4L	6.64	2.71	330.4	58.3	14.8	70.8	
13:58	7.22'	5L	6.63	2.40	332.0	36.9	15.4	73.2	
14:03	7.24'	6L	6.63	2.25	334.1	25.3	15.2	75.3	
14:08	7.25'	7L	6.63	2.14	333.8	26.6	15.4	76.6	
14:13	7.27'	8L	6.63	2.16	334.3	25.4	15.3	78.1	

Sampling Data

Sample No: MW-14-050720
Location and Depth:
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 14:14 ☐ AM ☒ PM
Weather: Sunny, 70°F
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI ProDSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): clear, slight orange color, some small turbidity, no odor

Sample Analyses

cPAHs ✓
✓ MNA parameters

TPH-D	(HCl)	☒	Chlor / Fluor	(unpres)	☐	COD / TOC	(H2SO4)	☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl)	☒	BTEX	(HCl)	☒	Total Metals	(HNO3)	☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1/2 L Amber	2	None	Total Depth = 11.56'
40 mL VOA w/ HCl	8		Ferrous iron = 0.02 mg/L
1/2 L poly	1		
1/4 L poly w/ HNO3	1		

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL - TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: AJ+PD+GC+TC

Purge Data

Well ID: MW-15
Secure: ☑ Yes ☐ No
Well Condition/Damage Description: Well box completely rusted over. Screws and bolts sealed

Depth Sounder decontaminated Prior to Placement in Well: ☑ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 14.11
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 14.19
Begin purge (time): 1240
End purge (time): 1324
Gallons purged: 6 L
Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged L	pH	DO mg/L	Conductivity µS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
1250	14.19	1	6.73	1.39	438.9	11.14	15.7	-81.3	
1255	14.19	1.5	6.30	0.53	435.4	10.41	15.2	-87.9	
1300	14.19	2.25	6.24	0.42	434.6	11.67	15.4	-91.9	
1305	14.19	3	6.24	0.38	434.1	9.30	15.2	-95.4	
1310	14.19	3.75	6.24	0.35	434.5	9.64	15.2	-96.6	

Sampling Data

Sample No: MW-15-050720
Location and Depth:
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 1321 ☐ AM ☐ PM
Weather: 65 and sunny
Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☑ Unfiltered Other:
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and] poly tubing Other:
Sample Description (Color, Turbidity, Odor, Other): Clear, colorless, no apparent odor

Sample Analyses

(PAHs

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOAs	6	NA	
1/2 L amber	2		

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: AJ + PO + GC + TS

Purge Data

Well ID: MW-16
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: Poor! Well cap broken and unsecure, casing taller than well monument box

Depth Sounder decontaminated Prior to Placement in Well: ☑ Yes ☐ No
One Casing Volume (gal):

Depth of water (from top of well casing): 9.92
Well Casing Type/Diameter/Screened Interval:

After 5 minutes of purging (from top of casing): 10.10

Begin purge (time): 11:20

End purge (time): 12:02

Gallons purged: 5 L

Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged L	pH	DO mg/L	Conductivity μS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
1130	10.25	1.5	6.68	3.13	287.7	3.46	14.4	49.8	
1135	10.35	2	6.48	2.80	287.3	3.13	14.2	61.0	
1140	10.49	2.75	6.45	2.76	286.6	3.62	14.1	65.8	
1145	10.00	3.5	6.44	2.78	286.9	3.12	14.1	68.9	

Sampling Data

Sample No: MW-16-050720
Location and Depth:

Date Collected (mo/dy/yr): 5/7/20
Time Collected: 1151 ☐ AM ☐ PM
Weather: 65 and Sunny

Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☑ Unfiltered Other:

Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltic

Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable and/or dedicated silicon and poly tubing] Other:

Sample Description (Color, Turbidity, Odor, Other): clear, colorless, no apparent odor

Sample Analyses

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOAs	6	NA	
½ L amber	2		

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 05/07/2020
Project Number:
Field Personnel: TS

Purge Data

Well ID: MW-17 Secure: ☒ Yes ☐ No Well Condition/Damage Description: ok - replace bolts next visit Total depth = 17.85'

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 10.07'
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 10.32'
Begin purge (time): 09:48
End purge (time): 11:57
Gallons purged: 8 Liters
Purge water disposal method: Drum on Site

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
09:53	10.32'	.75	6.88	8.98	0420	9.8	12.5	101.1	
09:58	10.60	1.75	6.84	8.96	0.419	9.7	12.5	113.6	pump rate slowed
10:03	10.81	2.5	6.83	8.98	0.419	8.7	12.8	123.4	
10:08	10.88	3	6.83	8.96	0.420	9.5	12.9	127.8	
10:13	11.09	3.75	6.83	8.89	0.418	9.0	13.1	135.0	pump rate slowed
10:18	11.17	4	6.82	8.83	0.419	8.6	13.3	138.0	
10:23	11.20	4.215	6.83	8.81	0.417	6.7	14.2	140.8	
10:28	11.20	4.25	6.83	8.78	0.418	8.0	14.6	145.0	cont. on back...

Sampling Data

Sample No: MW-17-050720 Location and Depth:
Date Collected (mo/dy/yr): 05/07/20 Time Collected: 11:03 ☒ AM ☐ PM Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other: Type: Peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOA	6		
1/2 L Amber	2		Ferrous Fe = 0.05 mg/L
250 mL POLY	1		
500 mL POLY	1		
VOA	2		

Signature: Tyler Scott Date: 05/07/2020

Cont. from front.

Time	DTW	Vol purged	pH	DO	Cond.	Turb	Temp	ORP
10:33	11.30	*4.75	6.81	8.77	0.418	8.0	13.5	146.0
10:38	11.35	5	6.82	8.69	0.416	8.0	14.5	150.0 *
10:43	11.36	5.15	6.81	8.71	0.420	8.1	13.8	152.5
10:48	11.46	5.75	6.81	8.71	0.417	7.9	13.5	155.1 **
10:53	11.55	6	6.81	8.57	0.418	5.1	14.2	157.8
10:58	11.60	6.15	6.81	8.55	0.417	6.5	14.7	159.5
11:03	11.63	6.25	6.80	8.55	0.419	6.8	14.5	161.3

***

Notes

* pump rate so slow pump intermittently stops, changing water temp in flow cell

** Pump rate increased on it's own

*** Drawdown continued at a rate of no more than 0.02'/5 min. during sample collection. End DTW 12.23'

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 05/07/2020
Project Number:
Field Personnel: TK

Purge Data

Well ID: MW-18
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: (1) Bolts need replacement
Total depth = 18.18'

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 12.50
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 12.62
Begin purge (time): 12:32
End purge (time): 13:34
Gallons purged: 4.75 Liters
Purge water disposal method: Drum on site

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water '	Vol. Purged L	pH	DO mg/L	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
12:37	12.62	.25	7.53	9.64	0.220	14.2	16.7	-2.6	
12:42	12.72	.75	6.84	9.57	0.195	13.0	13.6	52.6	
12:47	12.76	1.25	6.82	9.58	0.196	10.6	14.0	75.2	
12:52	12.77	1.75	6.81	9.56	0.195	7.1	14.1	88.2	
12:57	12.77	2.25	6.81	9.72	0.196	6.3	14.1	96.8	
13:02	12.78	3	6.81	9.68	0.195	5.8	13.8	108.2	
13:07	12.78	3.5	6.80	9.63	0.194	5.5	13.7	114.1	

Sampling Data

Sample No: MW-18-050720
Location and Depth:
Date Collected (mo/dy/yr): 05/07/20
Time Collected: 13:08 ☐ AM ☒ PM
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOA	6		
1/2 L Amber	2		Ferrous Fe = 0.15 mg/L
250 mL Poly	1		
500 mL Poly	1		
VOA	2		

Signature:
Date:

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POC-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: Gabe Cisneros

Purge Data

Well ID: MW-19
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: All 3 bolts stripped Total Depth = 18.70

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 13.30
Well Casing Type/Diameter/Screened Interval: 4''
After 5 minutes of purging (from top of casing):
Begin purge (time): 1400
End purge (time): 1428
Volume purged: 2.3 Liters
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Liters Vol. Purged	pH	mg/L DO	mS/cm Sp. Conductivity	NTU Turbidity	°C Temp	mV ORP	Cond. mS/cm Comments
1416	13.31	1.3	6.13	3.82	353.9	3.7	15.0	3.8	0.300
1419	13.31	1.6	6.04	3.63	315.8	3.8	14.5	69.3	0.268
1422	13.31	1.9	6.01	3.51	294.1	3.6	14.5	69.6	0.249
1425	13.31	2.1	5.99	3.37	278.3	3.8	14.6	71.1	0.237
1428	13.31	2.3	5.98	3.34	273.8	3.8	14.6	71.1	0.233

Sampling Data

Sample No: MW-19-050720
Location and Depth: N. End between tracks
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 1429
Weather: Sunny

Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peristaltic

Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

[✓ TPH-D]	(HCl) ☒	Chlor / Fluor	(unpres) ☐ cPAHs ☒	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☒	[✓ BTEX]	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	[✓ VOCs]	(HCl) ☒

Additional Information

FBI

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	2		
40ml VOAs	6		
			Ferrous Fe = 0.02 mg/L
40ml VOA (Methane)	2		
250ml Poly HNO₃ (Mn)	1		
500ml Poly (Alk, Ni, Sulfat)	1		

Tremont

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: P.O.

Purge Data

Well ID: MW-20
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: fine.

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal): 1 gallon
Depth of water (from top of well casing): 15.55'
Well Casing Type/Diameter/Screened Interval: 4" PVC
After 5 minutes of purging (from top of casing): 15.72'
Begin purge (time): 12:04
End purge (time): 13:06
Gallons purged: 1/2 gal
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Spc. Conductivity µS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
12:13	15.78'	1L	6.69	3.36↓	821	51.4	17.6	-102.3	
12:18	15.83	1.5L	6.76	2.08	815	49.2	16.6	-121.2	
12:23	15.89'	2L	6.77	1.92	804	44.6	16.5	-124.0	
12:28	15.89'	2.1L	6.76	2.23	802	43.4	16.6	-123.8	

DTW at end of sampling = 16.00'

Ferrous iron = 4.8 mg/L

Sampling Data

Sample No: MW-20-050720
Location and Depth:
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 12:27 ☐ AM ☒ PM
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): slight yellow discoloration, moderate odor, effervecent

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:
1L poly	1	None
1/4 L poly w/ H_2SO_4	1	
1/2 L Amber	2	
1/2 L poly	1	
1/4 L poly w/ HNO_3	1	
40 mL VOA w/ HCl	8	

Comments:

Total Depth = 17'

Purging v. slow. (odor when opened well.) No NAPL on water meter probe, but did not measure w/ interface probe).

Sheen in purge water

Signature: Del Ostlet
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POC-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: G. Cisneros

Purge Data

Well ID: MW-22
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: Total Depth = 29.60

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal): 4.5 gals
Depth of water (from top of well casing): 22.84
Well Casing Type/Diameter/Screened Interval: 4" well
After 5 minutes of purging (from top of casing): 22.95
Begin purge (time): 0853
End purge (time):
Volume purged:
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged (Gals)	pH	DO (mg/L)	Sp. Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments (mS/cm Cond.)
0906	23.02	2.5	6.40	6.17	286.6	6.9	14.7	32.8	0.245
0909	23.02	3.0	6.27	6.27	289.9	8.7	14.8	34.3	0.245
0920	23.02	5.0	6.23	3.23	284.2	7.1	14.7	30.0	0.243
0923	23.02	5.5	6.23	2.86	284.2	8.9	14.8	28.5	0.243
0926	23.2	6.0	6.23	2.74	284.2	9.9	14.8	27.3	0.243

Sampling Data

Sample No: MW-22-050720
Location and Depth: MW-22 SE corner/site
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 0927
Weather: SUNNY
Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other: N/A
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable and/or dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

cPAHs MNA Parameters

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

FBI

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Ambers	2		
40ml VOAs	6		Ferrous Fe = 5.26mg/L
40ml VOAs	2		
750ml Poly(HNO3)	1		
500ml Poly	1		

Fremont

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/6/20
Project Number:
Field Personnel: P.O

Purge Data

Well ID: MW-23
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: fine, missing all 3 bolts

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 22.80'
Well Casing Type/Diameter/Screened Interval: 4" PVC
After 5 minutes of purging (from top of casing): 22.90'
Begin purge (time): 15:28
End purge (time): 16:11
Gallons purged: 1.8 gal
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	SPC Conductivity µS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
15:38	22.88'	2.25L	6.45	0.31	619	9.51	15.7	-81.4	
15:43	22.86'	3L	6.49	0.21	623	5.86	15.6	-91.6	
15:48	22.85'	4L	6.50	0.16	628	4.69	15.6	-97.5	
15:53	22.82'	5L	6.50	0.15	633	4.14	15.5	-99.1	

Sampling Data

Sample No: MW-23-050620
Location and Depth:
Date Collected (mo/dy/yr): 5/6/20
Time Collected: 15:55 ☐ AM ☒ PM
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Clear, trace flock, v. slight reducing odor.

Sample Analyses

CPAH ☐
☐ MNA parameters: Mn, Alkalinity, Sulfate, Nitrate, Methane

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1/2 L Amber	2	None	Total depth = 32.60'
1/2 L poly	1		Tidally influenced?
1/4 L poly w/ HNO_3	1		Ferrous Iron Field Test: 9.64 mg/L
40 mL VOA w/ HCl	8		Purge water is clear, but slightly cloudy

Signature:
Date: 5/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: PO

Purge Data

Well ID: MW-24 Secure: ☒ Yes ☐ No Well Condition/Damage Description: fine

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal): 5 gallons
Depth of water (from top of well casing): 12.55'
Well Casing Type/Diameter/Screened Interval: 4" PVC
After 5 minutes of purging (from top of casing): 13.03'
Begin purge (time): 09:20
End purge (time): 10:12
Gallons purged: 2 gals
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Spc. Conductivity uS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
09:30	13.42'	2.25L	7.04	6.11	188.2	48.5	12.8	101.9	Slowed pump
09:35	13.71'	3L	7.12	6.00	188.6	38.4	13.1	105.1	
09:40	13.94'	4L	6.95	5.92	188.0	25.9	13.1	107.2	
09:45	14.20'	5L	6.92	5.89	188.0	17.2	13.1	109.6	
									Ferrous Iron=0 (non-detect)

Sampling Data

Sample No: MW-24-050720 Location and Depth:
Date Collected (mo/dy/yr): 5/7/20 Time Collected: 09:47 ☒ AM ☐ PM Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): turbid (chunks), no odor

Sample Analyses

cPAHs ☑ + MNA parameters: Mn, Methane, Alkalinity, Sulfate, nitrate

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:
1/2 L Amber	2	None
40 mL VOA w/ HCl	8	
1/2 L poly	1	
1/4 L poly w/ HNO3	1	

Comments:

Total Depth = 20.15' (soft bottom)

Purge water very turbid at start of pumping (probe caked w/ 4" of mud after measuring total depth).

Perched aquifer - No recharge.

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: P.O.

Purge Data

Well ID: MW-25
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: Well cap not sealed. Monument partially overgrown with grass.

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal): 6.3 gallons
Depth of water (from top of well casing): 8.02'
Well Casing Type/Diameter/Screened Interval: 4" PVC
After 5 minutes of purging (from top of casing): 8.35'
Begin purge (time): 10:37
End purge (time): 11:23
Gallons purged: 2 gal
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH SU	DO mg/L	Spc. Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
10:45	8.54'	2L	6.52	0.31	301.6	20.9	12.4	-42.8	
10:50	8.80'	3L	6.52	0.18	301.5	10.6	12.4	-56.5	
10:55	9.01'	4L	6.52	0.12	301.4	6.6	12.4	-64.6	
11:00	9.12'	5L	6.52	0.10	301.5	6.3	12.4	-68.0	
11:05	9.23'	6L	6.52	0.08	301.9	7.3	12.4	-70.9	Ferrous Iron = 3.11 mg/L

Sampling Data

Sample No: MW-25-050720
Location and Depth:
Date Collected (mo/dy/yr): 5/7/2020
Time Collected: 11:07 ☒ AM ☐ PM
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 [✓ Other:] YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): clear, trace flock, mild reducing (sulphury?) odor

Sample Analyses

cPAHs – ☑ + MNA parameters: Mn, Methane, Alk, Nitrate, Sulfate

TPH-D	(HCl)	☒	Chlor / Fluor	(unpres)	☐	COD / TOC	(H2SO4)	☐	Orthophos	(FILTER)	☐
TPH-G	(HCl)	☒	BTEX	(HCl)	☒	Total Metals	(HNO3)	☐	TKN/Phos	(N2SO4)	☐

Diss. Metals	(HNO3)	☐
VOCs	(HCl)	☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1/2 L Amber	2	None	Total Depth = 17.58' (soft bottom)
40 mL VOA w/ HCl	8		Well cap not sealed. Signs of mud/sediment
1/2 L poly	1		getting into well casing.
1/4 L poly w/ HNO_3	1		

Signature:

Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name:
Date of Collection:
Project Number:
Field Personnel:

Purge Data

Well ID: MW-26 Secure: ☑ Yes ☐ No Well Condition/Damage Description: good

Depth Sounder decontaminated Prior to Placement in Well: ☑ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 12.80 Well Casing Type/Diameter/Screened Interval:

After 5 minutes of purging (from top of casing): ~~919~~ 924 13.02

Begin purge (time): 919

End purge (time): 10:50

Gallons purged: 7L

Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ½"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged L	pH	DO mg/L	Conductivity µS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
932	13.24	1	6.50	2.22	117.4	44.28	13.5	-9.2	
937	13.34	1.5	6.35	1.76	187.0	33.65	13.1	-16.0	
942	13.44	2	6.32	1.56	192.6	34.50	13.1	-24.6	
947	13.52	2.5	6.30	1.44	195.7	28.60	13.3	-26.1	
952	13.58	3	6.27	1.57	195.1	27.01	13.2	-28.3	

Sampling Data

Sample No: MW-26-050720 Location and Depth:

Date Collected (mo/dy/yr): 5/7/20 Time Collected: 10:01 ☐ AM ☐ PM Weather:

Type: ☑ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☑ Unfiltered Other:

Sample Collected with: ☐ Bailer ☑ Pump Other: Type: Peristaltic

Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon] and poly tubing Other:

Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOAS	18	MS/MSD	
1/2 L amber	6		

Signature: **Date:** 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: G. Cisneros

Purge Data

Well ID: MW-27
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: Total 28.20

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal): 1.7 gals
Depth of water (from top of well casing): 18.10
Well Casing Type/Diameter/Screened Interval: 2 "
After 5 minutes of purging (from top of casing):
Begin purge (time): 1001
End purge (time): 1029
Volume purged: 4.0 Liters
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Liters Vol. Purged	pH	mg/L DO	Sp. uS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	Cond. mS/cm Comments
1014	18.10	1.9	6.61	9.82	543	12.8	14.6	61.2	0.464
1017	18.10	2.2	6.40	4.93	529	15.0	13.9	45.3	0.446
1020	18.10	2.5	6.41	4.13	530	16.0	13.9	37.3	0.448
1023	18.10	3.0	6.42	3.41	531	20.4	13.9	29.7	0.448
1026	18.10	3.5	6.43	3.19	532	22.0	13.9	21.0	0.449
1029	18.10	3.9	6.48	3.12	531	22.2	13.9	21.6	0.449

Sampling Data

Sample No: MW-27-050720
Location and Depth: Between tracks
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 1027
Weather: Sunny
Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other: N/A
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Slight yellow No odor

Sample Analyses

[✓ TPH-D]	(HCl) ☑	Chlor / Fluor	cPAHs (unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☑	[✓ BTEX]	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Ambers	2		
40ml VOAs	6	MW-127-050720	
		@ 1041	
Dup 500ml Ambers	2		
40ml VOAs	6		

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 05/06/2020
Project Number:
Field Personnel: TS

Purge Data

Well ID: MW-28
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: OK - flooded monument damage to cap seal · Total depth 19.34' Replaced 20' tubing
Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 17.91'
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 18.41
Begin purge (time): ~~15:35~~ 15:50
End purge (time):
Gallons purged:
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to ' Water	Vol. Purged L	pH	DO mg/L	Conductivity mS/cm	Turbidity	Temp °C	ORP	Comments
15:55	18.41	.25	6.31	4.84	0.169	85.5	16.3	69.1	
16:00	18.46	.5	6.06	1.24	0.163	51.6	15.7	62.7	
16:05	/	/	/	/	/	/	/	/	Ran dry.

Sampling Data

Sample No: MW-28-050620
Location and Depth:
Date Collected (mo/dy/yr): 05/06/20
Time Collected: / ☐ AM ☐ PM
Weather:
Type: ☐ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other:
Sample Collected with: ☐ Bailer ☐ Pump Other:
Type:
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other:
Sample Description (Color, Turbidity, Odor, Other): No sample taken

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
	0		No sample taken. Well ran dry @ 16:04.

Signature: Tyler Scott
Date: 05/06/2020

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL - TPH
Date of Collection: 4/6/20
Project Number:
Field Personnel: AJ + PD + TS + GC

Purge Data

Well ID: MW-29
Secure: ☑ Yes ☐ No
Well Condition/Damage Description:
Total depth 27.10

Depth Sounder decontaminated Prior to Placement in Well: ☑ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 15.82
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 15.82
Begin purge (time): 1505
End purge (time): 1600
Volume purged: 5 L
Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged L	pH	DO mg/L	Conductivity uS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
1515	15.84	1	6.44	4.30	150.7	5.10	14.4	94.2	
1520	15.84	1.75	6.29	4.32	146.1	0.22	14.3	106.8	
1525	15.84	2.5	6.21	4.48	141.2	1.01	14.2	113.6	
1530	15.84	3.25	6.18	4.51	139.8	0.33	14.2	118.2	
1535	15.84	4.00	6.17	4.13	120.6	0.17	14.2	120.8	

Sampling Data

Sample No: MW-29-040620
Location and Depth: 65 and partly cloudy
Date Collected (mo/dy/yr): 4/6/20
Time Collected: 1540
Weather:
Type: ☑ Ground Water ☐ Surface Water Other:
Sample ☐ Filtered ☑ Unfiltered Other:
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon] and poly tubing Other:
Sample Description (Color, Turbidity, Odor, Other): clear, colorless, no apparent odor

Sample Analyses

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOAS	6	N/A	Ferrous iron = 0.0 mg/L
½ L amber	2		
MNA Voas	2		
250 mL poly	1		
500 mL poly	1		

Signature:
Date: 4/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL - TPH
Date of Collection: 5/6/20
Project Number:
Field Personnel: P.D.

Purge Data

Well ID: MW-31
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: fine, buried under 6" gravel/dirt
ECY Tag: AEG 864
Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 13.13'
Well Casing Type/Diameter/Screened Interval: 2" PVC /
After 5 minutes of purging (from top of casing): 13.40'
Begin purge (time): 12:33
End purge (time): 13:18
Gallons purged: 7 Liters
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	SpC Conductivity µS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
12:43	13.41'	2L	6.53	4.40	363.7	29.14	14.1	96.9	
12:48	13.40'	3L	6.53	3.93	369.7	13.61	14.3	109.1	
12:53	" "	4L	6.53	3.79	371.7	10.64	14.3	113.6	
12:58	" "	5L	6.53	3.64	373.8	7.78	14.3	117.8	
13:03	" "	6L	6.53	3.53	375.8	6.03	14.3	124.1	

Sampling Data

Sample No: MW-31-050620
Location and Depth:
Date Collected (mo/dy/yr): 05/6/2020
Time Collected: 13:05 ☐ AM ☒ PM
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): clear, no discoloration or odor.

Sample Analyses

cPAHs ☑ + MNA parameters: Mn, methane, nitrate, sulfate, Alk

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:
1/2 L Amber	2	None
40 mL VOA	8	
500 mL poly (No head)	1	
250 mL poly w/ HNO_3	1	

Comments:
Total Depth = 18.38' (Soft bottom)
Ferrous Iron Colorimeter Field test: 0mg/L nondetect
Well next to creosote treated lumber pile.

Signature:
Date: 5/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: AJ+PD + CG+TT

Purge Data

Well ID: MW-32
Secure: ☑ Yes ☐ No
Well Condition/Damage Description: well cap is good but Poor condition, needs new well box well box is poor condition

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 13.20
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 13.52
Begin purge (time): 8:03
End purge (time): 855
Volume purged: 7 L
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. L Purged	pH	DO mg/L	Conductivity µS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
8:13	13.60	1	6.31	1.05	352.9	23.21	13.4	-101.2	
8:18	13.60	2	6.26	0.70	352.7	21.48	13.5	-112.1	
8:23	13.66	2.75	6.26	0.63	352.7	14.66	13.6	-116.8	
8:28	13.66	3.5	6.26	0.77	351.5	11.44	13.7	-118.4	
8:33	13.66	4.25	6.26	0.63	351.7	9.07	13.6	-118.8	

Sampling Data

Sample No: MW-32-050720
Location and Depth:
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 8:41
Weather: 60 and partly cloudy
Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☑ Unfiltered Other:
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: 451
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon] and poly tubing Other:
Sample Description (Color, Turbidity, Odor, Other): Clear, colorless, no apparent odor

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOAs	6	N/A	
1/2 L amber	2		

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/6/20
Project Number: Tanks GW
Field Personnel: G-Cisneros

Purge Data

Well ID: MW-133 MW-33 Secure: ☐ Yes ☐ No
Well Condition/Damage Description:
Total = 28.15

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 18.32
Well Casing Type/Diameter/Screened Interval: 2'
After 5 minutes of purging (from top of casing): 18.32
Begin purge (time): 1508
End purge (time): 1547
Volume purged: Liters
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged Liters	pH	DO mg/L	Sp. Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments Cond mS/cm
1532	18.32	3.8	6.49	3.43	461.9	143.6	14.9	-48.6	0.357
1535	18.32	4.0	6.49	3.20	466.1	128.7	14.9	-50.1	0.400
1538	18.32	4.3	6.47	2.98	468.0	102.0	14.8	-51.6	0.401
1541	18.32	4.8	6.46	2.84	473.9	86.6	14.9	-52.7	0.406
1544	18.32	5.2	6.46	2.80	474.7	80.3	14.9	-53.4	0.407
1547	18.32	5.6	6.46	2.74	474.6	72.5	14.8	-53.8	0.407

Sampling Data

Sample No: MW-33-050620
Location and Depth:
Date Collected (mo/dy/yr): 5/6
Time Collected: 1547
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other: N/A
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC CPAHs	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	4		
40ml VOAs	12	MW-133	MW-133-050620
		@ 1601	
			Dup @ 1601

Signature:

Date: 5/6/20

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GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: FCL-TPH
Date of Collection: 4/6/20
Project Number:
Field Personnel: AJ+PO+TS+GC

Purge Data

Well ID: MW-34
Secure: ☑ Yes ☐ No
Well Condition/Damage Description:
ENT: 3ME 944
Total depth 29.87

Depth Sounder decontaminated Prior to Placement in Well: ☑ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 18.87
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 18.98
Begin purge (time): 10:17
End purge (time): 11:03
Volume purged: 5 L
Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged L	pH	DO mg/L	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
10:28	18.99	1.5	5.88	1.41	1680	20.74	14.8	-70.8	
10:33	18.99	2	5.80	0.63	1679	19.39	15.6	-64.3	
10:38	18.99	2.5	5.79	0.52	1683	10.43	16.2	-58.2	
10:43	18.99	3	5.79	0.40	1678	9.11	16.3	-56.2	

Sampling Data

Sample No: MW-34-040620
Location and Depth:
Date Collected (mo/dy/yr): 4/6/20
Time Collected: 10:51
Weather: 60 and partly cloudy
Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☑ Unfiltered Other:
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other:
Sample Description (Color, Turbidity, Odor, Other): Clear, colorless, tph odor

Sample Analyses

TPH-D	(HCl) ☑	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☑

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOAS	6	N/A	
1 L amber	2		

Signature:
Date:

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/6/2020
Project Number:
Field Personnel: P.O.

Purge Data

Well ID: MW-35
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: good, new

ECM tag: BME 943

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 14.29' @ 10:01
Well Casing Type/Diameter/Screened Interval: 2" PVC, 16-26
After 5 minutes of purging (from top of casing): 14.76'
Begin purge (time): 10:08
End purge (time): 10:47
Gallons purged: 1.5 gals
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Spc Conductivity uS/cm	Turbidity	Temp °C	ORP mV	Comments
10:08	14.79'	2 L	6.60	0.35	352.6	4.90	13.1	111.2	
10:13	14.80'	2.75 L	6.58	0.22	354.6	6.27	13.1	117.3	
10:28	14.80'	4 L	6.55	0.16	368.1	6.60	13.3	119.6	
10:33	14.80'	5 L	6.55	0.13	364.8	7.70	13.2	119.9	

Sampling Data

Sample No: MW-35
Location and Depth:
Date Collected (mo/dy/yr): 5/6/2020
Time Collected: 10:35 ☒ AM ☐ PM
Weather: Rain storm, then sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other:
Sample Description (Color, Turbidity, Odor, Other): v. slight yellow coloration, clear. No obvious odor

Sample Analyses

		CPAHs ☑									
TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐		
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☒		

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1/2 L Amber	2	None	Total depth = 25.64'
40 mL VOA	6		

Signature:
Date: 5/6/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 05/06/20
Project Number:
Field Personnel: TB

Purge Data

Well ID: MW-36
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: good - new tubing installed 29' Total depth = 34.90'

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 22.88'
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 22.89
Begin purge (time): 16:42
End purge (time): 17:20
Gallons purged: 4.75 Liters
Purge water disposal method: Drum on site

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water '	Vol. Purged L	pH	DO mg/L	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
16:47	22.89'	.5	6.41	1.28	0.271	9.0	15.7	94.6	
16:52	22.89'	1.25	6.40	0.61	0.270	13.4	15.6	97.8	
16:57	22.89	2	6.41	0.39	0.269	13.2	15.5	98.9	
17:02	22.90	2.75	6.42	0.26	0.270	9.4	15.5	99.8	
17:07	22.90	3.5	6.42	0.24	0.270	10.7	15.5	100.3	

Sampling Data

Sample No: MW-36-050620
Location and Depth:
Date Collected (mo/dy/yr): 05/06/20
Time Collected: 17:08 ☐ AM ☒ PM
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable and/or dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): mostly clear, low/no odor

Sample Analyses

TPH-D	(HCl)	☐	Chlor / Fluor	(unpres)	☐	COD / TOC	(H2SO4)	☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl)	☐	BTEX	(HCl)	☐	Total Metals	(HNO3)	☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOA	6		
1/2 L Amber	2		

Signature: Tyler
Date:

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 05/07/2020
Project Number:
Field Personnel: TS

Purge Data

Well ID: MW-37
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: good - new tubing installed ≈ 35'   Total depth = 34.50'   # BME 947

Depth Sounder decontaminated Prior to Placement in Well: ☑ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 22.40
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 22.38'
Begin purge (time): 08:13
End purge (time): 08:58
Gallons purged: 6 Liters
Purge water disposal method: Drum on site

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water '	Vol. Purged L	pH	DO mg/L	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
08:18	22.38	1	6.97	2.91	2.041	10.1	14.6	-1073	
08:23	22.38	1.75	6.86	0.36	1.958	9.8	14.6	-128.1	
08:28	22.38	2.25	6.85	0.24	1.895	10.2	14.6	-128.7	
08:33	22.38	3	6.85	0.18	1.856	10.3	14.5	-129.6	
08:38	22.38	4	6.84	0.14	1.816	8.8	14.4	-130.0	
08:43	22.38	4.75	6.84	0.12	1.799	8.7	14.6	-130.8	

Sampling Data

Sample No: MW-37-050720
Location and Depth:
Date Collected (mo/dy/yr): 05/07/20
Time Collected: 08:45 ☒ AM ☐ PM
Weather: Sunny 48°
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): Dark yellow/orange color; clear; ~~moderate~~ low odor

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOA	6		
1/2 L Amber	2		

Signature: Tyler Scott
Date: 05/07/2020

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/7/20
Project Number:
Field Personnel: 5/7/20

Purge Data

Well ID: MW-38
Secure: ☐ Yes ☐ No
Well Condition/Damage Description:
Total 35.05

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal): 2.2 gals
Depth of water (from top of well casing): 22.12
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 22.13
Begin purge (time): 0807
End purge (time): 0836
Volume purged: 3.5 liters
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Sp. Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments mS/cm
0822	22.13	2.0	6.41	5.73	466.7	31.9	14.4	31.1	0.397
0825	22.13	2.2	6.32	4.52	467.3	130.8	14.6	10.5	0.399
0828	22.13	2.5	6.30	4.06	467.7	167.0	14.7	3.5	0.400
0831	22.13	2.8	6.30	3.72	468.7	201.0	14.6	3.7	0.399
0834	22.13	3.1	6.30	3.55	466.0	221.0	14.7	-5.4	0.398
0836	22.13	3.4	6.30	3.49	466.3	230.1	14.6	-6.5	0.398

Sampling Data

Sample No: MW-38-050720
Location and Depth: MW-38
Date Collected (mo/dy/yr): 5/7/20
Time Collected: ~~0836~~ 0836
Weather: Sunny
Type: ☑ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other: N/A
Sample Collected with: ☐ Bailer ☑ Pump Other:
Type: Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable and/or dedicated silicon and poly tubing] new Other:
Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

[✓ TPH-D]	(HCl) ☑	Chlor / Fluor	(unpres) ☐ cPAHs	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☑	[✓ BTEX]	(HCl) ☑	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	2		
40ml VOAs	6		
Total 8 Bottles			

Signature:
Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POC-TPH
Date of Collection: 5/7/20
Project Number: 2020 GW
Field Personnel: Sabe Cisneros

Purge Data

Well ID: MW-39
Secure: ☐ Yes ☐ No
Well Condition/Damage Description: New
Total Depth = 17.55

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 12.08
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 12.08
Begin purge (time): 1318
End purge (time): 1344
Volume purged: Liters
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Liters Vol. Purged	pH	mg/L DO	Sp. µS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	Cond. mS/cm Comments
1332	12.08	1.5	6.61	4.63	533	6.7	15.7	36.8	0.463
1335	12.08	1.7	6.50	3.83	527	6.0	15.5	17.5	0.456
1338	12.08	1.9	6.47	3.37	524	6.1	15.7	4.1	0.456
1341	12.08	2.1	6.46	3.06	523	5.9	15.9	-6.3	0.456
1344	12.08	2.3	6.45	2.93	522	5.8	16.0	-7.9	0.456

Sampling Data

Sample No: MW-39-050720
Location and Depth: N. end of Site
Date Collected (mo/dy/yr): 5/7/20
Time Collected: 1344
Weather: Sunny

Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peristaltic

Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	[✓ VOCs]	(HCl) ☒

cPAHs ☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	2		
40ml VOAs	6		

Signature:

Date: 5/7/20

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 05/06/2020
Project Number:
Field Personnel: TS

Purge Data

Well ID: MW-40
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: no tubing
Total Depth - 25.55'   30' tubing installed

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 17.05'
Well Casing Type/Diameter/Screened Interval: 4"
After 5 minutes of purging (from top of casing): 17.09
Begin purge (time): ~~2~~14:14
End purge (time): 15:01
Gallons purged: 6.25 Liters
Purge water disposal method: Drum on site

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to / Water	Vol. Purged L	pH	DO mg/L	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
~~2~~14:19	17.09	.5	6.49	1.13	0.417	6.1	14.4	-196.0	
14:24	17.09	1.25	6.52	0.57	0.410	5.3	14.1	-178.3	
14:29	17.09	2	6.54	0.35	0.405	3.9	13.7	-164.6	
14:34	17.09	3	6.54	0.26	0.406	3.9	14.0	-160.3	
14:39	17.09	4	6.54	0.21	0.407	3.7	14.0	-156.0	

Sampling Data

Sample No: MW-40-050620
Location and Depth:
Date Collected (mo/dy/yr): 05/06/20
Time Collected: 14:40 ☐ AM ☒ PM
Weather: Sunny
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peri
Water Quality Instrument Data Collected with: Type: ☐ Horiba U-22 ☐ Horiba U-50 Other: YSI Pro DSS
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable and/or dedicated silicon and poly tubing] Other: New
Sample Description (Color, Turbidity, Odor, Other): yellow color, clear but effervescent, moderate odor

Sample Analyses

TPH-D	(HCl)	☐	Chlor / Fluor	(unpres)	☐	COD / TOC	(H2SO4)	☐	Orthophos	(FILTER)	☐	Diss. Metals	(HNO3)	☐
TPH-G	(HCl)	☐	BTEX	(HCl)	☐	Total Metals	(HNO3)	☐	TKN/Phos	(N2SO4)	☐	VOCs	(HCl)	☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
VOA	6		
½ L Amber	2		
1L Poly	1		
~~40oz~~ Poly 250mL	1		

Signature: Tyler
Date: 05/06/2020

2

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 5/6/20
Project Number:
Field Personnel: G. Cisneros

Purge Data

Well ID: UST-4 Secure: ☐ Yes ☐ No Well Condition/Damage Description: Total = 23.38

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 17.36
Well Casing Type/Diameter/Screened Interval: 2"
After 5 minutes of purging (from top of casing): 17.38
Begin purge (time): 1432
End purge (time): 1503
Volume purged: 3.8 Liters
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged Li	pH	DO mg/L	Sp. Conductivity uS/cm	Turbidity NTU	Temp °C	ORP mV	Comments Cond mS/cm
1448	17.38	1.8	6.45	8.59	286.4	12.1	14.9	78.7	0.246
1451	17.38	2.0	6.13	8.38	284.6	11.7	14.8	85.7	0.244
1454	17.38	2.2	5.98	8.25	283.9	11.2	14.8	90.5	0.243
1457	17.38	2.6	5.91	8.20	283.6	15.2	14.8	93.9	0.242
1500	17.38	3.1	5.91	8.17	279.4	17.9	14.8	94.2	0.239
1503	17.38	3.5	5.90	8.13	277.5	19.1	14.8	94.2	0.237

Sampling Data

Sample No: UST-04-050620 Location and Depth: Former Mechanics Shop

Date Collected (mo/dy/yr): 5/6 Time Collected: 1504 Weather: Sunny

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☐ Unfiltered Other: Lab filtered

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Water Quality Instrument Data Collected with: Type: ☐ Horiba U-50 Other: YSI

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:

Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

Total & Dissolved Lead

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
250ml HNO3	1	← Total lead	
250ml	1	← Dissolved	
500ml Amber	2		
40 ml VOAs	6		

Signature: **Date:** 5/6/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event:
Field Personnel: TS

Purge Data

Location ID: **MW-01**
Ecology Tag —
Diameter: 4.0 Screened Interval: 6.2-16.3
GPS:
Total Depth: 16.3 Transducer S/N:

Location Condition (Well damage, well cap damaged, silted up):
Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 11.73
After 5 minutes of purging (from TOC): 11.75
Begin purge (time): 11:54 End purge (time): 12:55
Volume purged: 11 Liters Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
12:15	11.76'	3	6.55	0.08	282.6	-2.3	15.1	-85.5	*water clear
12:20	11.76'	4.25	6.51	0.02	280.7	-1.5	15.1	-92.0	
12:25	11.76'	6	6.50	-0.01	278.8	-2.0	15.0	-97.6	
12:30	11.76'	7	6.50	-0.01	276.9	-2.0	15.2	-82.4	
12:35	11.76	7.8	6.51	-0.02	275.3	-2.1	15.3	-85.9	
12:40	11.76	8.8	6.51	-0.03	274.6	-2.0	15.1	-93.2	

Ferrous Iron Field Test — mg/L or ☐ Not Detected **MNA Samples Required?** Yes [✓ No]

Sampling Data

Sample No: MW-01-081020 Location: North outside of gate
Date Collected (mo/dy/yr): 08/10/20 Time Sample Collected: 12:45 Weather: Sunny
Duplicate Sample No: — Time Duplicate Sample Collected:
Type: ☒ Groundwater ☐ Surface Water ☐ Other Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ ~~disposable 0.45-µm~~ ☐
Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): .25
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes [✓ No])
			☐ MS/MSD	
500 mL Glass Amber (1) none & (1) HCl		2	☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature: **Date:** 08/10/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: Qtrly GW Monitoring
Field Personnel: P.O.

Purge Data

Location ID: **MW-02**
Ecology Tag: Not found
Diameter: 4.0 Screened Interval: 6.2-12.4
GPS:
Total Depth: 12.4

Location Condition (Well damage, well cap damaged, silted up): Missing 1 bolt
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers: None
One Casing Volume (gal):

Depth of water (from top of casing): 10.16
After 5 minutes of purging (from TOC): 10.23
Begin purge (time): 16:04
End purge (time): 16:36
Volume purged: 2 gal
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged ([✓ L]/ gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
16:09	10.23	2L	6.28	1.62	483.8	9.22	16.8	122.2	
16:14	10.25	3L	6.27	1.53	484.1	5.08	16.7	122.9	
16:19	10.26	4.25	6.25	1.46	483.0	4.40	16.6	121.1	
16:24	10.26	5.5	6.28	1.47	481.7	4.22	16.6	119.8	
16:29	10.26	7L	6.28	1.49	481.5	4.22	16.6	119.2	

Ferrous Iron Field Test NM mg/L or ☐ Not Detected
MNA Samples Required? Yes [✓ No]

Sampling Data

Sample No: MW-02-081020
Location: Calloway Ross – Former Site
Date Collected (mo/dy/yr): 8/10/20
Time Sample Collected: 16:30
Weather: Sunny, 85° F
Duplicate Sample No: None
Time Duplicate Sample Collected:
Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ ~~disposable 0.45-um~~ ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear, no odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☒

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane? (Yes [✓ No])
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 8	

Signature:
Date: 8/10/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-02 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/10/20

Field Event: Qrtly GW Monitoring

Field Personnel: P.O.

Purge Data

Location ID: **MW-03**

Ecology Tag: Not found

Diameter: 4.0

Screened Interval: 8.4-18.4

GPS: NA

Total Depth: 18.4

Location Condition (Well damage, well cap damaged, silted up): fine - grass overgrown and well casing a bit slimy

Secure: ☒ Yes ☐ No

Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: None

One Casing Volume (gal):

Depth of water (from top of casing): 14.27'

After 5 minutes of purging (from TOC): 14.36

Begin purge (time): 14:18

End purge (time): 15:16

Volume purged: 14L

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *[✓ L] / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
14:23	14.36	2L	6.15	0.47	228.6	12.35	16.8	96.8	
14:28	14.36	3.5L	6.10	0.34	230.5	11.17	16.7	88.6	
14:33	14.37	5L	6.10	0.30	232.4	11.85	16.6	79.3	
14:38	14.37	6.5L	6.12	0.27	233.8	10.08	16.7	61.5	
14:43	14.38	8L	6.12	0.25	235.8	8.40	16.5	45.1	
14:48	14.38	9L	6.15	0.24	237.4	8.66	16.6	31.2	
14:53	14.38	10.25L	6.20	0.23	249.7	7.83	16.6	12.7	
14:58	14.38	11.5L	6.28	0.21	268.9	8.63	16.6	-1.6	(go to back)

Ferrous Iron Field Test NM mg/L or ☐ Not Detected

MNA Samples Required? Yes [✓ No]

Sampling Data

Sample No: MW-3-081020

Location:

Date Collected (mo/dy/yr): 8/10/20

Time Sample Collected: 1455

Weather: Sunny, 85°F

Duplicate Sample No:

Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear. Slight HC odor

Sample Analyses

TPH-Dx	(HCl)	☒	TPH-G	(HCl)	☒	BTEX	(HCl)	☒	cPAHs	(unpres)	☒
Diss Mg (lab filtered)	(unpres)	☐	Total Alkalinity	(unpres)	☐	Nitrate/Sulfate	(unpres)	☐	Methane	(HCl)	☐

EDB/EDC/MTBE and Naph. (HCl) ☐

VOCs (HCl) ☒

\+ lead (total)

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane? Yes [✓ No]
250 mL Poly - Pb	HNO3	1	☐ MS/MSD	
500 mL Glass Amber (1) none & (1) HCl		2	☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 9	

Signature:

Date: 8/10/20

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Time	DTW	Vol	pH	D.O.	SpC.	NTU	Temp	ORP
15:03	14.38	12.5 L	6.31	0.21	274.2	6.66	16.7	-10.8
15:08	14.38	13.5 L	6.32	0.20	276.3	6.95	16.7	-16.5

- Sampled @ 15:10 (Sample time on COC = 14:55)

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: Qtrly GW Monitoring
Field Personnel: P.O.

Purge Data

Location ID: **MW-05**
Ecology Tag
Diameter: 2.0 Screened Interval: 12.5-22.5
GPS:
Total Depth: 22.5 (16.64')

Location Condition (Well damage, well cap damaged, [✓ silted up]):
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Depth of water (from top of casing): 15.90
After 5 minutes of purging (from TOC):
Begin purge (time): End purge (time):
Volume purged: Purge water disposal method:

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments

No sample attempted, too little water

Ferrous Iron Field Test NM mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: Location:
Date Collected (mo/dy/yr): Time Sample Collected: Weather:
Duplicate Sample No: Time Duplicate Sample Collected:
Type: ☐ Groundwater ☐ Surface Water ☐ Other
Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☐ Grab ☐ Pump Other:
Type: ☐ Peristaltic ☐ Bladder Other: Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: : ☐ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature:
Date: 8/10/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event:
Field Personnel: TS

Purge Data

Location ID: **MW-06**
Ecology Tag —
Diameter: 4.0
Screened Interval: 16-21
GPS:
Total Depth: 21

Location Condition (Well damage, well cap damaged, silted up): replaced 4" cap
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 11.35'
After 5 minutes of purging (from TOC): 11.35'
Begin purge (time): 13:20
End purge (time): 14:10
Volume purged: 8 Liters
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:35	11.36	3.75	6.56	0.16	231.7	1.8	15.9	-117.7	
13:40	11.36	4.25	6.56	0.16	236.8	1.9	16.3	-115.8	
13:45	11.36	5	6.55	0.13	238.3	1.8	16.3	-115.9	
13:50	11.36	5.75	6.55	0.10	239.4	2.4	16.3	-116.1	

Ferrous Iron Field Test — mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-06-081020
Location: NE just inside gate
Date Collected (mo/dy/yr): 08/10/20
Time Sample Collected: 13:55
Weather: Sunny-hot
Duplicate Sample No: —
Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min): ≈.25
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear; no odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature: Tyler Scott
Date: 8/10/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20

Field Event:
Field Personnel: TS

Purge Data

Location ID: **MW-07**
Ecology Tag: n/a
Diameter: 4.0 Screened Interval: 18-23
GPS:
Total Depth: 23

Location Condition (Well damage, well cap damaged, silted up): Casing bent.

Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 15.70
After 5 minutes of purging (from TOC): 15.73
Begin purge (time): 8:21 End purge (time): 09:20
Volume purged: 14L Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
08:40	15.71	5.75	6.70	0.14	494.9	0.5	14.1	-112.9	
08:45	15.71	7	6.70	0.09	495.2	0.4	14.1	-121.0	
08:50	15.71	8.5	6.69	0.05	495.0	0.5	14.0	-125.1	
08:55	15.71	9.75	6.69	0.03	494.9	0.6	14.1	-128.0	

Ferrous Iron Field Test — mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-07-081120
Location: west of train tracks
Date Collected (mo/dy/yr): 08/11/20
Time Sample Collected: 09:00
Weather: Overcast ~ cool
Duplicate Sample No: MW-107-081120
Time Duplicate Sample Collected: 09:05

Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ ~~disposable 0.45 µm~~ ☐

Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min): .25

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☒ Tubing replaced = 40'

Sample Description (Color, Turbidity, Odor, Other): Slight yellowish tint; mild odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☒ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
250 mL Poly - Pb	HNO3	1	☐ MS/MSD	
500 mL Glass Amber (1) none & (1) HCl		2	☐ Field Blank	
250mL Poly Pb	None	1	☐ Rinsate	
			Total Bottles = 20	

Signature:
Date: 08/11/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/10/20

Field Event: Quarterly GW Monitoring

Field Personnel: P.O.

Purge Data

Location ID: **MW-08**

Ecology Tag: Not found

Diameter: 4.0 Screened Interval: 18-23

GPS: —

Total Depth: 23.65

Location Condition (Well damage, well cap damaged, silted up): one bolt sheared off

Secure: ☒ Yes ☐ No

Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: None

One Casing Volume (gal):

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Depth of water (from top of casing): 13.96

After 5 minutes of purging (from TOC): 14.06

Begin purge (time): 13:00 End purge (time): 14:01

Volume purged: 14 L Purge water disposal method: drum

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1305	14.06'	2L	6.38	0.44	576	20.07	15.6	76.2	slowed pump
1310	14.06	3.5L	6.44	0.31	572	7.31	15.6	-87	
1315	14.07'	5L	6.46	0.26	567	8.20	15.4	-40.5	
1321	14.08	7L	6.48	0.24	567	6.36	15.5	-58.7	
1326	14.08'	9L	6.47	0.22	569	6.80	15.4	-70.3	
1331	14.08'	10.5L	6.49	0.21	570	6.90	15.5	-78.8	
1336	14.06'	11.75	6.47	0.21	571	7.36	15.9	-85.0	

Ferrous Iron Field Test NM mg/L or ☐ Not Detected

MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-8-081020

Location: Former Calloway Ross Site

Date Collected (mo/dy/yr): 8/10/20

Time Sample Collected: 1338

Weather: Sunny, 75°F

Duplicate Sample No:

Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, slightly yellow, moderate to strong HC odor, light sheen in purge bucket effervescent

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6 x 2	☐ Field Duplicate	2 extra VOAs required for Methane (Yes [✓ No])
500 mL Glass Amber (1) none & (1) HCl		2 x 3	☒ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 18	

Signature:

Date: 8/10/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/10/20

Field Event: Quarterly GWM

Field Personnel: AJ + TS + PO + GC

Purge Data

Location ID: **MW-09**

Ecology Tag: Couldn't locate

Diameter: 4.0 Screened Interval: 8-18

GPS:

Total Depth: 18

Location Condition (Well damage, well cap damaged, silted up): Okay

Secure: ☑ Yes ☐ No

Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 16.73

After 5 minutes of purging (from TOC):

Begin purge (time): 17:64 End purge (time): 15:67

Volume purged: 0.25L Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(µS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments

NO PURGED - PRODUCT

Ferrous Iron Field Test X mg/L or ☐ Not Detected

MNA Samples Required? Yes/ [✓ No]

Sampling Data

NO SAMPLES COLLECTED

Sample No: Location:

Date Collected (mo/dy/yr): Time Sample Collected: Weather:

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☐ Other Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☐ Pump Other: Type: ☐ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☐ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Product in well

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature: **Date:** 8/10/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-09 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/10/20

Field Event: Qtrly GW Monitoring

Field Personnel: P.O.

Purge Data

Location ID: **MW-10**

Ecology Tag: Not found

Diameter: 4.0 Screened Interval: 18-23

GPS:

Total Depth: 23

Location Condition (Well damage, well cap damaged, silted up): bolt flanges broken, missing 2/3 bolts

Secure: ☒ Yes ☐ No

Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 16.34'

After 5 minutes of purging (from TOC): 16.36'

Begin purge (time): 16:45 End purge (time): 5:37

Volume purged: 2.5 gal Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
16:51	16.36	1L	6.28	0.70	389.0	5.81	15.6	107.4	
16:56	16.36	2.25	6.32	0.39	394.7	4.73	15.4	67.4	
17:01	16.37	3.25L	6.33	0.30	403.8	4.15	15.2	39.6	
17:06	16.37	4.75	6.34	0.28	411.4	4.14	15.1	20.5	
17:11	16.38	6L	6.34	0.25	421.0	3.95	15.2	3.4	
17:16	16.38	7.25	6.34	0.24	426.4	4.15	15.1	-6.5	

Ferrous Iron Field Test 3.0 mg/L or ☐ Not Detected

MNA Samples Required? [✓ Yes] No

Sampling Data

Sample No: MW-10-081020

Location: Calloway Ross - Former Site

Date Collected (mo/dy/yr): 8/10/20

Time Sample Collected: 17:17

Weather: Sunny, 80°F

Duplicate Sample No:

Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☒ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, Slight HC odor, purge water slightly yellow

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☒ + total lead	Total Alkalinity	(unpres) ☒	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☒	VOCs	(HCl) ☒

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane ([✓ Yes]/No)
250 mL Poly - Pb	HNO3	1	☐ MS/MSD	
500 mL Glass Amber (1) none & (1) HCl		2	☐ Field Blank	
MNA: 250 mL Poly	none	1	☐ Rinsate FBI, Fremont	
MNA: 500 ml Poly	none	1	Total Bottles = 8/4 = 13	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:

Date: 8/10/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/10/20

Field Event: Quarterly GWM

Field Personnel: AT + PD + TS + GC

Purge Data

Location ID: **MW-11**

Ecology Tag:

Diameter: 4.0 Screened Interval: 6.7-16.7

GPS:

Total Depth: 16.7 Measured TD = 15.53

Location Condition (Well damage, well cap damaged, silted up): Very silty, build up on water level

Secure: ☑ Yes ☐ No

Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 15.44

After 5 minutes of purging (from TOC): Not located

Begin purge (time): 1621 End purge (time):

Volume purged: 0 Purge water disposal method:

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments

NO WATER PURGED

Ferrous Iron Field Test ______ mg/L or ☐ Not Detected

MNA Samples Required? Yes/No

Sampling Data

Sample No: Location:

Date Collected (mo/dy/yr): Time Sample Collected: Weather:

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☐ Other

Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45 µm ☐

Sample Collected with: ☐ Grab ☐ Pump Other:

Type: ☐ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☐ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other):

NO SAMPLE COLLECTED

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature:

Date: 8/10/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-11 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 08/11/20
Field Event:
Field Personnel: TS

Purge Data

Location ID: **MW-12**
Ecology Tag
Diameter: **4.0**
Screened Interval: **22-27**
GPS:
Total Depth: **27**

Location Condition (Well damage, well cap damaged, silted up):
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 14.60
After 5 minutes of purging (from TOC): 14.61
Begin purge (time): 12:28
End purge (time): 13:25
Volume purged: ~~72~~9L
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(µS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
12:40	14.61	2.5	6.46	1.59	478.7	0.6	14.6	-86.2	
12:45	14.62	3.5	6.44	0.28	482.9	2.0	14.4	-85.8	
12:50	14.62	4.5	6.44	0.16	517.0	4.2	14.5	-85.0	
12:55	14.62	5.5	6.45	0.08	554.0	8.1	14.5	-102.8	
13:00	14.62	6.25	6.45	0.03	556.0	13.2	14.7	-106.8	
13:05	14.62	7.25	6.45	0.02	554.0	9.0	14.6	-108.8	

Ferrous Iron Field Test 2-3 mg/L or ☐ Not Detected
MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW-12-081120
Location:
Date Collected (mo/dy/yr): 08/11/20
Time Sample Collected: 13:10
Weather: Sunny
Duplicate Sample No:
Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): mostly clear, slight tint ; no odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☒	Total Alkalinity	(unpres) ☒	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles =	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:
Date: 8/11/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-12 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: Quarterly GWM
Field Personnel: AJ + GC + PO + TJ

Purge Data

Location ID: **MW-13**
Ecology Tag: Couldn't Locate
Diameter: 2.0 Screened Interval: 13-18
GPS:
Total Depth: 18

Location Condition (Well damage, well cap damaged, silted up): good
Secure: ☑ Yes ☐ No
Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 11.42
After 5 minutes of purging (from TOC): 12.09
Begin purge (time): 1525 End purge (time):
Volume purged: 6.5 L Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged [✓ L]/gal	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1537	12.33	2	7.01	0.70	526	6.82	16.6	-119.9	
1542	12.71	3.25	6.73	0.60	505	6.10	16.7	-118.9	Slowed a little
1547	12.91	4.5	6.69	0.54	523	5.16	16.4	-124.1	
1552	13.17	5.25	6.66	0.53	533	4.28	16.4	-128.1	

Ferrous Iron Field Test X mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW13-081020
Location:
Date Collected (mo/dy/yr): 8/10/20
Time Sample Collected: 1559
Weather: Sunny & 78
Duplicate Sample No: NA
Time Duplicate Sample Collected: NA
Type: ☑ Groundwater ☐ Surface Water ☐ Other
Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐
Sample Collected with: ☐ Grab ☑ Pump Other:
Type: ☑ Peristaltic ☐ Bladder Other:
Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☐ disposable and/or [✓ dedicated silicon] and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Colorless, clear, no apparent odor

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature:
Date: 8/10/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: Quarterly GWM
Field Personnel: AJ + TS + GC + PG

Purge Data

Location ID: **MW-14**
Ecology Tag: Not found
Diameter: 4.0 Screened Interval: 7-12
GPS:
Total Depth: 12

Location Condition (Well damage, well cap damaged, silted up): Rusty but okay
Secure: ☑ Yes ☐ No
Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 8.09
After 5 minutes of purging (from TOC): 8.39
Begin purge (time): 1316 End purge (time):
Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1328	8.62	1.5	6.56	1.03	0.422	20.7	18.3	51.3	
1333	8.82	2	6.57	0.69	0.424	18.2	18.2	43.8	
1338	9.14	2.5	6.57	0.59	0.425	16.5	18.1	33.5	
1343	9.45	3	6.56	0.56	0.426	12.4	18.0	36.5	

Ferrous Iron Field Test mg/L or ☐ Not Detected **MNA Samples Required? Yes/No**

Sampling Data

Sample No: MW14-081120 Location:
Date Collected (mo/dy/yr): 8/11/20 Time Sample Collected: 1346 Weather:
Duplicate Sample No: NA Time Duplicate Sample Collected: NA

Type: ☑ Groundwater ☐ Surface Water ☐ Other
Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☐ Grab ☑ Pump Other:
Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☐ disposable and/or [✓ dedicated silicon] and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Colorless, trace floc, no apparent odor

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane (**Yes/No**)
250 mL Poly - Pb	HNO3	0	☐ MS/MSD	
500 mL Glass Amber (1) none & (1) HCl		2	☐ Field Blank	
MNA: 250 mL Poly	none	1	☐ Rinsate	
MNA: 500 ml Poly	none	1	**Total Bottles =** 0	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature: **Date:** 8/11/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event:
Field Personnel: TS

Purge Data

Location ID: **MW-15**
Ecology Tag
Diameter: 4.0
Screened Interval: 8.5-18.5
GPS:
Total Depth: 18.5

Location Condition (Well damage, well cap damaged, silted up): Muddy, hard to take DTW
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 15.19
After 5 minutes of purging (from TOC): 15.27
Begin purge (time): 17:08
End purge (time): 17:52
Volume purged: 10 liters
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
17:25	15.27	4.25	6.61	0.40	661.0	0.9	15.1	-132.3	Very silty @ start of purge
17:30	15.27	5.25	6.62	0.14	656.0	3.3	15.0	-132.2	
17:35	15.27	6.5	6.62	0.05	647.0	4.1	14.9	-131.9	
17:40	15.27	8	6.57	0.03	643.0	5.2	14.8	-132.5	

Ferrous Iron Field Test ______ mg/L or ☐ Not Detected
MNA Samples Required? Yes/No

Sampling Data

Sample No: MW-15-081020
Location:
Date Collected (mo/dy/yr): 08/10/20
Time Sample Collected: 17:45
Weather: Sunny ~ hot
Duplicate Sample No:
Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ ~~disposable 0.45-μm~~ ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear w/ black flock; no odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:
Date: 8/10/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/11/20

Field Event:

Field Personnel: TS

Purge Data

Location ID: **MW-16**

Ecology Tag —

Diameter: 4.0 Screened Interval: 4.5-14.5

GPS:

Total Depth: 14.5

Location Condition (Well damage, well cap damaged, silted up):

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 12.47

After 5 minutes of purging (from TOC): 12.74

Begin purge (time): 10:37 End purge (time):

Volume purged: Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.61

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
10:50	13.22	3	6.59	0.22	420.3	-0.9	15.7	20.0	Pump slowed
10:55	13.34	3.5	6.56	0.16	422.7	-1.3	15.7	-6.9	to slowest rate
11:00	13.53	4.25	6.55	0.16	420.7	-1.3	15.6	-17.8	≈200mL/min
11:05	13.74	5.25	6.53	0.19	415.7	-1.3	15.3	-21.3	
11:10	13.90	6	6.53	0.28	415.1	-1.3	15.6	-19.3	
11:15	14.06	7	6.52	0.31	414.4	-1.2	15.8	-15.9	
11:20	14.25	7.75	6.52	0.37	414.4	-0.9	15.9	-18.0	
11:25									Switched pump

Ferrous Iron Field Test — mg/L or ☐ Not Detected

MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: ~~MW-16-081120~~ Location:

Date Collected (mo/dy/yr): ~~08/11/20~~ Time Sample Collected: Weather: Sunny ~ Warm

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): .2

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): No sample collected. Well dry; no re-charge.

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature:

Date: 8/11/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-16 GW Sample Collection Form.doc

Time	DTW	Vol Purged	pH	DO	SPC Cond.	Turb.	Temp	ORP	Notes
11:30	14.39	—	—	—	—	—	—	—	• Pump off @ 11:30 to swap equip. & re-charge for 30min (well)
11:50	14.37	—	—	—	—	—	—	—	
12:00	14.37	—	—	—	—	—	—	—	• No change in DTW after 30mins w/ pump off.
—	—	—	—	—	—	—	—	—	

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/11/20

Field Event: Qtrly GW Monitoring

Field Personnel: P.O.

Purge Data

Location ID: **MW-17**

Ecology Tag: Not Found

Diameter: 4.0 Screened Interval: 7.5-17.5

GPS:

Total Depth: 17.5

Location Condition (Well damage, well cap damaged, silted up): all 3 bolts rusted

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 12.67

After 5 minutes of purging (from TOC): 12.87

Begin purge (time): 11:56 End purge (time): 12:40

Volume purged: 7.25 L Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged [✓ L] *gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity (µS/cm)	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1201	12.87	1.75	6.95	5.76	299.6	8.03	14.6	112.3	
1206	13.07	2.5	6.93	5.48	298.4	9.80	14.5	110.8	
1211	13.25	3.5	6.91	5.37	297.6	10.47	14.5	108.9	
1216	13.51	4.75	6.91	5.38	297.2	9.46	14.5	108.3	
1221	13.71	5.75	6.91	5.38	296.3	8.70	14.5	107.8	

Ferrous Iron Field Test mg/L or ☒ Not Detected

MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW-17-081120

Location: perched aquifer

Date Collected (mo/dy/yr): 8/11/20

Time Sample Collected: 1225

Weather: 75°F, Sunny

Duplicate Sample No: –

Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, no odor

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane [✓ Yes]/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate 8/4	
			Total Bottles = 12	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:

Date: 8/11/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: Quarterly GWM
Field Personnel: AJ + TS + PO + GC

Purge Data

Location ID: **MW-18**
Ecology Tag: Not located
Diameter: 2.0 Screened Interval: 8-18
GPS:
Total Depth: 18

Location Condition (Well damage, well cap damaged, silted up): rusted but decent, needs 1 new bolt (at least)
Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 13.04
After 5 minutes of purging (from TOC): 13.12
Begin purge (time): 920 End purge (time): 1020
Volume purged: 5.5L Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
933	13.25	1.5	6.65	2.80	184.7	13.85	14.2	99.0	
938	13.25	2	6.59	2.91	184.8	12.48	14.7	84.0	
943	13.25	2.5	6.58	2.08	185.3	12.52	15.1	81.3	Pump stopped
948	13.29	3	6.54	2.22	196.6	8.22	14.7	73.9	
953	13.29	3.5	6.52	2.30	196.1	7.03	14.5	67.6	
958	13.29	4	6.51	2.13	198.2	6.09	14.6	63.8	
					~~2~~09				

Ferrous Iron Field Test ______ mg/L or ☒ Not Detected
MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW18-081120 Location:
Date Collected (mo/dy/yr): 8/11/20 Time Sample Collected: 10:04 Weather: Partly cloudy & 60°
Duplicate Sample No: Time Duplicate Sample Collected:
Type: ☑ Groundwater ☐ Surface Water ☐ Other
Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☐ Grab ☑ Pump Other:
Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): .20
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☐ disposable and/or [✓ dedicated silicon and poly tubing] ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane [✓ Yes]/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles = 0	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature: **Date:** 8/11/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-18 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/10/20

Field Event:

Field Personnel: TS

Purge Data

Location ID: **MW-19**

Ecology Tag: —

Diameter: 4.0 Screened Interval: 13.6-18.5

GPS:

Total Depth: 18.5

Location Condition (Well damage, well cap damaged, silted up):

Secure: ☒ Yes ☐ No

Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 14.07'

After 5 minutes of purging (from TOC): 14.09'

Begin purge (time): 15:40 End purge (time): 16:30

Volume purged: 7.5 Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. 8 Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
16:00	14.09	3.75	6.13	1.05	424.2	-1.6	15.4	111.3	
16:05	14.09	4.75	6.14	1.01	424.1	-0.3	15.3	121.3	
16:10	14.09	5.75	6.13	0.97	422.8	0.0	15.4	126.4	

Ferrous Iron Field Test ______ mg/L or ☒ Not Detected

MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW-19-081020 Location:

Date Collected (mo/dy/yr): 08/10/20 Time Sample Collected: 16:15 Weather: Sunny ~ hot

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): mostly clear; no odor

Sample Analyses

TPH-Dx	(HCl)	☐	TPH-G	(HCl)	☐	BTEX	(HCl)	☐	cPAHs	(unpres)	☐
Diss Mg (lab filtered)	(unpres)	☐	Total Alkalinity	(unpres)	☐	Nitrate/Sulfate	(unpres)	☐	Methane	(HCl)	☐

EDB/EDC/MTBE and Naph.	(HCl)	☐
VOCs	(HCl)	☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles =	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature: Tyler Scott

Date: 8/10/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-19 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection:

Field Event:

Field Personnel:

Purge Data

Location ID: **MW-20**

Ecology Tag missing

Diameter: **4.0** Screened Interval: **11.5-21.5**

GPS:

Total Depth: **21.5** Measured total depth=17.20'

Location Condition (Well damage, well cap damaged, silted up):

Secure: ☒ Yes ☐ No

Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 16.75

After 5 minutes of purging (from TOC): 16.99

Begin purge (time): 13:55 End purge (time):

Volume purged: Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1402	Well	went	dry.		2.5 L	purged	—	no	readings

Ferrous Iron Field Test NA mg/L or ☐ Not Detected

MNA Samples Required? Yes/No

Sampling Data

Sample No: MW-20-081120 Location:

Date Collected (mo/dy/yr): Time Sample Collected: Weather:

Duplicate Sample No: Time Duplicate Sample Collected:

NO SAMPLE COLLECTED

Type: ☐ Groundwater ☐ Surface Water ☐ Other

Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☐ Pump Other:

Type: ☐ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☐ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles =	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature: Colin

Date: 8/11/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-22**
Ecology Tag
Diameter: **4.0** Screened Interval: **20.2-30.2**
GPS:
Total Depth: **30.2**

Location Condition (Well damage, well cap damaged, silted up): No bolts
Secure: ☑ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 24.92
After 5 minutes of purging (from TOC): 25.25
Begin purge (time): 0743 End purge (time): 0814
Volume purged: 4.6 Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2816
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0802	25.23	3.0	6.42	0.75	0.266	4.1	15.3	-45.9	
0805	25.24	3.3	6.39	0.63	0.267	4.3	15.2	-47.4	
0808	25.24	3.9	6.38	0.57	0.266	4.6	15.3	-48.2	
0811	25.24	4.2	6.38	0.53	0.266	5.4	15.4	-49.4	
0814	25.24	4.6	6.38	0.51	0.266	6.0	15.4	-49.6	

Ferrous Iron Field Test 4.0 mg/L or ☐ Not Detected
MNA Samples Required? [✓ Yes] No

Sampling Data

Sample No: MW-22-081120
Location: MW-22
Date Collected (mo/dy/yr): 8/11/20
Time Sample Collected: 0814
Weather: Cloudy
Duplicate Sample No: MW-122-081120 ← ONly For MNA
Time Duplicate Sample Collected: 0821
Type: ☑ Groundwater ☐ Surface Water ☐ Other
Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☑ Grab ☐ Pump Other:
Type: ☑ Peristaltic ☐ Bladder Other:
Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other). Clear slight odor

Sample Analyses

TPH-Dx	(HCl) ☑	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☑	Total Alkalinity	(unpres) ☑	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☒	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:
40 mL VOAs	HCl	8
500 mL Glass Amber (1) none & (1) HCl		2
MNA: 250 mL Poly	none	1
MNA: 500 ml Poly	none	1

QA/QC Samples:
☒ Field Duplicate → For MNA ONly
☐ MS/MSD
☐ Field Blank
☐ Rinsate
Total Bottles = 12 + 4 for Dup

Comments:
2 extra VOAs required for Methane [✓ Yes] No
Dup collected for MNA Analyses
Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:
Date: 8/11/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-22 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: Qtrly GW Monitoring
Field Personnel: P.O.

Purge Data

Location ID: **MW-23**
Ecology Tag: Not found
Diameter: 4.0
Screened Interval: 22.4-32.4
GPS:
Total Depth: 32.4

Location Condition (Well damage, well cap damaged, silted up): Missing all 3 bolts
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 25.01'
After 5 minutes of purging (from TOC): 25.15
Begin purge (time): 0749
End purge (time): 08:40
Volume purged: 2.5gal
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0754	25.15	3L	6.38	0.62	598	4.33	15.2	94↓	slowed pump rate
0759	25.07	4L	6.40	0.47	614	3.92	15.4	50.2	
0804	25.05	5L	6.42	0.39	642	3.69	15.4	17.9	
0809	25.03	6L	6.43	0.35	667	3.49	15.4	-3.9	
0814	25.01	7L	6.44	0.32	684	3.43	15.4	-20.6	
0819	24.99	8L	6.44	0.30	706	3.35	15.5	-34.4	
0824	24.97	9L	6.44	0.29	712	3.35	15.5	-38.5	

Ferrous Iron Field Test 2.5 mg/L or ☐ Not Detected
MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW-23-081120
Location:
Date Collected (mo/dy/yr): 8/11/20
Time Sample Collected: 0826
Weather: 60°F, Partly Sunny
Duplicate Sample No: —
Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear, v. slight yellow, moderate reducing odor. Slight sheen in purge water

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☒	Total Alkalinity	(unpres) ☒	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☒	VOCs	(HCl) ☒

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane ([✓ Yes]/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles = 12	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:
Date: 8/11/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: Quarterly GWM
Field Personnel: AJ+PO+GC+TJ

Purge Data

Location ID: **MW-24**
Ecology Tag: Not Found
Diameter: 4.0 Screened Interval: 9.6-19.6
GPS:
Total Depth: 19.6

Location Condition (Well damage, well cap damaged, silted up): good
Secure: ☑ Yes ☐ No
Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Depth of water (from top of casing): 13.36
After 5 minutes of purging (from TOC): 13.69
Begin purge (time): 805 End purge (time): 855
Volume purged: 7.5L Purge water disposal method: on site drum

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
820	14.21	2	6.97	7.10	252.8	43.75	14.0	108.0	let purge due to
825	14.49	3	6.88	7.12	250.8	40.27	14.0	110.7	high turbidity
830	14.71	4	6.83	7.10	250.0	42.37	14.0	112.6	
835	14.81	5	6.80	7.11	247.9	39.87	14.0	113.9	

Ferrous Iron Field Test ______ mg/L or ☑ Not Detected
MNA Samples Required? [✓ Yes] No

Sampling Data

Sample No: MW24-081120 Location:
Date Collected (mo/dy/yr): 8/11/20 Time Sample Collected: 841 Weather: Partly cloudy & 60
Duplicate Sample No: N/A Time Duplicate Sample Collected: N/A
Type: ☑ Groundwater ☐ Surface Water ☐ Other
Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☐ Grab ☑ Pump Other:
Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): .20
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☐ disposable and/or [✓ dedicated silicon] and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Colorless, some flock, no apparent odor

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane [✓ Yes] No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	Negative ferrous iron test
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles =	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature: **Date:** 8/11/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: MW-25
Ecology Tag
Diameter: 4.0 Screened Interval: 7.8-17.8
GPS:
Total Depth: 17.8

Location Condition (Well damage, well cap damaged, silted up):
Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 9.68
After 5 minutes of purging (from TOC): 10.27
Begin purge (time): 1131 End purge (time): 1202
Volume purged: 7.2 Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.256	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1150	10.50	5.0	6.49	1.29	0.397	4.2	15.7	-97.4	
1153	10.55	5.5	6.48	1.03	0.398	4.2	15.9	-99.4	
1156	10.66	6.0	6.48	0.87	0.378	4.0	15.9	-100.4	
1159	10.74	6.5	6.47	0.72	0.399	4.1	15.8	-101.3	
1202	10.81	7.0	6.47	0.67	0.378	3.9	15.8	-101.7	

Ferrous Iron Field Test 4.5 mg/L or ☐ Not Detected
MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW-25-081120 Location: E. q Rails
Date Collected (mo/dy/yr): 8/11/20 Time Sample Collected: 1203 Weather: SUNNY
Duplicate Sample No: N/A Time Duplicate Sample Collected:
Type: ☒ Groundwater ☐ Surface Water ☐ Other Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☑ Grab [✓ ☒ Pump] Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): .2
Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear w/ slight yellow tint

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☑	Total Alkalinity	(unpres) ☑	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☒	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane [✓ Yes]/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles = 12	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature: **Date:** 8/11/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 7/10/20

Field Event: Quarterly GWM

Field Personnel: AJ + JS + PO + GG

Purge Data

Location ID: **MW-26**

Ecology Tag: Can't locate

Diameter: 4.0 Screened Interval: 9.4-19.4

GPS:

Total Depth: 19.4

Location Condition (Well damage, well cap damaged, silted up): good

Secure: ☑ Yes ☐ No

Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Depth of water (from top of casing): 13.18

After 5 minutes of purging (from TOC): 13.52

Begin purge (time): 1225 End purge (time): 1325

Volume purged: 7.5 L Purge water disposal method: on site drum

Time	DTW (decimal ft below TOC)	Vol. Purged [✓ L] gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1235	13.72	2.25	6.82	16.1	187.1	23.29	16.5	-21.9	
1240	13.72	2.75	6.38	3.82	197.3	24.71	18.9	-36.7	
1245	13.72	3.25	6.42	5.48	207.1	14.27	20.4	-53.6	Extra bubbles in cell
1250	13.85	3.75	6.45	2.46	225.3	18.52	16.4	-51.9	
1255	13.92	4.25	6.36	4.15	217.7	40.06	18.8	-56.2	Bubbles in cell
1300	14.01	5	6.36	4.13	227.6	38.86	17.9	-57.0	
1305	14.05	5.5	6.48	6.91	220.8	22.4	20.8	-64.2	
1310	14.05	6	6.52	7.29	218.5	20.87	22.2	-67.7	

Ferrous Iron Field Test X mg/L or ☐ Not Detected

MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW26-081020

Location:

Date Collected (mo/dy/yr): 8/10/20

Time Sample Collected: 1315

Weather: Sunny & 75

Duplicate Sample No: NA

Time Duplicate Sample Collected: NA

Type: ☑ Groundwater ☐ Surface Water ☐ Other

Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other:

Type: ☑ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or [✓ dedicated silicon] and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Colorless, no apparent odor, some flock

* water level dropped during sample collection — dropped tubing to water, ↑ flock - allowed for some additional stabilization but collected sample to avoid another drop

Sample Analyses

TPH-Dx	(HCl)	☐	TPH-G	(HCl)	☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres)	☐	Total Alkalinity	(unpres)	☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature:

Date: 7/10/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: Quarterly GWM
Field Personnel: AJ+GC+PO+TS

Purge Data

Location ID: **MW-27**
Ecology Tag: not located
Diameter: 4.0 Screened Interval: 18-28
GPS:
Total Depth: 28

Location Condition (Well damage, well cap damaged, silted up): good
Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 19.72
After 5 minutes of purging (from TOC): 19.79
Begin purge (time): 1345 End purge (time): 1428
Volume purged: 5.5L Purge water disposal method: on site drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1358	19.80	1.75	6.40	0.81	444.6	20.13	16.4	-25.0	
1403	19.80	2.50	6.30	0.76	441.7	17.33	16.3	-33.0	
1408	19.81	3	6.31	0.75	444.1	16.36	16.4	-35.8	
1413	19.81	3.5	6.31	0.73	445.0	18.24	16.3	-37.8	

Ferrous Iron Field Test X mg/L or ☐ Not Detected **MNA Samples Required? Yes/[✓ No]**

Sampling Data

Sample No: MW27-081020 Location:
Date Collected (mo/dy/yr): 8/10/20 Time Sample Collected: 1418 Weather: Sunny + 76°
Duplicate Sample No: NA Time Duplicate Sample Collected: NA
Type: ☑ Groundwater ☐ Surface Water ☐ Other Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☐ ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): colorless, clear, no apparent odor

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature: **Date:** 8/10/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/11/20

Field Event: Quarterly GWM

Field Personnel: AJ + TS + GC + PO

Purge Data

Location ID: **MW-28**

Ecology Tag: Not located

Diameter: 2.0

Screened Interval: 9.8-19.8

GPS:

Total Depth: 19.8 Measured 19.29

Location Condition (Well damage, well cap damaged, silted up): Okay, needs new bolts -- new monument needed

Secure: ~~☒ Yes~~ ☒ No

Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 17.54

After 5 minutes of purging (from TOC): 18.86

Begin purge (time): 1050

End purge (time):

Volume purged: 5.5L

Purge water disposal method: On site drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *[✓ L] gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(µS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1104	18.86	1	6.43	1.06	194.1	33.50	17.2	22.8	
1109	18.12	1.75	6.28	0.83	196.5	22.10	17.0	13.5	Lots of
1114	18.39	2	6.23	1.86	198.9	32.80	17.7	-5.6	bubbles in tubing
1119	18.39	2.5	6.24	0.96	201.7	19.36	16.9	6.1	
1124	18.39	3	6.22	0.70	203.6	17.32	16.9	3.6	
1129	18.39	3.5	6.20	1.57	203.4	17.02	17.5	2.8	
1210	19.00	Well	ran dry - measured		total depth = 19.29				

*Allowed 20 min recharge → 18.85 not enough water to purge

Ferrous Iron Field Test ____ mg/L or ☐ Not Detected

MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW28-081120

Location:

Date Collected (mo/dy/yr): 8/11/20

Time Sample Collected: 1134

Weather: Sunny & 62°

Duplicate Sample No: NA

Time Duplicate Sample Collected: NA

Type: ☑ Groundwater ☐ Surface Water ☐ Other

Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other:

Type: ☑ Peristaltic ☐ Bladder Other:

Flow Rate (L/min): .20

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and [✓ poly tubing] ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): *Lots of bubbles / no water level drop

Sample Analyses

TPH-Dx	(HCl) ☐	TPH-G	(HCl) ☐	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	~~☐ Field Duplicate~~	2 extra VOAs required for Methane ([✓ Yes]/No)
500 mL Glass Amber (1) none & (1) HCl		2	~~☐ MS/MSD~~	
MNA: 250 mL Poly	none	1	~~☐ Field Blank~~	
MNA: 500 ml Poly	none	1	~~☐ Rinsate~~	Bottles for Manganese, Alkalinity, Nitrate, Sulfate
MNA samples NOT collected			Total Bottles = ()	

Signature:

Date: 8/11/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: Qtrly GW Monitoring
Field Personnel: P.O.

Purge Data

Location ID: **MW-29**
Ecology Tag: Not found
Diameter: 2.0 Screened Interval: 15-27.7
GPS:
Total Depth: 27.7

Location Condition (Well damage, well cap damaged, silted up): good
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 16.33'
After 5 minutes of purging (from TOC): 16.31'
Begin purge (time): 0859 End purge (time): 0947
Volume purged: 9 L Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0904	16.31'	2L	6.48	2.87	170.1	4.08	14.4	53.9	
0911	16.31'	3.5L	6.37	2.75	167.0	3.44	14.2	59.3	
0916	16.31'	4.5L	6.36	2.87	165.7	3.93	14.1	61.0	
0921	16.31'	5.5L	6.36	2.76	167.7	3.75	14.0	62.6	
0926	16.31'	6.5L	6.35	2.78	167.0	3.69	14.1	63.7	

Ferrous Iron Field Test mg/L or ☒ Not Detected
MNA Samples Required? [✓ Yes] No

Sampling Data

Sample No: MW-29-081120
Location:
Date Collected (mo/dy/yr): 8/11/20
Time Sample Collected: 0929
Weather: [illegible]°F, Partly Sunny
Duplicate Sample No:
Time Duplicate Sample Collected:
Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear, no odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☒	Total Alkalinity	(unpres) ☒	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	☒ 6x2+2	☐ Field Duplicate	2 extra VOAs required for Methane [✓ Yes] No
500 mL Glass Amber (1) none & (1) HCl		2 x 3	☒ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	MS/MSD for TPH analyses only
MNA: 500 ml Poly	none	1	☐ Rinsate (18/4)	
			Total Bottles = 22	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:

Date: 8/11/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/11/20

Field Event: 3Q2020

Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-30**

Ecology Tag

Diameter: 2.0 Screened Interval: 9-26

GPS:

Total Depth: ~~26~~ 24.35

Location Condition (Well damage, well cap damaged, silted up): NO ROOTS

Secure: ☒ Yes ☐ No

Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 19.21

After 5 minutes of purging (from TOC): 19.62

Begin purge (time): 0851 End purge (time): 0920

Volume purged: 3.5 Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
0908	19.85	2.0	6.29	3.72	1.164	5.4	15.5	116.9	
0911	19.88	2.3	6.27	3.18	1.166	6.5	15.5	121.6	
0914	19.92	2.9	6.28	2.78	1.168	5.0	15.3	124.3	
0917	19.95	3.1	6.28	2.66	1.168	4.6	15.4	126.0	
0920	19.94	3.5	6.28	2.49	1.167	4.2	15.5	127.3	

Ferrous Iron Field Test <0.5 mg/L or ☒ Not Detected

MNA Samples Required? [✓ Yes] /No

Sampling Data

Sample No: MW-30-081120

Location: Below Lewis Clark Bridge

Date Collected (mo/dy/yr): 8/11/20

Time Sample Collected: 0921

Weather: Cloudy

Duplicate Sample No:

Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☒ Grab ☐ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min): 0.10

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☒	Total Alkalinity	(unpres) ☒	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☒	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane ([✓ Yes]/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	**Redevelop!** ← Yes
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles = 12	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:

Date: 8/11/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-31**
Ecology Tag: N/A
Diameter: 2.0 Screened Interval: 9-19
GPS:
Total Depth: 19

Location Condition (Well damage, well cap damaged, silted up): In depression & risk of being buri
Secure: ☐ Yes ☒ No
Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 13.72
After 5 minutes of purging (from TOC): 14.05
Begin purge (time): 1705 End purge (time): 1238
Volume purged: ~~1738~~ Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1726	14.01	2.0	6.48	~~8.7~~ 5.72	0.383	14.3	16.7	108.4	
1729	14.00	2.3	6.46	5.90	0.383	8.3	16.2	112.7	
1732	14.00	2.9	6.46	5.98	0.383	7.8	16.2	115.5	
1735	14.00	3.3	6.46	6.05	0.385	6.8	16.1	120.3	
1738	14.00	3.8	6.42	6.09	0.386	6.0	16.0	127.3	

Ferrous Iron Field Test <0.5 mg/L or ☒ Not Detected
MNA Samples Required? Yes/No

Sampling Data

Sample No: MW-31-081020
Location: Former Calloway Ross Area
Date Collected (mo/dy/yr): 8/10/20
Time Sample Collected: 1738
Weather: Sunny
Duplicate Sample No: N/A
Time Duplicate Sample Collected:
Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-μm ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min): 0.11
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Slight reddish color

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☒	Total Alkalinity	(unpres) ☒	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☒	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	Transducer removed @ 1715
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles = 12	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:
Date: 8/10/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-31 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/11/20

Field Event: 3Q2020

Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-32**

Ecology Tag:

Diameter: 2.0 Screened Interval: 8-18

GPS:

Total Depth: 18

Location Condition (Well damage, well cap damaged, silted up): Damaged Well Box needs replacement

Secure: ☐ Yes ☐ No

Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 14.35

After 5 minutes of purging (from TOC): 14.63

Begin purge (time): 0849 End purge (time): 1015

Volume purged: 3.6 Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1003	14.86	2.0	6.50	0.86	0.403	7.2	16.3	-106.5	
1006	14.81	2.2	6.51	0.64	0.402	6.6	16.3	-109.5	
1009	14.81	2.7	6.50	0.57	0.403	6.7	16.2	-110.9	
1012	14.81	3.1	6.50	0.48	0.403	6.1	16.3	-112.3	
1015	14.81	3.6	6.50	0.50	0.403	5.8	16.1	-112.5	

Ferrous Iron Field Test mg/L or ☐ Not Detected

MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-32-081120

Location: Maintenance Yard

Date Collected (mo/dy/yr): 8/11/20

Time Sample Collected: 1016

Weather: Sunny 70°

Duplicate Sample No.: N/A

Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Other

Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☑ Grab ☐ Pump Other:

Type: ☑ Peristaltic ☐ Bladder Other:

Flow Rate (L/min): 0.15

Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No odor

Sample Analyses

TPH-Dx	(HCl) ☑	TPH-G	(HCl) ☑	BTEX	(HCl) ☒	cPAHs	(unpres) ☑	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6 ✓	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
500 mL Glass Amber (1) none & (1) HCl		2 ✓	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 8	

Signature:

Date: 8/11/20

https://floydsnider.sharepoint.com/projects/POLTPH/08 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-32 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/11/20

Field Event: Qtrly GW Monitoring

Field Personnel: P.O.

Purge Data

Location ID: **MW-33**

Ecology Tag BME 942

Diameter: 2.0

Screened Interval: 18.2-28.2

GPS:

Total Depth: 28.2

Location Condition (Well damage, well cap damaged, silted up):

Secure: ☒ Yes ☐ No

Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 19.25

After 5 minutes of purging (from TOC): 19.25'

Begin purge (time): 10:25

End purge (time): 11:11

Volume purged: 9L

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged [✓ L] / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
10:35	19.26	2.5	6.31	0.79	298.7	38.13	14.4	103.0	
10:40	19.26	4L	6.29	0.57	297.6	27.23	14.4	97.6	
10:45	19.26	5L	6.29	0.50	297.6	27.30	14.1	94.3	
10:50	19.26	6L	6.29	0.43	296.6	27.35	14.4	90.3	
10:55	19.26	7.25	6.29	0.41	297.8	22.88	14.1	89.0	
11:00	19.26	8.25	6.30	0.40	298.6	19.33	14.2	88.4	

Ferrous Iron Field Test NM mg/L or ☐ Not Detected

MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-33-081120

Location:

Date Collected (mo/dy/yr): 8/11/20

Time Sample Collected: 11:03

Weather: 70°F, Sunny

Duplicate Sample No: –

Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Slightly cloudy, light yellow, v. slight odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	Dropped Rite in the rain pen down well at start of purge
			☐ Rinsate	
			Total Bottles = 8	

Signature:

Date: 8/11/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-33 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/10/20

Field Event: 3Q2020

Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-34**

Ecology Tag: BME-944

Diameter: **2.0** Screened Interval: **20.9-30.9**

GPS:

Total Depth: **30.9**

Location Condition (Well damage, well cap damaged, silted up):

Secure: ☐ Yes ☐ No

Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 20.95

After 5 minutes of purging (from TOC): 20.97

Begin purge (time): 1521 End purge (time): 1551

Volume purged: 4.9 Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(µS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1542	20.97	3.5	5.88	0.79	1.914	3.2	17.3	-25.4	
1545	20.97	3.9	5.80	0.68	1.912	3.2	17.2	-26.0	
1548	20.97	4.3	5.89	0.63	1.914	3.3	17.1	-26.5	
1551	20.97	4.9	5.88	0.56	1.906	3.3	17.3	-25.5	

Ferrous Iron Field Test mg/L or ☐ Not Detected

MNA Samples Required? Yes/No

Sampling Data

Sample No: MW-34-081020

Location: Parking Lot

Date Collected (mo/dy/yr): 8/10/20 Time Sample Collected: 1552 Weather: Sunny 75°

Duplicate Sample No:

Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☒ Grab ☐ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min): 0.16

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No odor, Slight Sheen

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☒

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 8	

Signature:

Date: 8/10/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-34 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-35**
Ecology Tag
Diameter: 2.0
Screened Interval: 15.7-25.7
GPS:
Total Depth: 25.7

Location Condition (Well damage, well cap damaged, silted up):
Secure: ☑ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 15.18
After 5 minutes of purging (from TOC): 15.12
Begin purge (time): 1610
End purge (time): 1643
Volume purged: 3.4
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged ([✓ L] / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1631	15.62	2.0	6.53	1.66	0.419	4.1	18.3	45.9	
1634	15.60	2.4	6.49	1.30	0.426	4.8	18.3	61.5	
1637	15.60	2.9	6.46	1.13	0.428	6.3	18.4	69.6	
1640	15.60	3.1	6.45	1.06	0.431	8.6	18.5	73.5	
1643	15.60	3.4	6.44	1.05	0.433	9.6	18.4	74.9	

Ferrous Iron Field Test <0.5 mg/L or ☒ Not Detected
MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW-35-081020
Location: Parking lot
Date Collected (mo/dy/yr): 8/10/20
Time Sample Collected: 1643
Weather: Sunny 80°
Duplicate Sample No: N/A
Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Other
Sample: ☑ Unfiltered ☐ Filtered
Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☐ Grab ☑ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min): 0.11
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

TPH-Dx	(HCl) ☑	TPH-G	(HCl) ☒	BTEX	(HCl) ☐	cPAHs	(unpres) ☐	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☒	Total Alkalinity	(unpres) ☒	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☒	VOCs	(HCl) ☒

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane ([✓ Yes]/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles =	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:
Date: 8/10/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-35 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-36**
Ecology Tag: BMG 945
Diameter: 2.0
Screened Interval: 25-35
GPS:
Total Depth: 35

Location Condition (Well damage, well cap damaged, silted up):
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Depth of water (from top of casing): 25.31
After 5 minutes of purging (from TOC): 25.38
Begin purge (time): 1307
End purge (time): 1348
Volume purged: 5.5
Purge water disposal method: Drum

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1336	25.39	3.5	6.31	1.29	0.231	12.7	16.8	60.7	
1339	25.39	4.0	6.31	1.29	0.231	11.1	17.0	61.9	
1342	25.39	4.5	6.30	1.31	0.231	10.7	17.1	63.5	
1345	25.39	5.0	6.24	1.26	0.230	9.3	17.2	64.0	
1348	25.39	5.5	6.26	1.29	0.232	9.3	17.1	61.1	

Ferrous Iron Field Test ______ mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-36-081020
Location:
Date Collected (mo/dy/yr): 8/10/20
Time Sample Collected: 1349
Weather: Sunny 75°
Duplicate Sample No: MW-136-081020 @1341
Time Duplicate Sample Collected: 1341
Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered
Filter Type: ☐ disposable 0.45-um ☐ 0
Sample Collected with: ☒ Grab ☐ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min): 0.14
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Fe-orange Biosludge on well @ First minute of purging. Then clear.

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐
EDB/EDC/MTBE and Naph.	(HCl) ☐	VOCs	(HCl) ☐				

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6 12	☒ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
500 mL Glass Amber (1) none & (1) HCl		2 4	☐ MS/MSD	Dupe 1341
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 16	

Signature:
Date: 8/10/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: 3Q2020 GW Smplng
Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-37**
Ecology Tag: BME 947
Diameter: **2.0** Screened Interval: **24.5-34.5**
GPS:
Total Depth: **34.5**

Location Condition (Well damage, well cap damaged, silted up): Good
Secure: ☐ Yes ☐ No
Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 23.89
After 5 minutes of purging (from TOC): 23.90
Begin purge (time): 1128
End purge (time): 1156
Volume purged: 5 L
Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(µS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1141	23.91	2.1	6.85	0.88	1.297	13.9	18.3	-102.1	
1144	23.91	2.9	6.85	0.63	1.288	27.9	18.5	-105.8	
1147	22.91	3.5	6.85	0.52	1.266	52.5	18.2	-107.7	
1150	23.91	3.9	6.85	0.47	1.250	66.4	18.5	-109.0	
1153	23.91	4.3	6.85	0.43	1.255	77.0	18.5	-110.5	
1156	23.91	4.9	6.83	0.40	1.267	87.3	18.5	-110.5	

~~Ferrous Iron Field Test~~ mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-37-081020
Location: MW37
Date Collected (mo/dy/yr): 8/10/20
Time Sample Collected: 1157
Weather: Sunny 70°
Duplicate Sample No:
Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Other
Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐
Sample Collected with: ☐ Grab ☑ Pump Other:
Type: ☑ Peristaltic ☐ Bladder Other:
Flow Rate (L/min): 0.16
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Slight orange tint

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6 ✓	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
500 mL Glass Amber (1) none & (1) HCl		2 ✓	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 8	

Signature:
Date: 8/10/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-38**
Ecology Tag: BME 946
Diameter: 2.0 Screened Interval: 24.8-34.8
GPS:
Total Depth: 34.8

Location Condition (Well damage, well cap damaged, silted up): Good
Secure: ☑ Yes ☐ No
Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 24.69
After 5 minutes of purging (from TOC): 24.11
Begin purge (time): 1220 End purge (time):
Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1237	24.12	2.0	6.66	0.80	0.377	15.5	17.2	-80.1	
1240	24.11	2.7	6.62	0.54	0.377	40.7	17.1	-82.7	
1243	24.11	3.1	6.62	0.49	0.380	57.5	17.1	-82.7	
1246	24.12	3.6	6.62	0.44	0.380	88.6	17.1	-83.3	
1249	24.12	4.1	6.61	0.43	0.381	104.4	17.2	-83.2	

N/A Ferrous Iron Field Test ____ mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-38-081020
Location: Transit Shed 2
Date Collected (mo/dy/yr): 8/10/20
Time Sample Collected: 1249
Weather: Sunny 75°
Duplicate Sample No:
Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min): 0.15
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Slight Yellow Tint

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 8	

Signature:
Date: 8/10/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/MW-38 GW Sample Collection Form.doc

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event:
Field Personnel: TS

Purge Data

Location ID: **MW-39**
Ecology Tag: BME 948
Diameter: 2.0 Screened Interval: 7.6-17.6
GPS:
Total Depth: 17.6

Location Condition (Well damage, well cap damaged, silted up):
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 12.83'
After 5 minutes of purging (from TOC): 12.85'
Begin purge (time): 14:30 End purge (time): 15:19
Volume purged: 8.75 Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
14:45	12.85	3.25	6.52	0.16	564.0	0.3	16.3	-132.5	
14:50	12.85	4	6.51	0.08	563.0	-0.3	16.3	-137.9	water clear
14:55	12.85	5	6.51	0.03	563.0	-0.4	16.3	-140.1	despite neg. turb
15:00	12.85	6	6.51	0.01	562.0	-0.4	16.1	-144.4	

Ferrous Iron Field Test — mg/L or ☐ Not Detected
MNA Samples Required? Yes/No

Sampling Data

Sample No: MW-39-081020
Location:
Date Collected (mo/dy/yr): 08/10/20 Time Sample Collected: 15:05 Weather: Sunny ~ hot
Duplicate Sample No: — Time Duplicate Sample Collected:
Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Slight yellow tint; clear; slight odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	
			☐ Rinsate	
			Total Bottles =	

Signature:
Date: 8/10/20

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Date of Collection: 8/11/20

Field Event: Qtrly GW Monitoring

Field Personnel: P.O.

Purge Data

Location ID: **MW-40**

Ecology Tag: BME 941

Diameter: 4.0 Screened Interval: 15.6-25.6

GPS:

Total Depth: 25.6

Location Condition (Well damage, well cap damaged, silted up): fine

Secure: ☒ Yes ☐ No

Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 17.89'

After 5 minutes of purging (from TOC): 18.06'

Begin purge (time): 13:07 End purge (time): 13:47

Volume purged: 2.25 gal Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged L/[✓ gal]	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:17	18.10'	0.5	6.45	5.99	281.6	17.16	15.0	106.1	
13:22	18.12	0.8	6.39	5.75	280.4	10.94	14.9	106.2	
13:27	18.12	1.1	6.38	5.68	280.0	7.68	14.9	106.1	
13:32	18.13	1.4	6.38	5.65	279.5	6.15	14.8	105.2	
13:37	18.13	1.8	6.37	5.60	279.1	5.89	14.8	104.5	

Ferrous Iron Field Test NM mg/L or ☐ Not Detected

MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: MW-40-081120

Location:

Date Collected (mo/dy/yr): 8/11/20

Time Sample Collected: 13:39

Weather: 75° F, Sunny

Duplicate Sample No: —

Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Other

Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or [✓ dedicated] silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, mild HC odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☐	cPAHs	(unpres) ☒
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐
EDB/EDC/MTBE and Naph.	(HCl) ☐	VOCs	(HCl) ☒				

Type of Sample Containers:	Preservative	Quantity:
40 mL VOAs	HCl	6
500 mL Glass Amber (1) none & (1) HCl		2

QA/QC Samples:

☐ Field Duplicate

☐ MS/MSD

☐ Field Blank

☐ Rinsate

Total Bottles = 8

Comments:

2 extra VOAs required for Methane (Yes/[✓ No])

Signature: P Ostdt

Date: 8/11/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/10/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: UST-4
Ecology Tag
Diameter: 2.0 Screened Interval: **14.3-24.3**
GPS:
Total Depth: 24.3

Location Condition (Well damage, well cap damaged, silted up):
Secure: ☒ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 17.69
After 5 minutes of purging (from TOC): 17.71
Begin purge (time): 1426 End purge (time):
Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1441	17.72	2.2	6.04	5.06	0.208	7.2	17.6	112.2	
1444	17.71	3.0	6.05	4.72	0.209	7.6	17.4	119.3	
1447	17.71	3.3	6.05	4.61	0.209	8.4	17.5	122.1	
1450	17.71	3.8	6.05	4.55	0.211	10.8	17.4	124.9	
1453	17.71	4.2	6.05	4.48	0.211	15.3	17.5	127.4	

Ferrous Iron Field Test mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: UST-4-081020
Location: Mechanic's Shop
Date Collected (mo/dy/yr): 8/10/20
Time Sample Collected: 1451
Weather: Sunny
Duplicate Sample No: N/A
Time Duplicate Sample Collected:
Type: ☒ Groundwater ☐ Surface Water ☐ Other
Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐
Sample Collected with: ☐ Grab ☒ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min): 0.15
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure. Sample collected with: ☒ Disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☒
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☐
						Lead ☒			

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/No)
250 mL Poly - Pb	HNO3	1	☐ MS/MSD	
500 mL Glass Amber (1) none & (1) HCl		2	☐ Field Blank	
			☐ Rinsate	
			Total Bottles = 9	

Signature:
Date: 8/10/20

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GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH

Field Event: 3Q2020

Date of Collection: 8/11/20

Field Personnel: G. Cisneros

Purge Data

Location ID: **T-2**

Ecology Tag

Diameter: 2"

Screened Interval:

GPS:

Total Depth: 19.80

Location Condition (Well damage, well cap damaged, silted up): Bent Casing ~2' bgs

Secure: ☑ Yes ☐ No

Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 12.89

After 5 minutes of purging (from TOC): 13.29

Begin purge (time): 1037

End purge (time):

Volume purged:

Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1050	13.28	2.2	6.48	372	0.331	28.0	14.3	-57.7	
1053	13.28	2.8	6.48	3.36	0.333	24.4	14.3	-62.6	
1056	1328	3.2	6.48	2.61	0.333	25.5	14.5	-64.5	
1059	13.28	3.6	6.48	2.53	0.334	24.0	14.5	-65.3	
1102	13.28	4.0	6.47	2.63	0.333	22.3	14.4	-65.5	

Ferrous Iron Field Test ____ mg/L or ☐ Not Detected

MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: T-2-081120

Location: Maintenance Yard Near Former AST

Date Collected (mo/dy/yr): 8/11/20

Time Sample Collected: 1103

Weather: Sunny

Duplicate Sample No: N/A

Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Other

Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-μm ☐

Sample Collected with: ☑ Grab ☐ Pump Other:

Type: ☒ Peristaltic ☐ Bladder Other:

Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear w/slight orange tint

Sample Analyses

TPH-Dx	(HCl) ☑	TPH-G	(HCl) ☒	BTEX	(HCl) ☐	cPAHs	(unpres) ☒
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐
EDB/EDC/MTBE and Naph.	(HCl) ☐	VOCs	(HCl) ☒				

Type of Sample Containers:	Preservative	Quantity:
40 mL VOAs	HCl	6
500 mL Glass Amber (1) none & (1) HCl		2

QA/QC Samples:

☐ Field Duplicate

☐ MS/MSD

☐ Field Blank

☐ Rinsate

Total Bottles =

Comments:

2 extra VOAs required for Methane (Yes/[✓ No])

Redevelop! - Yes on 8/10/20

Signature:

Date: 8/11/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/T-2 GW Sample Collection Form.doc

SOIL VAPOR SAMPLING SHEET

Site Reference: POL-TPH
10 Port way, Longview, WA
Address:

Date: 5/8/20

Personnel: G.C., P.O. and T.J.

	Vacuum Test		Purging				Helium		Sampling				PID			
Soil Vapor Sampling Point ID	Time Start Vacuum Testing	Time Stop Vacuum Testing	Time Start Purging	Time Stop Purging	Purging Rate (mL/min)	Total Volume Purged (mL)	Time of Helium Reading	Helium Reading (%)	Time Start Sampling	Time Stop Sampling	Canister Vacuum Before Sampling (in Hg)	Canister Vacuum After Sampling (in Hg)	Time of PID Reading	PID Reading	Can S/N Notes	Manifold
SVP-01	0749	0754	0800	0802	~~167~~ 150		0810	1%	0804	0810	30	4.5	0811	0.2	3257	240
SVP-101	0754	0759	0800	0802	~~167~~ 150		" "	" "	0804	0810	30	4.5	" "	0.2	2297	222
SVP-02	0842	0847	0848	0850	150		0852	11%	0851	0857	30	4.5	0858	0.3	3255	224

Notes:

Well Development Field Form

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Project Name: POL - TPH
Project Number:
Driller (if applicable): N/A

Date: 8/10/20
Field Personnel: G. Cisneros

Purge Data

Well ID: MW-30	**Total Well Depth:** 24.35	**Well Condition/Damage Description:** Bolts Stripped
Well Casing Type/Diameter/Screened Level: 2' Screen 9-26'		**One Casing Volume (gal):** 1.7 gals
Method of Development (Circle): Surge Block [✓ Pump Surge] Bailer		**Equipment Used (type of pump, etc.):** Whale pump

Begin Purge (time):	0845
End Purge (time):	0920
Gallons Purged (time):	~11.0 gals
Purge Water Disposal Method (circle):	
On-site Storage Tank On-site Treatment [✓ Drum] Other:	

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
[✓ 2"]	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (feet)	Vol. Purged (gallons)	Rate (gpm)	pH	Conductivity	Turbidity	Temp	Comments
0845	16.80	—	--	--	--	--	--	Prior to purging
0851	Dry	~2.5		purged dry - Allowed time to recharge				
0900	~3' of water purged ~ 4.5 gals & allowed to recharge							
	Surged casing again w/ pump & purged dry.							
0911	~5ft	7gals	—	Water clear & free of turbidity & orange coloring				
0920	~3ft	11gals	purged till dry. last 4gals were clear.					

Notes:
Surged w/ pump for 10 minutes prior to pumping.
Water orange brown - biogrowth / iron-reducing bacteria color
After ~7gals purged water became clear

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: **MW-30**
Ecology Tag
Diameter: 2.0 Screened Interval: 9-26
GPS:
Total Depth: ~~26~~ 24.35

Location Condition (Well damage, well cap damaged, silted up): NO ROOTS
Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 19.21
After 5 minutes of purging (from TOC): 19.62
Begin purge (time): 0851 End purge (time): 0920
Volume purged: 3.5 Purge water disposal method: Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
0908	19.85	2.0	6.29	3.72	1.164	5.4	15.5	116.9	
0911	19.88	2.3	6.27	3.18	1.166	6.5	15.5	121.6	
0914	19.92	2.9	6.28	2.78	1.168	5.0	15.3	124.3	
0917	19.95	3.1	6.28	2.66	1.168	4.6	15.4	126.0	
0920	19.94	3.5	6.28	2.49	1.167	4.2	15.5	127.3	

Ferrous Iron Field Test <0.5 mg/L or ☒ Not Detected
MNA Samples Required? [✓ Yes]/No

Sampling Data

Sample No: MW-30-081120 Location: Below Lewis Clark Bridge
Date Collected (mo/dy/yr): 8/11/20 Time Sample Collected: 0921 Weather: Cloudy
Duplicate Sample No: Time Duplicate Sample Collected:
Type: ☒ Groundwater ☐ Surface Water ☐ Other Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐
Sample Collected with: ☒ Grab ☐ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.10
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ; ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

TPH-Dx	(HCl) ☒	TPH-G	(HCl) ☒	BTEX	(HCl) ☒	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☒	Total Alkalinity	(unpres) ☒	Nitrate/Sulfate	(unpres) ☒	Methane	(HCl) ☒	VOCs	(HCl) ☐

Type of Sample Containers:	**Preservative**	**Quantity:**	**QA/QC Samples:**	Comments:
40 mL VOAs	HCl	8	☐ Field Duplicate	2 extra VOAs required for Methane [✓ Yes]/No)
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	**Redevelop!** ← Yes
MNA: 250 mL Poly	none	1	☐ Field Blank	
MNA: 500 ml Poly	none	1	☐ Rinsate	
			Total Bottles = 12	Bottles for Manganese, Alkalinity, Nitrate, Sulfate

Signature:
Date: 8/11/20

Well Development Field Form FLOYD | SNIDER

Project Name: POG-TPH
Date: 8/10/20
Project Number:
Field Personnel: G. Cisneros
Driller (if applicable): N/A

Purge Data

Well ID: T-2
Total Well Depth: 19.80
Well Condition/Damage Description: Bent Casing ~2' bgs
Well Casing Type/Diameter/Screened Level: UNKNOWN
One Casing Volume (gal): 1.1 gal
Method of Development (Circle): CAN'T get a bailer or pump down casing
Surge Block Pump Surge Bailer
Equipment Used (type of pump, etc.): Peristaltic pump

Begin Purge (time): 1000
End Purge (time): 1030
Gallons Purged (time): 1.75 gals
Purge Water Disposal Method (circle):
On-site Storage Tank On-site Treatment [✓ Drum] Other:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (feet)	Vol. Purged (gallons)	Rate (gpm)	pH	Conductivity	Turbidity	Temp	Comments
Surged	w/	DTW	Meter		--	--	--	Prior to purging
1002	~~[illegible]~~	0.5	–					Reddish brown color
1010	12.91	1.0	0.1 gpm					Clear after 1-gal
1018	–	1.7	"					Clear

↑ Bottom of casing felt hard; no silt present

Purged another gal on 8/11/20 during sampling @ 1037

Notes:
Casing bent. Surged w/ DTW level meter. Silty bottom ~2' bgs
After 1 gallon purged the water cleared & the casing bottom felt hard.

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: POL-TPH
Date of Collection: 8/11/20
Field Event: 3Q2020
Field Personnel: G. Cisneros

Purge Data

Location ID: T-2
Ecology Tag
Diameter: 2"
Screened Interval:
GPS:
Total Depth: 19.80

Location Condition (Well damage, well cap damaged, silted up): Bent Casing ~2' bgs
Secure: ☑ Yes ☐ No
Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from top of casing): 12.89
After 5 minutes of purging (from TOC): 13.29
Begin purge (time): 1037 End purge (time):
Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW *(decimal ft below TOC)*	Vol. Purged *L / gal*	pH *(s.u.)*	DO *(mg/L)*	Specific Conductivity *(uS/cm)*	Turbidity *(NTU)*	Temp *(°C)*	ORP *(mV)*	Comments
1050	13.28	2.2	6.48	3.72	0.331	28.0	14.3	-57.7	
1053	13.28	2.8	6.48	3.36	0.333	24.4	14.3	-62.6	
1056	13.28	3.2	6.48	2.61	0.333	25.5	14.5	-64.5	
1059	13.28	3.6	6.48	2.53	0.334	24.0	14.5	-65.3	
1102	13.28	4.0	6.47	2.63	0.333	22.3	14.4	-65.5	

Ferrous Iron Field Test ____ mg/L or ☐ Not Detected
MNA Samples Required? Yes/[✓ No]

Sampling Data

Sample No: T-2-081120
Location: Maintenance Yard Near Former AST
Date Collected (mo/dy/yr): 8/11/20
Time Sample Collected: 1103
Weather: Sunny
Duplicate Sample No: N/A
Time Duplicate Sample Collected:
Type: ☑ Groundwater ☐ Surface Water ☐ Other
Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐
Sample Collected with: ☑ Grab ☐ Pump Other:
Type: ☒ Peristaltic ☐ Bladder Other:
Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear w/slight orange tint

Sample Analyses

TPH-Dx	(HCl) ☑	TPH-G	(HCl) ☒	BTEX	(HCl) ☐	cPAHs	(unpres) ☒	EDB/EDC/MTBE and Naph.	(HCl) ☐
Diss Mg (lab filtered)	(unpres) ☐	Total Alkalinity	(unpres) ☐	Nitrate/Sulfate	(unpres) ☐	Methane	(HCl) ☐	VOCs	(HCl) ☒

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
40 mL VOAs	HCl	6	☐ Field Duplicate	2 extra VOAs required for Methane (Yes/[✓ No])
500 mL Glass Amber (1) none & (1) HCl		2	☐ MS/MSD	
			☐ Field Blank	**Redevelop!** - Yes on 8/10/20
			☐ Rinsate	
			Total Bottles =	

Signature:
Date: 8/11/20

https://floydsnider.sharepoint.com/projects/POLTPH/09 Field - MIGRATE INTO TASKS/3Q2020 GW Sampling/Binder Resources/02_Field Forms/Modified Well Forms/GW sampling Forms - modified/T-2 GW Sample Collection Form.doc

Port of Longview TPH Site

Interim Data Report

Appendix E
Data Validation Summary Memorandum and Laboratory Reports

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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

Data Validation Summary

Prepared by: Gretchen Heavner

Date: September 17, 2020

Project No.: POL-TPH

Sample Event(s): November 2019 RI Phase I Field Investigation
March 2020 RI Phase II Field Work
May 2020 Groundwater Sampling
August 2020 Groundwater Sampling

Sample Delivery Group(s): Friedman & Bruya 911363, 003244, 005111, 005097, and 008152
Fremont Analytical 1911358, 2003439, 2003268, 2005072, and 2008153

Sample Media: Soil and Groundwater

NOVEMBER 2019 RI PHASE I FIELD INVESTIGATION

A Compliance Screening (Stages 1 & 2A) data quality review was performed on total petroleum hydrocarbons (TPH), volatile organic compound (VOC), semivolatile organic compound (SVOC), metals, extractable petroleum hydrocarbons (EPH)/volatile petroleum hydrocarbons (VPH) and total organic carbon data resulting from laboratory analysis. The analytical data were validated in accordance with the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2017a) and/or *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2017b).

A total of eight soil samples were submitted in two sample delivery groups: 911363 to Friedman & Bruya for chemical analysis by NWTPH-Gx, NWTPH-Dx, USEPA 6020B, USEPA 8260D, and USEPA 8270D-SIM and 1911358 to Fremont Analytical for chemical analysis by NWEPH, NWVPH, and USEPA 9060. For all sample delivery groups, the holding times were met and the method blanks had no detections. The surrogate, matrix spike (MS), matrix spike duplicate (MSD), blank spike (BS), and blank spike duplicate (BSD) recoveries and MS/MSD, BS/BSD, and sample/sample duplicate relative percent differences (RPDs) all met U.S. Environmental Protection Agency (USEPA) requirements, except where noted below.

The laboratory flagged the surrogate recoveries for samples OIP52-19-19.5-112219, OIP52-22-22.5-112219, and OIP166D-12-12.5-112219 “ip” due to recoveries that fell outside of control limits due to sample matrix effects. Because only one surrogate was run, the gasoline-range organics (GRO) result for these samples will be flagged “J.”

The laboratory flagged the aliphatic hydrocarbon (C8-C10), aromatic hydrocarbon (C8-C10) and methyl *tert*-butyl ether (MTBE) results for samples OIP30-20-21-111919, OIP42-17-17.5-112119, OIP08-19-20-112219, and OIP66-12-12.5-112219 “*” due to laboratory control sample (LCS) recoveries that were outside the control limits with a potential low bias. This will be retained as a “J” qualifier.

The laboratory flagged the MTBE results for samples OIP30-20-21-111919, OIP42-17-17.5-112119, OIP08-19-20-112219, and OIP66-12-12.5-112219 “Q*” because the values were not within established control limits and continuing calibration did not meet established acceptance criteria. This will be retained as a “J” qualifier.

Based on the data quality review, data are determined to be of acceptable quality for use as reported by the laboratory unless specifically qualified above.

MARCH 2020 RI PHASE II FIELD WORK

A Compliance Screening (Stages 1 & 2A) data quality review was performed on TPH, VOC, SVOC, metals, EPH/VPH, and total organic carbon data resulting from laboratory analysis. The analytical data were validated in accordance with USEPA’s National Functional Guidelines (USEPA 2017a, 2017b).

A total of 109 soil samples were submitted in three sample delivery groups: 003244 to Friedman & Bruya for chemical analysis by NWTPH-Gx, NWTPH-Dx, USEPA 6020B, USEPA 8260D, and USEPA 8270D-SIM and 2003268 and 2003439 to Fremont Analytical for chemical analysis by NWEPH, NWVPH, and USEPA 9060. For all sample delivery groups, the holding times were met and the method blanks had no detections, except where noted below. The surrogate, MS, MSD, BS, and BSD recoveries and MS/MSD, BS/BSD, and sample/sample duplicate RPDs all met USEPA requirements, except where noted below.

NWEPH/NWVPH: Sample 01P-67-14.5-15 was analyzed outside of holding time. The results will be flagged “J.”

NWEPH: The laboratory flagged the aliphatic and aromatic hydrocarbon (C8-C10) results for sample 01P-67-14.5-15 “*” because the LCS and MS recoveries were outside the control limits with a potential low bias. This will be retained as a “J” qualifier.

The laboratory flagged the aliphatic and aromatic hydrocarbon (C8-C10) and aliphatic hydrocarbon (C21-C34) results for all samples “*” to indicate the LCS and MS recoveries for were not within established control limits with a potential low bias. This will be retained as a “J” qualifier.

NWVPH: The laboratory flagged the aromatic hydrocarbon (C12-C13) result for samples 01P-67-14.5-15, MW-33-12-12.5, and OIP-23-14-15 “E” because they exceeded the linear working range of the instruments and are estimates. This will be retained as a “J” qualifier.

The laboratory flagged the aromatic hydrocarbon (C8-C10) results in samples OIP-47-17, MW-33-12-12.5, OIP-23-14-15, and OIP-23-19-20 “Q*” to indicate that continuing calibration did not meet established acceptance criteria. This will be retained as a “J” qualifier.

The laboratory noted that the aromatic hydrocarbon (C12-C13) result in sample MW-33-19.5-20 was analyzed outside of holding time. The results will be flagged “J.”

NWTPH-Gx: The laboratory flagged several results “ip” because the surrogate recovery fell outside of control limits for several samples due to sample matrix effects. Because only one surrogate was run, this will be retained as a “J” qualifier.

USEPA Method 8260D: The laboratory flagged the MS/MSD RPD for toluene in sample MW-39-18.5-20 and hexane in sample MW-39-8-9 “vo” to indicate the value fell outside the control limits established for these analytes. Only the parent samples will be qualified “J.”

The laboratory noted that the naphthalene result in sample MW-33-19.5-20 was analyzed outside of holding time. This will be retained as a “J” qualifier.

USEPA Method 8270E-SIM: The laboratory flagged the MS/MSD RPDs for dibenzo(a,h)anthracene in sample MW-39-8-9 and benzo(a)anthracene and benzo(a)pyrene in sample OIP-67-GW-14-19 “vo” to indicate the value fell outside the control limits established for these analytes. Only the parent samples will be qualified “J.”

One surrogate recovery was out of control limits for sample P6-0.5-1. The sample was diluted and re-run, and the surrogate recovery was 0. This information will be noted as a “J” qualifier.

USEPA Method 8021B: The laboratory flagged detected results in samples OIP-49-17 and OIP-72-10-11 “ip” to indicate the surrogate recovery fell outside of control limits due to sample matrix effects and “ve” to indicate that the detected ethylbenzene and total xylene results exceeded the valid instrument calibration range. This will be retained as a “J” qualifier.

Based on the data quality review, data are determined to be of acceptable quality for use as reported by the laboratory unless specifically qualified above.

MAY 2020 SOIL VAPOR SAMPLING

A Compliance Screening (Stages 1 & 2A) data quality review was performed on VPH, VOC, and helium data resulting from laboratory analysis. The analytical data were validated in accordance with USEPA’s National Functional Guidelines (USEPA 2017a, 2017b).

A total of three soil vapor samples were submitted in sample delivery group 005111 to Friedman & Bruya for chemical analysis by MA-APH, TO-15, and ASTM D1946. The holding times were met and the method blanks had no detections. The surrogate, MS, MSD, BS, and BSD recoveries and MS/MSD, BS/BSD, and sample/sample duplicate RPDs all met USEPA requirements.

Based on the data quality review, data are determined to be of acceptable quality for use as reported by the laboratory.

MAY 2020 GROUNDWATER SAMPLING

A Compliance Screening (Stages 1 & 2A) data quality review was performed on TPH, VOC, SVOC, metals, dissolved gases, nitrate/sulfate, chemical oxygen demand (COD), biochemical oxygen demand (BOD), and alkalinity data resulting from laboratory analysis. The analytical data were validated in accordance with USEPA's National Functional Guidelines (USEPA 2017a, 2017b).

A total of 37 groundwater samples were submitted in two sample delivery groups: 005097 to Friedman & Bruya for chemical analysis by NWTPH-Gx, NWTPH-Dx, USEPA 6020B, USEPA 8260D, USEPA 8270E, and USEPA 8011 and 2005072 to Fremont Analytical for chemical analysis by RSK-175, USEPA 300.0, USEPA 200.8, USEPA 2320B, SM 5210B, and SM 5220d. For all sample delivery groups, the holding times were met and the method blanks had no detections. The MS, MSD, BS, and BSD recoveries and MS/MSD, BS/BSD, and sample/sample duplicate RPDs all met USEPA requirements.

USEPA Method 8260D: The laboratory flagged the benzene result in sample MW-40-050620 "ve" to indicate that the analyte response exceeded the valid instrument calibration range and the value reported is an estimate. This will be retained as a "J" qualifier.

USEPA Method 8270E SIM: The laboratory flagged all fluorene results "jl" to indicate that the LCS percent recovery and/or RPD were out of control limits and should be considered an estimate. This will be retained as a "J" qualifier.

The laboratory flagged the benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene recoveries and RPDs in the MS/MSD of sample MW-12-50720 "vo" to indicate that they fell outside the control limits established for these analytes. These results will be flagged "J" in sample MW-12-50720 only because there was an additional MS/MSD run on a different sample that met all requirements.

SM 5210B and USEPA Method 300.0: The laboratory noted that the several nitrate and BOD results were analyzed for this analyte outside of holding times. These results will be flagged "J."

RSK-175: The laboratory flagged the methane result for sample MW-20-050720 "E" because it exceeds the quantitation range. This will be retained as a "J" for this result.

Based on the data quality review, data are determined to be of acceptable quality for use as reported by the laboratory unless specifically qualified above.

AUGUST 2020 GROUNDWATER SAMPLING

A Compliance Screening (Stages 1 & 2A) data quality review was performed on TPH, VOC, SVOC, metals, dissolved gases, nitrate/sulfate, and alkalinity data resulting from laboratory analysis. The analytical data were validated in accordance with USEPA's National Functional Guidelines (USEPA 2017a, 2017b).

A total of 37 groundwater samples were submitted in two sample delivery groups: 008152 to Friedman & Bruya for chemical analysis by NWTPH-Gx, NWTPH-Dx, USEPA 6020B, USEPA 8260D, USEPA 8270E, and USEPA 8011 and 2008153 to Fremont Analytical for chemical analysis by RSK-175, USEPA 300.0, USEPA 200.8, and USEPA 2320B. For all sample delivery groups, the holding times were met and the method blanks had no detections. The MS, MSD, BS, and BSD recoveries and MS/MSD, BS/BSD, and sample/sample duplicate RPDs all met USEPA requirements.

NWTPH-Dx: The laboratory flagged the surrogate recovery for sample MW-37-081020 "ip" to indicate that it fell outside of control limits due to sample matrix effects. The surrogate recovery was low at 22% and the diesel-range and oil-range results were nondetect; so it is with professional judgement that these results be qualified "UJ."

USEPA EPA Method 300.0: Samples MW-19-081020, MW-35-081020, and MW-30-081120 required dilutions due to nitrate exceeding the calibration range of the detector. The analysis of the dilution was not within holding time, and thus those results will be flagged "J."

Based on the data quality review, data are determined to be of acceptable quality for use as reported by the laboratory unless specifically qualified above.

REFERENCES

U.S. Environmental Protection Agency (USEPA). 2017a. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-540-R-2017-001/OLEM 9355.0-135. January.

_____. 2017b. *National Functional Guidelines for Organic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-540-R-2017-002/OLEM 9355.0-136. January.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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December 5, 2019

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 November 23, 2019 from the POC-TPH, F&BI 911363 project. There are 37 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Scott Adamek
FDS1205R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 23, 2019 by Friedman & Bruya, Inc. from the Floyd-Snider POC-TPH, F&BI 911363 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
911363 -01	OIP30-20-21-111919
911363 -02	OIP42-17-17.5-112119
911363 -03	OIP52-19-19.5-112219
911363 -04	OIP52-22-22.5-112219
911363 -05	OIP53-21-21.5-112219
911363 -06	OIP08-19-20-112219
911363 -07	OIP66-12-12.5-112219
911363 -08	OIP166D-12-12.5-112219

Samples OIP30-20-21-111919, OIP42-17-17.5-112119, OIP08-19-20-112219, and OIP66-12-12.5-112219 were sent to Fremont Analytical for EPH/VPH analyses. In addition, sample OIP53-21-21.5-112219 was sent to Fremont for TOC analysis. The report will be forwarded to your office upon receipt.

All quality control requirements were acceptable.

Date of Report: 12/05/19
Date Received: 11/23/19
Project: POC-TPH, F&BI 911363
Date Extracted: 11/25/19
Date Analyzed: 11/25/19

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)
OIP30-20-21-111919 911363-01	61	149
OIP42-17-17.5-112119 911363-02 1/50	3,600	112
OIP52-19-19.5-112219 911363-03	86	ip
OIP52-22-22.5-112219 911363-04	260	ip
OIP53-21-21.5-112219 911363-05	<5	80
OIP08-19-20-112219 911363-06 1/50	4,900	145
OIP66-12-12.5-112219 911363-07 1/10	1,500	140
OIP166D-12-12.5-112219 911363-08 1/20	2,000	ip
Method Blank 09-2739 MB	<5	89

Date of Report: 12/05/19
Date Received: 11/23/19
Project: POC-TPH, F&BI 911363
Date Extracted: 11/25/19
Date Analyzed: 11/25/19

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)
OIP30-20-21-111919 911363-01	11,000	12,000	99
OIP42-17-17.5-112119 911363-02	17,000	1,500 x	102
OIP52-19-19.5-112219 911363-03	530	<250	96
OIP52-22-22.5-112219 911363-04	2,200	<250	93
OIP53-21-21.5-112219 911363-05	<50	<250	100
OIP08-19-20-112219 911363-06	12,000	1,000 x	101
OIP66-12-12.5-112219 911363-07	760	<250	107
OIP166D-12-12.5-112219 911363-08	490	<250	102
Method Blank 09-2880 MB	<50	<250	98

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP52-19-19.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-03
Date Analyzed:	11/25/19	Data File:	911363-03.110
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP52-22-22.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-04
Date Analyzed:	11/25/19	Data File:	911363-04.111
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.24

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP53-21-21.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-05
Date Analyzed:	11/25/19	Data File:	911363-05.112
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP66-12-12.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-07
Date Analyzed:	11/25/19	Data File:	911363-07.113
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	3.02

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP166D-12-12.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-08
Date Analyzed:	11/25/19	Data File:	911363-08.118
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	3.76

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/26/19	Lab ID:	I9-751 mb
Date Analyzed:	11/26/19	Data File:	I9-751 mb.035
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

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

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP30-20-21-111919	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-01 1/50
Date Analyzed:	12/02/19	Data File:	120223.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	113 d	31	163
Benzo(a)anthracene-d12	124 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.1
Acenaphthylene	<0.1
Acenaphthene	0.94
Fluorene	4.3
Phenanthrene	8.4
Anthracene	2.1
Fluoranthene	0.58
Pyrene	3.4
Benz(a)anthracene	0.81
Chrysene	2.0
Benzo(a)pyrene	0.40
Benzo(b)fluoranthene	0.24
Benzo(k)fluoranthene	<0.1
Indeno(1,2,3-cd)pyrene	<0.1
Dibenz(a,h)anthracene	<0.1
Benzo(g,h,i)perylene	0.11
1-Methylnaphthalene	13
2-Methylnaphthalene	15

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP42-17-17.5-112119	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-02 1/25
Date Analyzed:	11/26/19	Data File:	112528.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	109 d	31	163
Benzo(a)anthracene-d12	118 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	1.3
Fluorene	8.0
Phenanthrene	12 ve
Anthracene	<0.05
Fluoranthene	0.24
Pyrene	0.71
Benz(a)anthracene	0.13
Chrysene	0.40
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05
1-Methylnaphthalene	41 ve
2-Methylnaphthalene	29 ve

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP42-17-17.5-112119	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-02 1/250
Date Analyzed:	11/25/19	Data File:	112521.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	205 d	31	163
Benzo(a)anthracene-d12	131 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	1.3
Fluorene	7.8
Phenanthrene	11
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	0.65
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5
1-Methylnaphthalene	38
2-Methylnaphthalene	27

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP52-19-19.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-03 1/5
Date Analyzed:	11/25/19	Data File:	112518.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	91	31	163
Benzo(a)anthracene-d12	100	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	0.077
Fluorene	0.57
Phenanthrene	0.87
Anthracene	<0.01
Fluoranthene	0.011
Pyrene	0.026
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01
1-Methylnaphthalene	0.55
2-Methylnaphthalene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP52-22-22.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-04 1/5
Date Analyzed:	11/25/19	Data File:	112519.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	90	31	163
Benzo(a)anthracene-d12	107	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	0.37
Fluorene	2.5 ve
Phenanthrene	3.7 ve
Anthracene	<0.01
Fluoranthene	0.045
Pyrene	0.10
Benz(a)anthracene	<0.01
Chrysene	0.010
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01
1-Methylnaphthalene	7.4 ve
2-Methylnaphthalene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP52-22-22.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-04 1/50
Date Analyzed:	12/02/19	Data File:	120217.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	110 d	31	163
Benzo(a)anthracene-d12	111 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.1
Acenaphthylene	<0.1
Acenaphthene	0.39
Fluorene	3.5
Phenanthrene	4.0
Anthracene	<0.1
Fluoranthene	<0.1
Pyrene	<0.1
Benz(a)anthracene	<0.1
Chrysene	<0.1
Benzo(a)pyrene	<0.1
Benzo(b)fluoranthene	<0.1
Benzo(k)fluoranthene	<0.1
Indeno(1,2,3-cd)pyrene	<0.1
Dibenz(a,h)anthracene	<0.1
Benzo(g,h,i)perylene	<0.1
1-Methylnaphthalene	8.1
2-Methylnaphthalene	<0.1

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP53-21-21.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-05 1/5
Date Analyzed:	11/25/19	Data File:	112520.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	87	31	163
Benzo(a)anthracene-d12	87	24	168

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

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP08-19-20-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-06 1/25
Date Analyzed:	11/26/19	Data File:	112525.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	110 d	31	163
Benzo(a)anthracene-d12	111 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	0.86
Fluorene	6.1
Phenanthrene	8.6 ve
Anthracene	<0.05
Fluoranthene	0.16
Pyrene	0.43
Benz(a)anthracene	0.057
Chrysene	0.16
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05
1-Methylnaphthalene	31 ve
2-Methylnaphthalene	27 ve

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP08-19-20-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-06 1/250
Date Analyzed:	11/25/19	Data File:	112522.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	196 d	31	163
Benzo(a)anthracene-d12	79 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	1.0
Fluorene	6.8
Phenanthrene	8.8
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	<0.5
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5
1-Methylnaphthalene	32
2-Methylnaphthalene	27

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP66-12-12.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-07 1/25
Date Analyzed:	11/26/19	Data File:	112526.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	120 d	31	163
Benzo(a)anthracene-d12	108 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	0.053
Fluorene	0.28
Phenanthrene	0.32
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	<0.05
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05
1-Methylnaphthalene	1.7
2-Methylnaphthalene	1.9

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	OIP166D-12-12.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-08 1/25
Date Analyzed:	11/26/19	Data File:	112527.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	119 d	31	163
Benzo(a)anthracene-d12	103 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	0.24
Phenanthrene	0.30
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	<0.05
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05
1-Methylnaphthalene	1.4
2-Methylnaphthalene	1.6

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	09-2878 mb 1/5
Date Analyzed:	11/25/19	Data File:	112513.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	96	31	163
Benzo(a)anthracene-d12	99	24	168

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

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	OIP30-20-21-111919	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-01
Date Analyzed:	11/27/19	Data File:	112724.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	62	145
Toluene-d8	96	55	145
4-Bromofluorobenzene	101	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	0.063
Naphthalene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	OIP42-17-17.5-112119	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-02 1/10
Date Analyzed:	11/27/19	Data File:	112729.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	62	145
Toluene-d8	99	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	45
Methyl t-butyl ether (MTBE)	<0.5
1,2-Dichloroethane (EDC)	<0.5
Benzene	2.4
Toluene	0.99
1,2-Dibromoethane (EDB)	<0.5
Ethylbenzene	41
m,p-Xylene	4.1
o-Xylene	<0.5
Naphthalene	<0.5

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	OIP52-19-19.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-03
Date Analyzed:	11/27/19	Data File:	112727.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	145
Toluene-d8	97	55	145
4-Bromofluorobenzene	101	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:	OIP52-22-22.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-04
Date Analyzed:	11/27/19	Data File:	112726.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	62	145
Toluene-d8	98	55	145
4-Bromofluorobenzene	97	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:	OIP53-21-21.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-05
Date Analyzed:	11/27/19	Data File:	112725.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	145
Toluene-d8	97	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:	OIP08-19-20-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-06 1/5
Date Analyzed:	11/27/19	Data File:	112728.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	62	145
Toluene-d8	99	55	145
4-Bromofluorobenzene	97	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	23
Methyl t-butyl ether (MTBE)	<0.25
1,2-Dichloroethane (EDC)	<0.25
Benzene	1.1
Toluene	0.74
1,2-Dibromoethane (EDB)	<0.25
Ethylbenzene	27
m,p-Xylene	3.2
o-Xylene	<0.25
Naphthalene	<0.25

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	OIP66-12-12.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-07
Date Analyzed:	11/27/19	Data File:	112731.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	145
Toluene-d8	98	55	145
4-Bromofluorobenzene	101	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	1.1
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	0.12
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	OIP166D-12-12.5-112219	Client:	Floyd-Snider
Date Received:	11/23/19	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	911363-08
Date Analyzed:	11/27/19	Data File:	112730.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	62	145
Toluene-d8	99	55	145
4-Bromofluorobenzene	100	65	139

Compounds:	Concentration mg/kg (ppm)
Benzene	<0.03
Toluene	<0.05
Ethylbenzene	0.25
m,p-Xylene	<0.1
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POC-TPH, F&BI 911363
Date Extracted:	11/25/19	Lab ID:	09-2844 mb
Date Analyzed:	11/25/19	Data File:	112513.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	62	145
Toluene-d8	94	55	145
4-Bromofluorobenzene	96	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: 12/05/19
Date Received: 11/23/19
Project: POC-TPH, F&BI 911363

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

Laboratory Code: 911362-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	95	71-131

Date of Report: 12/05/19
Date Received: 11/23/19
Project: POC-TPH, F&BI 911363

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

Laboratory Code: 911363-04 (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	2,000	116	114	73-135	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	98	74-139

Date of Report: 12/05/19
Date Received: 11/23/19
Project: POC-TPH, F&BI 911363

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 911372-02 (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)	10	9.69	85	87	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	mg/kg (ppm)	10	100	80-120

Date of Report: 12/05/19
Date Received: 11/23/19
Project: POC-TPH, F&BI 911363

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

Laboratory Code: 911362-01 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	76	44-129
2-Methylnaphthalene	mg/kg (ppm)	0.17	<0.01	75	45-135
1-Methylnaphthalene	mg/kg (ppm)	0.17	<0.01	79	40-141
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	79	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	78	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	83	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	83	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	83	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	89	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	74	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	88	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	89	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	77	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	78	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	76	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	81	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	81	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	77	37-133

Date of Report: 12/05/19
Date Received: 11/23/19
Project: POC-TPH, F&BI 911363

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

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	87	90	58-121	3
2-Methylnaphthalene	mg/kg (ppm)	0.17	86	90	58-123	5
1-Methylnaphthalene	mg/kg (ppm)	0.17	90	95	60-124	5
Acenaphthylene	mg/kg (ppm)	0.17	88	87	54-121	1
Acenaphthene	mg/kg (ppm)	0.17	91	90	54-123	1
Fluorene	mg/kg (ppm)	0.17	90	95	56-127	5
Phenanthrene	mg/kg (ppm)	0.17	91	95	55-122	4
Anthracene	mg/kg (ppm)	0.17	91	94	50-120	3
Fluoranthene	mg/kg (ppm)	0.17	94	99	54-129	5
Pyrene	mg/kg (ppm)	0.17	77	82	53-127	6
Benz(a)anthracene	mg/kg (ppm)	0.17	95	100	51-115	5
Chrysene	mg/kg (ppm)	0.17	95	99	55-129	4
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	80	84	56-123	5
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	86	86	54-131	0
Benzo(a)pyrene	mg/kg (ppm)	0.17	78	81	51-118	4
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	82	88	49-148	7
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	85	89	50-141	5
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	79	83	52-131	5

Date of Report: 12/05/19
Date Received: 11/23/19
Project: POC-TPH, F&BI 911363

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

Laboratory Code: 911361-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Hexane	mg/kg (ppm)	2.5	<0.25	75	75	10-137	0
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	101	99	21-145	2
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	94	92	12-160	2
Benzene	mg/kg (ppm)	2.5	<0.03	91	90	29-129	1
Toluene	mg/kg (ppm)	2.5	<0.05	97	97	35-130	0
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	93	91	28-142	2
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	98	98	32-137	0
m,p-Xylene	mg/kg (ppm)	5	<0.1	99	99	34-136	0
o-Xylene	mg/kg (ppm)	2.5	<0.05	101	101	33-134	0
Naphthalene	mg/kg (ppm)	2.5	<0.05	92	95	14-157	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Hexane	mg/kg (ppm)	2.5	95	43-142
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	92	60-123
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	88	56-135
Benzene	mg/kg (ppm)	2.5	87	68-114
Toluene	mg/kg (ppm)	2.5	101	66-126
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	92	74-132
Ethylbenzene	mg/kg (ppm)	2.5	99	64-123
m,p-Xylene	mg/kg (ppm)	5	100	78-122
o-Xylene	mg/kg (ppm)	2.5	101	77-124
Naphthalene	mg/kg (ppm)	2.5	92	63-140

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 analyte 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 due to sample matrix effects.

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.

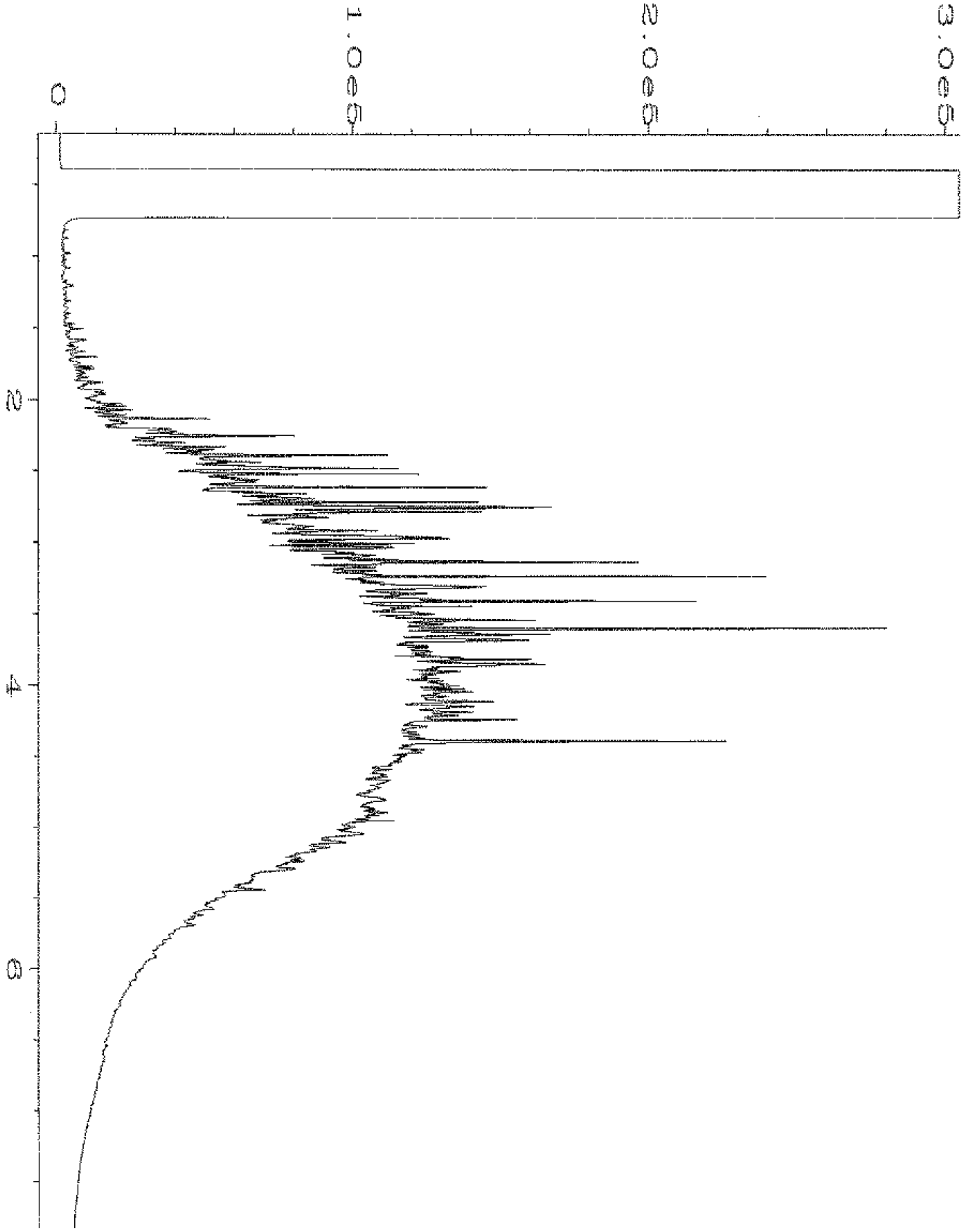
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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#4                                Vial Number       : 12
Sample Name       : 911363-01                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 5
Acquired on       : 25 Nov 19   12:17 PM                Instrument Method: DX.MTH
Report Created on: 04 Dec 19   12:28 PM                 Analysis Method   : DEFAULT.MTH
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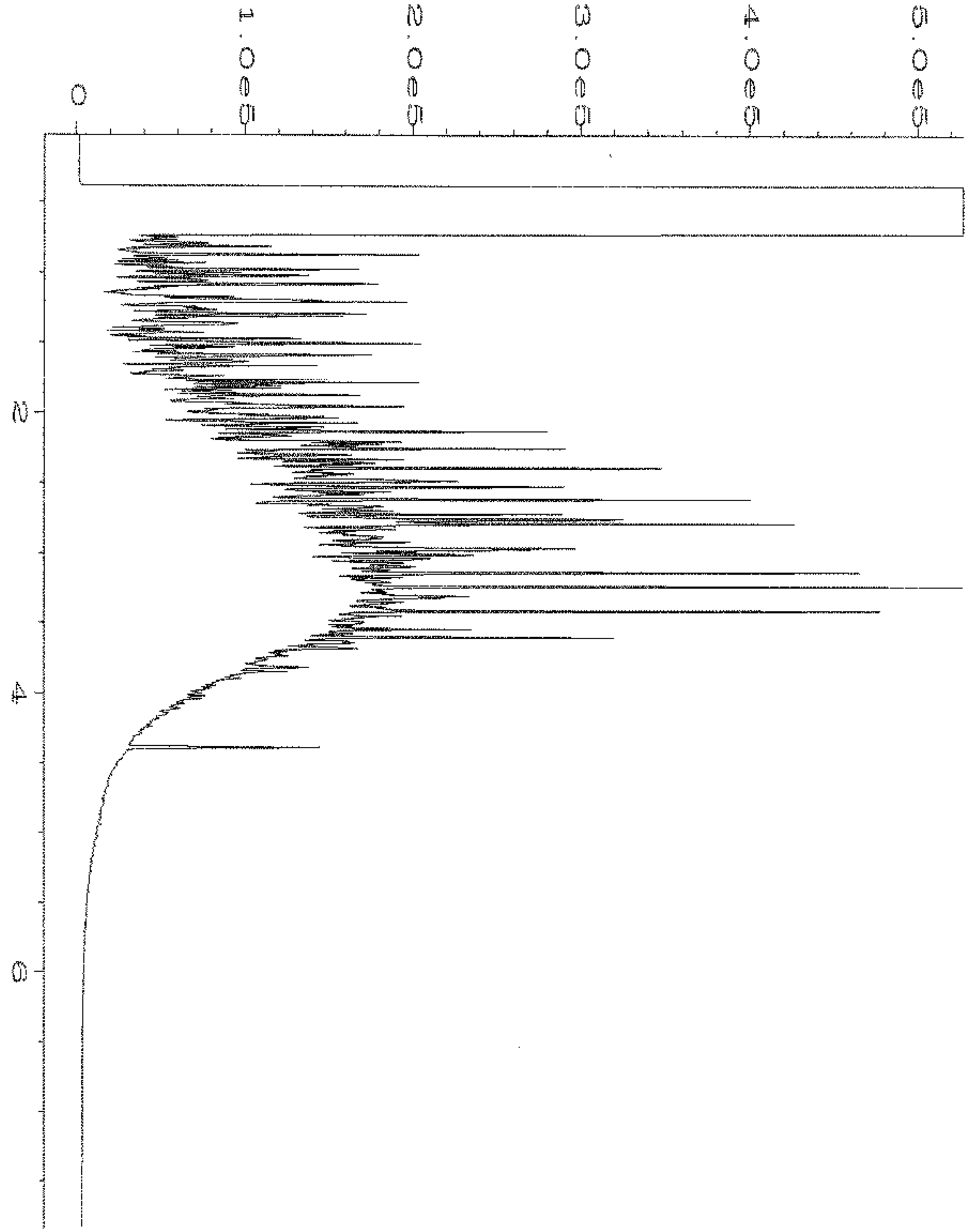

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Instrument        : GC#4                                Vial Number      : 13
Sample Name       : 911363-02                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 5
Acquired on       : 25 Nov 19   12:29 PM                Instrument Method: DX.MTH
Report Created on: 04 Dec 19   12:29 PM                 Analysis Method  : DEFAULT.MTH
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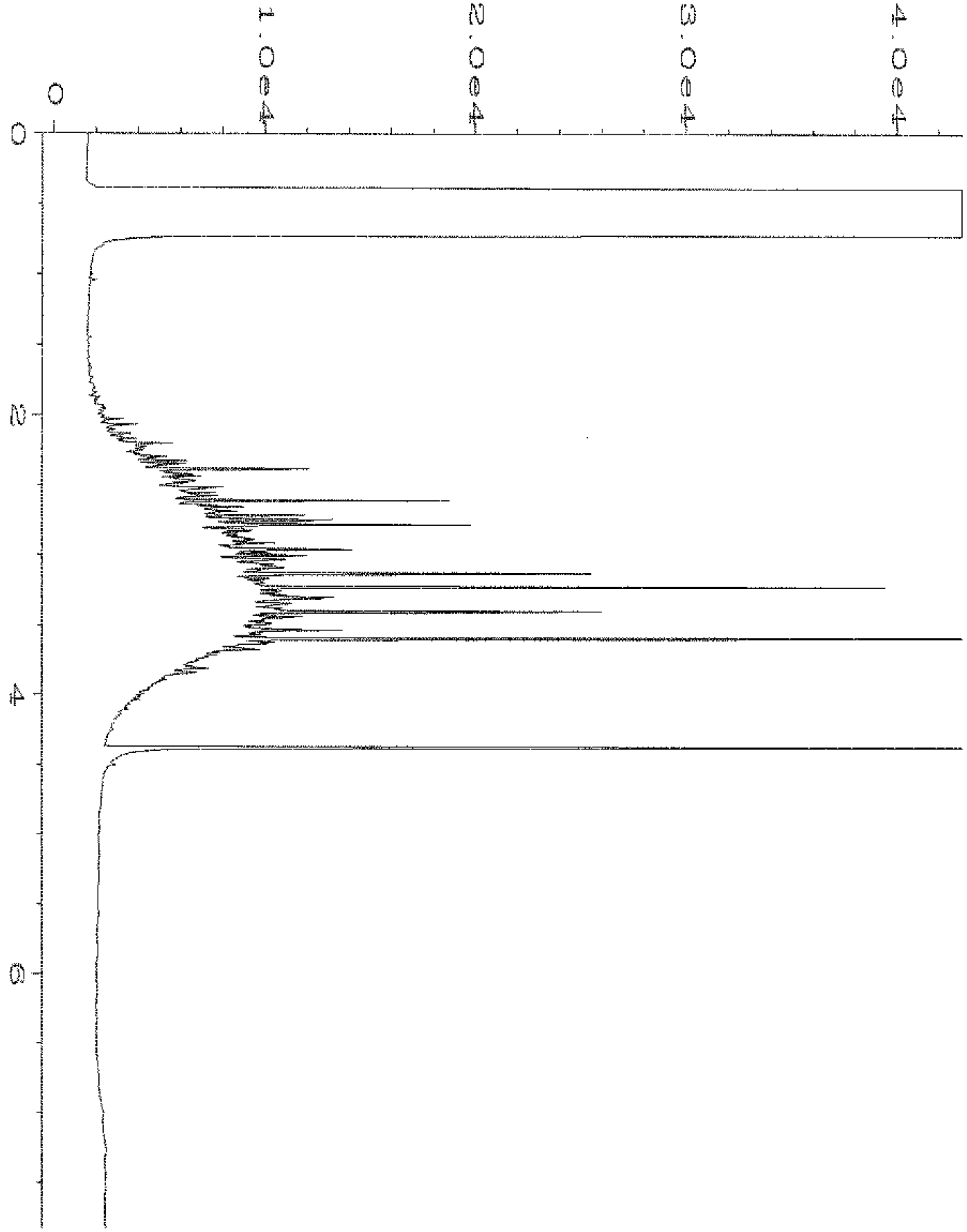

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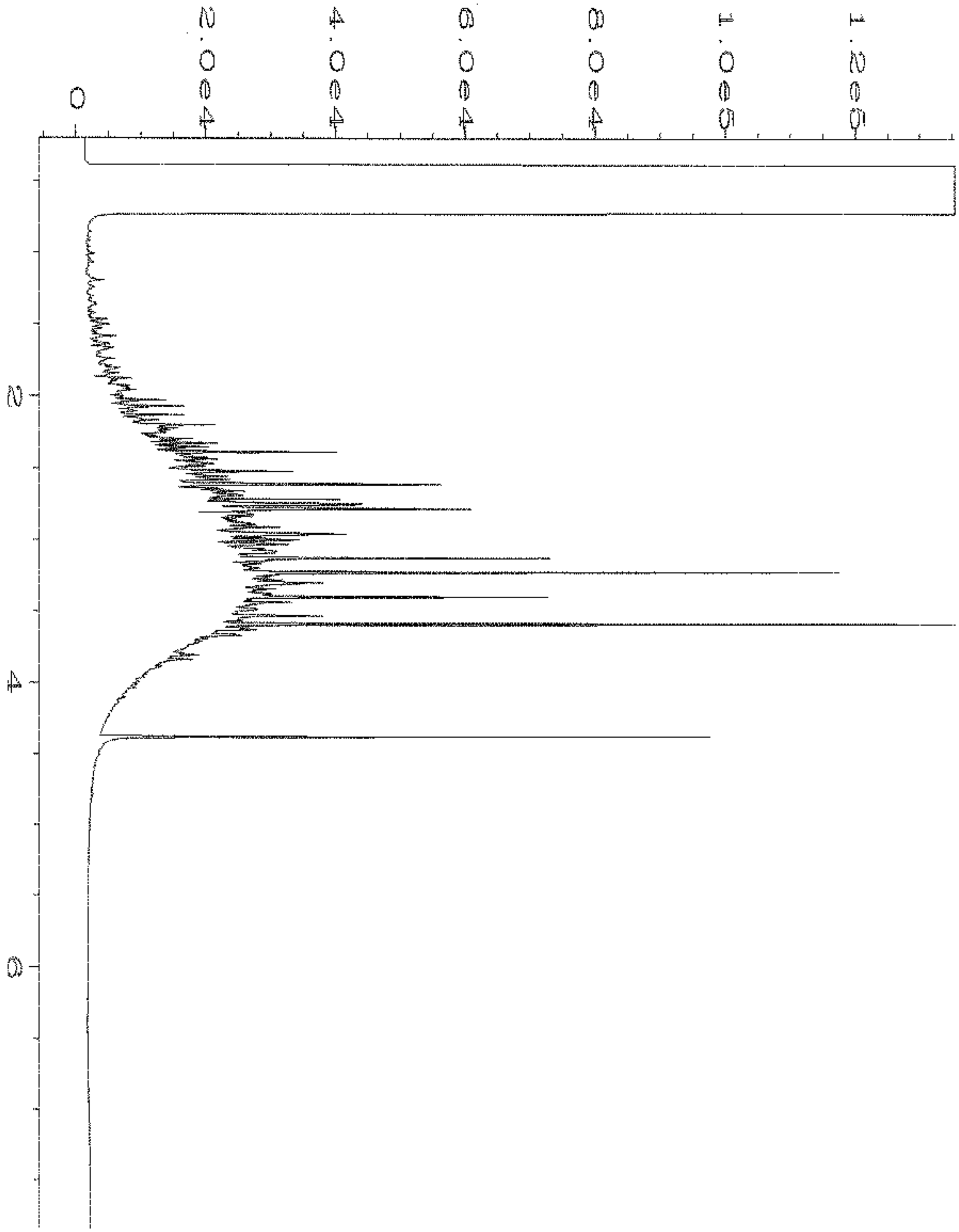
Instrument   : GC#4
Sample Name   : 911363-03
Run Time Bar Code:
Acquired on   : 25 Nov 19 12:41 PM
Report Created on: 04 Dec 19 12:29 PM

Page Number   : 1
Vial Number   : 14
Injection Number : 1
Sequence Line   : 5
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



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Operator          : TL                               Page Number      : 1
Instrument        : GC#4                             Vial Number      : 15
Sample Name       : 911363-04                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 5
Acquired on       : 25 Nov 19  12:53 PM              Instrument Method: DX.MTH
Report Created on: 04 Dec 19  12:29 PM               Analysis Method  : DEFAULT.MTH
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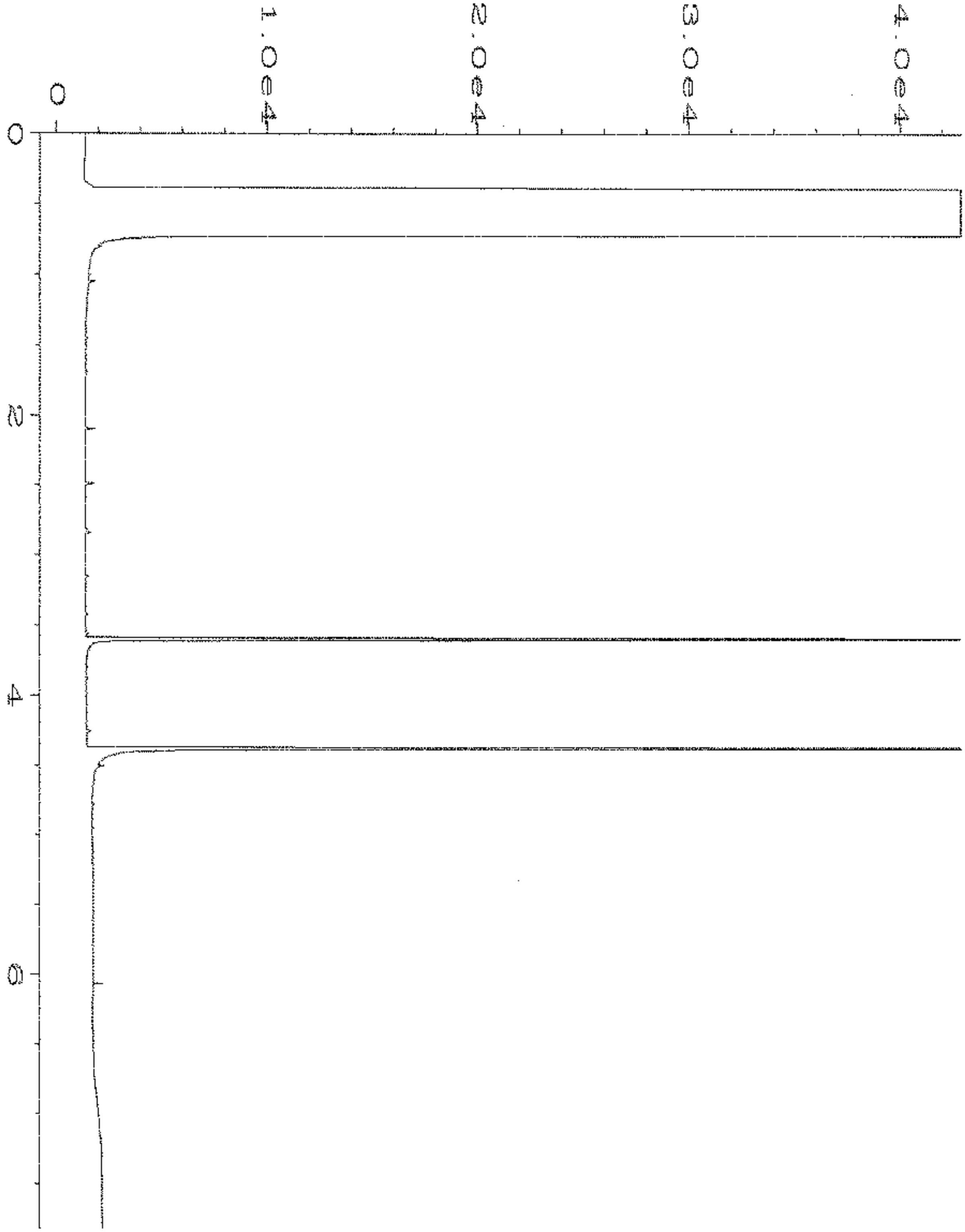

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Operator          : TL                                  Page Number      : 1
Instrument        : GC#4                                Vial Number      : 16
Sample Name       : 911363-05                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 5
Acquired on       : 25 Nov 19  01:05 PM                 Instrument Method: DX.MTH
Report Created on: 04 Dec 19  12:30 PM                  Analysis Method  : DEFAULT.MTH
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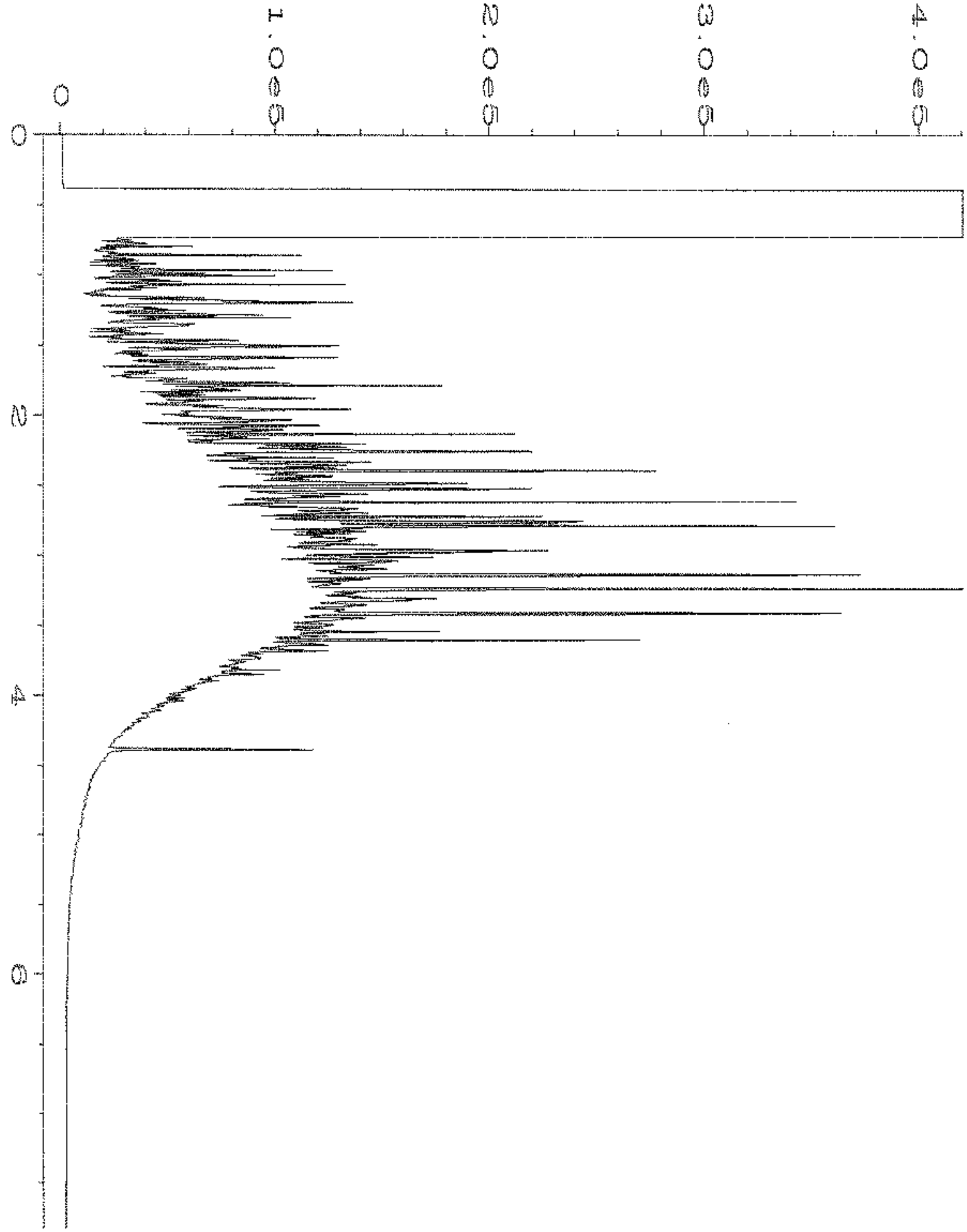

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Operator          : TL                                  Page Number      : 1
Instrument        : GC#4                                Vial Number      : 17
Sample Name       : 911363-06                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 5
Acquired on       : 25 Nov 19  01:17 PM                 Instrument Method: DX.MTH
Report Created on: 04 Dec 19  12:30 PM                  Analysis Method  : DEFAULT.MTH
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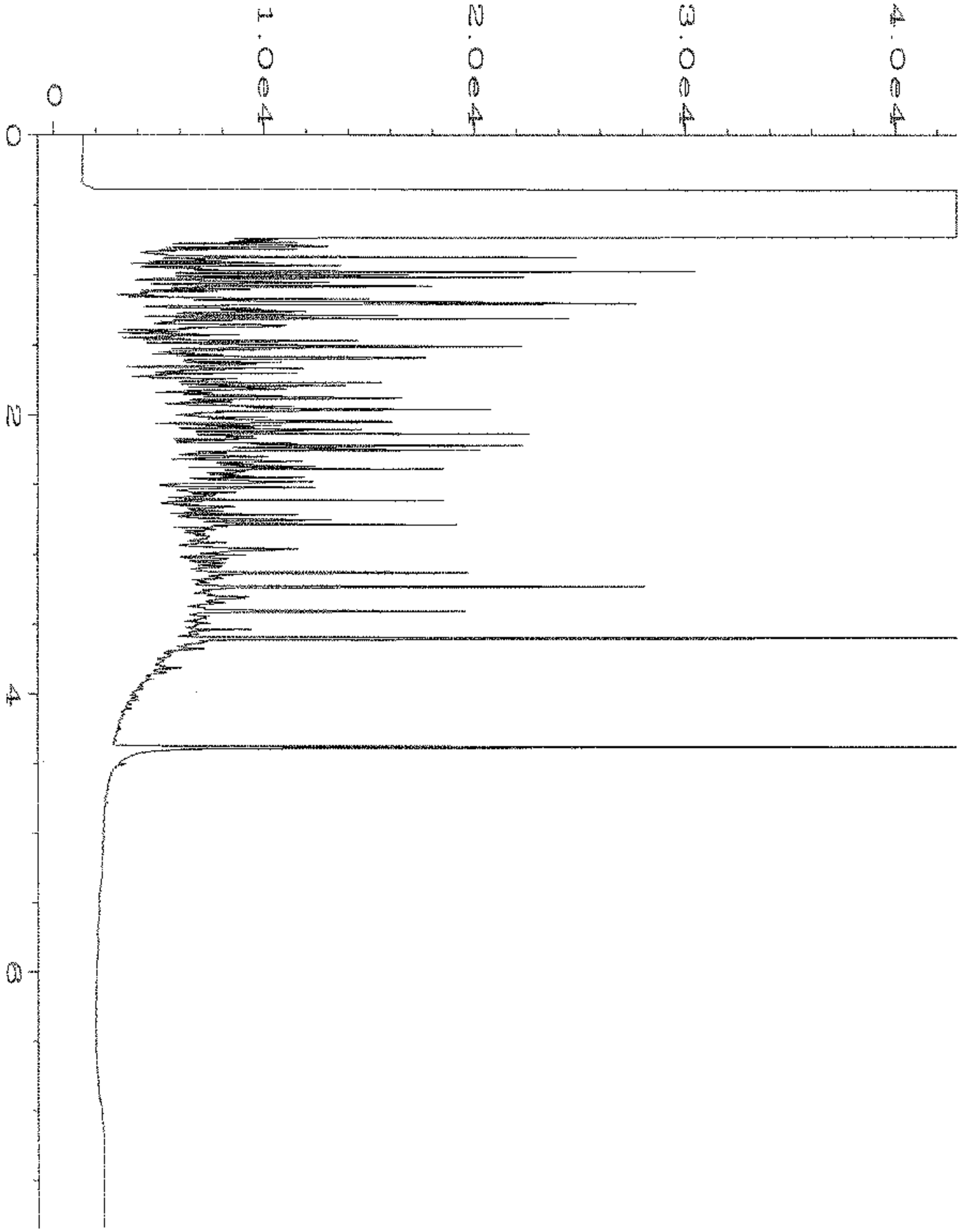

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Operator          : TL                           Page Number      : 1
Instrument        : GC#4                         Vial Number      : 18
Sample Name       : 911363-07                    Injection Number : 1
Run Time Bar Code:                               Sequence Line    : 5
Acquired on       : 25 Nov 19  01:29 PM          Instrument Method: DX.MTH
Report Created on: 04 Dec 19  12:30 PM           Analysis Method  : DEFAULT.MTH
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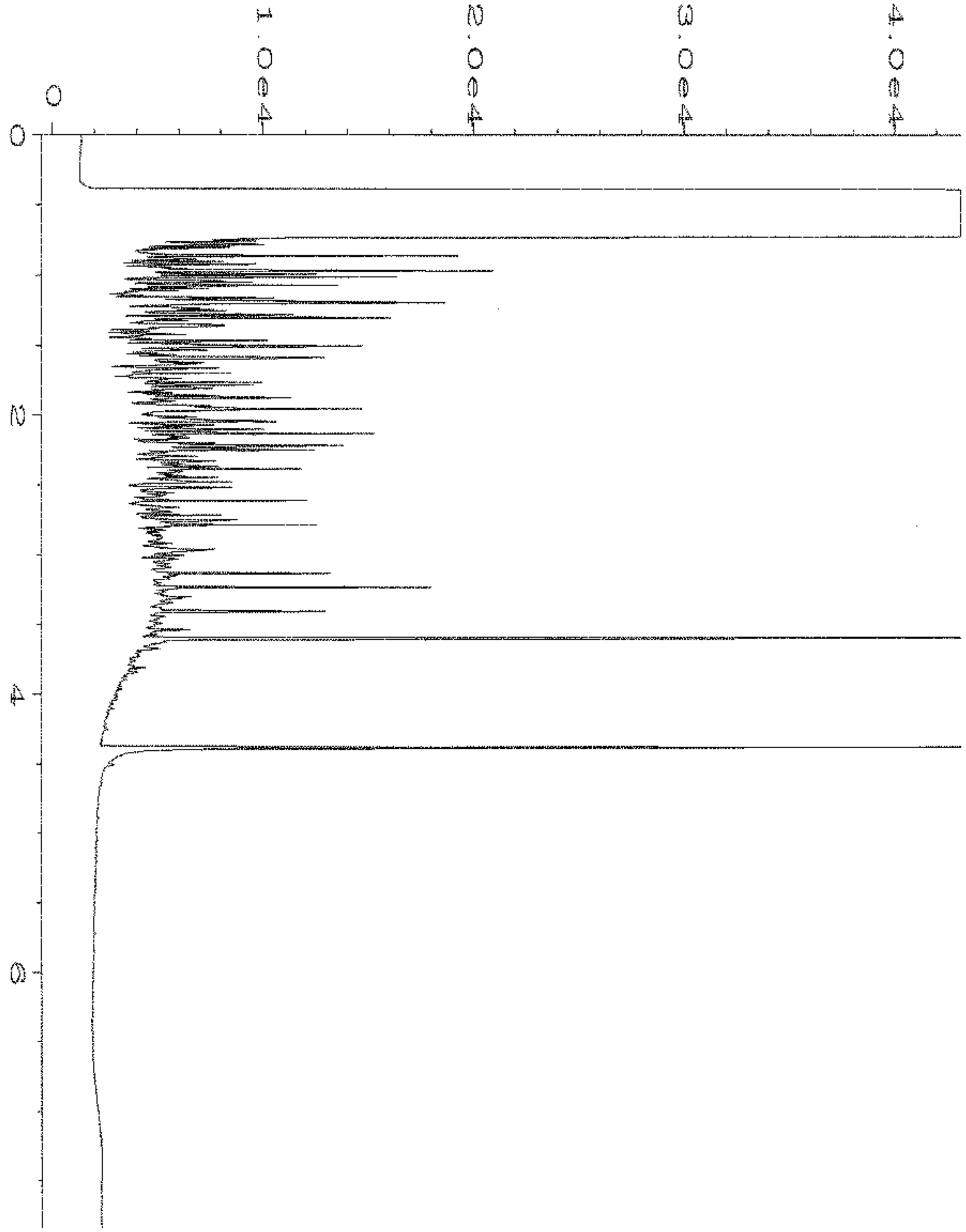

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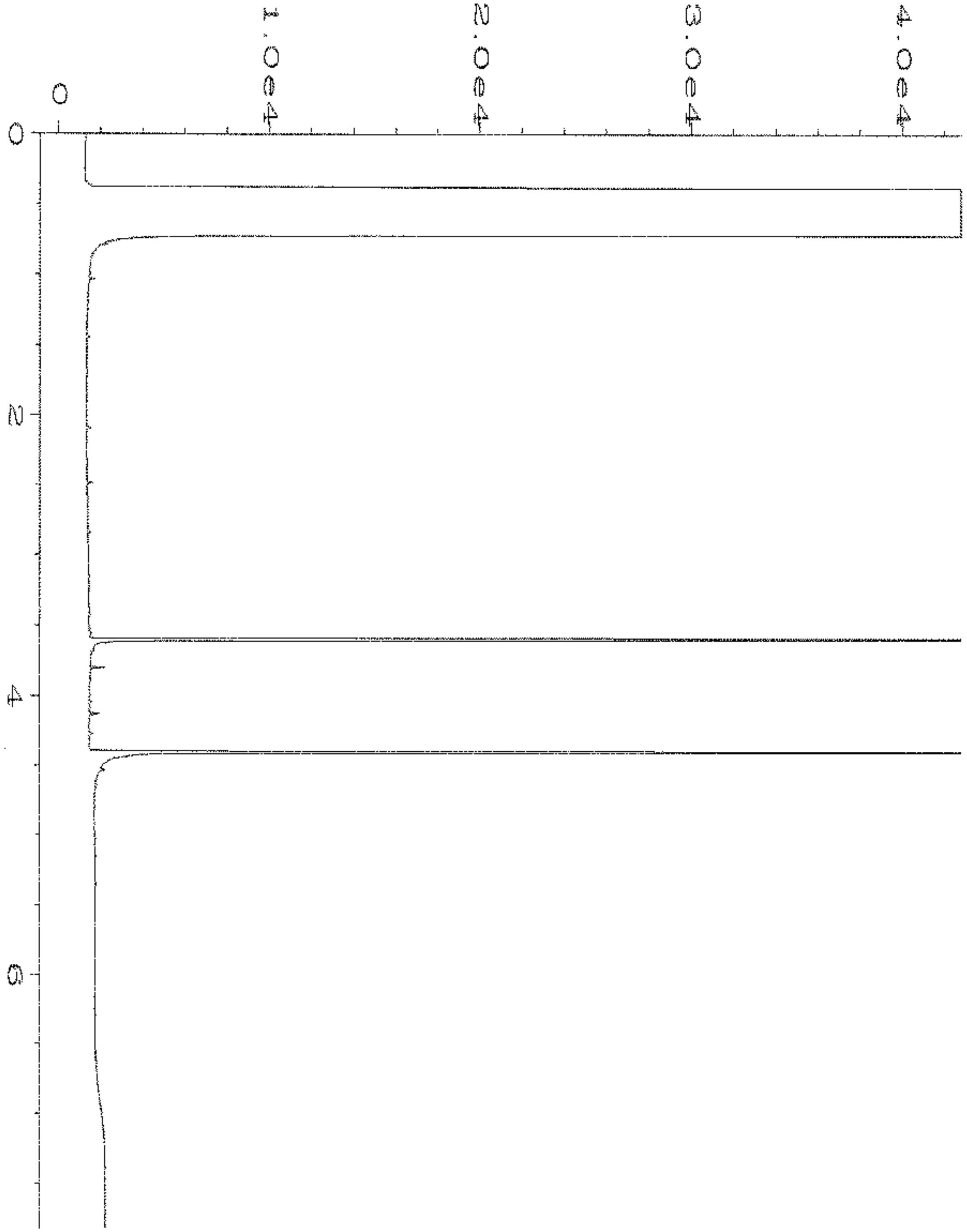
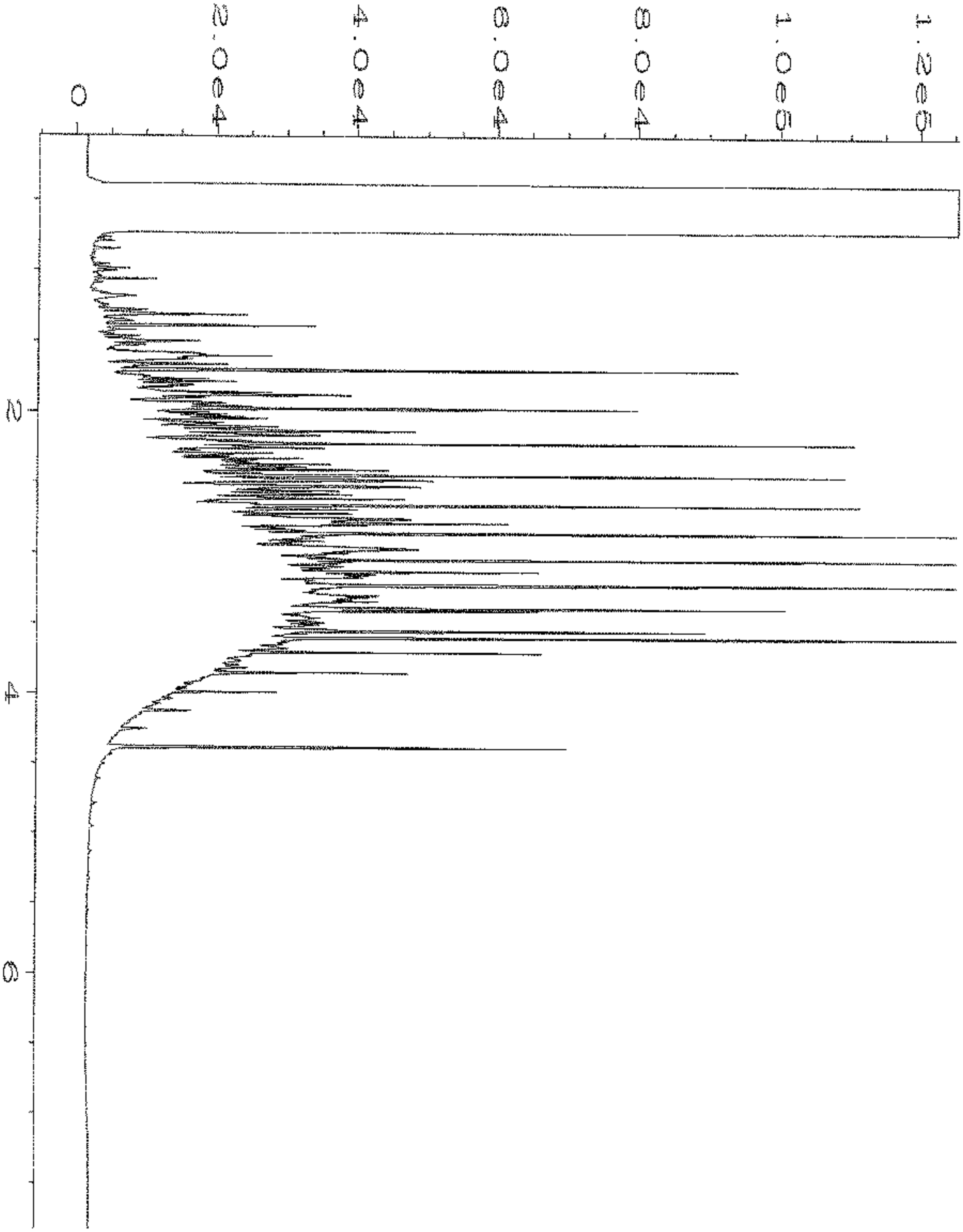
Data File Name   : C:\HPCHEM\4\DATA\11-25-19\019F0501.D
Operator         : TL                              Page Number       : 1
Instrument       : GC#4                            Vial Number       : 19
Sample Name      : 911363-08                       Injection Number  : 1
Run Time Bar Code:                                 Sequence Line     : 5
Acquired on      : 25 Nov 19  01:41 PM             Instrument Method: DX.MTH
Report Created on: 04 Dec 19  12:30 PM             Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\4\DATA\11-25-19\008F0501.D
Operator          : TL                              Page Number      : 1
Instrument        : GC#4                            Vial Number      : 8
Sample Name       : 09-2880 mb                      Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 5
Acquired on       : 25 Nov 19  11:31 AM             Instrument Method: DX.MTH
Report Created on: 04 Dec 19  12:30 PM              Analysis Method  : DEFAULT.MTH
```



Data File Name : C:\HPCHEM\4\DATA\11-25-19\003F0201.D
Operator : TL
Instrument : GC#4
Sample Name : 500 Dx 58-146B
Run Time Bar Code:
Acquired on : 25 Nov 19 05:27 AM
Report Created on: 04 Dec 19 12:30 PM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

911363

SAMPLE CHAIN OF CUSTODY

ME 11-23-19

BI3 / VS4

Report To Gabe Cisneros & Scott Adamek

Company 601 Union Street Floyd|Snider

Address Suite 600

City, State, ZIP Seattle, WA

Phone 206 292-2078 Email gabe.cisneros@floydsnider.com

SAMPLERS (*signature*) [redacted]

PROJECT NAME POL-TPH	PO #
REMARKS All samples placed in freezer day of collection to preserve. Project specific RLs? - Yes / No	INVOICE TO

Page # 1 of 1

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED												
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	VPH/EPH	Lead by 6020	TOC Total Organic Carbon	BTEX 8260	Notes
01P30-20-21-111919	01 A-H	11/19/19	1415	Soil	8	X	X			X	X		X				include BTEX, MTBE, EDB, EDC and n-hexane in VOCs & Naphthalenes
01P42-17-17.5-112119	02 A-H	11/21/19	1815	Soil	8	X	X			X	X		X				
01P 52-19-19.5-112219	03 A-E	11/22/19	0827	Soil	85 65	X	X				X			X		X	
01P52-22-22.5-112219	04 A-E		0845	Soil	8 85	X	X				X			X		X	
01P53-21-21.5-112219	05 A-E		0900	Soil	5	X	X				X			X	X	X	
01P08-19-20-112219	06 A-H		1109	Soil	8	X	X			X	X		X				
01P66-12-12.5-112219	07 A-H		1145	Soil	8	X	X			X	X		X	X			
01P166D-12-12.5-112219	08 A-E		1150	Soil	5	X	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:	Pamela Osterhout	Floyd/Snider	11/22/19	1953
Received by:	Eric Young	FB	11/22/19	1953
Relinquished by:				
Received by:		Samples received at 4 °C		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

March 30, 2020

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 13, 2020 from the POL-TPH, F&BI 003244 project. There are 156 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. 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
FDS0330R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 13, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 003244 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
003244 -01	MW-40-10.5'-11'
003244 -02	MW-40-17D
003244 -03	MW-40-17'
003244 -04	MW-40-24-24.5
003244 -05	MW-40-1.0-1.5
003244 -06	OIP-49-10
003244 -07	OIP-49-17
003244 -08	OIP-47-2-3
003244 -09	OIP-47-25
003244 -10	OIP-47-17
003244 -11	OIP-47-11-12
003244 -12	OIP-31-17
003244 -13	OIP-31-20
003244 -14	GP-33-28-29
003244 -15	GP-33-14-14.5
003244 -16	GP-33-19.5-20
003244 -17	GP-33-24-25
003244 -18	GP-34-14-15
003244 -19	GP-34-GW-14-19
003244 -20	MW-33-12-12.5
003244 -21	MW-33-19.5-20
003244 -22	MW-33-22.5-23
003244 -23	MW-35-15.5-16
003244 -24	MW-34-15-15.5
003244 -25	MW-34-20-20.5
003244 -26	MW-34-24-24.5
003244 -27	MW-34-28-28.5
003244 -28	OIP-23-14-15
003244 -29	OIP-23-19-20
003244 -30	OIP-23-23-24
003244 -31	OIP-23-29.5-30
003244 -32	OIP-46-8
003244 -33	OIP-46-10-11
003244 -34	OIP-46-14
003244 -35	OIP-70-8
003244 -36	OIP-70-12-14

CASE NARRATIVE

Laboratory ID	Floyd-Snider
003244 -37	OIP-70-GW-10-15
003244 -38	OIP-57-14
003244 -39	OIP-39-15-15.5
003244 -40	OIP-39-16.5-17
003244 -41	OIP-39-21-22
003244 -42	GP-35-7-8
003244 -43	GP-35-16-17
003244 -44	OIP-04-4-5
003244 -45	OIP-04-15-16
003244 -46	OIP-04-GW-15-20
003244 -47	MW-36-25.5-26
003244 -48	MW-38-23.5-24
003244 -49	GP-31-14-15
003244 -50	OIP-72-10-11
003244 -51	OIP-72-16-17
003244 -52	GP-32-17.5-18.5
003244 -53	GP-32-GW-14-19
003244 -54	OIP-68-13.5-14
003244 -55	OIP-68-14-14.5
003244 -56	OIP-68-10-11
003244 -57	OIP-68D-10-11
003244 -58	OIP-68-GW-13-18
003244 -59	OIP-69-GW-12-17
003244 -60	OIP-69-14.5-15
003244 -61	OIP-69-11-12
003244 -62	OIP-54-15-16
003244 -63	OIP-54-18-19
003244 -64	GP-31-GW-13.5-18.5
003244 -65	OIP-02-14-15
003244 -66	OIP-02-GW-14.5-19.5
003244 -67	OIP-02D-GW-14.5-19.5
003244 -68	OIP-02-5-5.5
003244 -69	OIP-15-15-16
003244 -70	MW-37-27.5-28
003244 -71	MW-37-27.5-28 D
003244 -72	P3-0-0.5
003244 -73	P4-0-0.5
003244 -74	P5-0-0.5
003244 -75	P6-0.5-1.0

CASE NARRATIVE

Laboratory ID	Floyd-Snider
003244 -76	P6-0.5-1.0 D
003244 -77	OIP-64-14-15
003244 -78	GP-36-22-23
003244 -79	GP-36-13-14
003244 -80	OIP-15-20-21
003244 -81	GP-37-12-14
003244 -82	GP-37D-12-14
003244 -83	GP-36-16-17
003244 -84	OIP-15-23-24
003244 -85	OIP-15-GW-14-19
003244 -86	OIP-73-13-14
003244 -87	OIP-73D-13-14
003244 -88	OIP-73-9-10
003244 -89	OIP-67-11-12
003244 -90	OIP-67-GW-14-19
003244 -91	OIP-67-18-19
003244 -92	OIP-67-7-8
003244 -93	OIP-67-14.5-15
003244 -94	MW-39-2-4
003244 -95	MW-39-8-9
003244 -96	MW-39-13-14
003244 -97	MW-39-18.5-20
003244 -98	GP-38-11-11.5
003244 -99	OIP-18-19-19.5
003244 -100	OIP-20-11-11.5
003244 -101	OIP-20-19-19.5
003244 -102	OIP-19-19-20
003244 -103	OIP-21-18-19
003244 -104	OIP-06-27-28
003244 -105	OIP-06-29-30
003244 -106	OIP-06-GW-25-30
003244 -107	OIP-05-27-28
003244 -108	OIP-05-29-30
003244 -109	Trip Blank

Samples OIP-47-17, OIP-47-11-12, MW-33-12-12.5, MW-33-19.5-20, OIP-23-14-15, OIP-23-19-20, OIP-23-23-24, OIP-39-16.5-17, OIP-15-15-16, GP-36-13-14, OIP-15-20-21, GP-36-16-17, OIP-67-11-12, MW-39-13-14, and OIP-20-11-11.5 were sent to Fremont Analytical for EPH and VPH analyses. In addition, samples OIP-46-8, OIP-02-14-15, OIP-69-14.5-15, and OIP-54-18-19 were sent to Fremont for TOC analysis. The report is enclosed.

CASE NARRATIVE (continued)

Sample OIP-67-14.5-15 sent to Fremont Analytical for EPH and VPH analyses. The data will be submitted as an additional report.

The 8260D matrix spike and matrix spike duplicate failed the relative percent difference for toluene. The laboratory control sample passed the acceptance criteria, therefore the results are due to matrix effect.

The 8270E matrix spike and matrix spike duplicate failed the relative percent difference for several compounds. The laboratory control sample passed the acceptance criteria, therefore the results are due to matrix effect.

An 8270E internal standard failed the acceptance criteria for sample P6-0.5-1.0 D. The sample was diluted and reanalyzed with acceptable results. Both data sets were reported.

All other quality control requirements were acceptable.

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20
Date Analyzed: 03/17/20

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID

Results Reported on a Dry Weight Basis
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 53-144)
MW-40-10.5’-11’ 003244-01	D	D	D	ip
MW-40-24-24.5 003244-04	ND	ND	ND	90
MW-40-1.0-1.5 003244-05	ND	ND	D	86
OIP-49-10 003244-06	D	ND	D	86
OIP-49-17 003244-07	D	ND	ND	91
OIP-47-2-3 003244-08	ND	ND	ND	85
OIP-47-25 003244-09	ND	ND	ND	91
OIP-31-17 003244-12	ND	ND	ND	92
OIP-31-20 003244-13	ND	ND	ND	84
GP-33-28-29 003244-14	ND	ND	ND	87
GP-33-14-14.5 003244-15	D	D	D	89

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

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20
Date Analyzed: 03/17/20

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID

Results Reported on a Dry Weight Basis
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 53-144)
GP-33-19.5-20 003244-16	ND	ND	ND	90
GP-33-24-25 003244-17	ND	ND	ND	93
GP-34-14-15 003244-18	ND	ND	ND	88
MW-33-22.5-23 003244-22	ND	ND	ND	87
MW-35-15.5-16 003244-23	ND	ND	ND	83
MW-34-28-28.5 003244-27	ND	ND	ND	89
OIP-23-29.5-30 003244-31	ND	ND	ND	93
OIP-46-10-11 003244-33	ND	ND	ND	94
OIP-46-14 003244-34	ND	ND	ND	85
OIP-70-8 003244-35	ND	ND	ND	82
OIP-70-12-14 003244-36	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: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20
Date Analyzed: 03/17/20

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID

Results Reported on a Dry Weight Basis
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 53-144)
OIP-57-14 003244-38	ND	ND	ND	85
OIP-39-21-22 003244-41	ND	ND	ND	87
GP-35-7-8 003244-42	ND	D	D	94
GP-35-16-17 003244-43	ND	ND	ND	88
OIP-04-4-5 003244-44	ND	ND	ND	82
OIP-04-15-16 003244-45	ND	ND	ND	64
MW-36-25.5-26 003244-47	ND	ND	ND	85
MW-38-23.5-24 003244-48	ND	ND	ND	90
GP-31-14-15 003244-49	ND	ND	ND	86
OIP-72-10-11 003244-50	D	ND	ND	83
OIP-72-16-17 003244-51	D	ND	ND	81

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

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20
Date Analyzed: 03/17/20

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID

Results Reported on a Dry Weight Basis
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 53-144)
GP-32-17.5-18.5 003244-52	ND	ND	ND	86
OIP-68-13.5-14 003244-54	ND	ND	ND	80
OIP-68-10-11 003244-56	ND	ND	ND	86
OIP-68D-10-11 003244-57	ND	ND	ND	87
OIP-69-14.5-15 003244-60	ND	ND	ND	83
OIP-69-11-12 003244-61	ND	ND	ND	84
OIP-54-15-16 003244-62	ND	ND	D	85
OIP-02-14-15 003244-65	ND	ND	ND	89
OIP-02-5-5.5 003244-68	ND	D	D	ip
MW-37-27.5-28 003244-70	ND	ND	ND	95
MW-37-27.5-28 D 003244-71	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: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20
Date Analyzed: 03/17/20

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID

Results Reported on a Dry Weight Basis
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 53-144)
OIP-64-14-15 003244-77	ND	ND	ND	90
GP-36-22-23 003244-78	ND	ND	ND	98
GP-37-12-14 003244-81	ND	ND	ND	88
GP-37D-12-14 003244-82	ND	ND	ND	96
OIP-15-23-24 003244-84	ND	ND	ND	92
OIP-73-13-14 003244-86	ND	ND	ND	87
OIP-73D-13-14 003244-87	ND	ND	ND	95
OIP-73-9-10 003244-88	ND	ND	ND	87
OIP-67-18-19 003244-91	ND	ND	ND	87
OIP-67-7-8 003244-92	ND	ND	ND	87
MW-39-2-4 003244-94	ND	ND	ND	86

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

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20
Date Analyzed: 03/17/20

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID

Results Reported on a Dry Weight Basis
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 53-144)
GP-38-11-11.5 003244-98	ND	ND	ND	95
OIP-18-19-19.5 003244-99	ND	ND	ND	94
OIP-20-19-19.5 003244-101	ND	ND	ND	95
OIP-19-19-20 003244-102	ND	ND	ND	86
OIP-21-18-19 003244-103	ND	ND	ND	95
OIP-06-27-28 003244-104	ND	ND	ND	87
OIP-05-27-28 003244-107	ND	ND	ND	96
Method Blank 00-686 MB	ND	ND	ND	87
Method Blank 00-687 MB	ND	ND	ND	86
Method Blank 00-688 MB	ND	ND	ND	81
Method Blank 00-689 MB	ND	ND	ND	87

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

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20 and 03/24/20
Date Analyzed: 03/18/20, 03/19/20, 03/23/20, 03/24/20 and 03/25/20

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 58-139)
MW-40-10.5'-11' 003244-01 1/50	2,000	83
MW-40-17D 003244-02 1/10	1,700	115
MW-40-17' 003244-03 1/5	170	ip
OIP-49-10 003244-06	22	80
OIP-49-17 003244-07 1/20	960	119
OIP-47-17 003244-10	49	87
OIP-47-11-12 003244-11 1/20	5,700	ip
GP-33-14-14.5 003244-15	170	ip
MW-33-12-12.5 003244-20 1/5	230	ip
MW-33-19.5-20 003244-21	<5	81
MW-34-15-15.5 003244-24 1/5	760	ip

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20 and 03/24/20
Date Analyzed: 03/18/20, 03/19/20, 03/23/20, 03/24/20 and 03/25/20

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 58-139)
MW-34-20-20.5 003244-25 1/5	280	85
MW-34-24-24.5 003244-26	46	88
OIP-23-14-15 003244-28 1/5	420	99
OIP-23-19-20 003244-29 1/5	790	139
OIP-23-23-24 003244-30	200	ip
OIP-39-15-15.5 003244-39	<5	135
OIP-39-16.5-17 003244-40	7.3	78
OIP-72-10-11 003244-50 1/10	520	121
OIP-72-16-17 003244-51	270	ip
OIP-15-15-16 003244-69	35	74
P3-0-0.5 003244-72 1/5	<25	79

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20 and 03/24/20
Date Analyzed: 03/18/20, 03/19/20, 03/23/20, 03/24/20 and 03/25/20

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 58-139)
P4-0-0.5 003244-73 1/5	<25	78
P5-0-0.5 003244-74 1/5	<25	66
P6-0.5-1.0 003244-75 1/5	<25	80
P6-0.5-1.0 D 003244-76 1/5	<25	80
GP-36-13-14 003244-79 1/10	4,100	ip
OIP-15-20-21 003244-80	<5	98
GP-36-16-17 003244-83 1/100	950	137
OIP-67-11-12 003244-89 1/100	1,500	ip
OIP-67-14.5-15 003244-93 1/100	2,200	139
MW-39-8-9 003244-95	150	ip
MW-39-13-14 003244-96 1/5	990	ip

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20 and 03/24/20
Date Analyzed: 03/18/20, 03/19/20, 03/23/20, 03/24/20 and 03/25/20

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 58-139)
MW-39-18.5-20 003244-97	<5	68
OIP-20-11-11.5 003244-100 1/5	630	104
Method Blank 00-647 MB	<5	77
Method Blank 00-648 MB	<5	95
Method Blank 00-650 MB	<5	69
Method Blank 00-659 MB	<5	83

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20
Date Analyzed: 03/17/20 and 03/18/20

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)
GP-34-GW-14-19 003244-19	<100	97
OIP-70-GW-10-15 003244-37	<100	96
OIP-04-GW-15-20 003244-46	130	96
GP-32-GW-14-19 003244-53	<100	97
OIP-68-GW-13-18 003244-58	860	107
OIP-69-GW-12-17 003244-59	<100	95
GP-31-GW-13.5-18.5 003244-64	<100	93
OIP-02-GW-14.5-19.5 003244-66	<100	93
OIP-02D-GW-14.5-19.5 003244-67	<100	93
OIP-15-GW-14-19 003244-85	380	104
OIP-67-GW-14-19 003244-90	3,200	98

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20
Date Analyzed: 03/17/20 and 03/18/20

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)
OIP-06-GW-25-30 003244-106	<100	89
Method Blank 00-643 MB	<100	90

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20 and 03/19/20
Date Analyzed: 03/17/20, 03/19/20 and 03/20/20

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)
MW-40-10.5'-11' 003244-01 1/10	18,000	7,900 x	101
MW-40-17D 003244-02	2,100	320 x	101
MW-40-17' 003244-03	2,400	<250	100
MW-40-1.0-1.5 003244-05	200 x	2,400	88
OIP-49-10 003244-06	<50	360	91
OIP-47-17 003244-10	360	<250	101
OIP-47-11-12 003244-11	210 x	<250	101
GP-33-14-14.5 003244-15	830 x	3,800	88
MW-33-12-12.5 003244-20	15,000	600 x	97
MW-33-19.5-20 003244-21	<50	<250	95
MW-34-15-15.5 003244-24	23,000	540 x	99

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20 and 03/19/20
Date Analyzed: 03/17/20, 03/19/20 and 03/20/20

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)
MW-34-20-20.5 003244-25	17,000	480 x	91
MW-34-24-24.5 003244-26	300	<250	100
OIP-23-14-15 003244-28	13,000	<250	95
OIP-23-19-20 003244-29	48,000	1,300 x	ip
OIP-23-23-24 003244-30	5,700	<250	92
OIP-39-15-15.5 003244-39	<50	<250	92
OIP-39-16.5-17 003244-40	<50	<250	93
GP-35-7-8 003244-42	590	<250	91
OIP-54-15-16 003244-62	<50	660	92
OIP-02-5-5.5 003244-68	1,900 x	3,400	92

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20 and 03/19/20
Date Analyzed: 03/17/20, 03/19/20 and 03/20/20

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)
OIP-15-15-16 003244-69	2,300	370 x	94
P3-0-0.5 003244-72	620 x	4,200	98
P4-0-0.5 003244-73	300 x	1,900	103
P5-0-0.5 003244-74	860	1,200	98
P6-0.5-1.0 003244-75	580	2,300	104
P6-0.5-1.0 D 003244-76	560	2,100	100
GP-36-13-14 003244-79	3,500	<250	90
OIP-15-20-21 003244-80	<50	<250	100
GP-36-16-17 003244-83	15,000	970 x	96
OIP-67-11-12 003244-89	4,300	310 x	96

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/17/20 and 03/19/20
Date Analyzed: 03/17/20, 03/19/20 and 03/20/20

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)
OIP-67-14.5-15 003244-93	2,100	<250	100
MW-39-8-9 003244-95	4,400	<250	105
MW-39-13-14 003244-96	18,000	340 x	114
MW-39-18.5-20 003244-97	<50	<250	99
OIP-20-11-11.5 003244-100	440 x	<250	94
Method Blank 00-683 MB	<50	<250	87
Method Blank 00-684 MB	<50	<250	101
Method Blank 00-724 MB	<50	<250	87

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/16/20 and 03/17/20
Date Analyzed: 03/17/20

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)
GP-34-GW-14-19 003244-19	330 x	<250	93
OIP-70-GW-10-15 003244-37	220 x	<250	114
OIP-04-GW-15-20 003244-46	660 x	870 x	109
GP-32-GW-14-19 003244-53	150 x	<250	90
OIP-68-GW-13-18 003244-58	900 x	290 x	99
OIP-69-GW-12-17 003244-59	140	<250	113
GP-31-GW-13.5-18.5 003244-64	55 x	<250	105
OIP-02-GW-14.5-19.5 003244-66	110 x	<250	105
OIP-02D-GW-14.5-19.5 003244-67	94 x	<250	98
OIP-15-GW-14-19 003244-85	1,300	380 x	105
OIP-67-GW-14-19 003244-90	2,000	<250	101

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244
Date Extracted: 03/16/20 and 03/17/20
Date Analyzed: 03/17/20

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)
OIP-06-GW-25-30 003244-106	200 x	<250	109
Method Blank 00-680 MB	<50	<250	112
Method Blank 00-636 MB	<50	<250	87

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-40-17D	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-02
Date Analyzed:	03/17/20	Data File:	003244-02.151
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.54

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-40-17’	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-03
Date Analyzed:	03/17/20	Data File:	003244-03.152
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2.10

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP-47-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-10
Date Analyzed:	03/17/20	Data File:	003244-10.153
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2.61

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP-47-11-12	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-11
Date Analyzed:	03/17/20	Data File:	003244-11.154
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	3.34

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-33-12-12.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-20
Date Analyzed:	03/17/20	Data File:	003244-20.155
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.05

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-33-19.5-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-21
Date Analyzed:	03/17/20	Data File:	003244-21.164
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	3.61

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-34-15-15.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-24
Date Analyzed:	03/17/20	Data File:	003244-24.165
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.06

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-34-20-20.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-25
Date Analyzed:	03/17/20	Data File:	003244-25.166
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.25

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-34-24-24.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-26
Date Analyzed:	03/17/20	Data File:	003244-26.167
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP-39-16.5-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-40
Date Analyzed:	03/17/20	Data File:	003244-40.168
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.18

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP-15-15-16	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-69
Date Analyzed:	03/17/20	Data File:	003244-69.175
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.06

Analysis For Total Metals By EPA Method 6020B

Client ID:	GP-36-13-14	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-79
Date Analyzed:	03/17/20	Data File:	003244-79.176
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2.69

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP-15-20-21	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-80
Date Analyzed:	03/17/20	Data File:	003244-80.177
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.91

Analysis For Total Metals By EPA Method 6020B

Client ID:	GP-36-16-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-83
Date Analyzed:	03/17/20	Data File:	003244-83.178
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	3.82

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP-67-11-12	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-89
Date Analyzed:	03/17/20	Data File:	003244-89.179
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	4.96

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP-67-14.5-15	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-93
Date Analyzed:	03/17/20	Data File:	003244-93.180
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1.60

Analysis For Total Metals By EPA Method 6020B

Client ID:	OIP-20-11-11.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	003244-100
Date Analyzed:	03/17/20	Data File:	003244-100.181
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	8.16

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	I0-155 mb2
Date Analyzed:	03/17/20	Data File:	I0-155 mb2.116
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 8260D

Client Sample ID:	MW-40-17D	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-02
Date Analyzed:	03/16/20	Data File:	031653.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	103	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration mg/kg (ppm)
Benzene	0.088
Toluene	<0.05
Ethylbenzene	0.19
m,p-Xylene	0.12
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-17’	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-03
Date Analyzed:	03/16/20	Data File:	031654.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration mg/kg (ppm)
Benzene	0.33
Toluene	<0.05
Ethylbenzene	0.14
m,p-Xylene	0.13
o-Xylene	<0.05

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-47-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-10
Date Analyzed:	03/16/20	Data File:	031655.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	108	50	150
4-Bromofluorobenzene	103	50	150

Compounds:	Concentration mg/kg (ppm)
Hexane	1.3
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	<0.03
Toluene	0.089
1,2-Dibromoethane (EDB)	<0.05
Ethylbenzene	7.0
m,p-Xylene	1.6
o-Xylene	0.15
Naphthalene	6.3

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-47-11-12	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-11
Date Analyzed:	03/16/20	Data File:	031657.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	131	50	150
4-Bromofluorobenzene	110	50	150

Compounds:	Concentration mg/kg (ppm)
Hexane	23 ve
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	<0.03
Toluene	0.12
1,2-Dibromoethane (EDB)	<0.05
Ethylbenzene	23 ve
m,p-Xylene	1.5
o-Xylene	0.30
Naphthalene	13

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-47-11-12	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-11 1/10
Date Analyzed:	03/24/20	Data File:	032359.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration mg/kg (ppm)
Hexane	3.6
Methyl t-butyl ether (MTBE)	<0.5
1,2-Dichloroethane (EDC)	<0.5
Benzene	<0.3
Toluene	<0.5
1,2-Dibromoethane (EDB)	<0.5
Ethylbenzene	27
m,p-Xylene	1.9
o-Xylene	<0.5
Naphthalene	18

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-33-12-12.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-20
Date Analyzed:	03/23/20	Data File:	032345.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	98	50	150

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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-33-19.5-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-21
Date Analyzed:	03/23/20	Data File:	032344.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	107	50	150
Toluene-d8	103	50	150
4-Bromofluorobenzene	99	50	150

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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-34-15-15.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-24
Date Analyzed:	03/17/20	Data File:	031716.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	62	145
Toluene-d8	103	55	145
4-Bromofluorobenzene	104	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 8260D

Client Sample ID:	MW-34-20-20.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-25
Date Analyzed:	03/16/20	Data File:	031614.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	62	145
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 8260D

Client Sample ID:	MW-34-24-24.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-26
Date Analyzed:	03/16/20	Data File:	031615.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	62	145
Toluene-d8	98	55	145
4-Bromofluorobenzene	97	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 8260D

Client Sample ID:	OIP-23-14-15	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-28
Date Analyzed:	03/16/20	Data File:	031616.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	62	145
Toluene-d8	101	55	145
4-Bromofluorobenzene	94	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-23-19-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-29
Date Analyzed:	03/17/20	Data File:	031717.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	62	145
Toluene-d8	107	55	145
4-Bromofluorobenzene	110	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	0.42
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	0.081
Naphthalene	1.0

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-23-23-24	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-30
Date Analyzed:	03/16/20	Data File:	031617.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	62	145
Toluene-d8	92	55	145
4-Bromofluorobenzene	94	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-39-15-15.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-39
Date Analyzed:	03/16/20	Data File:	031618.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	62	145
Toluene-d8	96	55	145
4-Bromofluorobenzene	95	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 8260D

Client Sample ID:	OIP-39-16.5-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-40
Date Analyzed:	03/16/20	Data File:	031619.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	62	145
Toluene-d8	98	55	145
4-Bromofluorobenzene	97	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-15-15-16	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-69
Date Analyzed:	03/16/20	Data File:	031620.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	62	145
Toluene-d8	117	55	145
4-Bromofluorobenzene	92	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	P3-0-0.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-72
Date Analyzed:	03/16/20	Data File:	031621.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	62	145
Toluene-d8	98	55	145
4-Bromofluorobenzene	101	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 8260D

Client Sample ID:	P4-0-0.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-73
Date Analyzed:	03/16/20	Data File:	031622.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	62	145
Toluene-d8	99	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 8260D

Client Sample ID:	P5-0-0.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-74
Date Analyzed:	03/16/20	Data File:	031623.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	62	145
Toluene-d8	94	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 8260D

Client Sample ID:	P6-0.5-1.0	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-75
Date Analyzed:	03/16/20	Data File:	031624.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	62	145
Toluene-d8	105	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 8260D

Client Sample ID:	P6-0.5-1.0 D	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-76
Date Analyzed:	03/16/20	Data File:	031625.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	62	145
Toluene-d8	99	55	145
4-Bromofluorobenzene	95	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 8260D

Client Sample ID:	GP-36-13-14	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-79
Date Analyzed:	03/17/20	Data File:	031709.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	62	145
Toluene-d8	107	55	145
4-Bromofluorobenzene	104	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	33 ve
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	0.25
Toluene	0.27
1,2-Dibromoethane (EDB)	<0.05
Ethylbenzene	4.7
m,p-Xylene	1.5
o-Xylene	<0.05
Naphthalene	0.93

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	GP-36-13-14	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-79 1/10
Date Analyzed:	03/24/20	Data File:	032361.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration mg/kg (ppm)
Hexane	18
Methyl t-butyl ether (MTBE)	<0.5
1,2-Dichloroethane (EDC)	<0.5
Benzene	<0.3
Toluene	<0.5
1,2-Dibromoethane (EDB)	<0.5
Ethylbenzene	4.6
m,p-Xylene	1.5
o-Xylene	<0.5
Naphthalene	1.1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-15-20-21	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-80
Date Analyzed:	03/17/20	Data File:	031710.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	87	62	145
Toluene-d8	107	55	145
4-Bromofluorobenzene	102	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	GP-36-16-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-83
Date Analyzed:	03/17/20	Data File:	031711.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	90	62	145
Toluene-d8	105	55	145
4-Bromofluorobenzene	96	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	60 ve
Methyl t-butyl ether (MTBE)	<0.05
1,2-Dichloroethane (EDC)	<0.05
Benzene	0.60
Toluene	0.47
1,2-Dibromoethane (EDB)	<0.05
Ethylbenzene	7.6
m,p-Xylene	2.5
o-Xylene	0.056
Naphthalene	1.2

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	GP-36-16-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-83 1/10
Date Analyzed:	03/24/20	Data File:	032360.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration mg/kg (ppm)
Hexane	32
Methyl t-butyl ether (MTBE)	<0.5
1,2-Dichloroethane (EDC)	<0.5
Benzene	0.61
Toluene	<0.5
1,2-Dibromoethane (EDB)	<0.5
Ethylbenzene	7.2
m,p-Xylene	2.3
o-Xylene	<0.5
Naphthalene	2.0

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-67-11-12	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-89
Date Analyzed:	03/17/20	Data File:	031712.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	62	145
Toluene-d8	108	55	145
4-Bromofluorobenzene	108	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	0.32
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	0.062
m,p-Xylene	<0.1
o-Xylene	<0.05
Naphthalene	0.48

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-67-14.5-15	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-93
Date Analyzed:	03/17/20	Data File:	031713.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	62	145
Toluene-d8	105	55	145
4-Bromofluorobenzene	104	65	139

Compounds:	Concentration mg/kg (ppm)
Hexane	1.0
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	0.15

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-39-8-9	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-95
Date Analyzed:	03/16/20	Data File:	031627.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	62	145
Toluene-d8	98	55	145
4-Bromofluorobenzene	94	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 8260D

Client Sample ID:	MW-39-13-14	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-96
Date Analyzed:	03/17/20	Data File:	031714.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	62	145
Toluene-d8	100	55	145
4-Bromofluorobenzene	102	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	0.43

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-39-18.5-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-97
Date Analyzed:	03/16/20	Data File:	031626.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	62	145
Toluene-d8	99	55	145
4-Bromofluorobenzene	97	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 8260D

Client Sample ID:	OIP-20-11-11.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-100
Date Analyzed:	03/17/20	Data File:	031715.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	62	145
Toluene-d8	102	55	145
4-Bromofluorobenzene	99	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	0.11
m,p-Xylene	0.11
o-Xylene	<0.05
Naphthalene	1.5

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	00-620 mb3
Date Analyzed:	03/16/20	Data File:	031631.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	100	50	150

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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	00-623 mb
Date Analyzed:	03/16/20	Data File:	031612.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	90	62	145
Toluene-d8	83	55	145
4-Bromofluorobenzene	104	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	00-624 mb
Date Analyzed:	03/16/20	Data File:	031613.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	62	145
Toluene-d8	101	55	145
4-Bromofluorobenzene	99	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	GP-34-GW-14-19	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-19
Date Analyzed:	03/16/20	Data File:	031641.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	50	150
Toluene-d8	103	50	150
4-Bromofluorobenzene	102	50	150

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 8260D

Client Sample ID:	OIP-70-GW-10-15	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-37
Date Analyzed:	03/16/20	Data File:	031642.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	107	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	101	50	150

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 8260D

Client Sample ID:	OIP-04-GW-15-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-46
Date Analyzed:	03/16/20	Data File:	031643.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	102	50	150
4-Bromofluorobenzene	103	50	150

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 8260D

Client Sample ID:	GP-32-GW-14-19	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-53
Date Analyzed:	03/16/20	Data File:	031644.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-68-GW-13-18	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-58
Date Analyzed:	03/16/20	Data File:	031645.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	104	50	150

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 8260D

Client Sample ID:	OIP-69-GW-12-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-59
Date Analyzed:	03/16/20	Data File:	031646.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	100	50	150

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 8260D

Client Sample ID:	GP-31-GW-13.5-18.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-64
Date Analyzed:	03/16/20	Data File:	031647.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-02-GW-14.5-19.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-66
Date Analyzed:	03/16/20	Data File:	031648.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	98	50	150

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 8260D

Client Sample ID:	OIP-02D-GW-14.5-19.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-67
Date Analyzed:	03/16/20	Data File:	031649.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	97	50	150

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 8260D

Client Sample ID:	OIP-15-GW-14-19	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-85
Date Analyzed:	03/16/20	Data File:	031650.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	99	50	150

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 8260D

Client Sample ID:	OIP-67-GW-14-19	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-90
Date Analyzed:	03/16/20	Data File:	031651.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	95	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	1.3
Toluene	2.3
Ethylbenzene	1.3
m,p-Xylene	2.2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	OIP-06-GW-25-30	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-106
Date Analyzed:	03/16/20	Data File:	031652.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	103	50	150
4-Bromofluorobenzene	96	50	150

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 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	00-621 mb
Date Analyzed:	03/16/20	Data File:	031615.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-40-17D	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-02 1/25
Date Analyzed:	03/19/20	Data File:	031911.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	83 d	31	163
Benzo(a)anthracene-d12	99 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	0.088
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-40-17’	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-03 1/25
Date Analyzed:	03/19/20	Data File:	031912.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	82 d	31	163
Benzo(a)anthracene-d12	100 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	0.068
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-47-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-10 1/5
Date Analyzed:	03/19/20	Data File:	031913.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	78	31	163
Benzo(a)anthracene-d12	100	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-47-11-12	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-11 1/5
Date Analyzed:	03/19/20	Data File:	031914.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	74	31	163
Benzo(a)anthracene-d12	94	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-33-12-12.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-20 1/25
Date Analyzed:	03/19/20	Data File:	031915.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	93 d	31	163
Benzo(a)anthracene-d12	117 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	0.10
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-33-19.5-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-21 1/5
Date Analyzed:	03/19/20	Data File:	031916.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	63	31	163
Benzo(a)anthracene-d12	79	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-34-15-15.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-24 1/25
Date Analyzed:	03/19/20	Data File:	031917.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	95 d	31	163
Benzo(a)anthracene-d12	108 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	0.14
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-34-20-20.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-25 1/25
Date Analyzed:	03/21/20	Data File:	032033.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	93 d	31	163
Benzo(a)anthracene-d12	103 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	0.072
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-34-24-24.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-26 1/5
Date Analyzed:	03/21/20	Data File:	032034.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	70	31	163
Benzo(a)anthracene-d12	100	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-23-14-15	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-28 1/25
Date Analyzed:	03/21/20	Data File:	032035.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	86 d	31	163
Benzo(a)anthracene-d12	95 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	0.058
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-23-19-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-29 1/25
Date Analyzed:	03/21/20	Data File:	032036.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	160 d	31	163
Benzo(a)anthracene-d12	100 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	0.16
Chrysene	0.23
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-23-23-24	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-30 1/25
Date Analyzed:	03/21/20	Data File:	032037.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	101 d	31	163
Benzo(a)anthracene-d12	104 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-39-15-15.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-39 1/5
Date Analyzed:	03/21/20	Data File:	032038.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	46	31	163
Benzo(a)anthracene-d12	79	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-39-16.5-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-40 1/5
Date Analyzed:	03/21/20	Data File:	032039.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	74	31	163
Benzo(a)anthracene-d12	85	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-15-15-16	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-69 1/25
Date Analyzed:	03/21/20	Data File:	032040.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	83 d	31	163
Benzo(a)anthracene-d12	104 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	P3-0-0.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-72 1/500
Date Analyzed:	03/21/20	Data File:	032051.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	287 d	31	163
Benzo(a)anthracene-d12	126 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	1.8
Chrysene	3.1
Benzo(a)pyrene	1.5
Benzo(b)fluoranthene	3.5
Benzo(k)fluoranthene	1.0
Indeno(1,2,3-cd)pyrene	1.3
Dibenz(a,h)anthracene	<1

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	P4-0-0.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-73 1/50
Date Analyzed:	03/24/20	Data File:	032413.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	93 d	31	163
Benzo(a)anthracene-d12	110 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	0.46
Chrysene	0.63
Benzo(a)pyrene	0.35
Benzo(b)fluoranthene	0.66
Benzo(k)fluoranthene	0.22
Indeno(1,2,3-cd)pyrene	0.19
Dibenz(a,h)anthracene	<0.1

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	P5-0-0.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-74 1/500
Date Analyzed:	03/21/20	Data File:	032048.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	257 d	31	163
Benzo(a)anthracene-d12	142 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<1
Chrysene	<1
Benzo(a)pyrene	<1
Benzo(b)fluoranthene	<1
Benzo(k)fluoranthene	<1
Indeno(1,2,3-cd)pyrene	<1
Dibenz(a,h)anthracene	<1

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	P6-0.5-1.0	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-75 1/500
Date Analyzed:	03/21/20	Data File:	032049.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	221 d	31	163
Benzo(a)anthracene-d12	72 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<1
Chrysene	<1
Benzo(a)pyrene	<1
Benzo(b)fluoranthene	<1
Benzo(k)fluoranthene	<1
Indeno(1,2,3-cd)pyrene	<1
Dibenz(a,h)anthracene	<1

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	P6-0.5-1.0 D	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-76 1/500
Date Analyzed:	03/21/20	Data File:	032050.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	238 d	31	163
Benzo(a)anthracene-d12	120 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<1
Chrysene	<1
Benzo(a)pyrene	<1 J
Benzo(b)fluoranthene	<1 J
Benzo(k)fluoranthene	<1 J
Indeno(1,2,3-cd)pyrene	<1 J
Dibenz(a,h)anthracene	<1 J

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	P6-0.5-1.0 D	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-76 1/5000
Date Analyzed:	03/23/20	Data File:	032316.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	0 d	31	163
Benzo(a)anthracene-d12	0 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<10
Chrysene	<10
Benzo(a)pyrene	<10
Benzo(b)fluoranthene	<10
Benzo(k)fluoranthene	<10
Indeno(1,2,3-cd)pyrene	<10
Dibenz(a,h)anthracene	<10

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	GP-36-13-14	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-79 1/25
Date Analyzed:	03/21/20	Data File:	032041.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	80 d	31	163
Benzo(a)anthracene-d12	100 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	0.064
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-15-20-21	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-80 1/5
Date Analyzed:	03/21/20	Data File:	032042.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	68	31	163
Benzo(a)anthracene-d12	89	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

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Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	GP-36-16-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-83 1/25
Date Analyzed:	03/21/20	Data File:	032043.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	86 d	31	163
Benzo(a)anthracene-d12	102 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	0.091
Chrysene	0.11
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-67-11-12	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-89 1/25
Date Analyzed:	03/21/20	Data File:	032044.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	84 d	31	163
Benzo(a)anthracene-d12	102 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	0.080
Chrysene	0.093
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	0.063
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-67-14.5-15	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-93 1/25
Date Analyzed:	03/21/20	Data File:	032045.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	76 d	31	163
Benzo(a)anthracene-d12	95 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-39-8-9	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-95 1/5
Date Analyzed:	03/18/20	Data File:	031819.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	76	31	163
Benzo(a)anthracene-d12	104	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	0.023
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-39-13-14	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-96 1/25
Date Analyzed:	03/21/20	Data File:	032046.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	125 d	31	163
Benzo(a)anthracene-d12	105 d	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.05
Chrysene	0.071
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-39-18.5-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-97 1/5
Date Analyzed:	03/18/20	Data File:	031820.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	76	31	163
Benzo(a)anthracene-d12	99	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-20-11-11.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	003244-100 1/5
Date Analyzed:	03/21/20	Data File:	032047.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	78	31	163
Benzo(a)anthracene-d12	88	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	00-681 mb 1/5
Date Analyzed:	03/19/20	Data File:	031903a.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	74	31	163
Benzo(a)anthracene-d12	100	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/18/20	Lab ID:	00-682 mb 1/5
Date Analyzed:	03/18/20	Data File:	031818.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	75	31	163
Benzo(a)anthracene-d12	101	24	168

Compounds:	Concentration mg/kg (ppm)
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	GP-34-GW-14-19	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-19 1/2
Date Analyzed:	03/17/20	Data File:	031706.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	82	31	160
Benzo(a)anthracene-d12	102	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-70-GW-10-15	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-37 1/2
Date Analyzed:	03/18/20	Data File:	031804.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	86	31	160
Benzo(a)anthracene-d12	110	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-04-GW-15-20	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-46 1/2
Date Analyzed:	03/18/20	Data File:	031805.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	79	31	160
Benzo(a)anthracene-d12	112	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	GP-32-GW-14-19	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-53 1/2
Date Analyzed:	03/18/20	Data File:	031809.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	78	31	160
Benzo(a)anthracene-d12	113	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-68-GW-13-18	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-58 1/2
Date Analyzed:	03/18/20	Data File:	031810.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	84	31	160
Benzo(a)anthracene-d12	108	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-69-GW-12-17	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-59 1/2
Date Analyzed:	03/18/20	Data File:	031811.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	84	31	160
Benzo(a)anthracene-d12	110	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	GP-31-GW-13.5-18.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-64 1/2
Date Analyzed:	03/18/20	Data File:	031812.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	82	31	160
Benzo(a)anthracene-d12	108	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-02-GW-14.5-19.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-66 1/2
Date Analyzed:	03/18/20	Data File:	031813.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	79	31	160
Benzo(a)anthracene-d12	100	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-02D-GW-14.5-19.5	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-67 1/2
Date Analyzed:	03/18/20	Data File:	031816.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	102	31	160
Benzo(a)anthracene-d12	109	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-15-GW-14-19	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-85 1/2
Date Analyzed:	03/19/20	Data File:	031910.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	63	31	160
Benzo(a)anthracene-d12	87	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-67-GW-14-19	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-90 1/2
Date Analyzed:	03/18/20	Data File:	031830.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	80	31	160
Benzo(a)anthracene-d12	111	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	OIP-06-GW-25-30	Client:	Floyd-Snider
Date Received:	03/13/20	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	003244-106 1/2
Date Analyzed:	03/19/20	Data File:	031909.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	77	31	160
Benzo(a)anthracene-d12	101	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/16/20	Lab ID:	00-679 mb
Date Analyzed:	03/17/20	Data File:	031705.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	76	31	160
Benzo(a)anthracene-d12	91	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 003244
Date Extracted:	03/17/20	Lab ID:	00-679 mb2
Date Analyzed:	03/18/20	Data File:	031803.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	76	31	160
Benzo(a)anthracene-d12	89	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-74 1/5 (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	<25	71	69	50-150	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	95	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-95 (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	150	305 b	154 b	50-143	66 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	100	61-153

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-97 (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	<5	63	63	50-150	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	85	71-131

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003232-02 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	90	71-131

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-90 (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	3,200	155 b	110 b	53-117	42 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	98	69-134

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-74 (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	1,400	102	88	73-135	15

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	108	74-139

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-95 (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	52 b	75 b	73-135	36 b

Laboratory Code: 003244-97 (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	106	96	73-135	10

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	106	74-139

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003331-01 (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	100	82	64-133	20

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	102	58-147

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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	76	84	63-142	10

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-90 (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	1,900	177 b	154 b	50-150	14 b

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	100	104	63-142	4

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 003226-04 x5 (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	<5	98	99	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	mg/kg (ppm)	50	105	80-120

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003236-08 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Hexane	mg/kg (ppm)	2.5	<0.25	70	70	10-95	0
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	99	99	17-134	0
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	84	83	22-124	1
Benzene	mg/kg (ppm)	2.5	<0.03	90	90	26-114	0
Toluene	mg/kg (ppm)	2.5	<0.05	93	94	34-112	1
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	95	92	32-126	3
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	96	95	34-115	1
m,p-Xylene	mg/kg (ppm)	5	<0.1	99	100	25-125	1
o-Xylene	mg/kg (ppm)	2.5	<0.05	101	102	27-126	1
Naphthalene	mg/kg (ppm)	2.5	<0.05	99	97	24-139	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Hexane	mg/kg (ppm)	2.5	85	55-107
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	93	72-122
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	92	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	102	77-117
Ethylbenzene	mg/kg (ppm)	2.5	98	75-112
m,p-Xylene	mg/kg (ppm)	5	101	77-115
o-Xylene	mg/kg (ppm)	2.5	100	76-115
Naphthalene	mg/kg (ppm)	2.5	83	73-122

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-97 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Hexane	mg/kg (ppm)	2.5	<0.25	48	43	10-137	11
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	70	72	21-145	3
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	59	57	12-160	3
Benzene	mg/kg (ppm)	2.5	<0.03	61	58	29-129	5
Toluene	mg/kg (ppm)	2.5	<0.05	81	65	35-130	22 vo
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	72	69	28-142	4
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	69	68	32-137	1
m,p-Xylene	mg/kg (ppm)	5	<0.1	69	68	34-136	1
o-Xylene	mg/kg (ppm)	2.5	<0.05	70	68	33-134	3
Naphthalene	mg/kg (ppm)	2.5	<0.05	73	72	14-157	1

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Hexane	mg/kg (ppm)	2.5	104	43-142
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	108	60-123
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	88	56-135
Benzene	mg/kg (ppm)	2.5	93	68-114
Toluene	mg/kg (ppm)	2.5	100	66-126
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	105	74-132
Ethylbenzene	mg/kg (ppm)	2.5	101	64-123
m,p-Xylene	mg/kg (ppm)	5	102	78-122
o-Xylene	mg/kg (ppm)	2.5	103	77-124
Naphthalene	mg/kg (ppm)	2.5	114	63-140

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-74 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Hexane	mg/kg (ppm)	2.5	<0.25	89	76	10-137	16
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	84	83	21-145	1
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	84	75	12-160	11
Benzene	mg/kg (ppm)	2.5	<0.03	88	81	29-129	8
Toluene	mg/kg (ppm)	2.5	<0.05	99	89	35-130	11
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	91	94	28-142	3
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	89	93	32-137	4
m,p-Xylene	mg/kg (ppm)	5	<0.1	88	97	34-136	10
o-Xylene	mg/kg (ppm)	2.5	<0.05	90	93	33-134	3
Naphthalene	mg/kg (ppm)	2.5	<0.05	92	94	14-157	2

Laboratory Code: 003244-95 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Hexane	mg/kg (ppm)	2.5	<0.25	54	43	10-137	23 vo
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	101	93	21-145	8
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	68	66	12-160	3
Benzene	mg/kg (ppm)	2.5	<0.03	70	72	29-129	3
Toluene	mg/kg (ppm)	2.5	<0.05	73	63	35-130	15
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	79	69	28-142	14
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	71	69	32-137	3
m,p-Xylene	mg/kg (ppm)	5	<0.1	72	67	34-136	7
o-Xylene	mg/kg (ppm)	2.5	<0.05	76	73	33-134	4
Naphthalene	mg/kg (ppm)	2.5	0.18	85	86	14-157	1

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Hexane	mg/kg (ppm)	2.5	92	43-142
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	104	60-123
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	90	56-135
Benzene	mg/kg (ppm)	2.5	96	68-114
Toluene	mg/kg (ppm)	2.5	98	66-126
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	108	74-132
Ethylbenzene	mg/kg (ppm)	2.5	104	64-123
m,p-Xylene	mg/kg (ppm)	5	105	78-122
o-Xylene	mg/kg (ppm)	2.5	105	77-124
Naphthalene	mg/kg (ppm)	2.5	112	63-140

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-90 (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	1.3	99	100	75-114	1
Toluene	ug/L (ppb)	50	2.3	98	99	73-117	1
Ethylbenzene	ug/L (ppb)	50	1.3	103	106	66-124	3
m,p-Xylene	ug/L (ppb)	100	2.2	108	111	63-128	3
o-Xylene	ug/L (ppb)	50	<1	111	115	64-129	4
Naphthalene	ug/L (ppb)	50	<1	93	100	60-145	7

Laboratory Code: 003245-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Benzene	ug/L (ppb)	50	1.4	95	75-114
Toluene	ug/L (ppb)	50	<1	99	73-117
Ethylbenzene	ug/L (ppb)	50	<1	97	66-124
m,p-Xylene	ug/L (ppb)	100	<2	101	63-128
o-Xylene	ug/L (ppb)	50	<1	100	64-129
Naphthalene	ug/L (ppb)	50	<1	99	60-145

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

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	100	96	75-116	4
Toluene	ug/L (ppb)	50	103	99	79-115	4
Ethylbenzene	ug/L (ppb)	50	102	97	83-111	5
m,p-Xylene	ug/L (ppb)	100	105	101	81-112	4
o-Xylene	ug/L (ppb)	50	105	98	81-117	7
Naphthalene	ug/L (ppb)	50	104	98	72-131	6

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-95 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	98	92	23-144	6
Chrysene	mg/kg (ppm)	0.17	0.018	77	74	32-149	4
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	79	77	23-176	3
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	81	78	42-139	4
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	86	81	21-163	6
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	73	62	23-170	16
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	77	62	31-146	22 vo

Laboratory Code: 003244-97 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	92	85	23-144	8
Chrysene	mg/kg (ppm)	0.17	<0.01	85	80	32-149	6
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	85	82	23-176	4
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	92	89	42-139	3
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	83	77	21-163	7
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	65	55	23-170	17
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	66	59	31-146	11

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benz(a)anthracene	mg/kg (ppm)	0.17	92	51-115
Chrysene	mg/kg (ppm)	0.17	90	55-129
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	84	56-123
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	92	54-131
Benzo(a)pyrene	mg/kg (ppm)	0.17	71	51-118
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	82	49-148
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	86	50-141

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	mg/kg (ppm)	0.17	92	91	51-115	1
Chrysene	mg/kg (ppm)	0.17	90	87	55-129	3
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	80	81	56-123	1
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	86	84	54-131	2
Benzo(a)pyrene	mg/kg (ppm)	0.17	78	81	51-118	4
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	95	91	49-148	4
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	101	98	50-141	3

Date of Report: 03/30/20
Date Received: 03/13/20
Project: POL-TPH, F&BI 003244

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

Laboratory Code: 003244-90 1/2 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	1	<0.04	95 vo	96 vo	60-93	1
Chrysene	ug/L (ppb)	1	<0.04	86	89	60-102	3
Benzo(b)fluoranthene	ug/L (ppb)	1	<0.04	89	83	62-91	7
Benzo(k)fluoranthene	ug/L (ppb)	1	<0.04	86	86	51-98	0
Benzo(a)pyrene	ug/L (ppb)	1	<0.04	88 vo	87 vo	60-86	1
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	<0.04	65	67	10-98	3
Dibenz(a,h)anthracene	ug/L (ppb)	1	<0.04	64	62	10-97	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	1	96	92	60-118	4
Chrysene	ug/L (ppb)	1	90	90	66-125	0
Benzo(b)fluoranthene	ug/L (ppb)	1	83	81	55-135	2
Benzo(k)fluoranthene	ug/L (ppb)	1	87	90	62-125	3
Benzo(a)pyrene	ug/L (ppb)	1	83	85	58-127	2
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	91	93	36-142	2
Dibenz(a,h)anthracene	ug/L (ppb)	1	95	102	37-133	7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte 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 due to sample matrix effects.

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.

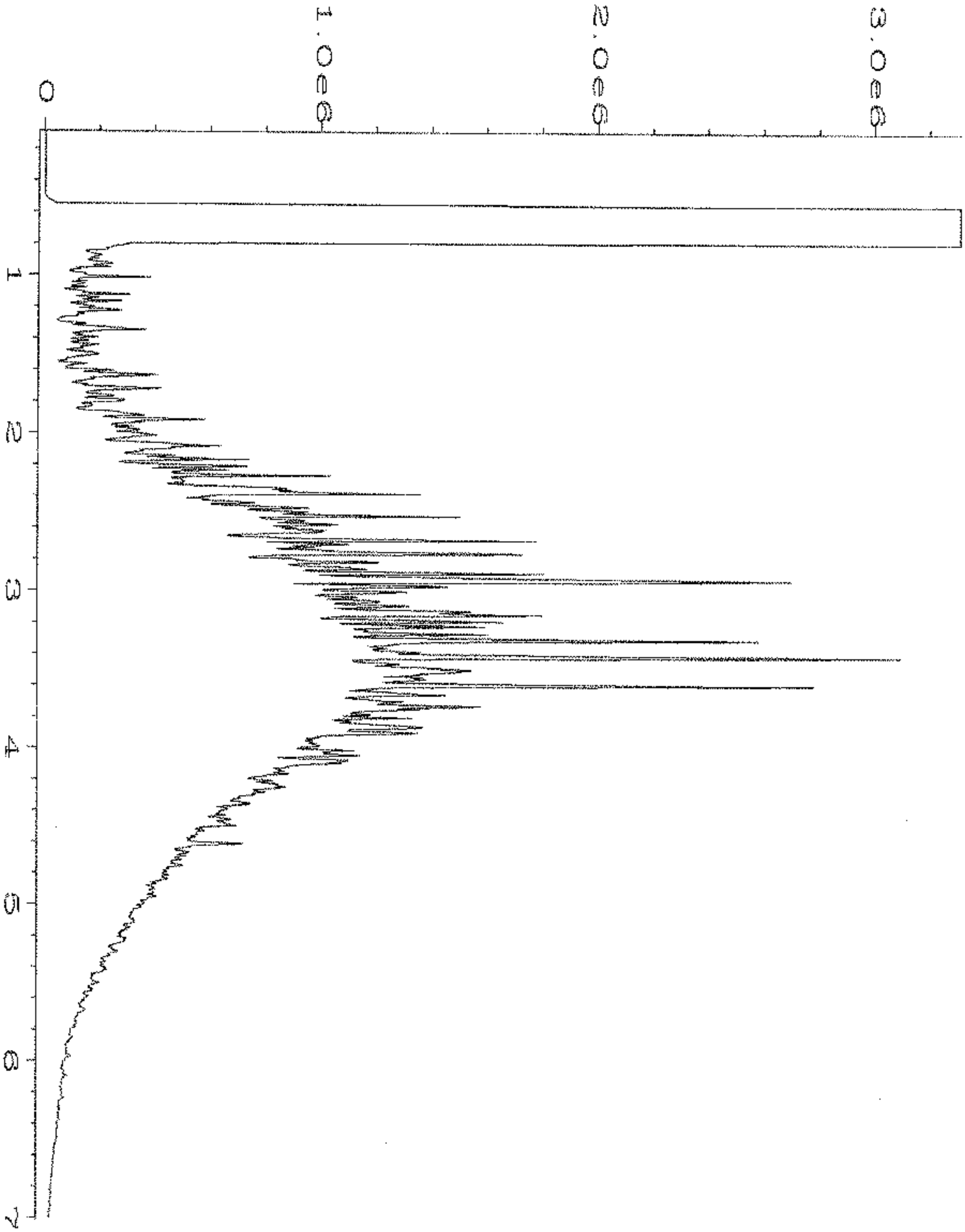
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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        : GC6                                 Vial Number       : 33
Sample Name       : 003244-01                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 8
Acquired on       : 17 Mar 20   05:36 PM                Instrument Method: DX.MTH
Report Created on: 18 Mar 20   10:59 AM                 Analysis Method   : DEFAULT.MTH
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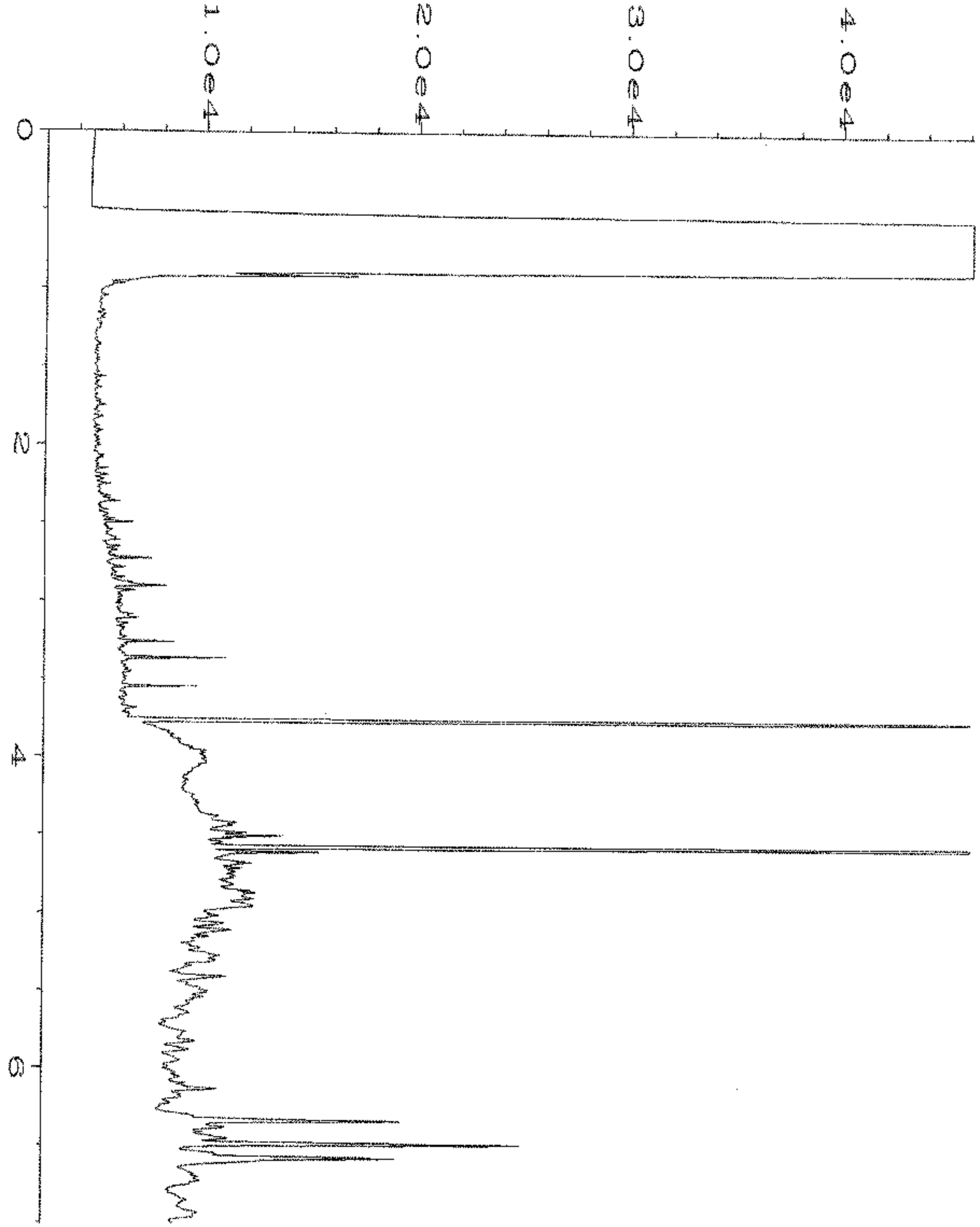

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Instrument        : GC6                                     Vial Number       : 34
Sample Name       : 003244-04                               Injection Number  : 1
Run Time Bar Code:                                          Sequence Line     : 8
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Report Created on: 18 Mar 20   10:59 AM                     Analysis Method   : DEFAULT.MTH
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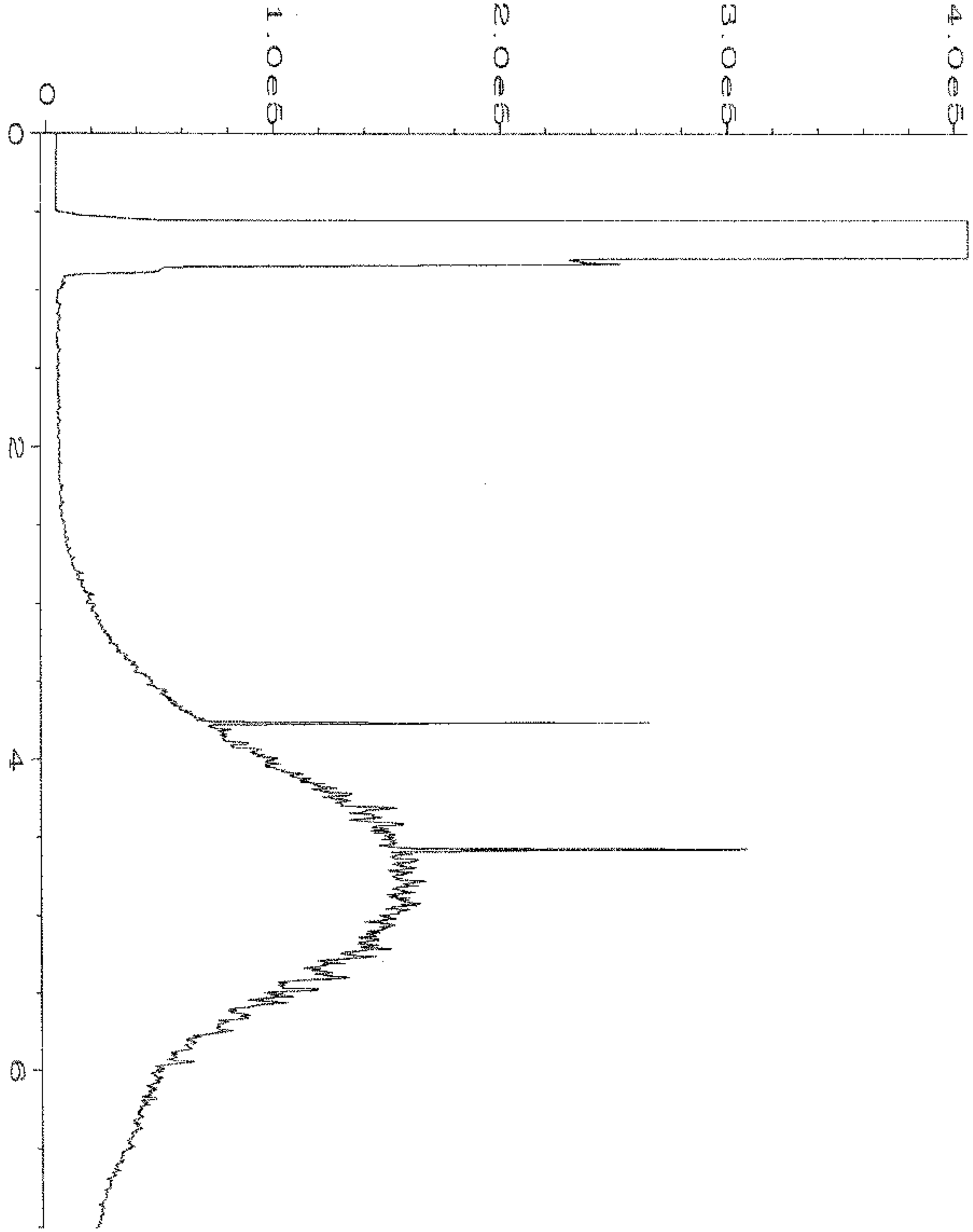

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Operator          : TL                                    Page Number       : 1
Instrument        : GC6                                   Vial Number       : 35
Sample Name       : 003244-05                             Injection Number  : 1
Run Time Bar Code:                                        Sequence Line     : 8
Acquired on       : 17 Mar 20   05:58 PM                  Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:00 AM                   Analysis Method   : DEFAULT.MTH
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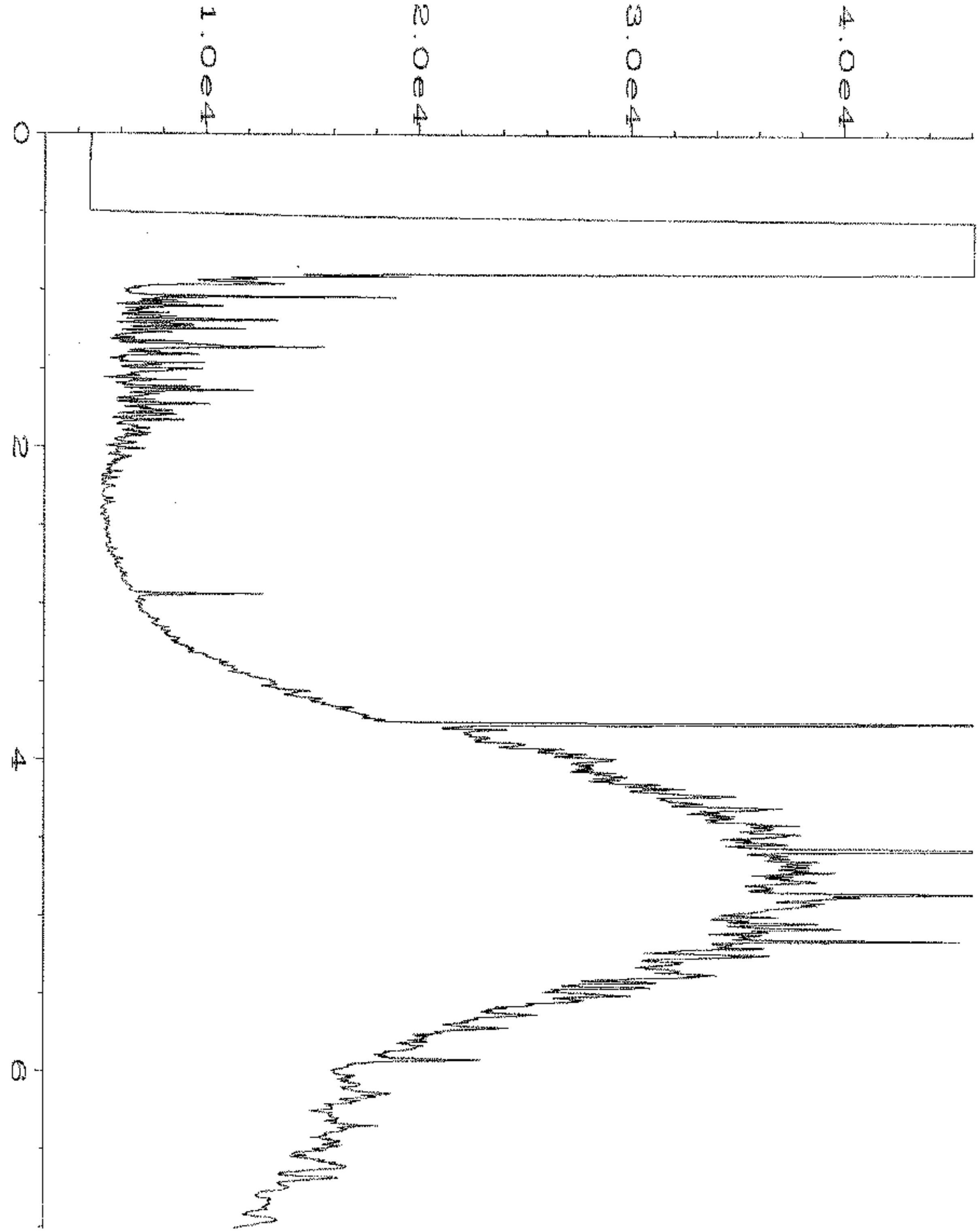

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Operator          : TL                              Page Number       : 1
Instrument        : GC6                             Vial Number       : 36
Sample Name       : 003244-06                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 8
Acquired on       : 17 Mar 20  06:09 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20  11:00 AM             Analysis Method   : DEFAULT.MTH
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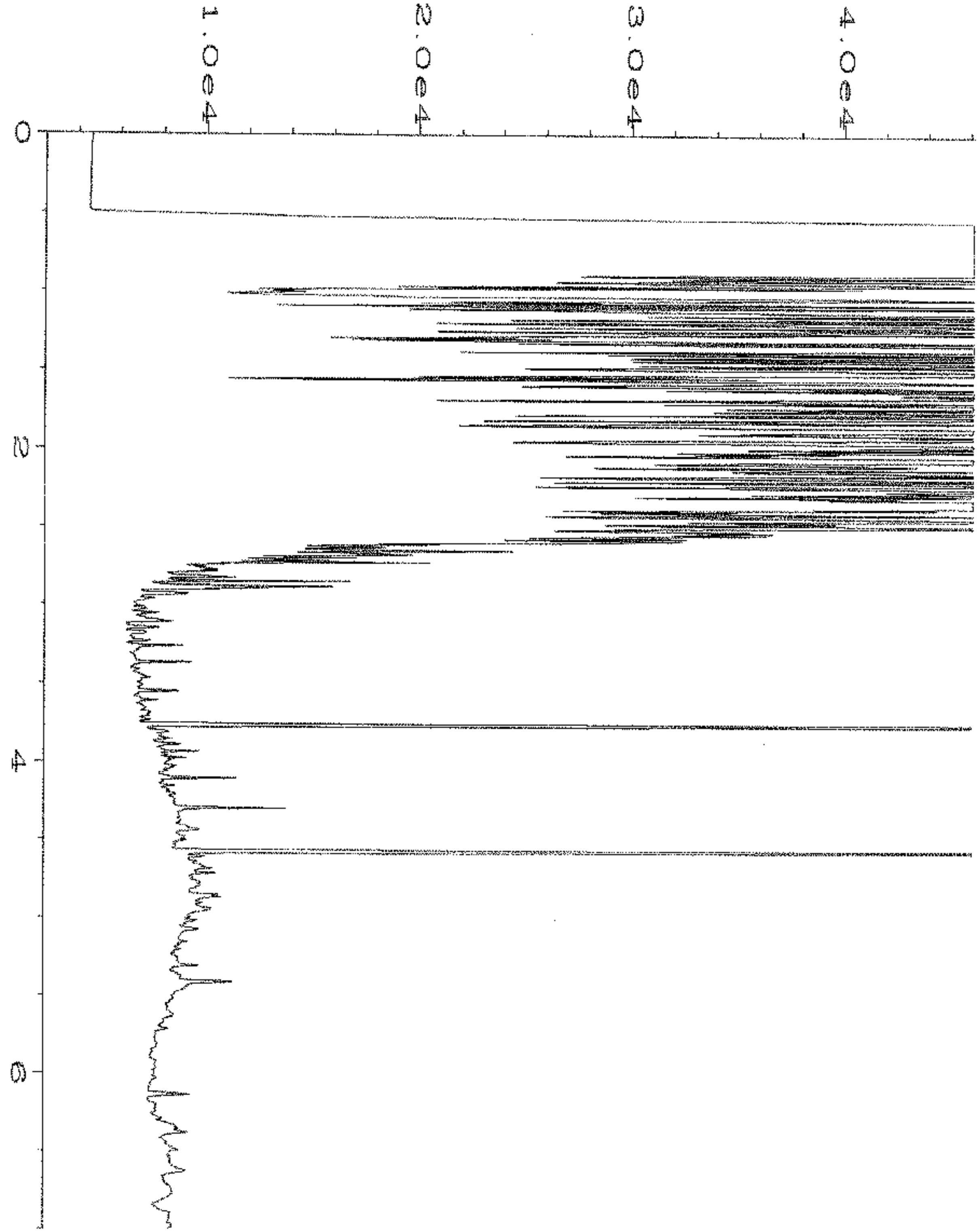

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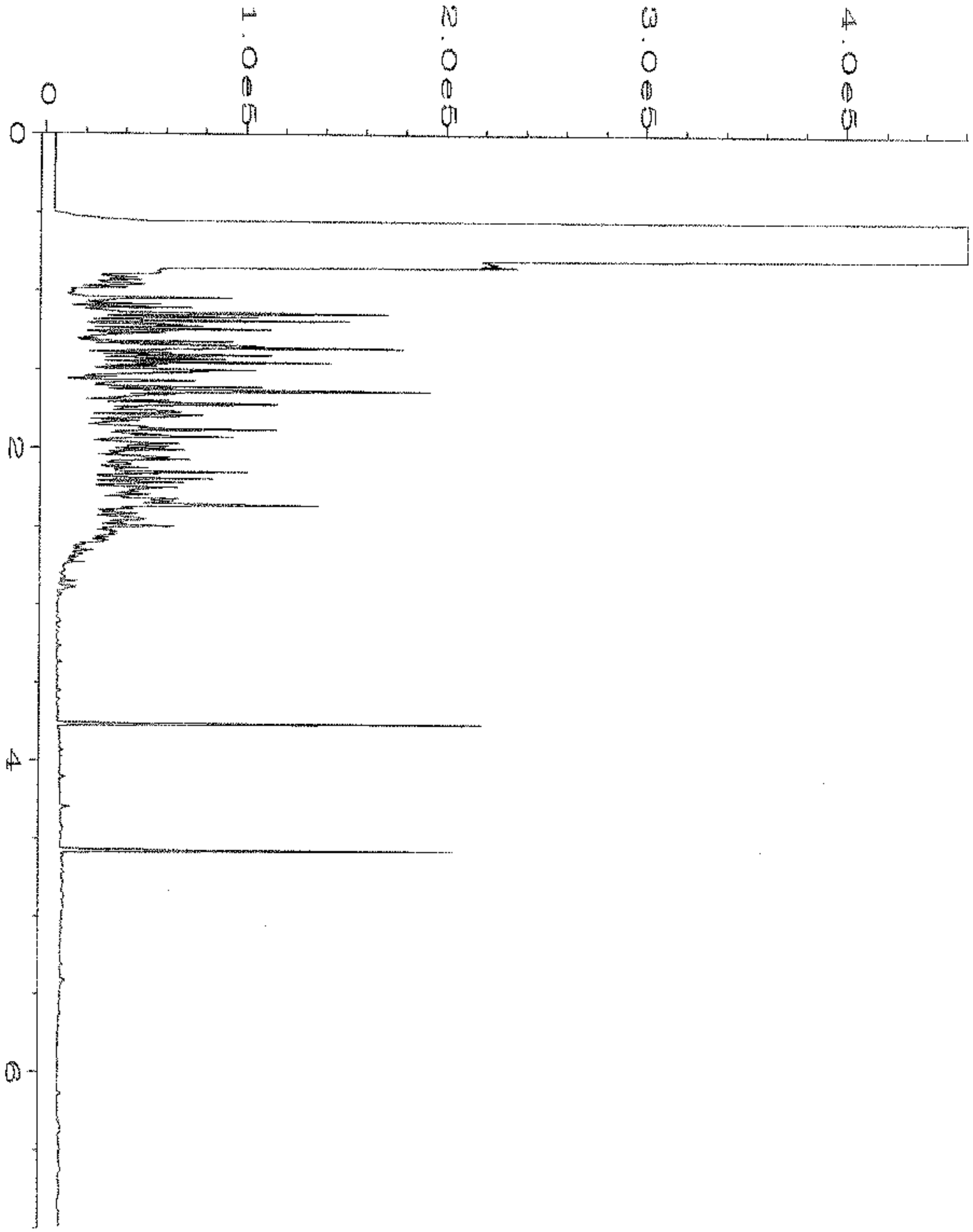
Operator   : TL
Instrument   : GC6
Sample Name   : 003244-07
Run Time Bar Code:
Acquired on   : 17 Mar 20   06:20 PM
Report Created on: 18 Mar 20   11:01 AM

Page Number   : 1
Vial Number   : 37
Injection Number : 1
Sequence Line   : 8
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



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Operator          : TL                              Page Number      : 1
Instrument        : GC6                             Vial Number      : 37
Sample Name       : 003244-07                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 8
Acquired on       : 17 Mar 20  06:20 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20  11:01 AM              Analysis Method  : DEFAULT.MTH
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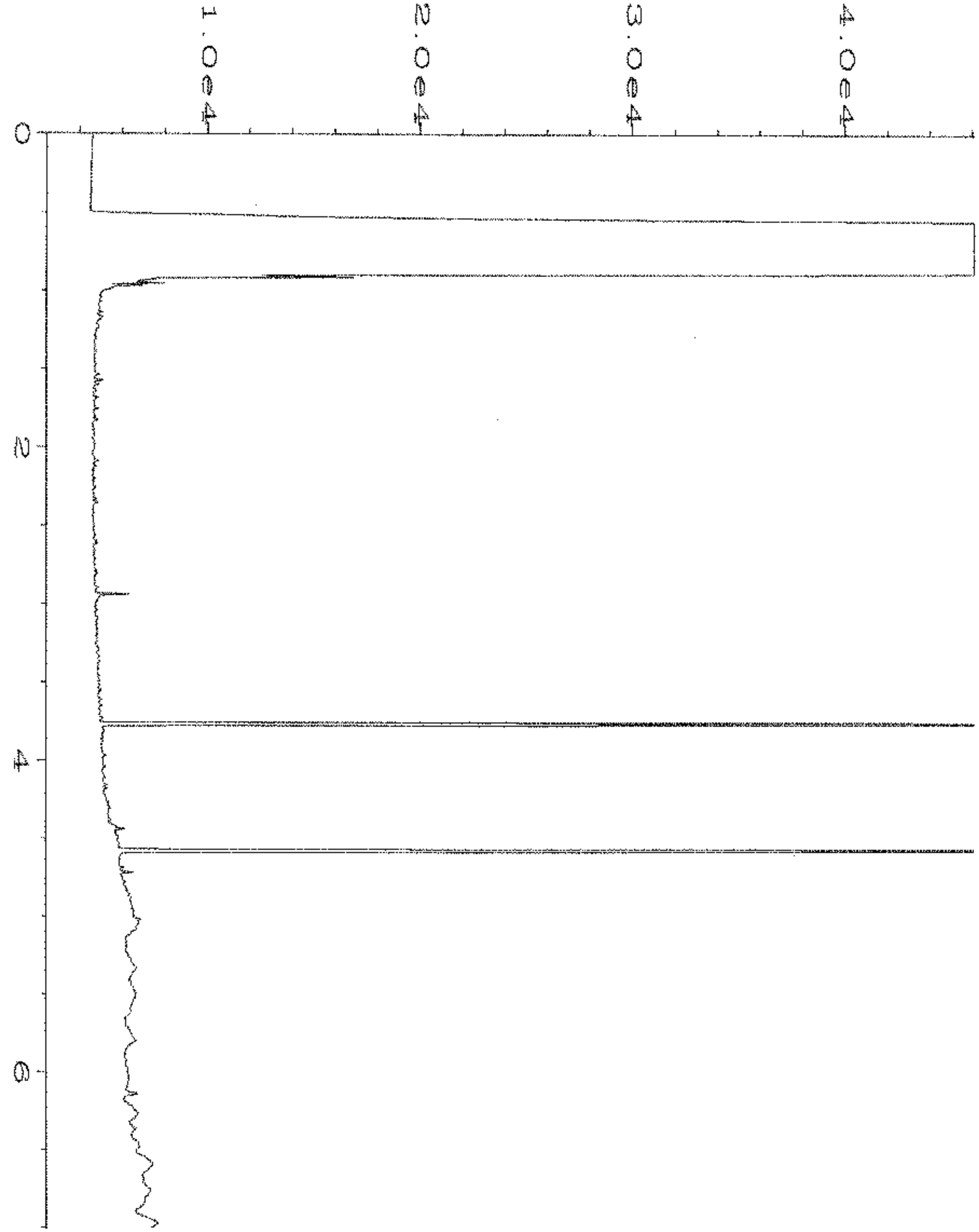

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Operator          : TL                          Page Number      : 1
Instrument        : GC6                         Vial Number      : 38
Sample Name       : 003244-08                   Injection Number : 1
Run Time Bar Code:                              Sequence Line    : 8
Acquired on       : 17 Mar 20   06:31 PM        Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:01 AM         Analysis Method  : DEFAULT.MTH
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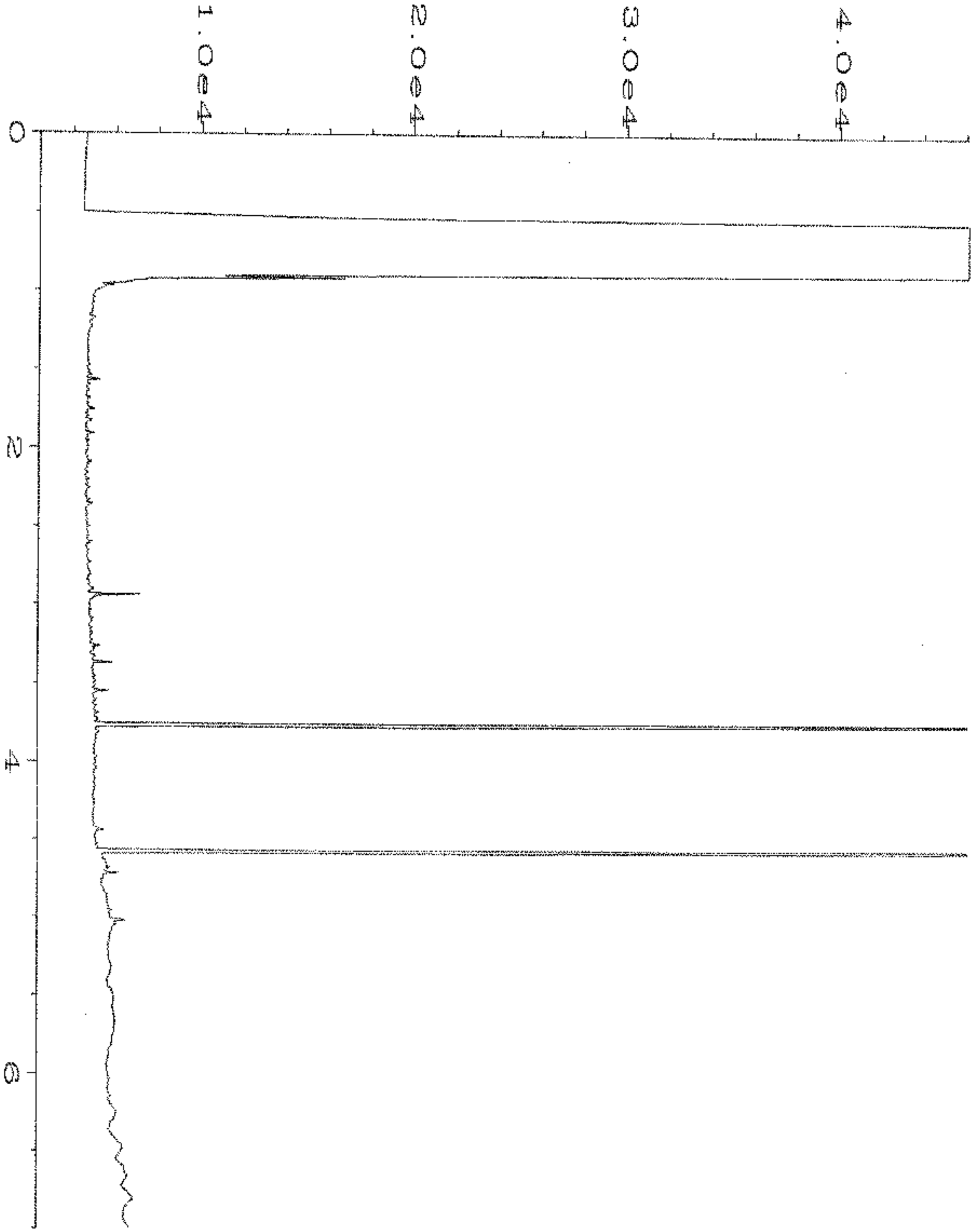

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Operator          : TL                              Page Number        : 1
Instrument        : GC6                             Vial Number        : 39
Sample Name       : 003244-09                       Injection Number   : 1
Run Time Bar Code:                                  Sequence Line      : 8
Acquired on       : 17 Mar 20   06:42 PM            Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:01 AM             Analysis Method    : DEFAULT.MTH
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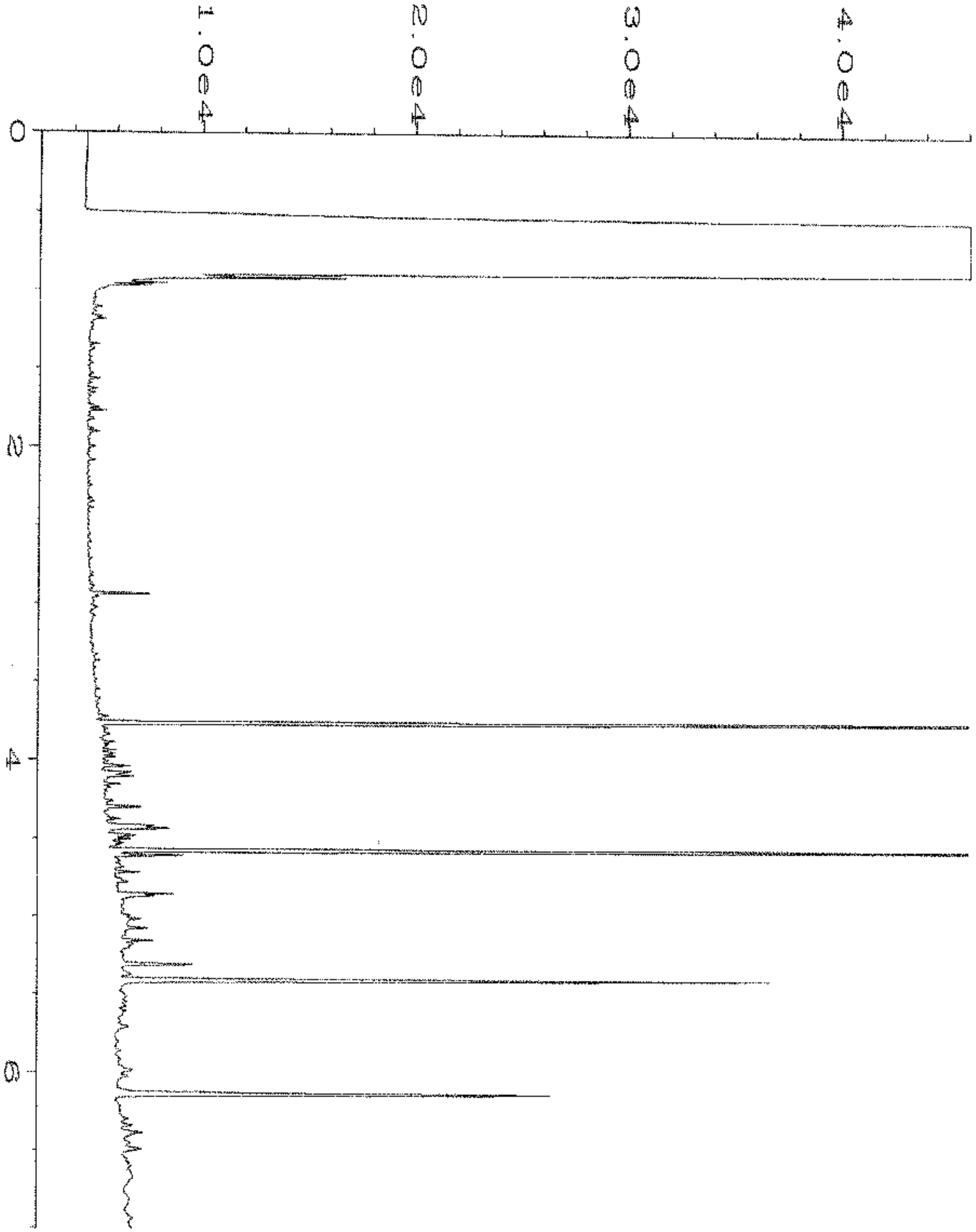

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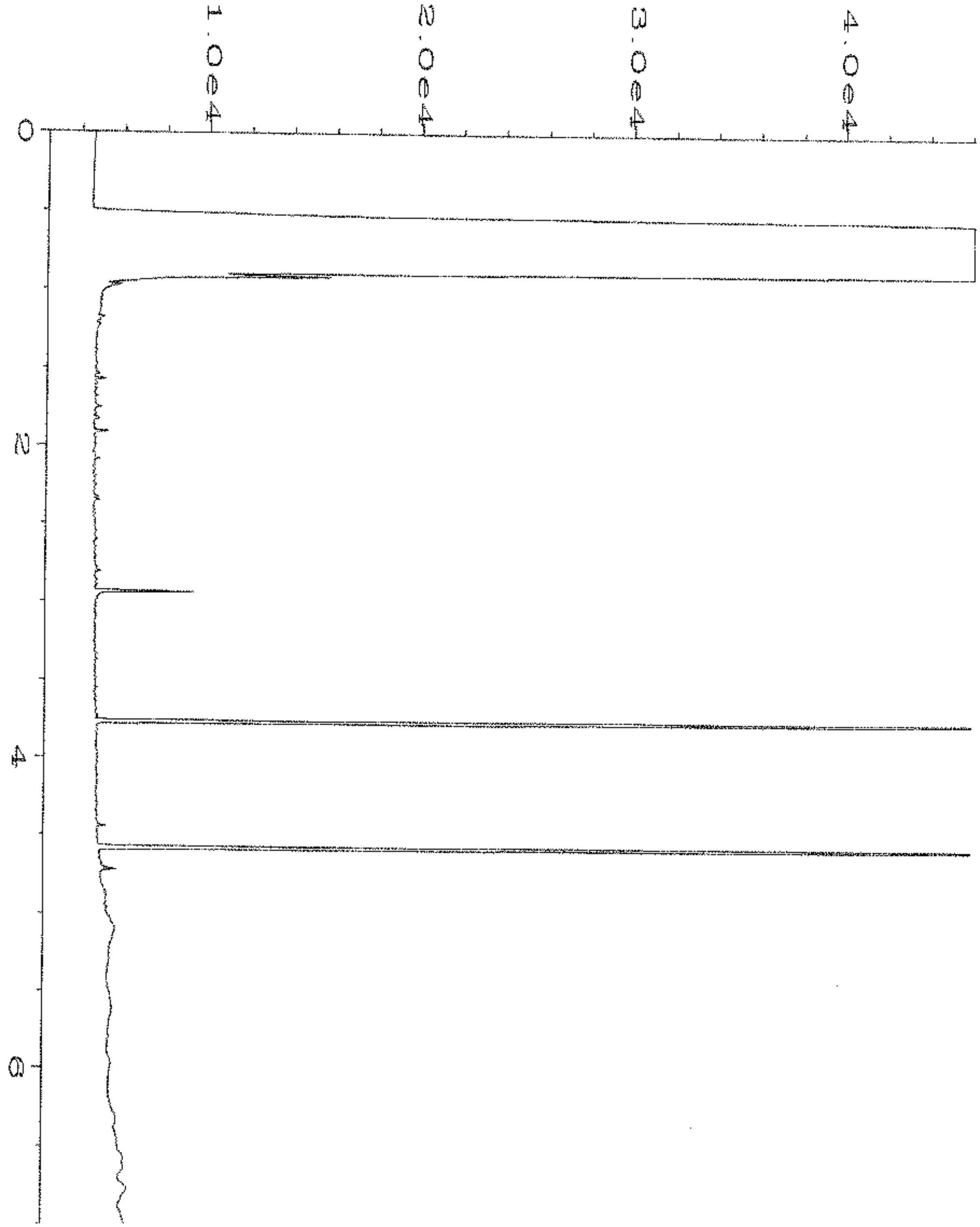
Operator : TL
Instrument : GC6
Sample Name : 003244-12
Run Time Bar Code:
Acquired on : 17 Mar 20 06:53 PM
Report Created on: 18 Mar 20 11:01 AM

Page Number : 1
Vial Number : 40
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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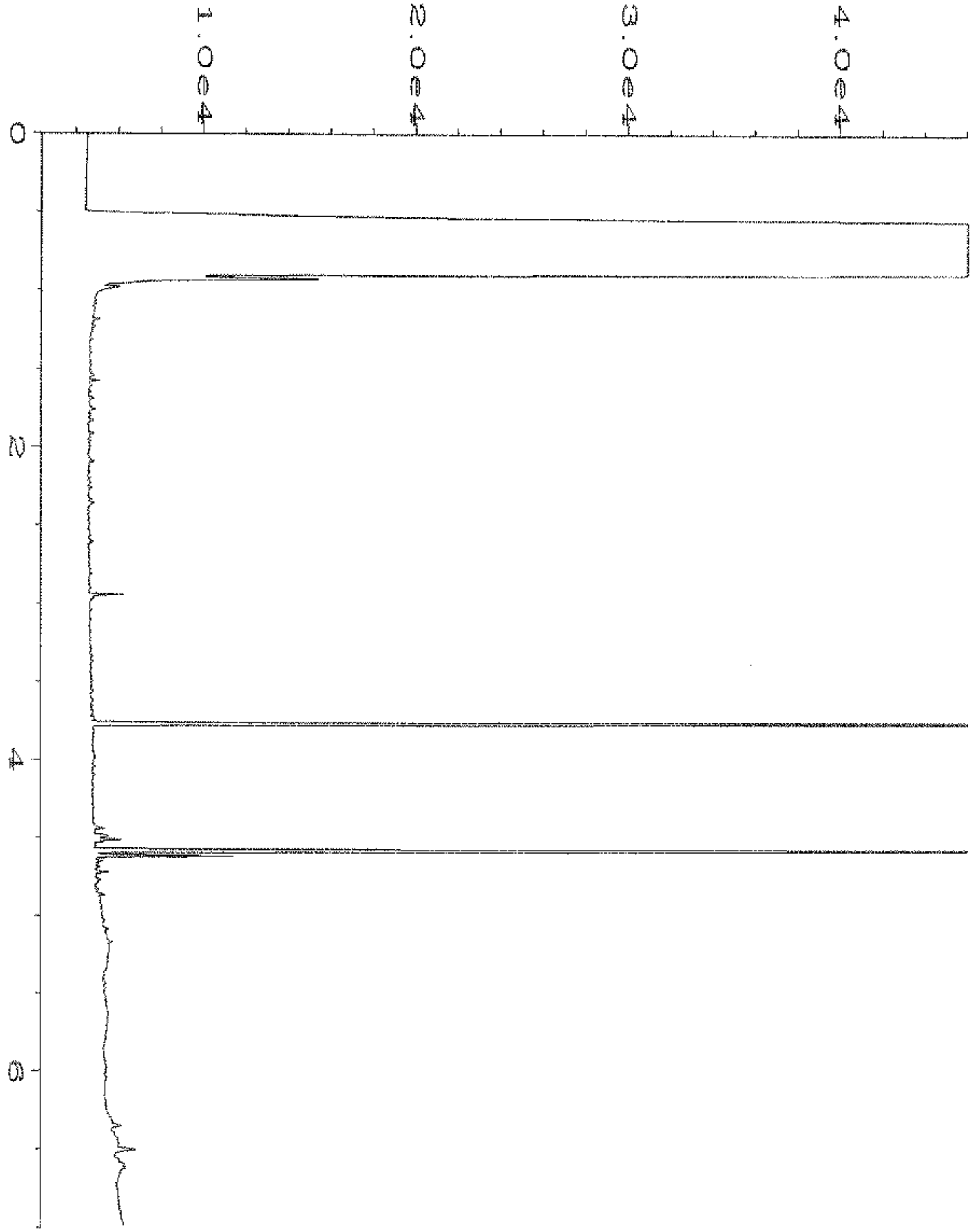
Operator : TL
Instrument : GC6
Sample Name : 003244-13
Run Time Bar Code:
Acquired on : 17 Mar 20 07:04 PM
Report Created on: 18 Mar 20 11:03 AM

Page Number : 1
Vial Number : 41
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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Instrument        : GC6                              Vial Number      : 42
Sample Name       : 003244-14                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 8
Acquired on       : 17 Mar 20  07:15 PM              Instrument Method: DX.MTH
Report Created on: 18 Mar 20  11:06 AM               Analysis Method  : DEFAULT.MTH
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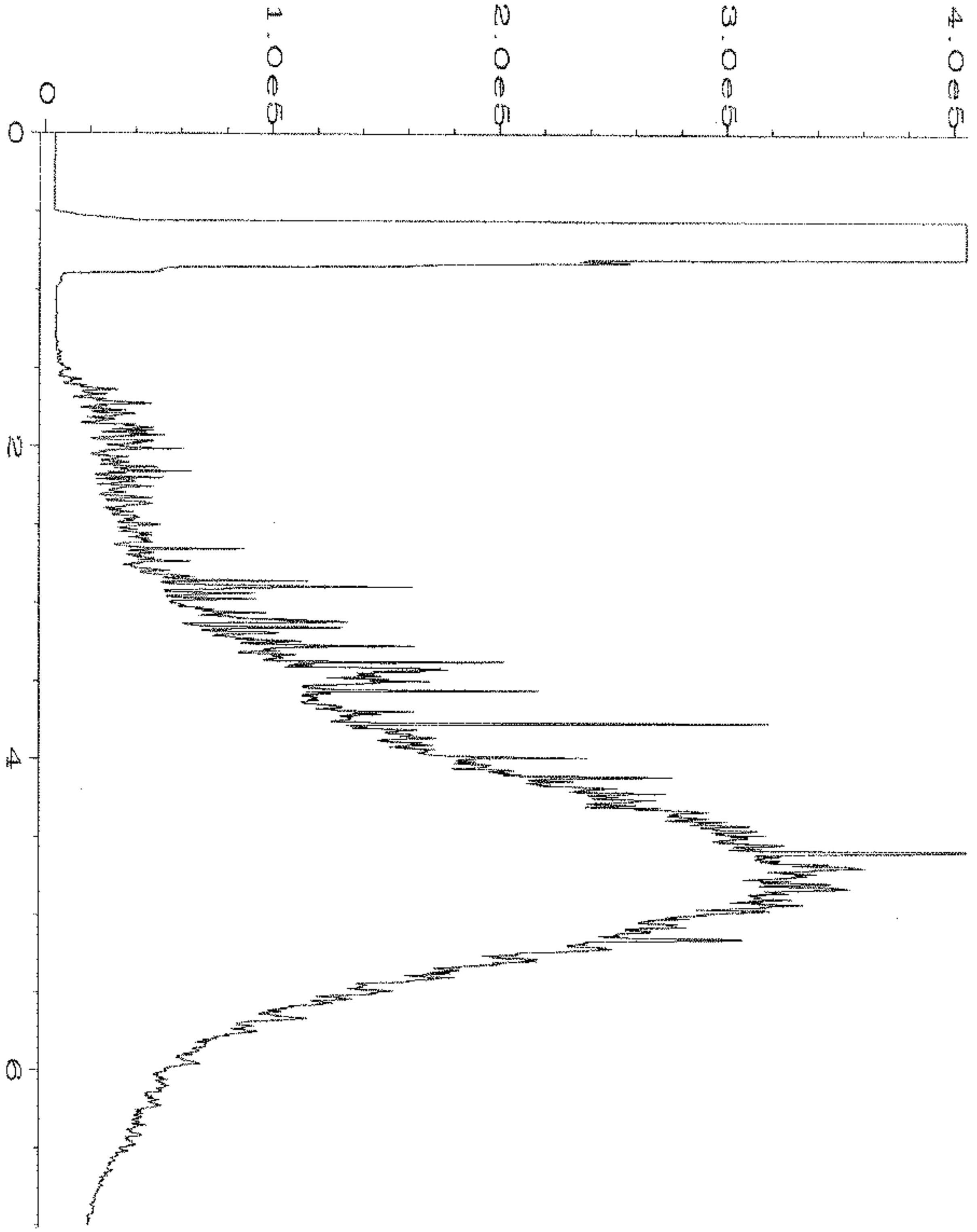

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Instrument : GC6
Sample Name : 003244-15
Run Time Bar Code:
Acquired on : 17 Mar 20 07:26 PM
Report Created on: 18 Mar 20 11:06 AM

Page Number : 1
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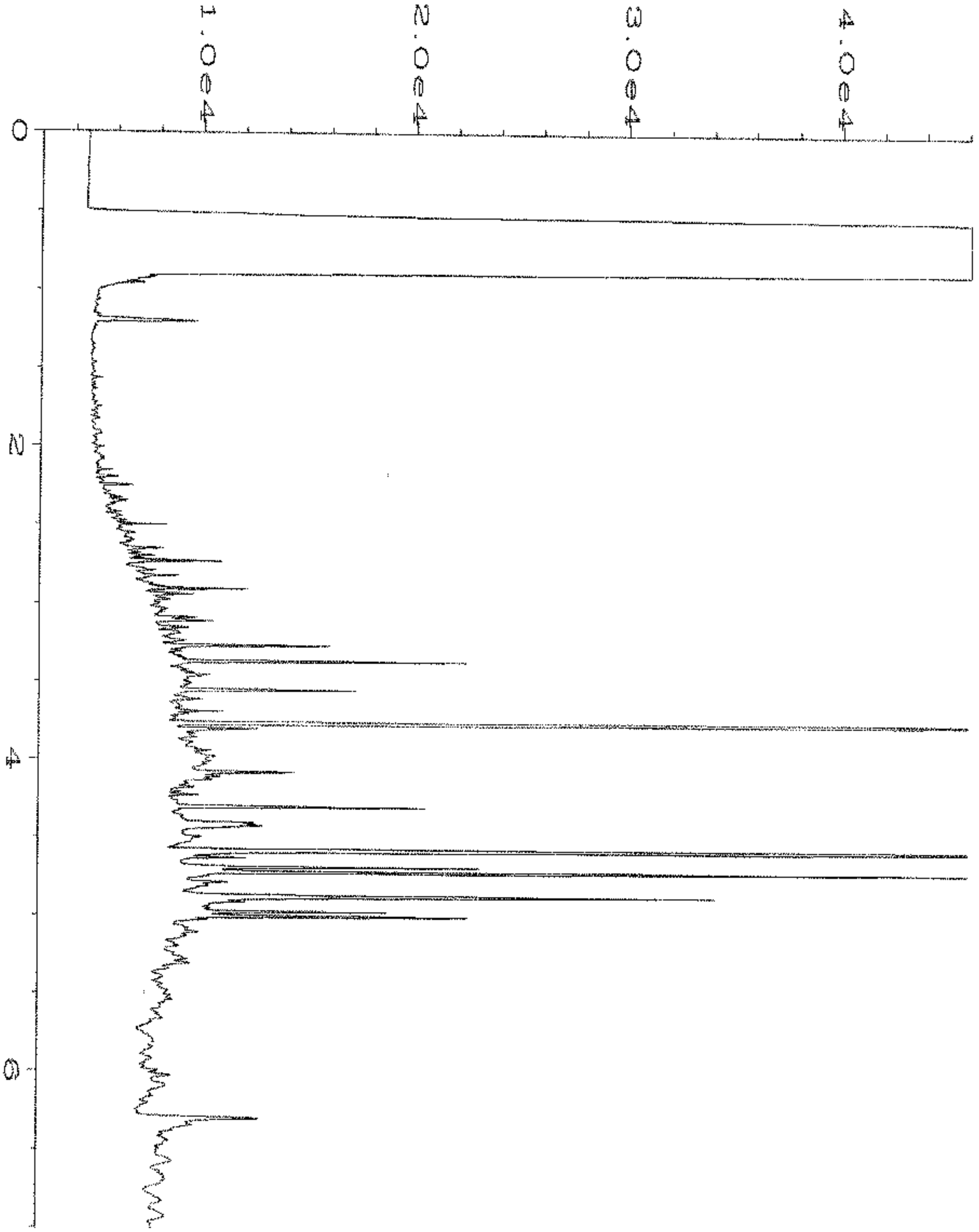
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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Operator : TL
Instrument : GC6
Sample Name : 003244-16
Run Time Bar Code:
Acquired on : 17 Mar 20 07:47 PM
Report Created on: 18 Mar 20 11:07 AM

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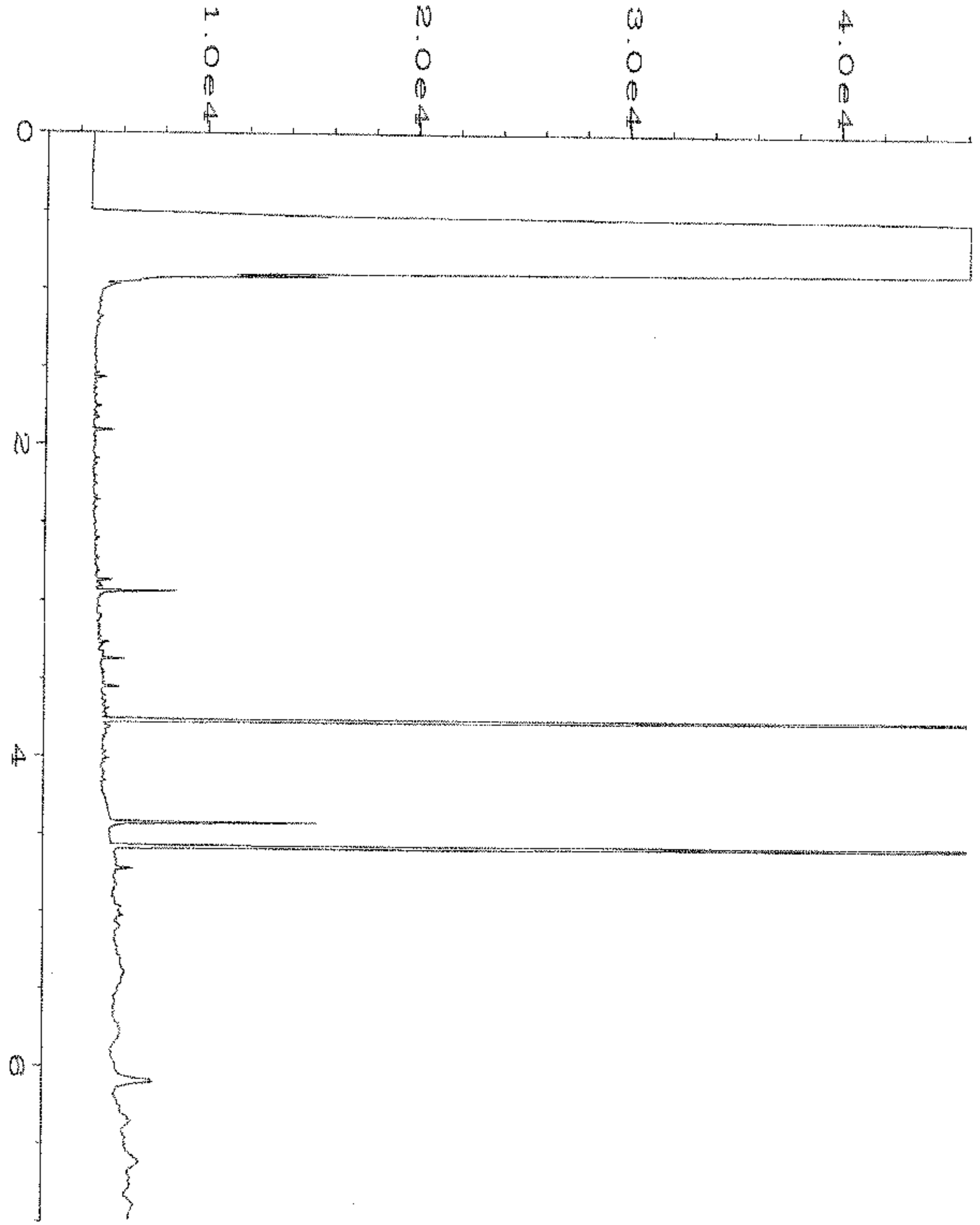
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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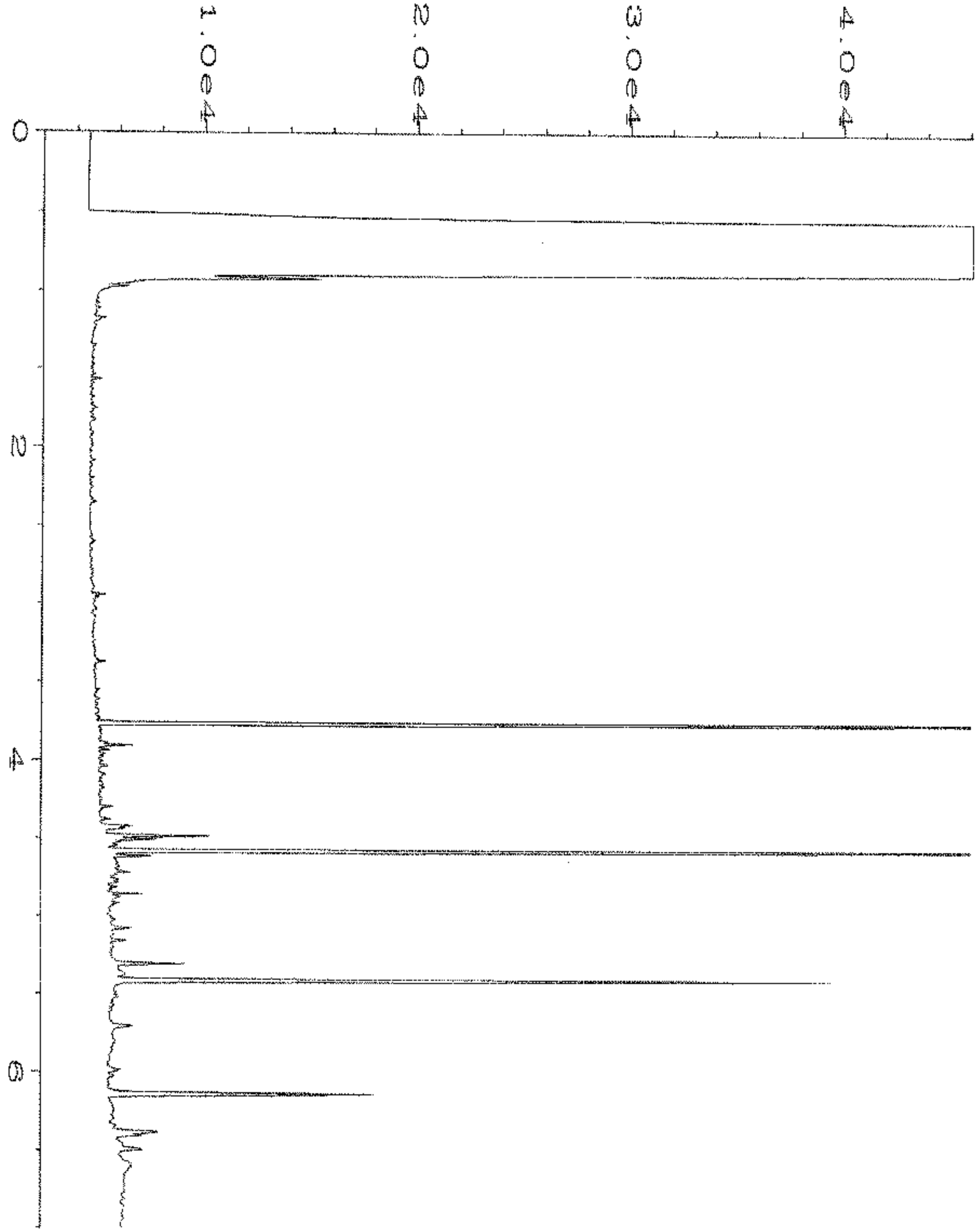
Operator : TL
Instrument : GC6
Sample Name : 003244-17
Run Time Bar Code:
Acquired on : 17 Mar 20 07:58 PM
Report Created on: 18 Mar 20 11:07 AM

Page Number : 1
Vial Number : 46
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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Operator          : TL                                Page Number       : 1
Instrument        : GC6                               Vial Number       : 47
Sample Name       : 003244-18                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line     : 8
Acquired on       : 17 Mar 20   08:09 PM              Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:07 AM               Analysis Method   : DEFAULT.MTH
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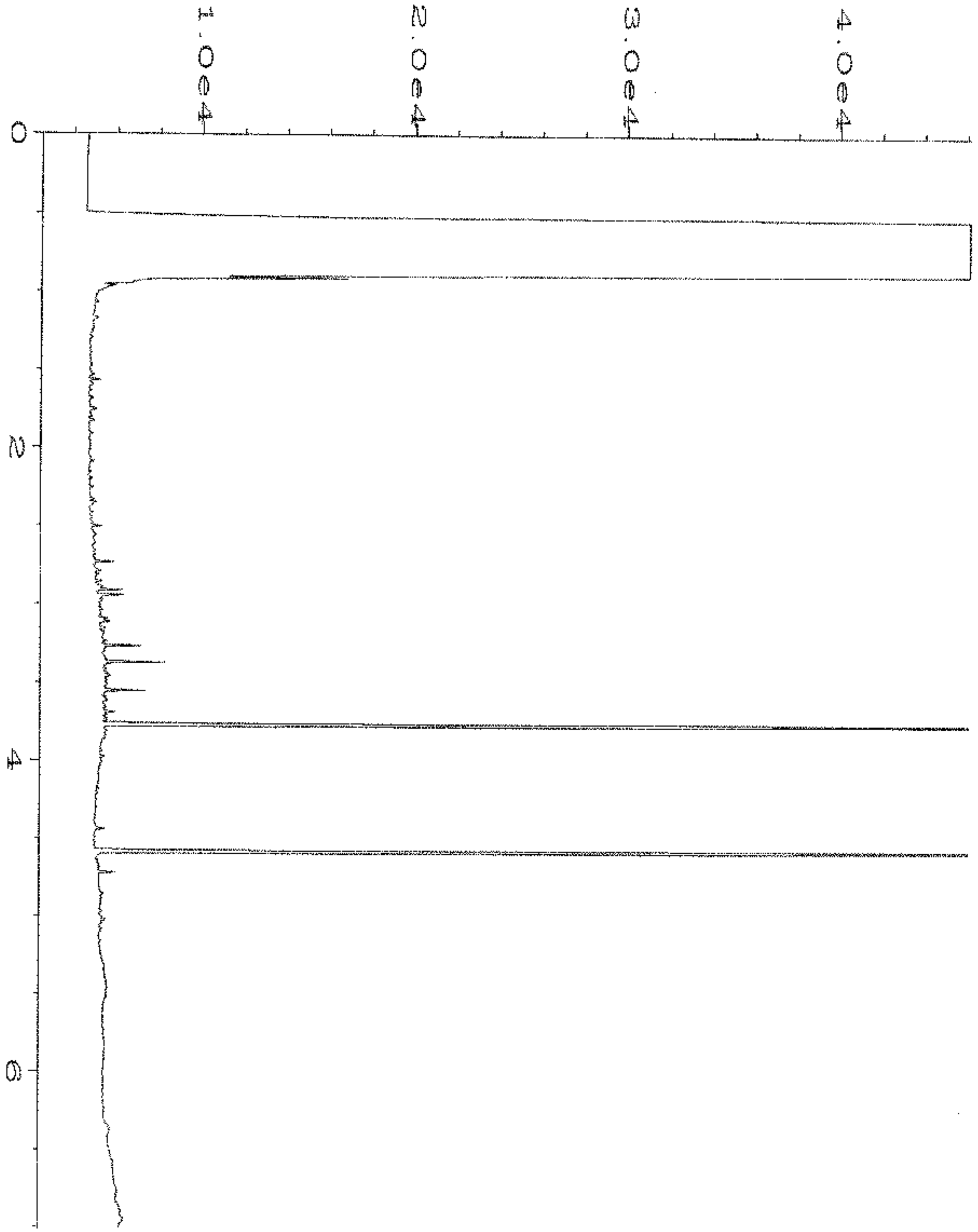

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Instrument        : GC6                              Vial Number       : 48
Sample Name       : 003244-22                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line     : 8
Acquired on       : 17 Mar 20   08:20 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:07 AM              Analysis Method   : DEFAULT.MTH
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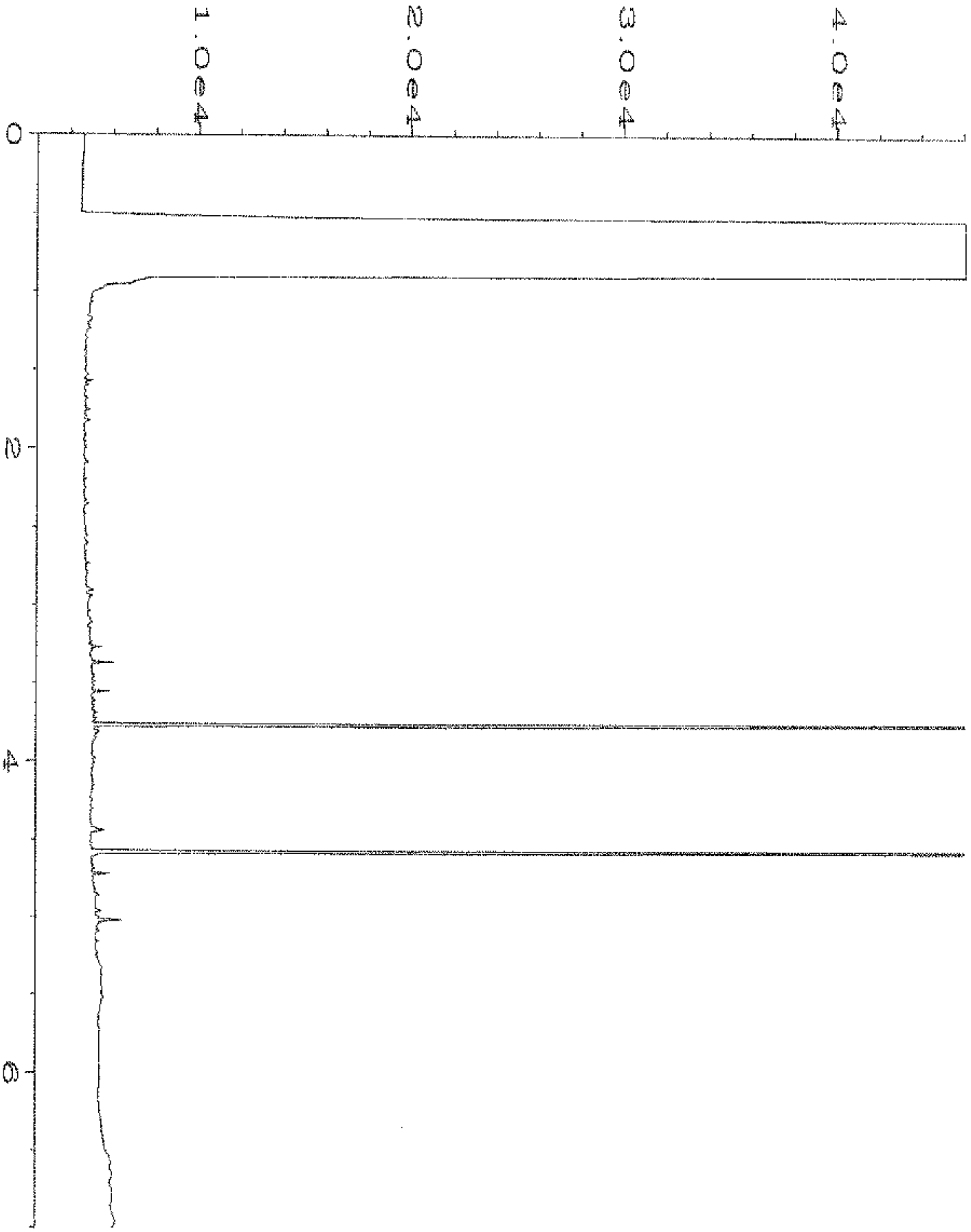

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Operator          : TL                                Page Number       : 1
Instrument        : GC6                               Vial Number       : 49
Sample Name       : 003244-23                         Injection Number  : 1
Run Time Bar Code:                                    Sequence Line     : 8
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Report Created on: 18 Mar 20   11:07 AM               Analysis Method   : DEFAULT.MTH
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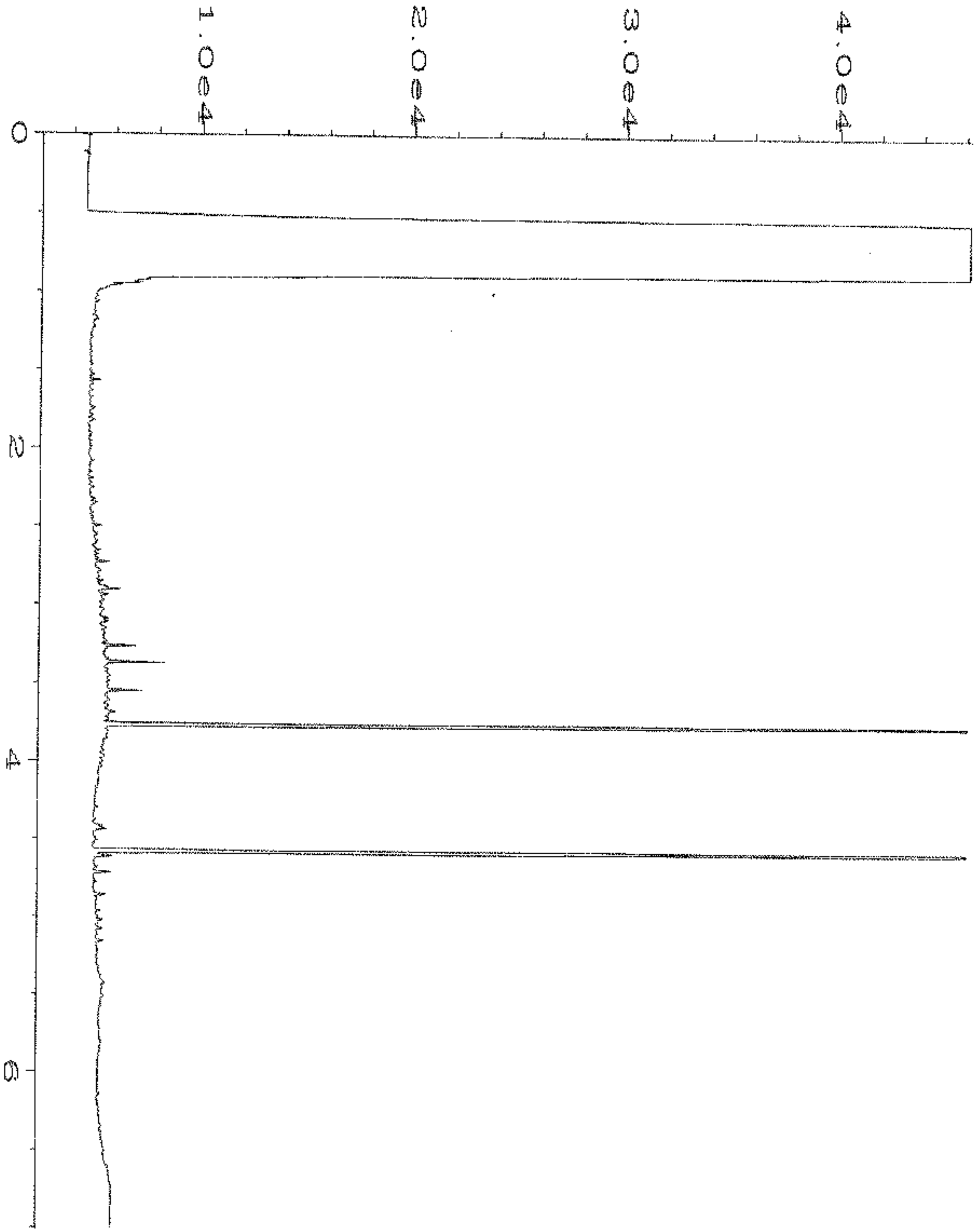
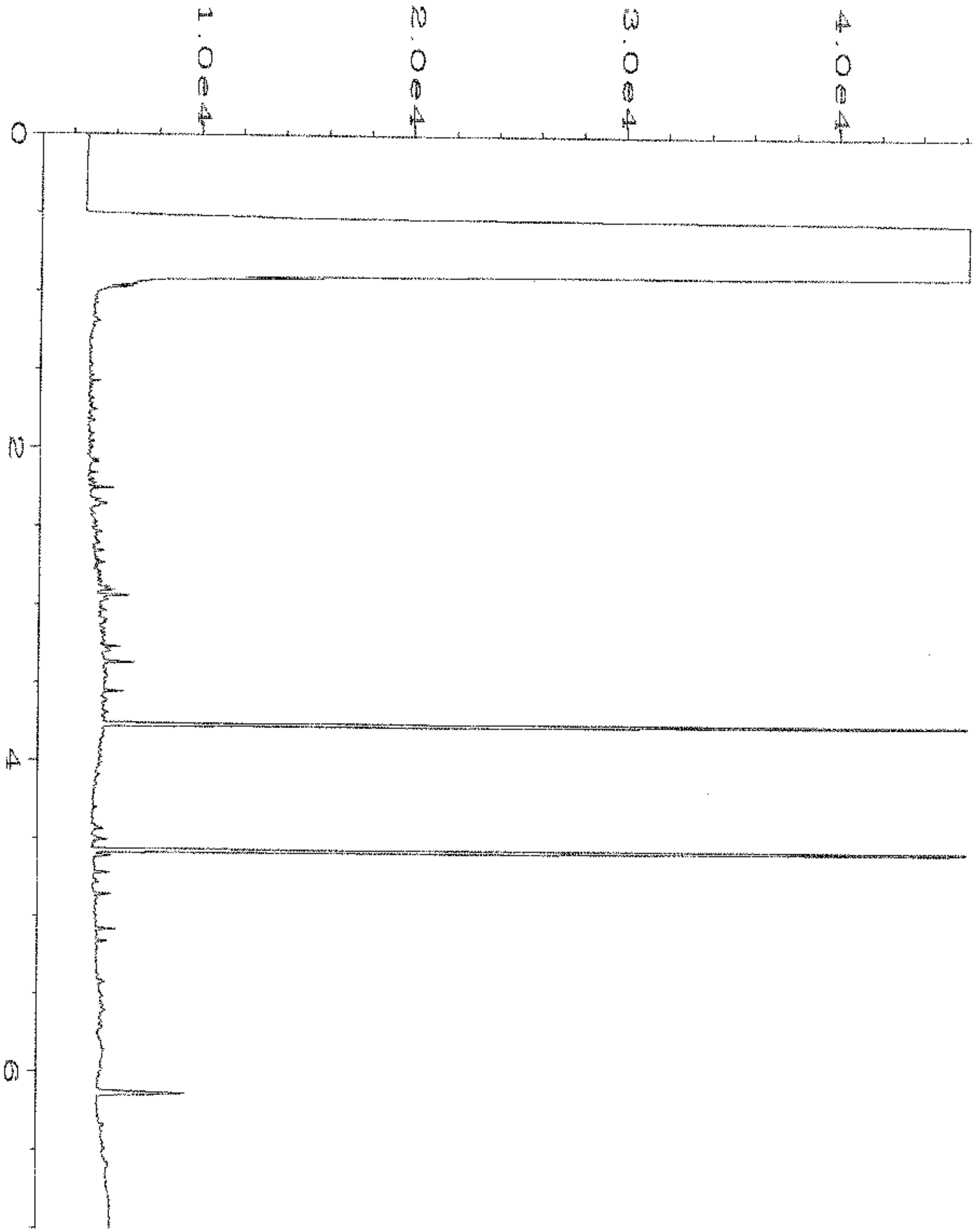


Data File Name : C:\HPCHEM\6\DATA\03-17-20\050F0801.D
Operator : TL
Instrument : GC6
Sample Name : 003244-27
Run Time Bar Code:
Acquired on : 17 Mar 20 08:42 PM
Report Created on: 18 Mar 20 11:07 AM

Page Number : 1
Vial Number : 50
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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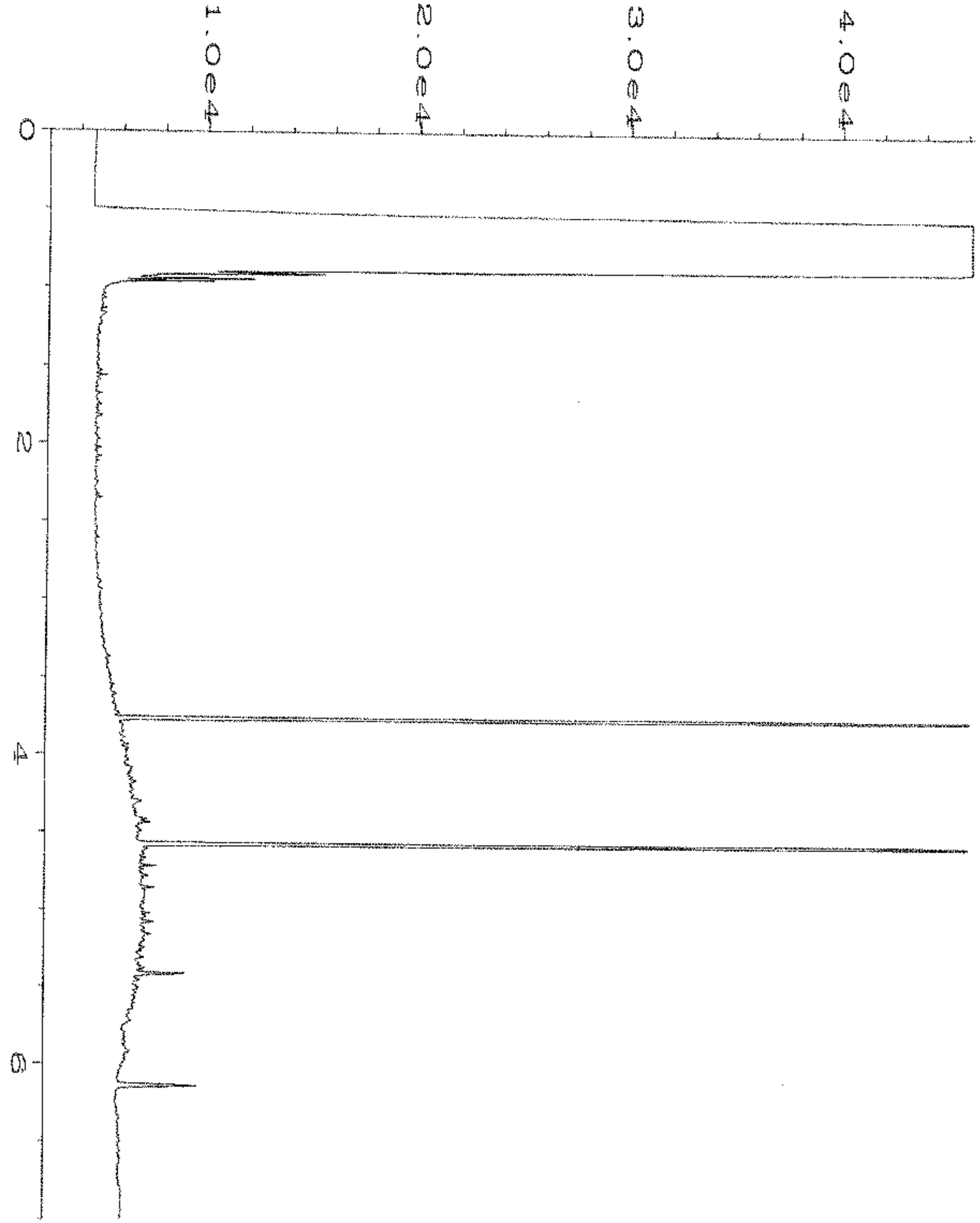
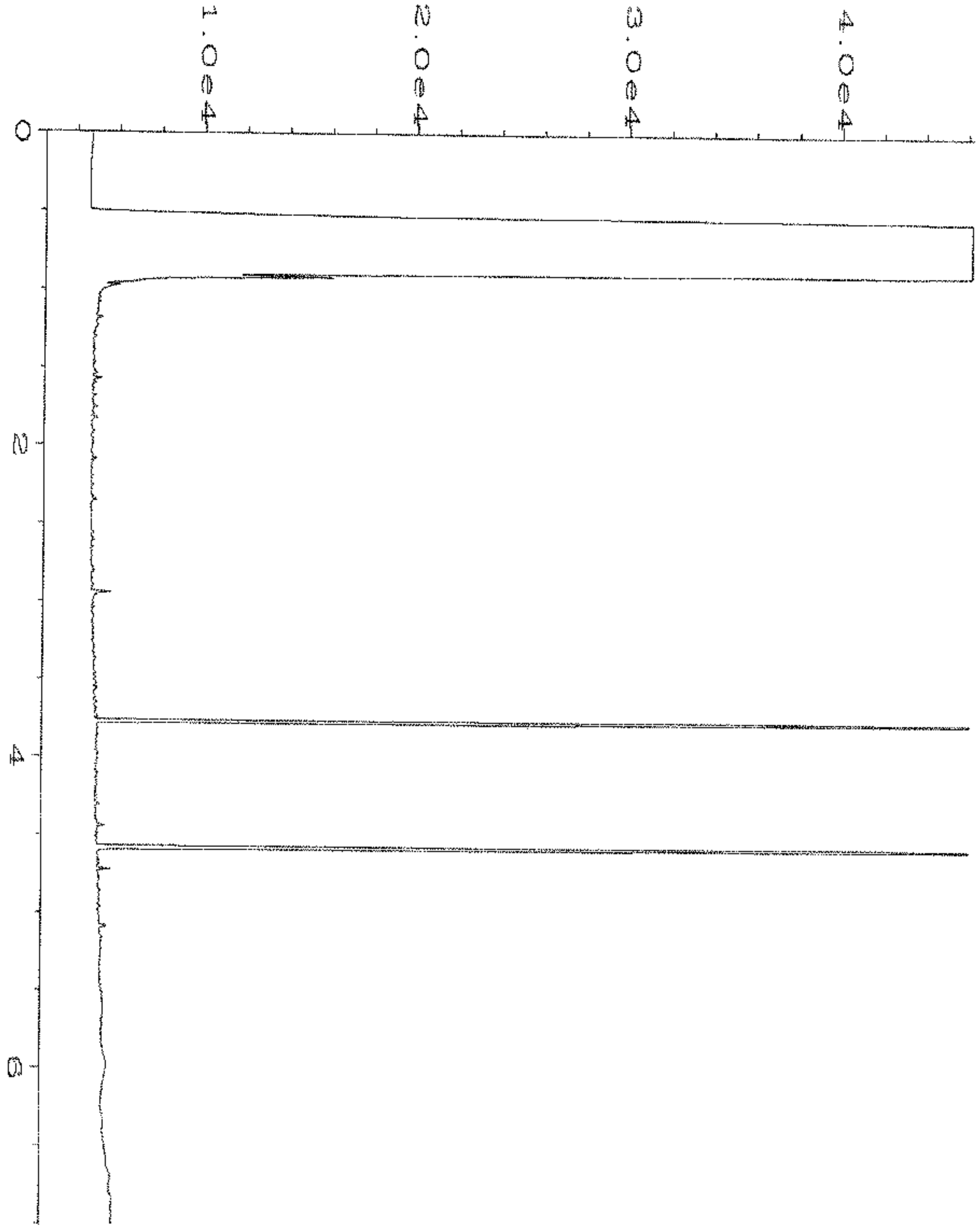
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\051F0801.D
Operator          : TL                              Page Number        : 1
Instrument        : GC6                             Vial Number        : 51
Sample Name       : 003244-31                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line      : 8
Acquired on       : 17 Mar 20   08:53 PM            Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:07 AM             Analysis Method    : DEFAULT.MTH
```

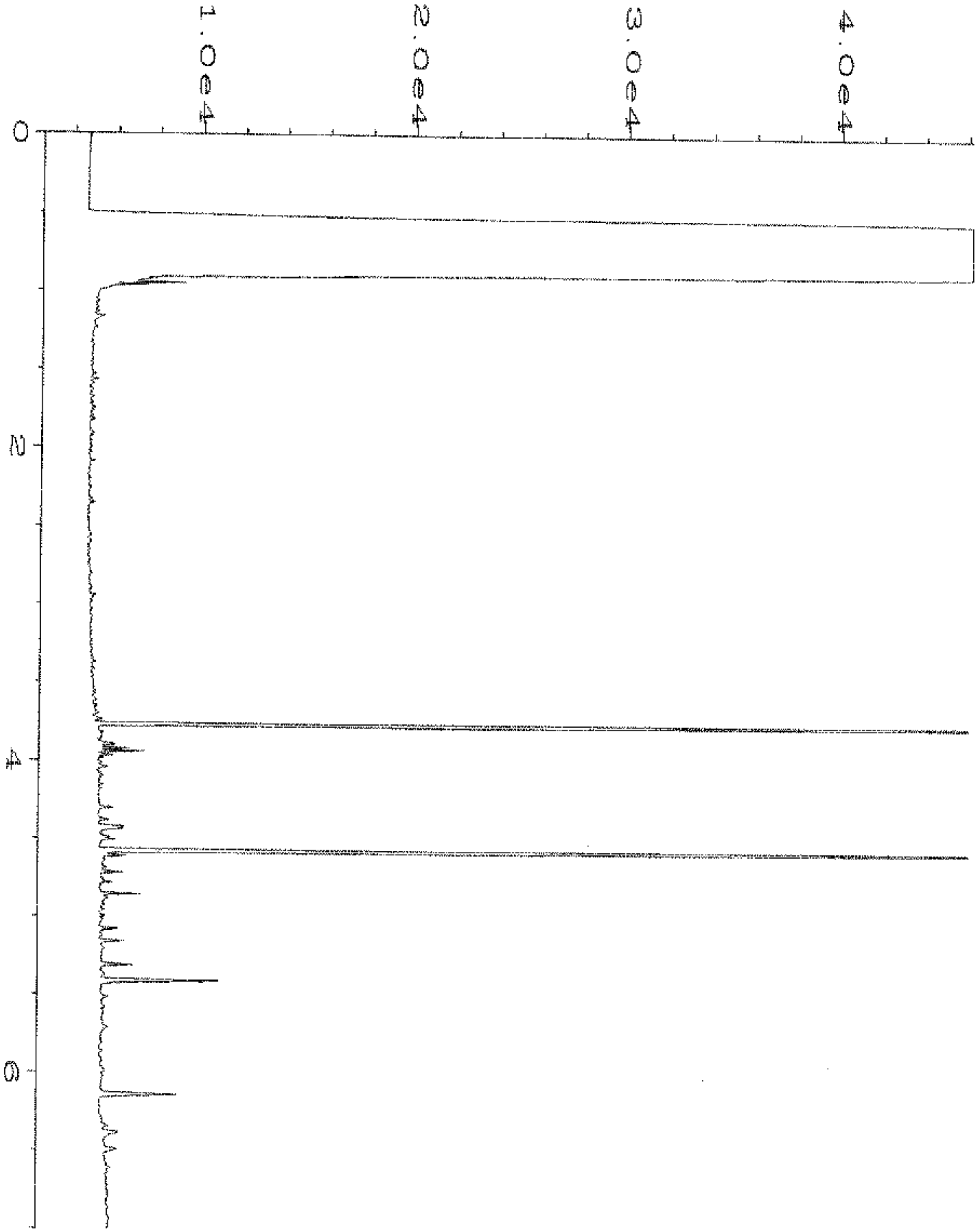


```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\052F0801.D
Operator          : TL                                 Page Number       : 1
Instrument        : GC6                                Vial Number       : 52
Sample Name       : 003244-33                          Injection Number  : 1
Run Time Bar Code:                                     Sequence Line     : 8
Acquired on       : 17 Mar 20   09:04 PM               Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:07 AM                Analysis Method   : DEFAULT.MTH
```

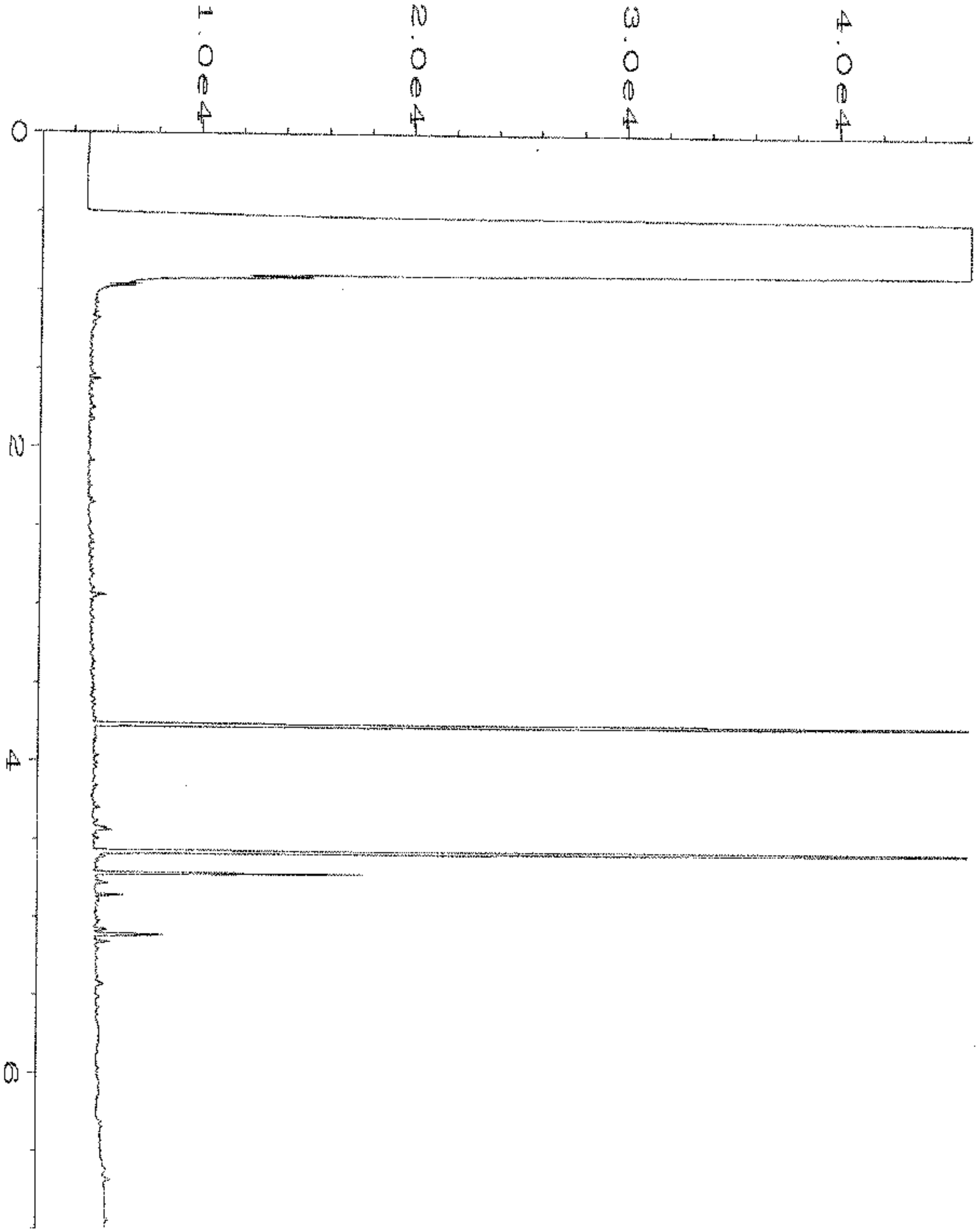


Data File Name : C:\HPCHEM\6\DATA\03-17-20\053F0801.D
Operator : TL
Instrument : GC6
Sample Name : 003244-34
Run Time Bar Code:
Acquired on : 17 Mar 20 09:15 PM
Report Created on: 18 Mar 20 11:08 AM

Page Number : 1
Vial Number : 53
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

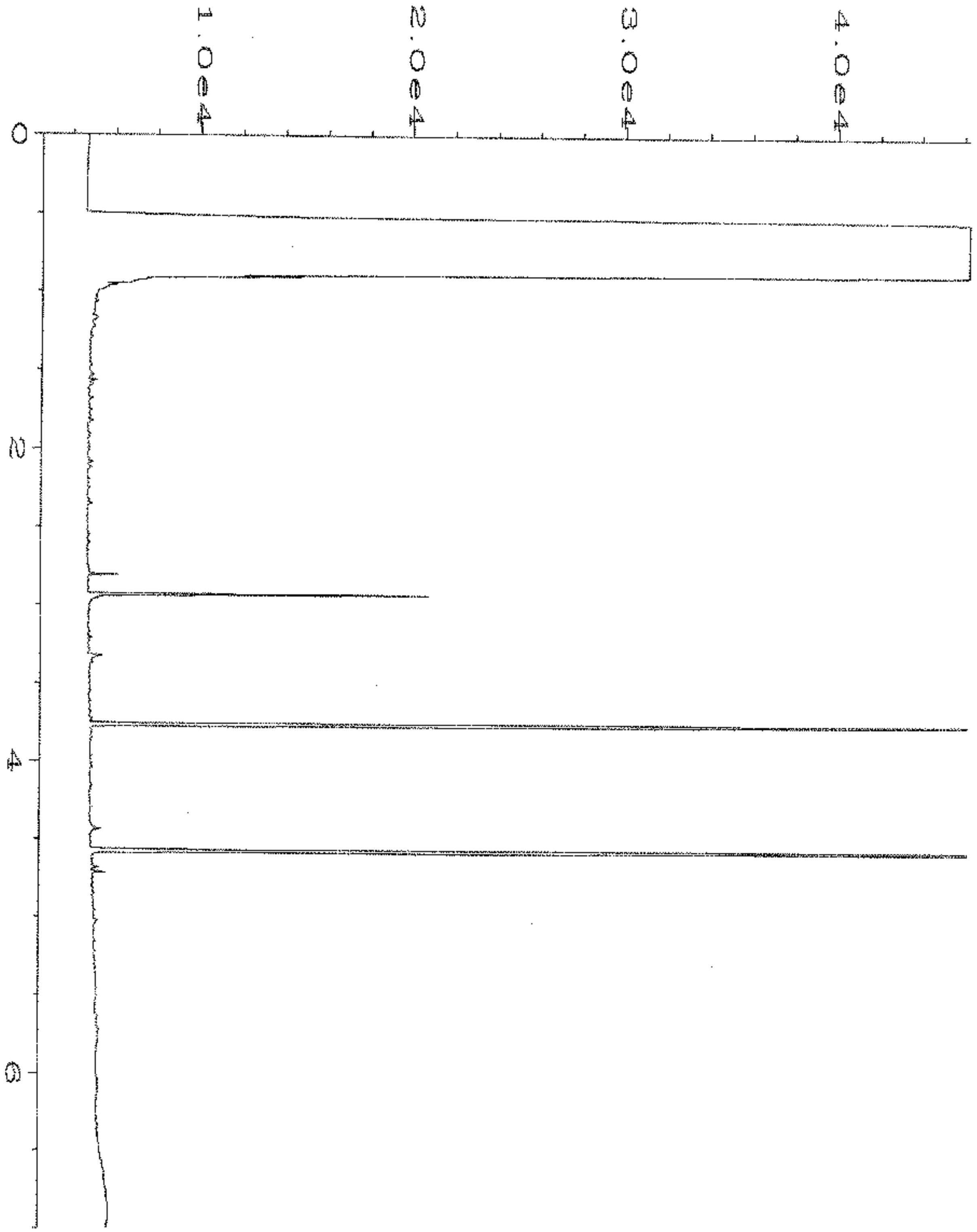


```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\055F0801.D
Operator          : TL                               Page Number       : 1
Instrument        : GC6                              Vial Number       : 55
Sample Name       : 003244-35                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 8
Acquired on       : 17 Mar 20   09:37 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:08 AM              Analysis Method   : DEFAULT.MTH
```

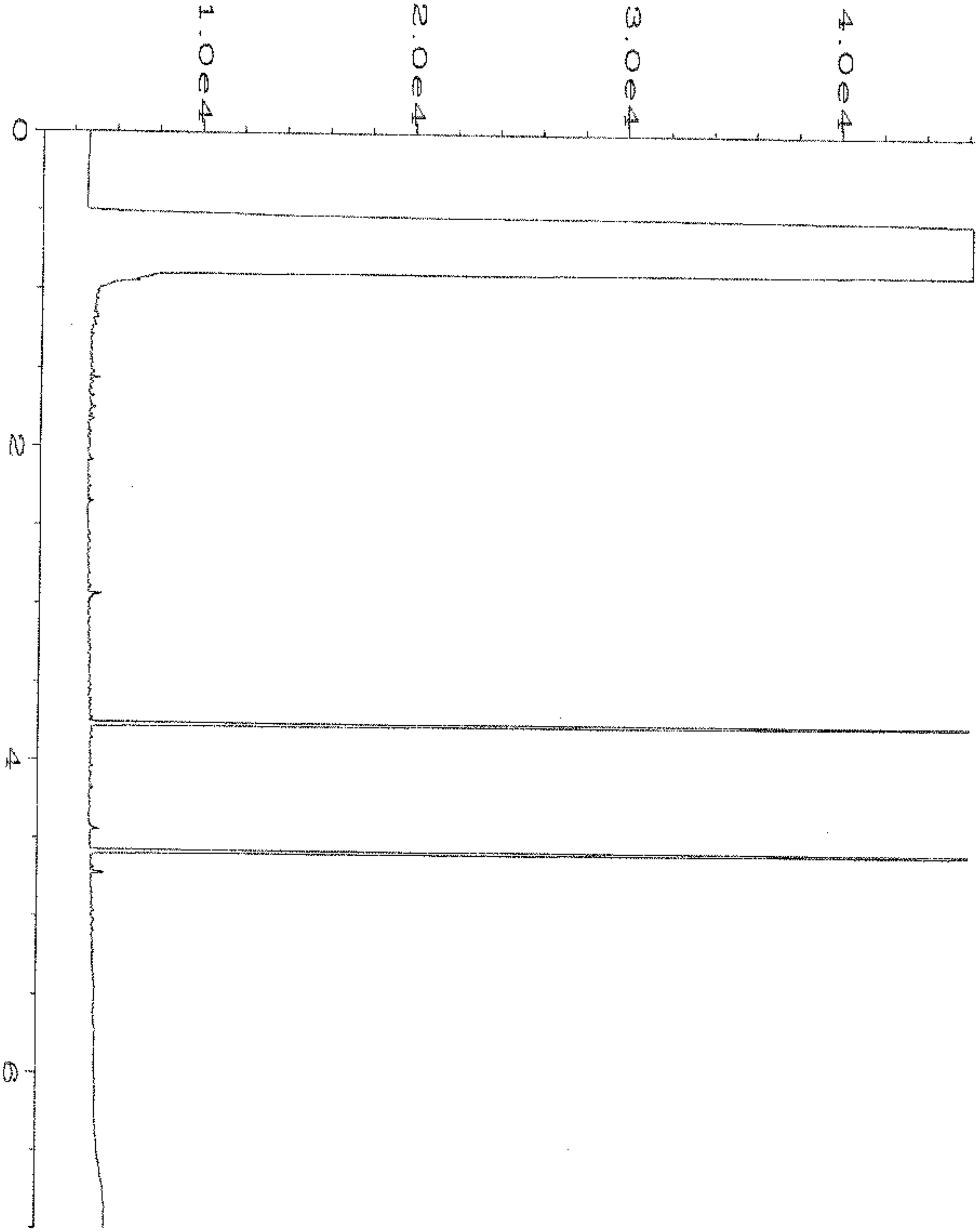


Data File Name : C:\HPCHEM\6\DATA\03-17-20\057F0801.D
Operator : TL
Instrument : GC6
Sample Name : 003244-36
Run Time Bar Code:
Acquired on : 17 Mar 20 09:59 PM
Report Created on: 18 Mar 20 11:08 AM

Page Number : 1
Vial Number : 57
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

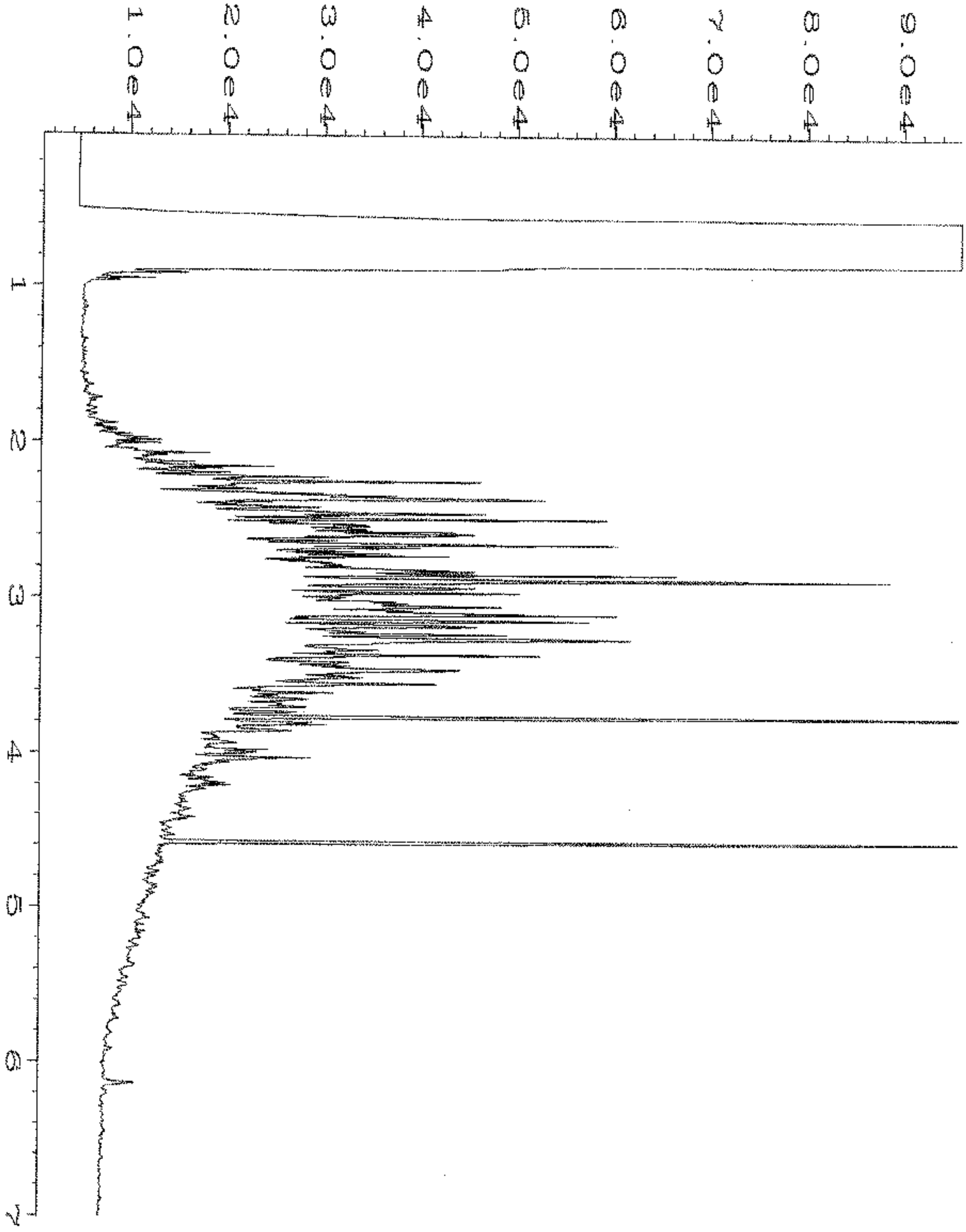


```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\058F0801.D
Operator          : TL                          Page Number       : 1
Instrument        : GC6                         Vial Number       : 58
Sample Name       : 003244-38                   Injection Number  : 1
Run Time Bar Code:                              Sequence Line     : 8
Acquired on       : 17 Mar 20   10:10 PM        Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:08 AM         Analysis Method   : DEFAULT.MTH
```

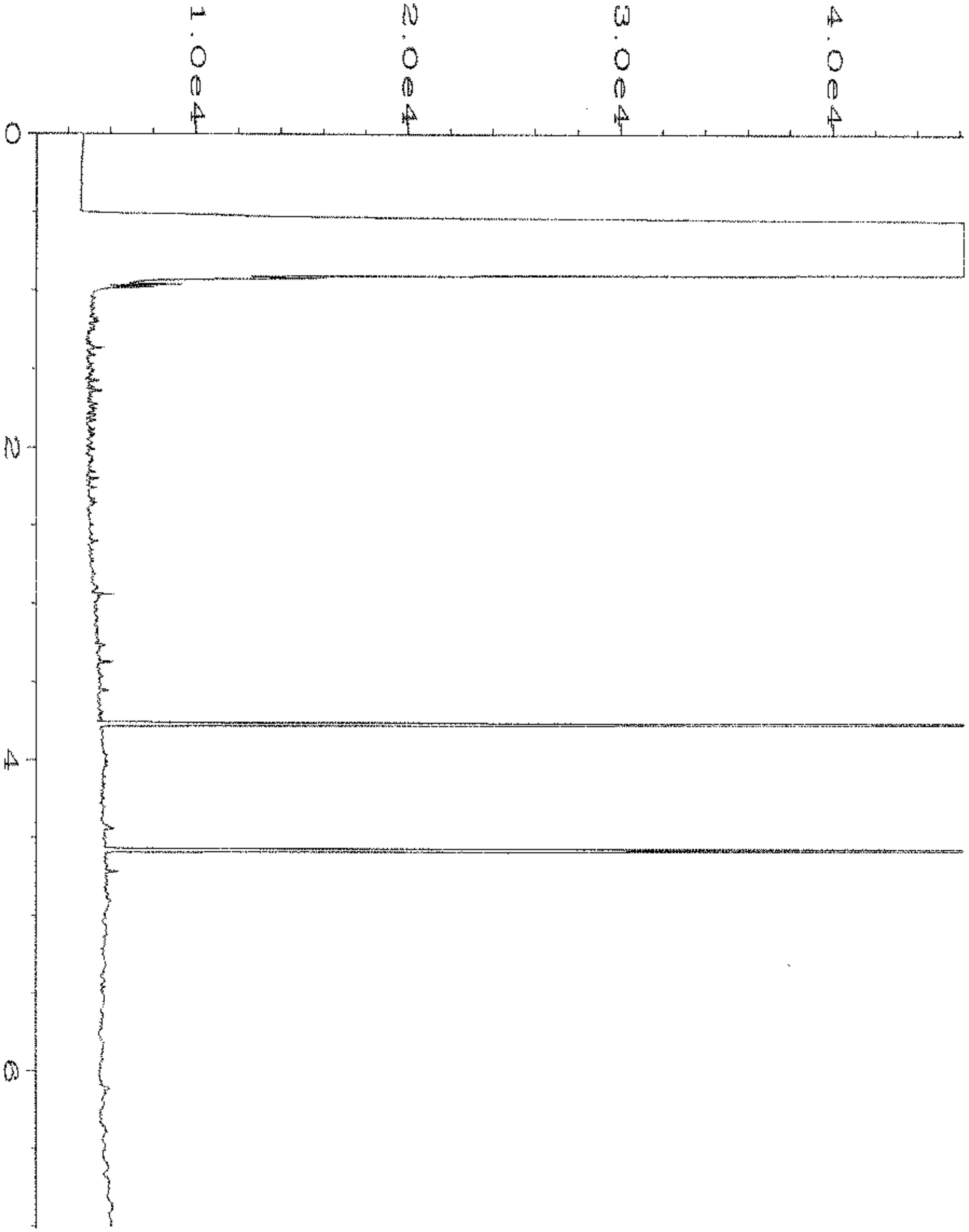


Data File Name : C:\HPCHEM\6\DATA\03-17-20\059F0801.D
Operator : TL
Instrument : GC6
Sample Name : 003244-41
Run Time Bar Code:
Acquired on : 17 Mar 20 10:20 PM
Report Created on: 18 Mar 20 11:08 AM

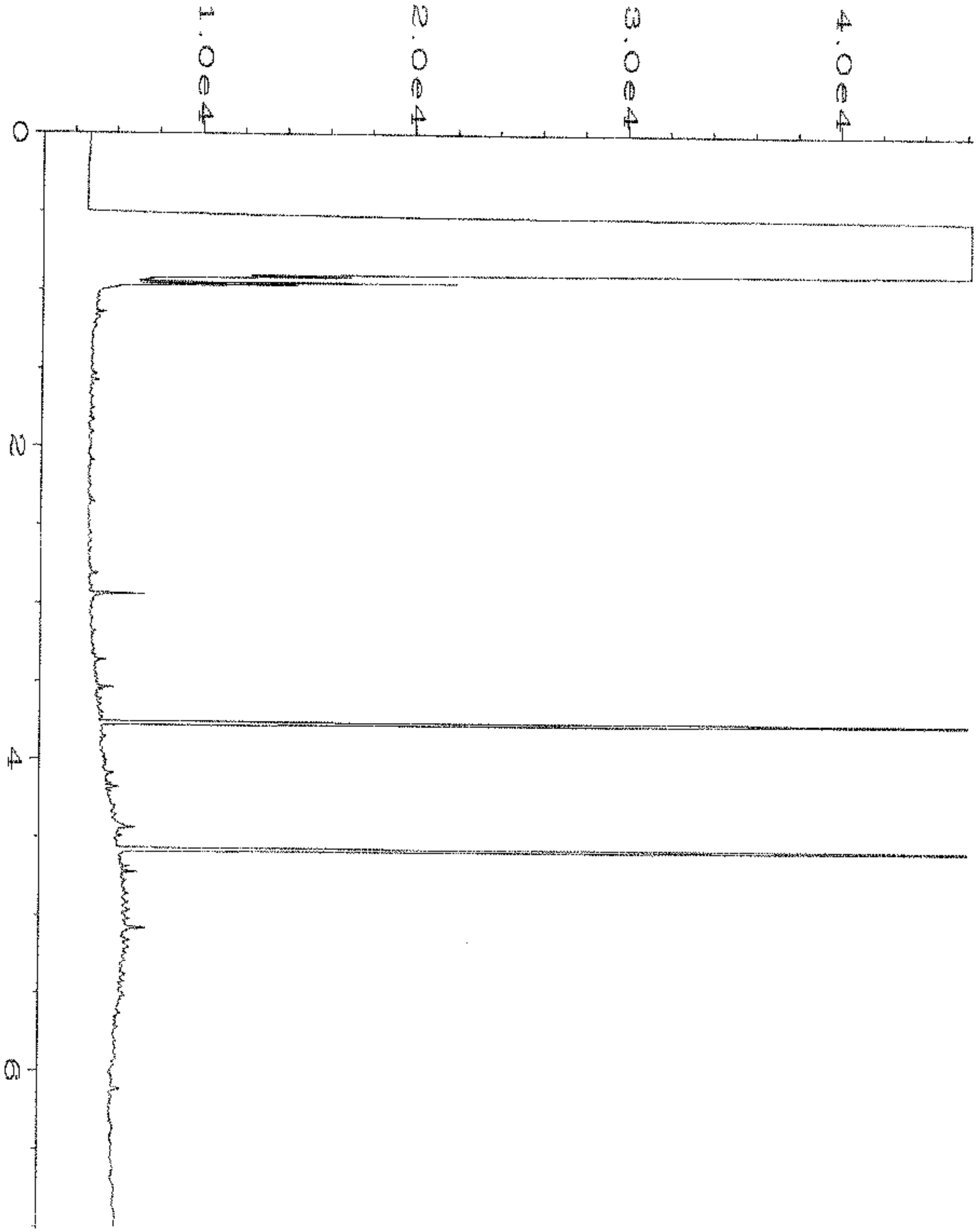
Page Number : 1
Vial Number : 59
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\060F0801.D
Operator          : TL                                    Page Number       : 1
Instrument        : GC6                                   Vial Number       : 60
Sample Name       : 003244-42                             Injection Number  : 1
Run Time Bar Code:                                        Sequence Line     : 8
Acquired on       : 17 Mar 20   10:31 PM                  Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:09 AM                   Analysis Method   : DEFAULT.MTH
```

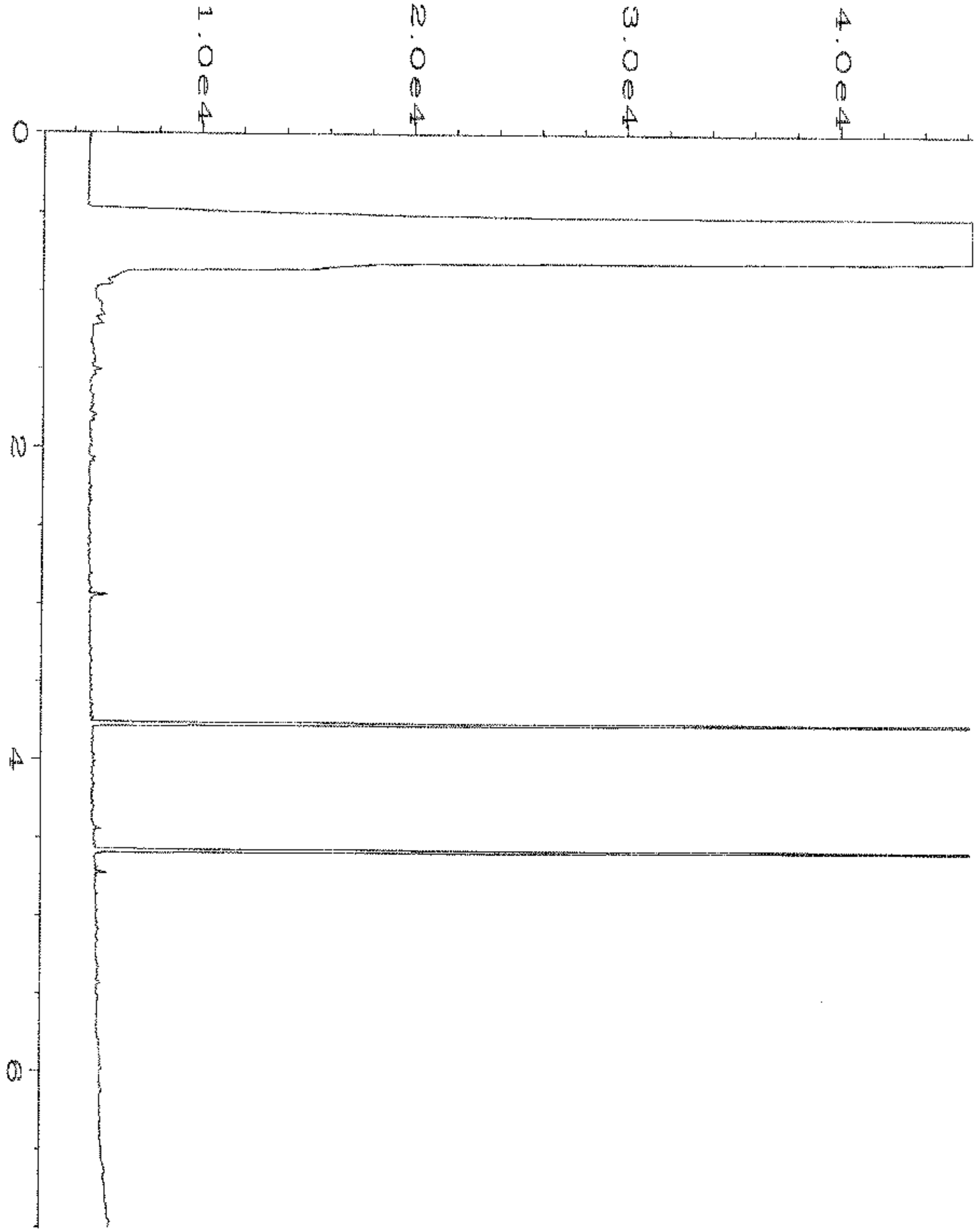


```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\061F0801.D
Operator          : TL                               Page Number      : 1
Instrument        : GC6                              Vial Number      : 61
Sample Name       : 003244-43                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 8
Acquired on       : 17 Mar 20   10:42 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:09 AM              Analysis Method  : DEFAULT.MTH
```

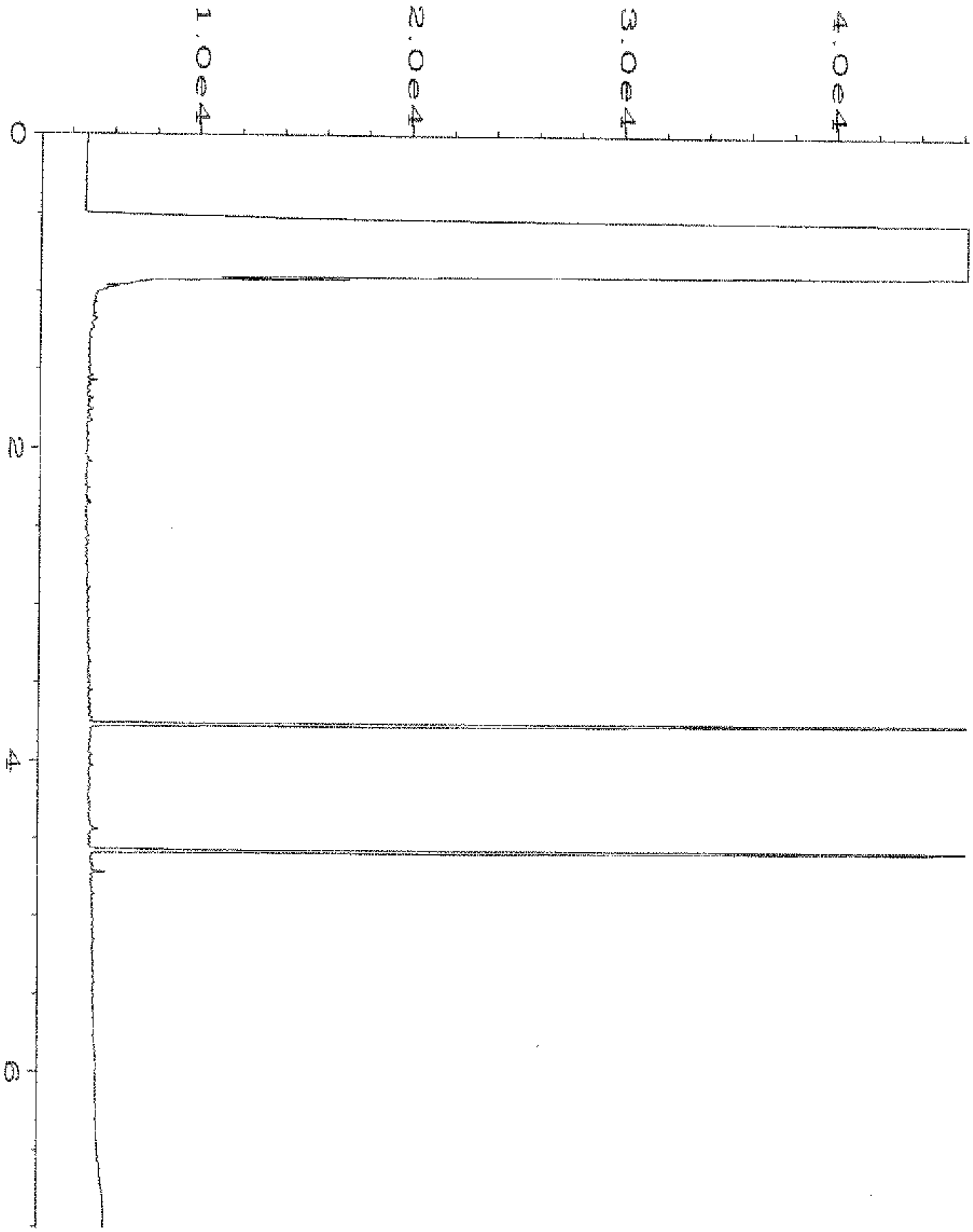


Data File Name : C:\HPCHEM\6\DATA\03-17-20\062F0801.D
Operator : TL
Instrument : GC6
Sample Name : 003244-44
Run Time Bar Code:
Acquired on : 17 Mar 20 10:53 PM
Report Created on: 18 Mar 20 11:09 AM

Page Number : 1
Vial Number : 62
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

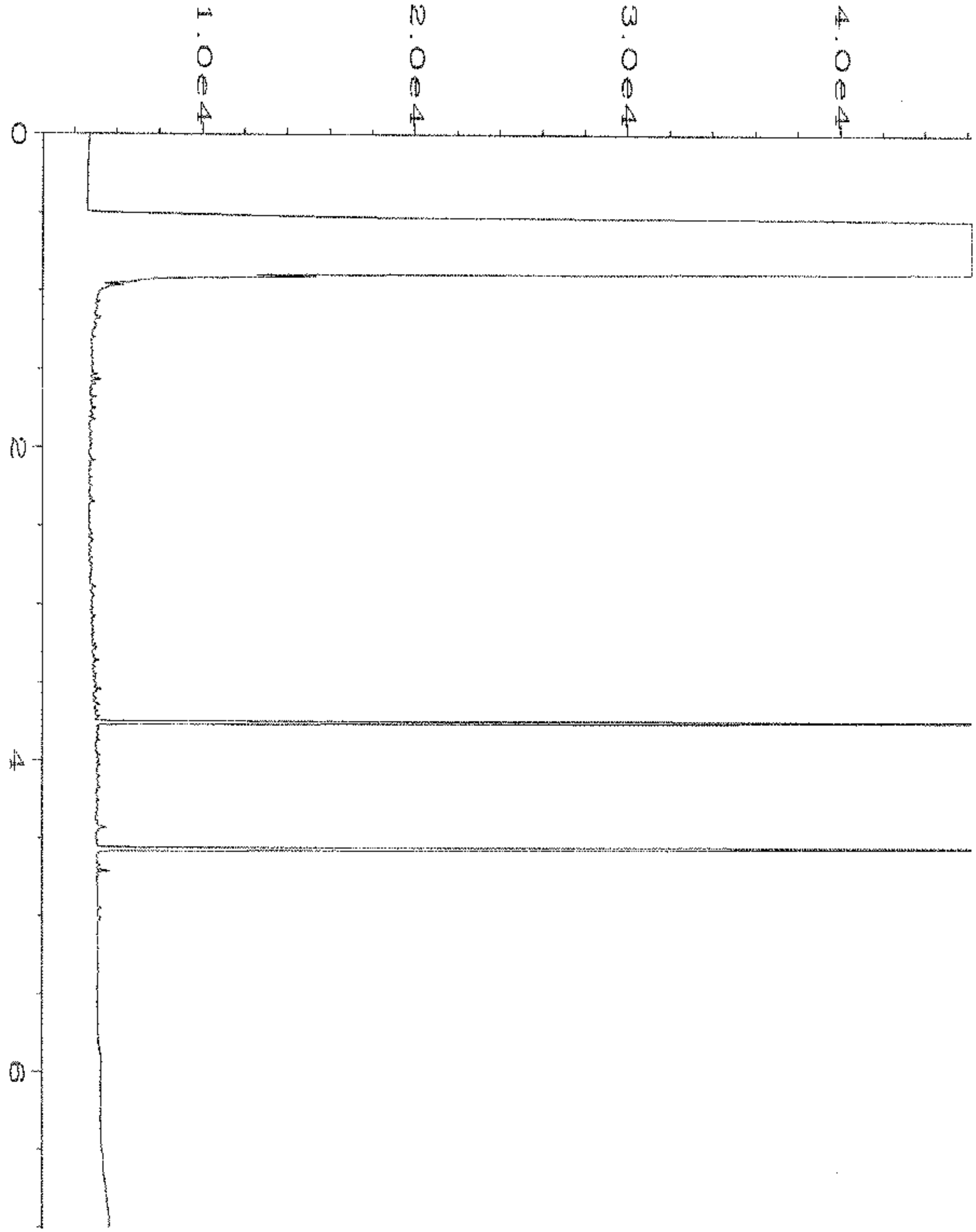


```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\063F0801.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC6                                 Vial Number       : 63
Sample Name       : 003244-45                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line     : 8
Acquired on       : 17 Mar 20   11:04 PM                Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:09 AM                 Analysis Method   : DEFAULT.MTH
```



Data File Name   : C:\HPCHEM\6\DATA\03-17-20\064F0801.D
Operator   : TL
Instrument   : GC6
Sample Name   : 003244-47
Run Time Bar Code:
Acquired on   : 17 Mar 20   11:15 PM
Report Created on: 18 Mar 20   11:09 AM

Page Number   : 1
Vial Number   : 64
Injection Number : 1
Sequence Line   : 8
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



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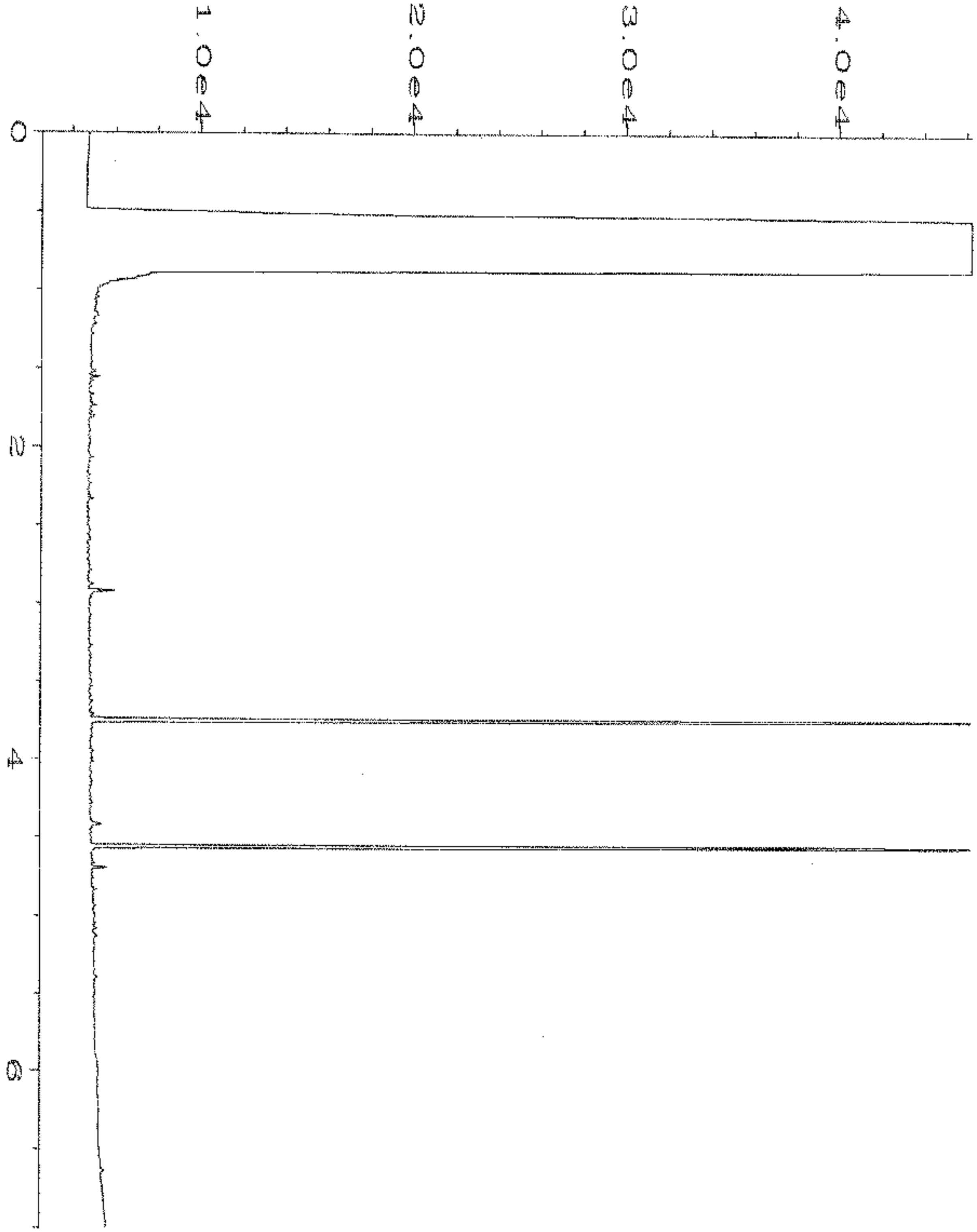
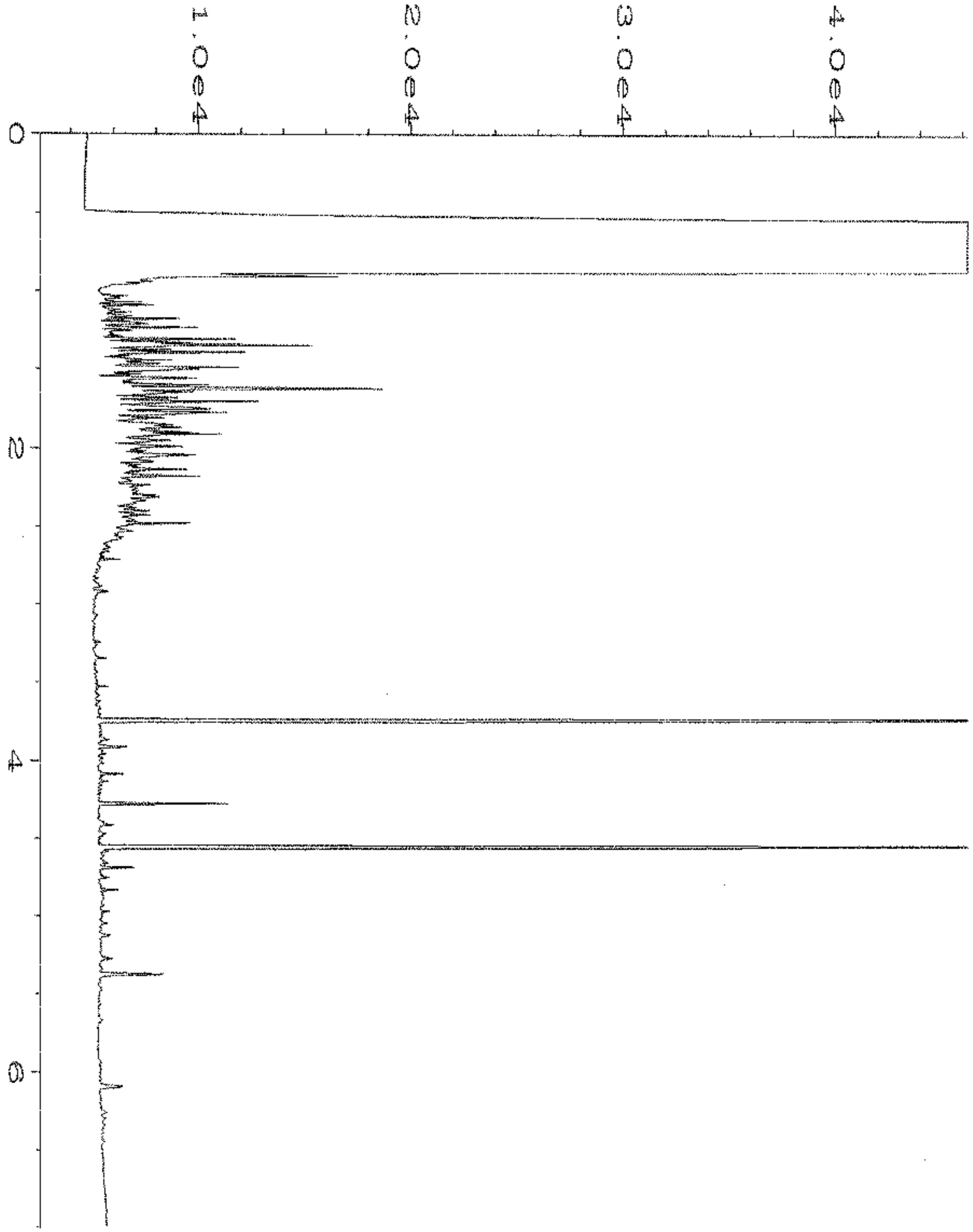
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\065F0801.D
Operator          : TL                            Page Number      : 1
Instrument        : GC6                           Vial Number      : 65
Sample Name       : 003244-48                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 8
Acquired on       : 17 Mar 20  11:26 PM           Instrument Method: DX.MTH
Report Created on: 18 Mar 20  11:10 AM            Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\067F0801.D
Operator          : TL                            Page Number       : 1
Instrument        : GC6                           Vial Number       : 67
Sample Name       : 003244-49                     Injection Number  : 1
Run Time Bar Code:                                Sequence Line     : 8
Acquired on       : 17 Mar 20  11:48 PM           Instrument Method: DX.MTH
Report Created on: 18 Mar 20  11:10 AM            Analysis Method   : DEFAULT.MTH
```



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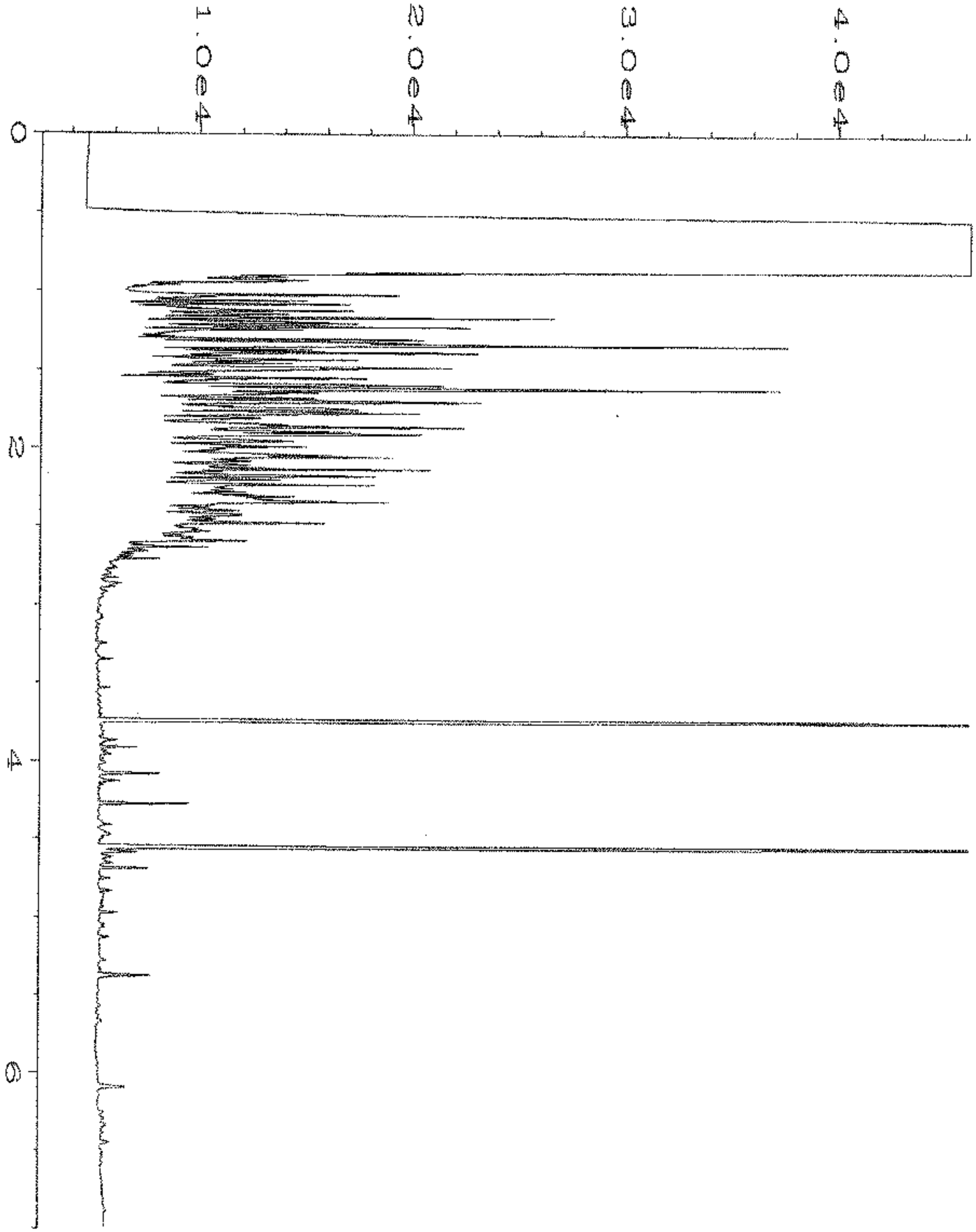
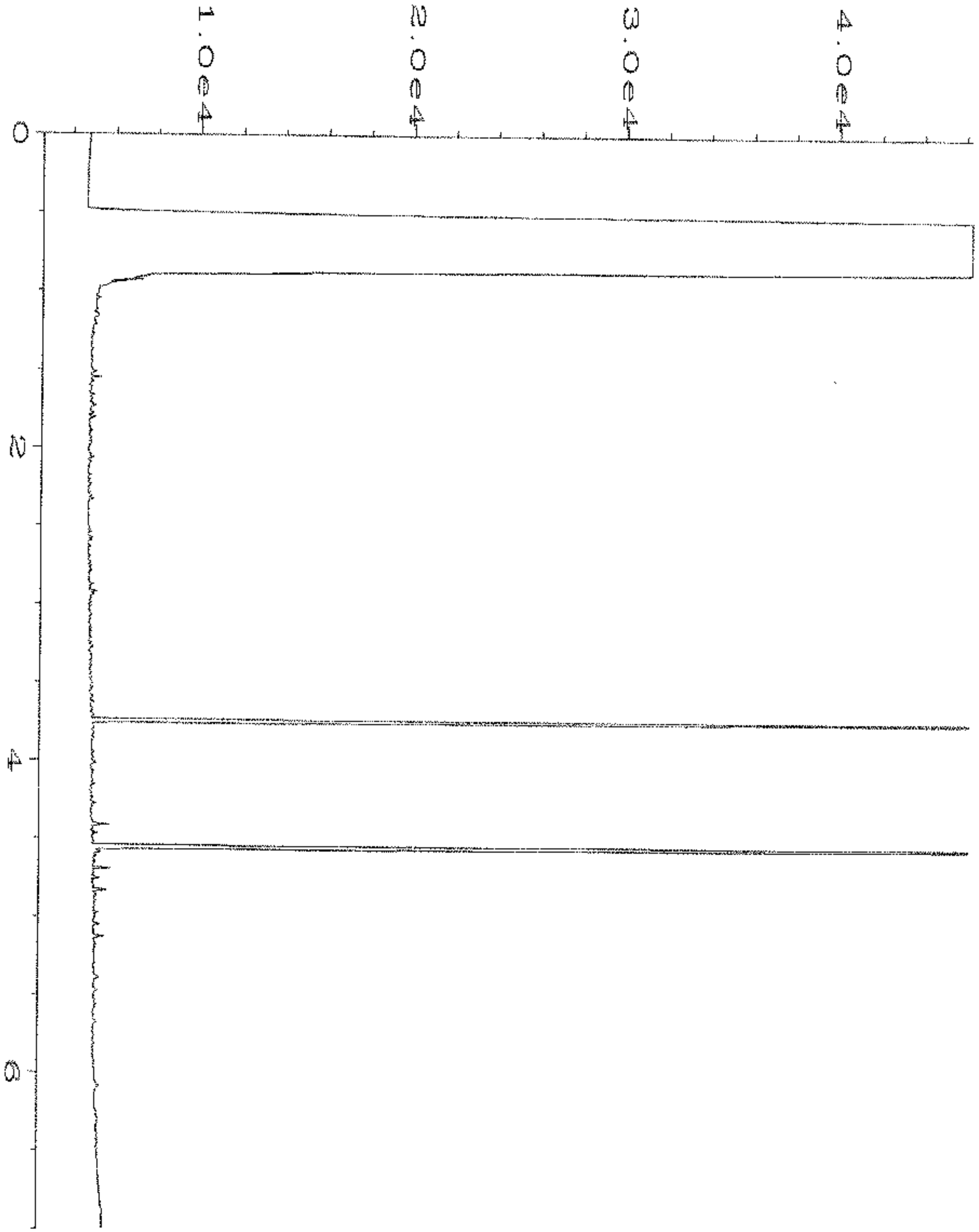
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\068F0801.D
Operator          : TL                              Page Number      : 1
Instrument        : GC6                             Vial Number      : 68
Sample Name       : 003244-50                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 8
Acquired on       : 17 Mar 20  11:59 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20  11:10 AM              Analysis Method  : DEFAULT.MTH
```



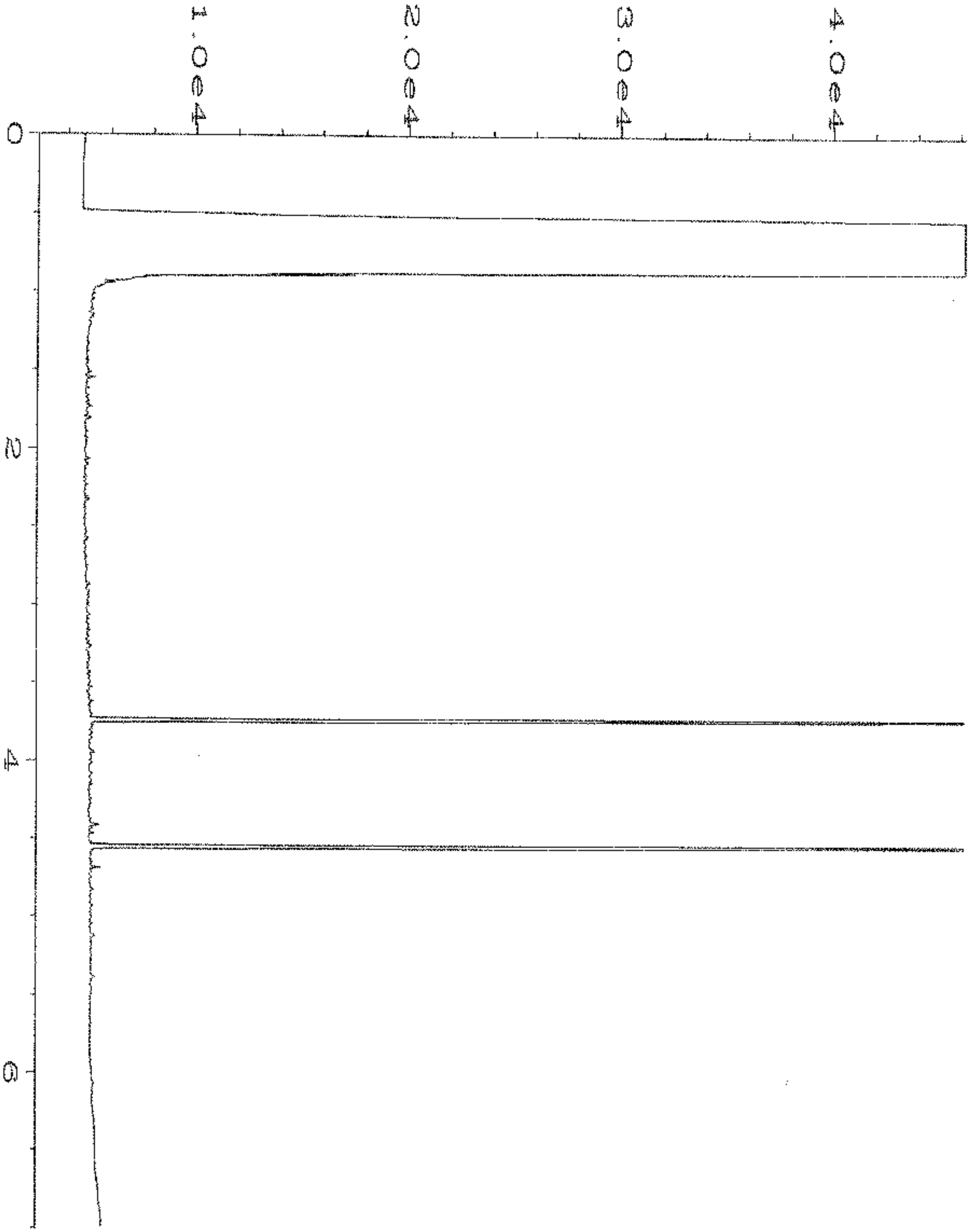
Data File Name   : C:\HPCHEM\6\DATA\03-17-20\069F0801.D
Operator   : TL
Instrument   : GC6
Sample Name   : 003244-51
Run Time Bar Code:
Acquired on   : 18 Mar 20   00:10 AM
Report Created on: 18 Mar 20   11:10 AM

Page Number   : 1
Vial Number   : 69
Injection Number : 1
Sequence Line   : 8
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH

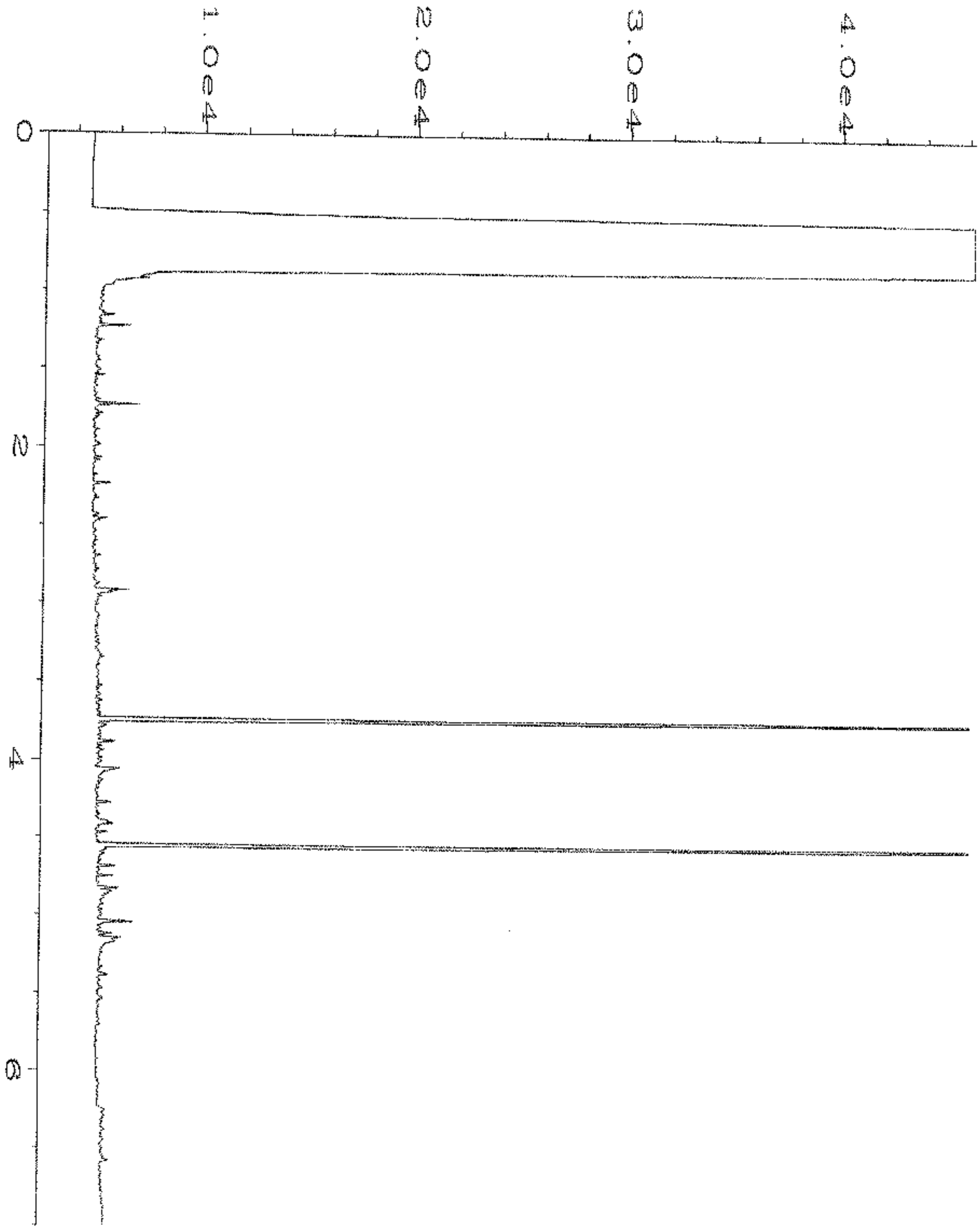


Data File Name : C:\HPCHEM\6\DATA\03-17-20\070F0801.D
Operator : TL
Instrument : GC6
Sample Name : 003244-52
Run Time Bar Code:
Acquired on : 18 Mar 20 00:21 AM
Report Created on: 18 Mar 20 11:10 AM

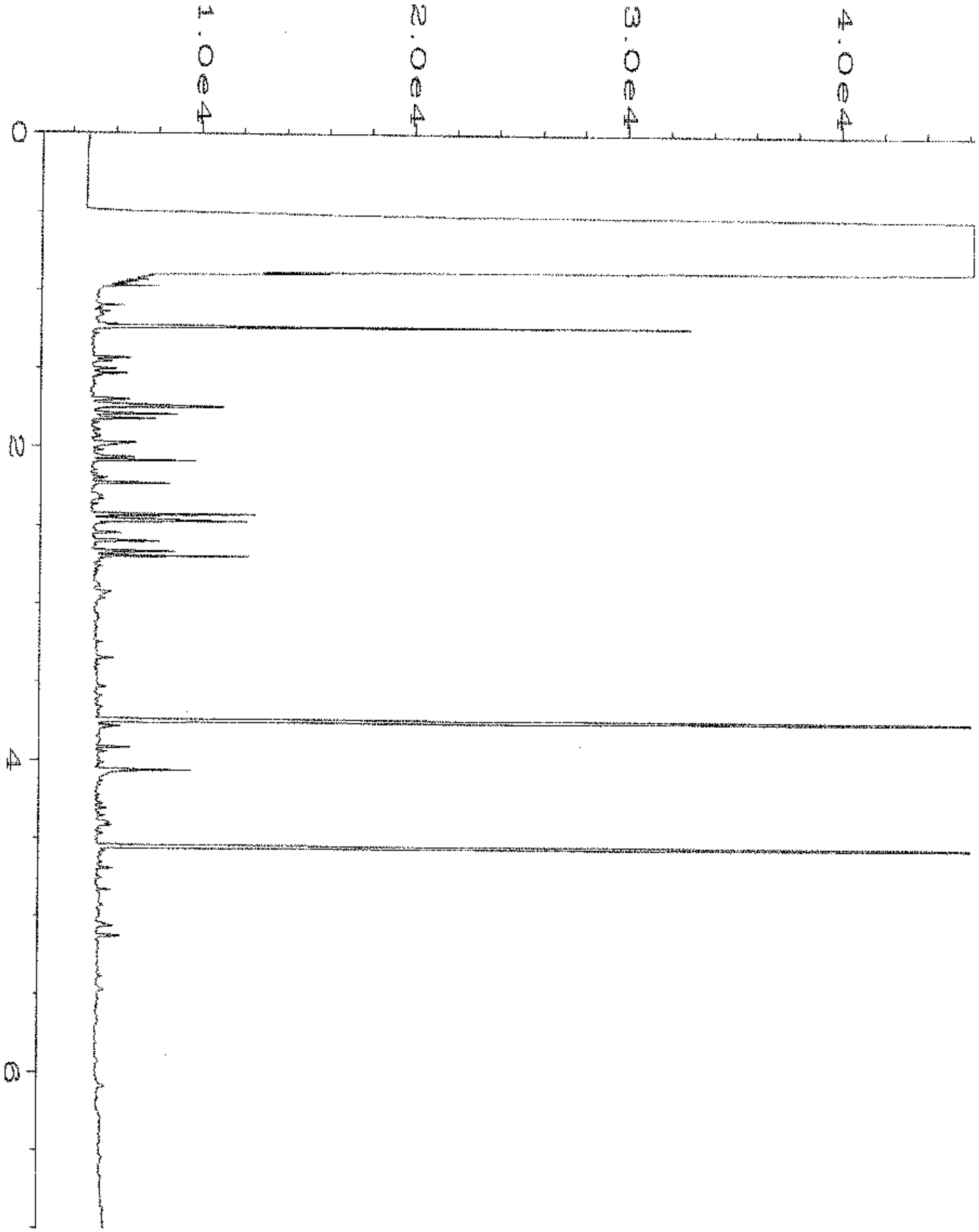
Page Number : 1
Vial Number : 70
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



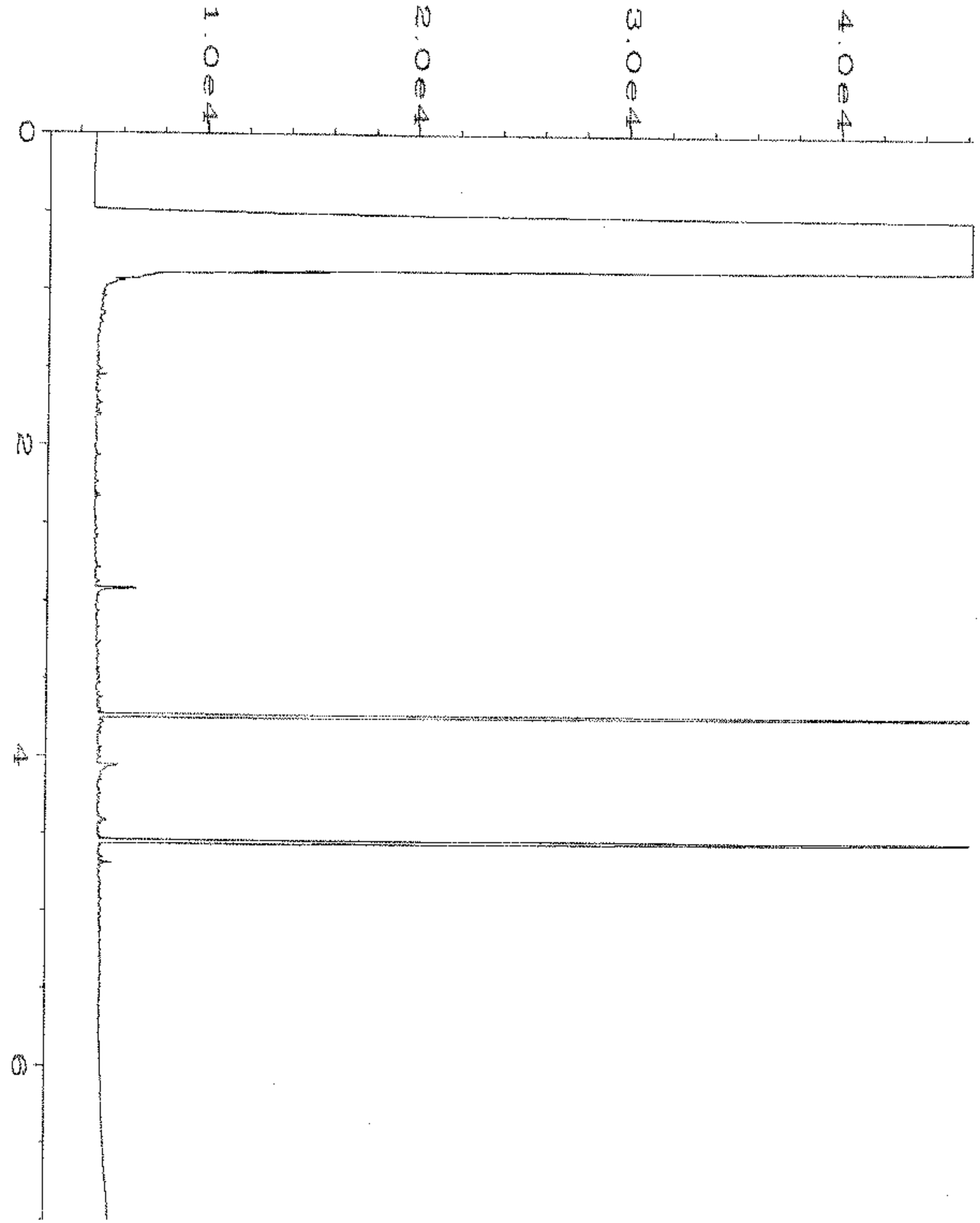
```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\071F0801.D
Operator          : TL                           Page Number      : 1
Instrument        : GC6                          Vial Number      : 71
Sample Name       : 003244-54                    Injection Number : 1
Run Time Bar Code:                               Sequence Line    : 8
Acquired on       : 18 Mar 20   00:31 AM         Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:10 AM          Analysis Method  : DEFAULT.MTH
```



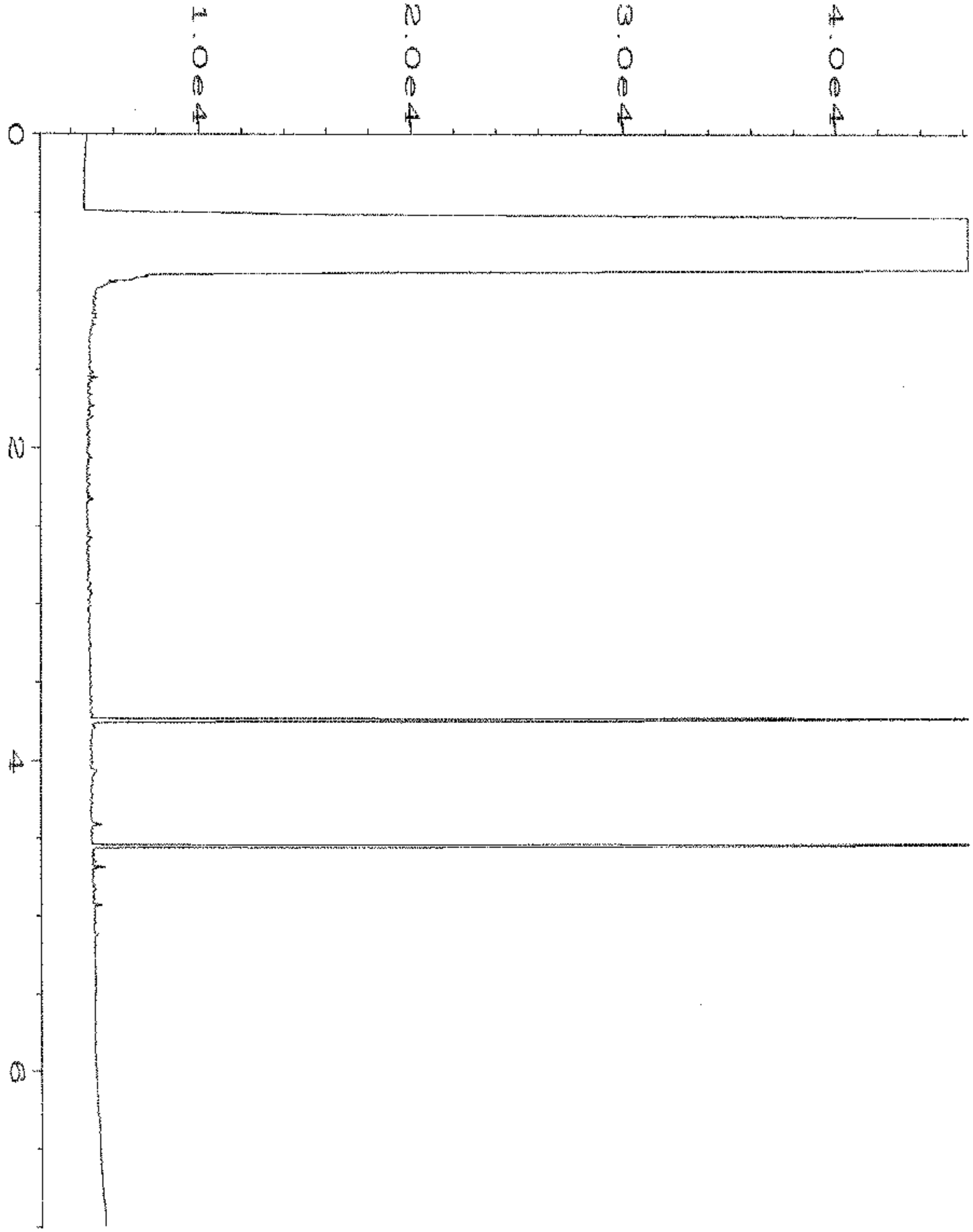
```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\072F0801.D
Operator          : TL
Instrument        : GC6                                  Page Number        : 1
Sample Name       : 003244-56                            Vial Number        : 72
Run Time Bar Code:                                       Injection Number : 1
                                                         Sequence Line      : 8
Acquired on       : 18 Mar 20   00:42 AM                 Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:10 AM                  Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\073F0801.D
Operator          : TL                                Page Number       : 1
Instrument        : GC6                               Vial Number       : 73
Sample Name       : 003244-57                         Injection Number  : 1
Run Time Bar Code:                                    Sequence Line     : 8
Acquired on       : 18 Mar 20  00:53 AM               Instrument Method: DX.MTH
Report Created on: 18 Mar 20  11:10 AM                Analysis Method   : DEFAULT.MTH
```

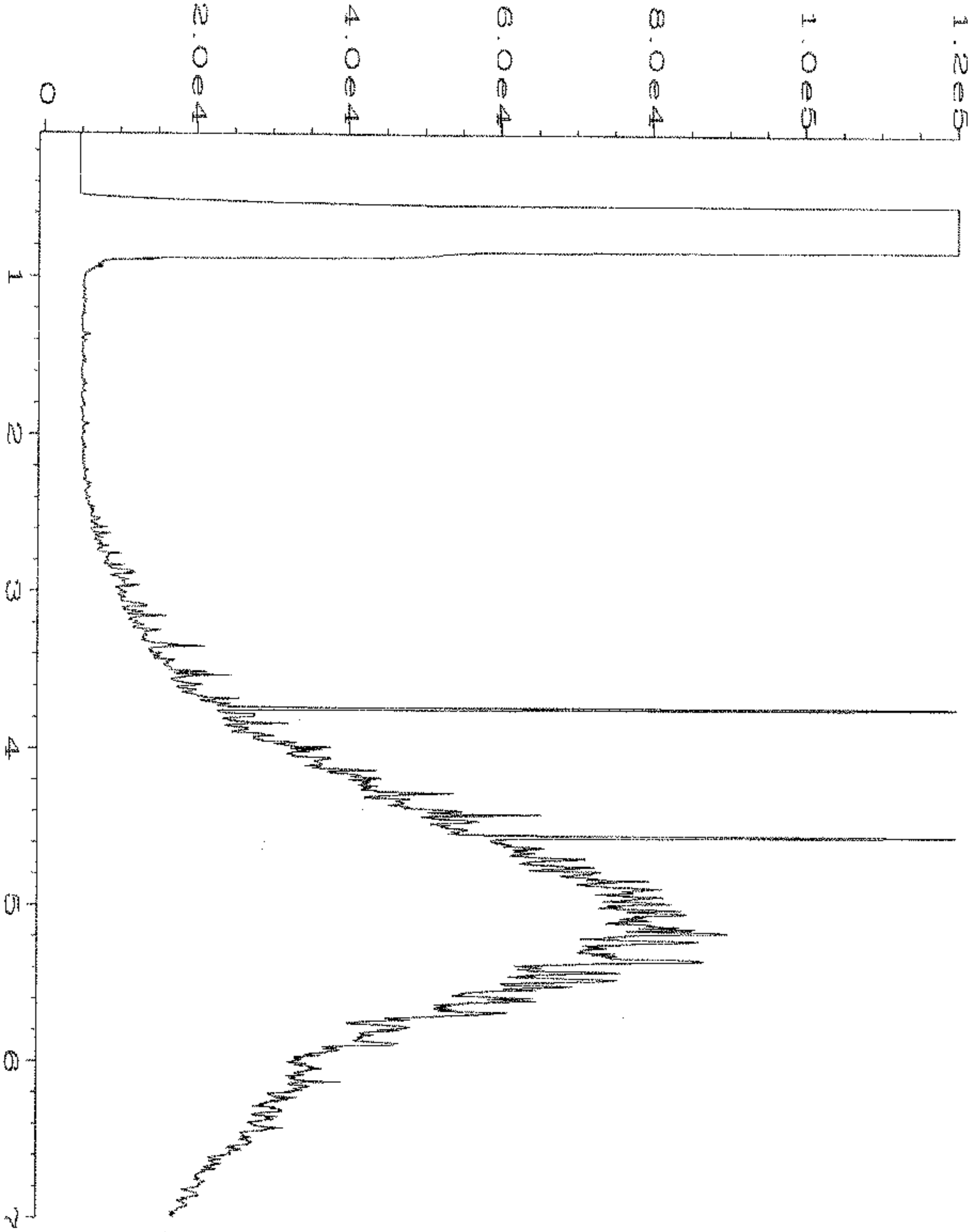


```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\074F0801.D
Operator          : TL                                      Page Number       : 1
Instrument        : GC6                                     Vial Number       : 74
Sample Name       : 003244-60                               Injection Number  : 1
Run Time Bar Code:                                          Sequence Line     : 8
Acquired on       : 18 Mar 20   01:04 AM                    Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:11 AM                     Analysis Method   : DEFAULT.MTH
```



Data File Name   : C:\HPCHEM\6\DATA\03-17-20\075F0801.D
Operator   : TL
Instrument   : GC6
Sample Name   : 003244-61
Run Time Bar Code:
Acquired on   : 18 Mar 20 01:15 AM
Report Created on: 18 Mar 20 11:11 AM

Page Number   : 1
Vial Number   : 75
Injection Number : 1
Sequence Line   : 8
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



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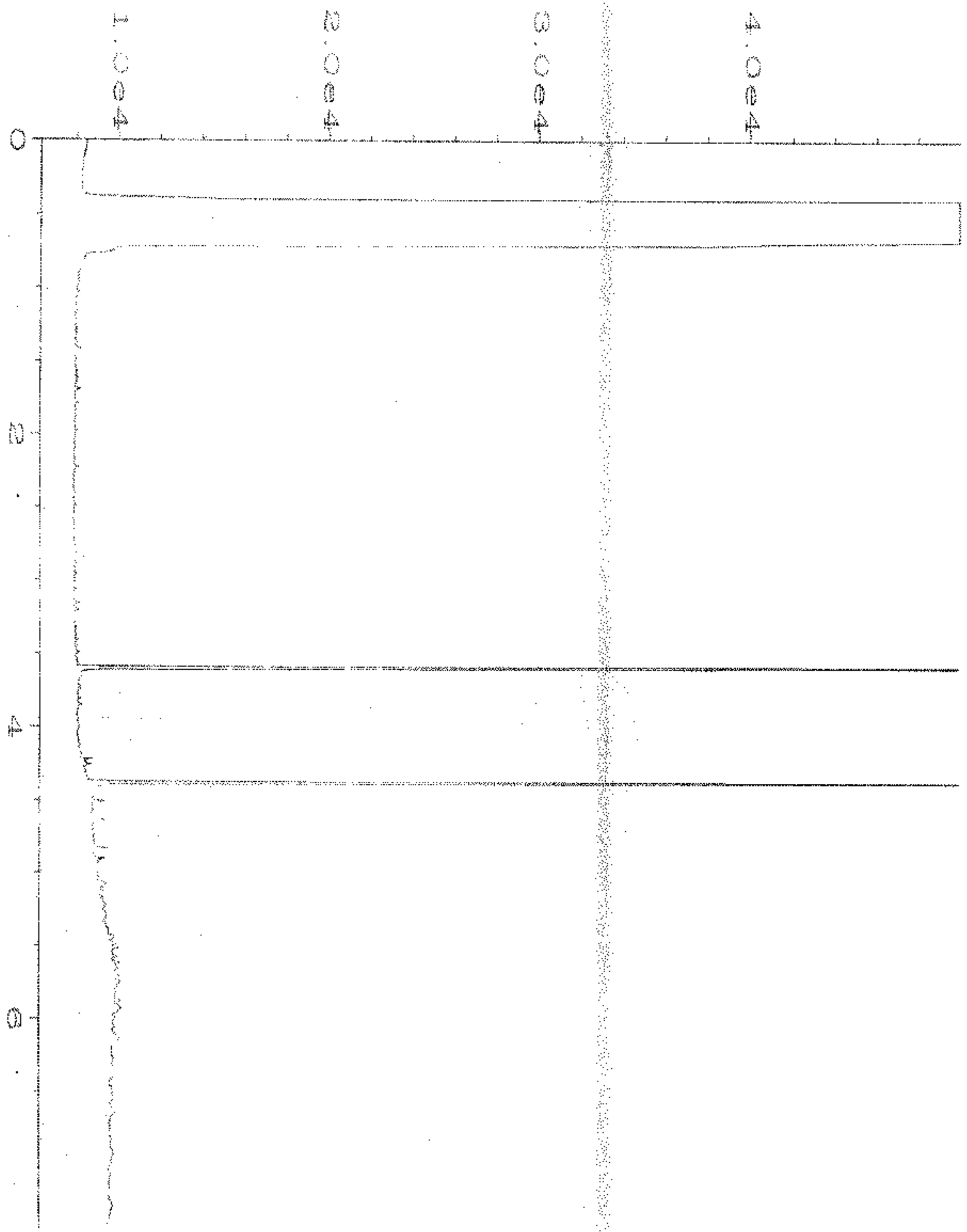
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\076F0801.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC6                                 Vial Number       : 76
Sample Name       : 003244-62                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 8
Acquired on       : 18 Mar 20   01:26 AM                Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:11 AM                 Analysis Method   : DEFAULT.MTH
```



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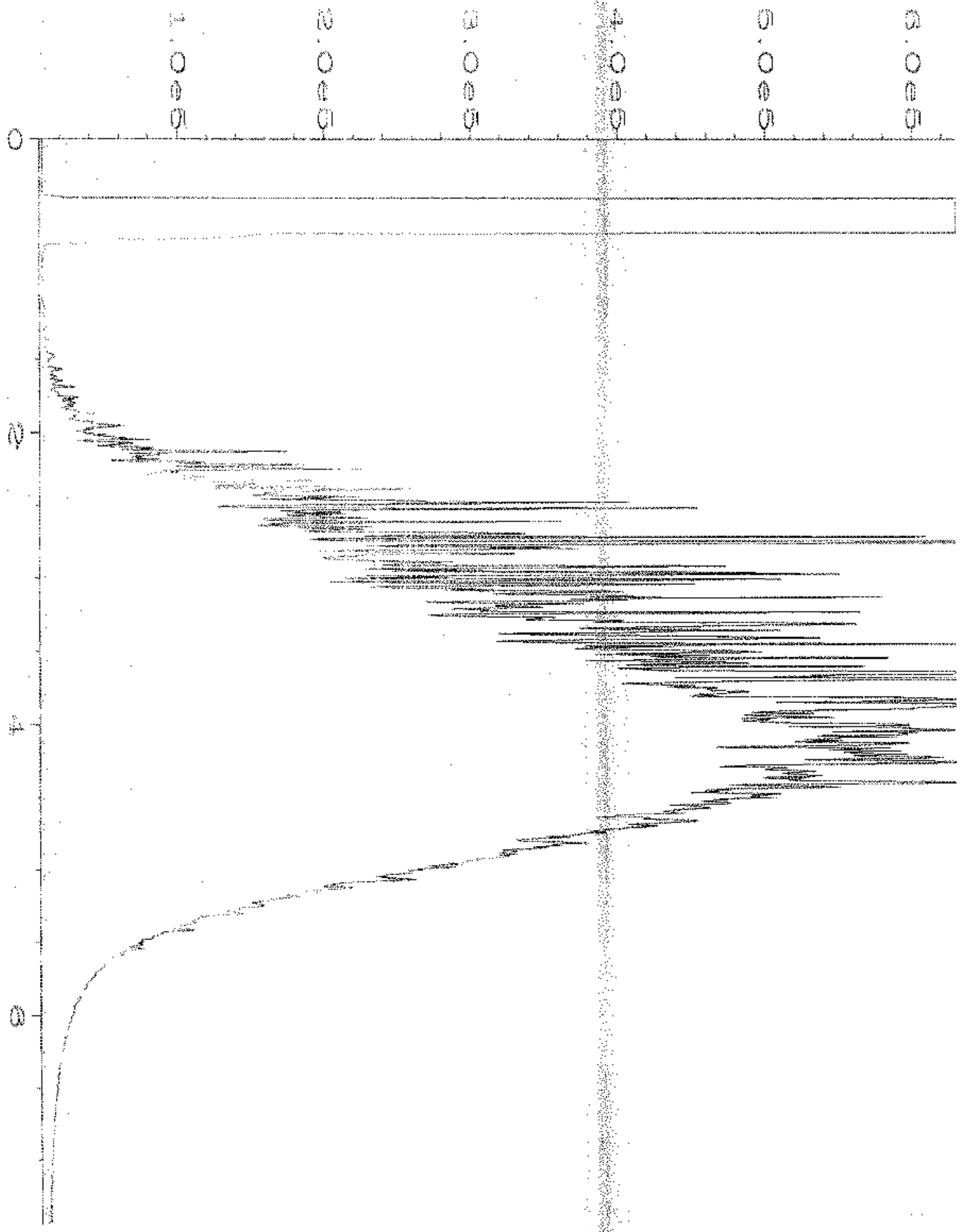
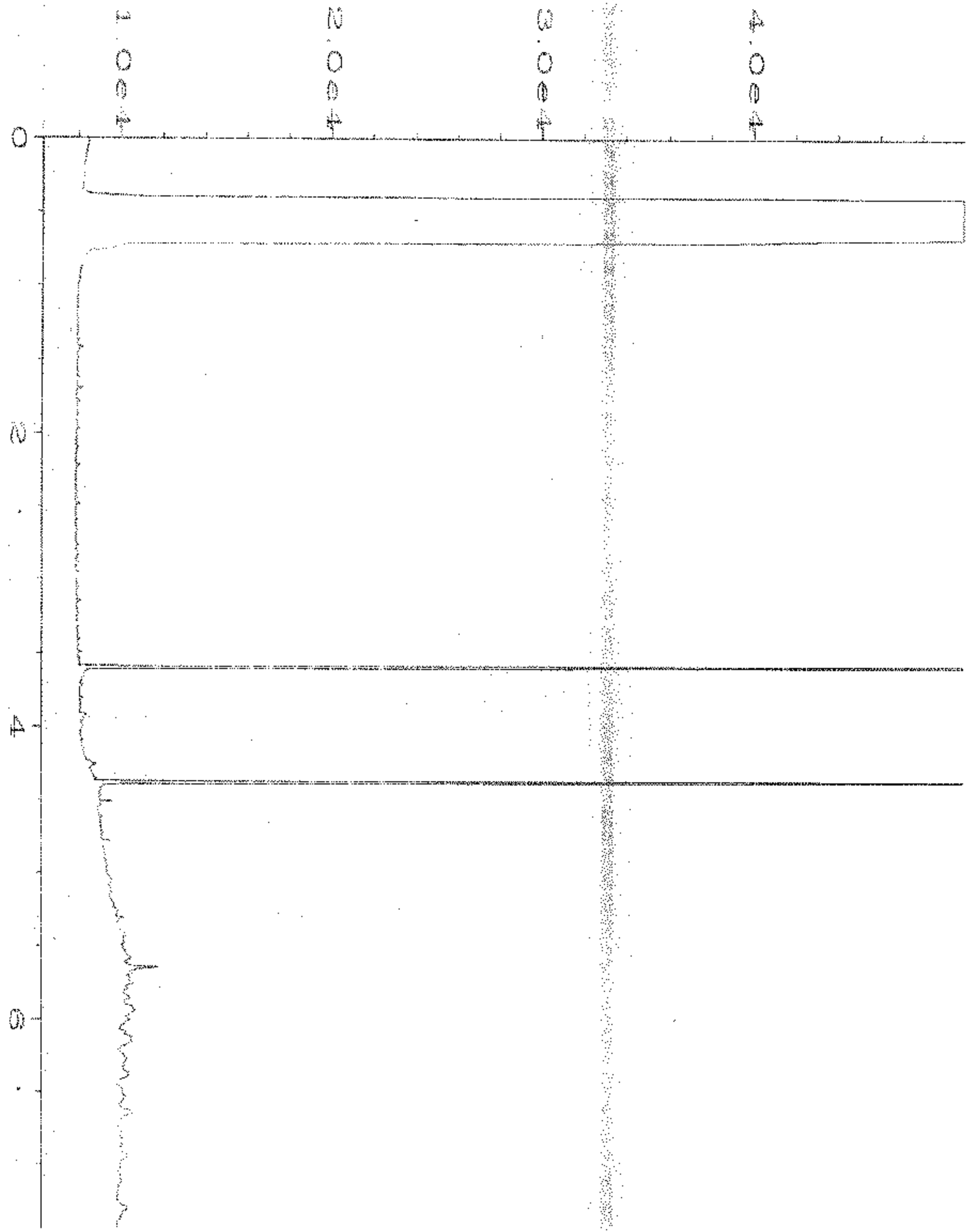
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\046F0801.D
Operator          : TL                             Page Number        : 1
Instrument        : GC1                            Vial Number        : 46
Sample Name       : 003244-65                      Injection Number   : 1
Run Time Bar Code:                                 Sequence Line      : 8
Acquired on       : 17 Mar 20   06:02 PM           Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:29 AM            Analysis Method   : DX.MTH
```

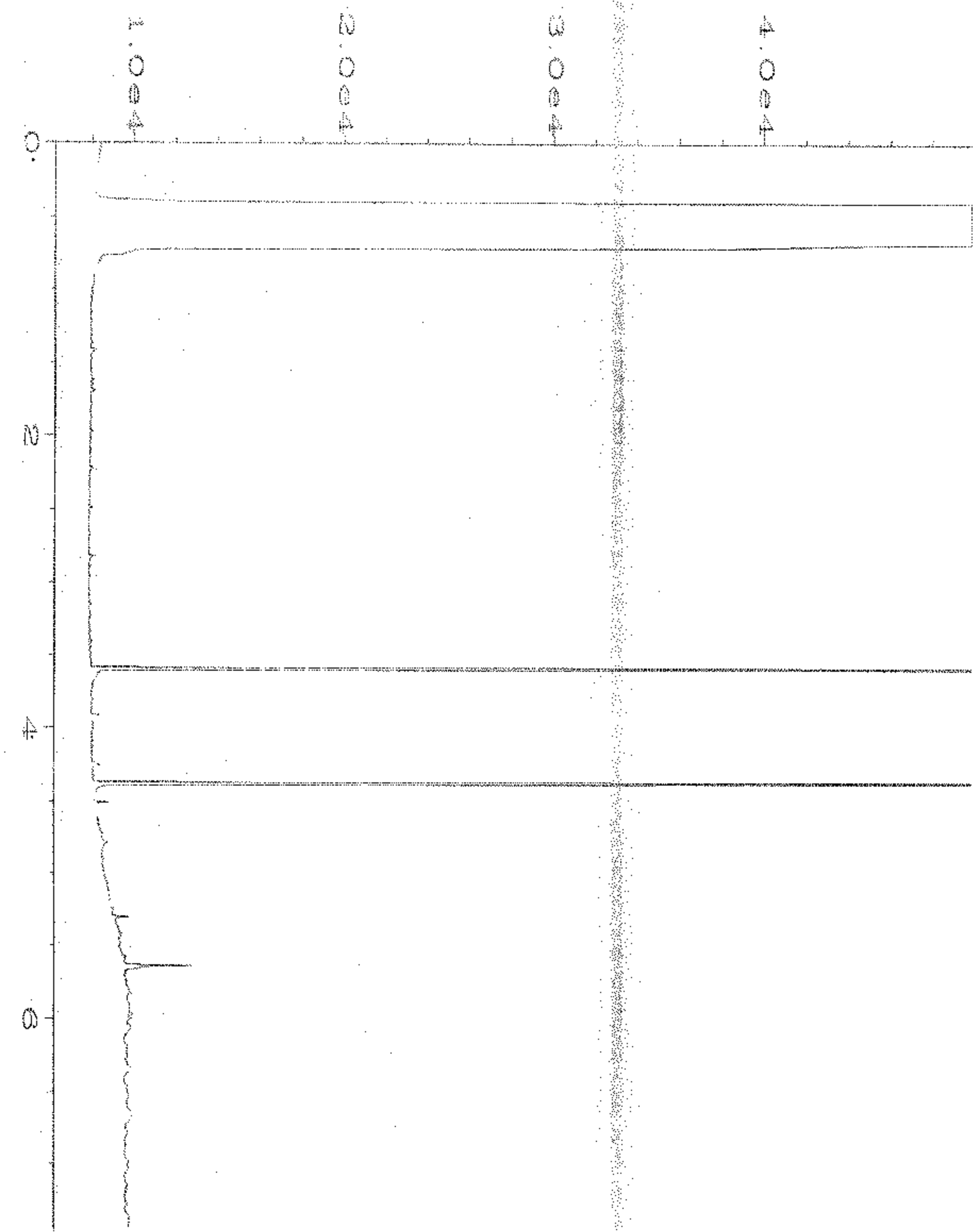


```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\047F0801.D
Operator          : TL                      Page Number        : 1
Instrument        : GC1                     Vial Number        : 47
Sample Name       : 003244-68               Injection Number   : 1
Run Time Bar Code:                          Sequence Line      : 8
Acquired on       : 17 Mar 20   06:13 PM    Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:29 AM     Analysis Method    : DX.MTH
```



Data File Name : C:\HPCHEM\1\DATA\03-17-20\048F0801.D
Operator : TL
Instrument : GC1
Sample Name : 003244-70
Run Time Bar Code:
Acquired on : 17 Mar 20 06:25 PM
Report Created on: 18 Mar 20 09:30 AM

Page Number : 1
Vial Number : 48
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DX.MTH



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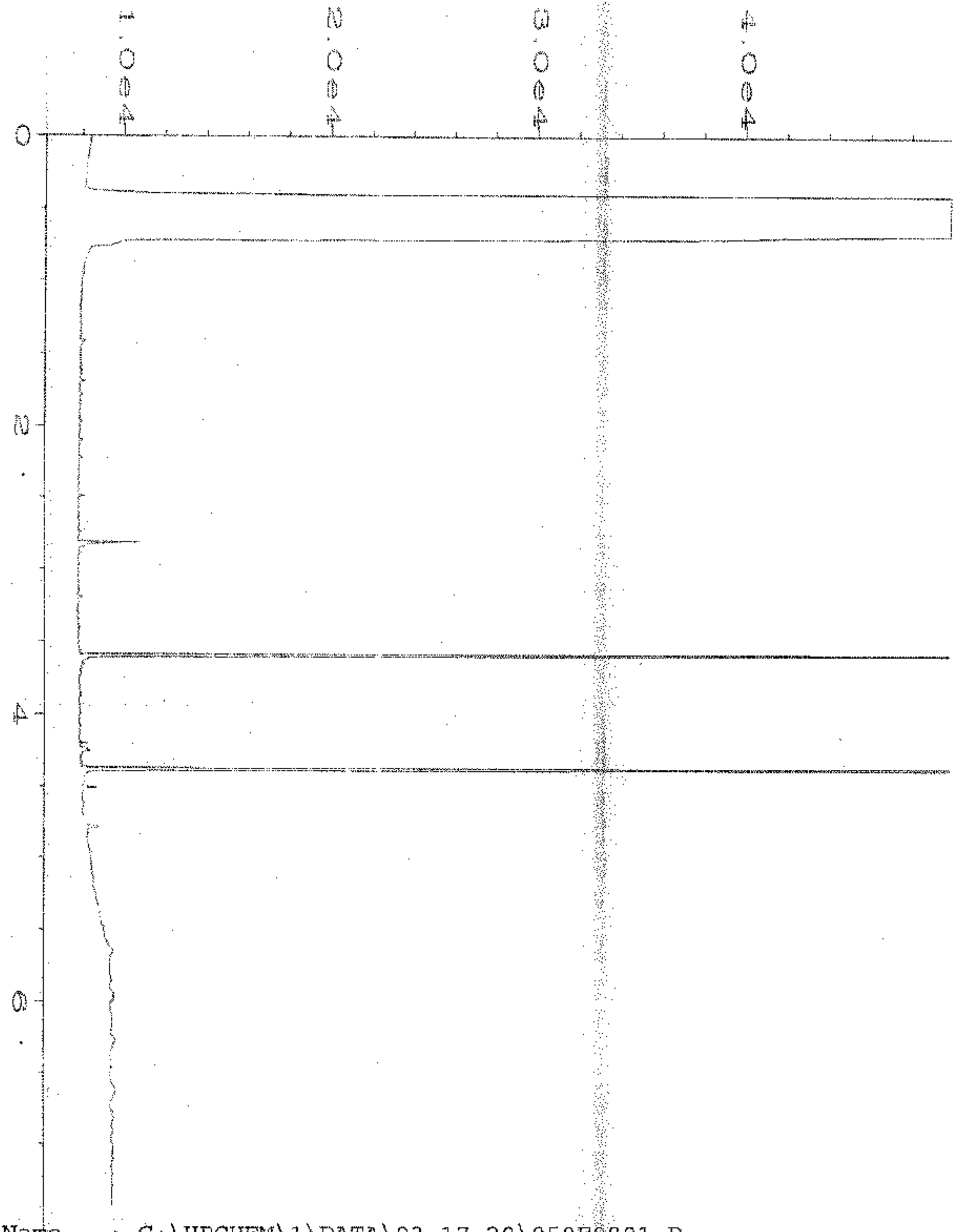
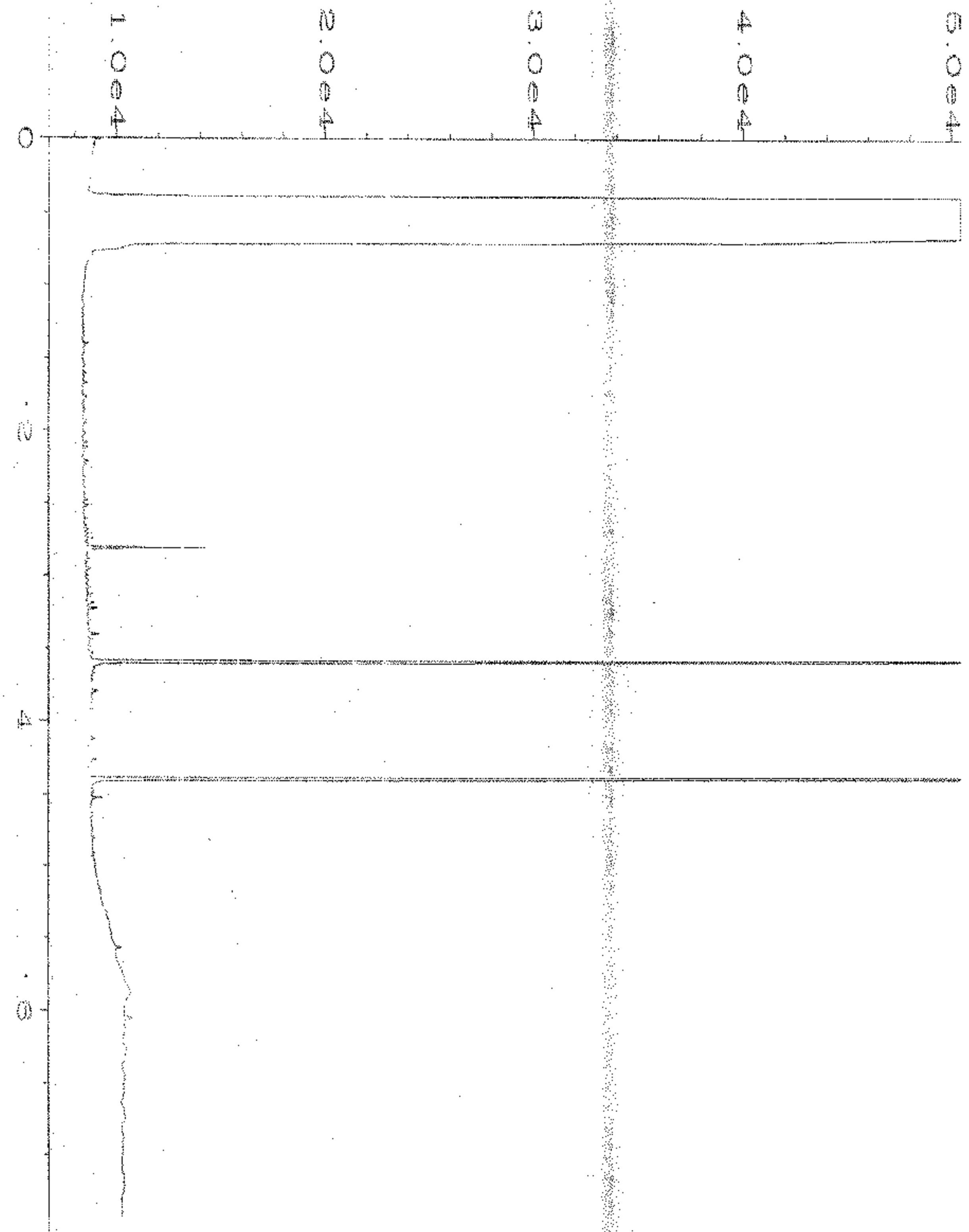
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\049F0801.D
Operator          : TL                               Page Number        : 1
Instrument        : GC1                              Vial Number        : 49
Sample Name       : 003244-71                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line      : 8
Acquired on       : 17 Mar 20   06:36 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:30 AM              Analysis Method    : DX.MTH
```

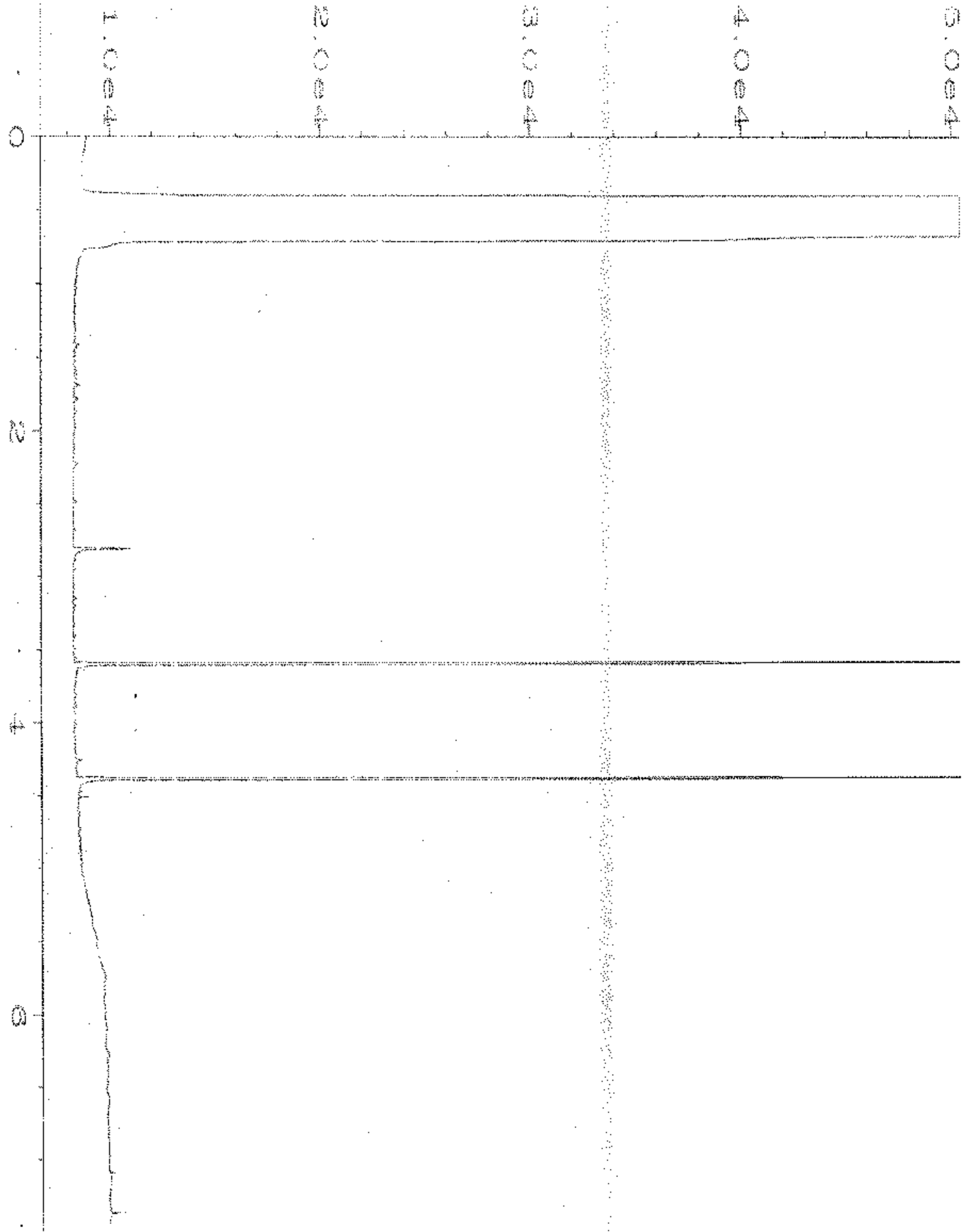


Data File Name   : C:\HPCHEM\1\DATA\03-17-20\050F0801.D
Operator   : TL   Page Number   : 1
Instrument   : GC1   Vial Number   : 50
Sample Name   : 003244-77   Injection Number : 1
Run Time Bar Code: Sequence Line   : 8
Acquired on   : 17 Mar 20   06:48 PM   Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:30 AM   Analysis Method   : DX.MTH

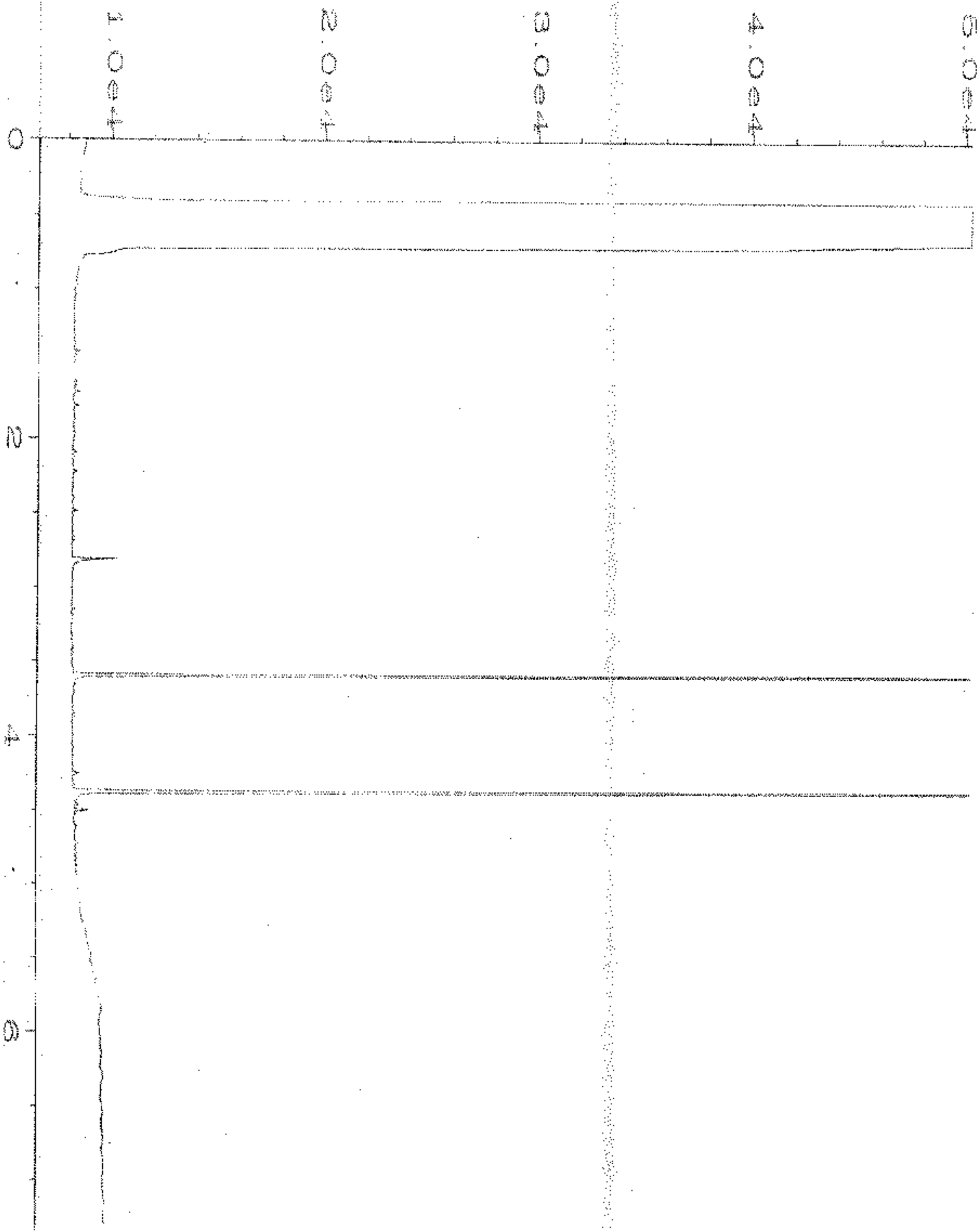


Data File Name   : C:\HPCHEM\1\DATA\03-17-20\051F0801.D
Operator   : TL
Instrument   : GC1
Sample Name   : 003244-78
Run Time Bar Code:
Acquired on   : 18 Mar 20   04:07 AM
Report Created on: 18 Mar 20   09:30 AM

Page Number   : 1
Vial Number   : 51
Injection Number : 1
Sequence Line   : 8
Instrument Method: DX.MTH
Analysis Method   : DX.MTH



```
Data File Name     : C:\HPCHEM\1\DATA\03-17-20\052F0801.D
Operator           : TL                                   Page Number       : 1
Instrument         : GC1                                  Vial Number       : 52
Sample Name        : 003244-81                            Injection Number  : 1
Run Time Bar Code:                                        Sequence Line     : 8
Acquired on        : 18 Mar 20   04:16 AM                 Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:30 AM                   Analysis Method   : DX.MTH
```



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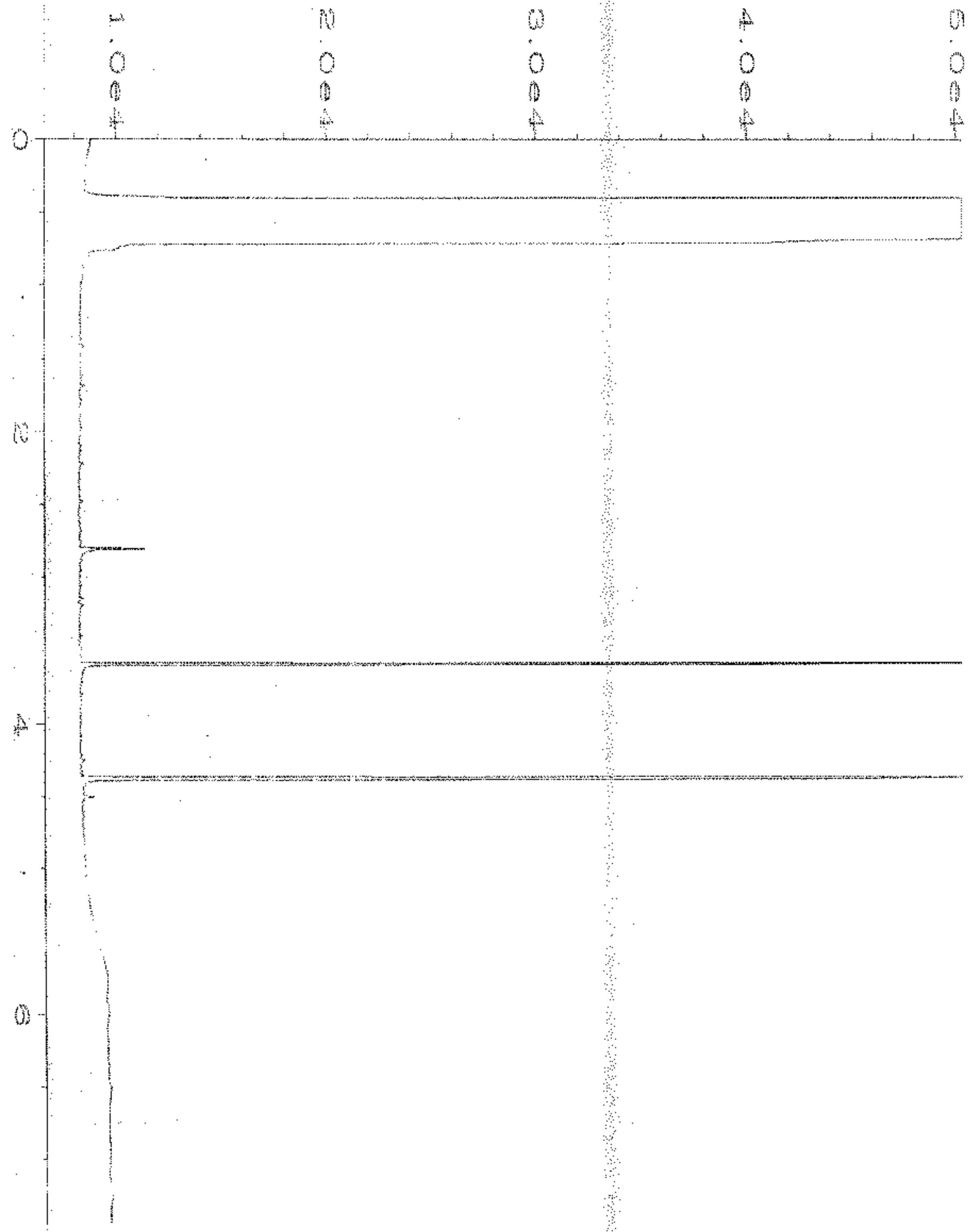
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\053F0801.D
Operator          : TL                           Page Number        : 1
Instrument        : GC1                          Vial Number        : 53
Sample Name       : 003244-82                    Injection Number   : 1
Run Time Bar Code:                               Sequence Line      : 8
Acquired on       : 18 Mar 20   04:27 AM         Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:30 AM          Analysis Method   : DX.MTH
```



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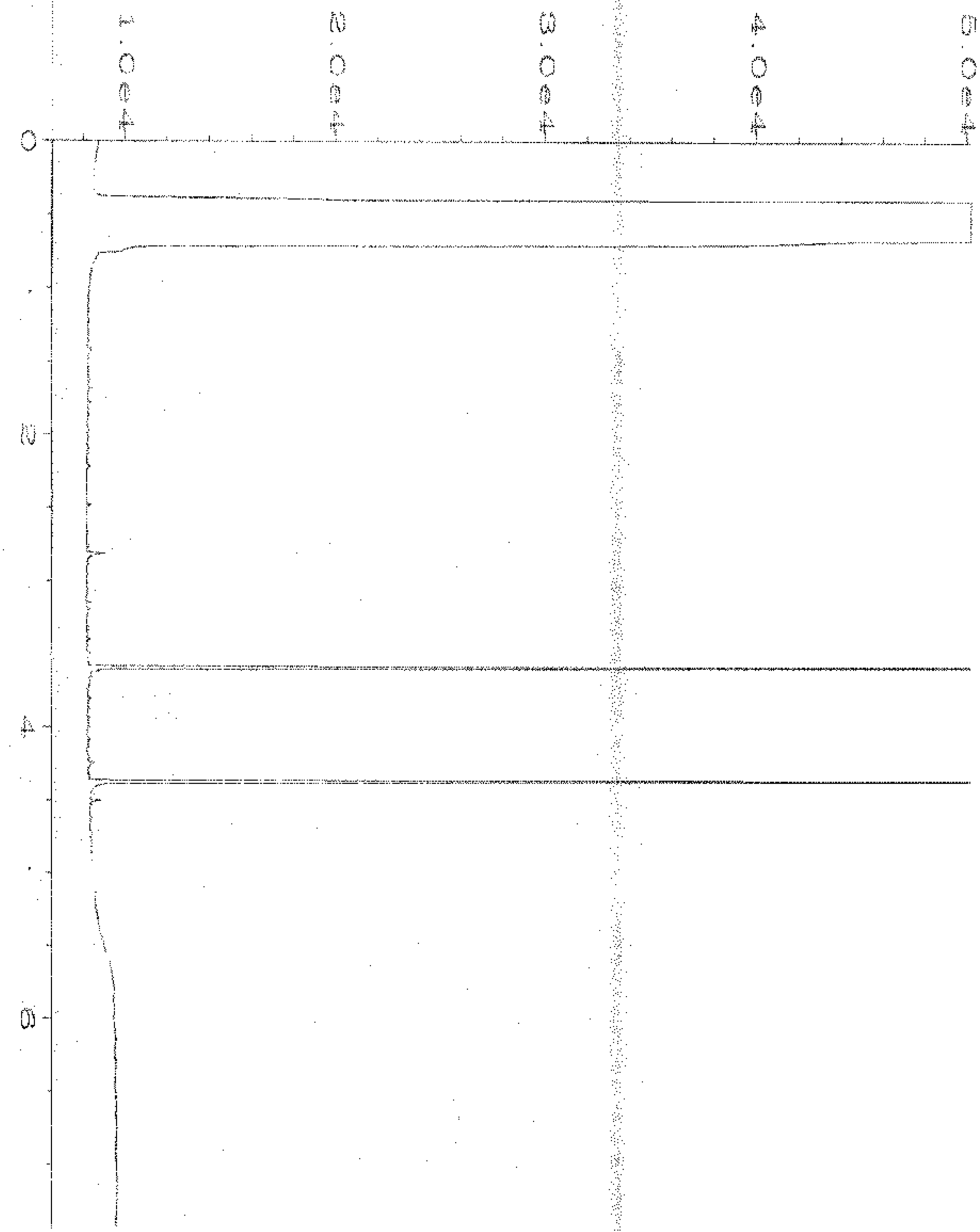
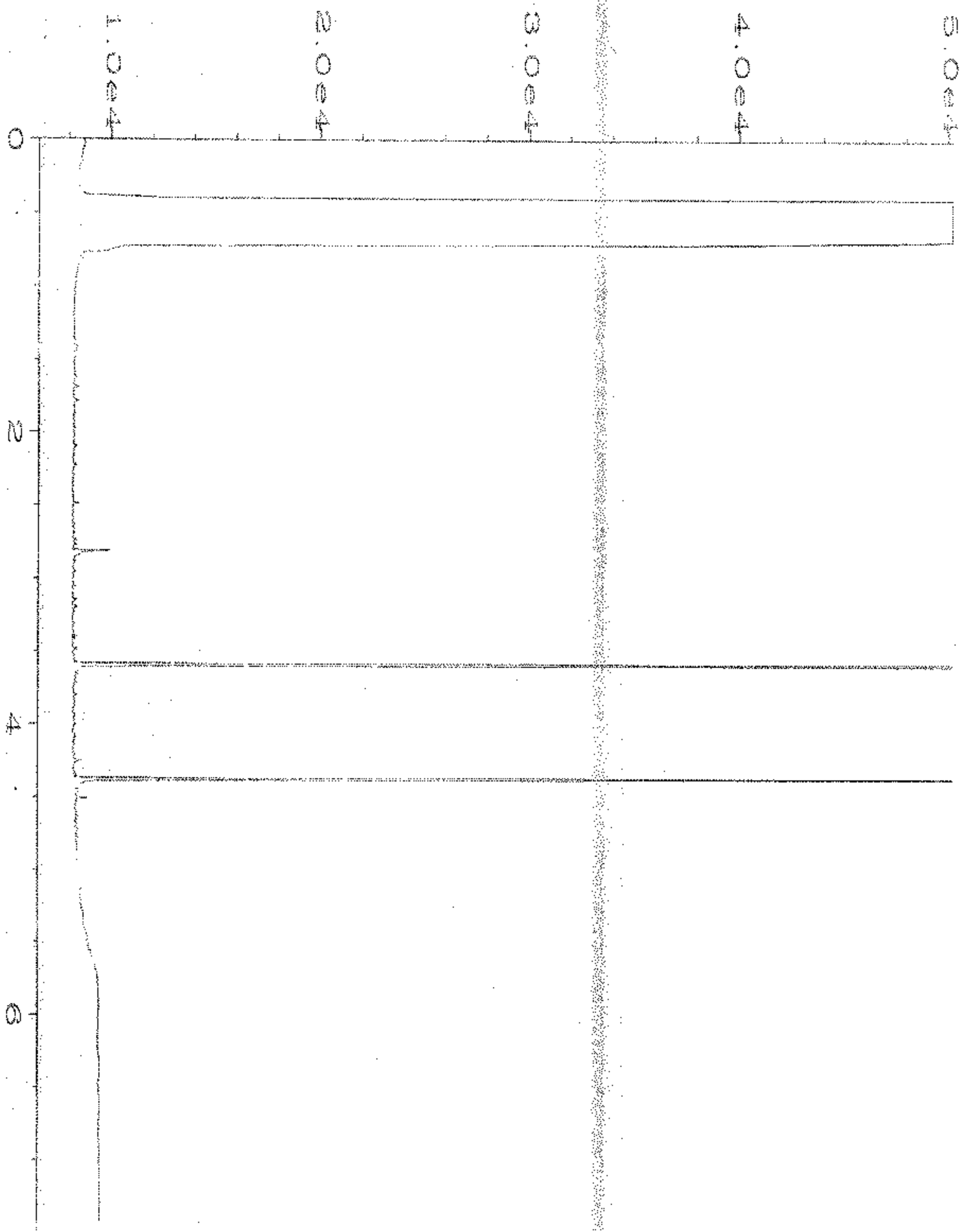
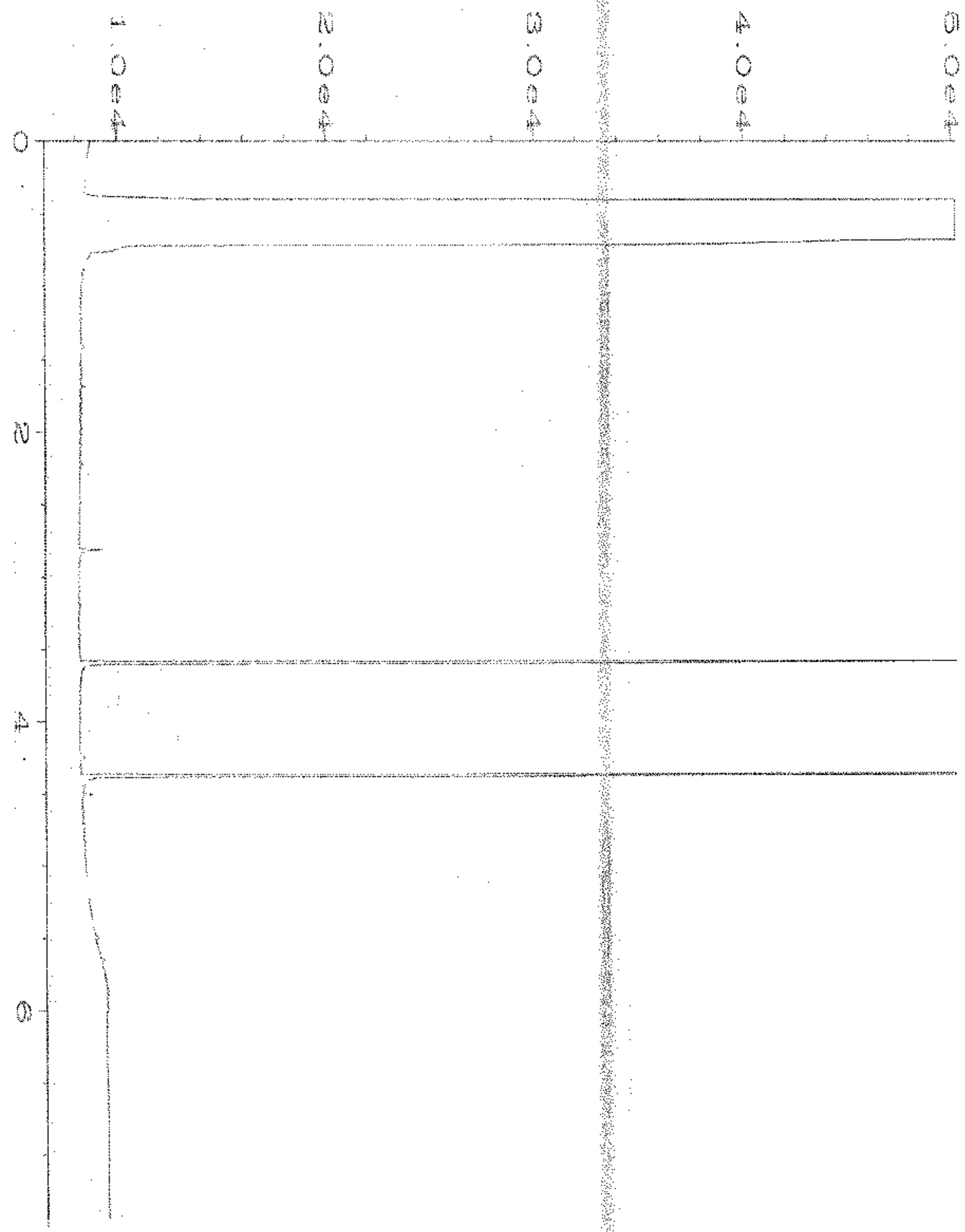
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\054F0801.D
Operator          : TL                          Page Number       : 1
Instrument        : GC1                         Vial Number       : 54
Sample Name       : 003244-84                   Injection Number  : 1
Run Time Bar Code:                              Sequence Line     : 8
Acquired on       : 18 Mar 20   04:39 AM        Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:30 AM         Analysis Method   : DX.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\055F0801.D
Operator          : TL                               Page Number       : 1
Instrument        : GC1                              Vial Number       : 55
Sample Name       : 003244-86                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 8
Acquired on       : 18 Mar 20   04:50 AM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:30 AM              Analysis Method   : DX.MTH
```

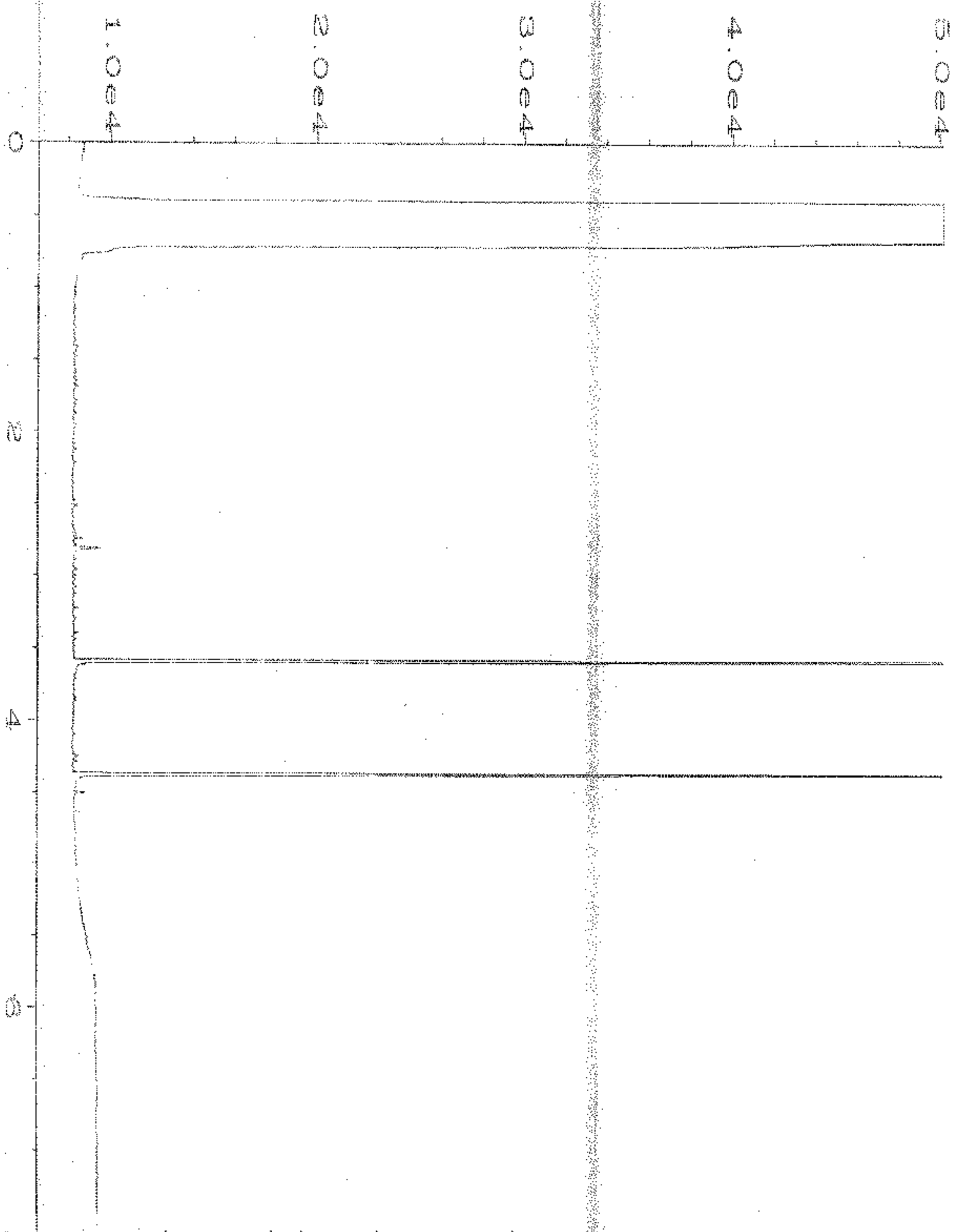


```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\057F0801.D
Operator          : TL                               Page Number       : 1
Instrument        : GC1                              Vial Number       : 57
Sample Name       : 003244-87                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 8
Acquired on       : 18 Mar 20   05:13 AM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:31 AM              Analysis Method   : DX.MTH
```

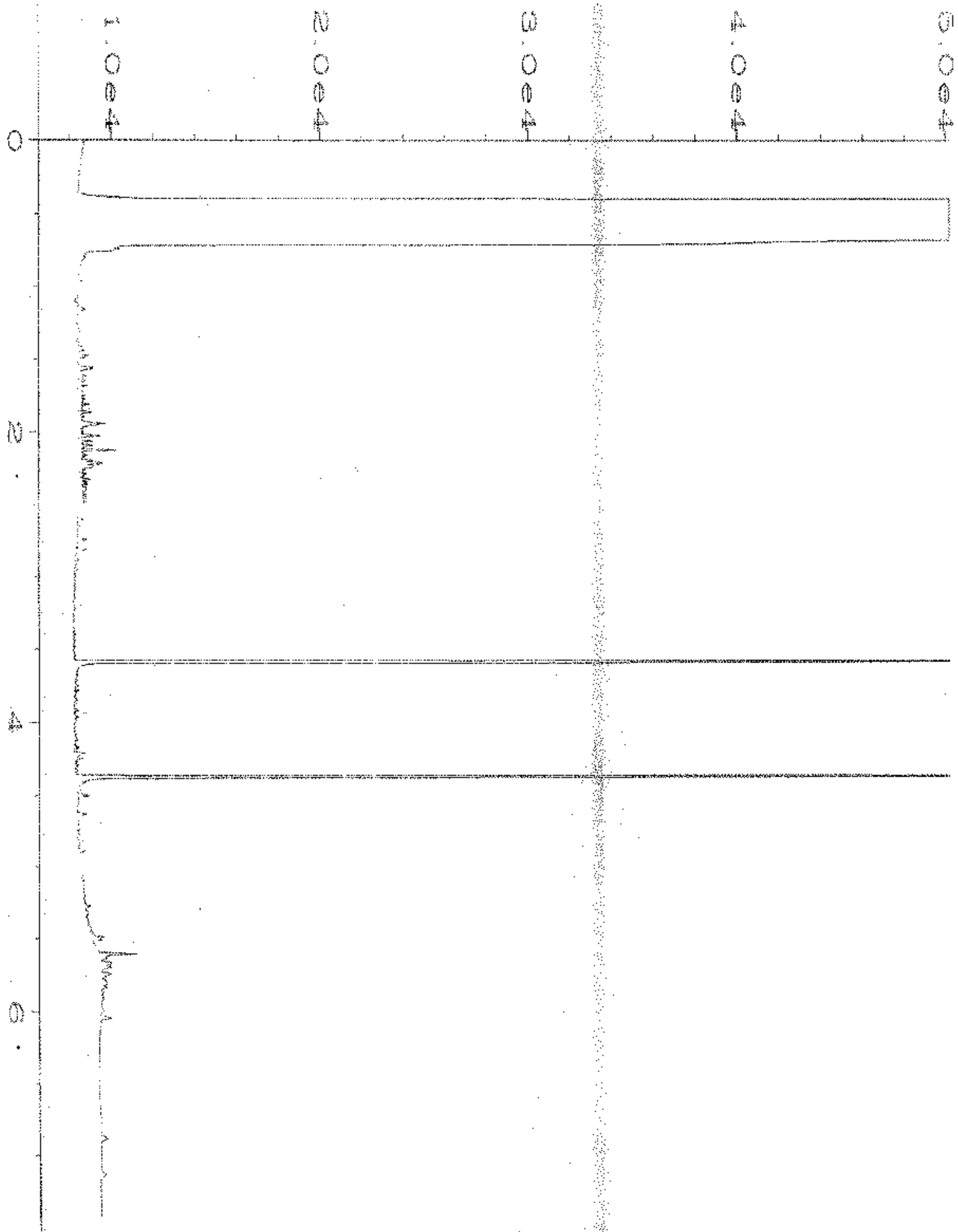


Data File Name   : C:\HPCHEM\1\DATA\03-17-20\058F0801.D
Operator   : TL
Instrument   : GC1
Sample Name.   : 003244-88
Run Time Bar Code:
Acquired on   : 18 Mar 20   05:24 AM
Report Created on: 18 Mar 20   09:31 AM

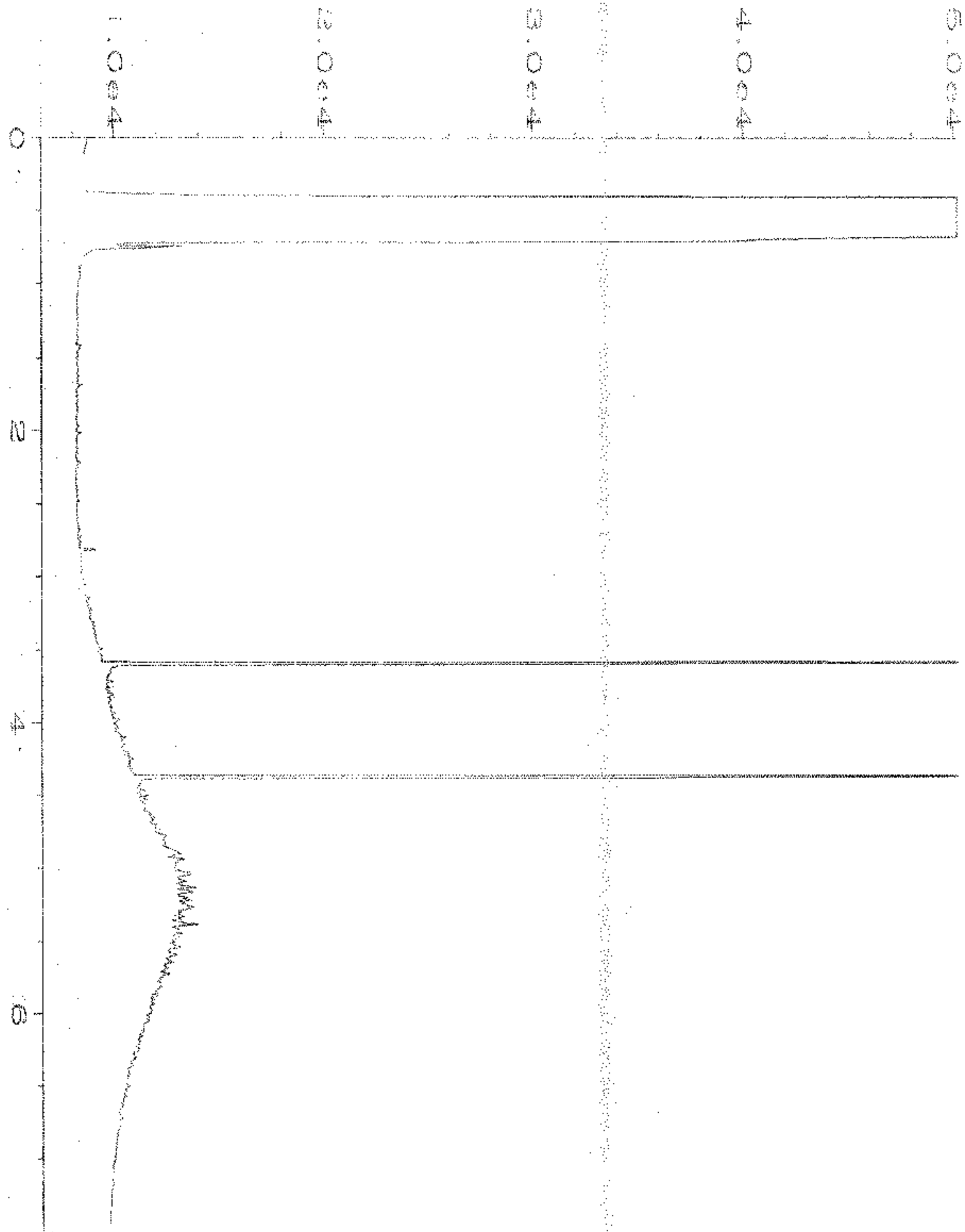
Page Number   : 1
Vial Number   : 58
Injection Number : 1
Sequence Line   : 8
Instrument Method: DX.MTH
Analysis Method   : DX.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\059F0801.D
Operator          : TL                          Page Number       : 1
Instrument        : GC1                         Vial Number       : 59
Sample Name       : 003244-91                   Injection Number : 1
Run Time Bar Code:                              Sequence Line     : 8
Acquired on       : 18 Mar 20  05:36 AM         Instrument Method: DX.MTH
Report Created on: 18 Mar 20  09:31 AM          Analysis Method  : DX.MTH
```

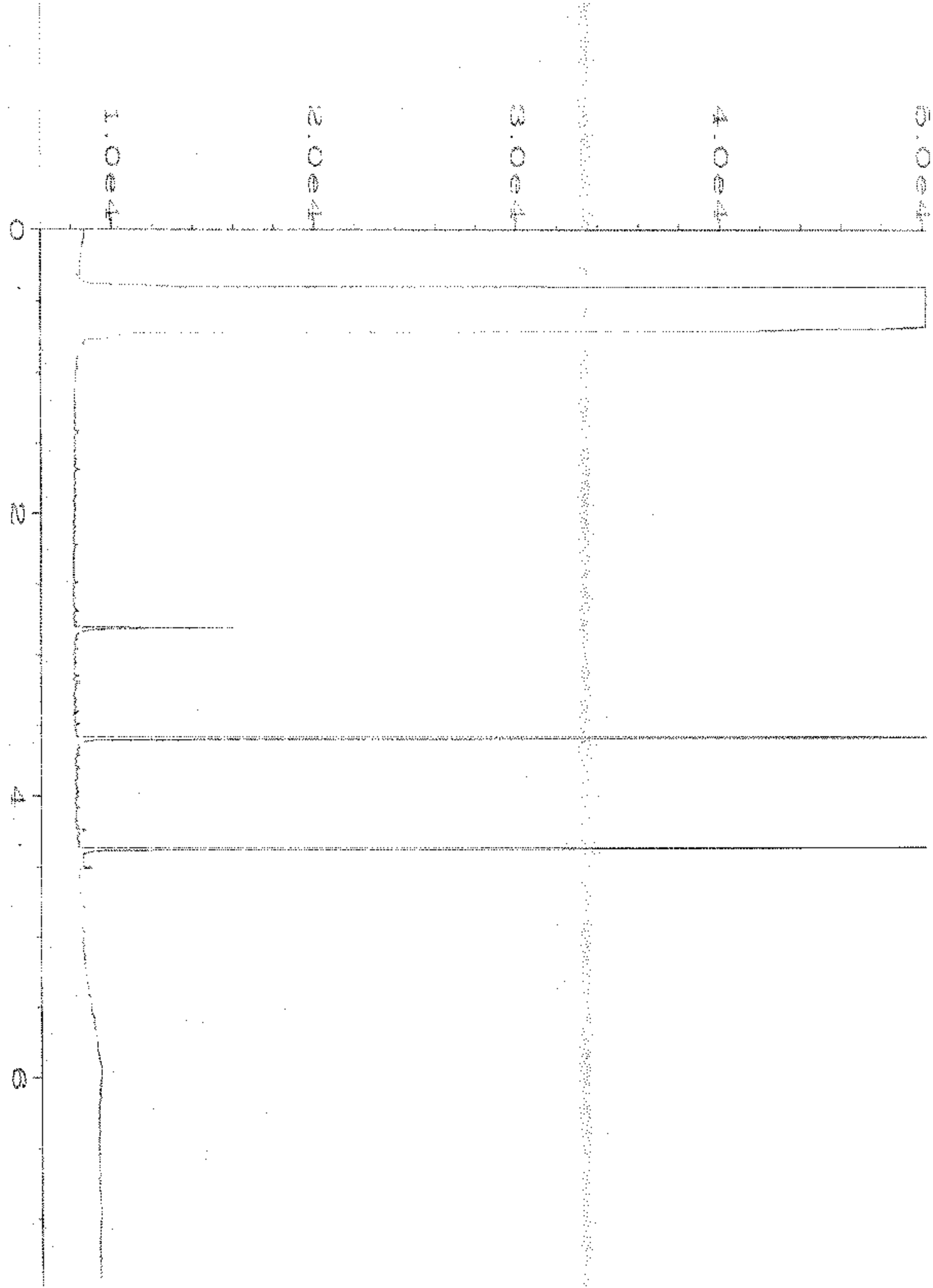


```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\060F0801.D
Operator          : TL                                   Page Number       : 1
Instrument        : GC1                                  Vial Number       : 60
Sample Name       : 003244-92                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line     : 8
Acquired on       : 18 Mar 20   05:47 AM                 Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:31 AM                  Analysis Method   : DX.MTH
```



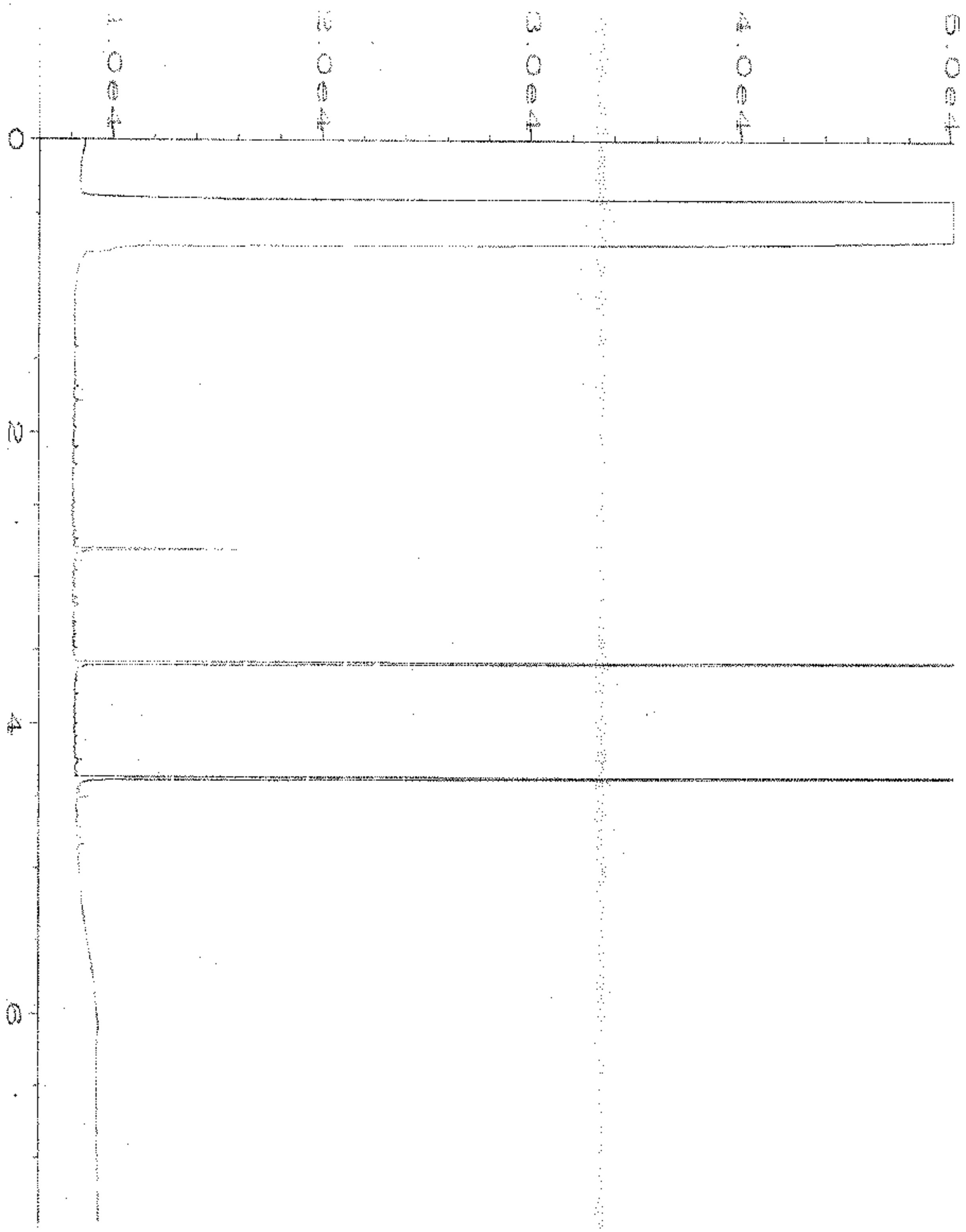
Data File Name : C:\HPCHEM\1\DATA\03-17-20\061F0801.D
Operator : TL
Instrument : GC1
Sample Name : 003244-94
Run Time Bar Code:
Acquired on : 18 Mar 20 05:58 AM
Report Created on: 18 Mar 20 09:31 AM

Page Number : 1
Vial Number : 61
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DX.MTH

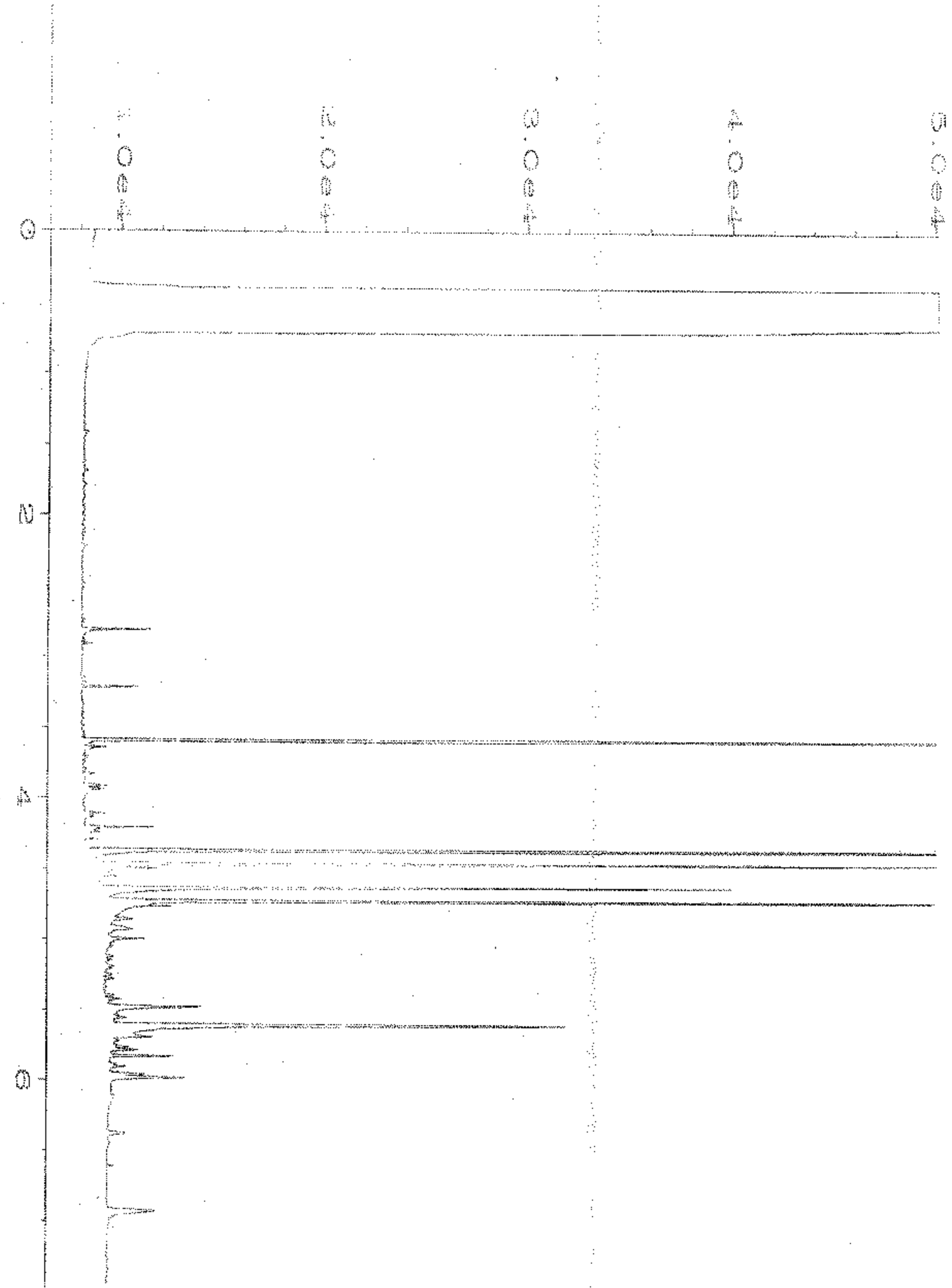


Data File Name : C:\HPCHEM\1\DATA\03-17-20\062F0801.D
Operator : TL
Instrument : GC1
Sample Name : 003244-98
Run Time Bar Code:
Acquired on : 18 Mar 20 06:10 AM
Report Created on: 18 Mar 20 09:31 AM

Page Number : 1
Vial Number : 62
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DX.MTH

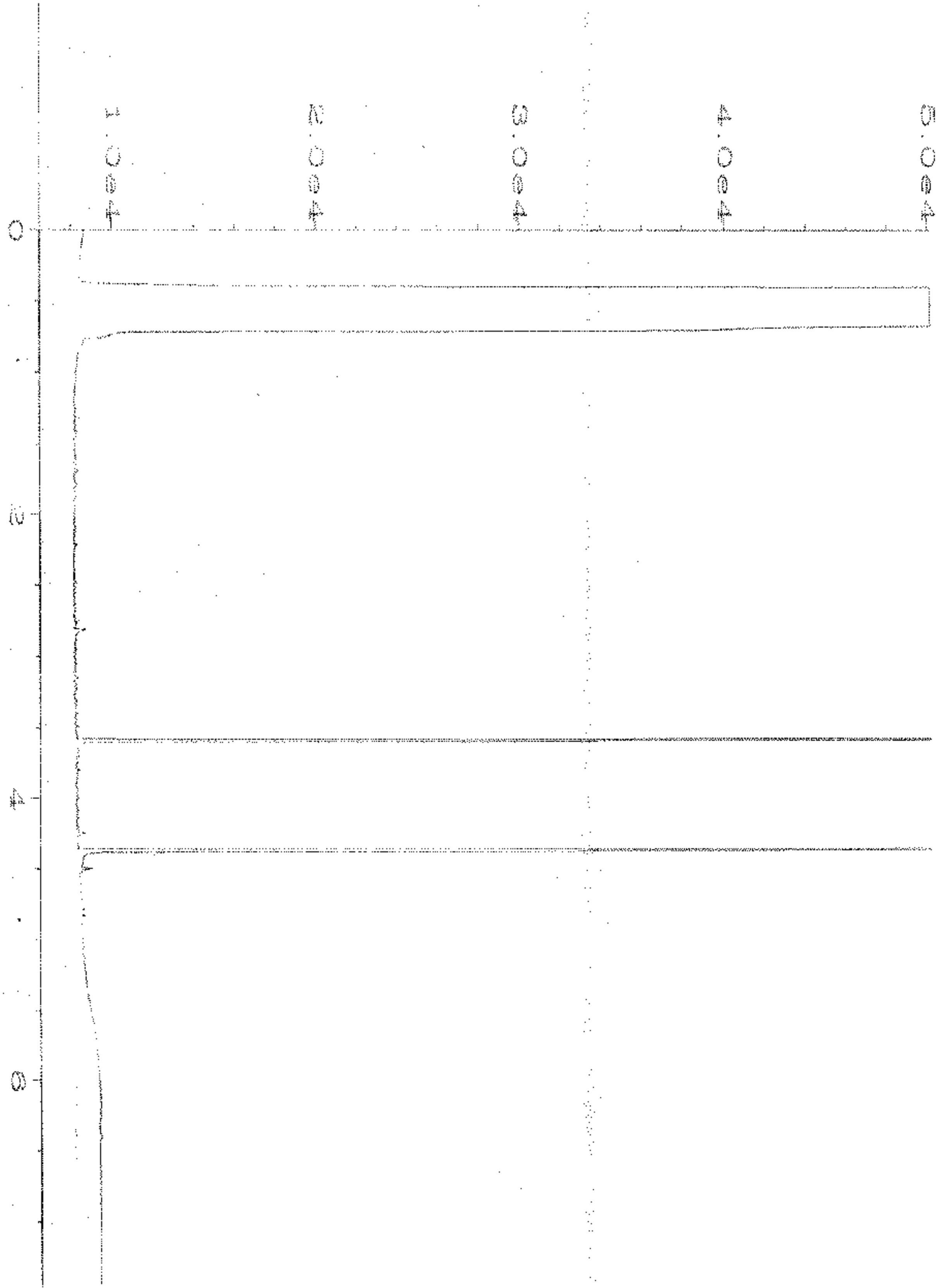


```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\063F0801.D
Operator          : TL                            Page Number        : 1
Instrument        : GC1                           Vial Number        : 63
Sample Name       : 003244-99                     Injection Number : 1
Run Time Bar Code:                                Sequence Line      : 8
Acquired on       : 18 Mar 20   06:21 AM          Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:31 AM          Analysis Method   : DX.MTH
```

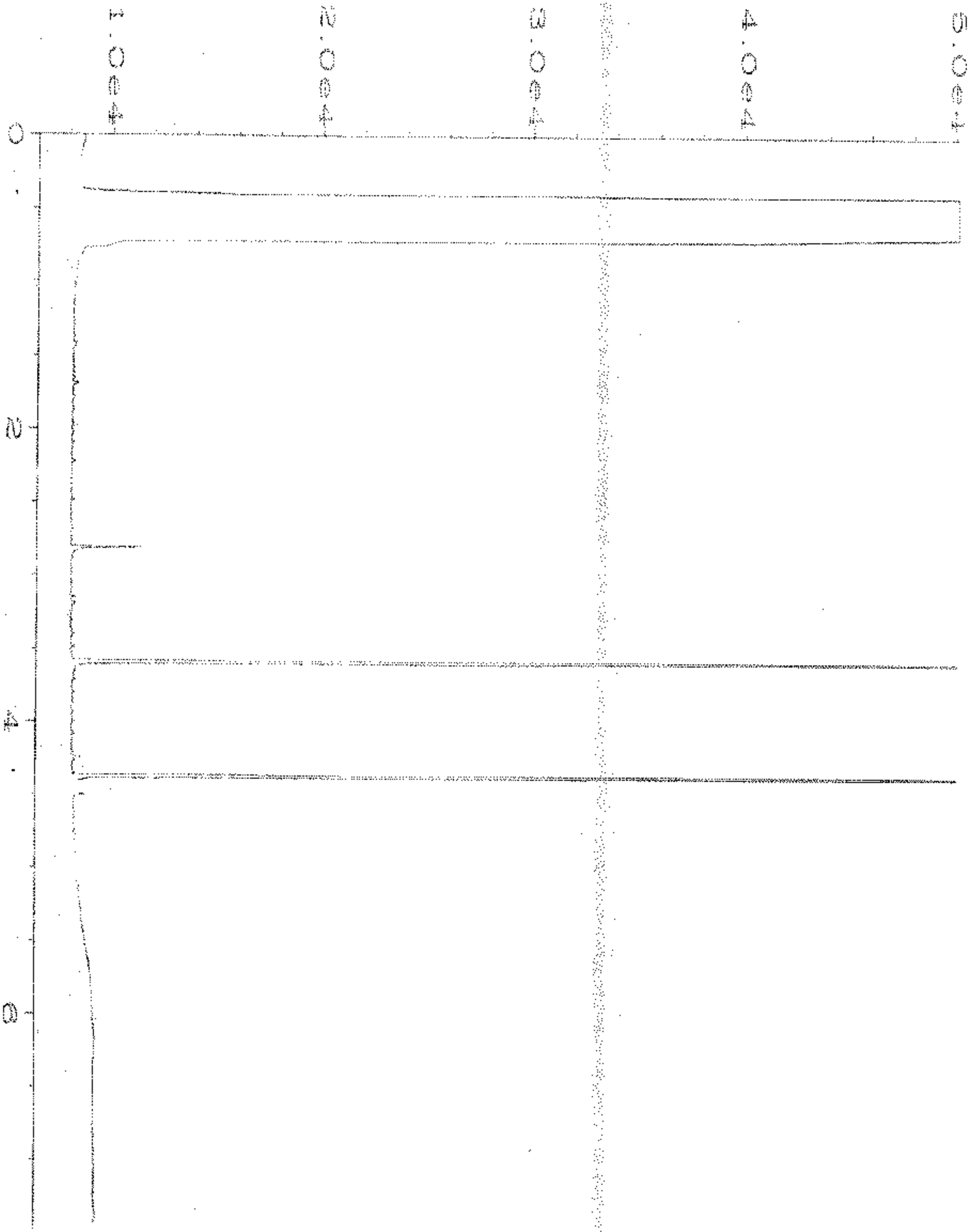


Data File Name : C:\HPCHEM\1\DATA\03-17-20\064F0801.D
Operator : TL
Instrument : GC1
Sample Name : 003244-101
Run Time Bar Code:
Acquired on : 18 Mar 20 06:32 AM
Report Created on: 18 Mar 20 09:31 AM

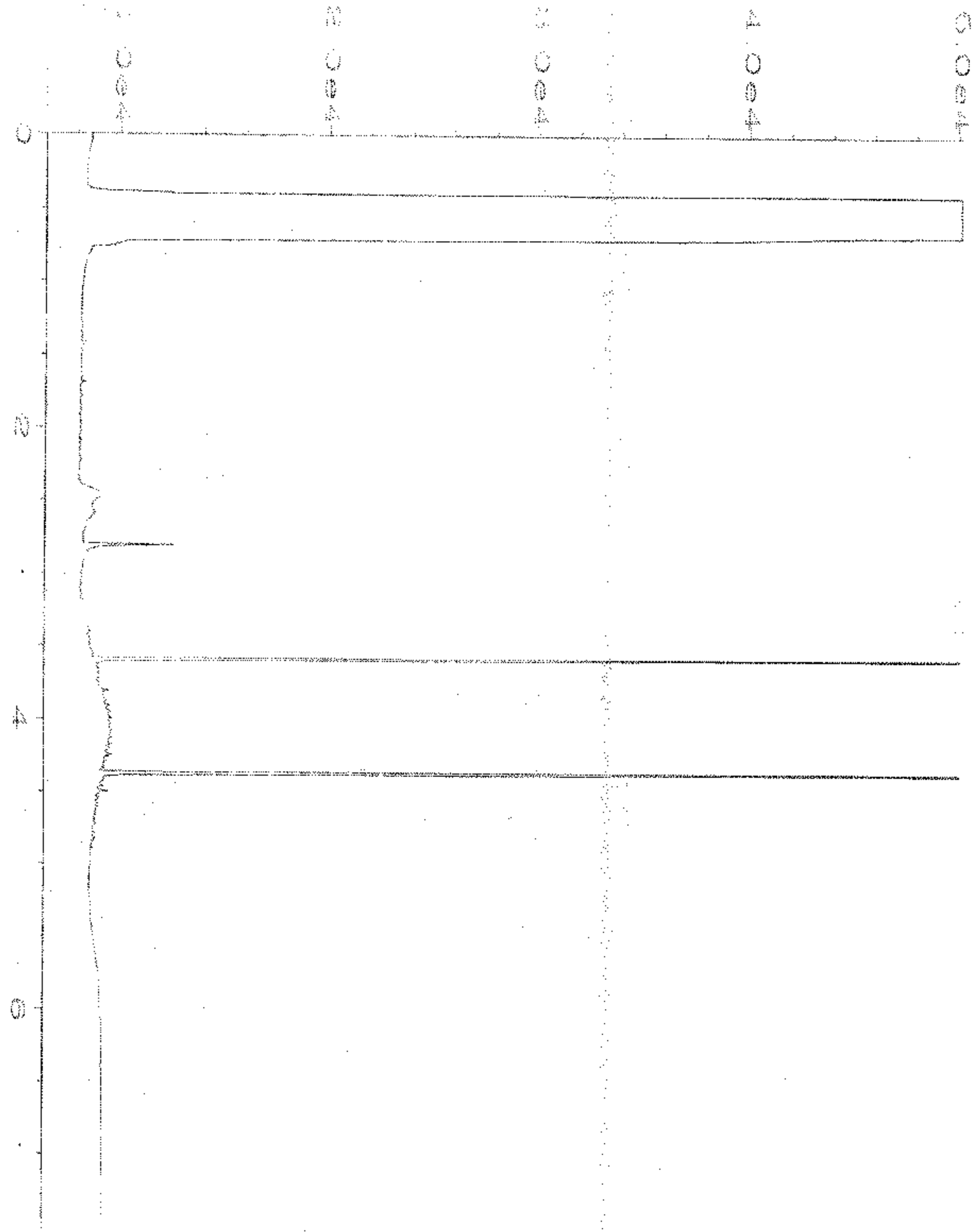
Page Number : 1
Vial Number : 64
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DX.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\065F0801.D
Operator          : TL                          Page Number       : 1
Instrument        : GC1                         Vial Number       : 65
Sample Name       : 003244-102                  Injection Number  : 1
Run Time Bar Code:                              Sequence Line     : 8
Acquired on       : 18 Mar 20   06:44 AM        Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:31 AM         Analysis Method   : DX.MTH
```

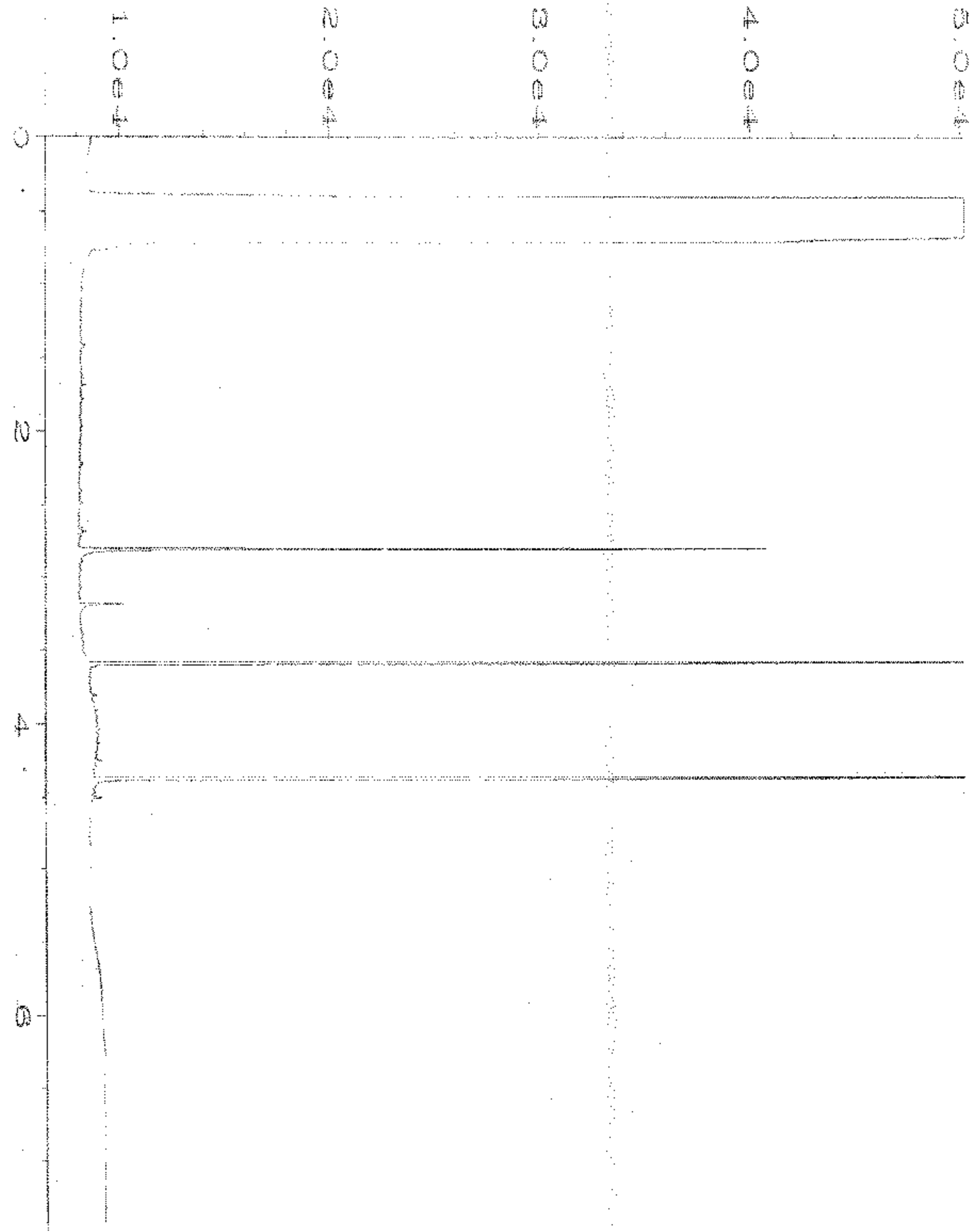


```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\066F0801.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC1                                 Vial Number       : 66
Sample Name       : 003244-103                          Injection Number : 1
Run Time Bar Code:                                      Sequence Line     : 8
Acquired on       : 18 Mar 20   06:55 AM                Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:32 AM                 Analysis Method  : DX.MTH
```

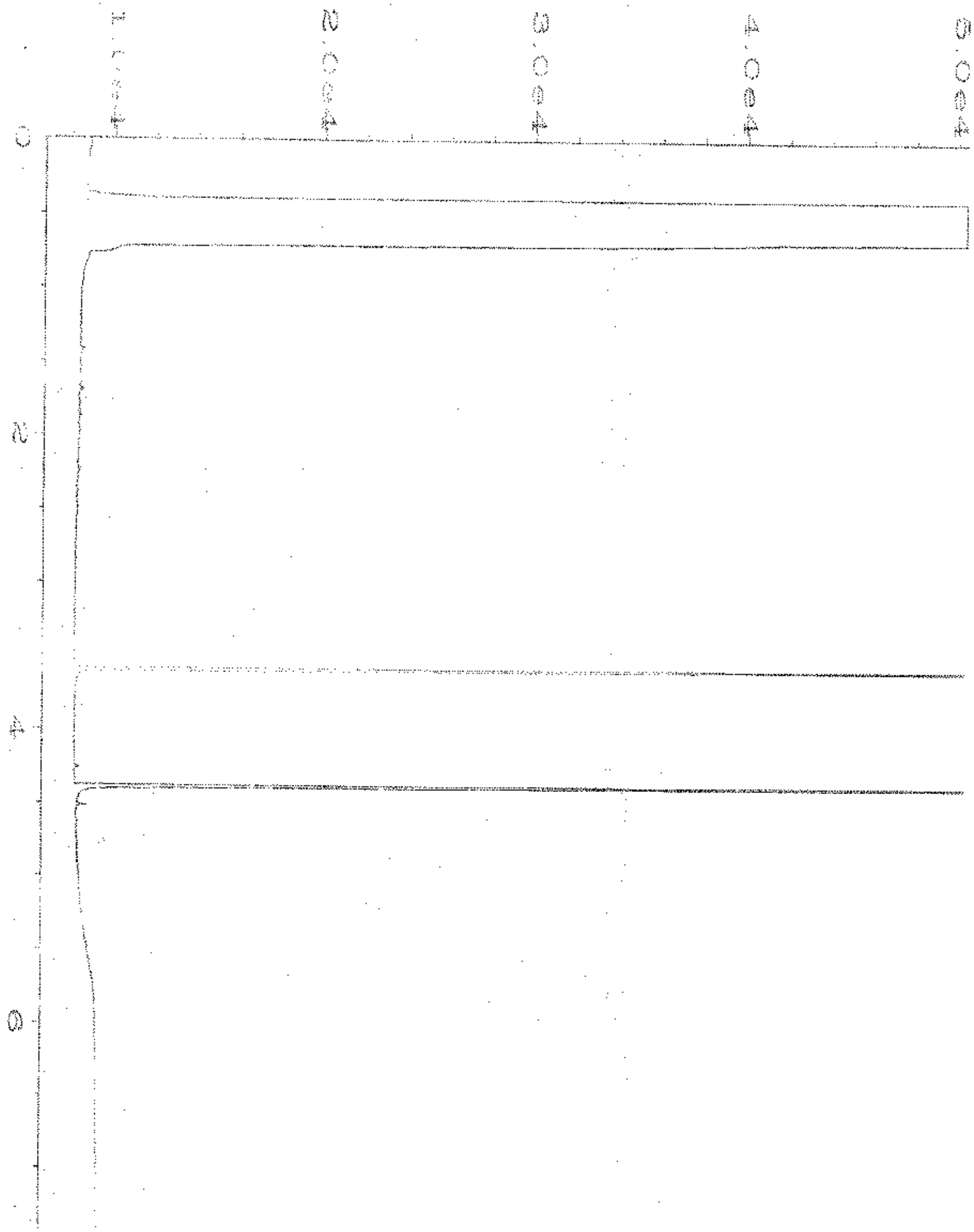


Data File Name : C:\HPCHEM\1\DATA\03-17-20\067F0801.D
Operator : TL
Instrument : GC1
Sample Name : 003244-104
Run Time Bar Code:
Acquired on : 18 Mar 20 07:06 AM
Report Created on: 18 Mar 20 09:32 AM

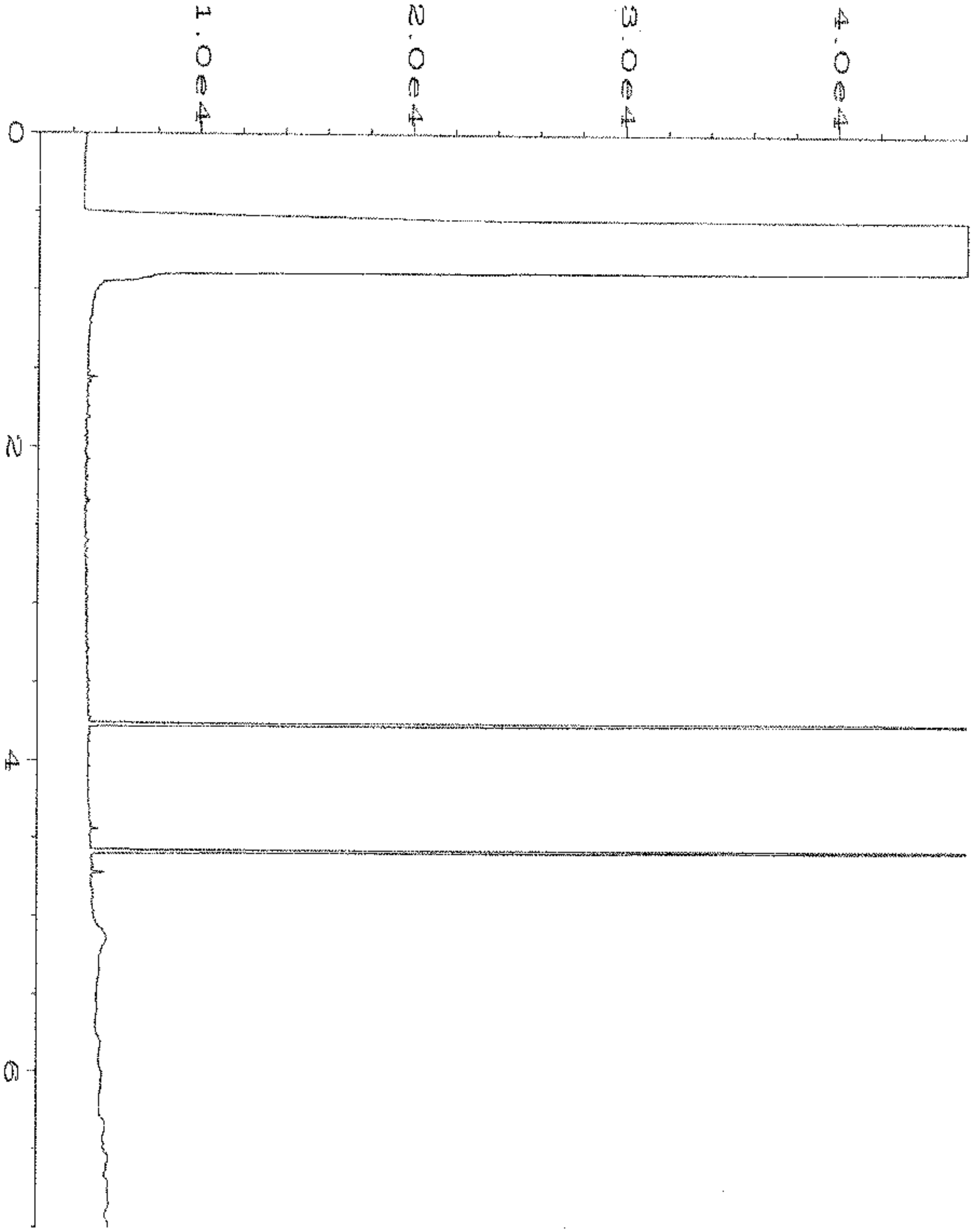
Page Number : 1
Vial Number : 67
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DX.MTH



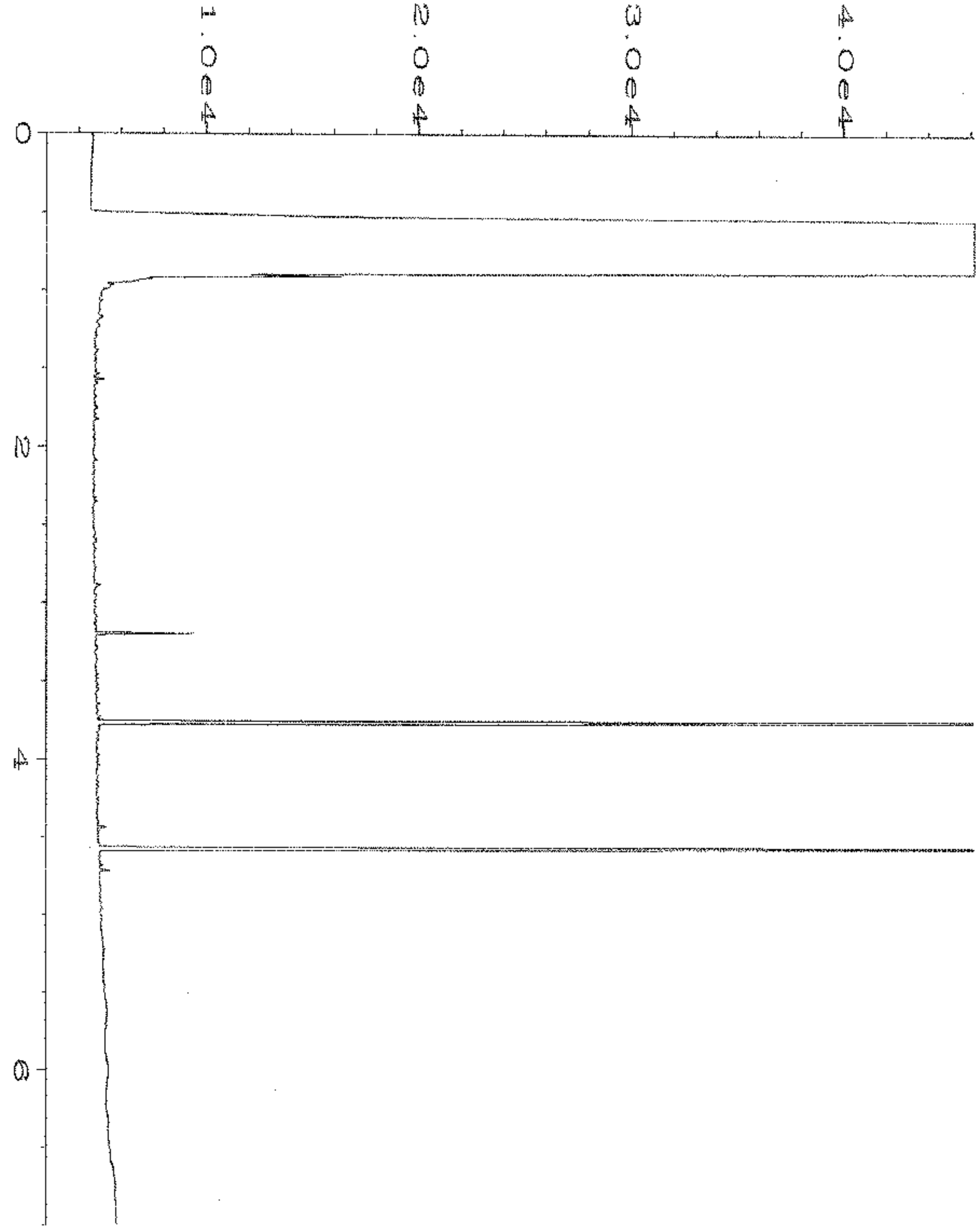
```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\068F0801.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 68
Sample Name       : 003244-107                      Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 8
Acquired on       : 18 Mar 20   07:18 AM            Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:32 AM             Analysis Method   : DX.MTH
```



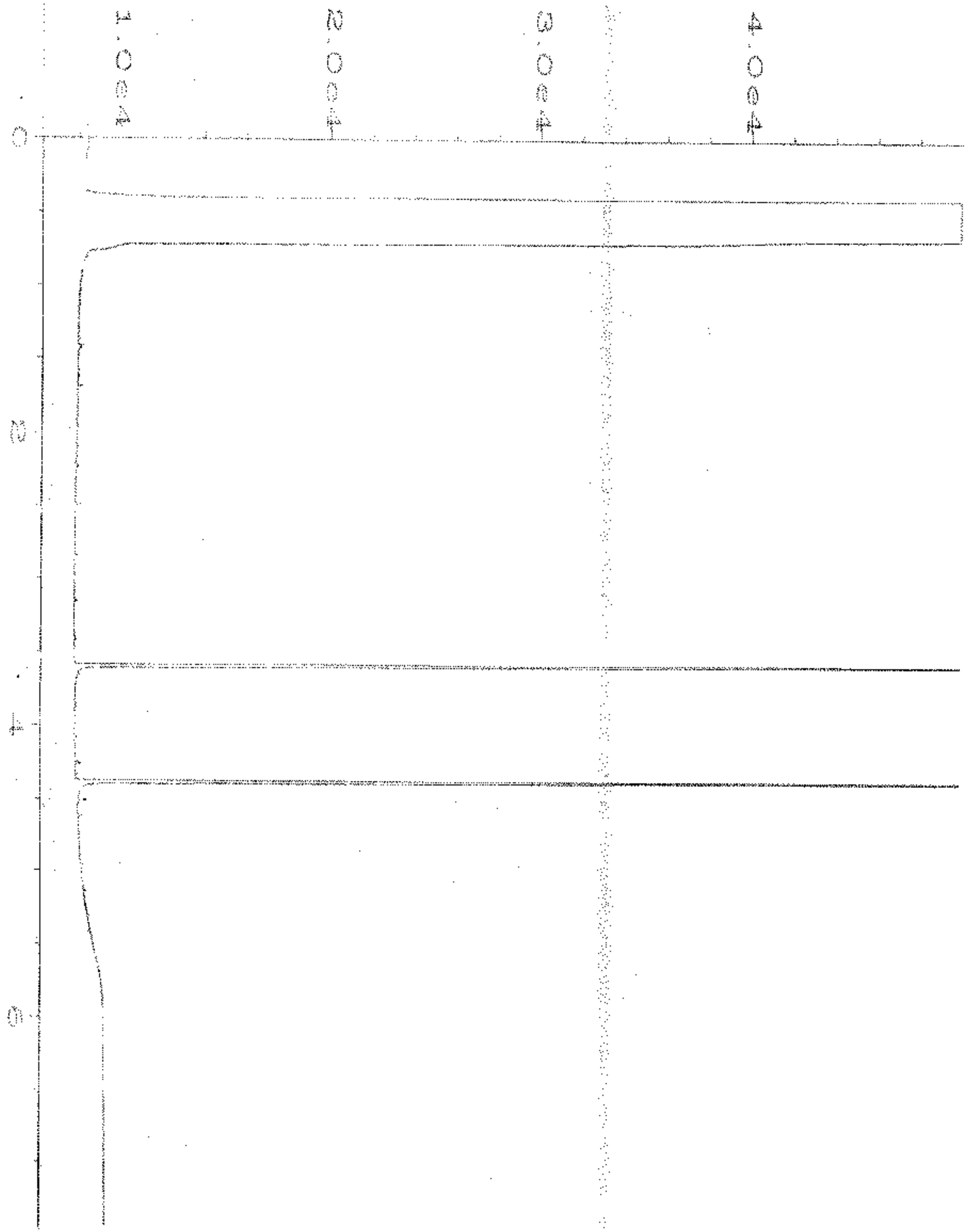
```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\012F0301.D
Operator          : TL                                Page Number       : 1
Instrument        : GC1                               Vial Number       : 12
Sample Name       : 00-686 mb                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line     : 3
Acquired on       : 17 Mar 20   09:48 AM              Instrument Method: DX.MTH
Report Created on: 18 Mar 20   01:23 PM               Analysis Method   : DX.MTH
```



```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\031F0801.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC6                                 Vial Number       : 31
Sample Name       : 00-687 mb                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 8
Acquired on       : 17 Mar 20   05:17 PM                Instrument Method: DX.MTH
Report Created on: 18 Mar 20   10:58 AM                 Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\054F0801.D
Operator          : TL                                 Page Number       : 1
Instrument        : GC6                                Vial Number       : 54
Sample Name       : 00-688 mb                          Injection Number  : 1
Run Time Bar Code:                                     Sequence Line     : 8
Acquired on       : 17 Mar 20   09:26 PM               Instrument Method: DX.MTH
Report Created on: 18 Mar 20   11:08 AM                Analysis Method   : DEFAULT.MTH
```



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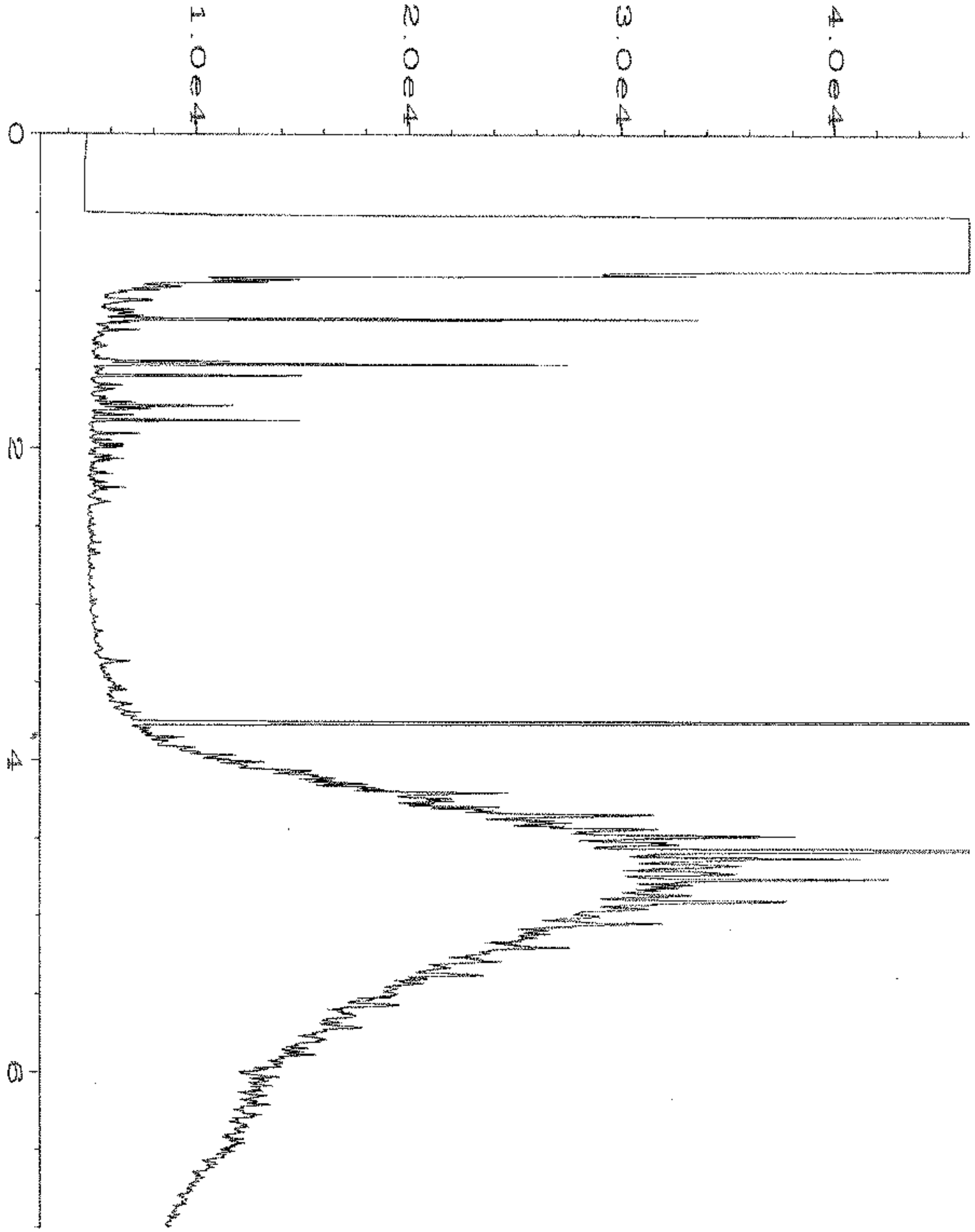
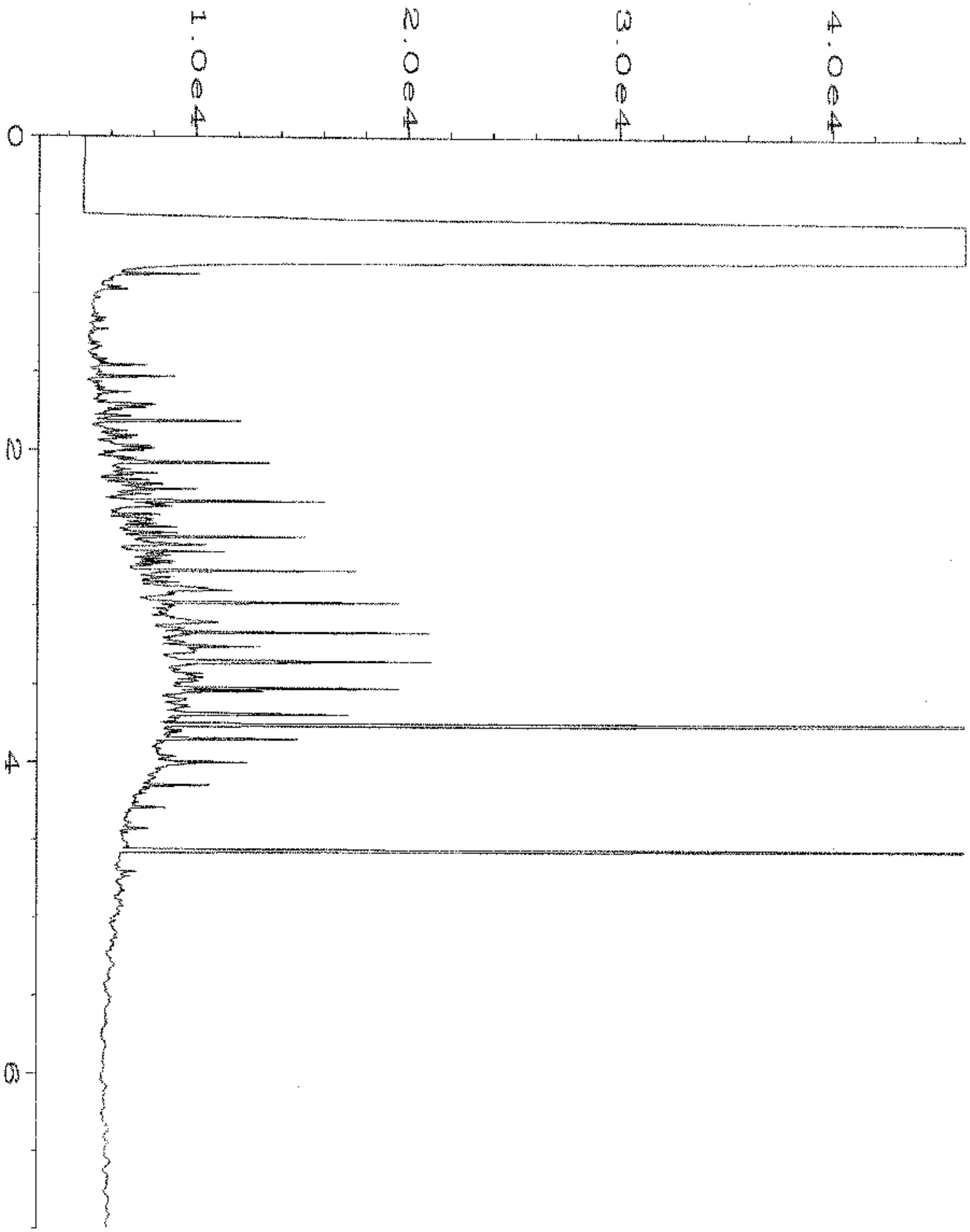
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\044F0801.D
Operator          : TL                    Page Number       : 1
Instrument        : GC1                   Vial Number       : 44
Sample Name       : 00-689 mb             Injection Number  : 1
Run Time Bar Code:                        Sequence Line     : 8
Acquired on       : 17 Mar 20  05:39 PM   Instrument Method: DX.MTH
Report Created on: 18 Mar 20  09:29 AM    Analysis Method   : DX.MTH
```

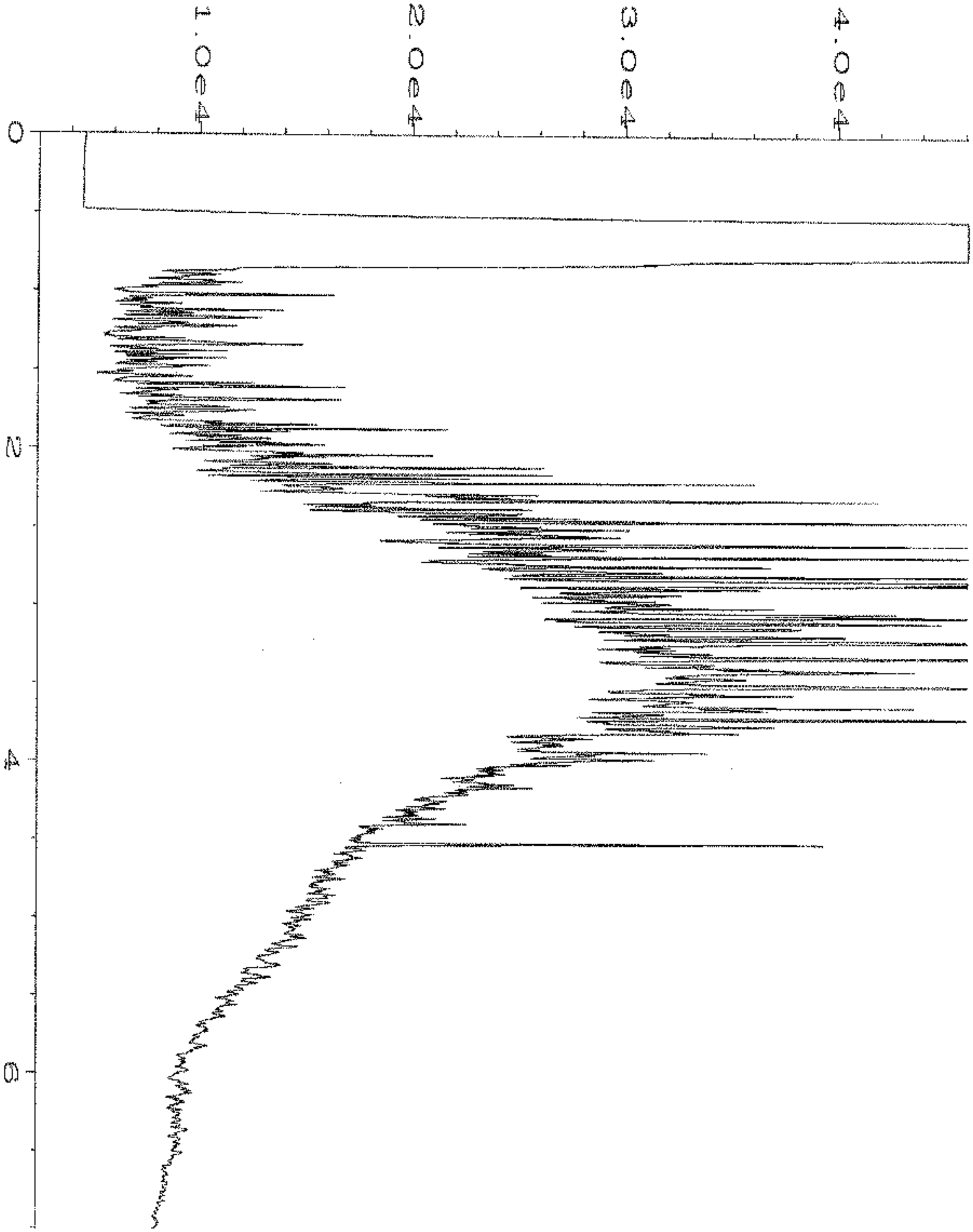


```
Data File Name    : C:\HPCHEM\6\DATA\03-17-20\096F0501.D
Operator          : TL                                   Page Number       : 1
Instrument        : GC6                                  Vial Number       : 96
Sample Name       : HCIDs G/M 57-167                     Injection Number  : 1
Run Time Bar Code:                                       Sequence Line     : 5
Acquired on       : 17 Mar 20   03:00 PM                 Instrument Method: DX.MTH
Report Created on: 18 Mar 20   10:51 AM                  Analysis Method   : DEFAULT.MTH
```



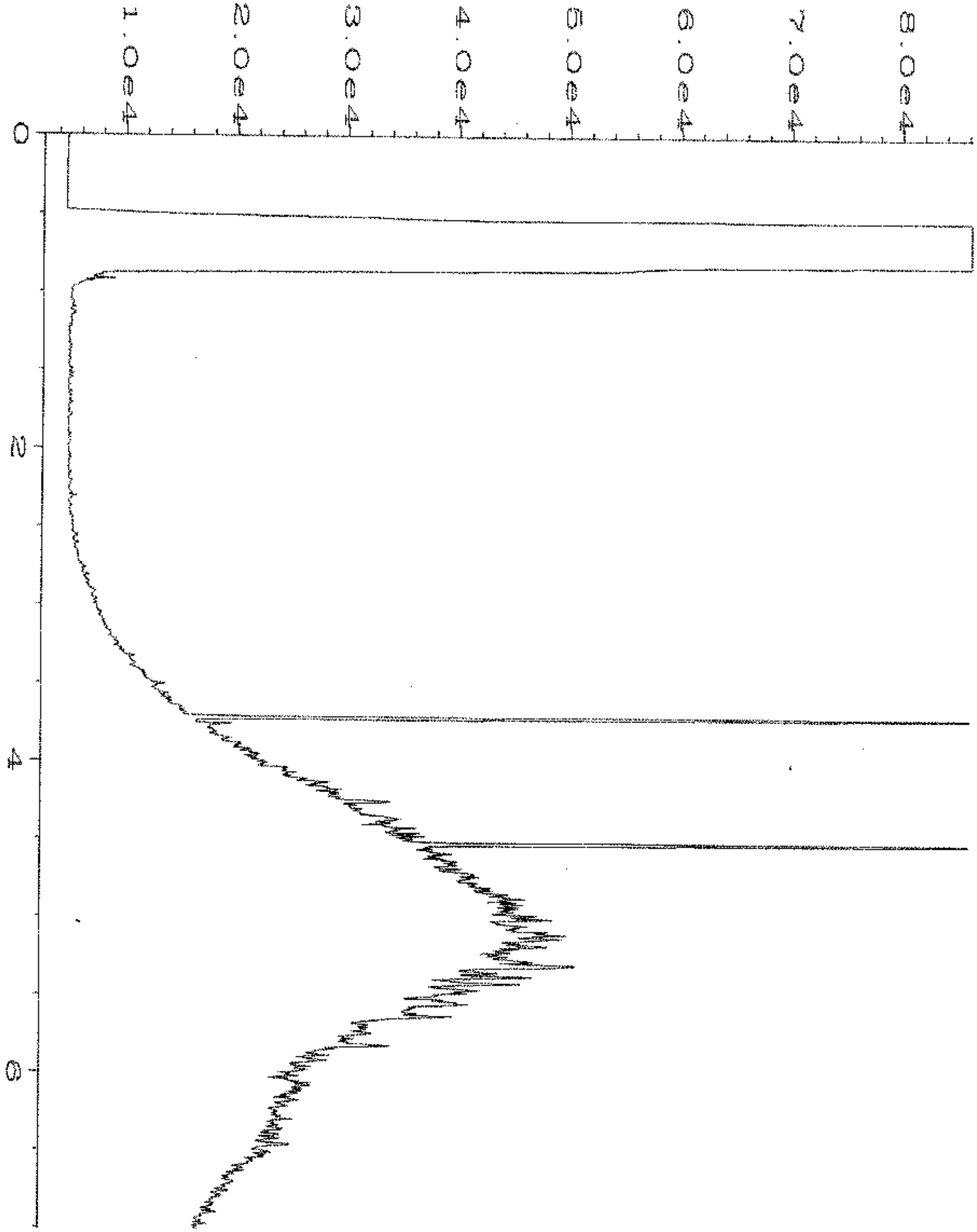
Data File Name   : C:\HPCHEM\6\DATA\03-17-20\097F0501.D
Operator   : TL
Instrument   : GC6
Sample Name   : HCIDs Dx 57-78D
Run Time Bar Code:
Acquired on   : 17 Mar 20   03:11 PM
Report Created on: 18 Mar 20   10:52 AM

Page Number   : 1
Vial Number   : 97
Injection Number : 1
Sequence Line   : 5
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH

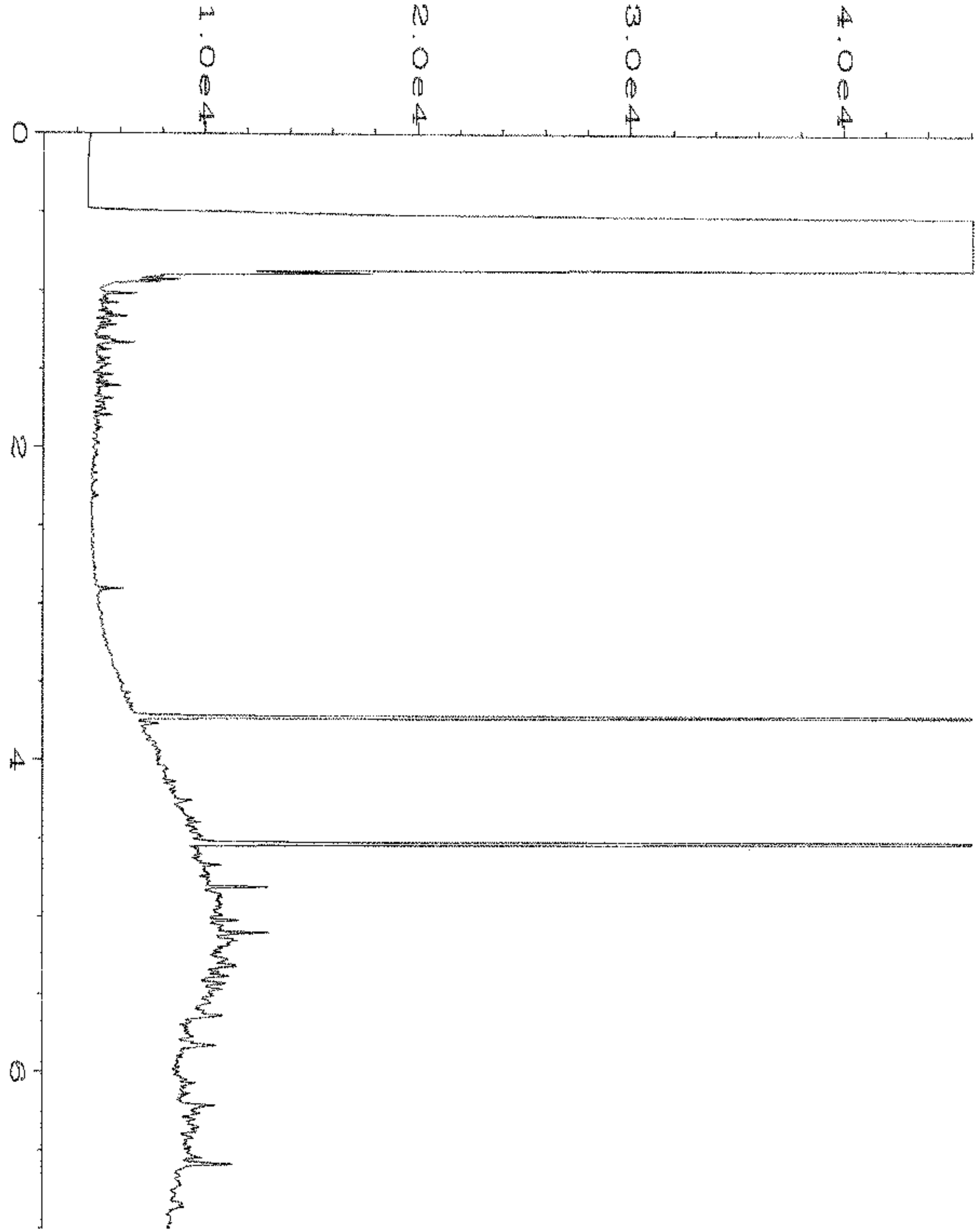


Data File Name : C:\HPCHEM\6\DATA\03-19-20\029F0701.D
Operator : TL
Instrument : GC6
Sample Name : 003244-01 1/10
Run Time Bar Code:
Acquired on : 19 Mar 20 05:59 PM
Report Created on: 20 Mar 20 08:27 AM

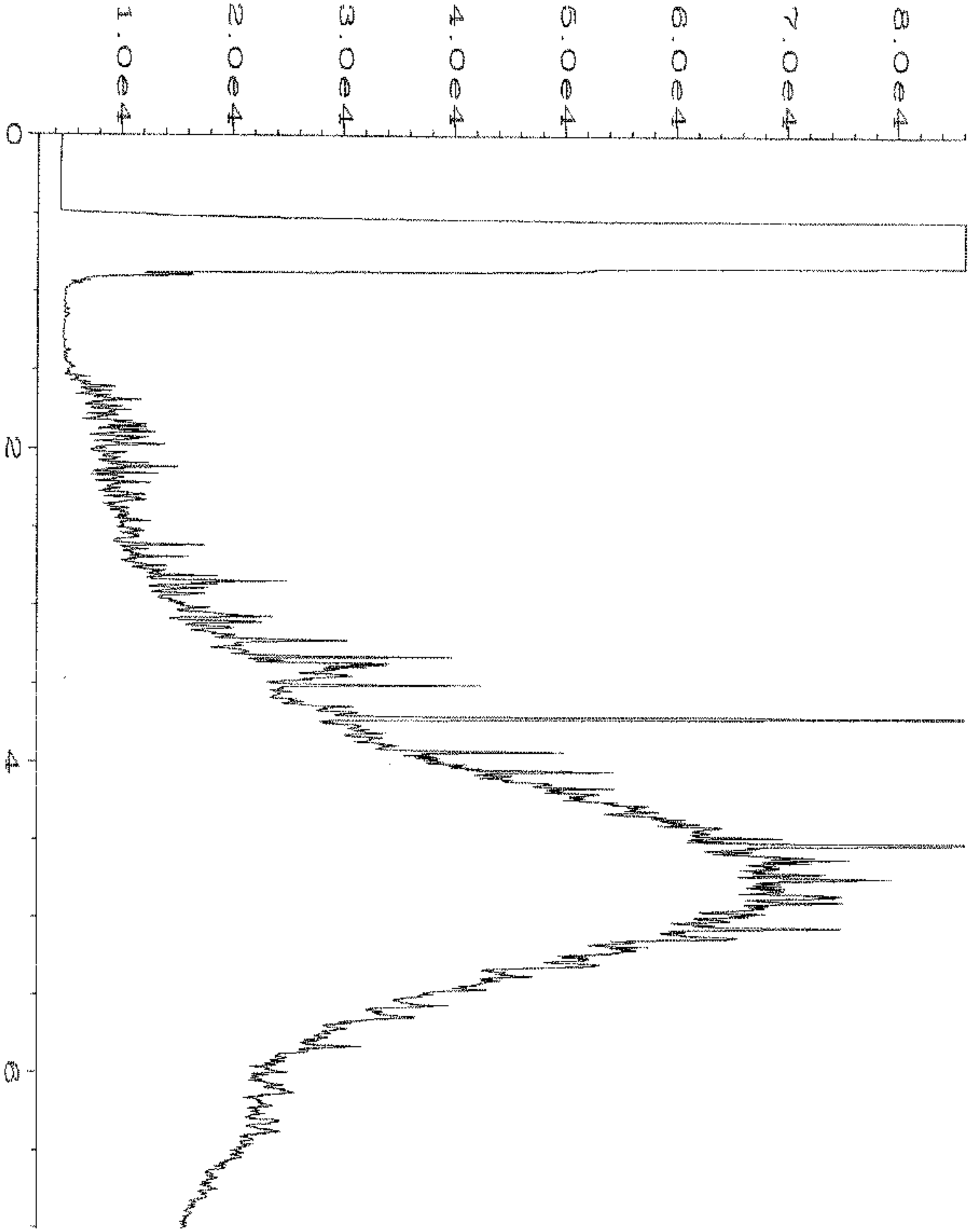
Page Number : 1
Vial Number : 29
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



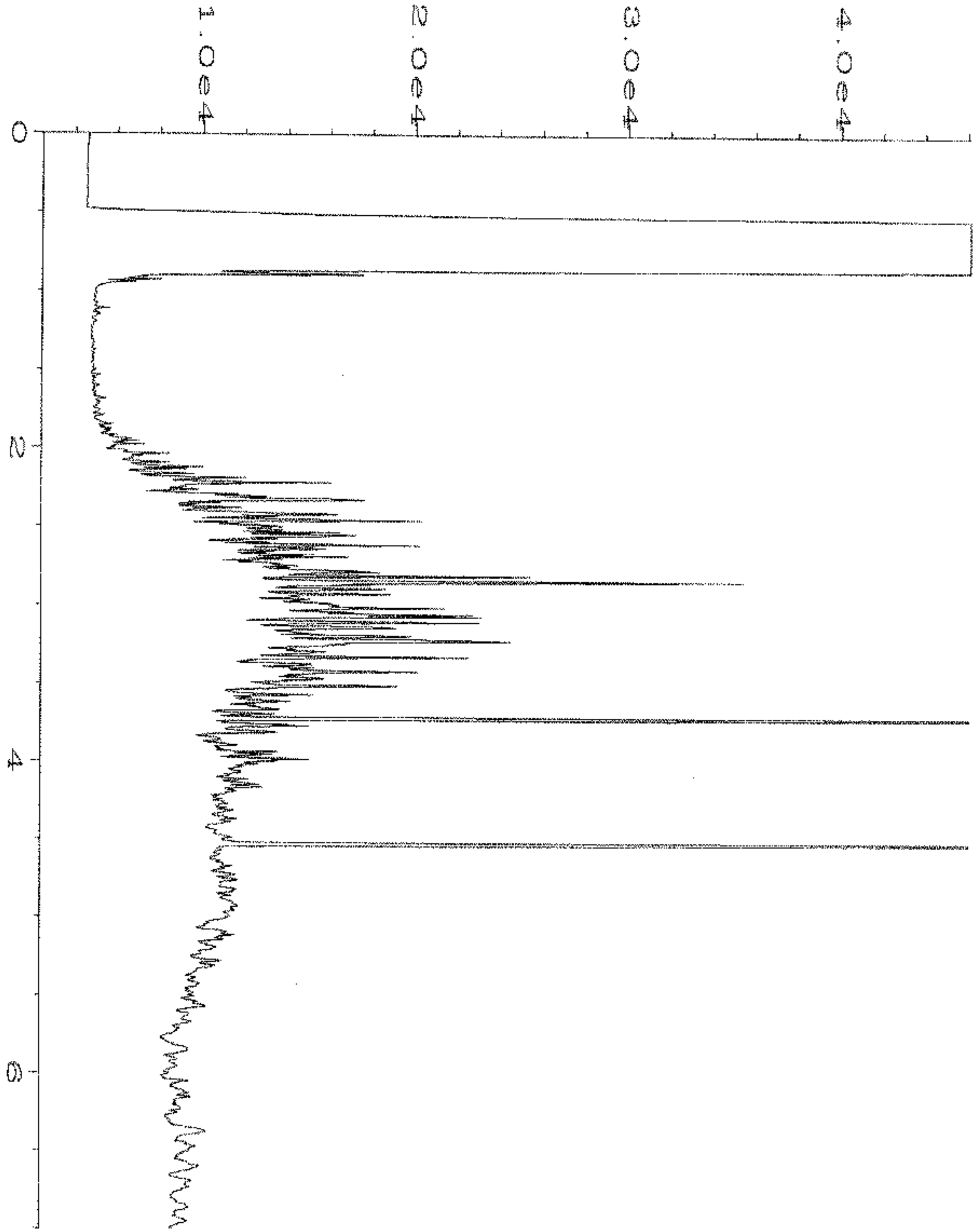
```
Data File Name    : C:\HPCHEM\6\DATA\03-20-20\023F1101.D
Operator          : TL                                Page Number       : 1
Instrument        : GC6                               Vial Number       : 23
Sample Name       : 003244-05                         Injection Number  : 1
Run Time Bar Code:                                    Sequence Line     : 11
Acquired on       : 20 Mar 20   03:35 PM              Instrument Method: DX.MTH
Report Created on: 23 Mar 20   08:38 AM               Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\6\DATA\03-19-20\031F0701.D
Operator          : TL                             Page Number       : 1
Instrument        : GC6                            Vial Number       : 31
Sample Name       : 003244-06                      Injection Number  : 1
Run Time Bar Code:                                 Sequence Line     : 7
Acquired on       : 19 Mar 20   06:21 PM           Instrument Method: DX.MTH
Report Created on: 20 Mar 20   08:27 AM            Analysis Method   : DEFAULT.MTH
```

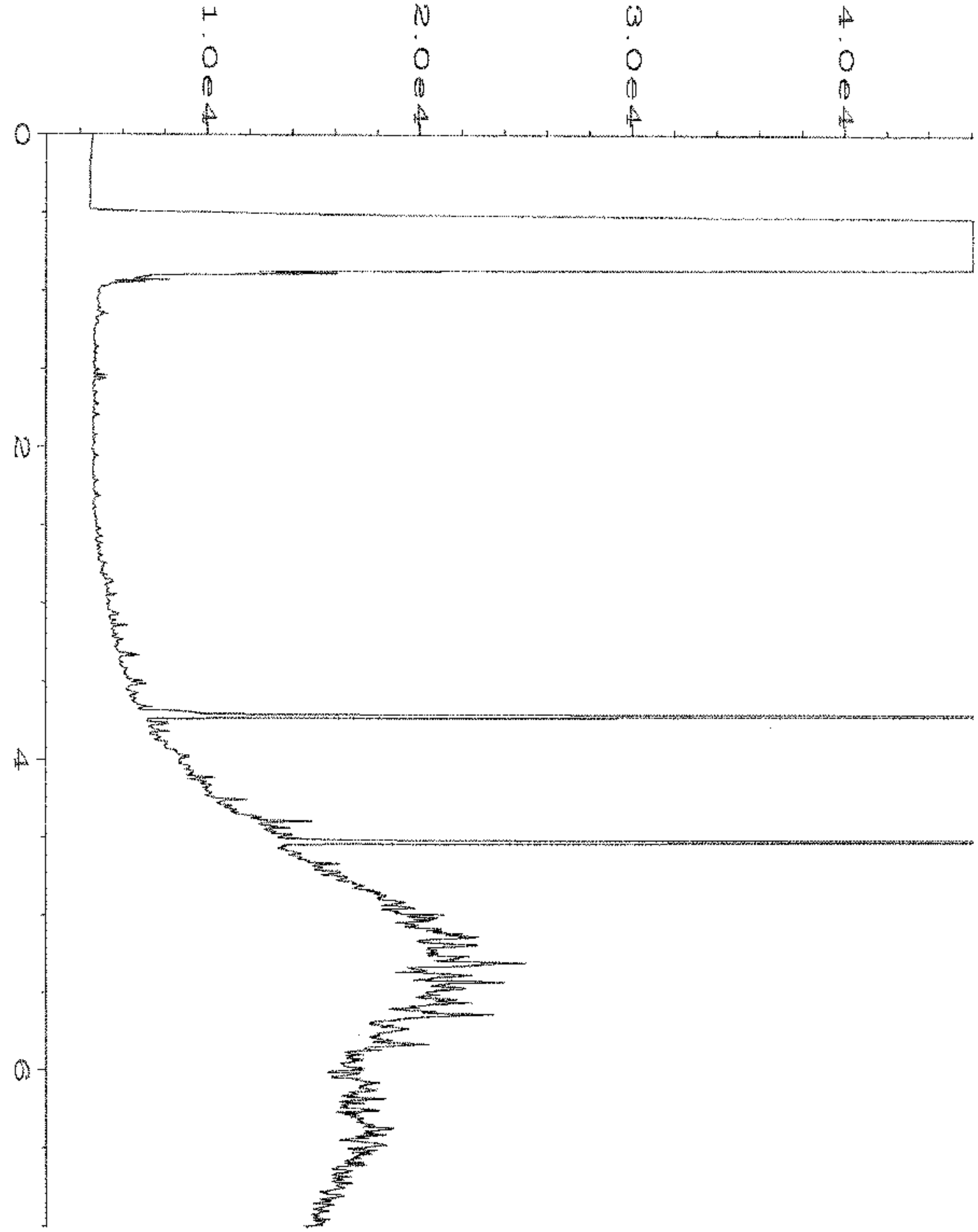


```
Data File Name    : C:\HPCHEM\6\DATA\03-19-20\032F0701.D
Operator          : TL                              Page Number      : 1
Instrument        : GC6                             Vial Number      : 32
Sample Name       : 003244-15                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 7
Acquired on       : 19 Mar 20   06:31 PM            Instrument Method: DX.MTH
Report Created on: 20 Mar 20   08:28 AM             Analysis Method  : DEFAULT.MTH
```

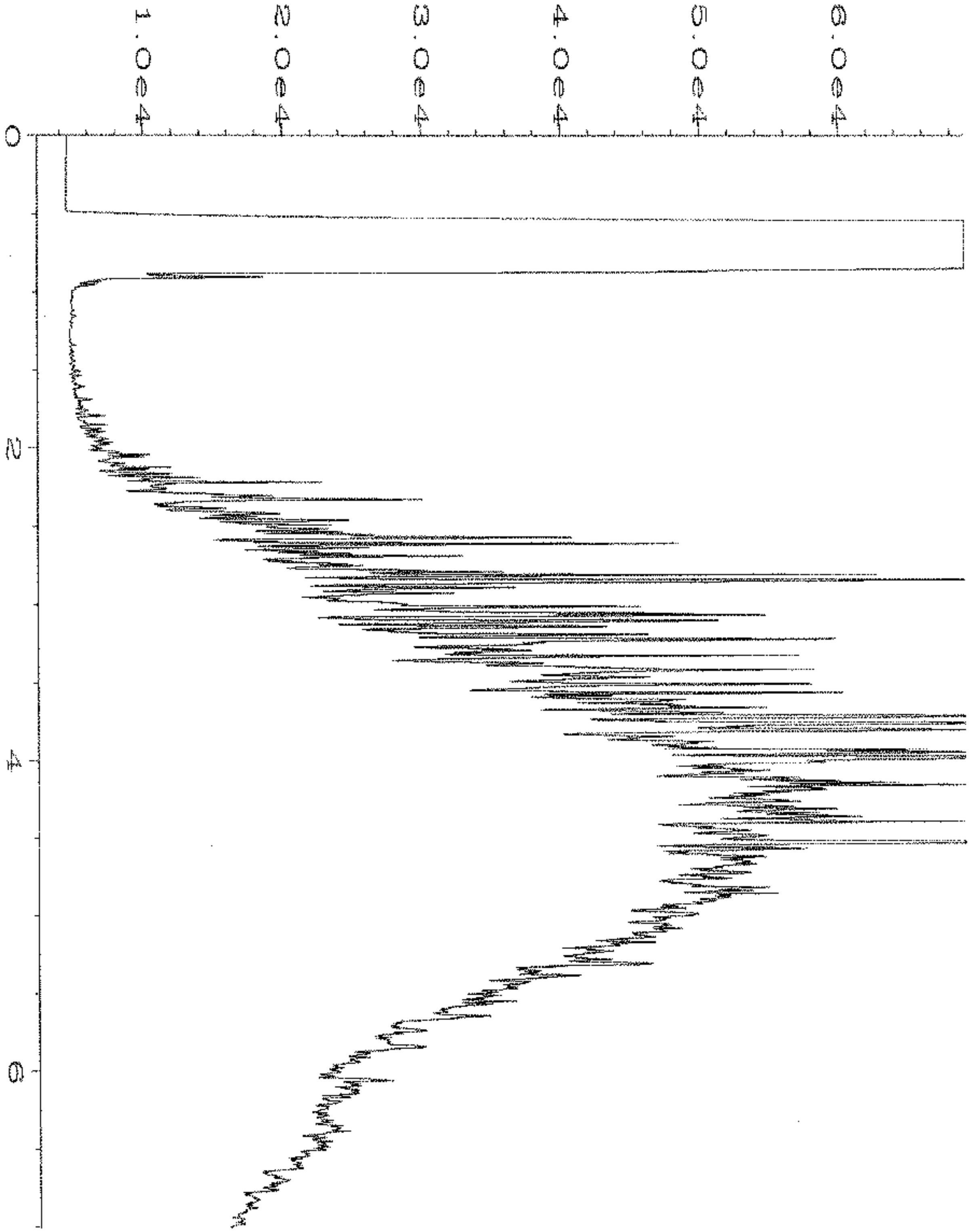


Data File Name : C:\HPCHEM\6\DATA\03-19-20\033F0701.D
Operator : TL
Instrument : GC6
Sample Name : 003244-42
Run Time Bar Code:
Acquired on : 19 Mar 20 06:42 PM
Report Created on: 20 Mar 20 08:28 AM

Page Number : 1
Vial Number : 33
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\6\DATA\03-19-20\034F0701.D
Operator          : TL                              Page Number      : 1
Instrument        : GC6                             Vial Number      : 34
Sample Name       : 003244-62                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 7
Acquired on       : 19 Mar 20   06:53 PM            Instrument Method: DX.MTH
Report Created on: 20 Mar 20   08:28 AM             Analysis Method  : DEFAULT.MTH
```



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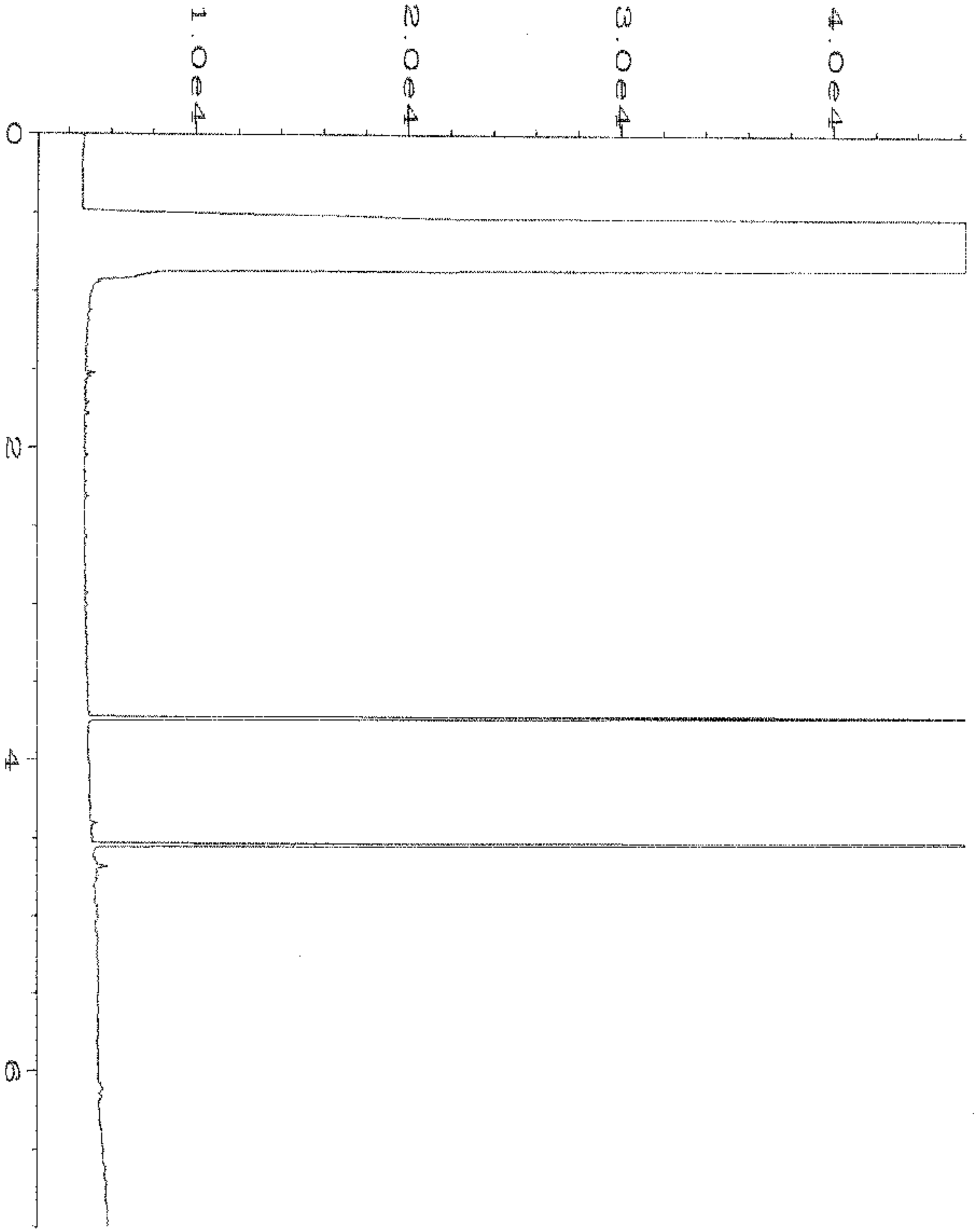
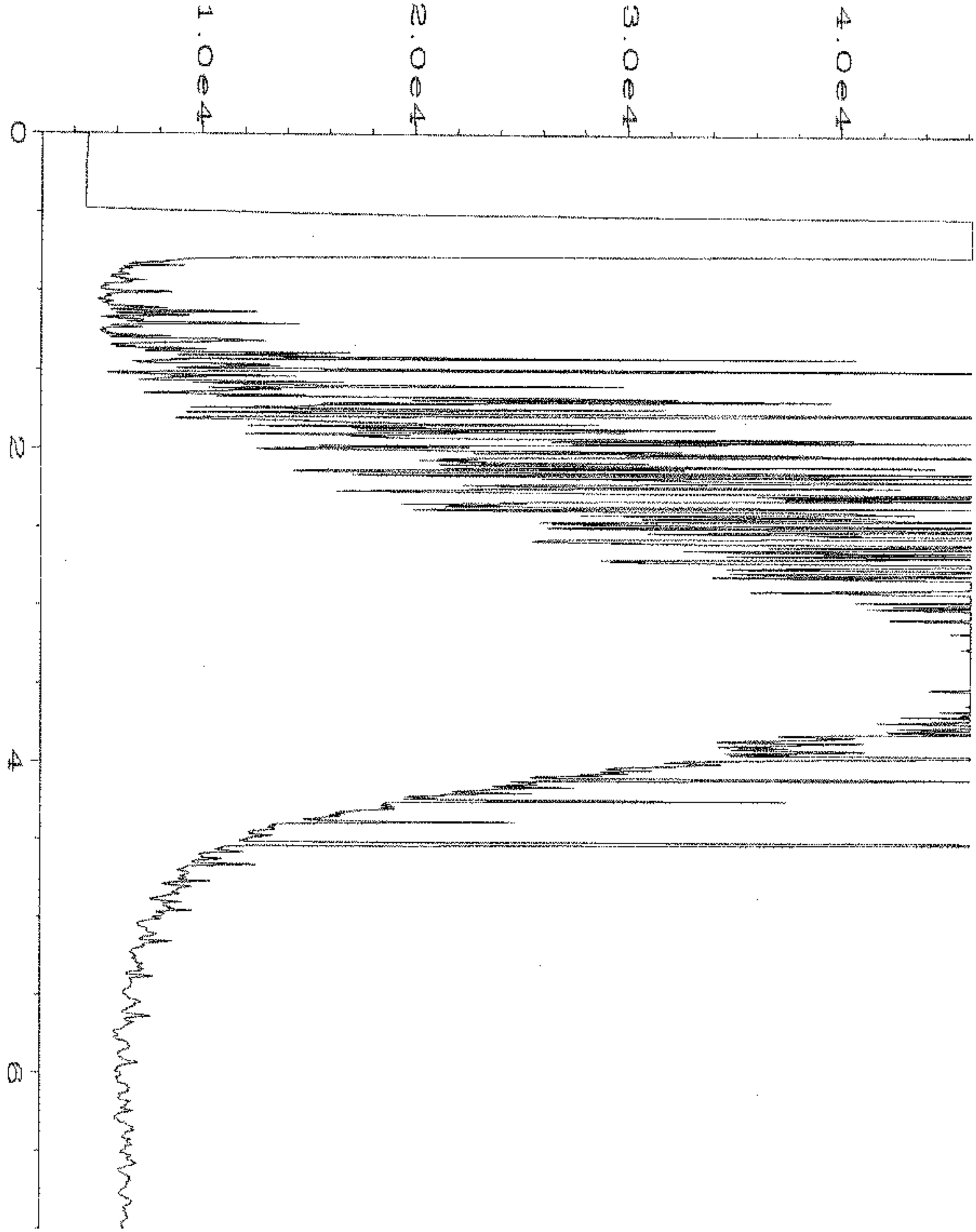
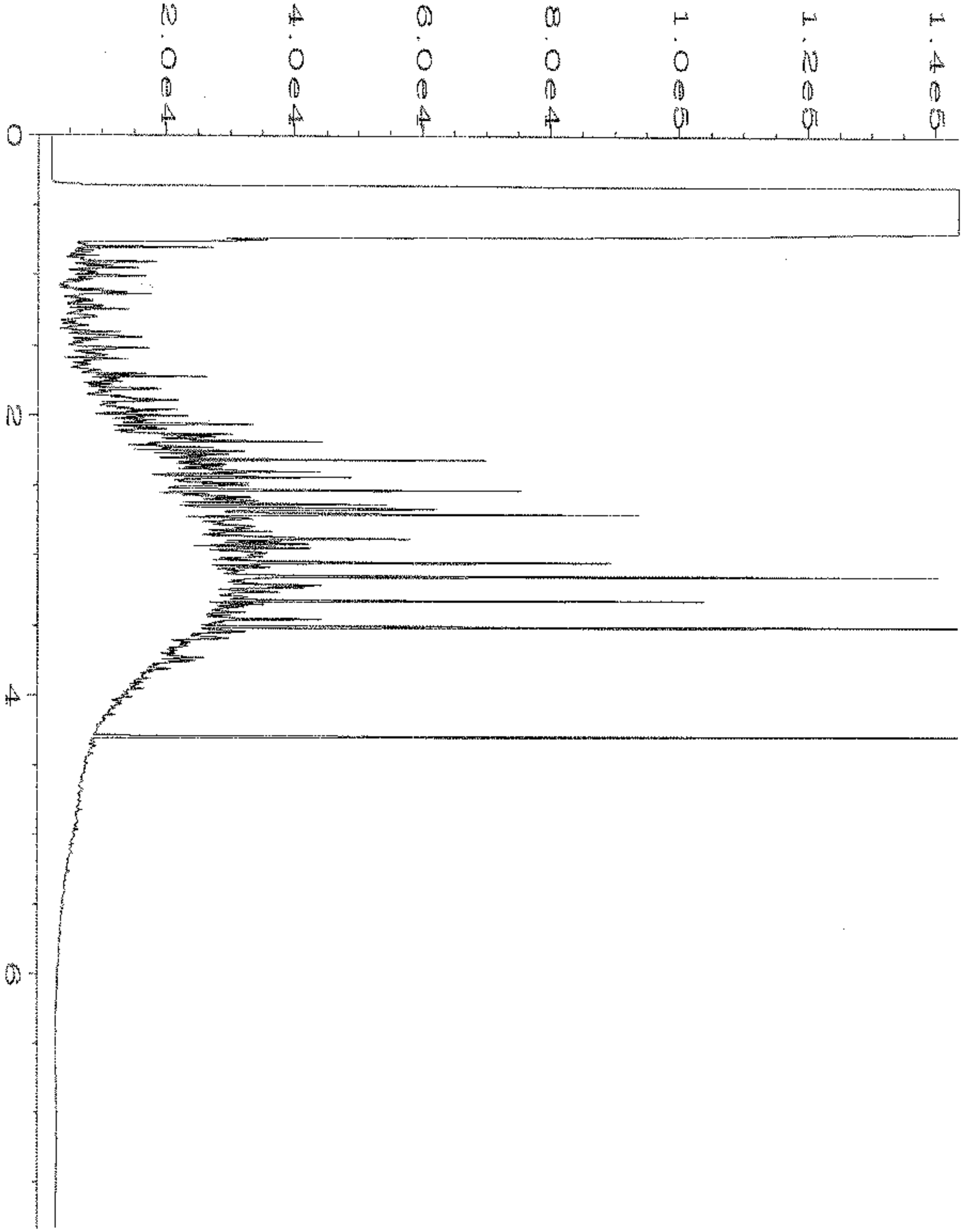
Data File Name    : C:\HPCHEM\6\DATA\03-19-20\035F0701.D
Operator          : TL                              Page Number       : 1
Instrument        : GC6                             Vial Number       : 35
Sample Name       : 003244-68                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 7
Acquired on       : 19 Mar 20   07:04 PM            Instrument Method: DX.MTH
Report Created on: 20 Mar 20   08:29 AM            Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\6\DATA\03-19-20\018F0501.D
Operator          : TL                               Page Number      : 1
Instrument        : GC6                              Vial Number      : 18
Sample Name       : 00-724 mb                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 5
Acquired on       : 19 Mar 20   03:40 PM             Instrument Method: DX.MTH
Report Created on: 20 Mar 20   08:27 AM              Analysis Method  : DEFAULT.MTH
```

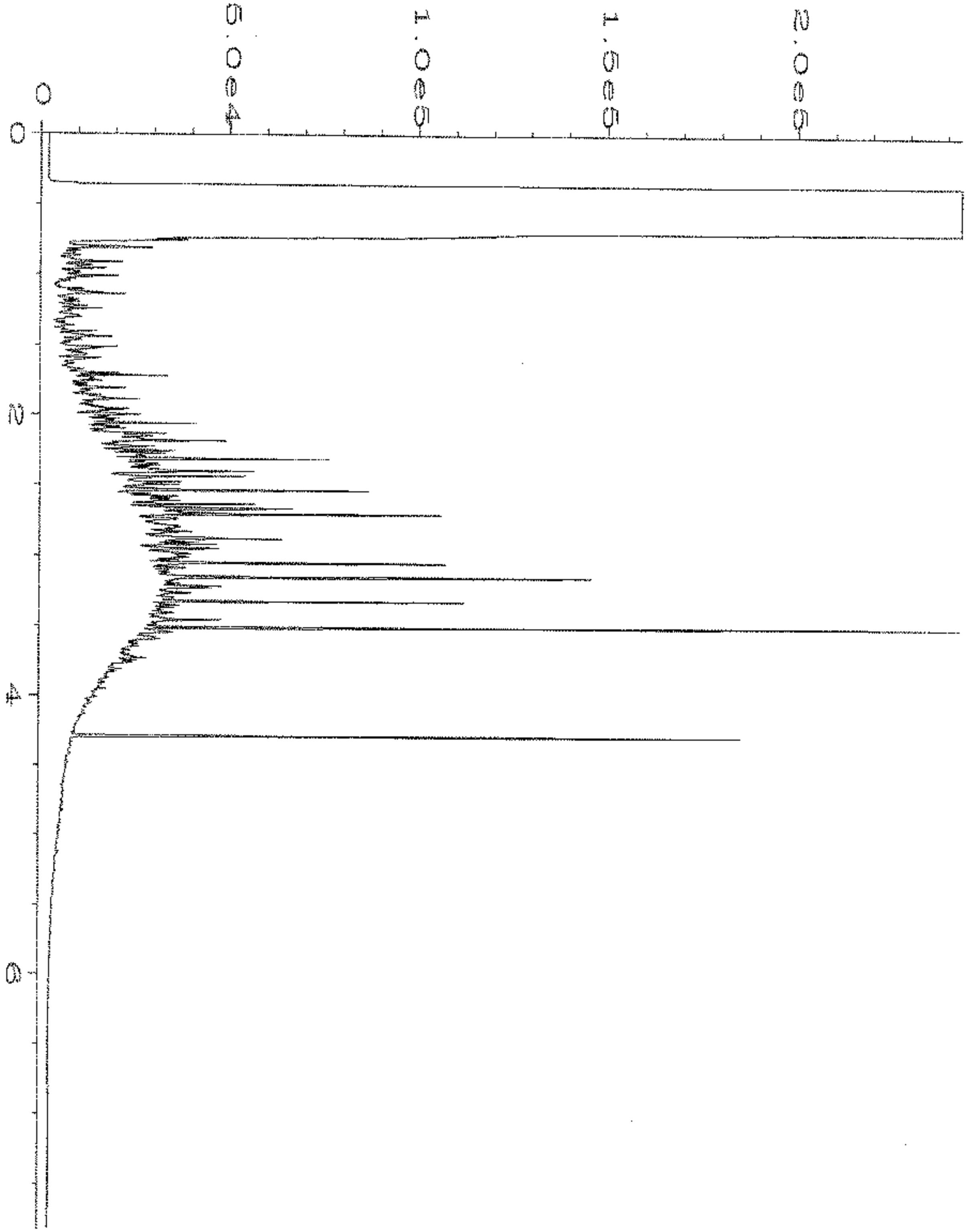


```
Data File Name    : C:\HPCHEM\6\DATA\03-19-20\003F0601.D
Operator          : TL                                    Page Number       : 1
Instrument        : GC6                                   Vial Number       : 3
Sample Name       : 500 Dx 58-146H                        Injection Number  : 1
Run Time Bar Code:                                        Sequence Line     : 6
Acquired on       : 19 Mar 20   05:04 PM                  Instrument Method: DX.MTH
Report Created on: 20 Mar 20   08:27 AM                   Analysis Method   : DEFAULT.MTH
```



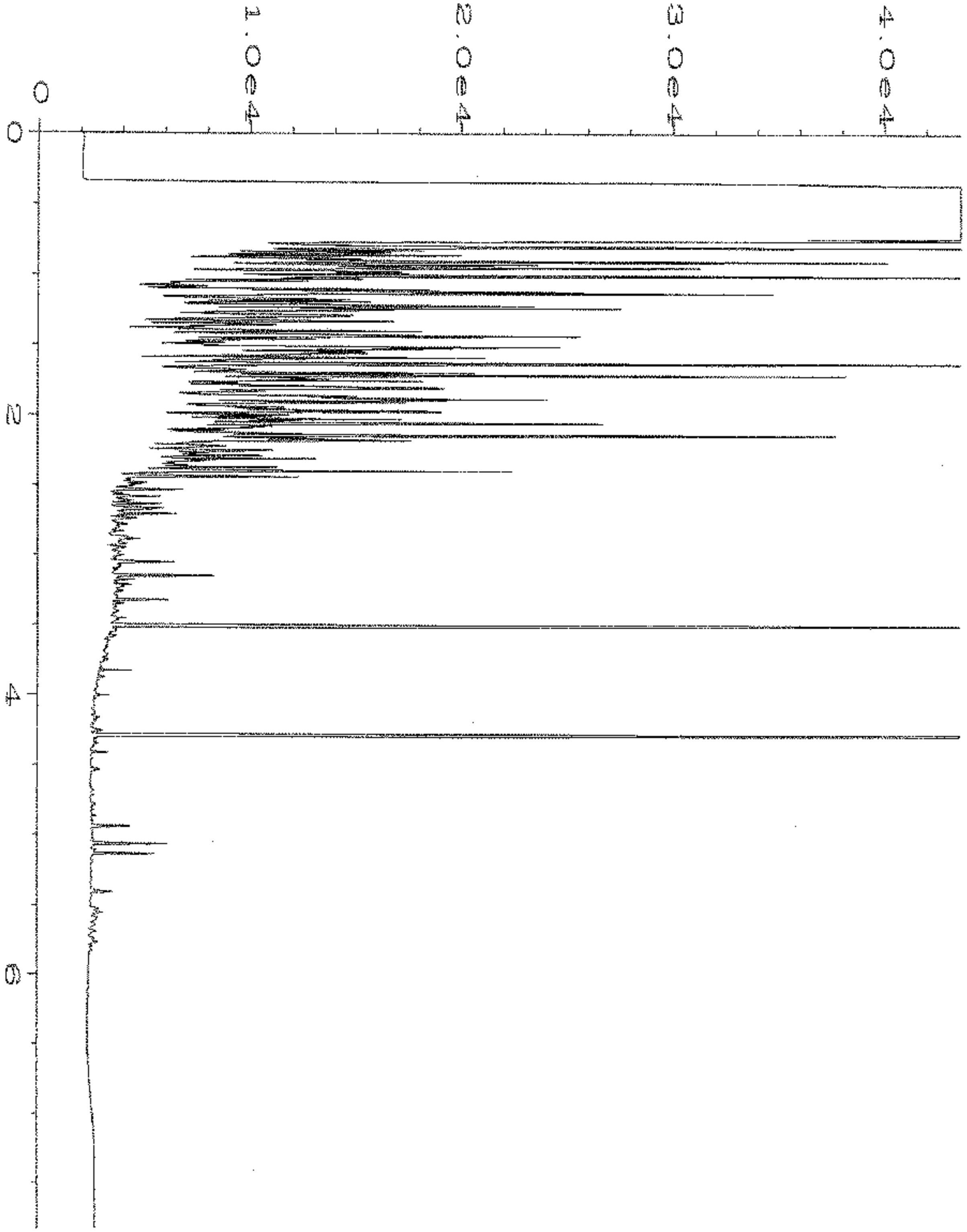
Data File Name : C:\HPCHEM\4\DATA\03-17-20\016F0501.D
Operator : TL
Instrument : GC#4
Sample Name : 003244-02
Run Time Bar Code:
Acquired on : 17 Mar 20 12:37 PM
Report Created on: 18 Mar 20 08:52 AM

Page Number : 1
Vial Number : 16
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



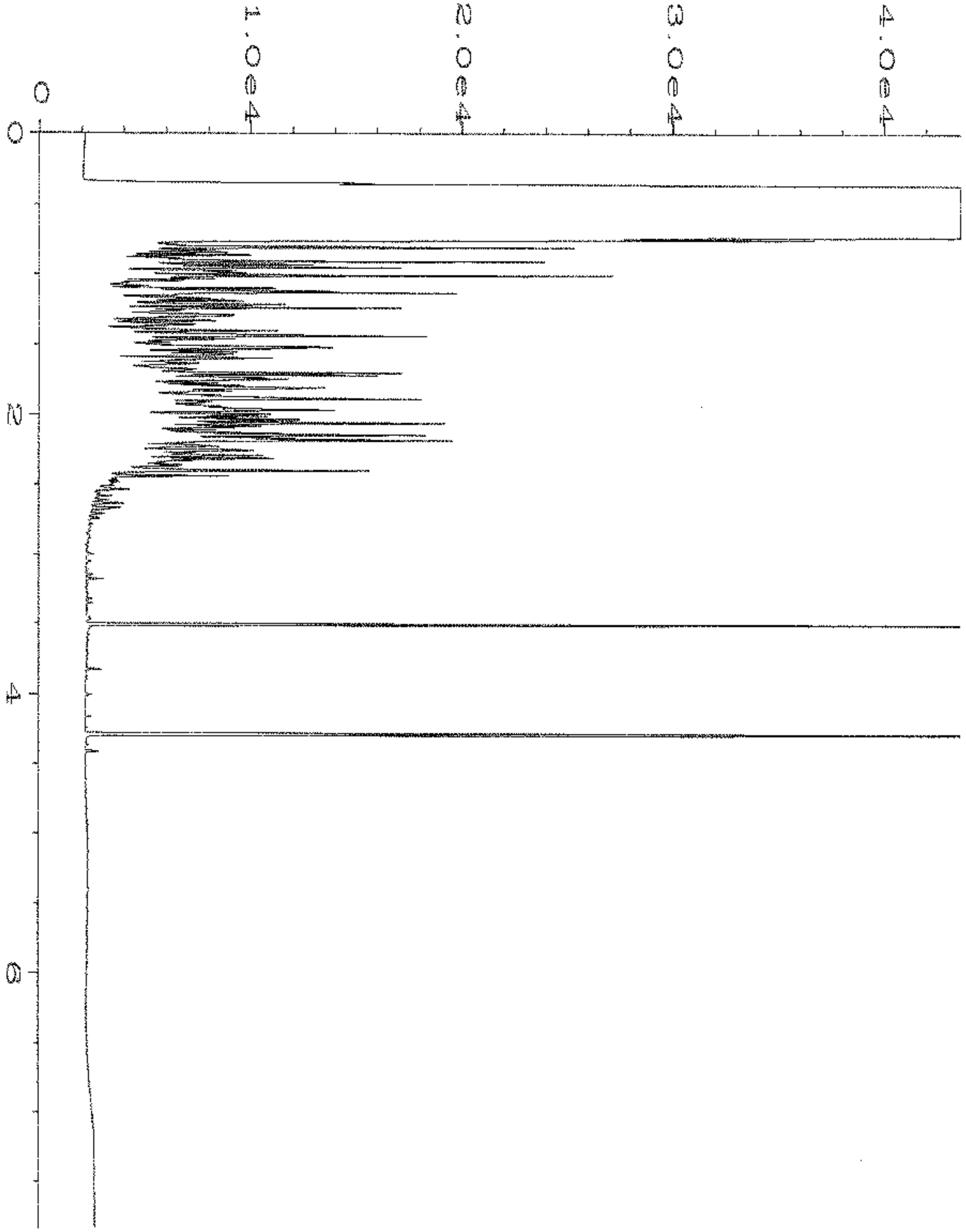
Data File Name   : C:\HPCHEM\4\DATA\03-17-20\017F0501.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 003244-03
Run Time Bar Code:
Acquired on   : 17 Mar 20   12:49 PM
Report Created on: 18 Mar 20   08:53 AM

Page Number   : 1
Vial Number   : 17
Injection Number : 1
Sequence Line   : 5
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH

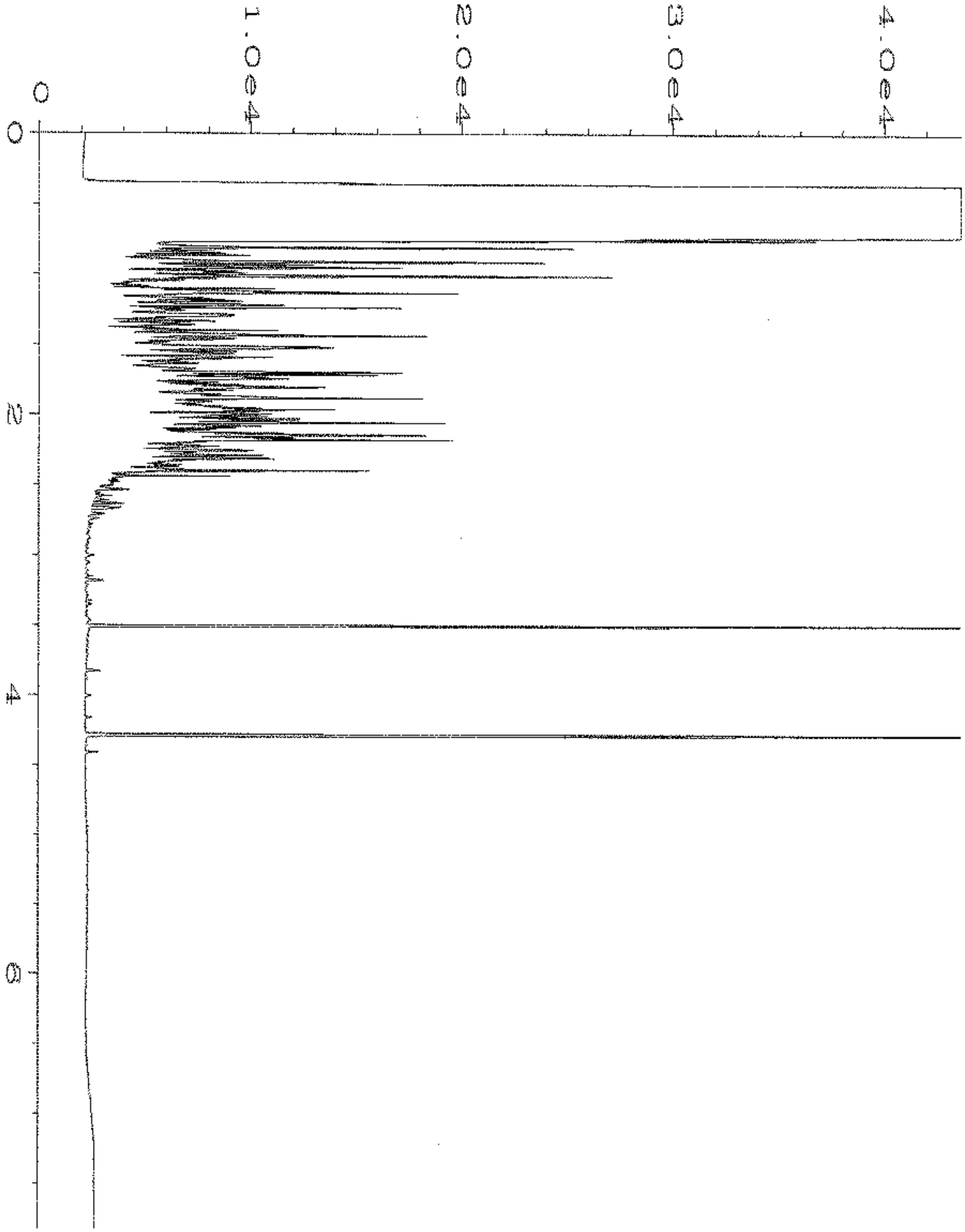


Data File Name : C:\HPCHEM\4\DATA\03-17-20\018F0501.D
Operator : TL
Instrument : GC#4
Sample Name : 003244-10
Run Time Bar Code:
Acquired on : 17 Mar 20 01:01 PM
Report Created on: 18 Mar 20 08:53 AM

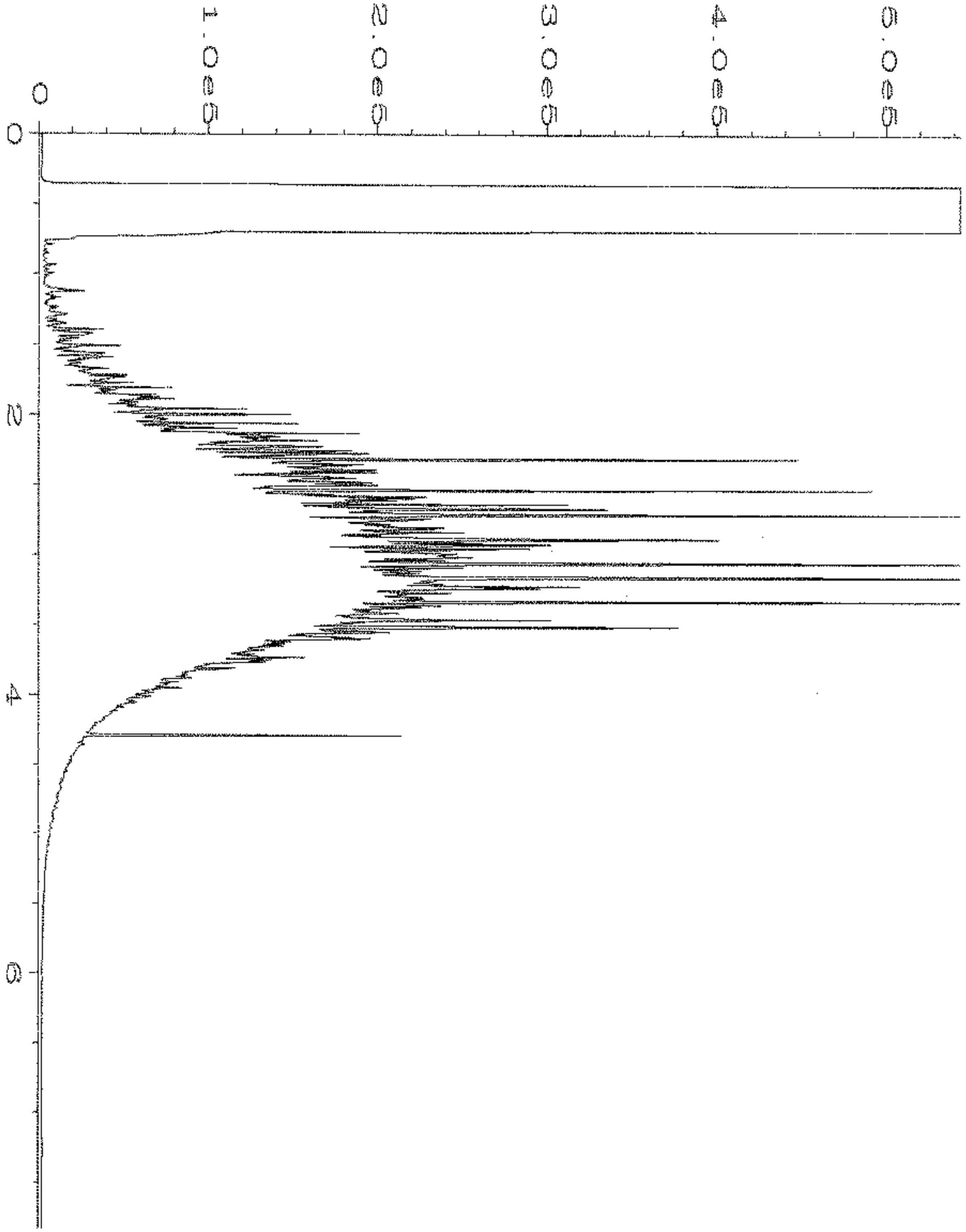
Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\019F0501.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC#4                                Vial Number       : 19
Sample Name       : 003244-11                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 5
Acquired on       : 17 Mar 20   01:13 PM                Instrument Method: DX.MTH
Report Created on: 18 Mar 20   08:53 AM                 Analysis Method   : DEFAULT.MTH
```

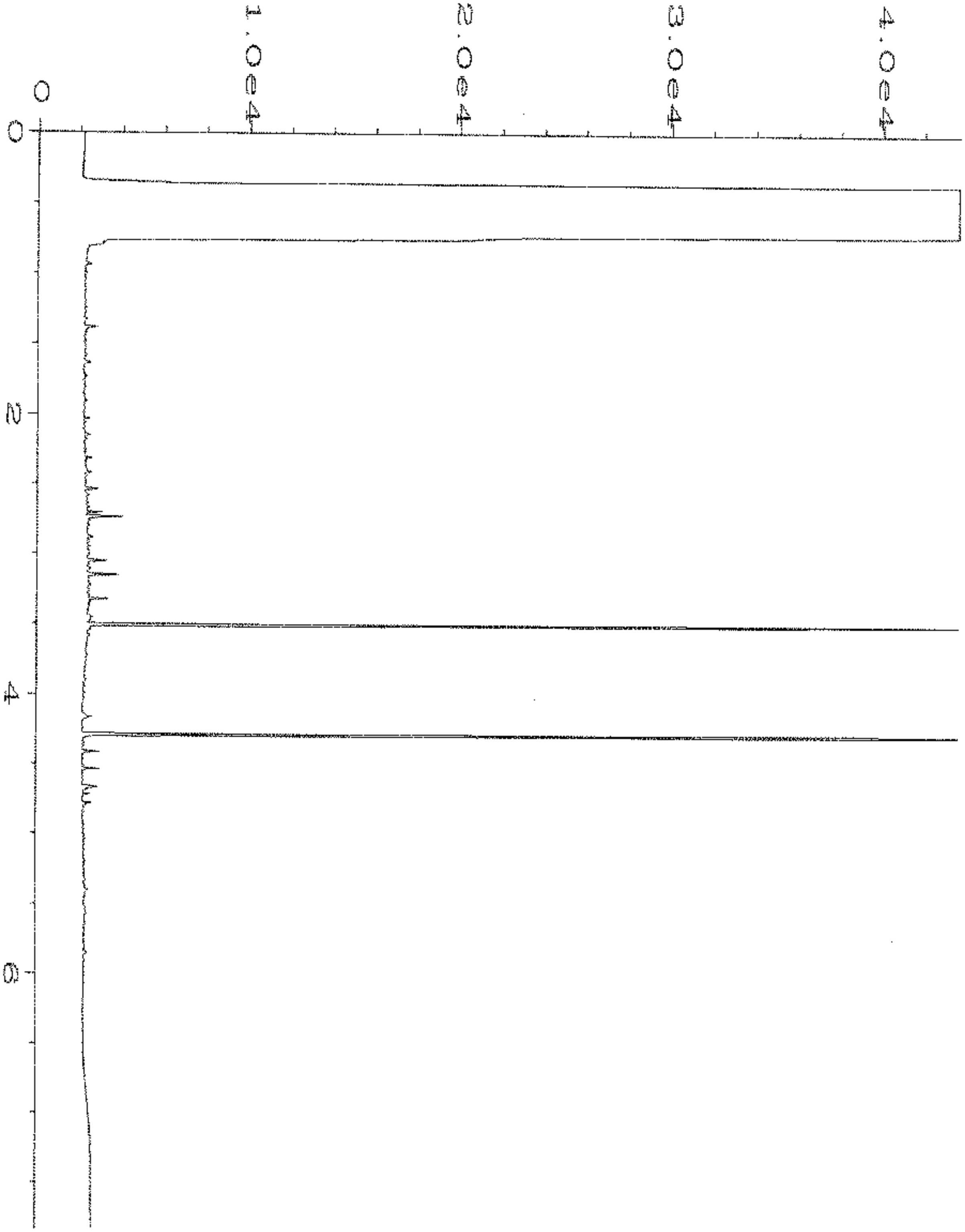


```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\019F0501.D
Operator          : TL                                    Page Number       : 1
Instrument        : GC#4                                  Vial Number       : 19
Sample Name       : 003244-11                             Injection Number  : 1
Run Time Bar Code:                                        Sequence Line     : 5
Acquired on       : 17 Mar 20   01:13 PM                  Instrument Method: DX.MTH
Report Created on: 18 Mar 20   08:53 AM                  Analysis Method   : DEFAULT.MTH
```

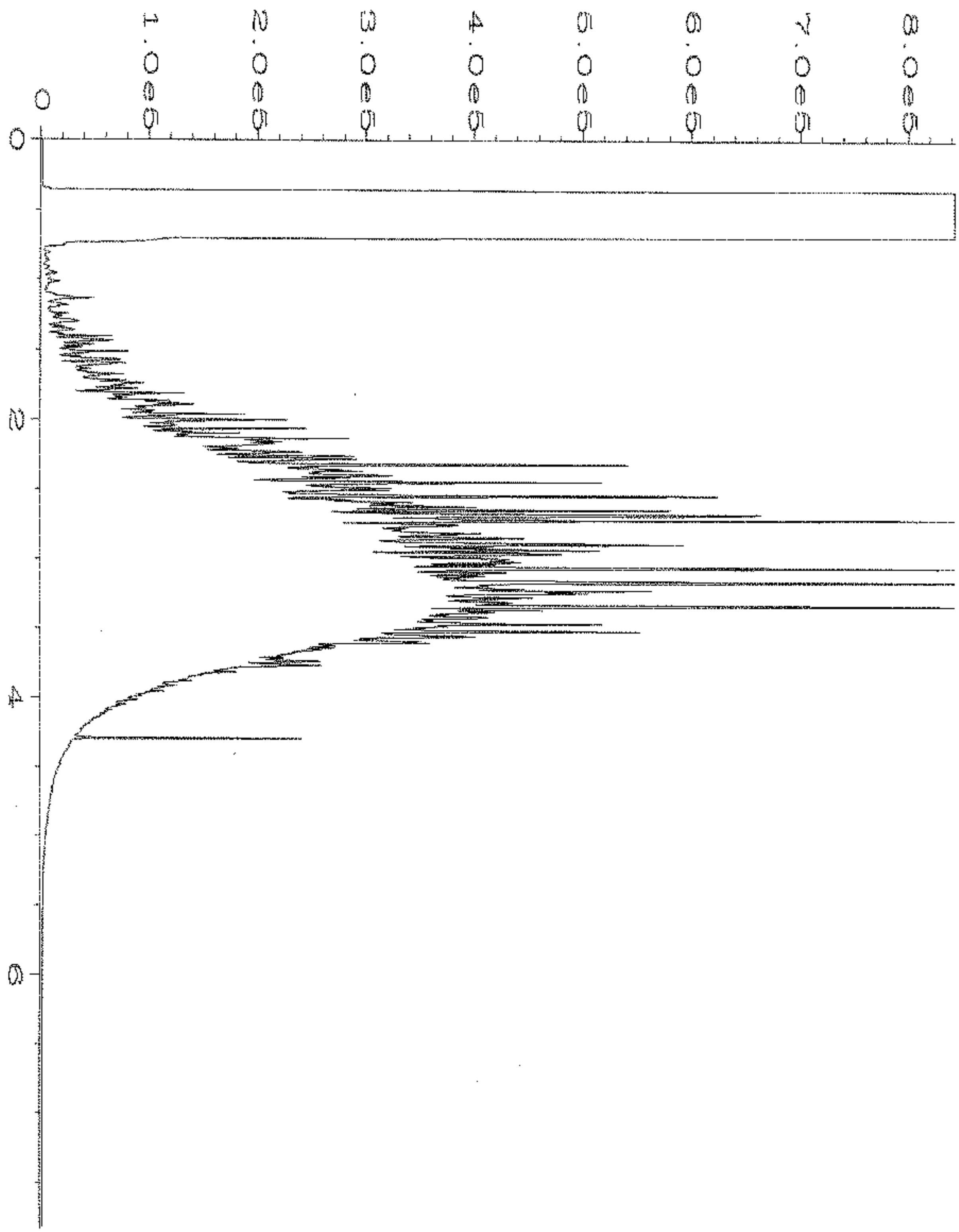


Data File Name   : C:\HPCHEM\4\DATA\03-17-20\020F0501.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 003244-20
Run Time Bar Code:
Acquired on   : 17 Mar 20 01:25 PM
Report Created on: 18 Mar 20 08:54 AM

Page Number   : 1
Vial Number   : 20
Injection Number : 1
Sequence Line   : 5
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH

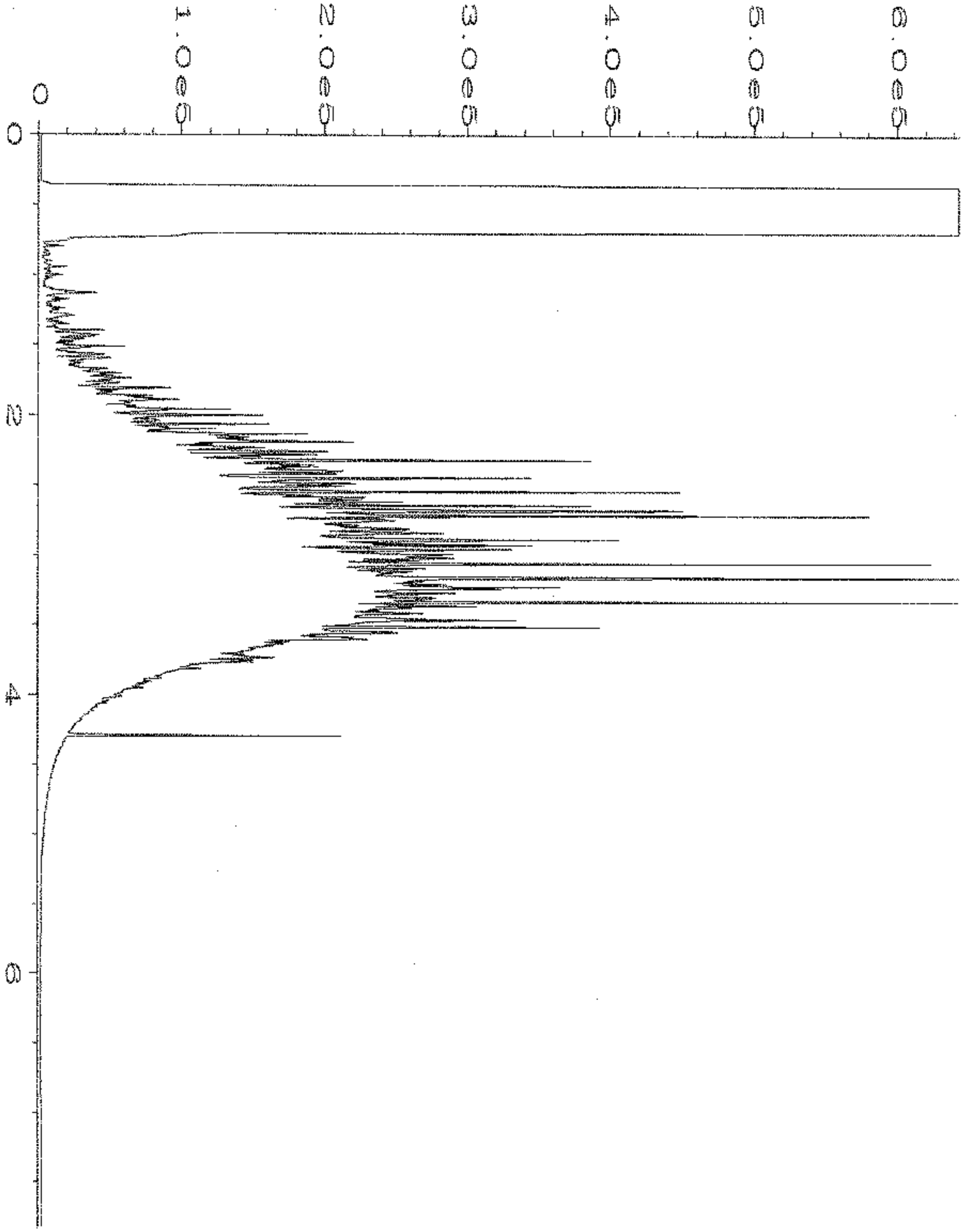


```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\021F0501.D
Operator          : TL                                      Page Number       : 1
Instrument        : GC#4                                    Vial Number       : 21
Sample Name       : 003244-21                               Injection Number  : 1
Run Time Bar Code:                                          Sequence Line     : 5
Acquired on       : 17 Mar 20   01:38 PM                    Instrument Method: DX.MTH
Report Created on: 18 Mar 20   08:54 AM                     Analysis Method   : DEFAULT.MTH
```

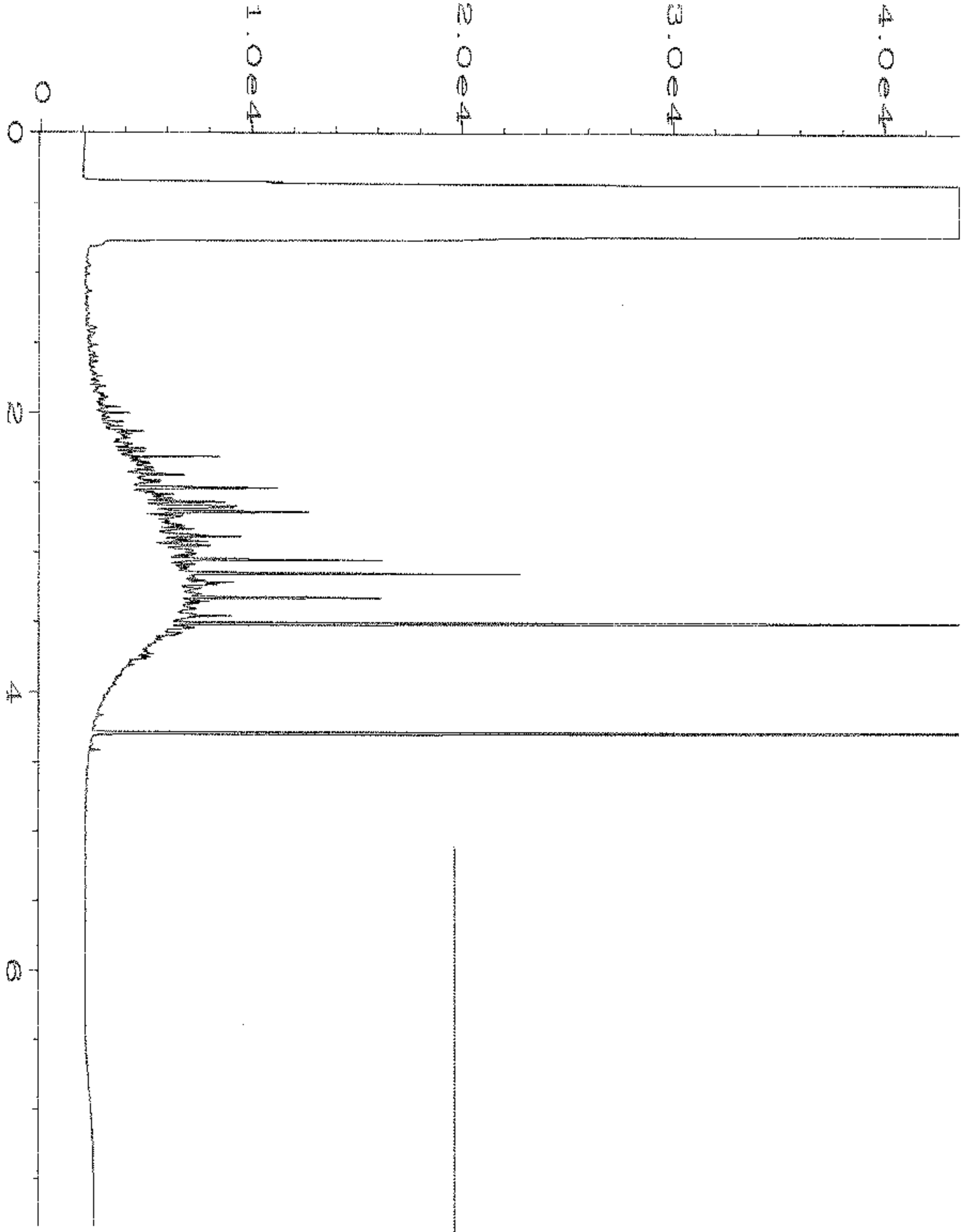


Data File Name : C:\HPCHEM\4\DATA\03-17-20\022F0501.D
Operator : TL
Instrument : GC#4
Sample Name : 003244-24
Run Time Bar Code:
Acquired on : 17 Mar 20 01:50 PM
Report Created on: 18 Mar 20 08:55 AM

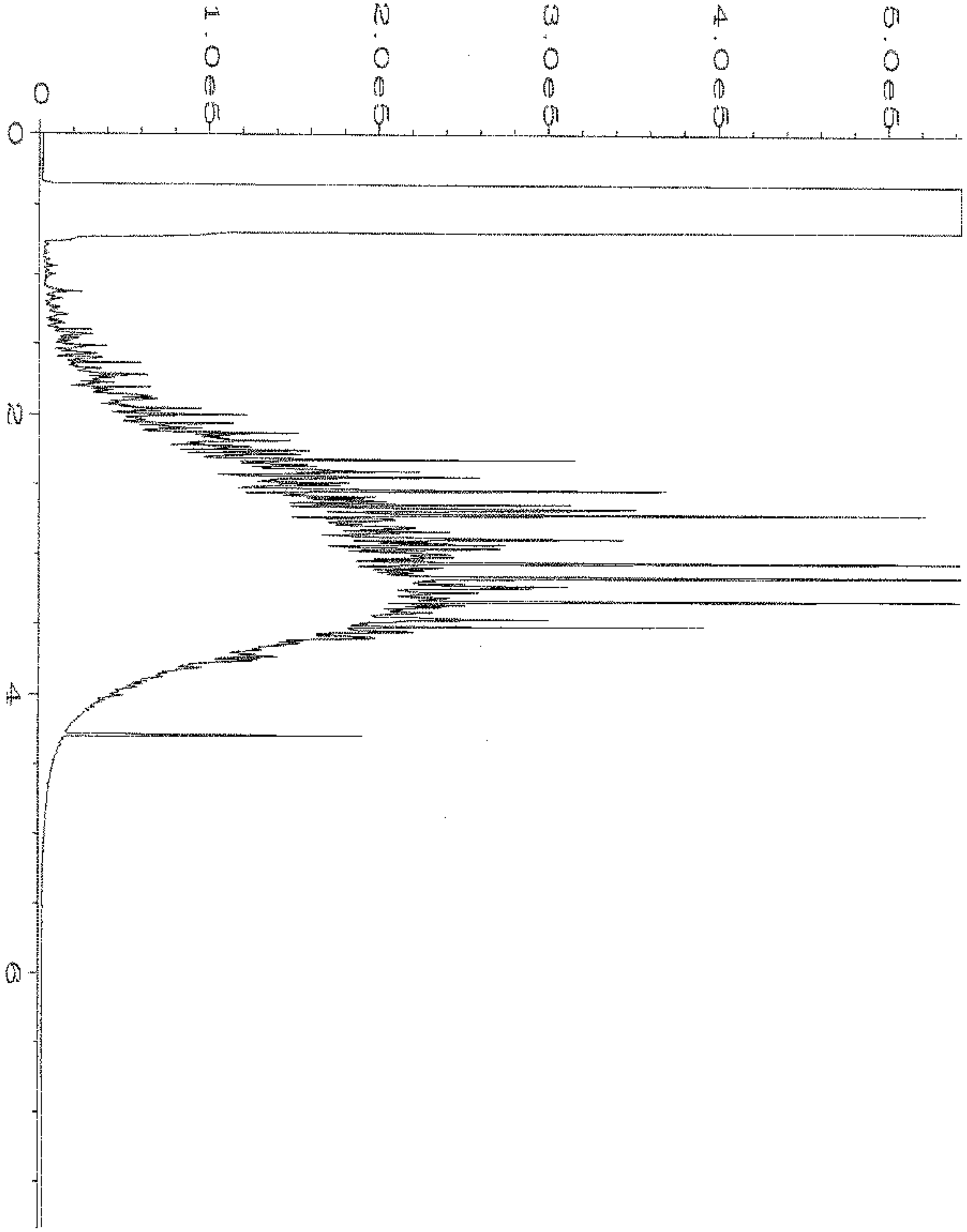
Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\023F0501.D
Operator          : TL                                 Page Number      : 1
Instrument        : GC#4                               Vial Number      : 23
Sample Name       : 003244-25                          Injection Number : 1
Run Time Bar Code:                                     Sequence Line    : 5
Acquired on       : 17 Mar 20   02:02 PM               Instrument Method: DX.MTH
Report Created on: 18 Mar 20   08:57 AM                Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\024F0501.D
Operator          : TL                              Page Number      : 1
Instrument        : GC#4                            Vial Number      : 24
Sample Name       : 003244-26                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 5
Acquired on       : 17 Mar 20   02:14 PM            Instrument Method: DX.MTH
Report Created on: 18 Mar 20   08:57 AM             Analysis Method  : DEFAULT.MTH
```



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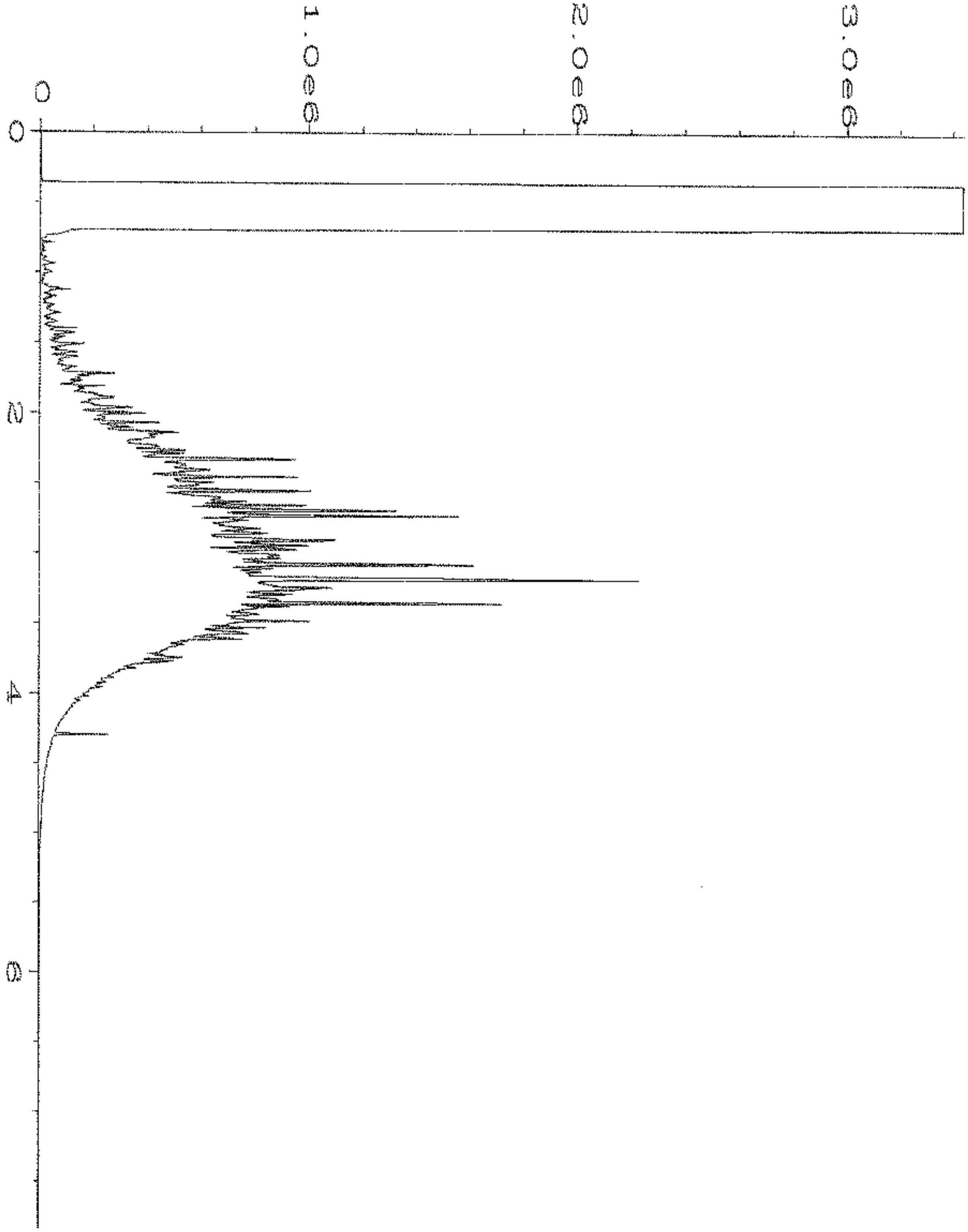
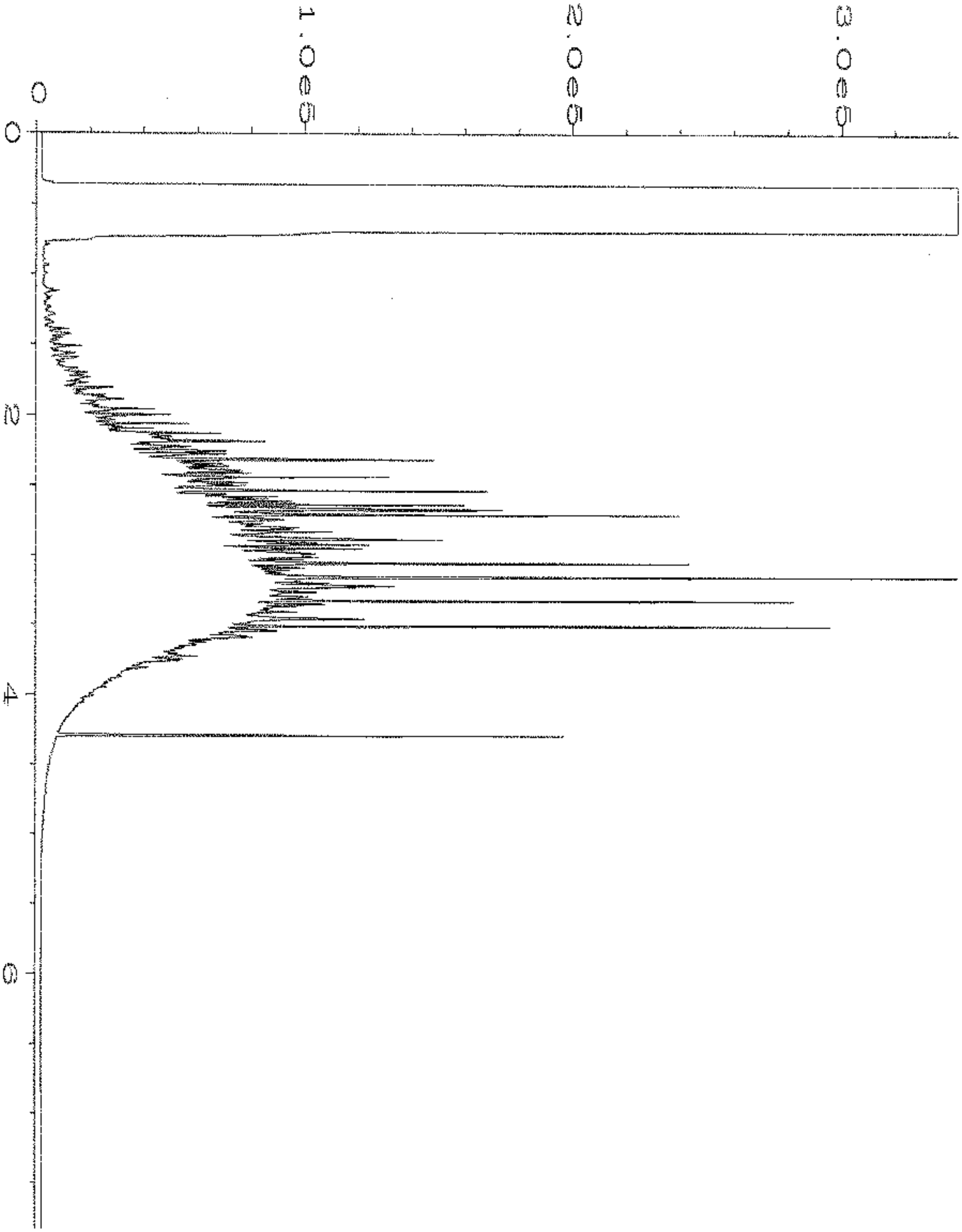
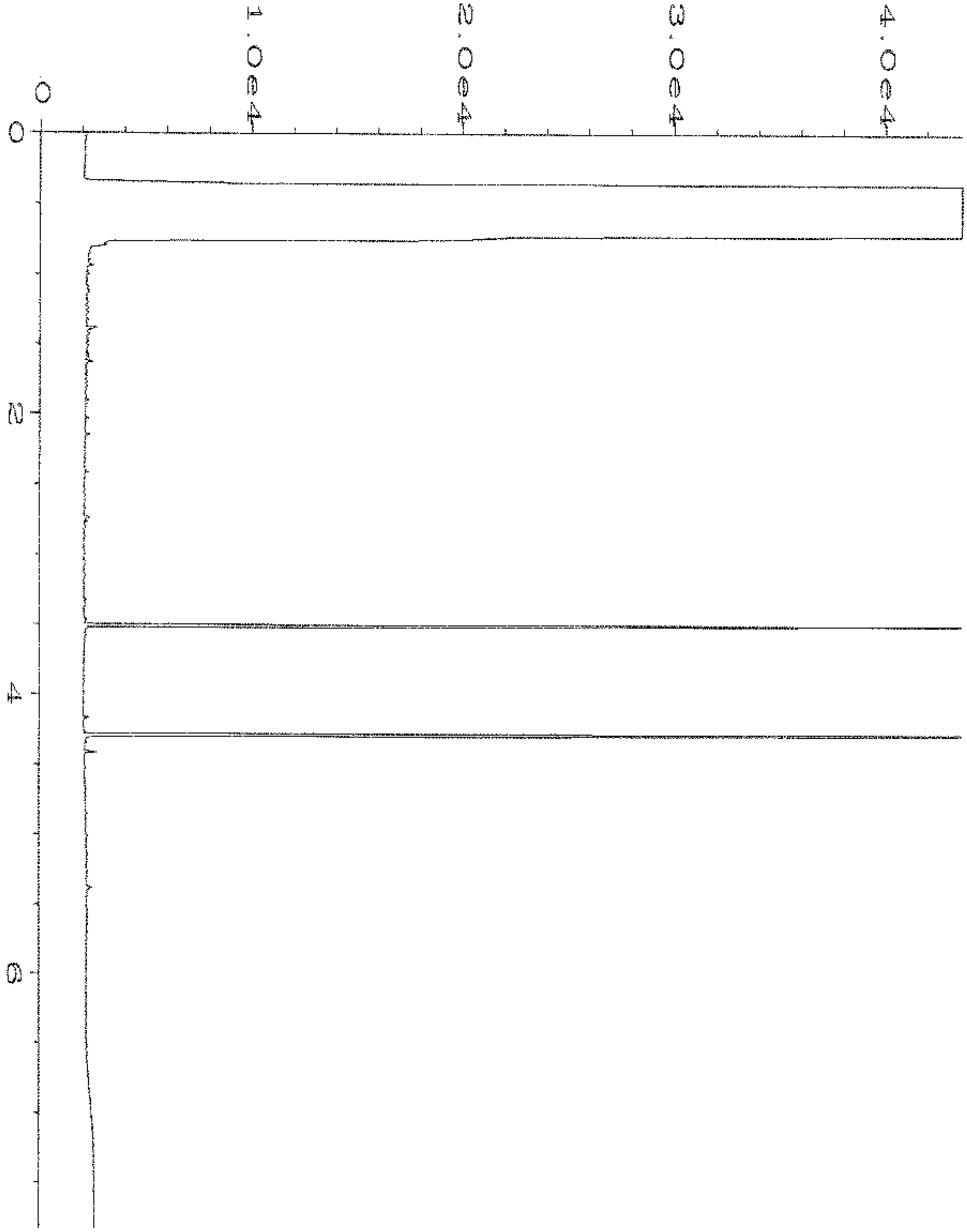
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\025F0501.D
Operator          : TL                              Page Number       : 1
Instrument        : GC#4                            Vial Number       : 25
Sample Name       : 003244-28                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line     : 5
Acquired on       : 17 Mar 20  02:26 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20  08:57 AM              Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\026F0701.D
Operator          : TL                                   Page Number       : 1
Instrument        : GC#4                                 Vial Number       : 26
Sample Name       : 003244-29                            Injection Number  : 1
Run Time Bar Code:                                       Sequence Line     : 7
Acquired on       : 17 Mar 20   03:05 PM                 Instrument Method: DX.MTH
Report Created on: 18 Mar 20   08:59 AM                  Analysis Method   : DEFAULT.MTH
```

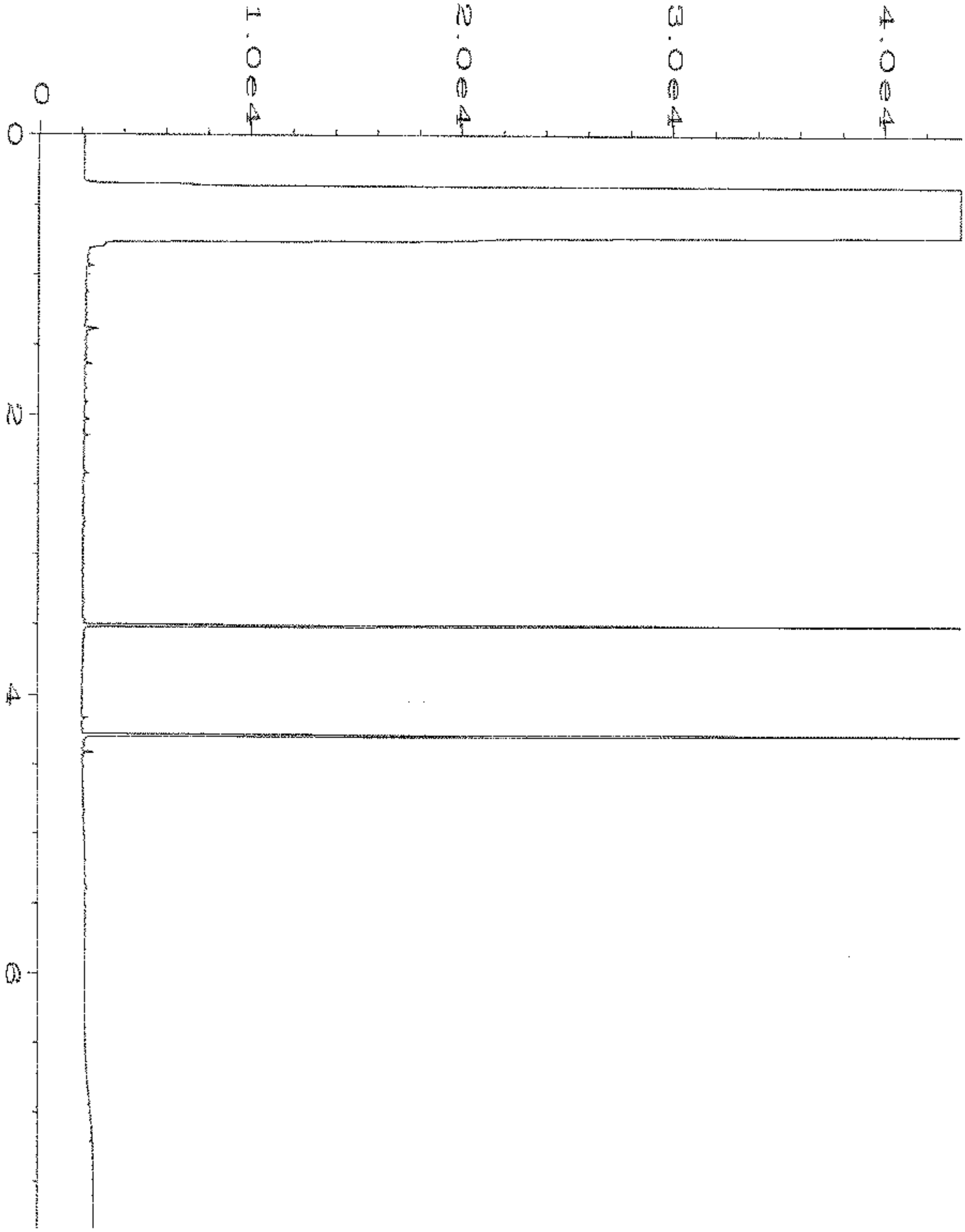


```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\027F0701.D
Operator          : TL                              Page Number      : 1
Instrument        : GC#4                            Vial Number      : 27
Sample Name       : 003244-30                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 7
Acquired on       : 17 Mar 20   03:16 PM            Instrument Method: DX.MTH
Report Created on: 18 Mar 20   08:59 AM            Analysis Method  : DEFAULT.MTH
```



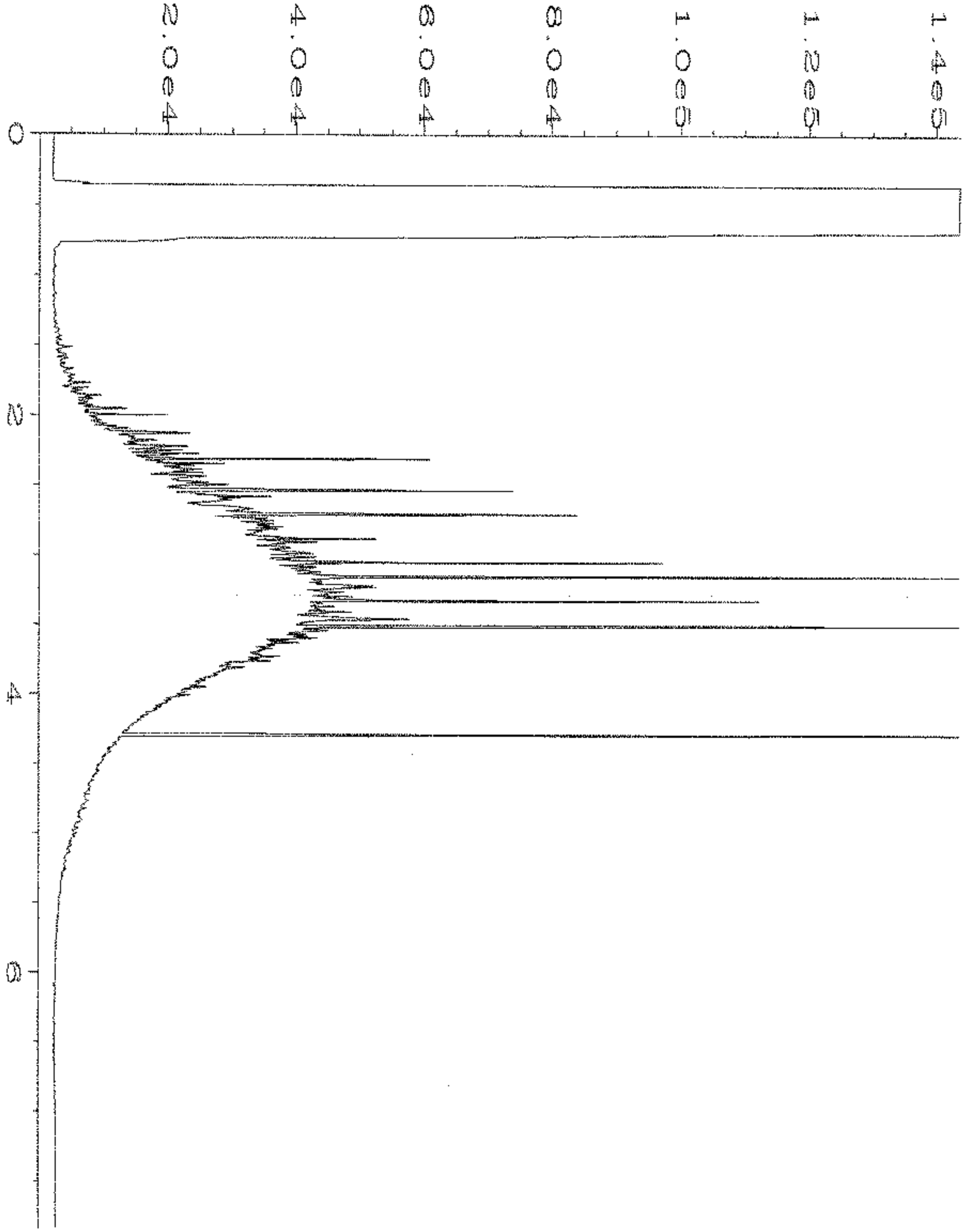
Data File Name : C:\HPCHEM\4\DATA\03-17-20\028F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 003244-39
Run Time Bar Code:
Acquired on : 17 Mar 20 03:28 PM
Report Created on: 18 Mar 20 08:59 AM

Page Number : 1
Vial Number : 28
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



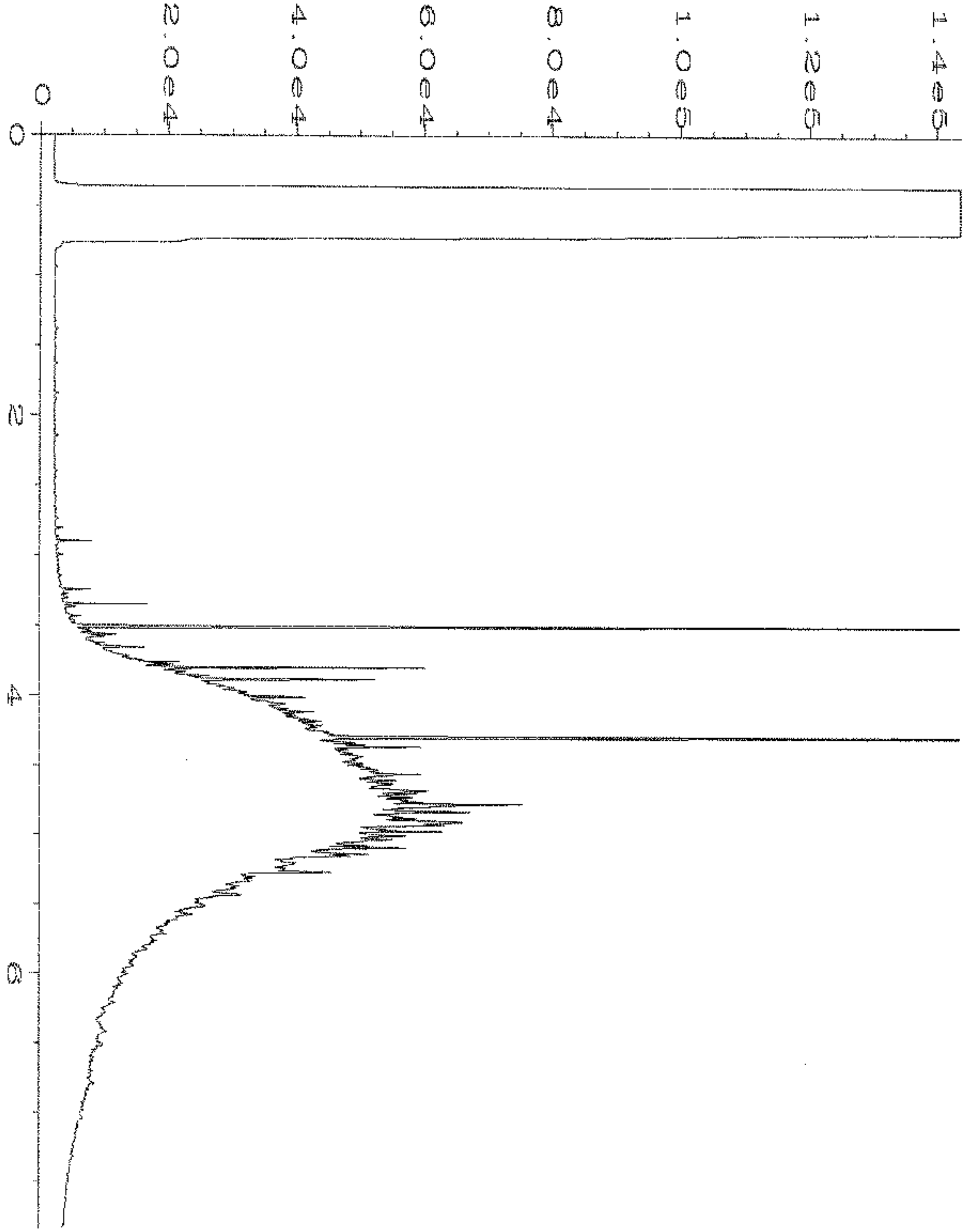
Data File Name   : C:\HPCHEM\4\DATA\03-17-20\029F0701.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 003244-40
Run Time Bar Code:
Acquired on   : 17 Mar 20   03:40 PM
Report Created on: 18 Mar 20   09:00 AM

Page Number   : 1
Vial Number   : 29
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH

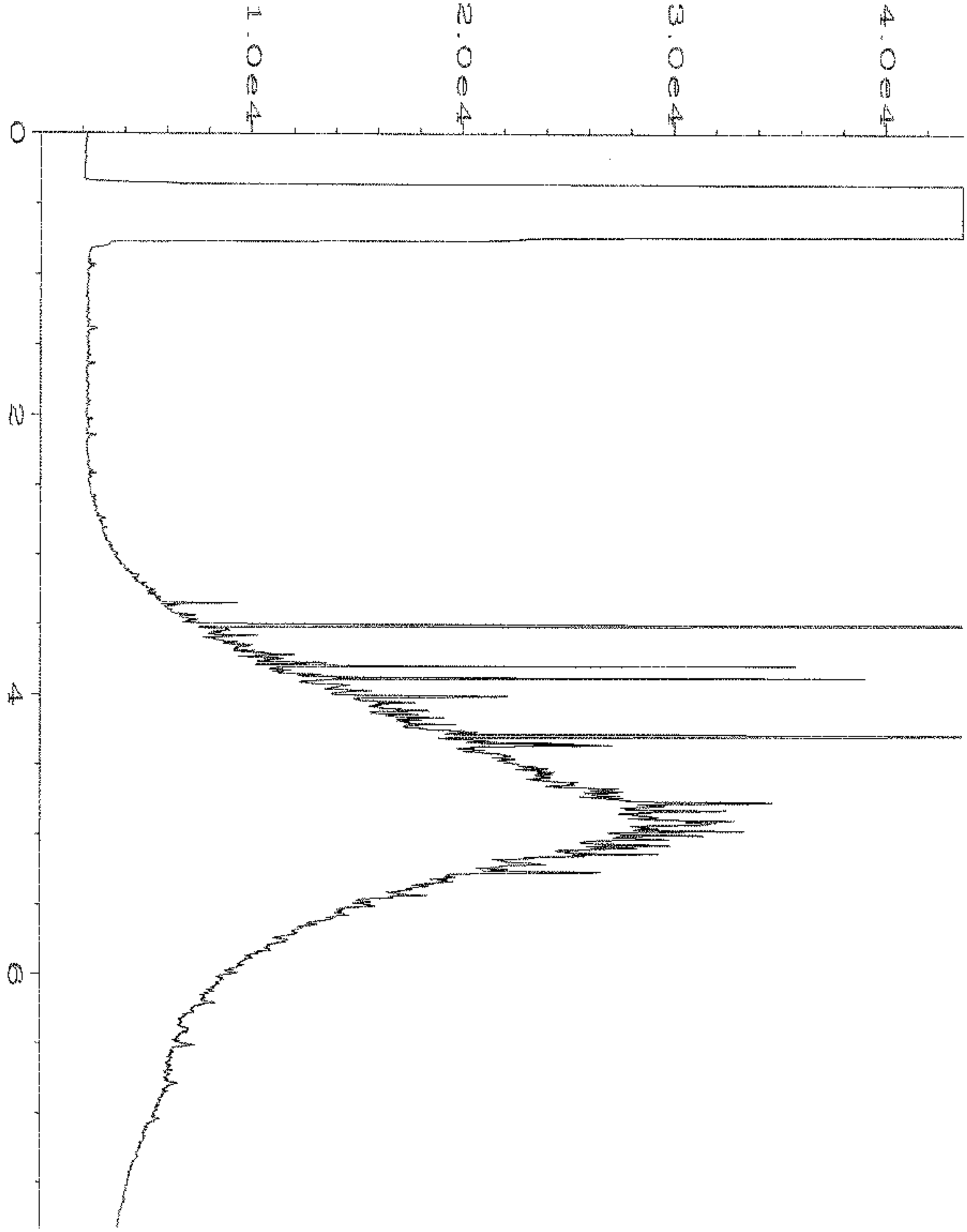


Data File Name   : C:\HPCHEM\4\DATA\03-17-20\030F0701.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 003244-69
Run Time Bar Code:
Acquired on   : 17 Mar 20   03:52 PM
Report Created on: 18 Mar 20   09:00 AM

Page Number   : 1
Vial Number   : 30
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH

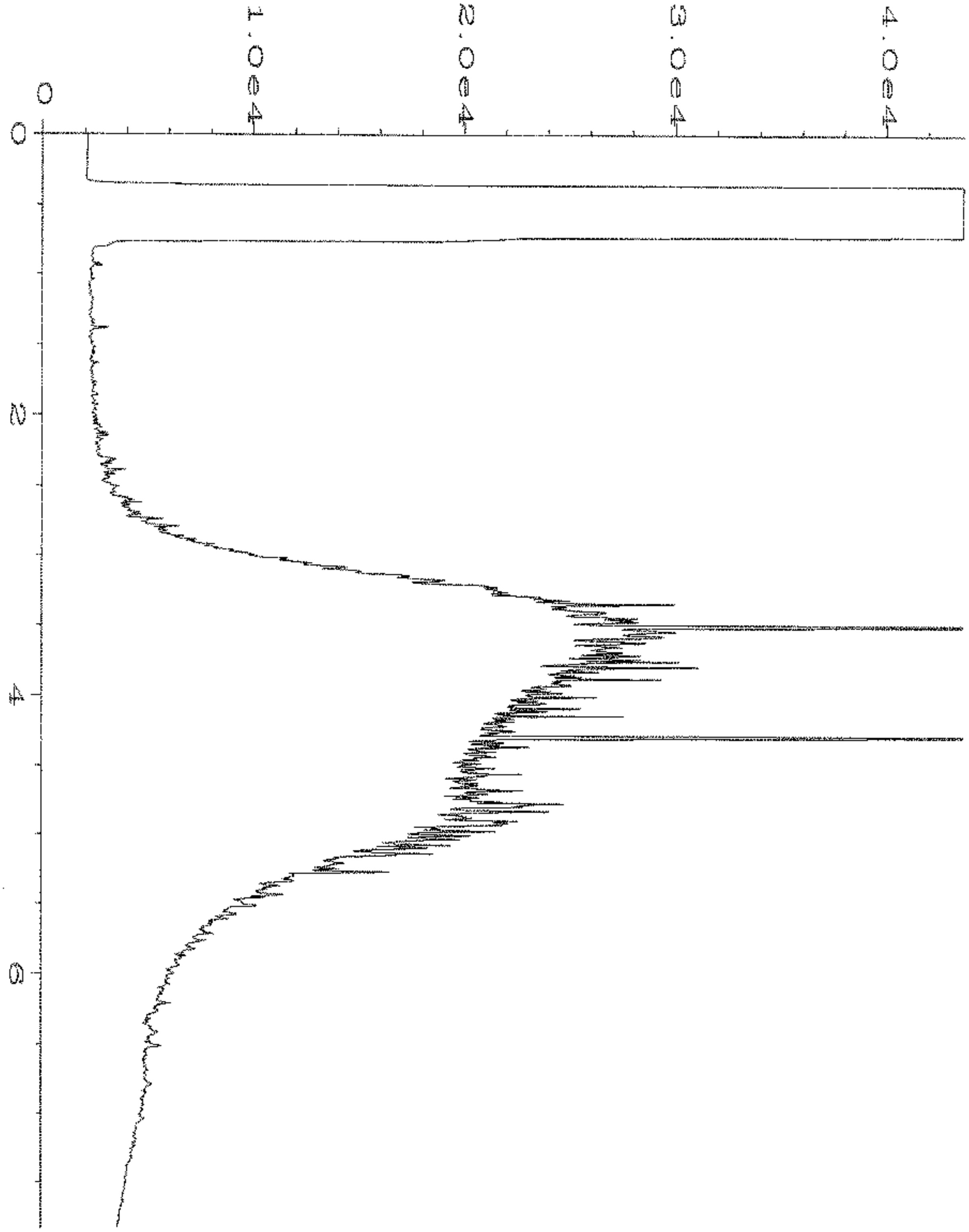


```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\031F0701.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC#4                                Vial Number      : 31
Sample Name       : 003244-72                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 7
Acquired on       : 17 Mar 20  04:04 PM                 Instrument Method: DX.MTH
Report Created on: 18 Mar 20  09:01 AM                  Analysis Method  : DEFAULT.MTH
```



Data File Name : C:\HPCHEM\4\DATA\03-17-20\032F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 003244-73
Run Time Bar Code:
Acquired on : 17 Mar 20 04:16 PM
Report Created on: 18 Mar 20 09:01 AM

Page Number : 1
Vial Number : 32
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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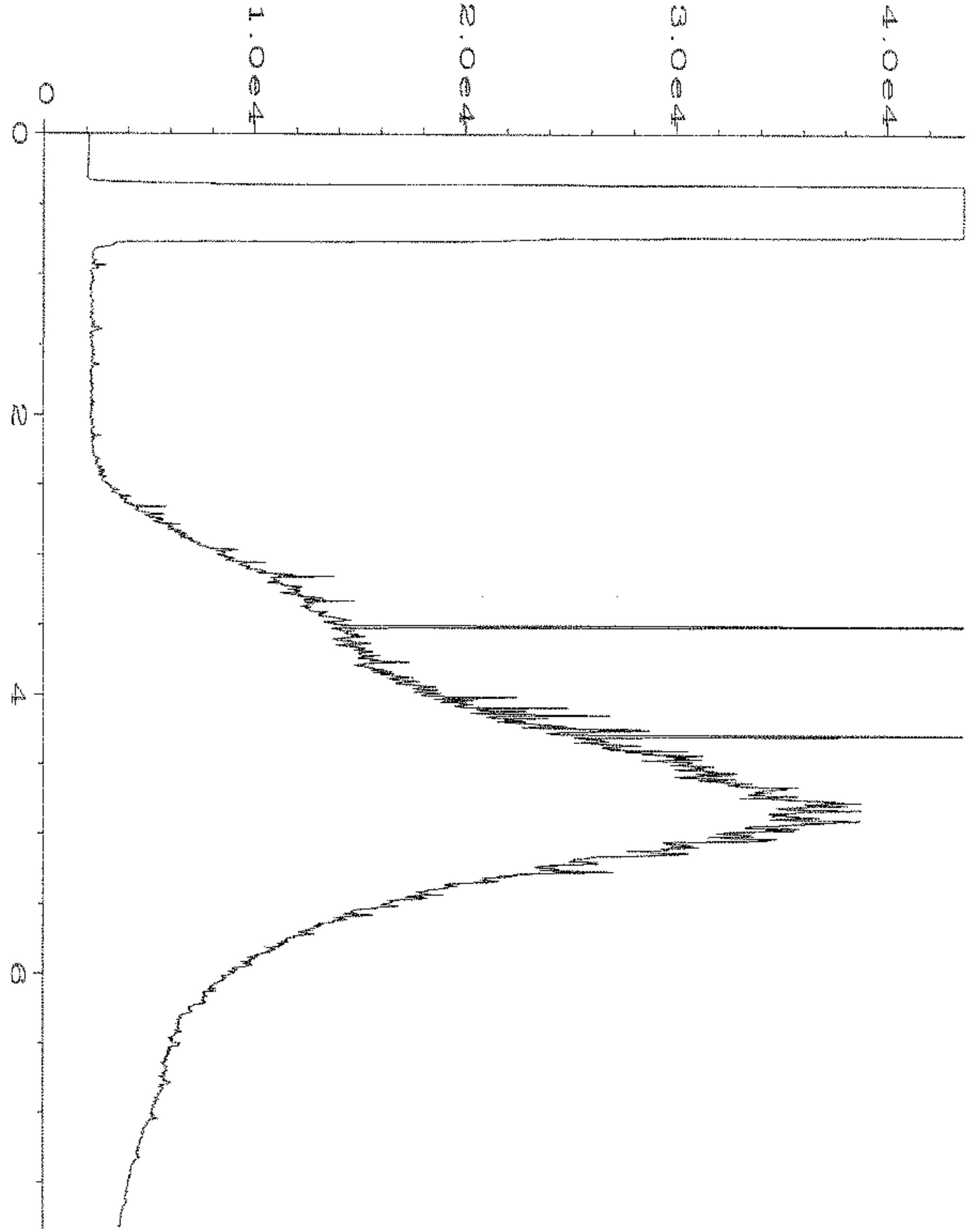
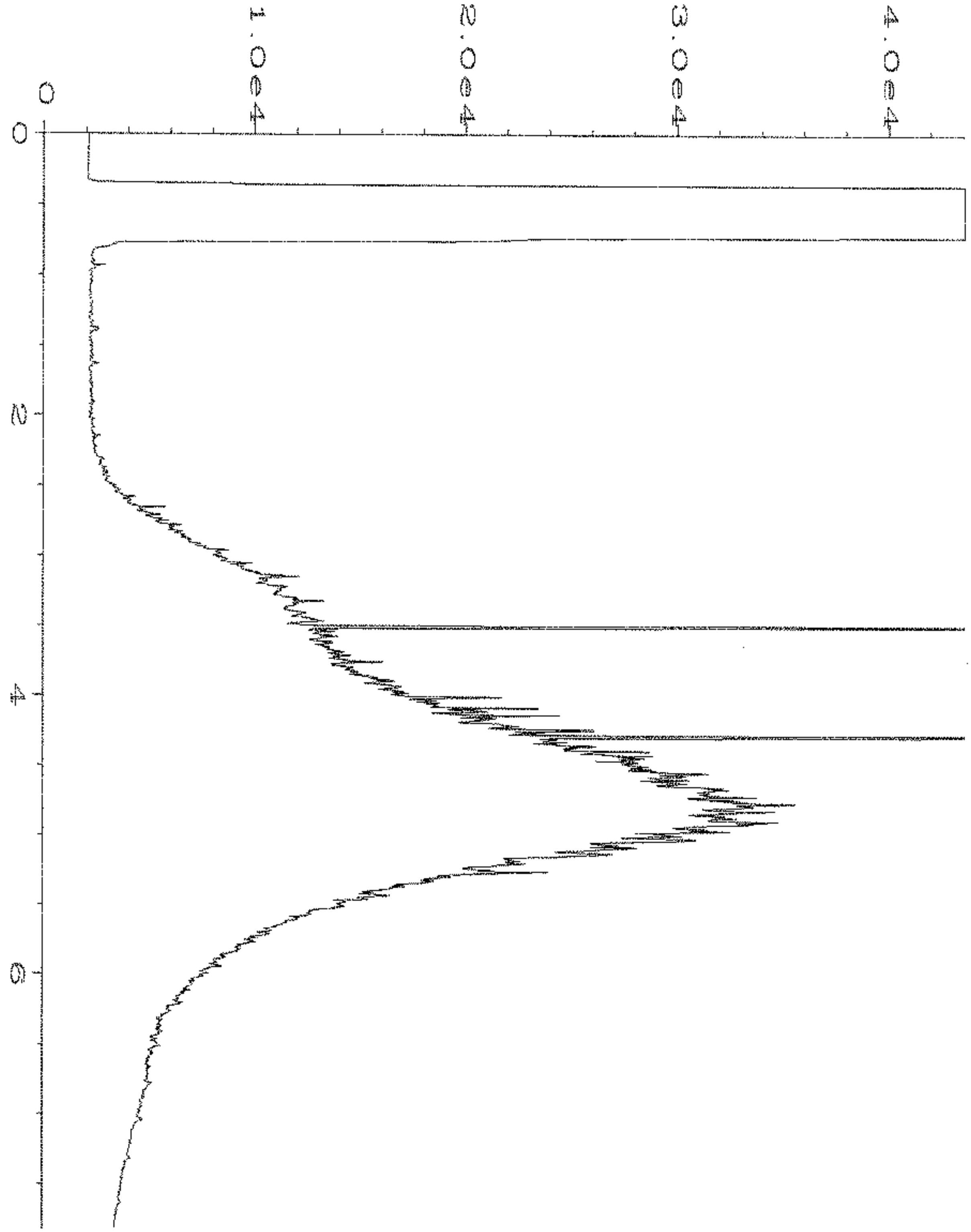
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\033F0701.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC#4                                Vial Number      : 33
Sample Name       : 003244-74                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 7
Acquired on       : 17 Mar 20  04:28 PM                 Instrument Method: DX.MTH
Report Created on: 18 Mar 20  09:02 AM                  Analysis Method  : DEFAULT.MTH
```



Data File Name   : C:\HPCHEM\4\DATA\03-17-20\034F0701.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 003244-75
Run Time Bar Code:
Acquired on   : 17 Mar 20   04:40 PM
Report Created on: 18 Mar 20   09:02 AM

Page Number   : 1
Vial Number   : 34
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



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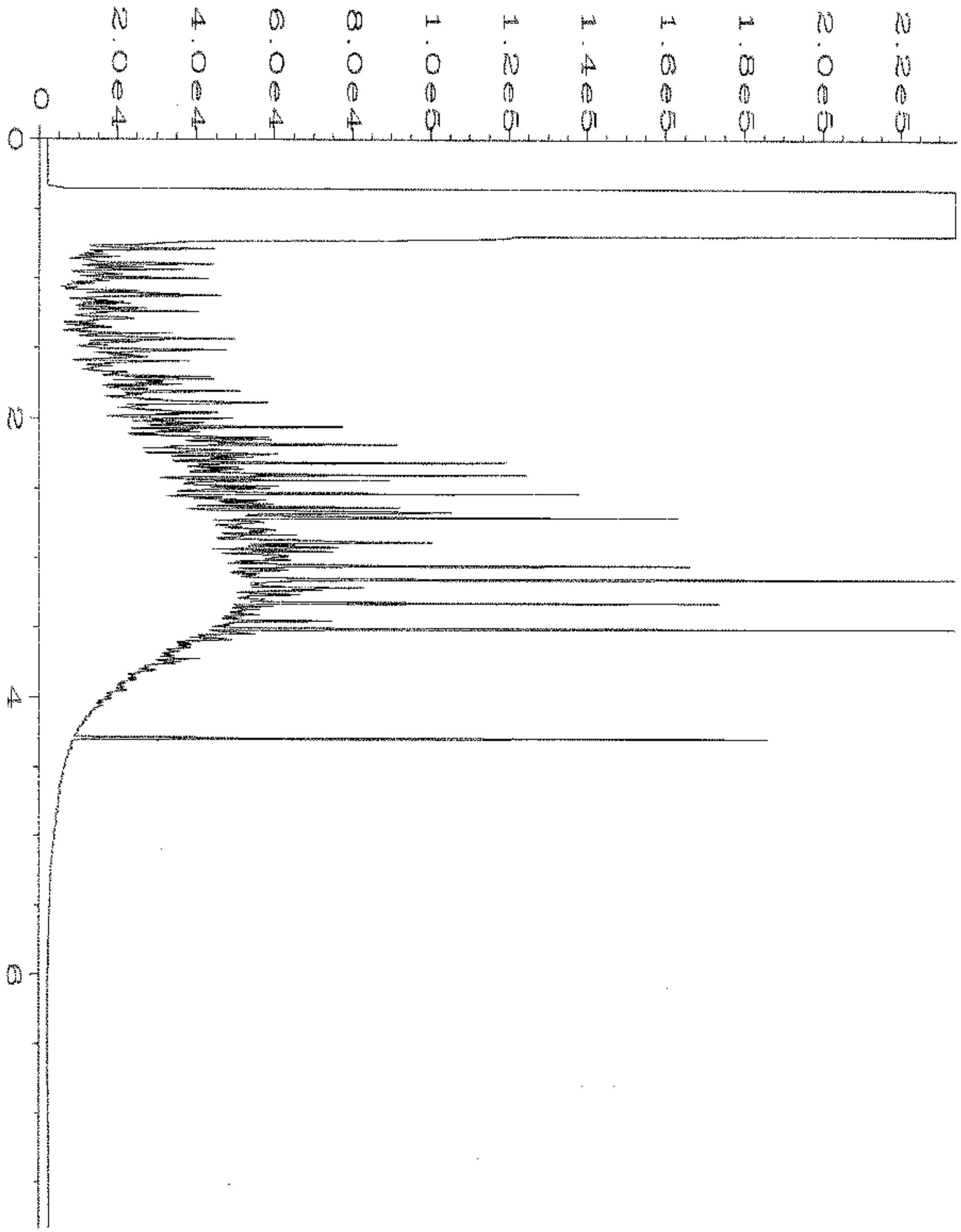
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\035F0701.D
Operator          : TL                               Page Number       : 1
Instrument        : GC#4                             Vial Number       : 35
Sample Name       : 003244-76                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line     : 7
Acquired on       : 17 Mar 20  04:52 PM              Instrument Method: DX.MTH
Report Created on: 18 Mar 20  09:02 AM               Analysis Method   : DEFAULT.MTH
```



Data File Name : C:\HPCHEM\4\DATA\03-17-20\042F0701.D

Operator : TL

Instrument : GC#4

Sample Name : 003244-79

Run Time Bar Code:

Acquired on : 17 Mar 20 06:17 PM

Report Created on: 18 Mar 20 09:04 AM

Page Number : 1

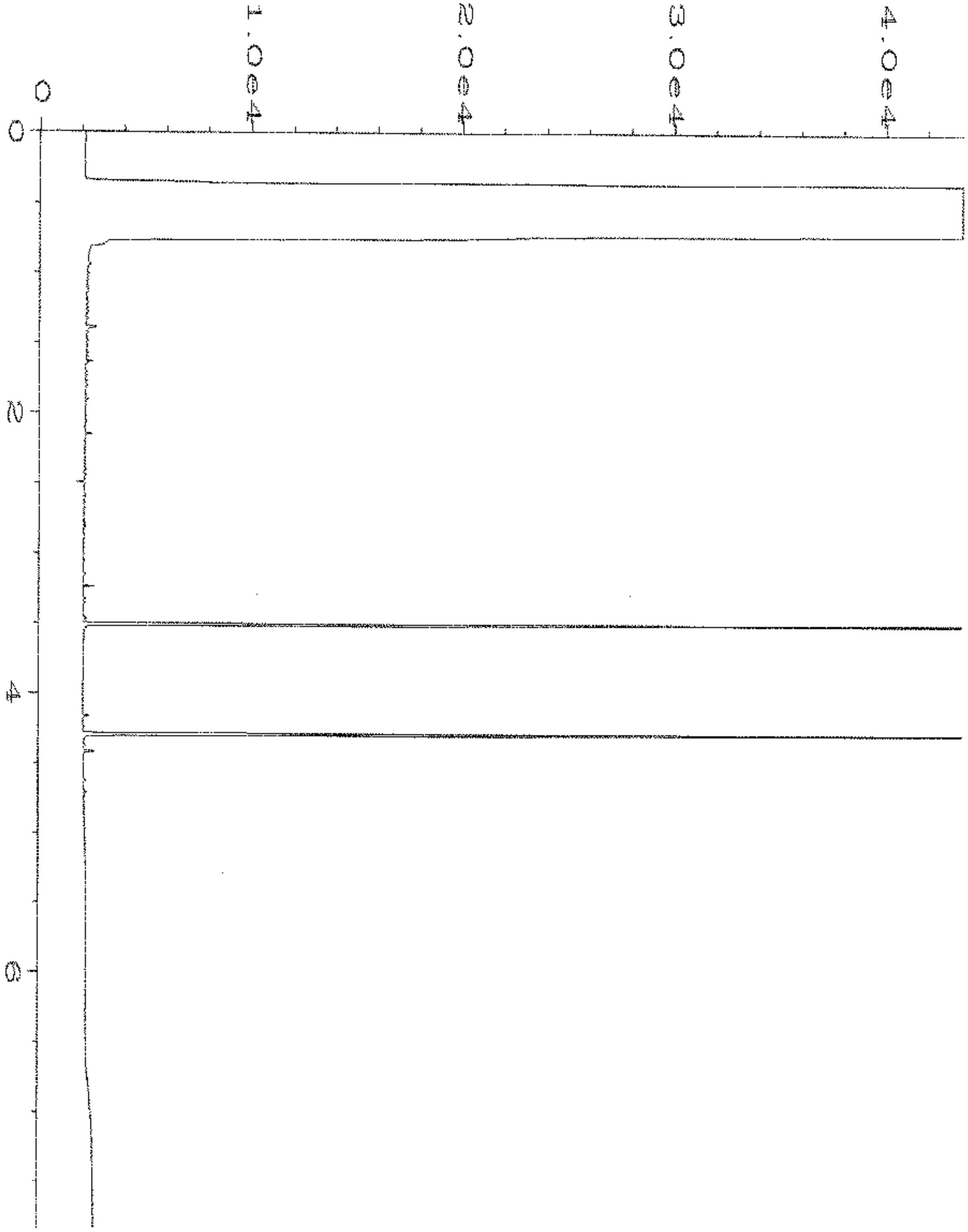
Vial Number : 42

Injection Number : 1

Sequence Line : 7

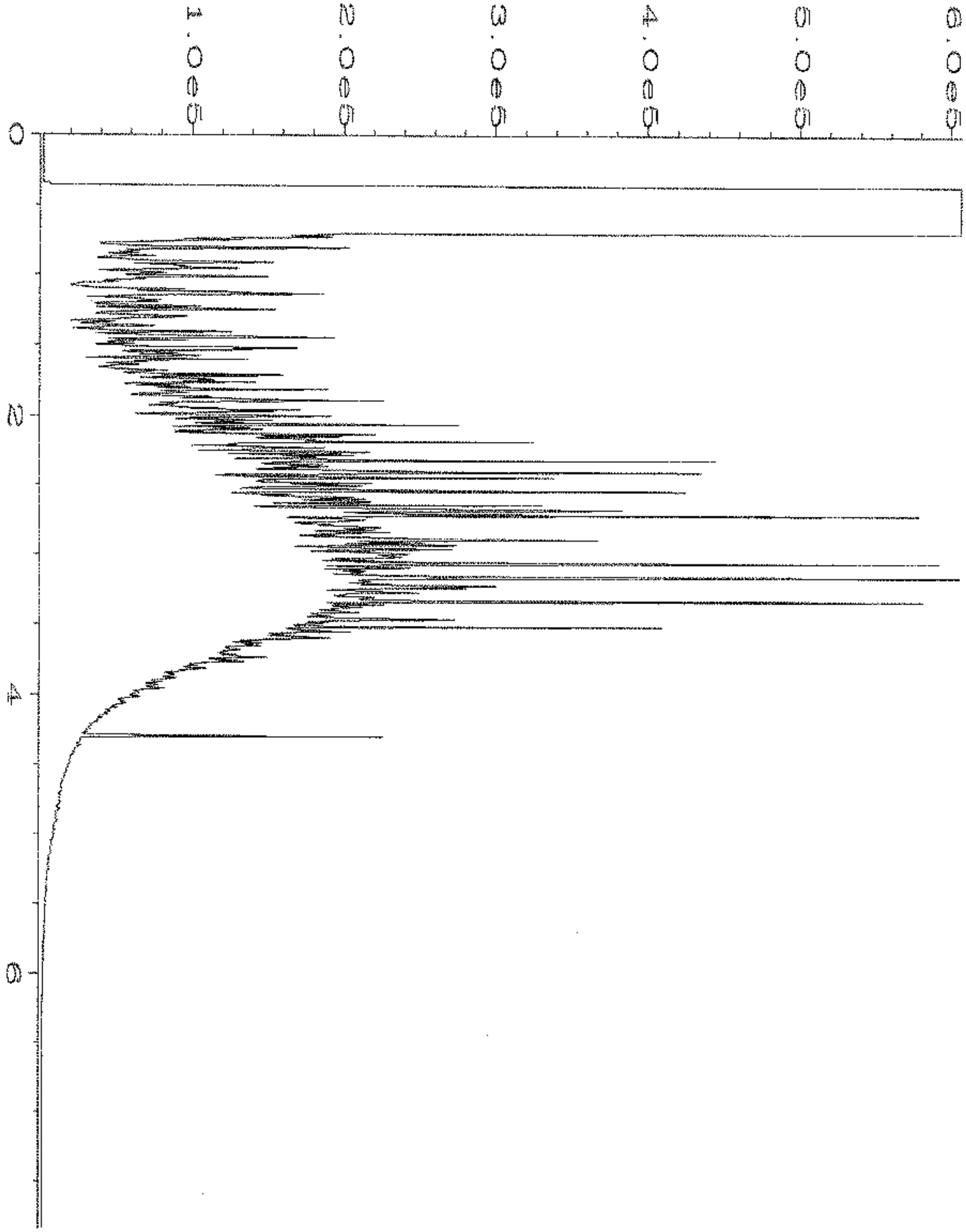
Instrument Method: DX.MTH

Analysis Method : DEFAULT.MTH

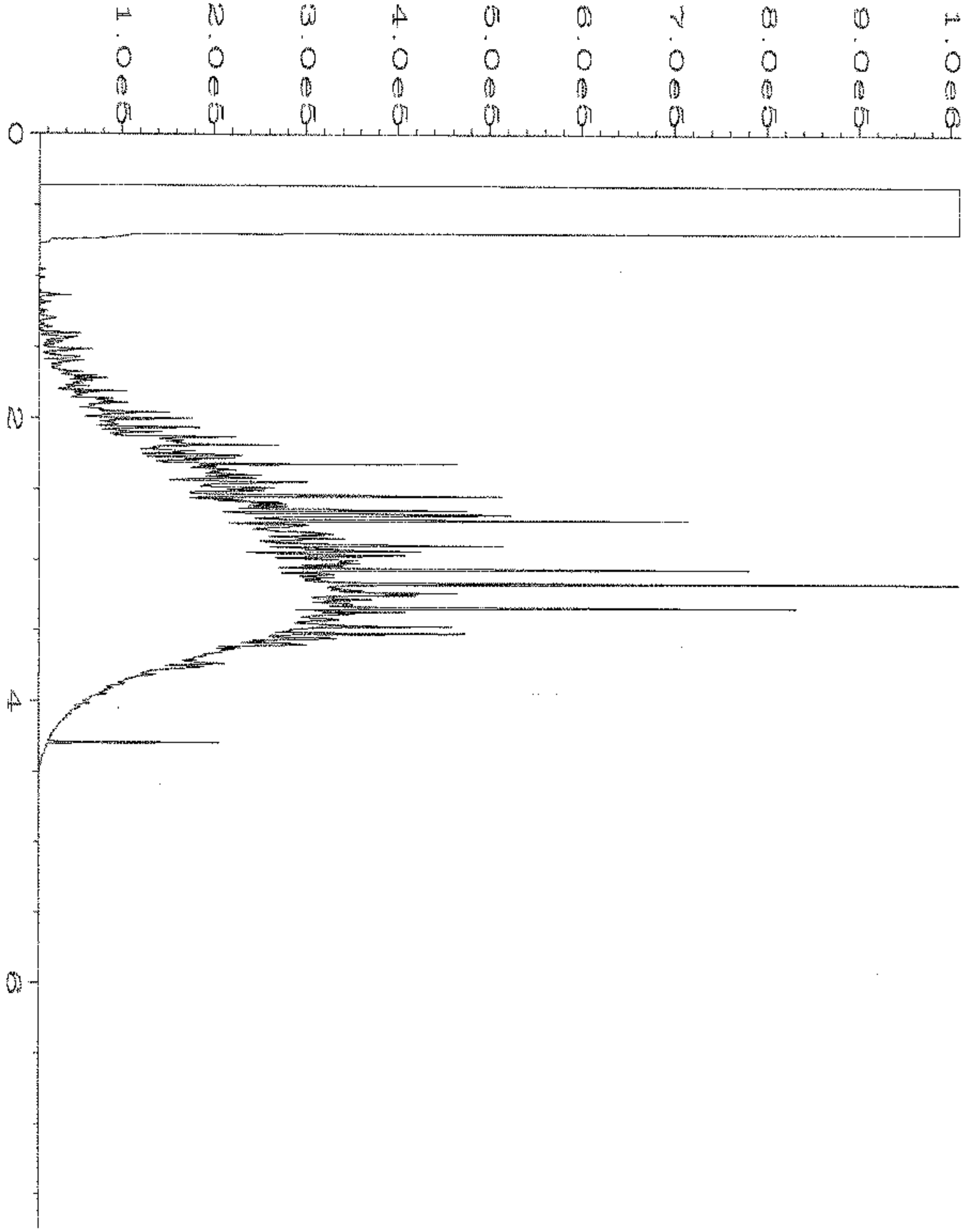


Data File Name : C:\HPCHEM\4\DATA\03-17-20\043F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 003244-80
Run Time Bar Code:
Acquired on : 17 Mar 20 06:29 PM
Report Created on: 18 Mar 20 09:04 AM

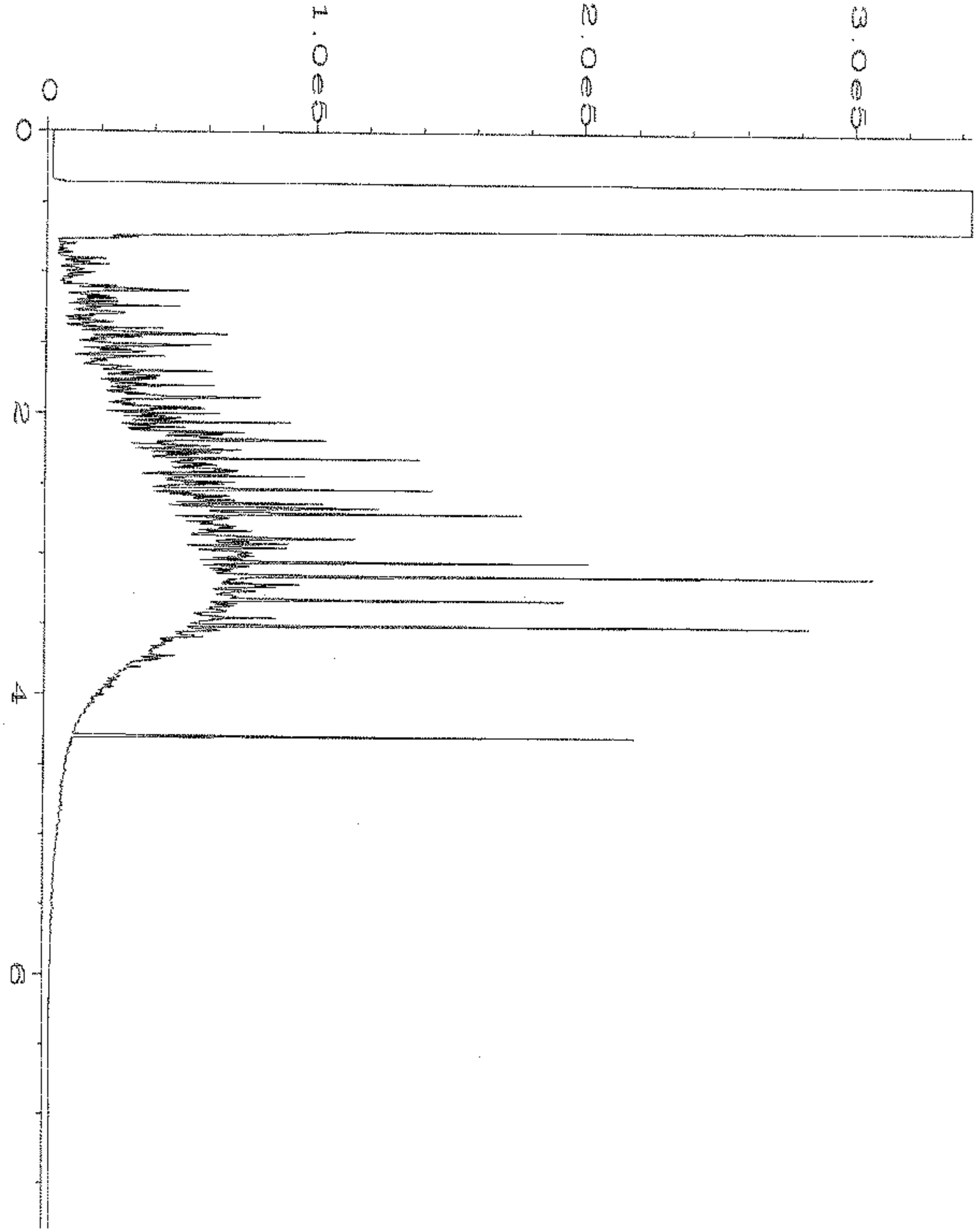
Page Number : 1
Vial Number : 43
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



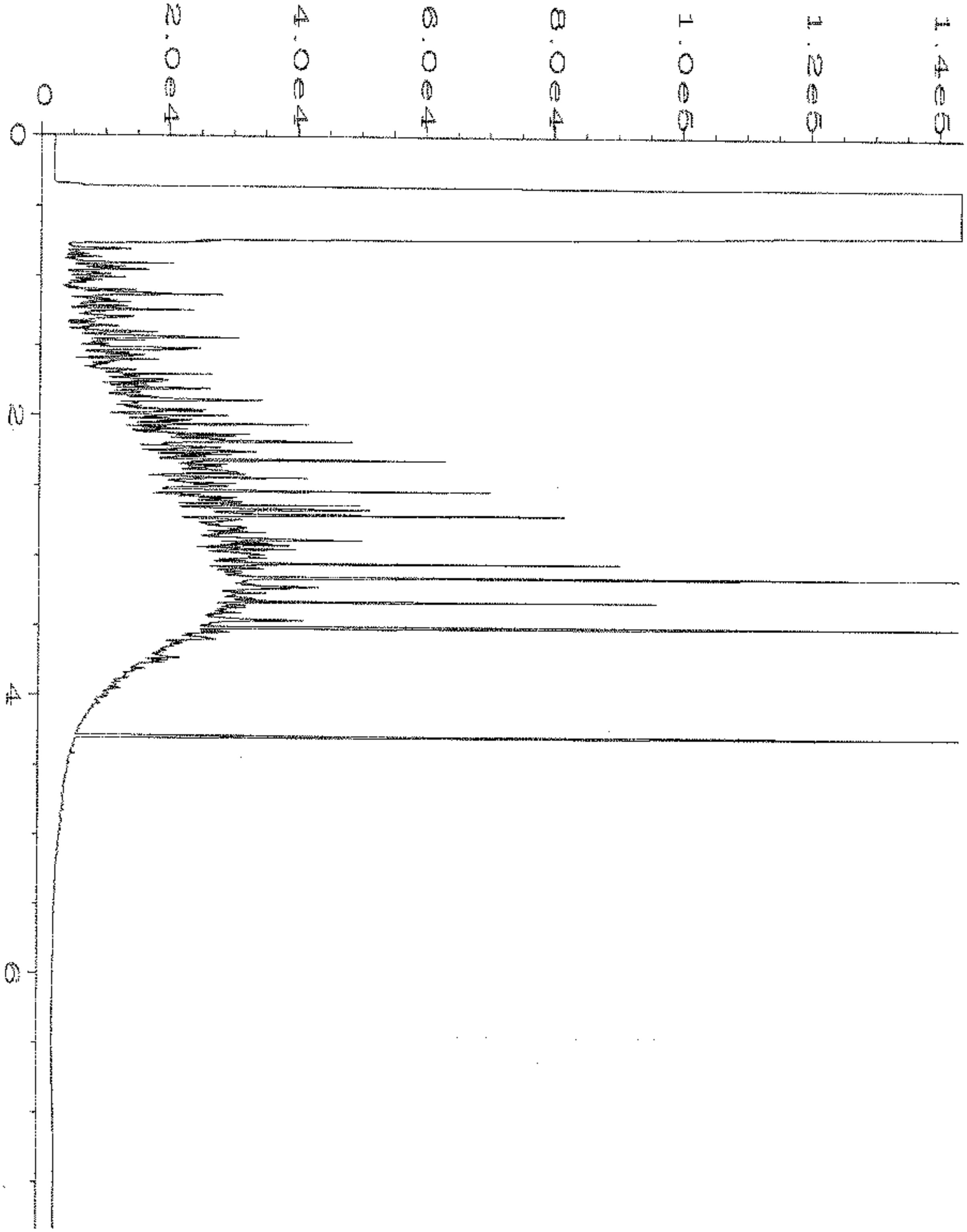
```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\044F0701.D
Operator          : TL                                    Page Number      : 1
Instrument        : GC#4                                  Vial Number      : 44
Sample Name       : 003244-83                             Injection Number : 1
Run Time Bar Code:                                        Sequence Line    : 7
Acquired on       : 17 Mar 20  06:41 PM                   Instrument Method: DX.MTH
Report Created on: 18 Mar 20  09:05 AM                    Analysis Method  : DEFAULT.MTH
```



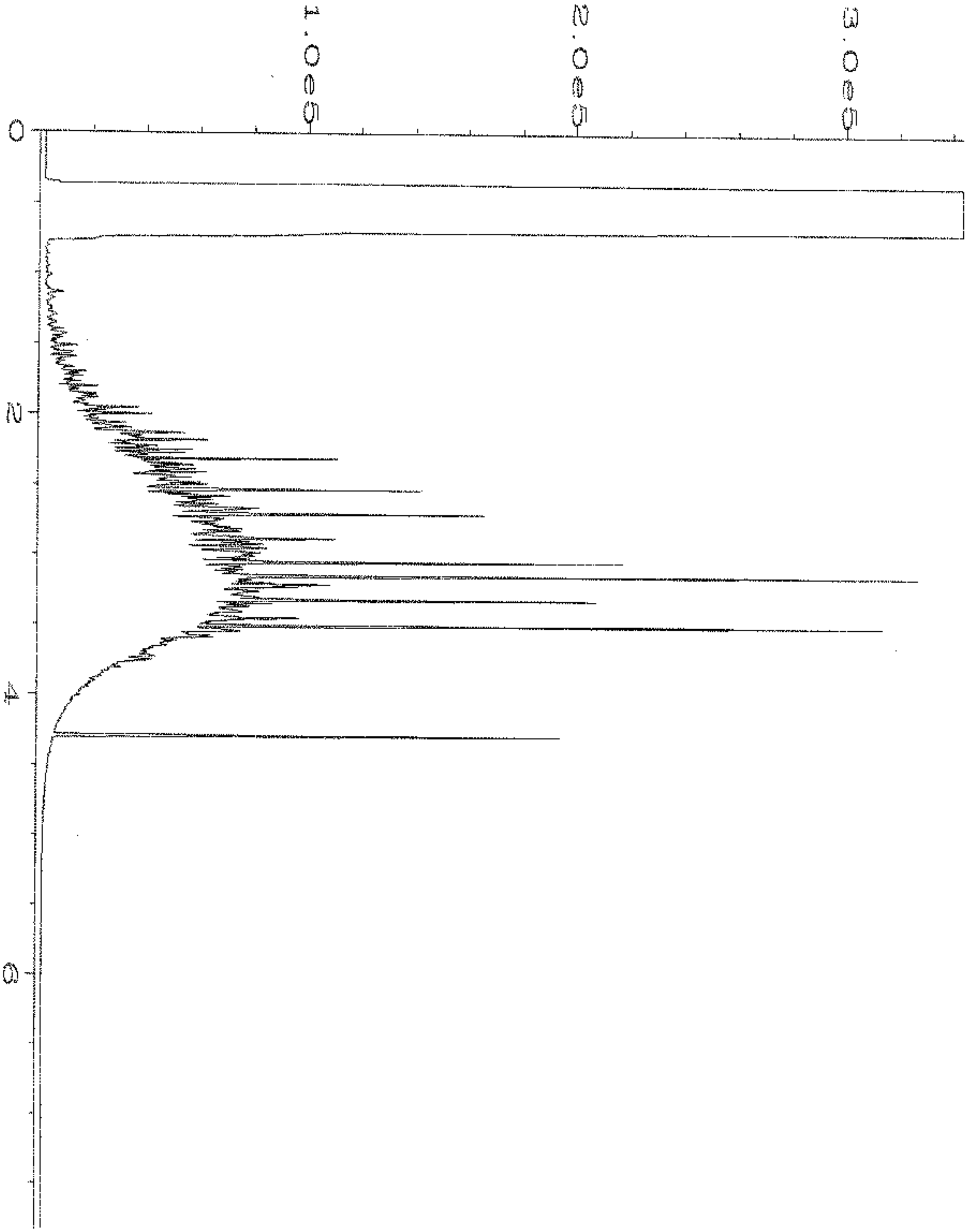
```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\048F0701.D
Operator          : TL                                   Page Number      : 1
Instrument        : GC#4                                 Vial Number      : 48
Sample Name       : 003244-96                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line    : 7
Acquired on       : 17 Mar 20   07:29 PM                 Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:08 AM                  Analysis Method  : DEFAULT.MTH
```



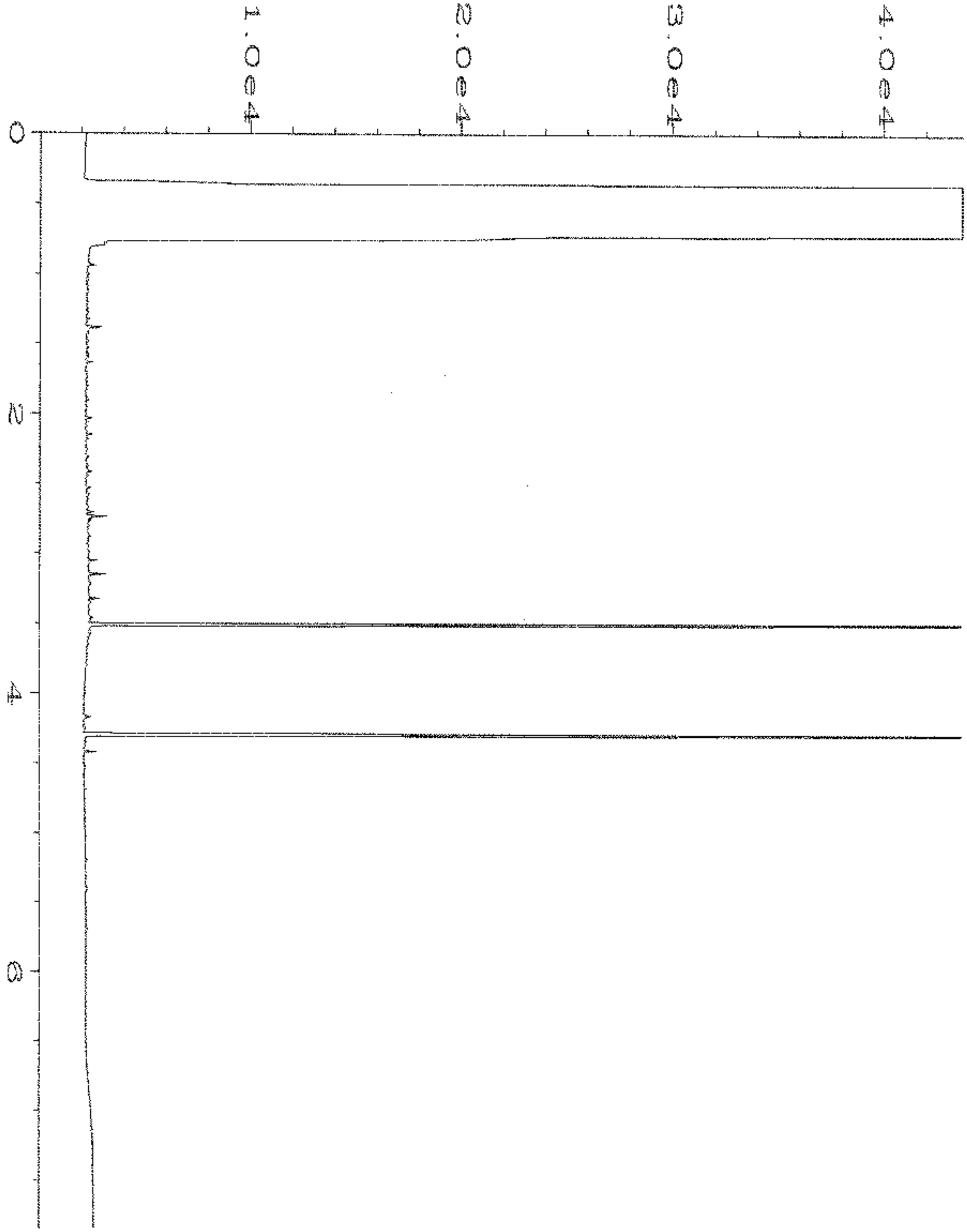
```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\045F0701.D
Operator          : TL                                Page Number      : 1
Instrument        : GC#4                              Vial Number      : 45
Sample Name       : 003244-89                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line    : 7
Acquired on       : 17 Mar 20   06:53 PM              Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:07 AM               Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\046F0701.D
Operator          : TL                                 Page Number       : 1
Instrument        : GC#4                               Vial Number       : 46
Sample Name       : 003244-93                          Injection Number  : 1
Run Time Bar Code:                                     Sequence Line     : 7
Acquired on       : 17 Mar 20  07:05 PM                Instrument Method: DX.MTH
Report Created on: 18 Mar 20  09:07 AM                 Analysis Method   : DEFAULT.MTH
```

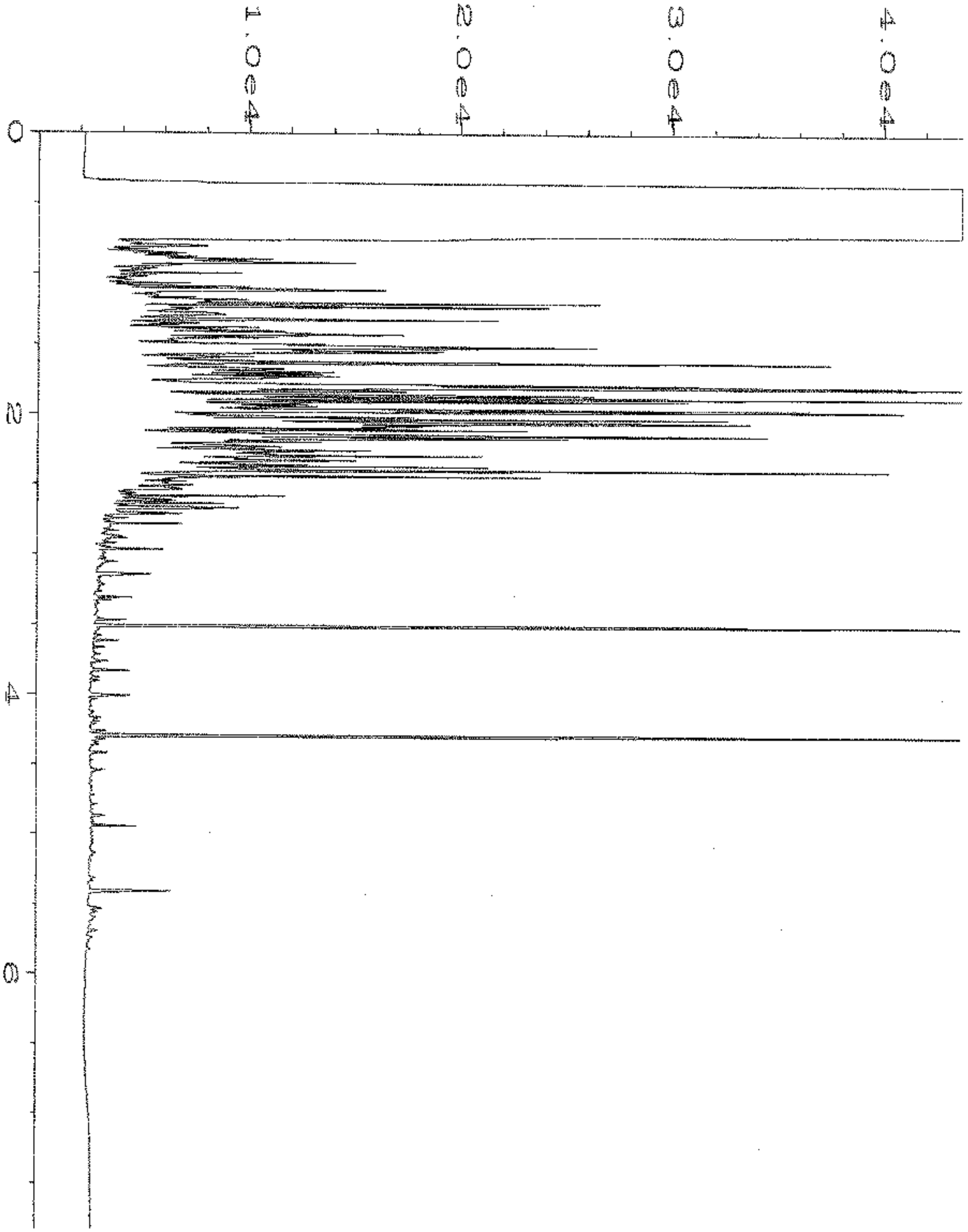


```
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\047F0701.D
Operator          : TL                              Page Number       : 1
Instrument        : GC#4                            Vial Number       : 47
Sample Name       : 003244-95                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 7
Acquired on       : 17 Mar 20   07:17 PM            Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:08 AM             Analysis Method   : DEFAULT.MTH
```



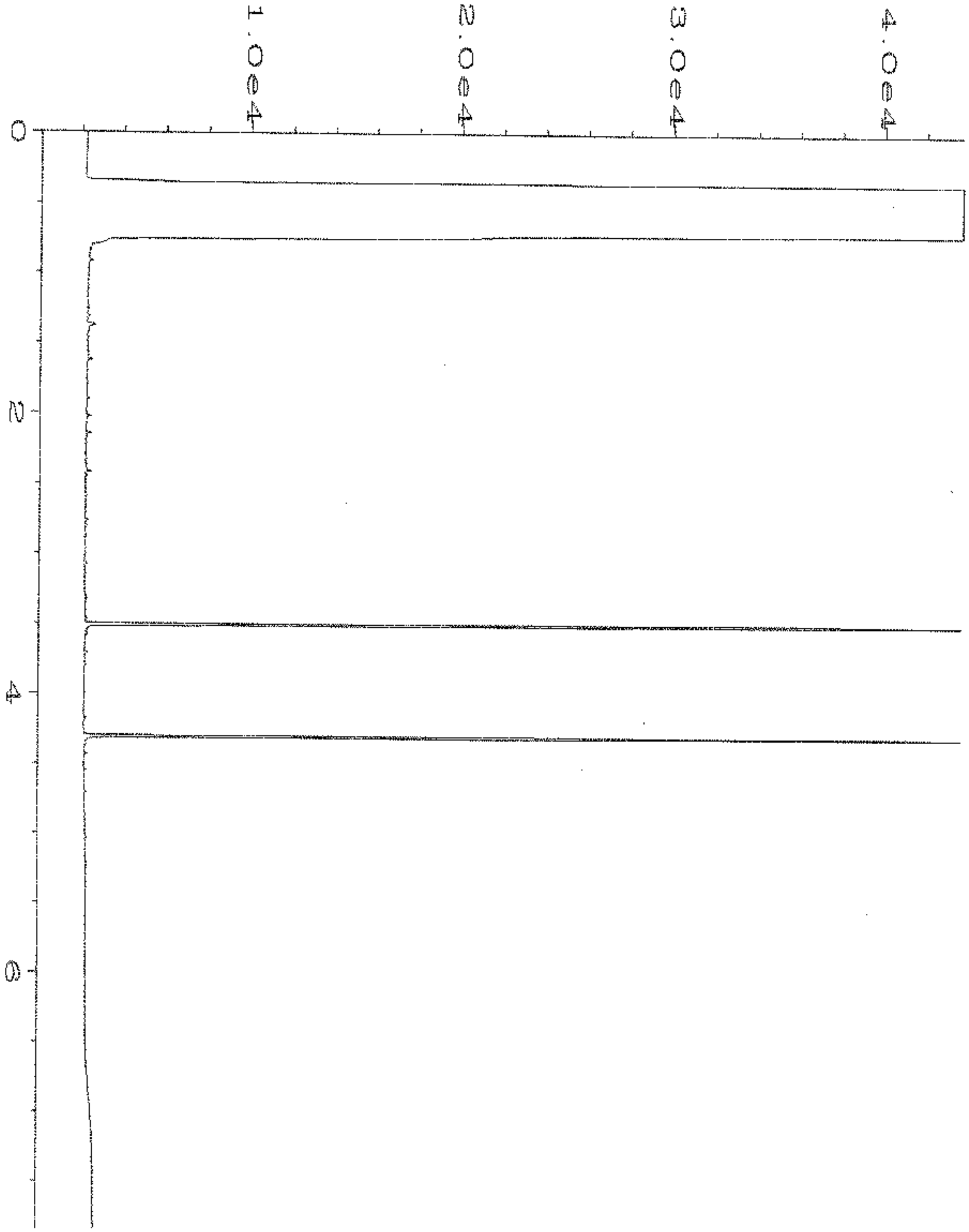
Data File Name : C:\HPCHEM\4\DATA\03-17-20\049F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 003244-97
Run Time Bar Code:
Acquired on : 17 Mar 20 07:42 PM
Report Created on: 18 Mar 20 09:09 AM

Page Number : 1
Vial Number : 49
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



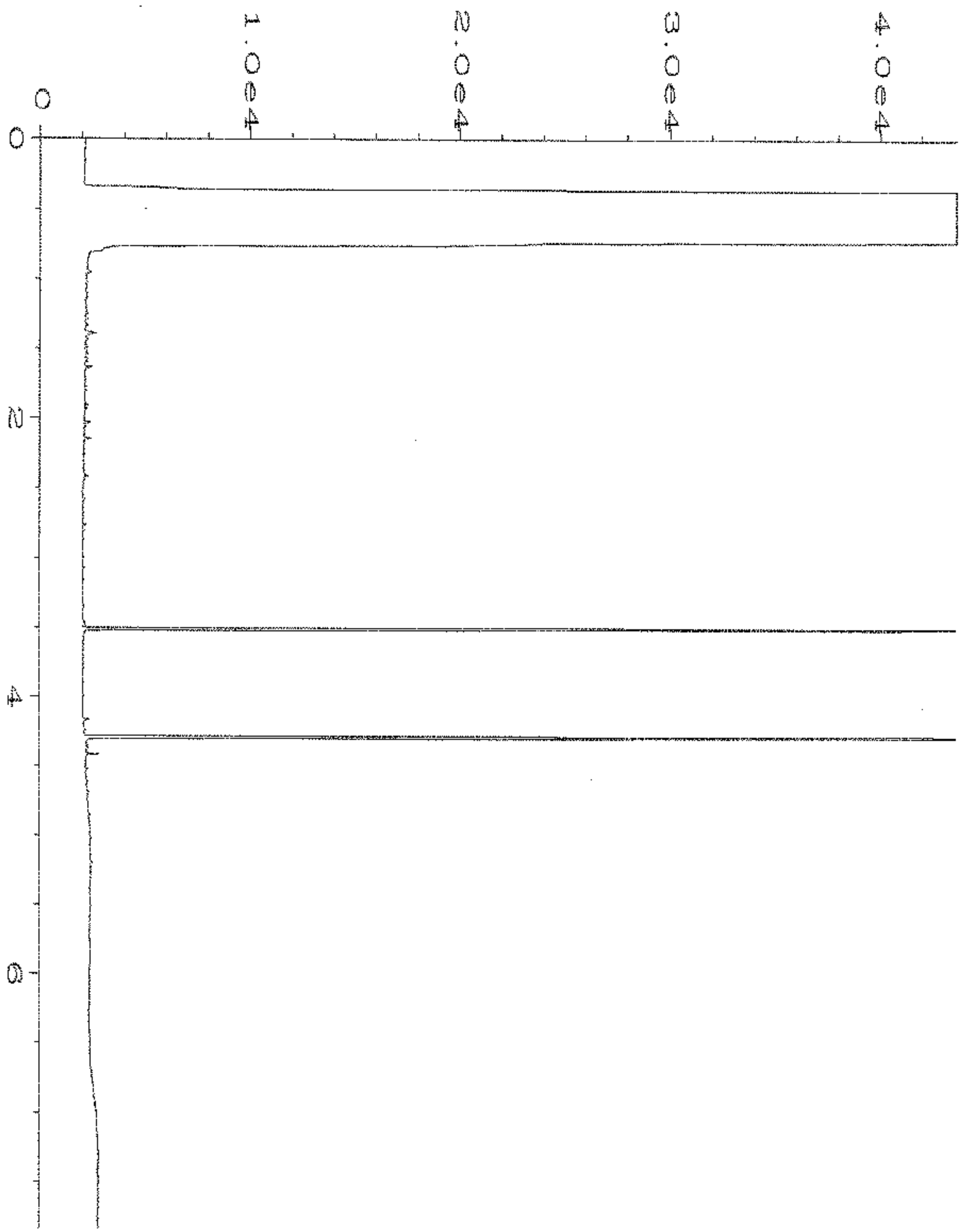
Data File Name : C:\HPCHEM\4\DATA\03-17-20\050F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 003244-100
Run Time Bar Code:
Acquired on : 17 Mar 20 07:54 PM
Report Created on: 18 Mar 20 09:09 AM

Page Number : 1
Vial Number : 50
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\4\DATA\03-17-20\012F0301.D

Operator	: TL	Page Number	: 1
Instrument	: GC#4	Vial Number	: 12
Sample Name	: 00-683 mb	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 3
Acquired on	: 17 Mar 20 10:51 AM	Instrument Method:	DX.MTH
Report Created on:	18 Mar 20 08:51 AM	Analysis Method	: DEFAULT.MTH



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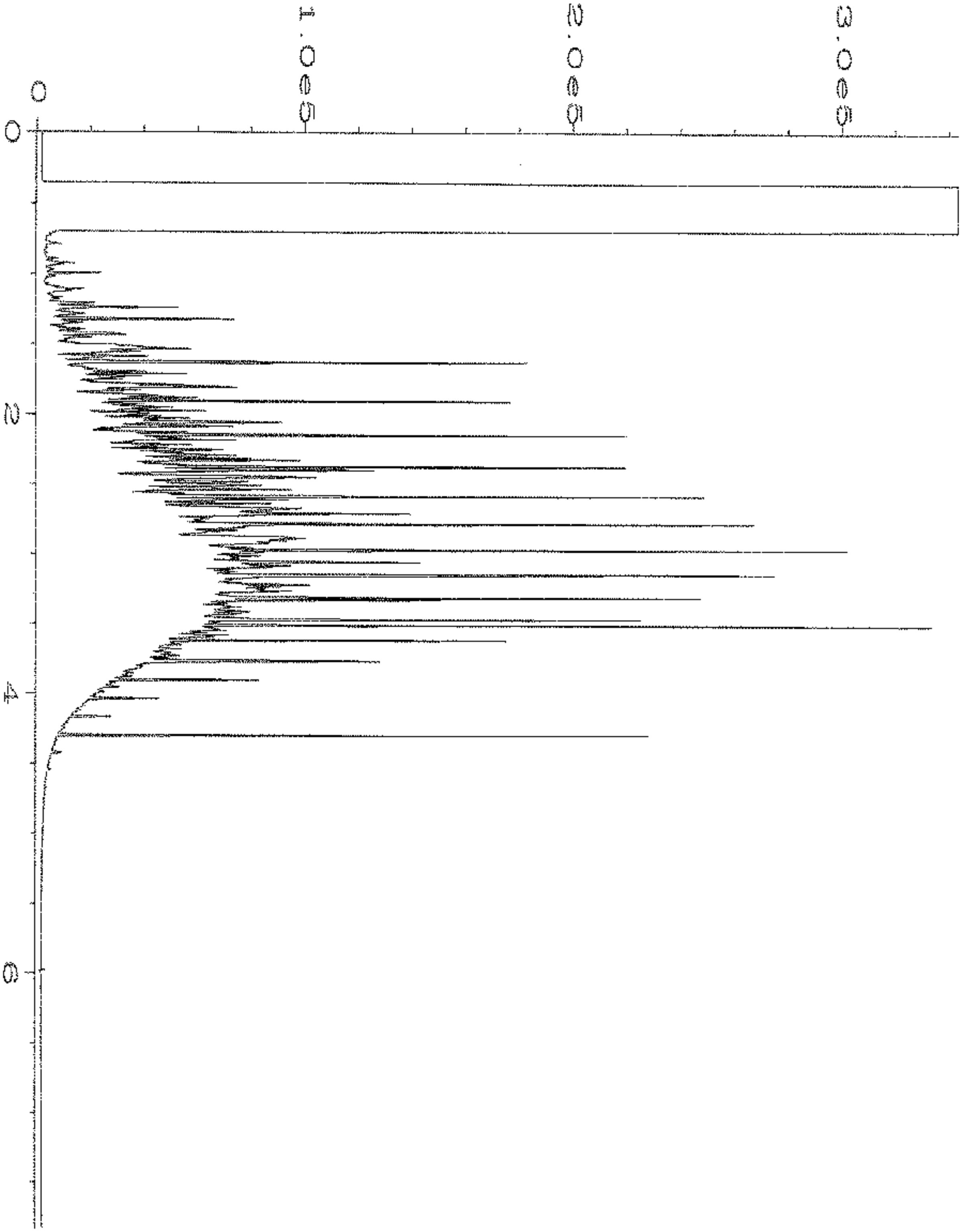
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\036F0701.D
Operator          : TL                            Page Number      : 1
Instrument        : GC#4                          Vial Number      : 36
Sample Name       : 00-684 mb                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 7
Acquired on       : 17 Mar 20  05:04 PM           Instrument Method: DX.MTH
Report Created on: 18 Mar 20  08:51 AM            Analysis Method  : DEFAULT.MTH
```



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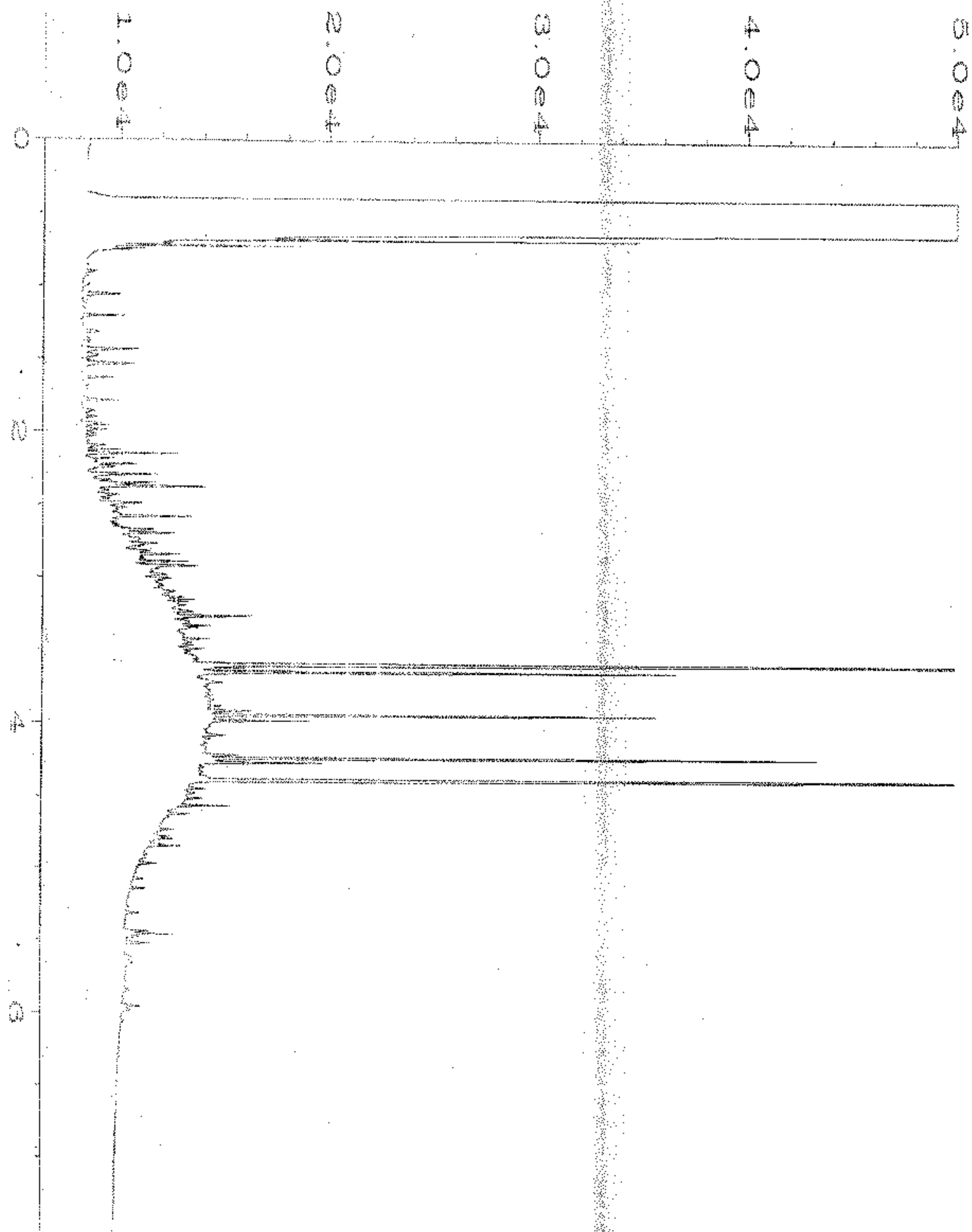
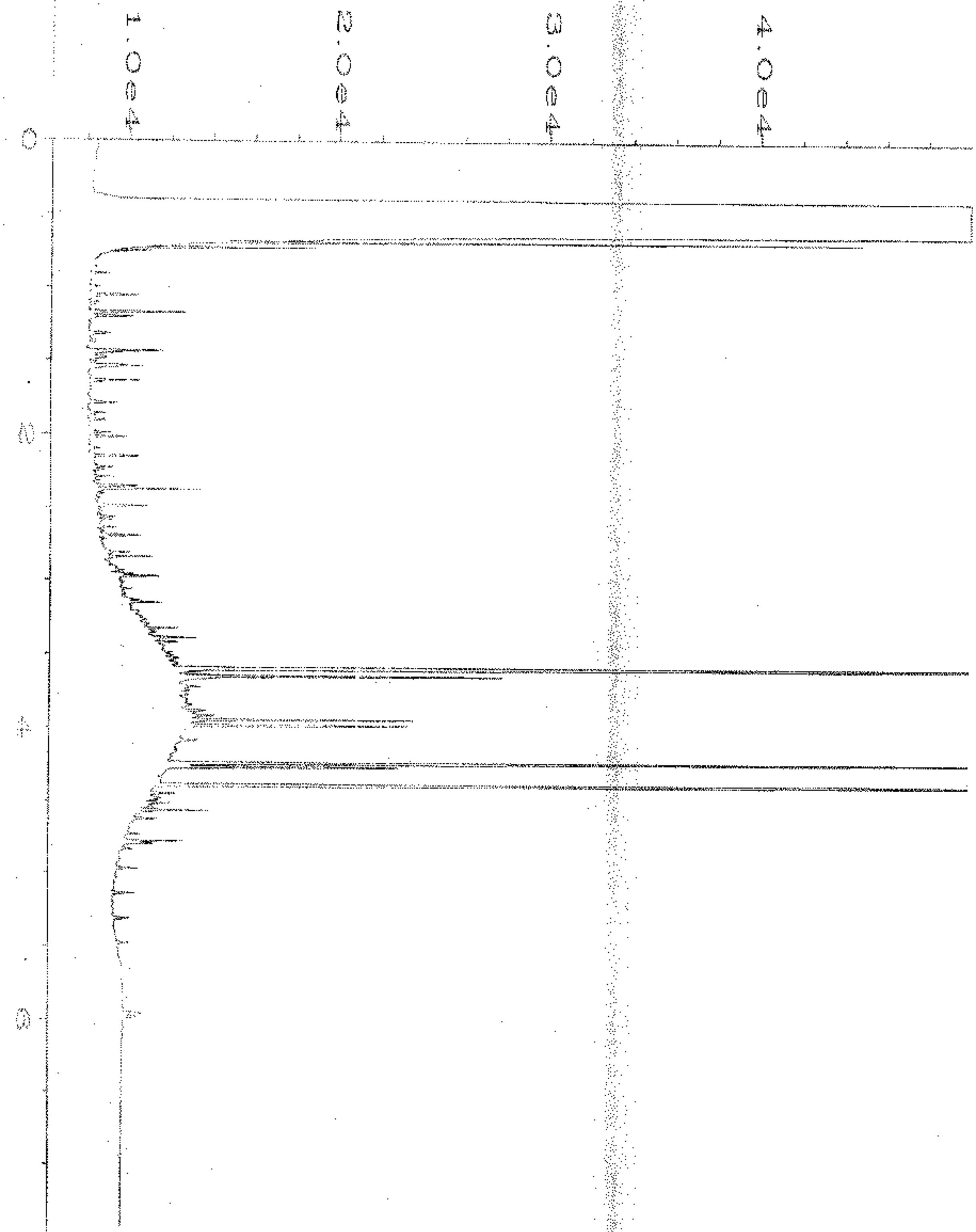
Data File Name    : C:\HPCHEM\4\DATA\03-17-20\005F0601.D
Operator          : TL                               Page Number       : 1
Instrument        : GC#4                             Vial Number       : 5
Sample Name       : 1000 Dx 59-162B                  Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 6
Acquired on       : 17 Mar 20   02:50 PM             Instrument Method: DX.MTH
Report Created on: 18 Mar 20   08:51 AM              Analysis Method   : DEFAULT.MTH
```



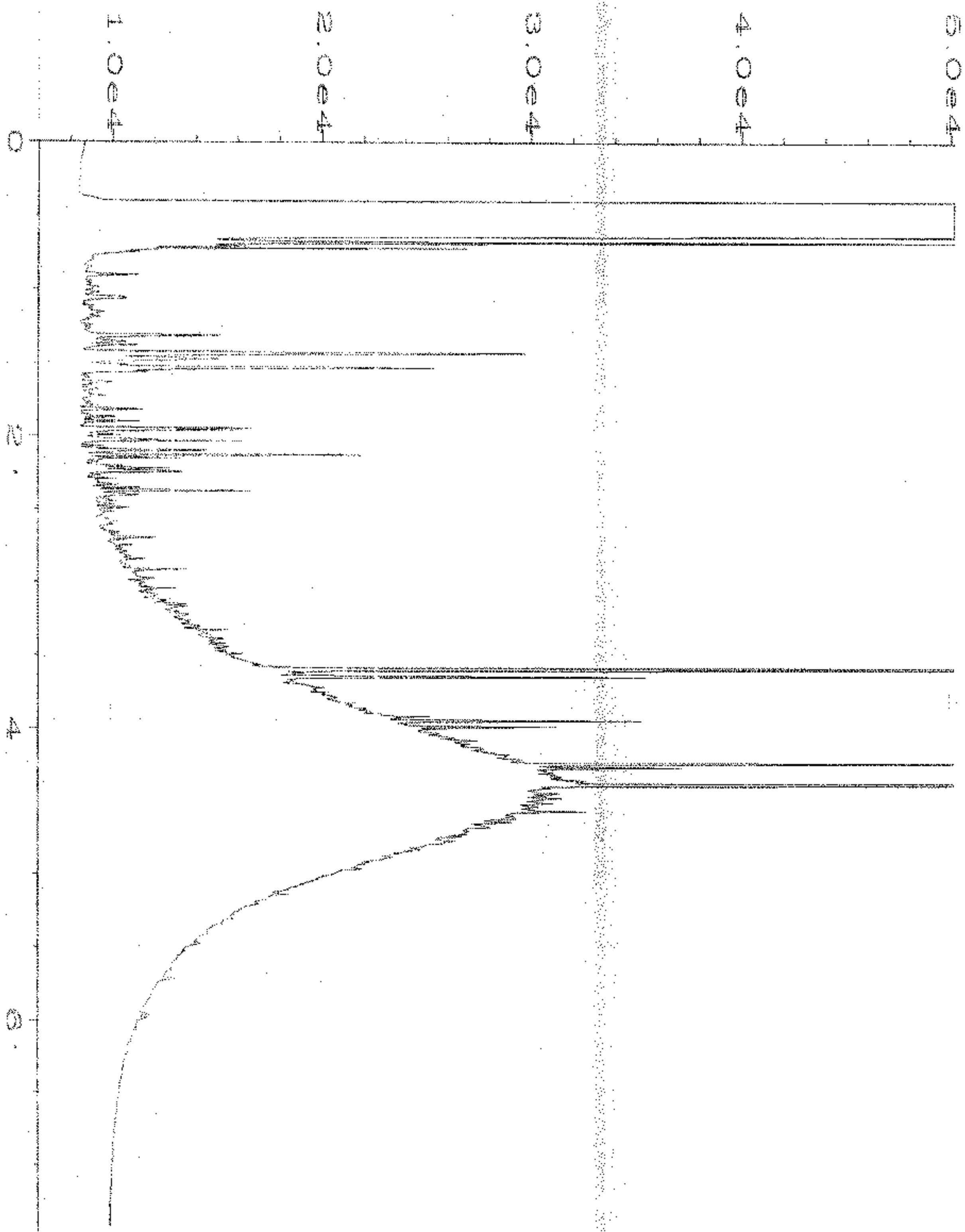
Data File Name : C:\HPCHEM\1\DATA\03-17-20\042F0501.D
Operator : TL
Instrument : GC1
Sample Name : 003244-19
Run Time Bar Code:
Acquired on : 17 Mar 20 04:04 PM
Report Created on: 18 Mar 20 09:28 AM

Page Number : 1
Vial Number : 42
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DX.MTH



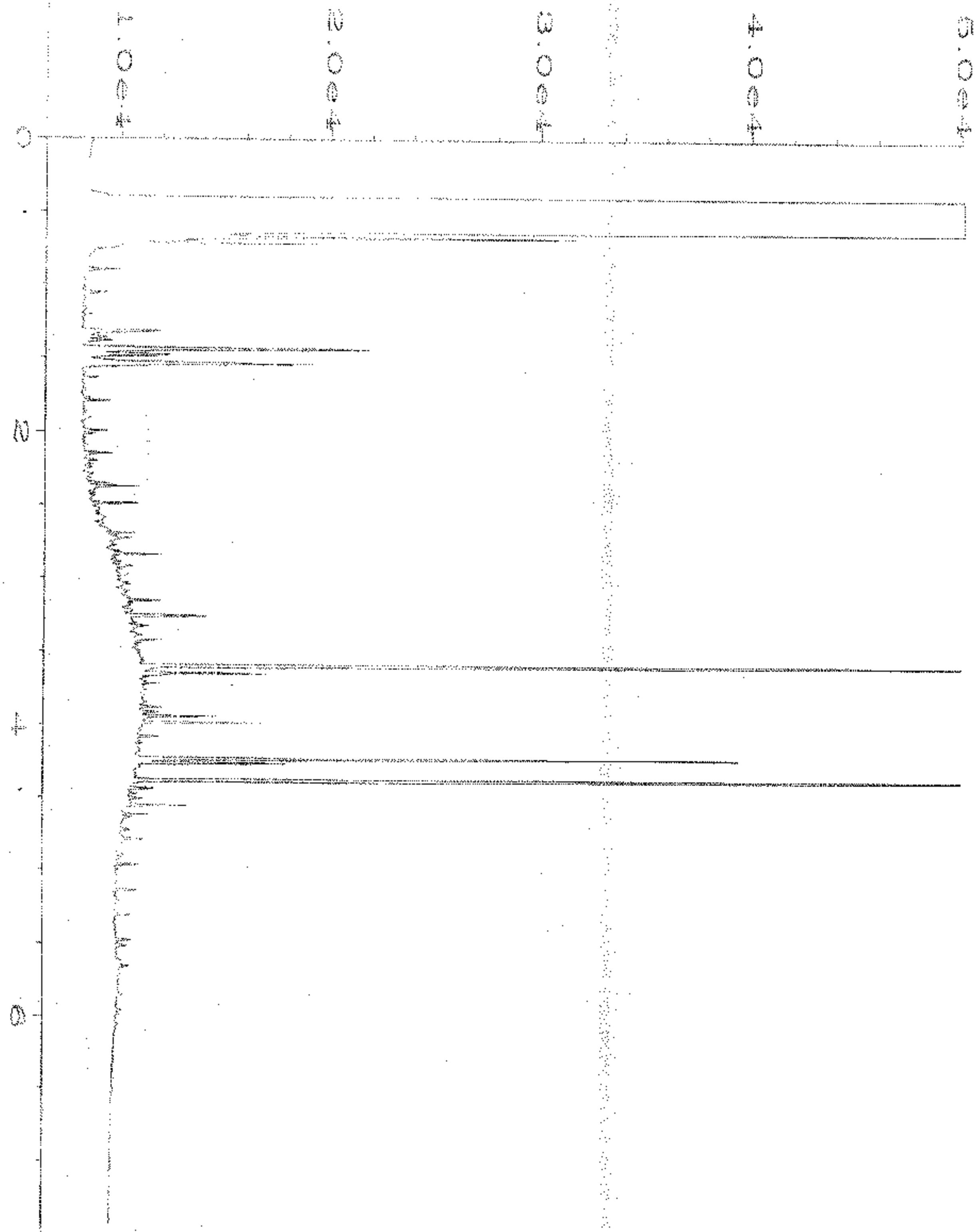
Data File Name : C:\HPCHEM\1\DATA\03-17-20\043F0501.D
Operator : TL
Instrument : GC1
Sample Name : 003244-37
Run Time Bar Code:
Acquired on : 17 Mar 20 04:16 PM
Report Created on: 18 Mar 20 09:28 AM

Page Number : 1
Vial Number : 43
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DX.MTH



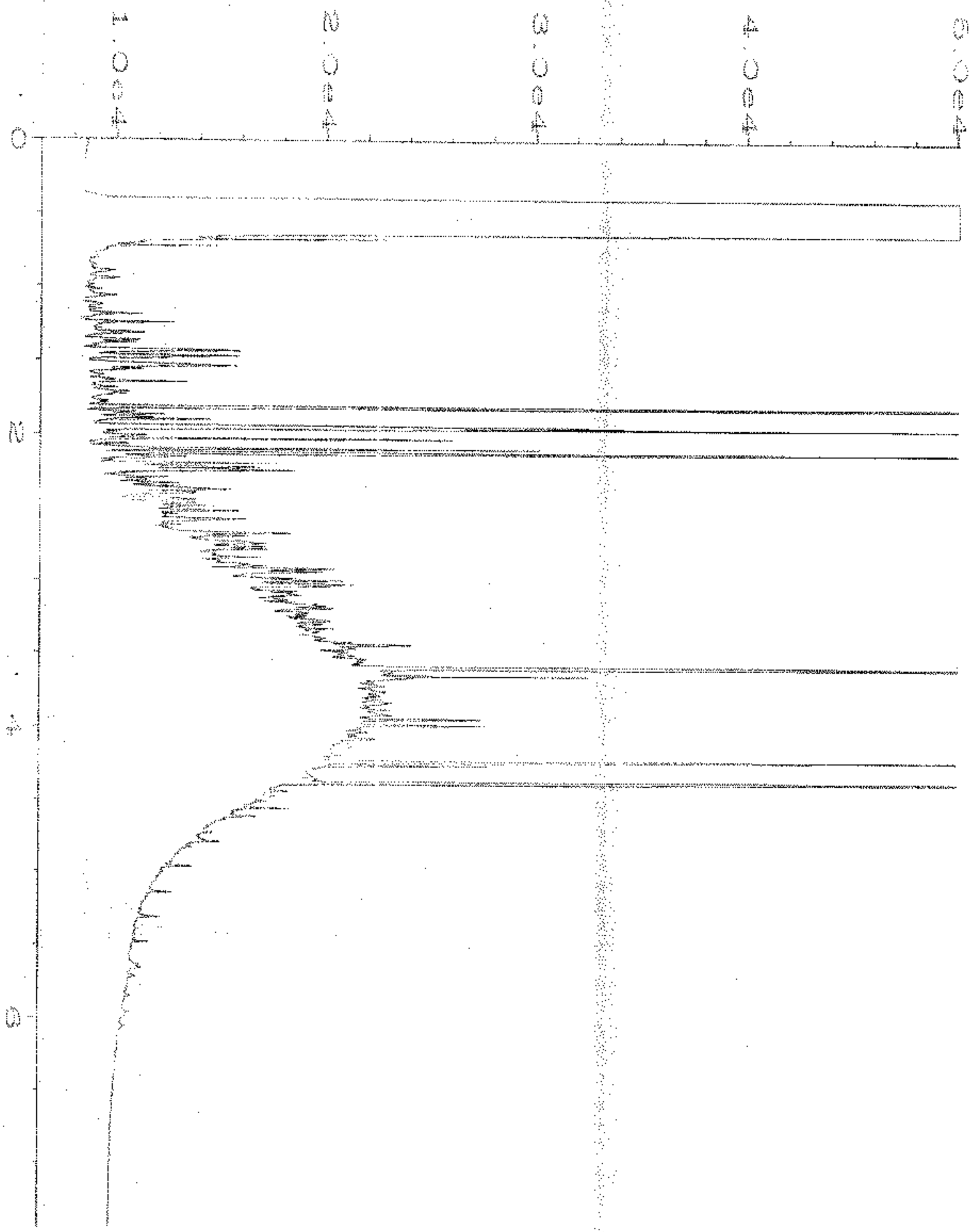
Data File Name : C:\HPCHEM\1\DATA\03-17-20\023F0301.D
Operator : TL
Instrument : GC1
Sample Name : 003244-46
Run Time Bar Code:
Acquired on : 17 Mar 20 11:53 AM
Report Created on: 18 Mar 20 09:26 AM

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH



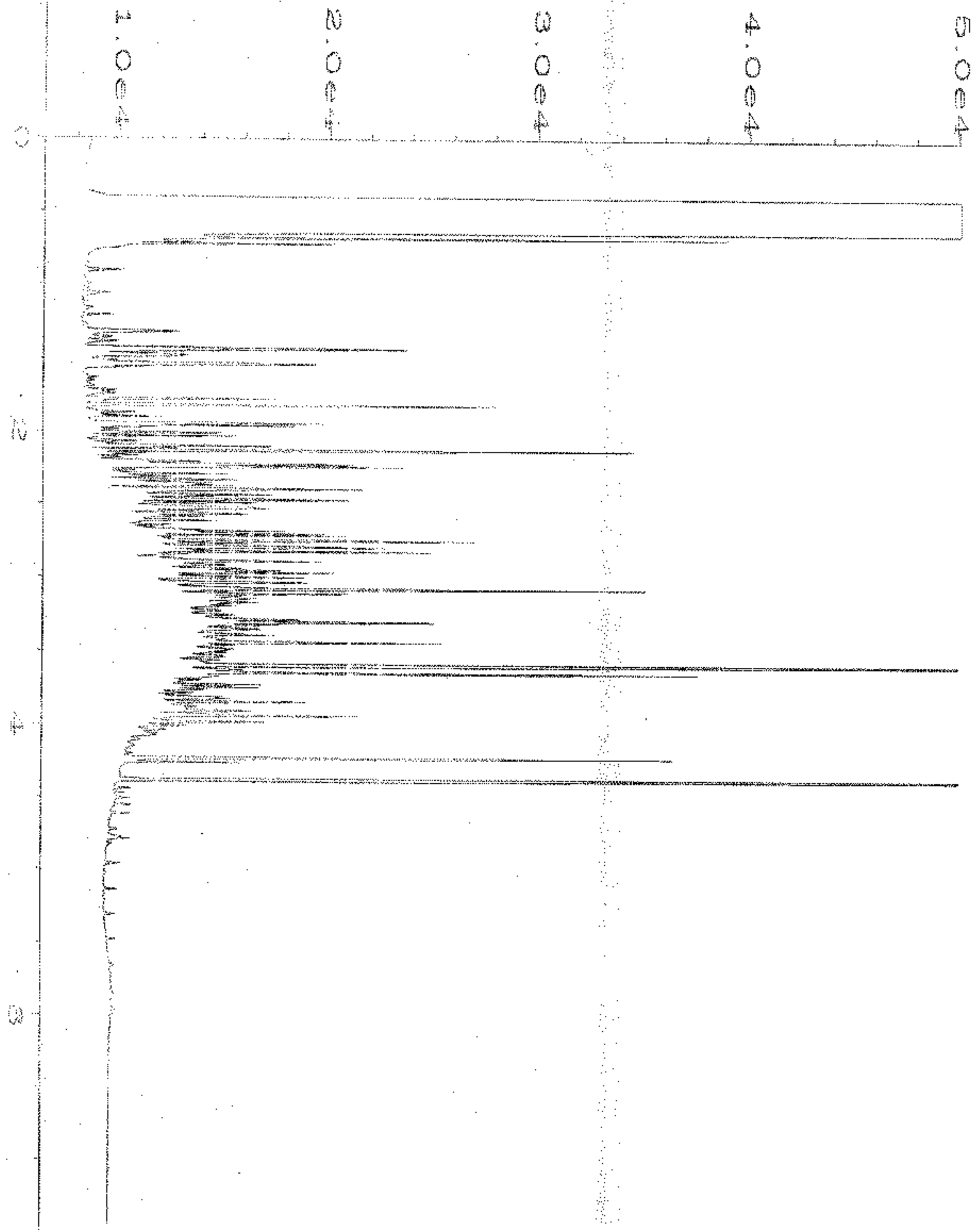
Data File Name : C:\HPCHEM\1\DATA\03-17-20\024F0301.D
Operator : TL
Instrument : GC1
Sample Name : 003244-53
Run Time Bar Code:
Acquired on : 17 Mar 20 12:04 PM
Report Created on: 18 Mar 20 09:26 AM

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH



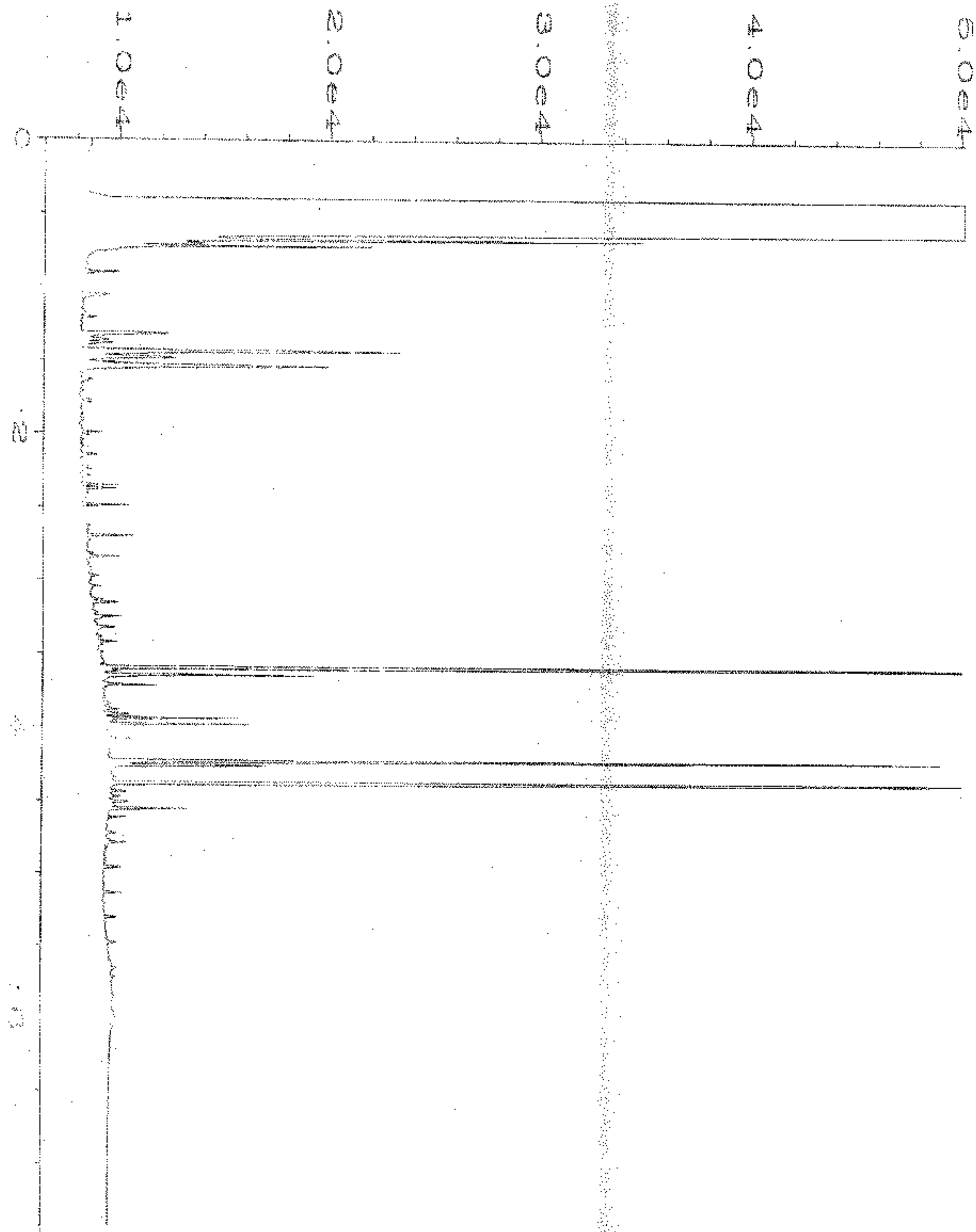
Data File Name : C:\HPCHEM\1\DATA\03-17-20\025F0301.D
Operator : TL
Instrument : GC1
Sample Name : 003244-58
Run Time Bar Code:
Acquired on : 17 Mar 20 12:15 PM
Report Created on: 18 Mar 20 09:26 AM

Page Number : 1
Vial Number : 25
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH



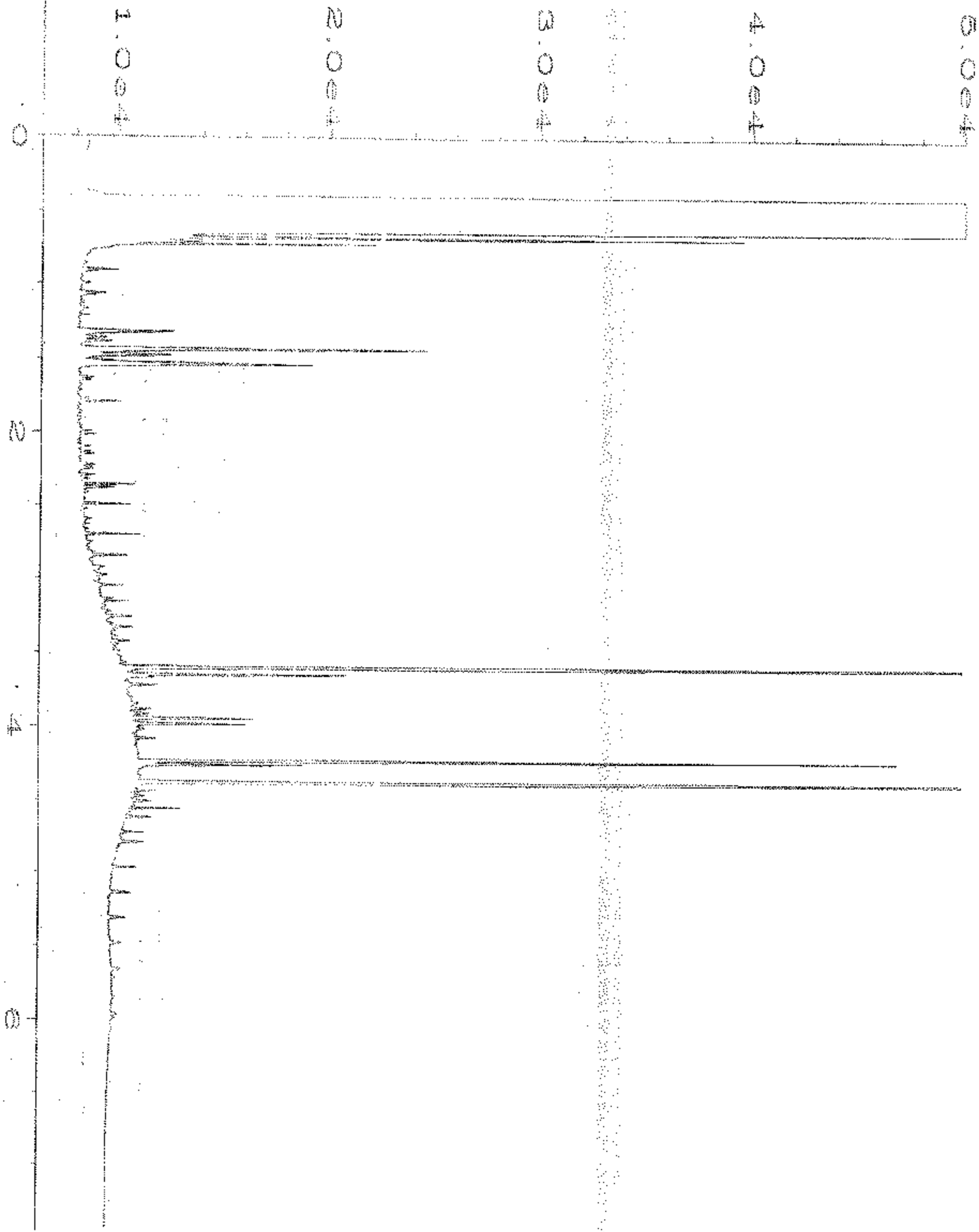
Data File Name : C:\HPCHEM\1\DATA\03-17-20\026F0301.D
Operator : TL
Instrument : GC1
Sample Name : 003244-59
Run Time Bar Code:
Acquired on : 17 Mar 20 12:27 PM
Report Created on: 18 Mar 20 09:26 AM

Page Number : 1
Vial Number : 26
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH

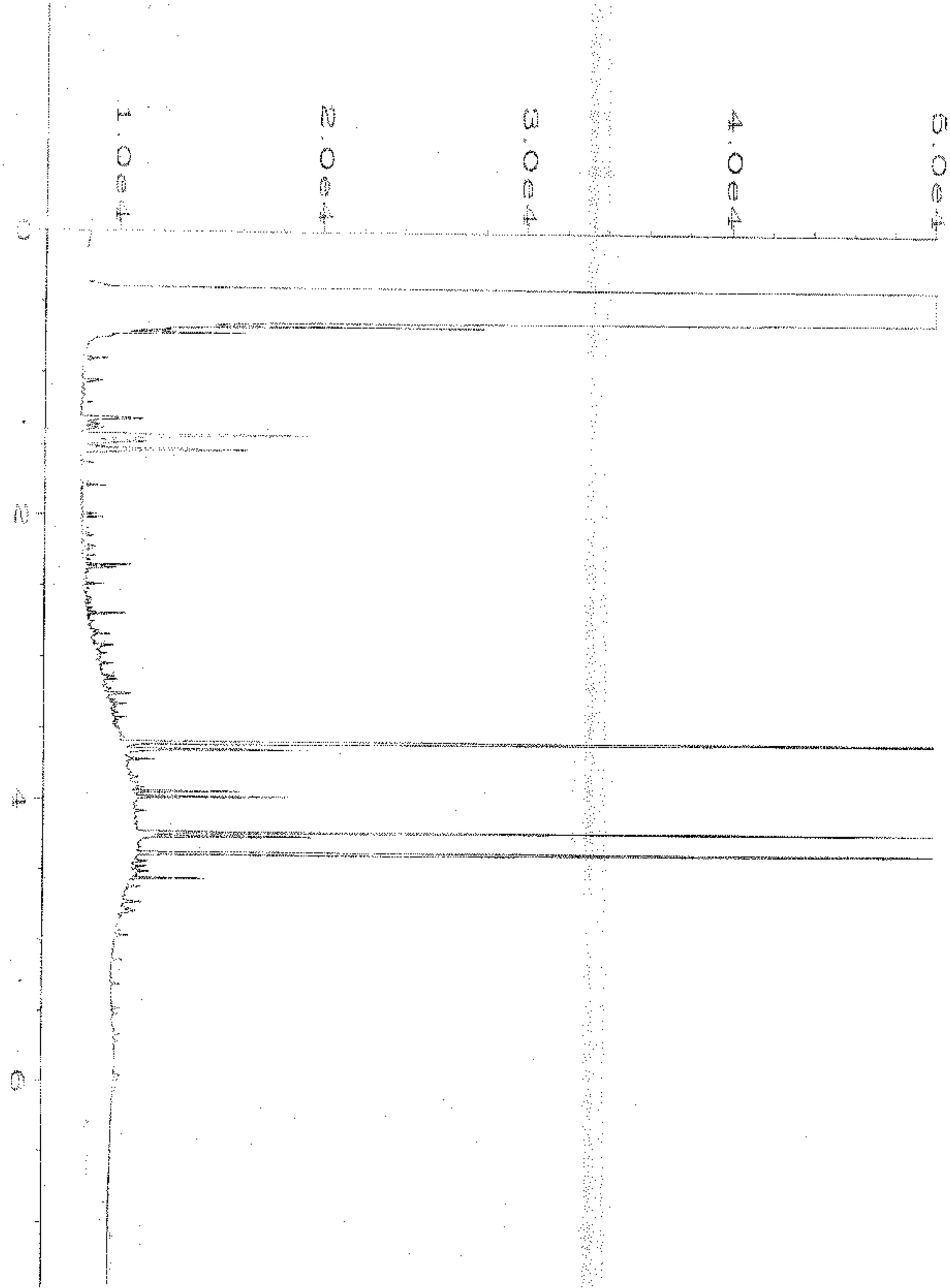


Data File Name : C:\HPCHEM\1\DATA\03-17-20\027F0301.D
Operator : TL
Instrument : GC1
Sample Name : 003244-64
Run Time Bar Code:
Acquired on : 17 Mar 20 12:38 PM
Report Created on: 18 Mar 20 09:27 AM

Page Number : 1
Vial Number : 27
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH

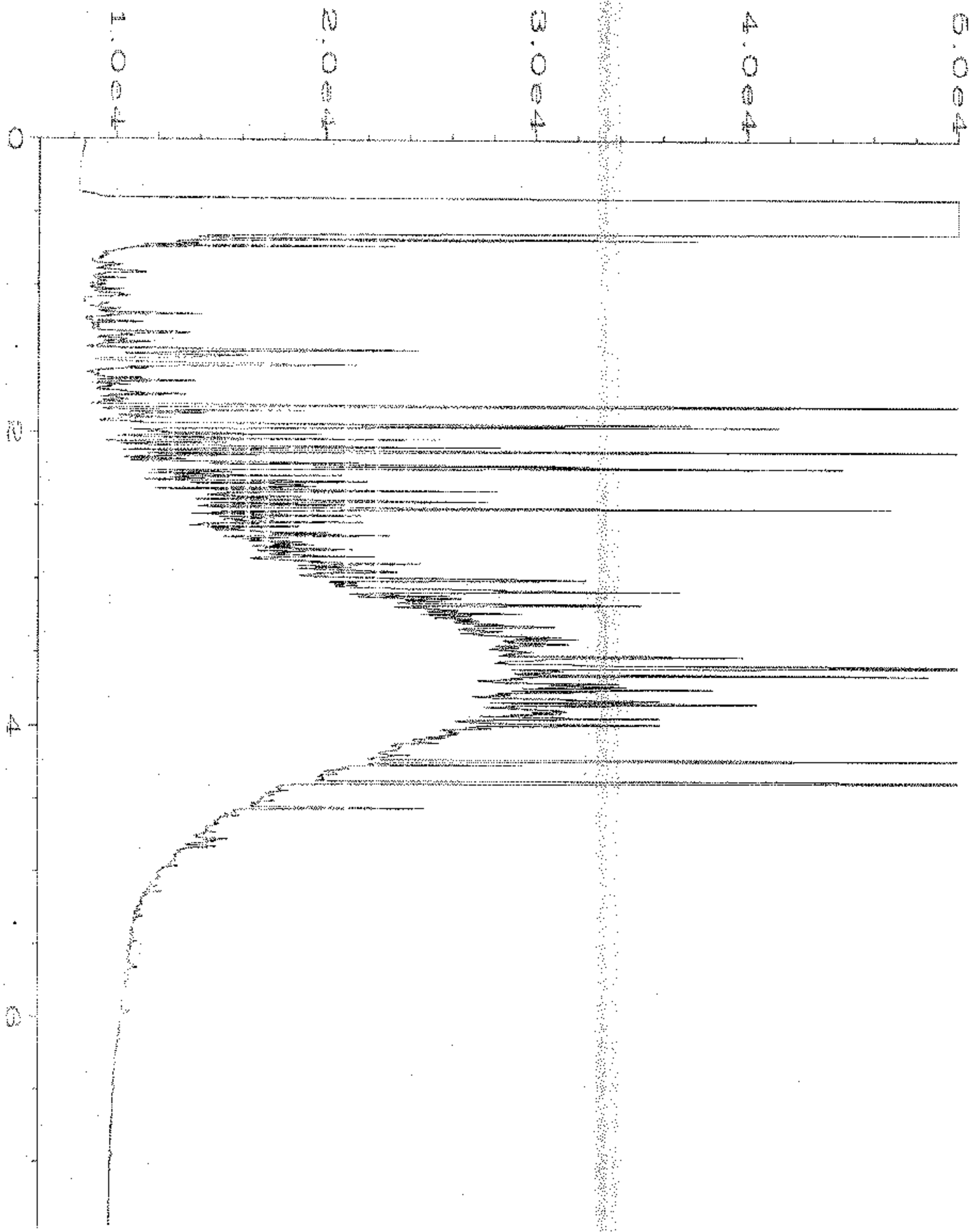


```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\028F0301.D
Operator          : TL                      Page Number       : 1
Instrument        : GC1                     Vial Number       : 28
Sample Name       : 003244-66               Injection Number : 1
Run Time Bar Code:                          Sequence Line     : 3
Acquired on       : 17 Mar 20   12:49 PM    Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:27 AM     Analysis Method   : DX.MTH
```



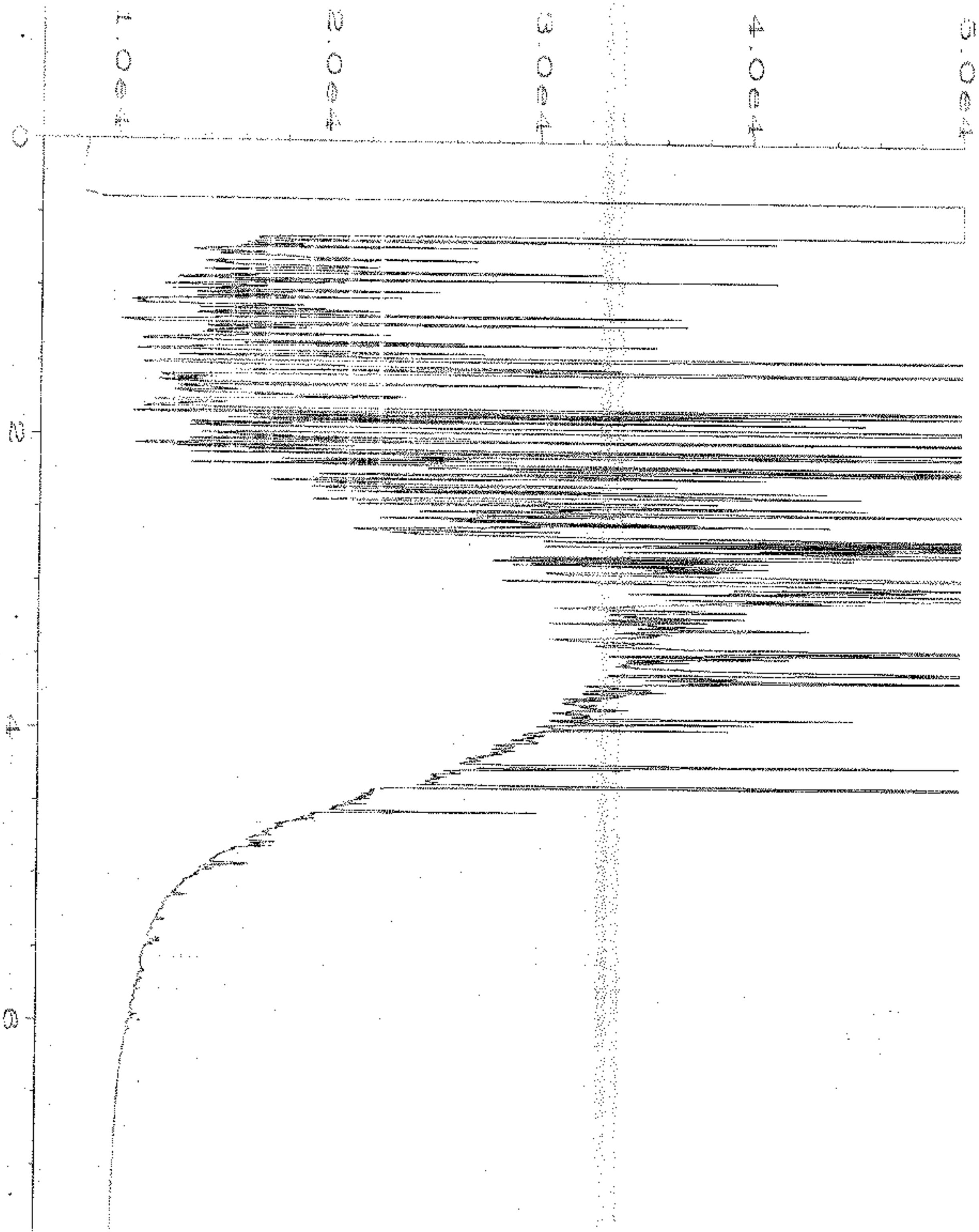
Data File Name : C:\HPCHEM\1\DATA\03-17-20\029F0301.D
Operator : TL
Instrument : GC1
Sample Name : 003244-67
Run Time Bar Code:
Acquired on : 17 Mar 20 01:01 PM
Report Created on: 18 Mar 20 09:27 AM

Page Number : 1
Vial Number : 29
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH

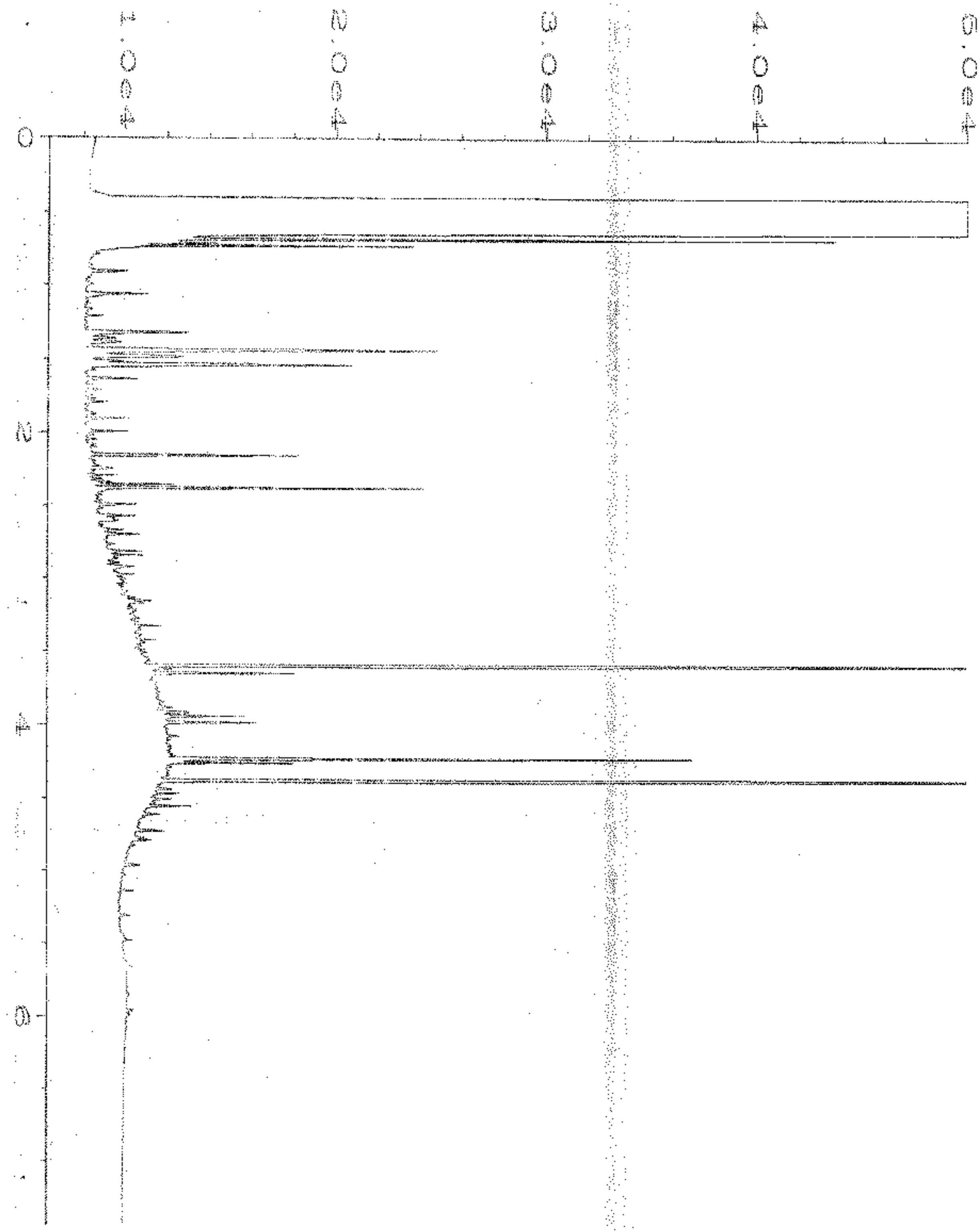


Data File Name : C:\HPCHEM\1\DATA\03-17-20\030F0301.D
Operator : TL
Instrument : GC1
Sample Name : 003244-85
Run Time Bar Code:
Acquired on : 17 Mar 20 01:12 PM
Report Created on: 18 Mar 20 09:27 AM

Page Number : 1
Vial Number : 30
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH

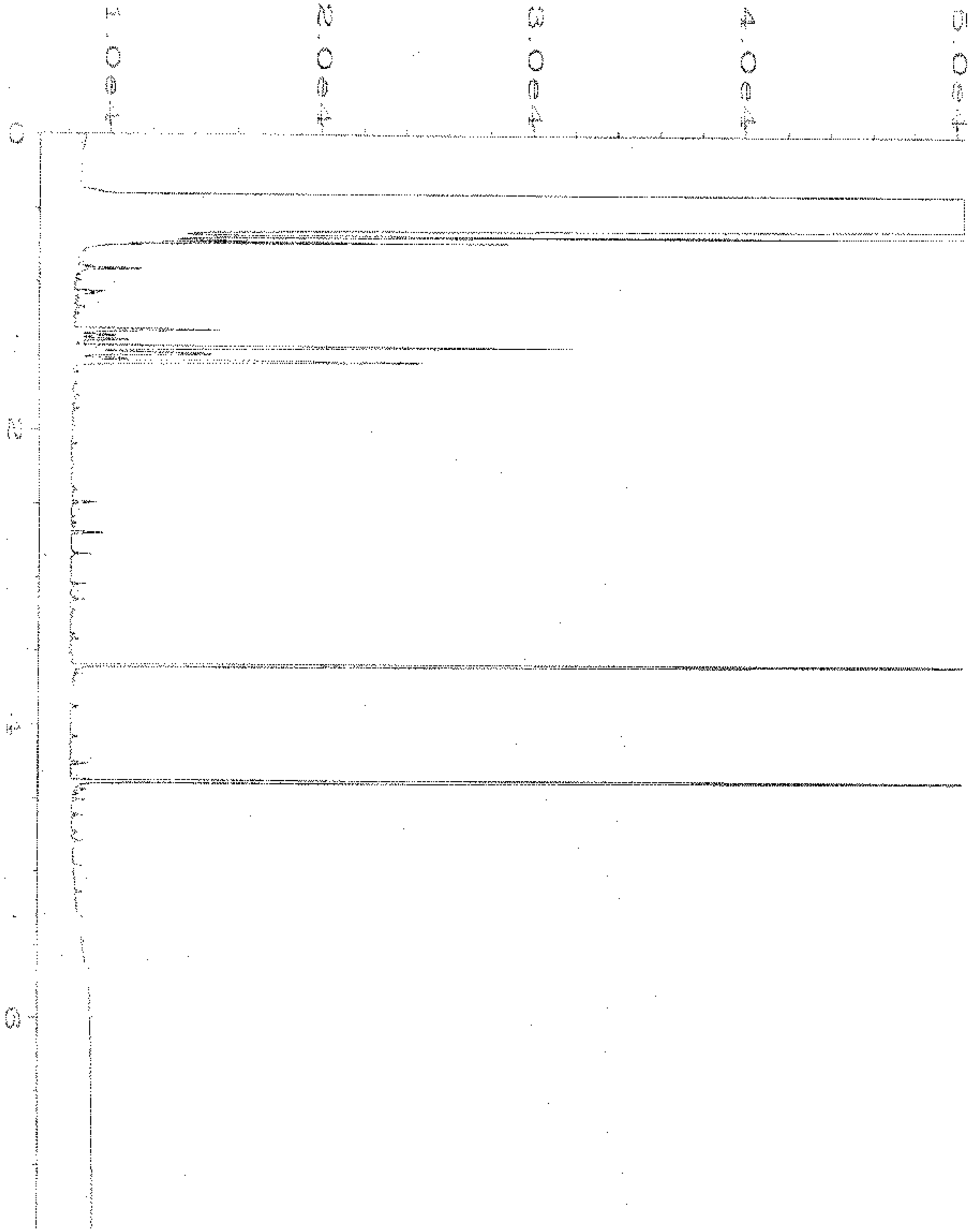


```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\031F0301.D
Operator          : TL                             Page Number        : 1
Instrument        : GC1                            Vial Number        : 31
Sample Name       : 003244-90                      Injection Number : 1
Run Time Bar Code:                                 Sequence Line      : 3
Acquired on       : 17 Mar 20   01:24 PM           Instrument Method: DX.MTH
Report Created on: 18 Mar 20   09:27 AM            Analysis Method    : DX.MTH
```

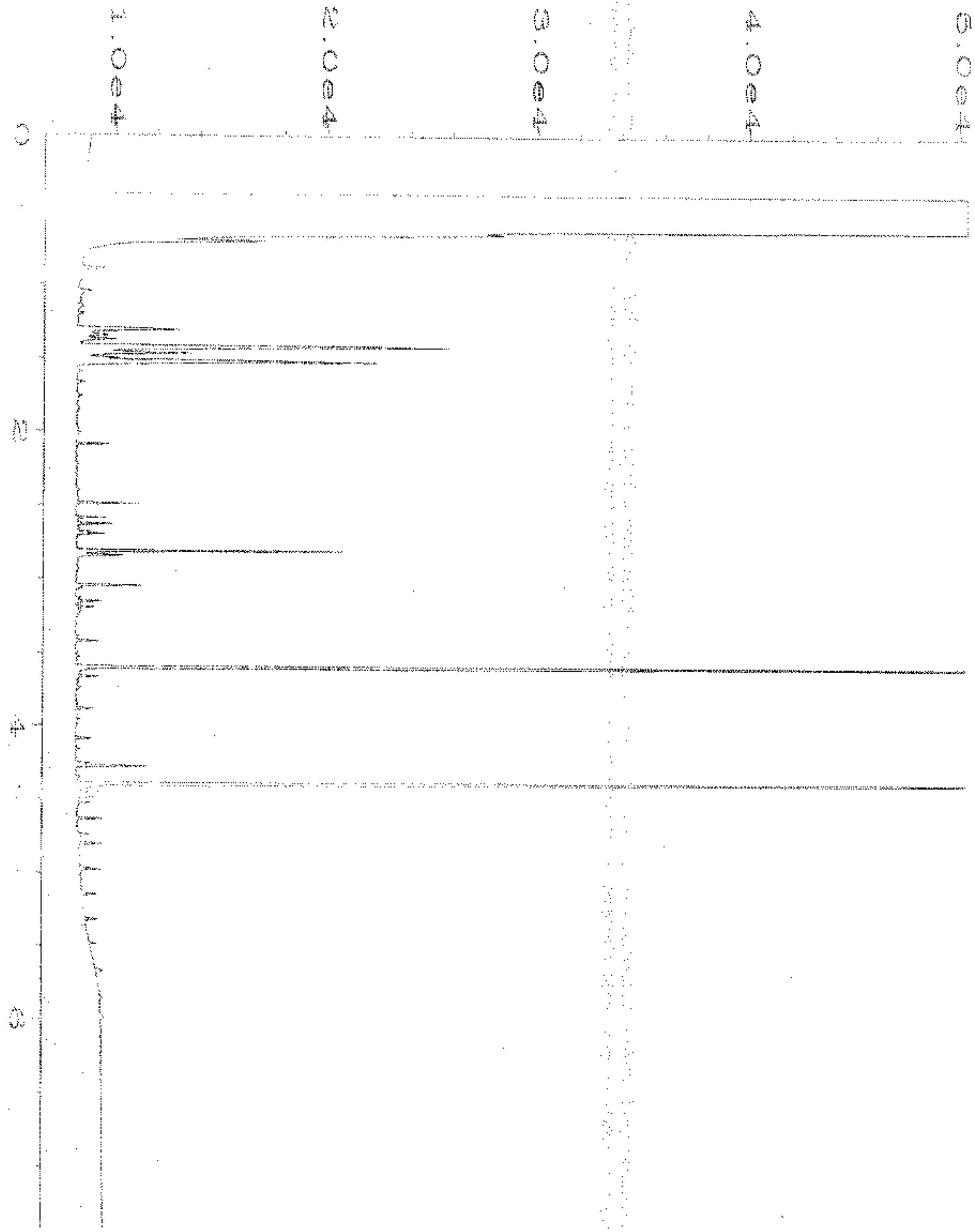


Data File Name : C:\HPCHEM\1\DATA\03-17-20\034F0301.D
Operator : TL
Instrument : GC1
Sample Name : 003244-106
Run Time Bar Code:
Acquired on : 17 Mar 20 01:58 PM
Report Created on: 18 Mar 20 09:27 AM

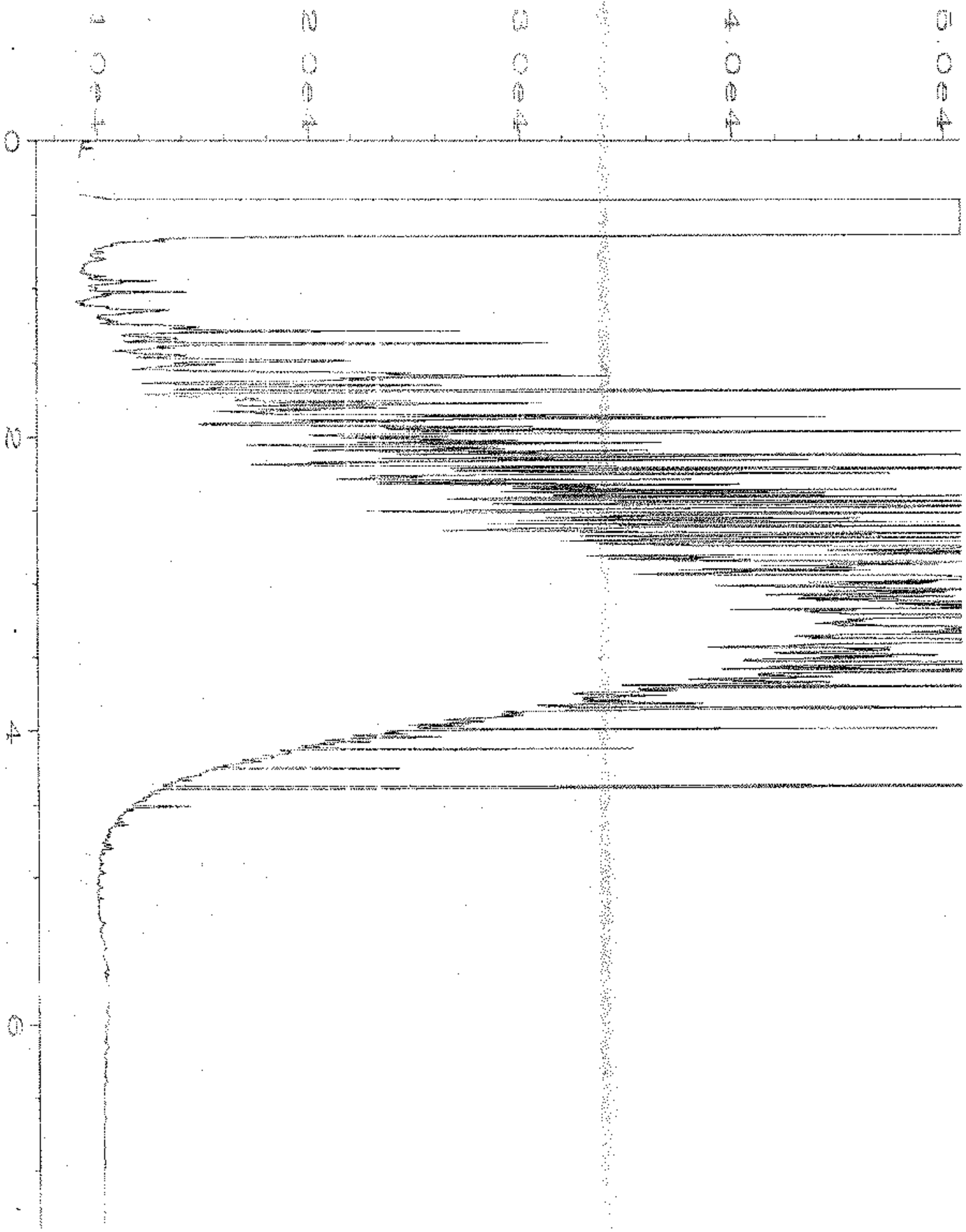
Page Number : 1
Vial Number : 34
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DX.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\03-17-20\020F0301.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC1                                 Vial Number       : 20
Sample Name       : 00-680 mb                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 3
Acquired on       : 17 Mar 20   11:19 AM                Instrument Method: DX.MTH
Report Created on: 18 Mar 20   01:23 PM                 Analysis Method   : DX.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\03-16-20\006F0701.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 6
Sample Name       : 00-636 mb                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 7
Acquired on       : 16 Mar 20   01:25 PM            Instrument Method: DX.MTH
Report Created on: 18 Mar 20   01:24 PM            Analysis Method  : DX.MTH
```



Data File Name : C:\HPCHEM\1\DATA\03-17-20\003F0201.D
Operator : TL
Instrument : GC1
Sample Name : 500 Dx 58-146H
Run Time Bar Code:
Acquired on : 17 Mar 20 07:24 AM
Report Created on: 18 Mar 20 09:24 AM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DX.MTH

003244

SAMPLE CHAIN OF CUSTODY

ME 03-13-20 CI3/VW5/A05/VS5

Page # 1 of 1

Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union St Suite 600
City, State, ZIP Seattle, WA 98101
Phone 206 292-2078 Email

SAMPLERS (signature)	
PROJECT NAME POL-TPH	PO #
REMARKS VOCs 8260 include MTBE, Hexane, EDB, EDS, IN, NH, BTEX Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID*	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	VPH / EPH	Lead			V-per CC EP 3/20 Notes
MW-40-10.5-11'	01A-E	3/9/20	1145	Soil	5	✓	✓		X								*Run HCID Archive Rest
8 ~~MW-40-11-13~~																	
8 mw-40-17D ~~MW-40-11~~	02A-D		1245		4	X	X	X			X			X			Dup.
mw-40-17'	03		1235		4	X	X	X			X			X			
mw-40-24-24.5	04A-E		1330		5				X								*
mw-40-1.0-1.5	05		1530		5				X								* Run HCID Archive rest
OIP-49-10	06		14:05		5	✓	✓		X								Archive VOAs
OIP-49-17	07		14:15		5	✓	✓		X								" "
OIP-47-2-3	08		15:10		5				X								" "
OIP-47-25	09		15:30		5				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	3/13	1644
Received by:	Eric Young	FeB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244

SAMPLE CHAIN OF CUSTODY

ME 03-13-20

CI3/VW5/A05
VS5

Page # 2 of 11

Report To Gabe Cisneros

Company Floyd Snider

Address

City, State, ZIP see page 1

Phone Email

SAMPLERS (*signature*)	
PROJECT NAME POL-TPH	PO #
REMARKS VOC 8260: MTBE, EDB Hexane, EDS, Naph, BTEX Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	cPAHs EPA 8270	PCBs EPA 8082	Lead	EPH/VPH	Naphthalene		Notes
OIP-47-17	10A-H	3/9/20	1535	Soil	8	X	X			X	X		X	X			
OIP-47-11-12	11 A-H		15:05		8	X	X			X	X		X	X			
OIP-31-17	12A-E		17:20		5				X								Archive VOAs
OIP-31-20	13		17:15		5				X								Archive VOAs
GP-33-28-29	14		16:50		5				X								" "
GP-33-14-14.5	15		16:30		5	✓	✓		X								" "
GP-33-19.5-20	16		16:35		5				X								" "
GP-33-24-25	17		16:45		5				X								" "
GP-34-14-15	18		18:10		5				X								" "
GP-34-GW-14-19	19A-H		18:05	GW	8	X	X	X			X				X		

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3012 16th Avenue West
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SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabe Cisneros	Snider/Floyd	3/13	1644
Received by:	Eric Young	F&B	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244
[redacted]

SAMPLE CHAIN OF CUSTODY

ME 03-13-20 [redacted] Page # 3 of 11

CI3/VW5/A05/VS5

Report To Gabe Cisneros

Company Floyd/Snider

Address 601 Union Street Ste 600

City, State, ZIP Seattle 98161

Phone ____ Email ____

SAMPLERS (signature)

PROJECT NAME Poc-TPH

PO #

REMARKS VOC's include MTBE, Hexane, BTEX EDB, EDC & Napth.

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Lead	VPH/EPH	BTEX 8260		Notes
MW-33-12-12.5	20 A-H	3/9	1720	Soil	8	X	X			X	X		X	X			See Remarks
MW-33-19.5-20	21 |	3/9	1740	Soil	8	X	X			X	X		X	X			for VOCs 8260
MW-33-22.5-23	22 A-E	3/9	1800	Soil	5				X								Run HCID Archive rest
MW-35-15.5-16	23 |	3/10	1245	Soil	5				X								"
MW-34-15-15.5	24	|	1800	|	5	X	X				X		X		X		
MW-34-20-20.5	25		1806		5	X	X				X		X		X		
MW-34-24-24.5	26		1812		5	X	X				X		X		X		
MW-34-28-28.5	27 |	↓	1818		5				X								Run HCID Archive rest
OIP-23-14-15	28 A-H	3/10/20	0935		8	X	X			X	X			X			
OIP-23-19-20	29 |	3/10/20	0945	↓	8	X	X			X	X			X			

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabe Cisneros	Floyd/Snider	3/13	1645
Received by:	Eric Coun	FEBI	3/13/20	1645
Relinquished by:				
Received by:		Samples received at 4 °C		

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3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

003 244 [redacted]

SAMPLE CHAIN OF CUSTODY

ME 03-13-20 [redacted] # 4 of 11 CI3/VW5/A05 / V55

Report To Gabe Cisneros
Company Floyd Snider
Address
City, State, ZIP see page 1
Phone Email

SAMPLERS (signature)

PROJECT NAME: POL - TPH

PO #

REMARKS: see page 1 for VOCs list

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TOC	VPH/EPH	Naphthalene		Notes
01P-23-23-24	30 A-H	3/10/20	0955	Soil	8	X	X			X	X			X			
01P-23-29.5-30	31 A-E		10:20		5				X								~~Archive VOAs~~
01P-46-8	32		0850		1								X				
01P-46-10-11	33 A-E		0845		5				X								Archive VOAs
01P-46-14	34		0840		5				X								Archive VOAs
01P-70-8	35		1130		5				X								Archive VOAs
01P-70-12-14	36		1145		5				X								Archive VOAs
01P-70-GW-10-15	37 A-H		12:00	GW	8	X	X	X			X				X		
C1P-57-14	38 A-E		12:50	Soil	5				X								Archive VOAs
01P-39-15-15.5	39		1342	Soil	5	X	X	X	~~X~~ RO		X						~~Archive VOAs~~ RO.

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
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SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabe Cisneros	Floyd/Snider	3/13	1644
Received by:	[illegible]	FeB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244 [redacted]

Report To Gabe Cisneros
Company Floyd Snider
Address see page 1
City, State, ZIP
Phone ______ Email ______

SAMPLE CHAIN OF CUSTODY

ME 03-13-20 [redacted] 03/UW5/A05 VSS

Page # 5 of 11

SAMPLERS (*signature*)	
PROJECT NAME PCL-TPH	PO #
REMARKS see page 1 for VOCs list Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Naphthalene	Lead	VPH/EPH		Notes
01P-39-16.5-17	40 A-H	3/10/20	1402	Soil	8	X	X			X	X			X	X		
01P-39-21-22	41 A-E		1400		5				X								Archive VOAs
GP-35-7-8	42		14:42		5	✓			X								Archive VOAs
GP-35-16-17	43		14:47		5				X								Archive VOAs
01P-04-4-5	44		16:50		5				X								Archive VOAs
01P-04-15-16	45		17:08		5				X								Archive VOAs
01P-04-GW-15-20	46 A-H		17:30	GW	8	X	X	X			X		X				
MW-36-25.5-26	47 A-E	3/11/20	1135	Soil	5				X								Archive VOAs
MW-38-23.5-24	48		1600	Soil	5				X								Archive VOAs
GP-31-14-15	49		1220	Soil	5				X								Archive VOAs

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Seattle, WA 98119-2029
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SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabe Cisneros	Floyd Snider	3/13	1644
Received by:	Eric Young	FB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244

SAMPLE CHAIN OF CUSTODY ME 03-13-20 03/NWS/A05/V35

Page # 6 of 11

Report To Gabe Cisneros

Company Floyd Snider

Address

City, State, ZIP See page 1

Phone Email

SAMPLERS (signature) Dal Ostat

PROJECT NAME	PO #
POL-TPH	

REMARKS	INVOICE TO
See page 1 for list of VOCs Project specific RLs? - Yes / No	

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TOC	Naphthalene			Notes
OIP-72-10-11	50 A-E	3/11/20	0950	Soil	5				X								Archive VOAs
OIP-72-16-17	51		1000		5				X								" "
GP ~~OIP~~ - 32-17.5-185	52		1320	↓	5				X								" "
GP 32-GW-14-19	53 A-H		1330	GW	8	X	X	X			X						
OIP-68-13.5-14	54 A-E		1640	Soil	5				X								Archive VOAs
OIP-68-14-14.5	55		1638		1								X				
OIP-68-10-11	56 A-E		1645		5				X								Archive VOAs
OIP-68D-10-11	57		1700	↓	5				X								" "
OIP-68-GW-13-18	58 A-H		1705	GW	8	X	X	X			X			X			
OIP-69-GW-12-17	59	↓	1555	GW	8	X	X	X			X			X			

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3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gabe Cisneros	Floyd Snider	3/13	1644
Received by:	Eric Young	FeB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at	4 °C	

003244

SAMPLE CHAIN OF CUSTODY

HE 03-13-20

CE3/VW5/A05/U55

Page # 7 of 11

Report To Gabe Cisneros
Company Floyd Snider
Address
City, State, ZIP see page 1
Phone Email

SAMPLERS (signature)	
PROJECT NAME POL-TPH	PO #
REMARKS see page 1 for list of VOCs Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TOCs	Naphthalene	Lead	VPH/EPH	Notes
01P-69-14.5-15	60 A-F	3/11/20	1540	Soil	6				X				X				Archive VOAs
01P-69-11-12	61 A-E		1535		5				X								" "
01P-54-15-16	62 A-E		0845		5	✓			X								" "
01P-54-18-19	63		0840		1								X				
GP-31-GW-13.5-18.5	64 A-H		1230	GW	8	X	X	X			X						
01P-02-14-15	65 A-E		1055	Soil	5				X								Archive VOAs
01P-02-GW-14.5-19.5	66 A-H		1115	GW	8	X	X	X			X			X			
01P-02D-GW-14.5-19.5	67 A-H		1120	GW	8	X	X	X			X			X			
01P-02-5-5.5	68 A-E		1640	Soil	5	✓			X								Archive VOAs
01P-15-15-16	69 A-H	3/12/20	1500	Soil	8	X	X			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	3/13	1644
Received by:	Eric Young	FEB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at	4 °C	

003244

[redacted]

SAMPLE CHAIN OF CUSTODY ME 03-13-20

03/VW5/A05/VS5

[redacted]

Page # 8 of 11

Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union St, Ste 600
City, State, ZIP Seattle, WA
Phone 206 292 2078 Email

SAMPLERS (*signature*)	
PROJECT NAME POC	PO #
REMARKS See page 1 for list of VOCs Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	cPAHs EPA 8270	PCBs EPA 8082	Lead	VPH EPH			Notes
MW-37-27.5-28	70 A-E	3/12/20	0930	S	5				X								Archive Vials
MW-37-27.5-28 D	71	↓	0935	S	5				X								~~Archive Vials~~
P3-0-0.5 ~~Feet~~ RO	72		1440	S	5	X	X	X			X						
P4-0-0.5 ~~Feet~~ RO	73 ↓		1450	S	5	X	X	X			X						
P5-0-0.5 ~~Feet~~ RO	74 A-D		1455	S	15	X	X	X			X						MS/MSD
P6-0.5-1.0 ~~Feet~~ RO	75 A-E		1315	S	5	X	X	X			X						
P6-0.5-1.0 D	76	↓	1320	S	5	X	X	X			X						
OIP-64-14-15	77	3/12	1545	S	5				X								Archive rest
GP-36-22-23	78 ↓		1401	S	5				X								Archive VOAs
GP-36-13-14	79 A-H	↓	1347	S	8	X	X			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	3/13	1644
Received by:	Eric [illegible]	FB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

~~003244~~

SAMPLE CHAIN OF CUSTODY

ME 03/13/20

Page # 9 of 11

USS/CO5/003 VWS

Report To Gabe Cisneros
Company Floyd Snider
Address See page 1
City, State, ZIP
Phone Email

SAMPLERS (*signature*) Dub Ostet

PROJECT NAME POL-TPH

PO #

REMARKS See page 1 for list of VOCs

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Lead	VPH/EPH	Naphthalene		Notes
01P-15-20-21	80 A-H	3/12/20	1520	Soil	8	X	X			X	X		X	X			
~~01P~~ GP-37-12-14	81 A-E		1315	Soil	5				X								Archive VOAs
RD ~~01P~~ GP-37D-12-14	82 A-E		1320	Soil	5				X								Archive VOAs
GP-36-16-17	83 A-H		1402	Soil	8	X	X			X	X		X	X			
* 01P-64-14-15			1545	Soil	5				X								Archive VOAs
01P-15-23-24	84 A-E		1535	Soil	5				X								Archive VOAs
01P-15-GW-14-19	85 A-H		1515	~~Soil~~ GW	8	X	X	X			X				X		
01P-73-13-14	86 A-E		1045	Soil	5				X								Archive VOAs
01P-73D-13-14	87		1040	Soil	5				X								" "
01P-73-9-10	88		1030	Soil	5				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	3/13	1644
Received by:	Eric Clowne	F&B	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244

SAMPLE CHAIN OF CUSTODY

ME 03-13-20 vs5/co5/KI3/vw5

Report To Gabe Cisneros
Company Floyd Snider
Address
City, State, ZIP See page 1
Phone ______ Email ______

SAMPLERS (*signature*)

PROJECT NAME
POL-TPH

PO #

REMARKS
See page 1 for list of VOCs
Project specific RLs? - Yes / No

INVOICE TO

Page # 10 of 11

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	Targeted VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Lead	VPH/EPH	Naphthalene		Notes
01P-67-11-12	89 A-H	3/12/20	1225	Soil	8	X	X			X	X		X	X			
01P-67-GW-14-19	90 A-K		1155	GW	24	X	X	X			X				X		MS/MSD
01P-67-18-19	91 A-E		1240	Soil	5				X								Archive VOAs
01P-67-7-8	92 A-E		1150	Soil	5				X								Archive VOAs
01P-67-14.5-15	93 A-H		1230	Soil	8	X	X			✓	X		X	✓			
MW-39-2-4	94 A-E		0900	Soil	5				X								Archive VOAs
MW-39-8-9	95 A-O		0905	Soil	15	X	X	X			X						MS/MSD
MW-39-13-14	96 A-H		0925	Soil	8	X	X			X	X			X			
MW-39-18.5-20	97 A-O		0930	Soil	15	X	X	X			X						MS/MSD
GP-38-11-11.5	98 A-E	3/13/20	1210	S	5				X								Archive by test

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	3/13	1644
Received by:	Eric	F&B	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244 [redacted]

SAMPLE CHAIN OF CUSTODY

ME 03-13-20 [redacted] CE3/OWS/A05/VSS

Page # 1 of 1

Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union St Ste 600
City, State, ZIP Seattle, WA
Phone 206 292-2078 Email

SAMPLERS (*signature*)	
PROJECT NAME POC-TPH	PO #
REMARKS VOCs include EDB, EDC, MTBE, BTEX Hexane, Naphthalen Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	cPAHs EPA 8270	PCBs EPA 8082	EDB|EDC	Lead	VPH|EPH	Naphthalene	Notes
01P-18-19-19.5	99 A-E	3/13/20	0841	S	5				X								Archive rest
01P-20-11-11.5	100 A-H		0909	Soil	8	X	X			X	X		X	X	X		EDB|EDC included in VOCs
01P-20-19-19.5	101 A-E		0919		5				X								Archive rest
01P-19-19-20	102 A-O		0830		15				X								MS/MSD
01P-21-18-19	103 A-E		0917		5				X								
01P-06-27-28	104 A-E		10:30		5				X								Archive VOAs
01P-06-29-30	105 A-O		10:40		15												Archive/MS/MSD
01P-06-GW-25-30	106 A-H		10:50	GW	8	X	X	X			X					X	
01P-05-27-28	107 A-E		11:18	Soil	5				X								Archive VOAs
01P-05-29-30	108 A-E		11:20	Soil	5												Archive
* Trip Blank	109 A-N			Water	14												

NP) 3/16/20

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	3/13	1644
Received by:		Eric Young	FEB	3/13/20	1649
Relinquished by:					
Received by:			Samples received at 4 °C		

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

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

RE: 911363
Work Order Number: 1911358

December 12, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 5 sample(s) on 11/25/2019 for the analyses presented in the following report.

Extractable Petroleum Hydrocarbons by NWEPH
Sample Moisture (Percent Moisture)
Total Organic Carbon by EPA 9060
Volatile Petroleum Hydrocarbons by NWVPH

This report consists of the following:

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

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

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT: Friedman & Bruya
Project: 911363
Work Order: 1911358

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1911358-001	OIP30-20-21-111919	11/19/2019 2:15 PM	11/25/2019 11:52 AM
1911358-002	OIP42-17-17.5-112119	11/21/2019 6:15 PM	11/25/2019 11:52 AM
1911358-003	OIP53-21-21.5-112219	11/22/2019 9:00 AM	11/25/2019 11:52 AM
1911358-004	OIP08-19-20-112219	11/22/2019 11:09 AM	11/25/2019 11:52 AM
1911358-005	OIP66-12-12.5-112219	11/22/2019 11:45 AM	11/25/2019 11:52 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1911358**
Date: **12/12/2019**

CLIENT: Friedman & Bruya
Project: 911363

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

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

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

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

Qualifiers & Acronyms

Qualifiers:

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

Acronyms:

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

Analytical Report

Work Order: **1911358**
Date Reported: **12/12/2019**

Client: Friedman & Bruya **Collection Date:** 11/19/2019 2:15:00 PM
Project: 911363
Lab ID: 1911358-001 **Matrix:** Soil
Client Sample ID: OIP30-20-21-111919

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 26663 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	32.8	24.7	*	mg/Kg-dry	1	12/10/2019 7:41:00 PM
Aliphatic Hydrocarbon (C10-C12)	154	12.3		mg/Kg-dry	1	12/10/2019 7:41:00 PM
Aliphatic Hydrocarbon (C12-C16)	1,250	123	D	mg/Kg-dry	10	12/11/2019 9:55:00 PM
Aliphatic Hydrocarbon (C16-C21)	1,680	123	D	mg/Kg-dry	10	12/11/2019 9:55:00 PM
Aliphatic Hydrocarbon (C21-C34)	1,960	123	D	mg/Kg-dry	10	12/11/2019 9:55:00 PM
Aromatic Hydrocarbon (C8-C10)	15.5	12.3	*	mg/Kg-dry	1	12/11/2019 5:52:00 AM
Aromatic Hydrocarbon (C10-C12)	56.1	12.3		mg/Kg-dry	1	12/11/2019 5:52:00 AM
Aromatic Hydrocarbon (C12-C16)	555	12.3		mg/Kg-dry	1	12/11/2019 5:52:00 AM
Aromatic Hydrocarbon (C16-C21)	1,730	123	D	mg/Kg-dry	10	12/11/2019 4:48:00 PM
Aromatic Hydrocarbon (C21-C34)	2,320	123	D	mg/Kg-dry	10	12/11/2019 4:48:00 PM
Surr: 1-Chlorooctadecane	83.5	60 - 140		%Rec	1	12/10/2019 7:41:00 PM
Surr: o-Terphenyl	78.4	60 - 140		%Rec	1	12/11/2019 5:52:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 26673 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	1.56		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Aliphatic Hydrocarbon (C6-C8)	6.23	2.22		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Aliphatic Hydrocarbon (C8-C10)	9.51	1.25		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Aliphatic Hydrocarbon (C10-C12)	39.3	1.33		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Aromatic Hydrocarbon (C8-C10)	18.3	2.67		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Aromatic Hydrocarbon (C10-C12)	43.6	5.34	D	mg/Kg-dry	10	12/2/2019 3:42:47 PM
Aromatic Hydrocarbon (C12-C13)	142	62.3	D	mg/Kg-dry	10	12/2/2019 3:42:47 PM
Benzene	ND	0.534		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Toluene	ND	0.623		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Ethylbenzene	ND	0.623		mg/Kg-dry	1	12/2/2019 11:14:21 PM
m,p-Xylene	ND	1.16		mg/Kg-dry	1	12/2/2019 11:14:21 PM
o-Xylene	0.703	0.534		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Naphthalene	8.03	0.445		mg/Kg-dry	1	12/2/2019 11:14:21 PM
Methyl tert-butyl ether (MTBE)	ND	0.445	Q*	mg/Kg-dry	1	12/2/2019 11:14:21 PM
Surr: 1,4-Difluorobenzene	102	65 - 140		%Rec	1	12/2/2019 11:14:21 PM
Surr: Bromofluorobenzene	122	65 - 140		%Rec	1	12/2/2019 11:14:21 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
* - Flagged value is not within established control limits.
Volatile organic compound detections should be confirmed by GCMS.

Client: Friedman & Bruya
Collection Date: 11/19/2019 2:15:00 PM
Project: 911363
Lab ID: 1911358-001
Matrix: Soil
Client Sample ID: **OIP30-20-21-111919**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R55596		Analyst: CG
Percent Moisture	20.7	0.500		wt%	1	11/26/2019 4:06:03 PM

Analytical Report

Work Order: **1911358**
Date Reported: **12/12/2019**

Client: Friedman & Bruya
Collection Date: 11/21/2019 6:15:00 PM
Project: 911363
Lab ID: 1911358-002
Matrix: Soil
Client Sample ID: **OIP42-17-17.5-112119**

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 26663 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	915	214	D*	mg/Kg-dry	10	12/11/2019 9:12:00 PM
Aliphatic Hydrocarbon (C10-C12)	1,330	107	D	mg/Kg-dry	10	12/11/2019 9:12:00 PM
Aliphatic Hydrocarbon (C12-C16)	4,090	107	D	mg/Kg-dry	10	12/11/2019 9:12:00 PM
Aliphatic Hydrocarbon (C16-C21)	3,540	107	D	mg/Kg-dry	10	12/11/2019 9:12:00 PM
Aliphatic Hydrocarbon (C21-C34)	992	10.7		mg/Kg-dry	1	12/10/2019 11:19:00 PM
Aromatic Hydrocarbon (C8-C10)	107	10.7	*	mg/Kg-dry	1	12/11/2019 9:30:00 AM
Aromatic Hydrocarbon (C10-C12)	397	10.7		mg/Kg-dry	1	12/11/2019 9:30:00 AM
Aromatic Hydrocarbon (C12-C16)	1,310	107	D	mg/Kg-dry	10	12/11/2019 4:05:00 PM
Aromatic Hydrocarbon (C16-C21)	2,620	107	D	mg/Kg-dry	10	12/11/2019 4:05:00 PM
Aromatic Hydrocarbon (C21-C34)	503	10.7		mg/Kg-dry	1	12/11/2019 9:30:00 AM
Surr: 1-Chlorooctadecane	103	60 - 140		%Rec	1	12/10/2019 11:19:00 PM
Surr: o-Terphenyl	91.0	60 - 140		%Rec	1	12/11/2019 9:30:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 26673 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	283	23.7	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Aliphatic Hydrocarbon (C6-C8)	597	33.8	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Aliphatic Hydrocarbon (C8-C10)	119	18.9	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Aliphatic Hydrocarbon (C10-C12)	215	20.3	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Aromatic Hydrocarbon (C8-C10)	199	40.6	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Aromatic Hydrocarbon (C10-C12)	536	8.12	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Aromatic Hydrocarbon (C12-C13)	562	94.7	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Benzene	ND	8.12	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Toluene	ND	9.47	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Ethylbenzene	42.7	9.47	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
m,p-Xylene	ND	17.6	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
o-Xylene	ND	8.12	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Naphthalene	23.2	6.77	D	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Methyl tert-butyl ether (MTBE)	ND	6.77	DQ*	mg/Kg-dry	20	12/2/2019 5:46:00 PM
Surr: 1,4-Difluorobenzene	113	65 - 140	D	%Rec	20	12/2/2019 5:46:00 PM
Surr: Bromofluorobenzene	114	65 - 140	D	%Rec	20	12/2/2019 5:46:00 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
* - Flagged value is not within established control limits.
Diluted due to matrix.
Volatile organic compound detections should be confirmed by GCMS.

Analytical Report

Work Order: **1911358**
Date Reported: **12/12/2019**

Client: Friedman & Bruya
Project: 911363
Lab ID: 1911358-002
Client Sample ID: **OIP42-17-17.5-112119**

Collection Date: 11/21/2019 6:15:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R55596		Analyst: CG
Percent Moisture	16.2	0.500		wt%	1	11/26/2019 4:06:03 PM

Analytical Report

Work Order: **1911358**
Date Reported: **12/12/2019**

Client: Friedman & Bruya
Collection Date: 11/22/2019 9:00:00 AM
Project: 911363
Lab ID: 1911358-003
Matrix: Soil
Client Sample ID: **OIP53-21-21.5-112219**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R55596		Analyst: CG
Percent Moisture	28.4	0.500		wt%	1	11/26/2019 4:06:03 PM
Total Organic Carbon by EPA 9060				Batch ID: 26680		Analyst: SS
Total Organic Carbon	ND	0.0750		%-dry	1	12/3/2019 4:28:00 PM

Client: Friedman & Bruya
Collection Date: 11/22/2019 11:09:00 AM
Project: 911363
Lab ID: 1911358-004
Matrix: Soil
Client Sample ID: OIP08-19-20-112219

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 26663 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	820	19.8	*	mg/Kg-dry	1	12/11/2019 12:03:00 AM
Aliphatic Hydrocarbon (C10-C12)	1,070	98.9	D	mg/Kg-dry	10	12/11/2019 8:28:00 PM
Aliphatic Hydrocarbon (C12-C16)	3,280	98.9	D	mg/Kg-dry	10	12/11/2019 8:28:00 PM
Aliphatic Hydrocarbon (C16-C21)	2,820	98.9	D	mg/Kg-dry	10	12/11/2019 8:28:00 PM
Aliphatic Hydrocarbon (C21-C34)	870	9.89		mg/Kg-dry	1	12/11/2019 12:03:00 AM
Aromatic Hydrocarbon (C8-C10)	79.9	9.89	*	mg/Kg-dry	1	12/11/2019 10:14:00 AM
Aromatic Hydrocarbon (C10-C12)	290	9.89		mg/Kg-dry	1	12/11/2019 10:14:00 AM
Aromatic Hydrocarbon (C12-C16)	890	9.89		mg/Kg-dry	1	12/11/2019 10:14:00 AM
Aromatic Hydrocarbon (C16-C21)	1,990	98.9	D	mg/Kg-dry	10	12/11/2019 3:21:00 PM
Aromatic Hydrocarbon (C21-C34)	393	9.89		mg/Kg-dry	1	12/11/2019 10:14:00 AM
Surr: 1-Chlorooctadecane	96.8	60 - 140		%Rec	1	12/11/2019 12:03:00 AM
Surr: o-Terphenyl	85.9	60 - 140		%Rec	1	12/11/2019 10:14:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 26673 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	15.6	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Aliphatic Hydrocarbon (C6-C8)	269	22.3	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Aliphatic Hydrocarbon (C8-C10)	285	12.5	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Aliphatic Hydrocarbon (C10-C12)	616	66.9	D	mg/Kg-dry	50	12/3/2019 5:02:15 PM
Aromatic Hydrocarbon (C8-C10)	425	26.8	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Aromatic Hydrocarbon (C10-C12)	1,360	26.8	D	mg/Kg-dry	50	12/3/2019 5:02:15 PM
Aromatic Hydrocarbon (C12-C13)	2,180	312	D	mg/Kg-dry	50	12/3/2019 5:02:15 PM
Benzene	ND	5.35	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Toluene	7.07	6.24	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Ethylbenzene	38.6	6.24	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
m,p-Xylene	ND	11.6	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
o-Xylene	12.9	5.35	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Naphthalene	51.4	4.46	D	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Methyl tert-butyl ether (MTBE)	ND	4.46	DQ*	mg/Kg-dry	10	12/2/2019 7:08:30 PM
Surr: 1,4-Difluorobenzene	89.3	65 - 140	D	%Rec	10	12/2/2019 7:08:30 PM
Surr: Bromofluorobenzene	100	65 - 140	D	%Rec	10	12/2/2019 7:08:30 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
* - Flagged value is not within established control limits.
Diluted due to matrix.
Volatile organic compound detections should be confirmed by GCMS.

Analytical Report

Work Order: **1911358**
Date Reported: **12/12/2019**

Client: Friedman & Bruya
Collection Date: 11/22/2019 11:09:00 AM
Project: 911363
Lab ID: 1911358-004
Matrix: Soil
Client Sample ID: OIP08-19-20-112219

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R55630		Analyst: CG
Percent Moisture	12.2	0.500		wt%	1	12/2/2019 9:23:17 AM

Client: Friedman & Bruya
Collection Date: 11/22/2019 11:45:00 AM
Project: 911363
Lab ID: 1911358-005
Matrix: Soil
Client Sample ID: OIP66-12-12.5-112219

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 26663 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	243	25.0	*	mg/Kg-dry	1	12/11/2019 12:47:00 AM
Aliphatic Hydrocarbon (C10-C12)	198	12.5		mg/Kg-dry	1	12/11/2019 12:47:00 AM
Aliphatic Hydrocarbon (C12-C16)	266	12.5		mg/Kg-dry	1	12/11/2019 12:47:00 AM
Aliphatic Hydrocarbon (C16-C21)	199	12.5		mg/Kg-dry	1	12/11/2019 12:47:00 AM
Aliphatic Hydrocarbon (C21-C34)	44.5	12.5		mg/Kg-dry	1	12/11/2019 12:47:00 AM
Aromatic Hydrocarbon (C8-C10)	ND	12.5	*	mg/Kg-dry	1	12/11/2019 10:57:00 AM
Aromatic Hydrocarbon (C10-C12)	69.2	12.5		mg/Kg-dry	1	12/11/2019 10:57:00 AM
Aromatic Hydrocarbon (C12-C16)	96.2	12.5		mg/Kg-dry	1	12/11/2019 10:57:00 AM
Aromatic Hydrocarbon (C16-C21)	176	12.5		mg/Kg-dry	1	12/11/2019 10:57:00 AM
Aromatic Hydrocarbon (C21-C34)	93.0	12.5		mg/Kg-dry	1	12/11/2019 10:57:00 AM
Surr: 1-Chlorooctadecane	70.2	60 - 140		%Rec	1	12/11/2019 12:47:00 AM
Surr: o-Terphenyl	85.1	60 - 140		%Rec	1	12/11/2019 10:57:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 26673 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	1.30		mg/Kg-dry	1	12/2/2019 10:33:17 PM
Aliphatic Hydrocarbon (C6-C8)	36.2	1.86		mg/Kg-dry	1	12/2/2019 10:33:17 PM
Aliphatic Hydrocarbon (C8-C10)	35.0	10.4	D	mg/Kg-dry	10	12/2/2019 5:04:51 PM
Aliphatic Hydrocarbon (C10-C12)	60.3	11.1	D	mg/Kg-dry	10	12/2/2019 5:04:51 PM
Aromatic Hydrocarbon (C8-C10)	57.1	2.23		mg/Kg-dry	1	12/2/2019 10:33:17 PM
Aromatic Hydrocarbon (C10-C12)	200	4.46	D	mg/Kg-dry	10	12/2/2019 5:04:51 PM
Aromatic Hydrocarbon (C12-C13)	172	52.0	D	mg/Kg-dry	10	12/2/2019 5:04:51 PM
Benzene	ND	0.446		mg/Kg-dry	1	12/2/2019 10:33:17 PM
Toluene	0.812	0.520		mg/Kg-dry	1	12/2/2019 10:33:17 PM
Ethylbenzene	0.700	0.520		mg/Kg-dry	1	12/2/2019 10:33:17 PM
m,p-Xylene	ND	0.966		mg/Kg-dry	1	12/2/2019 10:33:17 PM
o-Xylene	1.87	0.446		mg/Kg-dry	1	12/2/2019 10:33:17 PM
Naphthalene	9.97	0.371		mg/Kg-dry	1	12/2/2019 10:33:17 PM
Methyl tert-butyl ether (MTBE)	ND	0.371	Q*	mg/Kg-dry	1	12/2/2019 10:33:17 PM
Surr: 1,4-Difluorobenzene	105	65 - 140		%Rec	1	12/2/2019 10:33:17 PM
Surr: Bromofluorobenzene	105	65 - 140		%Rec	1	12/2/2019 10:33:17 PM

NOTES:
Volatile organic compound detections should be confirmed by GCMS.
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
* - Flagged value is not within established control limits.

Analytical Report

Work Order: **1911358**
Date Reported: **12/12/2019**

Client: Friedman & Bruya
Project: 911363
Lab ID: 1911358-005
Client Sample ID: **OIP66-12-12.5-112219**

Collection Date: 11/22/2019 11:45:00 AM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R55630		Analyst: CG
Percent Moisture	24.4	0.500		wt%	1	12/2/2019 9:23:17 AM

Date: *12/12/2019*

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Total Organic Carbon by EPA 9060

Sample ID: **MB-26680** SampType: **MBLK** Units: **%-dry** Prep Date: **12/3/2019** RunNo: **55700**
Client ID: **MBLKS** Batch ID: **26680** Analysis Date: **12/3/2019** SeqNo: **1108560**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.0750									

Sample ID: **LCS-26680** SampType: **LCS** Units: **%-dry** Prep Date: **12/3/2019** RunNo: **55700**
Client ID: **LCSS** Batch ID: **26680** Analysis Date: **12/3/2019** SeqNo: **1108561**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	0.745	0.0750	0.8580	0	86.8	70	131				

Sample ID: **1911291-007ADUP** SampType: **DUP** Units: **%-dry** Prep Date: **12/3/2019** RunNo: **55700**
Client ID: **BATCH** Batch ID: **26680** Analysis Date: **12/3/2019** SeqNo: **1108563**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.0750						0		30	H

Sample ID: **1911291-007AMS** SampType: **MS** Units: **%-dry** Prep Date: **12/3/2019** RunNo: **55700**
Client ID: **BATCH** Batch ID: **26680** Analysis Date: **12/3/2019** SeqNo: **1108564**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	0.912	0.0750	1.000	0	91.2	38.5	146				H

Sample ID: **1911291-007AMSD** SampType: **MSD** Units: **%-dry** Prep Date: **12/3/2019** RunNo: **55700**
Client ID: **BATCH** Batch ID: **26680** Analysis Date: **12/3/2019** SeqNo: **1108565**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	0.892	0.0750	1.000	0	89.2	38.5	146	0.9120	2.22	20	H

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **MB-26663** SampType: **MBLK** Units: **mg/Kg** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **MBLKS** Batch ID: **26663** Analysis Date: **12/10/2019** SeqNo: **1113183**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	ND	20.0									*
Aliphatic Hydrocarbon (C10-C12)	ND	10.0									
Aliphatic Hydrocarbon (C12-C16)	ND	10.0									
Aliphatic Hydrocarbon (C16-C21)	ND	10.0									
Aliphatic Hydrocarbon (C21-C34)	ND	10.0									
Surr: 1-Chlorooctadecane	95.9		100.0		95.9	60	140				

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **LCS-26663** SampType: **LCS** Units: **mg/Kg** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **LCSS** Batch ID: **26663** Analysis Date: **12/10/2019** SeqNo: **1113182**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	170	20.0	250.0	0	68.1	70	130				S
Aliphatic Hydrocarbon (C10-C12)	120	10.0	125.0	0	96.3	70	130				
Aliphatic Hydrocarbon (C12-C16)	129	10.0	125.0	0	103	70	130				
Aliphatic Hydrocarbon (C16-C21)	125	10.0	125.0	0	99.6	70	130				
Aliphatic Hydrocarbon (C21-C34)	134	10.0	125.0	0	107	70	130				
Surr: 1-Chlorooctadecane	101		100.0		101	60	140				

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

Sample ID: **1911358-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **OIP30-20-21-111919** Batch ID: **26663** Analysis Date: **12/10/2019** SeqNo: **1113181**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	30.3	24.7						32.77	7.66	25	*
Aliphatic Hydrocarbon (C10-C12)	137	12.4						154.1	11.6	25	
Aliphatic Hydrocarbon (C12-C16)	1,290	12.4						1,480	13.9	25	E
Aliphatic Hydrocarbon (C16-C21)	1,670	12.4						1,945	15.0	25	E
Aliphatic Hydrocarbon (C21-C34)	3,550	12.4						4,320	19.5	25	E
Surr: 1-Chlorooctadecane	111		123.7		89.6	60	140		0		

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **1911358-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **OIP30-20-21-111919** Batch ID: **26663** Analysis Date: **12/10/2019** SeqNo: **1113181**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.
* - Flagged value is not within established control limits.

Sample ID: **1911358-001AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **OIP30-20-21-111919** Batch ID: **26663** Analysis Date: **12/10/2019** SeqNo: **1113184**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	199	23.3	291.8	32.77	57.1	70	130				S
Aliphatic Hydrocarbon (C10-C12)	300	11.7	145.9	154.1	99.8	70	130				
Aliphatic Hydrocarbon (C12-C16)	1,600	11.7	145.9	1,480	80.5	70	130				E
Aliphatic Hydrocarbon (C16-C21)	2,030	11.7	145.9	1,945	59.6	70	130				SE
Aliphatic Hydrocarbon (C21-C34)	4,040	11.7	145.9	4,320	-190	70	130				SE
Surr: 1-Chlorooctadecane	113		116.7		96.7	60	140				

NOTES:
S - Outlying spike recovery(ies) observed.
E - Estimated value. The amount exceeds the linear working range of the instrument.

Sample ID: **1911358-001AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **OIP30-20-21-111919** Batch ID: **26663** Analysis Date: **12/10/2019** SeqNo: **1113185**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	209	24.0	299.9	32.77	58.7	70	130	199.5	4.53	30	S
Aliphatic Hydrocarbon (C10-C12)	311	12.0	149.9	154.1	105	70	130	299.8	3.75	30	
Aliphatic Hydrocarbon (C12-C16)	1,670	12.0	149.9	1,480	129	70	130	1,597	4.63	30	E
Aliphatic Hydrocarbon (C16-C21)	2,170	12.0	149.9	1,945	152	70	130	2,032	6.69	30	SE
Aliphatic Hydrocarbon (C21-C34)	4,250	12.0	149.9	4,320	-46.7	70	130	4,044	4.98	30	SE
Surr: 1-Chlorooctadecane	108		120.0		90.2	60	140		0		

NOTES:
S - Outlying spike recovery(ies) observed.
E - Estimated value. The amount exceeds the linear working range of the instrument.

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **MB-26663** SampType: **MBLK** Units: **mg/Kg** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **MBLKS** Batch ID: **26663** Analysis Date: **12/11/2019** SeqNo: **1113241**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	10.0									*
Aromatic Hydrocarbon (C10-C12)	ND	10.0									
Aromatic Hydrocarbon (C12-C16)	ND	10.0									
Aromatic Hydrocarbon (C16-C21)	ND	10.0									
Aromatic Hydrocarbon (C21-C34)	ND	10.0									
Surr: o-Terphenyl	80.6		100.0		80.6	60	140				

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **LCS-26663** SampType: **LCS** Units: **mg/Kg** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **LCSS** Batch ID: **26663** Analysis Date: **12/11/2019** SeqNo: **1113240**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	139	10.0	250.0	0	55.7	70	130				S
Aromatic Hydrocarbon (C10-C12)	109	10.0	125.0	0	87.0	70	130				
Aromatic Hydrocarbon (C12-C16)	121	10.0	125.0	0	97.1	70	130				
Aromatic Hydrocarbon (C16-C21)	124	10.0	125.0	0	99.6	70	130				
Aromatic Hydrocarbon (C21-C34)	126	10.0	125.0	0	100	70	130				
Surr: o-Terphenyl	101		100.0		101	60	140				

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

Sample ID: **1911358-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **OIP30-20-21-111919** Batch ID: **26663** Analysis Date: **12/11/2019** SeqNo: **1113239**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	12.4						15.49	67.1	25	*
Aromatic Hydrocarbon (C10-C12)	51.0	12.4						56.15	9.59	25	
Aromatic Hydrocarbon (C12-C16)	433	12.4						555.4	24.8	25	
Aromatic Hydrocarbon (C16-C21)	1,560	12.4						2,159	32.4	25	RE
Aromatic Hydrocarbon (C21-C34)	3,110	12.4						4,549	37.6	25	RE
Surr: o-Terphenyl	90.9		123.7		73.5	60	140		0		

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **1911358-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **OIP30-20-21-111919** Batch ID: **26663** Analysis Date: **12/11/2019** SeqNo: **1113239**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:
R - High RPD due to high analyte concentration. In this range, high RPD's may be expected.
E - Estimated value. The amount exceeds the linear working range of the instrument.
* - Flagged value is not within established control limits.

Sample ID: **1911358-001AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **OIP30-20-21-111919** Batch ID: **26663** Analysis Date: **12/11/2019** SeqNo: **1113242**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	151	11.7	291.8	15.49	46.3	70	130				S
Aromatic Hydrocarbon (C10-C12)	189	11.7	145.9	56.15	91.2	70	130				
Aromatic Hydrocarbon (C12-C16)	702	11.7	145.9	555.4	100	70	130				
Aromatic Hydrocarbon (C16-C21)	2,300	11.7	145.9	2,159	99.4	70	130				E
Aromatic Hydrocarbon (C21-C34)	4,490	11.7	145.9	4,549	-42.2	70	130				SE
Surr: o-Terphenyl	113		116.7		96.5	60	140				

NOTES:
S - Outlying spike recovery(ies) observed.
E - Estimated value. The amount exceeds the linear working range of the instrument.

Sample ID: **1911358-001AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55912**
Client ID: **OIP30-20-21-111919** Batch ID: **26663** Analysis Date: **12/11/2019** SeqNo: **1113243**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	154	12.0	299.9	15.49	46.2	70	130	150.7	2.13	30	S
Aromatic Hydrocarbon (C10-C12)	174	12.0	149.9	56.15	78.7	70	130	189.2	8.32	30	
Aromatic Hydrocarbon (C12-C16)	680	12.0	149.9	555.4	82.9	70	130	701.5	3.18	30	
Aromatic Hydrocarbon (C16-C21)	2,150	12.0	149.9	2,159	-8.62	70	130	2,304	7.10	30	SE
Aromatic Hydrocarbon (C21-C34)	3,930	12.0	149.9	4,549	-413	70	130	4,488	13.2	30	SE
Surr: o-Terphenyl	99.8		120.0		83.2	60	140		0		

NOTES:
S - Outlying spike recovery(ies) observed.
E - Estimated value. The amount exceeds the linear working range of the instrument.

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **LCS-26673** SampType: **LCS** Units: **mg/Kg** Prep Date: **12/2/2019** RunNo: **55711**
Client ID: **LCSS** Batch ID: **26673** Analysis Date: **12/2/2019** SeqNo: **1108879**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	33.4	1.75	30.00	0	111	70	130				
Aliphatic Hydrocarbon (C6-C8)	10.5	2.50	10.00	0	105	70	130				
Aliphatic Hydrocarbon (C8-C10)	10.7	1.40	10.00	0	107	70	130				
Aliphatic Hydrocarbon (C10-C12)	10.2	1.50	10.00	0	102	70	130				
Aromatic Hydrocarbon (C8-C10)	41.6	3.00	40.00	0	104	70	130				
Aromatic Hydrocarbon (C10-C12)	9.49	0.600	10.00	0	94.9	70	130				
Aromatic Hydrocarbon (C12-C13)	10.9	7.00	10.00	0	109	70	130				
Benzene	10.2	0.600	10.00	0	102	70	130				
Toluene	10.3	0.700	10.00	0	103	70	130				
Ethylbenzene	10.4	0.700	10.00	0	104	70	130				
m,p-Xylene	21.1	1.30	20.00	0	105	70	130				
o-Xylene	10.5	0.600	10.00	0	105	70	130				
Naphthalene	9.00	0.500	10.00	0	90.0	70	130				
Methyl tert-butyl ether (MTBE)	ND	0.500	10.00	0	0	70	130				S
Surr: 1,4-Difluorobenzene	2.56		2.500		102	65	140				
Surr: Bromofluorobenzene	2.61		2.500		104	65	140				

NOTES:

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

Sample ID: **MB-26673** SampType: **MBLK** Units: **mg/Kg** Prep Date: **12/2/2019** RunNo: **55711**
Client ID: **MBLKS** Batch ID: **26673** Analysis Date: **12/2/2019** SeqNo: **1108880**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	1.75		0	0						
Aliphatic Hydrocarbon (C6-C8)	ND	2.50		0	0						
Aliphatic Hydrocarbon (C8-C10)	ND	1.40		0	0						
Aliphatic Hydrocarbon (C10-C12)	ND	1.50		0	0						
Aromatic Hydrocarbon (C8-C10)	ND	3.00		0	0						
Aromatic Hydrocarbon (C10-C12)	ND	0.600		0	0						
Aromatic Hydrocarbon (C12-C13)	ND	7.00		0	0						
Benzene	ND	0.600		0	0						

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **MB-26673** SampType: **MBLK** Units: **mg/Kg** Prep Date: **12/2/2019** RunNo: **55711**
Client ID: **MBLKS** Batch ID: **26673** Analysis Date: **12/2/2019** SeqNo: **1108880**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toluene	ND	0.700		0	0						
Ethylbenzene	ND	0.700		0	0						
m,p-Xylene	ND	1.30		0	0						
o-Xylene	ND	0.600		0	0						
Naphthalene	ND	0.500		0	0						
Methyl tert-butyl ether (MTBE)	ND	0.500		0	0						Q*
Surr: 1,4-Difluorobenzene	2.29		2.500		91.6	65	140				
Surr: Bromofluorobenzene	2.43		2.500		97.4	65	140				

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
* - Flagged value is not within established control limits.

Sample ID: **1911358-001BDUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55711**
Client ID: **OIP30-20-21-111919** Batch ID: **26673** Analysis Date: **12/2/2019** SeqNo: **1108866**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	15.6		0	0			0		25	D
Aliphatic Hydrocarbon (C6-C8)	ND	22.2		0	0			0		25	D
Aliphatic Hydrocarbon (C8-C10)	ND	12.5		0	0			0		25	D
Aliphatic Hydrocarbon (C10-C12)	ND	13.3		0	0			0		25	D
Aromatic Hydrocarbon (C8-C10)	ND	26.7		0	0			0		25	D
Aromatic Hydrocarbon (C10-C12)	67.9	5.34		0	0			43.63	43.5	25	DR
Aromatic Hydrocarbon (C12-C13)	178	62.3		0	0			141.7	22.7	25	D
Benzene	ND	5.34		0	0			0		25	D
Toluene	ND	6.23		0	0			0		25	D
Ethylbenzene	ND	6.23		0	0			0		25	D
m,p-Xylene	ND	11.6		0	0			0		25	D
o-Xylene	ND	5.34		0	0			0		25	D
Naphthalene	6.06	4.45		0	0			3.518	53.1	25	D
Methyl tert-butyl ether (MTBE)	ND	4.45		0	0			0		25	DQ*
Surr: 1,4-Difluorobenzene	19.9		22.24		89.6	65	140		0		D

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **1911358-001BDUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55711**
Client ID: **OIP30-20-21-111919** Batch ID: **26673** Analysis Date: **12/2/2019** SeqNo: **1108866**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene	23.7		22.24		107	65	140		0		D

NOTES:
R - High RPD observed. The method is in control as indicated by the LCS.
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
* - Flagged value is not within established control limits.

Sample ID: **1911358-005BMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55711**
Client ID: **OIP66-12-12.5-112219** Batch ID: **26673** Analysis Date: **12/2/2019** SeqNo: **1108872**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	208	13.0	222.9	0	93.5	70	130				D
Aliphatic Hydrocarbon (C6-C8)	111	18.6	74.29	37.49	98.7	70	130				D
Aliphatic Hydrocarbon (C8-C10)	102	10.4	74.29	35.03	89.9	70	130				D
Aliphatic Hydrocarbon (C10-C12)	133	11.1	74.29	60.26	98.5	70	130				D
Aromatic Hydrocarbon (C8-C10)	347	22.3	297.2	0	117	70	130				D
Aromatic Hydrocarbon (C10-C12)	282	4.46	74.29	199.5	111	70	130				D
Aromatic Hydrocarbon (C12-C13)	250	52.0	74.29	172.4	104	70	130				D
Benzene	73.9	4.46	74.29	0	99.4	70	130				D
Toluene	74.4	5.20	74.29	0	100	70	130				D
Ethylbenzene	76.1	5.20	74.29	0	102	70	130				D
m,p-Xylene	152	9.66	148.6	0	103	70	130				D
o-Xylene	78.9	4.46	74.29	0	106	70	130				D
Naphthalene	69.1	3.71	74.29	9.389	80.3	70	130				D
Methyl tert-butyl ether (MTBE)	ND	3.71	74.29	0	0	70	130				DS
Surr: 1,4-Difluorobenzene	19.3		18.57		104	65	140				D
Surr: Bromofluorobenzene	21.6		18.57		116	65	140				D

NOTES:
S - Outlying spike recovery observed.

Work Order: 1911358
CLIENT: Friedman & Bruya
Project: 911363

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **1911358-005BMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **55711**
Client ID: **OIP66-12-12.5-112219** Batch ID: **26673** Analysis Date: **12/2/2019** SeqNo: **1108873**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	213	13.0	222.9	0	95.6	70	130	208.4	2.26	30	D
Aliphatic Hydrocarbon (C6-C8)	111	18.6	74.29	37.49	98.5	70	130	110.8	0.154	30	D
Aliphatic Hydrocarbon (C8-C10)	103	10.4	74.29	35.03	91.9	70	130	101.8	1.48	30	D
Aliphatic Hydrocarbon (C10-C12)	137	11.1	74.29	60.26	103	70	130	133.5	2.52	30	D
Aromatic Hydrocarbon (C8-C10)	347	22.3	297.2	0	117	70	130	347.0	0.00535	30	D
Aromatic Hydrocarbon (C10-C12)	311	4.46	74.29	199.5	150	70	130	282.1	9.77	30	DS
Aromatic Hydrocarbon (C12-C13)	254	52.0	74.29	172.4	109	70	130	249.8	1.55	30	D
Benzene	75.3	4.46	74.29	0	101	70	130	73.87	1.93	30	D
Toluene	75.6	5.20	74.29	0	102	70	130	74.39	1.64	30	D
Ethylbenzene	77.0	5.20	74.29	0	104	70	130	76.14	1.17	30	D
m,p-Xylene	155	9.66	148.6	0	104	70	130	152.4	1.42	30	D
o-Xylene	79.9	4.46	74.29	0	108	70	130	78.95	1.19	30	D
Naphthalene	76.1	3.71	74.29	9.389	89.8	70	130	69.06	9.69	30	D
Methyl tert-butyl ether (MTBE)	ND	3.71	74.29	0	0	70	130	0		30	DS
Surr: 1,4-Difluorobenzene	19.9		18.57		107	65	140		0		D
Surr: Bromofluorobenzene	21.8		18.57		117	65	140		0		D

NOTES:
S - Outlying spike recovery observed.

Fremont Analytical

Sample Log-In Check List

Client Name: **FB** Work Order Number: **1911358**

Logged by: **Matt Langston** Date Received: **11/25/2019 11:52:00 AM**

Chain of Custody

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

Log In

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

Special Handling (if applicable)

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

Person Notified: Michael Erdahl Date: 11/25/2019

By Whom: Brianna Barnes Via: ☑ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: Requesting signature on chain of custody.

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	3.6
Sample	5.2

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1911358

Page # 1 of 1

Send Report To Michael Erdahl
Company Friedman and Bruya, Inc.
Address 3012 16th Ave W
City, State, ZIP Seattle, WA 98119
Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER Fremont	
PROJECT NAME/NO. 911363	PO # A-486
REMARKS Please Email Results F/S Delivables.	

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	Matrix	# of jars	Dioxins/Furans	EPH	VPH	TOC							Notes
01P30-20-21-111919		11/19/19	1415	Soil			×	×								
01P42-17-17.5-112119		11/21/19	1815	Soil			×	×								
01P53-21-21.5-112219		11/22/19	0900	Soil					×							
01P08-19-20-112219		11/22/19	1109	Soil			×	×								
01P66-12-12.5-112219		11/22/19	1145	Soil			×	×								

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:	Michael Erdahl	Friedman & Bruya		
Received by:	Sara Becker-May	FAI	11/25/19	1152
Relinquished by:				
Received by:				

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1911358

Send Report To Michael Erdahl
Company Friedman and Bruya, Inc.
Address 3012 16th Ave W
City, State, ZIP Seattle, WA 98119
Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER Fremont	
PROJECT NAME/NO. 911363	PO # A-486
REMARKS Please Email Results F/S Deliverables.	

Page # 1 of 1

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

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

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	TOC							Notes
01P30-20-21-111919		11/19/19	1415	Soil			x	x								
01P42-17-17.5-112119		11/21/19	1815	Soil			X	x								
01P53-21-21.5-112219		11/22/19	0900	Soil					X							
01P08-19-20-112219		11/22/19	1109	Soil			X	x								
01P66-12-12.5-112219		11/22/19	1145	Soil			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:	Michael Erdahl	Friedman & Bruya	11/25/19	1000
Received by:	Sara Weber-Mays	FAI	11/25/19	1152
Relinquished by:				
Received by:				

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

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

RE: 003244
Work Order Number: 2003268

March 31, 2020

Attention Michael Erdahl:

Fremont Analytical, Inc. received 19 sample(s) on 3/16/2020 for the analyses presented in the following report.

Extractable Petroleum Hydrocarbons by NWEPH
Sample Moisture (Percent Moisture)
Total Organic Carbon by EPA 9060
Volatile Petroleum Hydrocarbons by NWVPH

This report consists of the following:

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

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

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

Date: *03/31/2020*

CLIENT: Friedman & Bruya
Project: 003244
Work Order: 2003268

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2003268-001	OIP-47-17	03/09/2020 3:35 PM	03/16/2020 2:13 PM
2003268-002	OIP-47-11-12	03/09/2020 3:05 PM	03/16/2020 2:13 PM
2003268-003	MW-33-12-12.5	03/09/2020 5:20 PM	03/16/2020 2:13 PM
2003268-004	MW-33-19.5-20	03/09/2020 5:40 PM	03/16/2020 2:13 PM
2003268-005	OIP-23-14-15	03/10/2020 9:35 AM	03/16/2020 2:13 PM
2003268-006	OIP-23-19-20	03/10/2020 9:45 AM	03/16/2020 2:13 PM
2003268-007	OIP-23-23-24	03/10/2020 9:55 AM	03/16/2020 2:13 PM
2003268-008	OIP-46-8	03/10/2020 8:50 AM	03/16/2020 2:13 PM
2003268-009	OIP-39-16.5-17	03/10/2020 2:02 PM	03/16/2020 2:13 PM
2003268-010	OIP-68-14-14.5	03/11/2020 4:38 PM	03/16/2020 2:13 PM
2003268-011	OIP-69-14.5-15	03/11/2020 3:40 PM	03/16/2020 2:13 PM
2003268-012	OIP-54-18-19	03/11/2020 8:40 AM	03/16/2020 2:13 PM
2003268-013	OIP-15-15-16	03/12/2020 3:00 PM	03/16/2020 2:13 PM
2003268-014	GP-36-13-14	03/12/2020 1:47 PM	03/16/2020 2:13 PM
2003268-015	OIP-15-20-21	03/12/2020 3:20 PM	03/16/2020 2:13 PM
2003268-016	GP-36-16-17	03/12/2020 2:02 PM	03/16/2020 2:13 PM
2003268-017	OIP-67-11-12	03/12/2020 12:25 PM	03/16/2020 2:13 PM
2003268-018	MW-39-13-14	03/12/2020 9:25 AM	03/16/2020 2:13 PM
2003268-019	OIP-20-11-11.5	03/13/2020 9:09 AM	03/16/2020 2:13 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2003268**
Date: **3/31/2020**

CLIENT: Friedman & Bruya
Project: 003244

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

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

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

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

Qualifiers & Acronyms

Qualifiers:

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

Acronyms:

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

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-001
Client Sample ID: **OIP-47-17**

Collection Date: 3/9/2020 3:35:00 PM

Matrix: Soil

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	31.6	30.2	*	mg/Kg-dry	1	3/24/2020 10:06:00 PM
Aliphatic Hydrocarbon (C10-C12)	19.1	15.1		mg/Kg-dry	1	3/24/2020 10:06:00 PM
Aliphatic Hydrocarbon (C12-C16)	ND	15.1		mg/Kg-dry	1	3/24/2020 10:06:00 PM
Aliphatic Hydrocarbon (C16-C21)	ND	15.1		mg/Kg-dry	1	3/24/2020 10:06:00 PM
Aliphatic Hydrocarbon (C21-C34)	ND	15.1		mg/Kg-dry	1	3/24/2020 10:06:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	15.1	*	mg/Kg-dry	1	3/26/2020 12:21:00 AM
Aromatic Hydrocarbon (C10-C12)	27.5	15.1		mg/Kg-dry	1	3/26/2020 12:21:00 AM
Aromatic Hydrocarbon (C12-C16)	ND	15.1		mg/Kg-dry	1	3/26/2020 12:21:00 AM
Aromatic Hydrocarbon (C16-C21)	17.8	15.1		mg/Kg-dry	1	3/26/2020 12:21:00 AM
Aromatic Hydrocarbon (C21-C34)	27.0	15.1		mg/Kg-dry	1	3/26/2020 12:21:00 AM
Surr: 1-Chlorooctadecane	78.4	60 - 140		%Rec	1	3/24/2020 10:06:00 PM
Surr: o-Terphenyl	86.3	60 - 140		%Rec	1	3/26/2020 12:21:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27816 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	8.54	1.78		mg/Kg-dry	1	3/20/2020 3:11:10 PM
Aliphatic Hydrocarbon (C6-C8)	106	2.54		mg/Kg-dry	1	3/20/2020 3:11:10 PM
Aliphatic Hydrocarbon (C8-C10)	100	1.42		mg/Kg-dry	1	3/20/2020 3:11:10 PM
Aliphatic Hydrocarbon (C10-C12)	111	30.5	D	mg/Kg-dry	20	3/19/2020 2:39:38 PM
Aromatic Hydrocarbon (C8-C10)	130	3.05	Q	mg/Kg-dry	1	3/20/2020 3:11:10 PM
Aromatic Hydrocarbon (C10-C12)	361	12.2	D	mg/Kg-dry	20	3/19/2020 2:39:38 PM
Aromatic Hydrocarbon (C12-C13)	422	142	D	mg/Kg-dry	20	3/19/2020 2:39:38 PM
Benzene	ND	0.609		mg/Kg-dry	1	3/20/2020 3:11:10 PM
Toluene	0.734	0.711		mg/Kg-dry	1	3/20/2020 3:11:10 PM
Ethylbenzene	12.0	0.711		mg/Kg-dry	1	3/20/2020 3:11:10 PM
m,p-Xylene	1.40	1.32		mg/Kg-dry	1	3/20/2020 3:11:10 PM
o-Xylene	2.16	0.609		mg/Kg-dry	1	3/20/2020 3:11:10 PM
Naphthalene	18.5	0.508	Q	mg/Kg-dry	1	3/20/2020 3:11:10 PM
Methyl tert-butyl ether (MTBE)	ND	0.508		mg/Kg-dry	1	3/20/2020 3:11:10 PM
Surr: 1,4-Difluorobenzene	112	65 - 140	D	%Rec	20	3/19/2020 2:39:38 PM
Surr: Bromofluorobenzene	109	65 - 140	D	%Rec	20	3/19/2020 2:39:38 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
Analyte detections should be confirmed by GCMS.

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-001
Client Sample ID: **OIP-47-17**

Collection Date: 3/9/2020 3:35:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58189		Analyst: EH
Percent Moisture	34.4	0.500		wt%	1	3/23/2020 10:43:28 AM

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-002
Client Sample ID: OIP-47-11-12

Collection Date: 3/9/2020 3:05:00 PM

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Extractable Petroleum Hydrocarbons by NWEPH				Batch ID: 27833		Analyst: DW
Aliphatic Hydrocarbon (C8-C10)	ND	26.6	*	mg/Kg-dry	1	3/24/2020 11:32:00 PM
Aliphatic Hydrocarbon (C10-C12)	16.5	13.3		mg/Kg-dry	1	3/24/2020 11:32:00 PM
Aliphatic Hydrocarbon (C12-C16)	ND	13.3		mg/Kg-dry	1	3/24/2020 11:32:00 PM
Aliphatic Hydrocarbon (C16-C21)	ND	13.3		mg/Kg-dry	1	3/24/2020 11:32:00 PM
Aliphatic Hydrocarbon (C21-C34)	ND	13.3		mg/Kg-dry	1	3/24/2020 11:32:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	13.3	*	mg/Kg-dry	1	3/26/2020 1:48:00 AM
Aromatic Hydrocarbon (C10-C12)	15.6	13.3		mg/Kg-dry	1	3/26/2020 1:48:00 AM
Aromatic Hydrocarbon (C12-C16)	16.2	13.3		mg/Kg-dry	1	3/26/2020 1:48:00 AM
Aromatic Hydrocarbon (C16-C21)	ND	13.3		mg/Kg-dry	1	3/26/2020 1:48:00 AM
Aromatic Hydrocarbon (C21-C34)	ND	13.3		mg/Kg-dry	1	3/26/2020 1:48:00 AM
Surr: 1-Chlorooctadecane	72.8	60 - 140		%Rec	1	3/24/2020 11:32:00 PM
Surr: o-Terphenyl	84.8	60 - 140		%Rec	1	3/26/2020 1:48:00 AM
NOTES: * - Flagged value is not within established control limits.						
Volatile Petroleum Hydrocarbons by NWVPH				Batch ID: 27816		Analyst: CR
Aliphatic Hydrocarbon (C5-C6)	267	43.8	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Aliphatic Hydrocarbon (C6-C8)	827	62.5	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Aliphatic Hydrocarbon (C8-C10)	332	35.0	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Aliphatic Hydrocarbon (C10-C12)	465	37.5	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Aromatic Hydrocarbon (C8-C10)	327	75.1	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Aromatic Hydrocarbon (C10-C12)	1,050	15.0	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Aromatic Hydrocarbon (C12-C13)	1,230	175	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Benzene	ND	15.0	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Toluene	ND	17.5	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Ethylbenzene	ND	17.5	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
m,p-Xylene	ND	32.5	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
o-Xylene	ND	15.0	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Naphthalene	41.0	12.5	DQ	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Methyl tert-butyl ether (MTBE)	15.8	12.5	D	mg/Kg-dry	20	3/19/2020 3:22:15 PM
Surr: 1,4-Difluorobenzene	123	65 - 140	D	%Rec	20	3/19/2020 3:22:15 PM
Surr: Bromofluorobenzene	105	65 - 140	D	%Rec	20	3/19/2020 3:22:15 PM
NOTES: Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria Diluted due to matrix. Analyte detections should be confirmed by GCMS.						

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-002
Client Sample ID: OIP-47-11-12

Collection Date: 3/9/2020 3:05:00 PM

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58189		Analyst: EH
Percent Moisture	26.7	0.500		wt%	1	3/23/2020 10:43:28 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/9/2020 5:20:00 PM
Project: 003244
Lab ID: 2003268-003
Matrix: Soil
Client Sample ID: MW-33-12-12.5

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	109	26.4	*	mg/Kg-dry	1	3/25/2020 3:09:00 AM
Aliphatic Hydrocarbon (C10-C12)	686	13.2		mg/Kg-dry	1	3/25/2020 3:09:00 AM
Aliphatic Hydrocarbon (C12-C16)	3,280	132	D	mg/Kg-dry	10	3/25/2020 3:37:00 PM
Aliphatic Hydrocarbon (C16-C21)	2,970	132	D	mg/Kg-dry	10	3/25/2020 3:37:00 PM
Aliphatic Hydrocarbon (C21-C34)	721	13.2	*	mg/Kg-dry	1	3/25/2020 3:09:00 AM
Aromatic Hydrocarbon (C8-C10)	ND	13.2	*	mg/Kg-dry	1	3/26/2020 5:25:00 AM
Aromatic Hydrocarbon (C10-C12)	110	13.2		mg/Kg-dry	1	3/26/2020 5:25:00 AM
Aromatic Hydrocarbon (C12-C16)	846	13.2		mg/Kg-dry	1	3/26/2020 5:25:00 AM
Aromatic Hydrocarbon (C16-C21)	2,380	132	D	mg/Kg-dry	10	3/27/2020 3:53:00 AM
Aromatic Hydrocarbon (C21-C34)	486	13.2		mg/Kg-dry	1	3/26/2020 5:25:00 AM
Surr: 1-Chlorooctadecane	84.9	60 - 140		%Rec	1	3/25/2020 3:09:00 AM
Surr: o-Terphenyl	85.8	60 - 140		%Rec	1	3/26/2020 5:25:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27816 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	7.70	2.33		mg/Kg-dry	1	3/20/2020 3:53:12 PM
Aliphatic Hydrocarbon (C6-C8)	12.4	3.33		mg/Kg-dry	1	3/20/2020 3:53:12 PM
Aliphatic Hydrocarbon (C8-C10)	39.6	1.86		mg/Kg-dry	1	3/20/2020 3:53:12 PM
Aliphatic Hydrocarbon (C10-C12)	208	39.9	D	mg/Kg-dry	20	3/19/2020 4:04:34 PM
Aromatic Hydrocarbon (C8-C10)	52.6	3.99	Q	mg/Kg-dry	1	3/20/2020 3:53:12 PM
Aromatic Hydrocarbon (C10-C12)	758	16.0	D	mg/Kg-dry	20	3/19/2020 4:04:34 PM
Aromatic Hydrocarbon (C12-C13)	2,160	186	DE	mg/Kg-dry	20	3/19/2020 4:04:34 PM
Benzene	ND	0.799		mg/Kg-dry	1	3/20/2020 3:53:12 PM
Toluene	ND	0.932		mg/Kg-dry	1	3/20/2020 3:53:12 PM
Ethylbenzene	ND	0.932		mg/Kg-dry	1	3/20/2020 3:53:12 PM
m,p-Xylene	ND	1.73		mg/Kg-dry	1	3/20/2020 3:53:12 PM
o-Xylene	ND	0.799		mg/Kg-dry	1	3/20/2020 3:53:12 PM
Naphthalene	64.5	0.665	Q	mg/Kg-dry	1	3/20/2020 3:53:12 PM
Methyl tert-butyl ether (MTBE)	ND	0.665		mg/Kg-dry	1	3/20/2020 3:53:12 PM
Surr: 1,4-Difluorobenzene	112	65 - 140		%Rec	1	3/20/2020 3:53:12 PM
Surr: Bromofluorobenzene	121	65 - 140		%Rec	1	3/20/2020 3:53:12 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
E - Estimated value. The amount exceeds the linear working range of the instrument.
Analyte detections should be confirmed by GCMS.

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/9/2020 5:20:00 PM
Project: 003244
Lab ID: 2003268-003
Matrix: Soil
Client Sample ID: **MW-33-12-12.5**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58189		Analyst: EH
Percent Moisture	24.9	0.500		wt%	1	3/23/2020 10:43:28 AM

Fremont Analytical

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/9/2020 5:40:00 PM
Project: 003244
Lab ID: 2003268-004
Matrix: Soil
Client Sample ID: MW-33-19.5-20

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	ND	29.6	*	mg/Kg-dry	1	3/25/2020 3:53:00 AM
Aliphatic Hydrocarbon (C10-C12)	ND	14.8		mg/Kg-dry	1	3/25/2020 3:53:00 AM
Aliphatic Hydrocarbon (C12-C16)	20.4	14.8		mg/Kg-dry	1	3/25/2020 3:53:00 AM
Aliphatic Hydrocarbon (C16-C21)	ND	14.8		mg/Kg-dry	1	3/25/2020 3:53:00 AM
Aliphatic Hydrocarbon (C21-C34)	ND	14.8		mg/Kg-dry	1	3/25/2020 3:53:00 AM
Aromatic Hydrocarbon (C8-C10)	ND	14.8	*	mg/Kg-dry	1	3/26/2020 6:08:00 AM
Aromatic Hydrocarbon (C10-C12)	ND	14.8		mg/Kg-dry	1	3/26/2020 6:08:00 AM
Aromatic Hydrocarbon (C12-C16)	ND	14.8		mg/Kg-dry	1	3/26/2020 6:08:00 AM
Aromatic Hydrocarbon (C16-C21)	ND	14.8		mg/Kg-dry	1	3/26/2020 6:08:00 AM
Aromatic Hydrocarbon (C21-C34)	ND	14.8		mg/Kg-dry	1	3/26/2020 6:08:00 AM
Surr: 1-Chlorooctadecane	72.3	60 - 140		%Rec	1	3/25/2020 3:53:00 AM
Surr: o-Terphenyl	88.4	60 - 140		%Rec	1	3/26/2020 6:08:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27816 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	1.47		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Aliphatic Hydrocarbon (C6-C8)	ND	2.11		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Aliphatic Hydrocarbon (C8-C10)	ND	1.18		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Aliphatic Hydrocarbon (C10-C12)	ND	1.26		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Aromatic Hydrocarbon (C8-C10)	ND	2.53		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Aromatic Hydrocarbon (C10-C12)	13.5	0.506		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Aromatic Hydrocarbon (C12-C13)	20.0	5.90	H	mg/Kg-dry	1	3/27/2020 4:10:20 PM
Benzene	ND	0.506		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Toluene	ND	0.590		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Ethylbenzene	ND	0.590		mg/Kg-dry	1	3/20/2020 4:35:38 PM
m,p-Xylene	ND	1.10		mg/Kg-dry	1	3/20/2020 4:35:38 PM
o-Xylene	ND	0.506		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Naphthalene	ND	0.421	H	mg/Kg-dry	1	3/27/2020 4:10:20 PM
Methyl tert-butyl ether (MTBE)	ND	0.421		mg/Kg-dry	1	3/20/2020 4:35:38 PM
Surr: 1,4-Difluorobenzene	115	65 - 140		%Rec	1	3/20/2020 4:35:38 PM
Surr: Bromofluorobenzene	107	65 - 140		%Rec	1	3/20/2020 4:35:38 PM

Sample Moisture (Percent Moisture)

Batch ID: R58189 Analyst: EH

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Percent Moisture	35.6	0.500		wt%	1	3/23/2020 10:43:28 AM

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-005
Client Sample ID: OIP-23-14-15

Collection Date: 3/10/2020 9:35:00 AM
Matrix: Soil

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	137	25.0	*	mg/Kg-dry	1	3/25/2020 4:36:00 AM
Aliphatic Hydrocarbon (C10-C12)	629	12.5		mg/Kg-dry	1	3/25/2020 4:36:00 AM
Aliphatic Hydrocarbon (C12-C16)	2,910	125	D	mg/Kg-dry	10	3/25/2020 4:21:00 PM
Aliphatic Hydrocarbon (C16-C21)	3,110	125	D	mg/Kg-dry	10	3/25/2020 4:21:00 PM
Aliphatic Hydrocarbon (C21-C34)	467	12.5	*	mg/Kg-dry	1	3/25/2020 4:36:00 AM
Aromatic Hydrocarbon (C8-C10)	ND	12.5	*	mg/Kg-dry	1	3/26/2020 6:51:00 AM
Aromatic Hydrocarbon (C10-C12)	97.5	12.5		mg/Kg-dry	1	3/26/2020 6:51:00 AM
Aromatic Hydrocarbon (C12-C16)	909	12.5		mg/Kg-dry	1	3/26/2020 6:51:00 AM
Aromatic Hydrocarbon (C16-C21)	2,660	125	D	mg/Kg-dry	10	3/27/2020 4:37:00 AM
Aromatic Hydrocarbon (C21-C34)	321	12.5		mg/Kg-dry	1	3/26/2020 6:51:00 AM
Surr: 1-Chlorooctadecane	88.3	60 - 140		%Rec	1	3/25/2020 4:36:00 AM
Surr: o-Terphenyl	106	60 - 140		%Rec	1	3/26/2020 6:51:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27816 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	16.9	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Aliphatic Hydrocarbon (C6-C8)	ND	24.1	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Aliphatic Hydrocarbon (C8-C10)	34.7	13.5	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Aliphatic Hydrocarbon (C10-C12)	109	14.5	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Aromatic Hydrocarbon (C8-C10)	34.4	28.9	DQ	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Aromatic Hydrocarbon (C10-C12)	473	11.6	D	mg/Kg-dry	20	3/19/2020 6:11:30 PM
Aromatic Hydrocarbon (C12-C13)	1,060	135	DE	mg/Kg-dry	20	3/19/2020 6:11:30 PM
Aromatic Hydrocarbon (C12-C13)	898	135	DH	mg/Kg-dry	20	3/27/2020 3:27:41 PM
Benzene	ND	5.79	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Toluene	ND	6.75	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Ethylbenzene	ND	6.75	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
m,p-Xylene	ND	12.5	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
o-Xylene	ND	5.79	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Naphthalene	16.3	4.82	DQ	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Naphthalene	36.9	9.65	DH	mg/Kg-dry	20	3/27/2020 3:27:41 PM
Methyl tert-butyl ether (MTBE)	ND	4.82	D	mg/Kg-dry	10	3/20/2020 5:18:05 PM
Surr: 1,4-Difluorobenzene	112	65 - 140	D	%Rec	10	3/20/2020 5:18:05 PM
Surr: Bromofluorobenzene	112	65 - 140	D	%Rec	10	3/20/2020 5:18:05 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
E - Estimated value. The amount exceeds the linear working range of the instrument.
Analyte detections should be confirmed by GCMS.

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-005
Client Sample ID: **OIP-23-14-15**

Collection Date: 3/10/2020 9:35:00 AM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58189		Analyst: EH
Percent Moisture	24.2	0.500		wt%	1	3/23/2020 10:43:28 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/10/2020 9:45:00 AM
Project: 003244
Lab ID: 2003268-006
Matrix: Soil
Client Sample ID: OIP-23-19-20

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	623	21.9	*	mg/Kg-dry	1	3/25/2020 5:19:00 AM
Aliphatic Hydrocarbon (C10-C12)	2,820	109	D	mg/Kg-dry	10	3/25/2020 2:53:00 PM
Aliphatic Hydrocarbon (C12-C16)	12,100	547	D	mg/Kg-dry	50	3/26/2020 2:07:00 PM
Aliphatic Hydrocarbon (C16-C21)	11,300	547	D	mg/Kg-dry	50	3/26/2020 2:07:00 PM
Aliphatic Hydrocarbon (C21-C34)	1,560	109	D*	mg/Kg-dry	10	3/25/2020 2:53:00 PM
Aromatic Hydrocarbon (C8-C10)	44.4	10.9	*	mg/Kg-dry	1	3/26/2020 7:35:00 AM
Aromatic Hydrocarbon (C10-C12)	481	10.9		mg/Kg-dry	1	3/26/2020 7:35:00 AM
Aromatic Hydrocarbon (C12-C16)	3,620	219	D	mg/Kg-dry	20	3/27/2020 6:03:00 AM
Aromatic Hydrocarbon (C16-C21)	9,510	219	D	mg/Kg-dry	20	3/27/2020 6:03:00 AM
Aromatic Hydrocarbon (C21-C34)	913	219	D	mg/Kg-dry	20	3/27/2020 6:03:00 AM
Surr: 1-Chlorooctadecane	110	60 - 140		%Rec	1	3/25/2020 5:19:00 AM
Surr: o-Terphenyl	127	60 - 140		%Rec	1	3/26/2020 7:35:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27816 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	15.8	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Aliphatic Hydrocarbon (C6-C8)	39.4	22.6	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Aliphatic Hydrocarbon (C8-C10)	65.4	12.7	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Aliphatic Hydrocarbon (C10-C12)	305	13.6	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Aromatic Hydrocarbon (C8-C10)	110	27.2	DQ	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Aromatic Hydrocarbon (C10-C12)	1,020	54.3	D	mg/Kg-dry	100	3/20/2020 2:28:45 PM
Aromatic Hydrocarbon (C12-C13)	3,970	634	D	mg/Kg-dry	100	3/20/2020 2:28:45 PM
Benzene	ND	5.43	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Toluene	ND	6.34	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Ethylbenzene	ND	6.34	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
m,p-Xylene	ND	11.8	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
o-Xylene	ND	5.43	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Naphthalene	48.7	4.53	DQ	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Methyl tert-butyl ether (MTBE)	ND	4.53	D	mg/Kg-dry	10	3/20/2020 6:00:56 PM
Surr: 1,4-Difluorobenzene	113	65 - 140	D	%Rec	10	3/20/2020 6:00:56 PM
Surr: Bromofluorobenzene	103	65 - 140	D	%Rec	10	3/20/2020 6:00:56 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
Analyte detections should be confirmed by GCMS.

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/10/2020 9:45:00 AM
Project: 003244
Lab ID: 2003268-006
Matrix: Soil
Client Sample ID: OIP-23-19-20

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58189		Analyst: EH
Percent Moisture	17.5	0.500		wt%	1	3/23/2020 10:43:28 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/10/2020 9:55:00 AM
Project: 003244
Lab ID: 2003268-007
Matrix: Soil
Client Sample ID: OIP-23-23-24

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	69.6	24.5	*	mg/Kg-dry	1	3/26/2020 2:51:00 PM
Aliphatic Hydrocarbon (C10-C12)	300	12.3		mg/Kg-dry	1	3/26/2020 2:51:00 PM
Aliphatic Hydrocarbon (C12-C16)	1,600	123	D	mg/Kg-dry	10	3/28/2020 4:11:00 AM
Aliphatic Hydrocarbon (C16-C21)	1,770	123	D	mg/Kg-dry	10	3/28/2020 4:11:00 AM
Aliphatic Hydrocarbon (C21-C34)	261	12.3	*	mg/Kg-dry	1	3/26/2020 2:51:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	12.3	*	mg/Kg-dry	1	3/27/2020 7:30:00 AM
Aromatic Hydrocarbon (C10-C12)	48.7	12.3		mg/Kg-dry	1	3/27/2020 7:30:00 AM
Aromatic Hydrocarbon (C12-C16)	494	12.3		mg/Kg-dry	1	3/27/2020 7:30:00 AM
Aromatic Hydrocarbon (C16-C21)	1,520	123	D	mg/Kg-dry	10	3/27/2020 9:38:00 PM
Aromatic Hydrocarbon (C21-C34)	163	12.3		mg/Kg-dry	1	3/27/2020 7:30:00 AM
Surr: 1-Chlorooctadecane	87.0	60 - 140		%Rec	1	3/26/2020 2:51:00 PM
Surr: o-Terphenyl	87.6	60 - 140		%Rec	1	3/27/2020 7:30:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27816 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	26.8	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Aliphatic Hydrocarbon (C6-C8)	ND	38.3	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Aliphatic Hydrocarbon (C8-C10)	ND	21.5	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Aliphatic Hydrocarbon (C10-C12)	83.9	23.0	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Aromatic Hydrocarbon (C8-C10)	ND	46.0	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Aromatic Hydrocarbon (C10-C12)	323	9.20	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Aromatic Hydrocarbon (C12-C13)	1,680	537	DH	mg/Kg-dry	100	3/27/2020 11:54:53 AM
Aromatic Hydrocarbon (C12-C13)	1,340	107	DE	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Benzene	ND	9.20	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Toluene	ND	10.7	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Ethylbenzene	ND	10.7	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
m,p-Xylene	ND	19.9	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
o-Xylene	ND	9.20	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Naphthalene	13.8	7.67	DQ	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Methyl tert-butyl ether (MTBE)	ND	7.67	D	mg/Kg-dry	20	3/19/2020 7:36:26 PM
Surr: 1,4-Difluorobenzene	113	65 - 140	D	%Rec	20	3/19/2020 7:36:26 PM
Surr: Bromofluorobenzene	106	65 - 140	D	%Rec	20	3/19/2020 7:36:26 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
E - Estimated value. The amount exceeds the linear working range of the instrument.
Diluted due to matrix.
Analyte detections should be confirmed by GCMS.

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-007
Client Sample ID: **OIP-23-23-24**

Collection Date: 3/10/2020 9:55:00 AM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58189		Analyst: EH
Percent Moisture	21.8	0.500		wt%	1	3/23/2020 10:43:28 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-008
Client Sample ID: **OIP-46-8**

Collection Date: 3/10/2020 8:50:00 AM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58189		Analyst: EH
Percent Moisture	22.7	0.500		wt%	1	3/23/2020 10:43:28 AM
Total Organic Carbon by EPA 9060				Batch ID: 27879		Analyst: SS
Total Organic Carbon	ND	0.0750		%-dry	1	3/25/2020 10:48:00 AM

Client: Friedman & Bruya
Collection Date: 3/10/2020 2:02:00 PM
Project: 003244
Lab ID: 2003268-009
Matrix: Soil
Client Sample ID: OIP-39-16.5-17

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	37.2	23.2	*	mg/Kg-dry	1	3/26/2020 3:34:00 PM
Aliphatic Hydrocarbon (C10-C12)	ND	11.6		mg/Kg-dry	1	3/26/2020 3:34:00 PM
Aliphatic Hydrocarbon (C12-C16)	ND	11.6		mg/Kg-dry	1	3/26/2020 3:34:00 PM
Aliphatic Hydrocarbon (C16-C21)	ND	11.6		mg/Kg-dry	1	3/26/2020 3:34:00 PM
Aliphatic Hydrocarbon (C21-C34)	ND	11.6		mg/Kg-dry	1	3/26/2020 3:34:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	11.6	*	mg/Kg-dry	1	3/27/2020 8:13:00 AM
Aromatic Hydrocarbon (C10-C12)	ND	11.6		mg/Kg-dry	1	3/27/2020 8:13:00 AM
Aromatic Hydrocarbon (C12-C16)	ND	11.6		mg/Kg-dry	1	3/27/2020 8:13:00 AM
Aromatic Hydrocarbon (C16-C21)	ND	11.6		mg/Kg-dry	1	3/27/2020 8:13:00 AM
Aromatic Hydrocarbon (C21-C34)	ND	11.6		mg/Kg-dry	1	3/27/2020 8:13:00 AM
Surr: 1-Chlorooctadecane	75.2	60 - 140		%Rec	1	3/26/2020 3:34:00 PM
Surr: o-Terphenyl	82.2	60 - 140		%Rec	1	3/27/2020 8:13:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27816 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	1.30		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Aliphatic Hydrocarbon (C6-C8)	2.12	1.86		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Aliphatic Hydrocarbon (C8-C10)	ND	1.04		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Aliphatic Hydrocarbon (C10-C12)	ND	1.12		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Aromatic Hydrocarbon (C8-C10)	ND	2.23		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Aromatic Hydrocarbon (C10-C12)	0.845	0.446		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Aromatic Hydrocarbon (C12-C13)	ND	5.20		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Benzene	ND	0.446		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Toluene	ND	0.520		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Ethylbenzene	ND	0.520		mg/Kg-dry	1	3/19/2020 8:18:54 PM
m,p-Xylene	ND	0.967		mg/Kg-dry	1	3/19/2020 8:18:54 PM
o-Xylene	ND	0.446		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Naphthalene	ND	0.372	Q	mg/Kg-dry	1	3/19/2020 8:18:54 PM
Methyl tert-butyl ether (MTBE)	ND	0.372		mg/Kg-dry	1	3/19/2020 8:18:54 PM
Surr: 1,4-Difluorobenzene	114	65 - 140		%Rec	1	3/19/2020 8:18:54 PM
Surr: Bromofluorobenzene	104	65 - 140		%Rec	1	3/19/2020 8:18:54 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Sample Moisture (Percent Moisture)

Batch ID: R58217 Analyst: EH

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Percent Moisture	23.4	0.500		wt%	1	3/24/2020 8:31:55 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-010
Client Sample ID: **OIP-68-14-14.5**

Collection Date: 3/11/2020 4:38:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58217		Analyst: EH
Percent Moisture	25.6	0.500		wt%	1	3/24/2020 8:31:55 AM
Total Organic Carbon by EPA 9060				Batch ID: 27933		Analyst: SS
Total Organic Carbon	0.161	0.0750		%-dry	1	3/30/2020 3:54:00 PM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-011
Client Sample ID: **OIP-69-14.5-15**

Collection Date: 3/11/2020 3:40:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58217		Analyst: EH
Percent Moisture	19.5	0.500		wt%	1	3/24/2020 8:31:55 AM
Total Organic Carbon by EPA 9060				Batch ID: 27879		Analyst: SS
Total Organic Carbon	ND	0.0750		%-dry	1	3/25/2020 12:25:00 PM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-012
Client Sample ID: **OIP-54-18-19**

Collection Date: 3/11/2020 8:40:00 AM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58217		Analyst: EH
Percent Moisture	17.8	0.500		wt%	1	3/24/2020 8:31:55 AM
Total Organic Carbon by EPA 9060				Batch ID: 27879		Analyst: SS
Total Organic Carbon	ND	0.0750		%-dry	1	3/25/2020 12:44:00 PM

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-013
Client Sample ID: **OIP-15-15-16**
Collection Date: 3/12/2020 3:00:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	ND	22.6	*	mg/Kg-dry	1	3/26/2020 4:18:00 PM
Aliphatic Hydrocarbon (C10-C12)	154	11.3		mg/Kg-dry	1	3/26/2020 4:18:00 PM
Aliphatic Hydrocarbon (C12-C16)	1,060	11.3		mg/Kg-dry	1	3/26/2020 4:18:00 PM
Aliphatic Hydrocarbon (C16-C21)	1,090	11.3		mg/Kg-dry	1	3/26/2020 4:18:00 PM
Aliphatic Hydrocarbon (C21-C34)	313	11.3	*	mg/Kg-dry	1	3/26/2020 4:18:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	11.3	*	mg/Kg-dry	1	3/27/2020 8:57:00 AM
Aromatic Hydrocarbon (C10-C12)	ND	11.3		mg/Kg-dry	1	3/27/2020 8:57:00 AM
Aromatic Hydrocarbon (C12-C16)	122	11.3		mg/Kg-dry	1	3/27/2020 8:57:00 AM
Aromatic Hydrocarbon (C16-C21)	736	11.3		mg/Kg-dry	1	3/27/2020 8:57:00 AM
Aromatic Hydrocarbon (C21-C34)	267	11.3		mg/Kg-dry	1	3/27/2020 8:57:00 AM
Surr: 1-Chlorooctadecane	84.8	60 - 140		%Rec	1	3/26/2020 4:18:00 PM
Surr: o-Terphenyl	98.3	60 - 140		%Rec	1	3/27/2020 8:57:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27868 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	1.10		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Aliphatic Hydrocarbon (C6-C8)	ND	1.57		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Aliphatic Hydrocarbon (C8-C10)	ND	0.877		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Aliphatic Hydrocarbon (C10-C12)	13.2	0.940		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Aromatic Hydrocarbon (C8-C10)	ND	1.88		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Aromatic Hydrocarbon (C10-C12)	30.7	0.376		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Aromatic Hydrocarbon (C12-C13)	203	87.7	D	mg/Kg-dry	20	3/25/2020 12:05:48 AM
Benzene	ND	0.376		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Toluene	ND	0.438		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Ethylbenzene	ND	0.438		mg/Kg-dry	1	3/25/2020 7:52:55 AM
m,p-Xylene	ND	0.814		mg/Kg-dry	1	3/25/2020 7:52:55 AM
o-Xylene	ND	0.376		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Naphthalene	5.94	0.313		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Methyl tert-butyl ether (MTBE)	ND	0.313		mg/Kg-dry	1	3/25/2020 7:52:55 AM
Surr: 1,4-Difluorobenzene	98.8	65 - 140		%Rec	1	3/25/2020 7:52:55 AM
Surr: Bromofluorobenzene	105	65 - 140		%Rec	1	3/25/2020 7:52:55 AM

NOTES:
Analyte detections should be confirmed by GCMS.

Sample Moisture (Percent Moisture)

Batch ID: R58217 Analyst: EH

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Percent Moisture	17.5	0.500		wt%	1	3/24/2020 8:31:55 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-014
Client Sample ID: **GP-36-13-14**
Collection Date: 3/12/2020 1:47:00 PM
Matrix: Soil

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	167	25.5	*	mg/Kg-dry	1	3/26/2020 5:02:00 PM
Aliphatic Hydrocarbon (C10-C12)	352	12.8		mg/Kg-dry	1	3/26/2020 5:02:00 PM
Aliphatic Hydrocarbon (C12-C16)	1,240	12.8		mg/Kg-dry	1	3/26/2020 5:02:00 PM
Aliphatic Hydrocarbon (C16-C21)	1,180	12.8		mg/Kg-dry	1	3/26/2020 5:02:00 PM
Aliphatic Hydrocarbon (C21-C34)	246	12.8	*	mg/Kg-dry	1	3/26/2020 5:02:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	12.8	*	mg/Kg-dry	1	3/27/2020 9:40:00 AM
Aromatic Hydrocarbon (C10-C12)	117	12.8		mg/Kg-dry	1	3/27/2020 9:40:00 AM
Aromatic Hydrocarbon (C12-C16)	451	12.8		mg/Kg-dry	1	3/27/2020 9:40:00 AM
Aromatic Hydrocarbon (C16-C21)	969	12.8		mg/Kg-dry	1	3/27/2020 9:40:00 AM
Aromatic Hydrocarbon (C21-C34)	170	12.8		mg/Kg-dry	1	3/27/2020 9:40:00 AM
Surr: 1-Chlorooctadecane	79.2	60 - 140		%Rec	1	3/26/2020 5:02:00 PM
Surr: o-Terphenyl	87.1	60 - 140		%Rec	1	3/27/2020 9:40:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27868 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	62.3	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Aliphatic Hydrocarbon (C6-C8)	ND	88.9	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Aliphatic Hydrocarbon (C8-C10)	ND	49.8	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Aliphatic Hydrocarbon (C10-C12)	ND	53.4	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Aromatic Hydrocarbon (C8-C10)	ND	107	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Aromatic Hydrocarbon (C10-C12)	79.2	21.3	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Aromatic Hydrocarbon (C12-C13)	608	249	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Benzene	ND	21.3	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Toluene	ND	24.9	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Ethylbenzene	ND	24.9	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
m,p-Xylene	ND	46.2	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
o-Xylene	ND	21.3	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Naphthalene	ND	17.8	D	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Methyl tert-butyl ether (MTBE)	ND	17.8	DQ	mg/Kg-dry	20	3/25/2020 12:48:14 AM
Surr: 1,4-Difluorobenzene	97.2	65 - 140	D	%Rec	20	3/25/2020 12:48:14 AM
Surr: Bromofluorobenzene	99.8	65 - 140	D	%Rec	20	3/25/2020 12:48:14 AM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
Diluted due to matrix.

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-014
Client Sample ID: **GP-36-13-14**

Collection Date: 3/12/2020 1:47:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58217		Analyst: EH
Percent Moisture	25.5	0.500		wt%	1	3/24/2020 8:31:55 AM

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-015
Client Sample ID: **OIP-15-20-21**

Collection Date: 3/12/2020 3:20:00 PM
Matrix: Soil

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	ND	26.2	*	mg/Kg-dry	1	3/26/2020 5:45:00 PM
Aliphatic Hydrocarbon (C10-C12)	ND	13.1		mg/Kg-dry	1	3/26/2020 5:45:00 PM
Aliphatic Hydrocarbon (C12-C16)	ND	13.1		mg/Kg-dry	1	3/26/2020 5:45:00 PM
Aliphatic Hydrocarbon (C16-C21)	ND	13.1		mg/Kg-dry	1	3/26/2020 5:45:00 PM
Aliphatic Hydrocarbon (C21-C34)	ND	13.1		mg/Kg-dry	1	3/26/2020 5:45:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	13.1	*	mg/Kg-dry	1	3/27/2020 10:24:00 AM
Aromatic Hydrocarbon (C10-C12)	ND	13.1		mg/Kg-dry	1	3/27/2020 10:24:00 AM
Aromatic Hydrocarbon (C12-C16)	ND	13.1		mg/Kg-dry	1	3/27/2020 10:24:00 AM
Aromatic Hydrocarbon (C16-C21)	ND	13.1		mg/Kg-dry	1	3/27/2020 10:24:00 AM
Aromatic Hydrocarbon (C21-C34)	ND	13.1		mg/Kg-dry	1	3/27/2020 10:24:00 AM
Surr: 1-Chlorooctadecane	74.5	60 - 140		%Rec	1	3/26/2020 5:45:00 PM
Surr: o-Terphenyl	87.5	60 - 140		%Rec	1	3/27/2020 10:24:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27868 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	1.78		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Aliphatic Hydrocarbon (C6-C8)	ND	2.54		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Aliphatic Hydrocarbon (C8-C10)	ND	1.42		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Aliphatic Hydrocarbon (C10-C12)	ND	1.52		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Aromatic Hydrocarbon (C8-C10)	ND	3.05		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Aromatic Hydrocarbon (C10-C12)	ND	0.609		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Aromatic Hydrocarbon (C12-C13)	ND	7.11		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Benzene	ND	0.609		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Toluene	ND	0.711		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Ethylbenzene	ND	0.711		mg/Kg-dry	1	3/24/2020 8:33:27 PM
m,p-Xylene	ND	1.32		mg/Kg-dry	1	3/24/2020 8:33:27 PM
o-Xylene	ND	0.609		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Naphthalene	ND	0.508		mg/Kg-dry	1	3/24/2020 8:33:27 PM
Methyl tert-butyl ether (MTBE)	ND	0.508	Q	mg/Kg-dry	1	3/24/2020 8:33:27 PM
Surr: 1,4-Difluorobenzene	95.6	65 - 140		%Rec	1	3/24/2020 8:33:27 PM
Surr: Bromofluorobenzene	98.7	65 - 140		%Rec	1	3/24/2020 8:33:27 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Sample Moisture (Percent Moisture)

Batch ID: R58217 Analyst: EH

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Percent Moisture	26.3	0.500		wt%	1	3/24/2020 8:31:55 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-016
Client Sample ID: **GP-36-16-17**

Collection Date: 3/12/2020 2:02:00 PM
Matrix: Soil

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	443	23.3	*	mg/Kg-dry	1	3/26/2020 6:29:00 PM
Aliphatic Hydrocarbon (C10-C12)	824	11.7		mg/Kg-dry	1	3/26/2020 6:29:00 PM
Aliphatic Hydrocarbon (C12-C16)	2,360	117	D	mg/Kg-dry	10	3/28/2020 4:54:00 AM
Aliphatic Hydrocarbon (C16-C21)	2,340	117	D	mg/Kg-dry	10	3/28/2020 4:54:00 AM
Aliphatic Hydrocarbon (C21-C34)	518	11.7	*	mg/Kg-dry	1	3/26/2020 6:29:00 PM
Aromatic Hydrocarbon (C8-C10)	22.3	11.7	*	mg/Kg-dry	1	3/27/2020 12:35:00 PM
Aromatic Hydrocarbon (C10-C12)	239	11.7		mg/Kg-dry	1	3/27/2020 12:35:00 PM
Aromatic Hydrocarbon (C12-C16)	884	11.7		mg/Kg-dry	1	3/27/2020 12:35:00 PM
Aromatic Hydrocarbon (C16-C21)	1,780	117	D	mg/Kg-dry	10	3/27/2020 10:22:00 PM
Aromatic Hydrocarbon (C21-C34)	400	11.7		mg/Kg-dry	1	3/27/2020 12:35:00 PM
Surr: 1-Chlorooctadecane	97.6	60 - 140		%Rec	1	3/26/2020 6:29:00 PM
Surr: o-Terphenyl	108	60 - 140		%Rec	1	3/27/2020 12:35:00 PM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27868 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	62.6	1.64		mg/Kg-dry	1	3/25/2020 11:25:52 AM
Aliphatic Hydrocarbon (C6-C8)	403	46.8	D	mg/Kg-dry	20	3/25/2020 1:30:38 AM
Aliphatic Hydrocarbon (C8-C10)	167	26.2	D	mg/Kg-dry	20	3/25/2020 1:30:38 AM
Aliphatic Hydrocarbon (C10-C12)	240	28.1	D	mg/Kg-dry	20	3/25/2020 1:30:38 AM
Aromatic Hydrocarbon (C8-C10)	189	56.1	D	mg/Kg-dry	20	3/25/2020 1:30:38 AM
Aromatic Hydrocarbon (C10-C12)	562	11.2	D	mg/Kg-dry	20	3/25/2020 1:30:38 AM
Aromatic Hydrocarbon (C12-C13)	817	131	D	mg/Kg-dry	20	3/25/2020 1:30:38 AM
Benzene	0.797	0.561		mg/Kg-dry	1	3/25/2020 11:25:52 AM
Toluene	1.91	0.655		mg/Kg-dry	1	3/25/2020 11:25:52 AM
Ethylbenzene	11.7	0.655		mg/Kg-dry	1	3/25/2020 11:25:52 AM
m,p-Xylene	3.68	1.22		mg/Kg-dry	1	3/25/2020 11:25:52 AM
o-Xylene	3.13	0.561		mg/Kg-dry	1	3/25/2020 11:25:52 AM
Naphthalene	20.8	0.468		mg/Kg-dry	1	3/25/2020 11:25:52 AM
Methyl tert-butyl ether (MTBE)	2.44	0.468		mg/Kg-dry	1	3/25/2020 11:25:52 AM
Surr: 1,4-Difluorobenzene	104	65 - 140	D	%Rec	20	3/25/2020 1:30:38 AM
Surr: Bromofluorobenzene	123	65 - 140		%Rec	1	3/25/2020 11:25:52 AM

NOTES:
Analyte detections should be confirmed by GCMS.

Sample Moisture (Percent Moisture)

Batch ID: R58217 Analyst: EH

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Percent Moisture	21.4	0.500		wt%	1	3/24/2020 8:31:55 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/12/2020 12:25:00 PM
Project: 003244
Lab ID: 2003268-017
Matrix: Soil
Client Sample ID: OIP-67-11-12

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	319	24.2	*	mg/Kg-dry	1	3/26/2020 7:12:00 PM
Aliphatic Hydrocarbon (C10-C12)	577	12.1		mg/Kg-dry	1	3/26/2020 7:12:00 PM
Aliphatic Hydrocarbon (C12-C16)	1,480	121	D	mg/Kg-dry	10	3/28/2020 5:38:00 AM
Aliphatic Hydrocarbon (C16-C21)	1,500	121	D	mg/Kg-dry	10	3/28/2020 5:38:00 AM
Aliphatic Hydrocarbon (C21-C34)	330	12.1	*	mg/Kg-dry	1	3/26/2020 7:12:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	12.1	*	mg/Kg-dry	1	3/27/2020 1:19:00 PM
Aromatic Hydrocarbon (C10-C12)	183	12.1		mg/Kg-dry	1	3/27/2020 1:19:00 PM
Aromatic Hydrocarbon (C12-C16)	606	12.1		mg/Kg-dry	1	3/27/2020 1:19:00 PM
Aromatic Hydrocarbon (C16-C21)	1,230	121	D	mg/Kg-dry	10	3/27/2020 11:06:00 PM
Aromatic Hydrocarbon (C21-C34)	253	12.1		mg/Kg-dry	1	3/27/2020 1:19:00 PM
Surr: 1-Chlorooctadecane	82.2	60 - 140		%Rec	1	3/26/2020 7:12:00 PM
Surr: o-Terphenyl	113	60 - 140		%Rec	1	3/27/2020 1:19:00 PM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27868 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	34.5	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Aliphatic Hydrocarbon (C6-C8)	248	49.3	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Aliphatic Hydrocarbon (C8-C10)	544	27.6	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Aliphatic Hydrocarbon (C10-C12)	796	29.6	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Aromatic Hydrocarbon (C8-C10)	505	59.1	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Aromatic Hydrocarbon (C10-C12)	1,670	11.8	DE	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Aromatic Hydrocarbon (C10-C12)	1,870	59.1	DH	mg/Kg-dry	100	3/27/2020 12:37:26 PM
Aromatic Hydrocarbon (C12-C13)	4,290	690	DH	mg/Kg-dry	100	3/27/2020 12:37:26 PM
Aromatic Hydrocarbon (C12-C13)	2,360	138	DE	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Benzene	ND	11.8	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Toluene	ND	13.8	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Ethylbenzene	ND	13.8	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
m,p-Xylene	ND	25.6	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
o-Xylene	ND	11.8	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Naphthalene	48.9	9.86	D	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Methyl tert-butyl ether (MTBE)	ND	9.86	DQ	mg/Kg-dry	20	3/25/2020 2:13:10 AM
Surr: 1,4-Difluorobenzene	101	65 - 140	D	%Rec	20	3/25/2020 2:13:10 AM
Surr: Bromofluorobenzene	106	65 - 140	D	%Rec	20	3/25/2020 2:13:10 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/12/2020 12:25:00 PM
Project: 003244
Lab ID: 2003268-017
Matrix: Soil
Client Sample ID: OIP-67-11-12

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27868 Analyst: CR

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
E - Estimated value. The amount exceeds the linear working range of the instrument.
Diluted due to matrix.
Analyte detections should be confirmed by GCMS.

Sample Moisture (Percent Moisture)

Batch ID: R58217 Analyst: EH

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Percent Moisture	23.4	0.500		wt%	1	3/24/2020 8:31:55 AM

Client: Friedman & Bruya
Collection Date: 3/12/2020 9:25:00 AM
Project: 003244
Lab ID: 2003268-018
Matrix: Soil
Client Sample ID: MW-39-13-14

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27833 Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	199	19.9	*	mg/Kg-dry	1	3/26/2020 9:23:00 PM
Aliphatic Hydrocarbon (C10-C12)	888	9.96		mg/Kg-dry	1	3/26/2020 9:23:00 PM
Aliphatic Hydrocarbon (C12-C16)	4,300	99.6	D	mg/Kg-dry	10	3/28/2020 6:21:00 AM
Aliphatic Hydrocarbon (C16-C21)	4,570	99.6	D	mg/Kg-dry	10	3/28/2020 6:21:00 AM
Aliphatic Hydrocarbon (C21-C34)	629	9.96	*	mg/Kg-dry	1	3/26/2020 9:23:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	9.96	*	mg/Kg-dry	1	3/27/2020 2:03:00 PM
Aromatic Hydrocarbon (C10-C12)	131	9.96		mg/Kg-dry	1	3/27/2020 2:03:00 PM
Aromatic Hydrocarbon (C12-C16)	1,040	99.6	D	mg/Kg-dry	10	3/27/2020 11:49:00 PM
Aromatic Hydrocarbon (C16-C21)	3,290	99.6	D	mg/Kg-dry	10	3/27/2020 11:49:00 PM
Aromatic Hydrocarbon (C21-C34)	409	9.96		mg/Kg-dry	1	3/27/2020 2:03:00 PM
Surr: 1-Chlorooctadecane	94.8	60 - 140		%Rec	1	3/26/2020 9:23:00 PM
Surr: o-Terphenyl	96.6	60 - 140		%Rec	1	3/27/2020 2:03:00 PM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27868 Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	ND	15.4	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Aliphatic Hydrocarbon (C6-C8)	33.1	22.0	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Aliphatic Hydrocarbon (C8-C10)	57.3	12.3	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Aliphatic Hydrocarbon (C10-C12)	260	13.2	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Aromatic Hydrocarbon (C8-C10)	62.9	26.4	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Aromatic Hydrocarbon (C10-C12)	522	5.27	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Aromatic Hydrocarbon (C12-C13)	2,680	615	DH	mg/Kg-dry	100	3/27/2020 1:19:59 PM
Aromatic Hydrocarbon (C12-C13)	1,210	61.5	DE	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Benzene	ND	5.27	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Toluene	ND	6.15	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Ethylbenzene	ND	6.15	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
m,p-Xylene	ND	11.4	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
o-Xylene	ND	5.27	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Naphthalene	21.5	4.39	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Methyl tert-butyl ether (MTBE)	ND	4.39	D	mg/Kg-dry	10	3/25/2020 5:45:38 AM
Surr: 1,4-Difluorobenzene	97.5	65 - 140	D	%Rec	10	3/25/2020 5:45:38 AM
Surr: Bromofluorobenzene	101	65 - 140	D	%Rec	10	3/25/2020 5:45:38 AM

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.
Analyte detections should be confirmed by GCMS.

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003268-018
Client Sample ID: MW-39-13-14

Collection Date: 3/12/2020 9:25:00 AM

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58217		Analyst: EH
Percent Moisture	13.9	0.500		wt%	1	3/24/2020 8:31:55 AM

Analytical Report

Work Order: **2003268**
Date Reported: **3/31/2020**

Client: Friedman & Bruya
Collection Date: 3/13/2020 9:09:00 AM
Project: 003244
Lab ID: 2003268-019
Matrix: Soil
Client Sample ID: OIP-20-11-11.5

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Extractable Petroleum Hydrocarbons by NWEPH				Batch ID: 27833		Analyst: DW
Aliphatic Hydrocarbon (C8-C10)	71.3	28.2	*	mg/Kg-dry	1	3/26/2020 10:06:00 PM
Aliphatic Hydrocarbon (C10-C12)	64.3	14.1		mg/Kg-dry	1	3/26/2020 10:06:00 PM
Aliphatic Hydrocarbon (C12-C16)	31.8	14.1		mg/Kg-dry	1	3/26/2020 10:06:00 PM
Aliphatic Hydrocarbon (C16-C21)	ND	14.1		mg/Kg-dry	1	3/26/2020 10:06:00 PM
Aliphatic Hydrocarbon (C21-C34)	ND	14.1		mg/Kg-dry	1	3/26/2020 10:06:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	14.1	*	mg/Kg-dry	1	3/27/2020 4:32:00 PM
Aromatic Hydrocarbon (C10-C12)	131	14.1		mg/Kg-dry	1	3/27/2020 4:32:00 PM
Aromatic Hydrocarbon (C12-C16)	108	14.1		mg/Kg-dry	1	3/27/2020 4:32:00 PM
Aromatic Hydrocarbon (C16-C21)	20.1	14.1		mg/Kg-dry	1	3/27/2020 4:32:00 PM
Aromatic Hydrocarbon (C21-C34)	20.1	14.1		mg/Kg-dry	1	3/27/2020 4:32:00 PM
Surr: 1-Chlorooctadecane	67.7	60 - 140		%Rec	1	3/26/2020 10:06:00 PM
Surr: o-Terphenyl	98.2	60 - 140		%Rec	1	3/27/2020 4:32:00 PM

NOTES:
* - Flagged value is not within established control limits.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Volatile Petroleum Hydrocarbons by NWVPH				Batch ID: 27868		Analyst: CR
Aliphatic Hydrocarbon (C5-C6)	ND	1.69		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Aliphatic Hydrocarbon (C6-C8)	25.8	2.41		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Aliphatic Hydrocarbon (C8-C10)	55.6	1.35		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Aliphatic Hydrocarbon (C10-C12)	119	14.5	D	mg/Kg-dry	10	3/25/2020 6:28:01 AM
Aromatic Hydrocarbon (C8-C10)	50.8	2.90		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Aromatic Hydrocarbon (C10-C12)	274	5.80	D	mg/Kg-dry	10	3/25/2020 6:28:01 AM
Aromatic Hydrocarbon (C12-C13)	279	67.6	D	mg/Kg-dry	10	3/25/2020 6:28:01 AM
Benzene	ND	0.580		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Toluene	0.730	0.676		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Ethylbenzene	ND	0.676		mg/Kg-dry	1	3/25/2020 10:00:35 AM
m,p-Xylene	ND	1.26		mg/Kg-dry	1	3/25/2020 10:00:35 AM
o-Xylene	0.876	0.580		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Naphthalene	10.5	0.483		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Methyl tert-butyl ether (MTBE)	ND	0.483		mg/Kg-dry	1	3/25/2020 10:00:35 AM
Surr: 1,4-Difluorobenzene	104	65 - 140		%Rec	1	3/25/2020 10:00:35 AM
Surr: Bromofluorobenzene	129	65 - 140		%Rec	1	3/25/2020 10:00:35 AM

NOTES:
Analyte detections should be confirmed by GCMS.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58217		Analyst: EH
Percent Moisture	34.2	0.500		wt%	1	3/24/2020 8:31:55 AM

Date: *3/31/2020*

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **MB-27833** SampType: **MBLK** Units: **mg/Kg** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **MBLKS** Batch ID: **27833** Analysis Date: **3/24/2020** SeqNo: **1164091**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	ND	20.0									*
Aliphatic Hydrocarbon (C10-C12)	ND	10.0									
Aliphatic Hydrocarbon (C12-C16)	ND	10.0									
Aliphatic Hydrocarbon (C16-C21)	ND	10.0									
Aliphatic Hydrocarbon (C21-C34)	ND	10.0									
Surr: 1-Chlorooctadecane	75.5		100.0		75.5	60	140				

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **LCS-27833** SampType: **LCS** Units: **mg/Kg** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **LCSS** Batch ID: **27833** Analysis Date: **3/24/2020** SeqNo: **1164090**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	118	20.0	250.0	0	47.3	70	130				S
Aliphatic Hydrocarbon (C10-C12)	95.9	10.0	125.0	0	76.8	70	130				
Aliphatic Hydrocarbon (C12-C16)	110	10.0	125.0	0	88.4	70	130				
Aliphatic Hydrocarbon (C16-C21)	110	10.0	125.0	0	87.9	70	130				
Aliphatic Hydrocarbon (C21-C34)	222	10.0	125.0	0	178	70	130				S
Surr: 1-Chlorooctadecane	84.0		100.0		84.0	60	140				

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

Sample ID: **2003268-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **OIP-47-17** Batch ID: **27833** Analysis Date: **3/24/2020** SeqNo: **1164085**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	42.1	26.9						31.62	28.5	25	*
Aliphatic Hydrocarbon (C10-C12)	19.9	13.4						19.07	4.08	25	
Aliphatic Hydrocarbon (C12-C16)	ND	13.4						0		25	
Aliphatic Hydrocarbon (C16-C21)	ND	13.4						0		25	
Aliphatic Hydrocarbon (C21-C34)	ND	13.4						0		25	

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **2003268-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **OIP-47-17** Batch ID: **27833** Analysis Date: **3/24/2020** SeqNo: **1164085**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: 1-Chlorooctadecane	90.0		134.4		67.0	60	140		0		

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **2003268-002AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **OIP-47-11-12** Batch ID: **27833** Analysis Date: **3/25/2020** SeqNo: **1164092**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	210	24.1	300.8	21.69	62.5	70	130				S
Aliphatic Hydrocarbon (C10-C12)	140	12.0	150.4	16.47	82.0	70	130				
Aliphatic Hydrocarbon (C12-C16)	143	12.0	150.4	4.580	92.2	70	130				
Aliphatic Hydrocarbon (C16-C21)	130	12.0	150.4	3.707	84.0	70	130				
Aliphatic Hydrocarbon (C21-C34)	224	12.0	150.4	0	149	70	130				S
Surr: 1-Chlorooctadecane	93.1		120.3		77.4	60	140				

NOTES:
S - Outlying spike recovery(ies) observed.

Sample ID: **2003268-002AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **OIP-47-11-12** Batch ID: **27833** Analysis Date: **3/25/2020** SeqNo: **1164093**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	245	26.8	335.4	21.69	66.5	70	130	209.6	15.5	30	S
Aliphatic Hydrocarbon (C10-C12)	176	13.4	167.7	16.47	95.4	70	130	139.8	23.1	30	
Aliphatic Hydrocarbon (C12-C16)	188	13.4	167.7	4.580	109	70	130	143.3	27.0	30	
Aliphatic Hydrocarbon (C16-C21)	164	13.4	167.7	3.707	95.8	70	130	130.0	23.4	30	
Aliphatic Hydrocarbon (C21-C34)	175	13.4	167.7	0	104	70	130	224.5	24.7	30	
Surr: 1-Chlorooctadecane	101		134.2		75.4	60	140		0		

NOTES:
S - Outlying spike recovery(ies) observed.

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **MB-27833** SampType: **MBLK** Units: **mg/Kg** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **MBLKS** Batch ID: **27833** Analysis Date: **3/25/2020** SeqNo: **1164643**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	10.0									*
Aromatic Hydrocarbon (C10-C12)	ND	10.0									
Aromatic Hydrocarbon (C12-C16)	ND	10.0									
Aromatic Hydrocarbon (C16-C21)	ND	10.0									
Aromatic Hydrocarbon (C21-C34)	ND	10.0									
Surr: o-Terphenyl	93.9		100.0		93.9	60	140				

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **LCS-27833** SampType: **LCS** Units: **mg/Kg** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **LCSS** Batch ID: **27833** Analysis Date: **3/25/2020** SeqNo: **1164642**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	154	10.0	250.0	0	61.6	70	130				S
Aromatic Hydrocarbon (C10-C12)	122	10.0	125.0	0	97.7	70	130				
Aromatic Hydrocarbon (C12-C16)	151	10.0	125.0	0	121	70	130				
Aromatic Hydrocarbon (C16-C21)	151	10.0	125.0	0	121	70	130				
Aromatic Hydrocarbon (C21-C34)	116	10.0	125.0	0	93.1	70	130				
Surr: o-Terphenyl	119		100.0		119	60	140				

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

Sample ID: **2003268-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **OIP-47-17** Batch ID: **27833** Analysis Date: **3/26/2020** SeqNo: **1164636**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	13.4						0		25	*
Aromatic Hydrocarbon (C10-C12)	21.0	13.4						27.47	26.8	25	
Aromatic Hydrocarbon (C12-C16)	17.4	13.4						14.19	20.1	25	
Aromatic Hydrocarbon (C16-C21)	ND	13.4						17.84	65.7	25	
Aromatic Hydrocarbon (C21-C34)	ND	13.4						26.96	69.1	25	R
Surr: o-Terphenyl	116		134.4		86.1	60	140		0		

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **2003268-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **OIP-47-17** Batch ID: **27833** Analysis Date: **3/26/2020** SeqNo: **1164636**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:
R - High RPD due to low analyte concentration. In this range, high RPD's may be expected.
* - Flagged value is not within established control limits.

Sample ID: **2003268-002AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **OIP-47-11-12** Batch ID: **27833** Analysis Date: **3/26/2020** SeqNo: **1164644**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	167	12.0	300.8	0	55.5	70	130				S
Aromatic Hydrocarbon (C10-C12)	155	12.0	150.4	15.63	92.5	70	130				
Aromatic Hydrocarbon (C12-C16)	168	12.0	150.4	16.23	101	70	130				
Aromatic Hydrocarbon (C16-C21)	164	12.0	150.4	9.897	102	70	130				
Aromatic Hydrocarbon (C21-C34)	155	12.0	150.4	0	103	70	130				
Surr: o-Terphenyl	115		120.3		95.6	60	140				

NOTES:
S - Outlying spike recovery(ies) observed.

Sample ID: **2003268-002AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **OIP-47-11-12** Batch ID: **27833** Analysis Date: **3/26/2020** SeqNo: **1164645**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	145	13.4	335.4	0	43.1	70	130	166.9	14.3	30	S
Aromatic Hydrocarbon (C10-C12)	145	13.4	167.7	15.63	77.3	70	130	154.8	6.38	30	
Aromatic Hydrocarbon (C12-C16)	172	13.4	167.7	16.23	93.0	70	130	168.4	2.31	30	
Aromatic Hydrocarbon (C16-C21)	173	13.4	167.7	9.897	97.4	70	130	163.7	5.64	30	
Aromatic Hydrocarbon (C21-C34)	173	13.4	167.7	0	103	70	130	155.5	10.9	30	
Surr: o-Terphenyl	132		134.2		98.3	60	140		0		

NOTES:
S - Outlying spike recovery(ies) observed.

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **2003276-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **BATCH** Batch ID: **27833** Analysis Date: **3/26/2020** SeqNo: **1165064**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	59.8	20.0						28.54	70.8	25	R*
Aliphatic Hydrocarbon (C10-C12)	187	10.0						155.9	18.3	25	
Aliphatic Hydrocarbon (C12-C16)	1,060	10.0						959.3	9.55	25	E
Aliphatic Hydrocarbon (C16-C21)	775	10.0						708.6	8.96	25	
Aliphatic Hydrocarbon (C21-C34)	123	10.0						125.3	2.17	25	*
Surr: 1-Chlorooctadecane	87.5		100.0		87.4	60	140		0		

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.
* - Flagged value is not within established control limits.
R - High RPD due to suspected sample inhomogeneity.

Sample ID: **2003276-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/19/2020** RunNo: **58266**
Client ID: **BATCH** Batch ID: **27833** Analysis Date: **3/27/2020** SeqNo: **1165601**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	10.0						0		25	*
Aromatic Hydrocarbon (C10-C12)	31.6	10.0						27.76	13.1	25	
Aromatic Hydrocarbon (C12-C16)	387	10.0						384.0	0.663	25	
Aromatic Hydrocarbon (C16-C21)	621	10.0						610.9	1.71	25	
Aromatic Hydrocarbon (C21-C34)	48.0	10.0						52.30	8.58	25	
Surr: o-Terphenyl	84.3		100.0		84.3	60	140		0		

NOTES:
* - Flagged value is not within established control limits.

Date: *3/31/2020*

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Total Organic Carbon by EPA 9060

Sample ID: **MB-27933** SampType: **MBLK** Units: **%-dry** Prep Date: **3/30/2020** RunNo: **58354**
Client ID: **MBLKS** Batch ID: **27933** Analysis Date: **3/30/2020** SeqNo: **1165871**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.0750									

Sample ID: **LCS-27933** SampType: **LCS** Units: **%-dry** Prep Date: **3/30/2020** RunNo: **58354**
Client ID: **LCSS** Batch ID: **27933** Analysis Date: **3/30/2020** SeqNo: **1165872**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	1.04	0.0750	1.000	0	104	80	120				

Sample ID: **2003359-001ADUP** SampType: **DUP** Units: **%-dry** Prep Date: **3/30/2020** RunNo: **58354**
Client ID: **BATCH** Batch ID: **27933** Analysis Date: **3/30/2020** SeqNo: **1165874**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	1.56	0.0750						1.987	24.2	20	R

NOTES:

R - High RPD due to suspected sample inhomogeneity. The method is in control as indicated by the Laboratory Control Sample (LCS).

Sample ID: **2003359-002AMS** SampType: **MS** Units: **%-dry** Prep Date: **3/30/2020** RunNo: **58354**
Client ID: **BATCH** Batch ID: **27933** Analysis Date: **3/30/2020** SeqNo: **1165876**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	1.20	0.0750	1.000	0.7080	48.7	75	125				S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed and recovered within range.

Sample ID: **2003359-002AMSD** SampType: **MSD** Units: **%-dry** Prep Date: **3/30/2020** RunNo: **58354**
Client ID: **BATCH** Batch ID: **27933** Analysis Date: **3/30/2020** SeqNo: **1165877**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	1.63	0.0750	1.000	0.7080	92.5	75	125	1.195	31.0	20	R

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Total Organic Carbon by EPA 9060

Sample ID: **2003359-002AMSD**		SampType: **MSD**			Units: **%-dry**			Prep Date: **3/30/2020**			RunNo: **58354**		
Client ID: **BATCH**		Batch ID: **27933**						Analysis Date: **3/30/2020**			SeqNo: **1165877**		
Analyte	Result		RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

NOTES:
R - High RPD observed. The method is in control as indicated by the LCS.

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Total Organic Carbon by EPA 9060

Sample ID: **MB-27879** SampType: **MBLK** Units: **%-dry** Prep Date: **3/24/2020** RunNo: **58267**
Client ID: **MBLKS** Batch ID: **27879** Analysis Date: **3/25/2020** SeqNo: **1164107**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	0.377	0.0750									

Sample ID: **LCS-27879** SampType: **LCS** Units: **%-dry** Prep Date: **3/24/2020** RunNo: **58267**
Client ID: **LCSS** Batch ID: **27879** Analysis Date: **3/25/2020** SeqNo: **1164108**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	1.28	0.0750	1.000	0	128	80	120				BS

Sample ID: **2003268-008ADUP** SampType: **DUP** Units: **%-dry** Prep Date: **3/24/2020** RunNo: **58267**
Client ID: **OIP-46-8** Batch ID: **27879** Analysis Date: **3/25/2020** SeqNo: **1164110**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.0750						0		20	

Sample ID: **2003268-010AMS** SampType: **MS** Units: **%-dry** Prep Date: **3/24/2020** RunNo: **58267**
Client ID: **OIP-68-14-14.5** Batch ID: **27879** Analysis Date: **3/25/2020** SeqNo: **1164112**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	1.35	0.0750	1.000	0.1720	118	75	125				B

Sample ID: **2003268-010AMSD** SampType: **MSD** Units: **%-dry** Prep Date: **3/24/2020** RunNo: **58267**
Client ID: **OIP-68-14-14.5** Batch ID: **27879** Analysis Date: **3/25/2020** SeqNo: **1164113**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	1.42	0.0750	1.000	0.1720	125	75	125	1.349	5.13	20	B

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **LCS-27868** SampType: **LCS** Units: **mg/Kg** Prep Date: **3/23/2020** RunNo: **58335**
Client ID: **LCSS** Batch ID: **27868** Analysis Date: **3/24/2020** SeqNo: **1165784**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	31.6	1.75	30.00	0	105	70	130				
Aliphatic Hydrocarbon (C6-C8)	9.86	2.50	10.00	0	98.6	70	130				
Aliphatic Hydrocarbon (C8-C10)	10.4	1.40	10.00	0	104	70	130				
Aliphatic Hydrocarbon (C10-C12)	10.2	1.50	10.00	0	102	70	130				
Aromatic Hydrocarbon (C8-C10)	40.6	3.00	40.00	0	102	70	130				
Aromatic Hydrocarbon (C10-C12)	10.6	0.600	10.00	0	106	70	130				
Aromatic Hydrocarbon (C12-C13)	10.1	7.00	10.00	0	101	70	130				
Benzene	10.2	0.600	10.00	0	102	70	130				
Toluene	10.2	0.700	10.00	0	102	70	130				
Ethylbenzene	10.3	0.700	10.00	0	103	70	130				
m,p-Xylene	20.7	1.30	20.00	0	104	70	130				
o-Xylene	10.3	0.600	10.00	0	103	70	130				
Naphthalene	9.08	0.500	10.00	0	90.8	70	130				
Methyl tert-butyl ether (MTBE)	9.49	0.500	10.00	0	94.9	70	130				
Surr: 1,4-Difluorobenzene	2.45		2.500		98.0	65	140				
Surr: Bromofluorobenzene	2.42		2.500		96.8	65	140				

Sample ID: **LCSD-27868** SampType: **LCSD** Units: **mg/Kg** Prep Date: **3/23/2020** RunNo: **58335**
Client ID: **LCSS02** Batch ID: **27868** Analysis Date: **3/24/2020** SeqNo: **1165785**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	30.4	1.75	30.00	0	101	70	130	31.58	3.84	20	
Aliphatic Hydrocarbon (C6-C8)	9.78	2.50	10.00	0	97.8	70	130	9.856	0.810	20	
Aliphatic Hydrocarbon (C8-C10)	10.6	1.40	10.00	0	106	70	130	10.43	1.23	20	
Aliphatic Hydrocarbon (C10-C12)	10.3	1.50	10.00	0	103	70	130	10.21	0.429	20	
Aromatic Hydrocarbon (C8-C10)	39.1	3.00	40.00	0	97.8	70	130	40.63	3.78	20	
Aromatic Hydrocarbon (C10-C12)	9.43	0.600	10.00	0	94.3	70	130	10.63	11.9	20	
Aromatic Hydrocarbon (C12-C13)	10.6	7.00	10.00	0	106	70	130	10.10	5.02	20	
Benzene	9.73	0.600	10.00	0	97.3	70	130	10.24	5.04	20	
Toluene	9.76	0.700	10.00	0	97.6	70	130	10.22	4.65	20	

Sample ID: **LCSD-27868** SampType: **LCSD** Units: **mg/Kg** Prep Date: **3/23/2020** RunNo: **58335**
Client ID: **LCSS02** Batch ID: **27868** Analysis Date: **3/24/2020** SeqNo: **1165785**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ethylbenzene	9.78	0.700	10.00	0	97.8	70	130	10.30	5.21	20	
m,p-Xylene	19.7	1.30	20.00	0	98.7	70	130	20.72	4.85	20	
o-Xylene	9.87	0.600	10.00	0	98.7	70	130	10.31	4.30	20	
Naphthalene	8.68	0.500	10.00	0	86.8	70	130	9.083	4.57	20	
Methyl tert-butyl ether (MTBE)	8.59	0.500	10.00	0	85.9	70	130	9.489	10.0	20	
Surr: 1,4-Difluorobenzene	2.44		2.500		97.6	65	140		0		
Surr: Bromofluorobenzene	2.40		2.500		96.1	65	140		0		

Sample ID: **MB-27868** SampType: **MBLK** Units: **mg/Kg** Prep Date: **3/23/2020** RunNo: **58335**
Client ID: **MBLKS** Batch ID: **27868** Analysis Date: **3/24/2020** SeqNo: **1165786**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	1.75		0	0						
Aliphatic Hydrocarbon (C6-C8)	ND	2.50		0	0						
Aliphatic Hydrocarbon (C8-C10)	ND	1.40		0	0						
Aliphatic Hydrocarbon (C10-C12)	ND	1.50		0	0						
Aromatic Hydrocarbon (C8-C10)	ND	3.00		0	0						
Aromatic Hydrocarbon (C10-C12)	ND	0.600		0	0						
Aromatic Hydrocarbon (C12-C13)	ND	7.00		0	0						
Benzene	ND	0.600		0	0						
Toluene	ND	0.700		0	0						
Ethylbenzene	ND	0.700		0	0						
m,p-Xylene	ND	1.30		0	0						
o-Xylene	ND	0.600		0	0						
Naphthalene	ND	0.500		0	0						
Methyl tert-butyl ether (MTBE)	ND	0.500		0	0						Q
Surr: 1,4-Difluorobenzene	2.36		2.500		94.4	65	140				
Surr: Bromofluorobenzene	2.45		2.500		98.0	65	140				

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **2003268-015BDUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/23/2020** RunNo: **58335**
Client ID: **OIP-15-20-21** Batch ID: **27868** Analysis Date: **3/24/2020** SeqNo: **1165767**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	1.78		0	0			0		25	
Aliphatic Hydrocarbon (C6-C8)	ND	2.54		0	0			0		25	
Aliphatic Hydrocarbon (C8-C10)	ND	1.42		0	0			0		25	
Aliphatic Hydrocarbon (C10-C12)	ND	1.52		0	0			0		25	
Aromatic Hydrocarbon (C8-C10)	ND	3.05		0	0			0		25	
Aromatic Hydrocarbon (C10-C12)	ND	0.609		0	0			0		25	
Aromatic Hydrocarbon (C12-C13)	ND	7.11		0	0			0		25	
Benzene	ND	0.609		0	0			0		25	
Toluene	ND	0.711		0	0			0		25	
Ethylbenzene	ND	0.711		0	0			0		25	
m,p-Xylene	ND	1.32		0	0			0		25	
o-Xylene	ND	0.609		0	0			0		25	
Naphthalene	ND	0.508		0	0			0		25	
Methyl tert-butyl ether (MTBE)	ND	0.508		0	0			0		25	Q
Surr: 1,4-Difluorobenzene	2.48		2.539		97.7	65	140		0		
Surr: Bromofluorobenzene	2.57		2.539		101	65	140		0		

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Sample ID: **2003360-001BDUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/23/2020** RunNo: **58335**
Client ID: **BATCH** Batch ID: **27868** Analysis Date: **3/24/2020** SeqNo: **1165780**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	1.43		0	0			0		25	
Aliphatic Hydrocarbon (C6-C8)	ND	2.04		0	0			0		25	
Aliphatic Hydrocarbon (C8-C10)	6.77	1.14		0	0			4.503	40.2	25	R
Aliphatic Hydrocarbon (C10-C12)	33.4	1.22		0	0			18.61	57.0	25	R
Aromatic Hydrocarbon (C8-C10)	3.80	2.45		0	0			4.605	19.2	25	
Aromatic Hydrocarbon (C10-C12)	27.7	0.489		0	0			32.32	15.3	25	
Aromatic Hydrocarbon (C12-C13)	7.25	5.71		0	0			7.398	2.03	25	
Benzene	ND	0.489		0	0			0		25	

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **2003360-001BDUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/23/2020** RunNo: **58335**
Client ID: **BATCH** Batch ID: **27868** Analysis Date: **3/24/2020** SeqNo: **1165780**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toluene	ND	0.571		0	0			0		25	
Ethylbenzene	ND	0.571		0	0			0		25	
m,p-Xylene	ND	1.06		0	0			0		25	
o-Xylene	ND	0.489		0	0			0		25	
Naphthalene	0.738	0.408		0	0			1.602	73.9	25	R
Methyl tert-butyl ether (MTBE)	ND	0.408		0	0			0		25	Q
Surr: 1,4-Difluorobenzene	1.99		2.038		97.8	65	140		0		
Surr: Bromofluorobenzene	2.15		2.038		105	65	140		0		

NOTES:

R - High RPD observed. The method is in control as indicated by the LCS.

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **LCS-27816** SampType: **LCS** Units: **mg/Kg** Prep Date: **3/18/2020** RunNo: **58327**
Client ID: **LCSS** Batch ID: **27816** Analysis Date: **3/19/2020** SeqNo: **1165365**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	34.2	1.75	30.00	0	114	70	130				
Aliphatic Hydrocarbon (C6-C8)	9.69	2.50	10.00	0	96.9	70	130				
Aliphatic Hydrocarbon (C8-C10)	10.2	1.40	10.00	0	102	70	130				
Aliphatic Hydrocarbon (C10-C12)	10.8	1.50	10.00	0	108	70	130				
Aromatic Hydrocarbon (C8-C10)	46.0	3.00	40.00	0	115	70	130				
Aromatic Hydrocarbon (C10-C12)	10.0	0.600	10.00	0	100	70	130				
Aromatic Hydrocarbon (C12-C13)	10.8	7.00	10.00	0	108	70	130				
Benzene	11.7	0.600	10.00	0	117	70	130				
Toluene	11.8	0.700	10.00	0	118	70	130				
Ethylbenzene	11.7	0.700	10.00	0	117	70	130				
m,p-Xylene	23.5	1.30	20.00	0	117	70	130				
o-Xylene	11.4	0.600	10.00	0	114	70	130				
Naphthalene	7.20	0.500	10.00	0	72.0	70	130				
Methyl tert-butyl ether (MTBE)	11.5	0.500	10.00	0	115	70	130				
Surr: 1,4-Difluorobenzene	2.86		2.500		114	65	140				
Surr: Bromofluorobenzene	2.65		2.500		106	65	140				

Sample ID: **LCSD-27816** SampType: **LCSD** Units: **mg/Kg** Prep Date: **3/18/2020** RunNo: **58327**
Client ID: **LCSS02** Batch ID: **27816** Analysis Date: **3/19/2020** SeqNo: **1165366**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	35.7	1.75	30.00	0	119	70	130	34.18	4.48	20	
Aliphatic Hydrocarbon (C6-C8)	10.3	2.50	10.00	0	103	70	130	9.691	5.97	20	
Aliphatic Hydrocarbon (C8-C10)	10.0	1.40	10.00	0	100	70	130	10.25	2.17	20	
Aliphatic Hydrocarbon (C10-C12)	10.0	1.50	10.00	0	100	70	130	10.79	7.58	20	
Aromatic Hydrocarbon (C8-C10)	46.5	3.00	40.00	0	116	70	130	46.02	1.02	20	
Aromatic Hydrocarbon (C10-C12)	9.87	0.600	10.00	0	98.7	70	130	10.04	1.68	20	
Aromatic Hydrocarbon (C12-C13)	10.8	7.00	10.00	0	108	70	130	10.77	0.0385	20	
Benzene	11.7	0.600	10.00	0	117	70	130	11.66	0.462	20	
Toluene	11.8	0.700	10.00	0	118	70	130	11.77	0.271	20	

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **LCSD-27816** SampType: **LCSD** Units: **mg/Kg** Prep Date: **3/18/2020** RunNo: **58327**
Client ID: **LCSS02** Batch ID: **27816** Analysis Date: **3/19/2020** SeqNo: **1165366**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ethylbenzene	11.7	0.700	10.00	0	117	70	130	11.70	0.392	20	
m,p-Xylene	23.6	1.30	20.00	0	118	70	130	23.46	0.549	20	
o-Xylene	11.6	0.600	10.00	0	116	70	130	11.40	1.40	20	
Naphthalene	7.45	0.500	10.00	0	74.5	70	130	7.197	3.43	20	
Methyl tert-butyl ether (MTBE)	11.3	0.500	10.00	0	113	70	130	11.48	1.54	20	
Surr: 1,4-Difluorobenzene	2.85		2.500		114	65	140		0		
Surr: Bromofluorobenzene	2.67		2.500		107	65	140		0		

Sample ID: **MB-27816** SampType: **MBLK** Units: **mg/Kg** Prep Date: **3/18/2020** RunNo: **58327**
Client ID: **MBLKS** Batch ID: **27816** Analysis Date: **3/19/2020** SeqNo: **1165367**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	1.75		0	0						
Aliphatic Hydrocarbon (C6-C8)	ND	2.50		0	0						
Aliphatic Hydrocarbon (C8-C10)	ND	1.40		0	0						
Aliphatic Hydrocarbon (C10-C12)	ND	1.50		0	0						
Aromatic Hydrocarbon (C8-C10)	ND	3.00		0	0						
Aromatic Hydrocarbon (C10-C12)	ND	0.600		0	0						
Aromatic Hydrocarbon (C12-C13)	ND	7.00		0	0						
Benzene	ND	0.600		0	0						
Toluene	ND	0.700		0	0						
Ethylbenzene	ND	0.700		0	0						
m,p-Xylene	ND	1.30		0	0						
o-Xylene	ND	0.600		0	0						
Naphthalene	ND	0.500		0	0						Q
Methyl tert-butyl ether (MTBE)	ND	0.500		0	0						
Surr: 1,4-Difluorobenzene	2.71		2.500		108	65	140				
Surr: Bromofluorobenzene	2.62		2.500		105	65	140				

NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Fremont *Analytical*

Date: *3/31/2020*

Work Order: 2003268
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **2003268-009BDUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/18/2020** RunNo: **58327**
Client ID: **OIP-39-16.5-17** Batch ID: **27816** Analysis Date: **3/19/2020** SeqNo: **1165360**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	1.30		0	0			0		25	
Aliphatic Hydrocarbon (C6-C8)	1.94	1.86		0	0			2.117	8.47	25	
Aliphatic Hydrocarbon (C8-C10)	ND	1.04		0	0			0		25	
Aliphatic Hydrocarbon (C10-C12)	ND	1.12		0	0			0		25	
Aromatic Hydrocarbon (C8-C10)	ND	2.23		0	0			0		25	
Aromatic Hydrocarbon (C10-C12)	0.819	0.446		0	0			0.8446	3.07	25	
Aromatic Hydrocarbon (C12-C13)	ND	5.20		0	0			0		25	
Benzene	ND	0.446		0	0			0		25	
Toluene	ND	0.520		0	0			0		25	
Ethylbenzene	ND	0.520		0	0			0		25	
m,p-Xylene	ND	0.967		0	0			0		25	
o-Xylene	ND	0.446		0	0			0		25	
Naphthalene	ND	0.372		0	0			0		25	Q
Methyl tert-butyl ether (MTBE)	ND	0.372		0	0			0		25	
Surr: 1,4-Difluorobenzene	2.11		1.859		114	65	140		0		
Surr: Bromofluorobenzene	1.96		1.859		106	65	140		0		

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Fremont Analytical

Sample Log-In Check List

Client Name: **FB**
Work Order Number: **2003268**
Logged by: **Matt Langston**
Date Received: **3/16/2020 2:13:00 PM**

Chain of Custody

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

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐

4. Shipping container/cooler in good condition? Yes ☑ No ☐
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes ☐ No ☑ Not Required ☐

6. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐

7. Were all items received at a temperature of >2°C to 6°C * Yes ☑ No ☐ NA ☐

8. Sample(s) in proper container(s)? Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
10. Are samples properly preserved? Yes ☑ No ☐
11. Was preservative added to bottles? Yes ☐ No ☑ NA ☐

12. Is there headspace in the VOA vials? Yes ☐ No ☐ NA ☑
13. Did all samples containers arrive in good condition(unbroken)? Yes ☑ No ☐
14. Does paperwork match bottle labels? Yes ☑ No ☐

15. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
16. Is it clear what analyses were requested? Yes ☑ No ☐
17. Were all holding times able to be met? Yes ☑ No ☐

Special Handling (if applicable)

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

Person Notified: ____ Date: ____
By Whom: ____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding: ____
Client Instructions: ____

19. Additional remarks:

Item Information

Item #	Temp ºC
Cooler	2.3
Sample	2.9

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2003268

Page # 1 of 2

Send Report To Michael Erdahl
Company Friedman and Bruya, Inc.
Address 3012 16th Ave W
City, State, ZIP Seattle, WA 98119
Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont	
PROJECT NAME/NO. 003244	PO # B-143
REMARKS F/S Deliverables	

TURNAROUND TIME
☒ Standard TAT
☐ 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	Matrix	# of jars	Dioxins/Furans	EPH	VPH	TOC							Notes
01P-47-17		3/9/20	1535	Soil	2		x	x								
01P-47-11-12		3/9/20	1505				x	x								
MW-33-12-12.5		3/9/20	1726				x	x								
MW-33-19.5-20		3/9/20	1740				x	x								
01P-23-14-15		3/10/20	0935				x	x								
01P-23-19-20		3/10/20	0945				x	x								
01P-23-23-24		3/10/20	0955				x	x								
01P-46-8		3/10/20	0850		1				x							
01P-39-16.5-17		3/10/20	1402		2		x	x								
01P-68-14-14.5		3/11/20	1638		1				x							
01P-69-14.5-15		3/11/20	1540		1				x							
01P-54-18-19		3/11/20	0840		1				x							
01P-15-15-16		3/12/20	1500		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:	Michael Erdahl	Friedman & Bruya	3/16/20	1316
Received by:	Carter Johnson	FAI	3/16/20	1413
Relinquished by:				
Received by:				

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2003268

Send Report To Michael Erdahl
Company Friedman and Bruya, Inc.
Address 3012 16th Ave W
City, State, ZIP Seattle, WA 98119
Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont	
PROJECT NAME/NO. 003244	PO # B-143
REMARKS F/S Deliverables	

Page # 2 of 2

TURNAROUND TIME
☒ Standard TAT
☐ 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	Matrix	# of jars	Dioxins/Furans	EPH	VPH	TOC							Notes
GP-36-13-14		3/12/20	1347	Soil	2		X	X								
OIP-15-20-21		3/12/20	1520	Soil			X	X								
GP-36-16-17		3/12/20	1402	Soil			X	X								
OIP-67-11-12		3/12/20	1225	Soil			X	X								
MW-39-13-14		3/12/20	0925	Soil			X	X								
OIP-20-11-11.5		3/13/20	0909	Soil			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:	Michael Erdahl	Friedman & Bruya	3/16/20	1316
Received by:	Carter Johnson	FAI	3/16/20	1413
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

April 16, 2020

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

Dear Mr Cisneros:

Included are the additional results from the testing of material submitted on March 13, 2020 from the POL-TPH, F&BI 003244 project. There are 3 pages included in this report.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
FDS0416R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 13, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 003244 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
003244 -01	MW-40-10.5'-11'
003244 -02	MW-40-17D
003244 -03	MW-40-17'
003244 -04	MW-40-24-24.5
003244 -05	MW-40-1.0-1.5
003244 -06	OIP-49-10
003244 -07	OIP-49-17
003244 -08	OIP-47-2-3
003244 -09	OIP-47-25
003244 -10	OIP-47-17
003244 -11	OIP-47-11-12
003244 -12	OIP-31-17
003244 -13	OIP-31-20
003244 -14	GP-33-28-29
003244 -15	GP-33-14-14.5
003244 -16	GP-33-19.5-20
003244 -17	GP-33-24-25
003244 -18	GP-34-14-15
003244 -19	GP-34-GW-14-19
003244 -20	MW-33-12-12.5
003244 -21	MW-33-19.5-20
003244 -22	MW-33-22.5-23
003244 -23	MW-35-15.5-16
003244 -24	MW-34-15-15.5
003244 -25	MW-34-20-20.5
003244 -26	MW-34-24-24.5
003244 -27	MW-34-28-28.5
003244 -28	OIP-23-14-15
003244 -29	OIP-23-19-20
003244 -30	OIP-23-23-24
003244 -31	OIP-23-29.5-30
003244 -32	OIP-46-8
003244 -33	OIP-46-10-11
003244 -34	OIP-46-14
003244 -35	OIP-70-8
003244 -36	OIP-70-12-14
003244 -37	OIP-70-GW-10-15

CASE NARRATIVE (continued)

Laboratory ID	Floyd-Snider
003244 -38	OIP-57-14
003244 -39	OIP-39-15-15.5
003244 -40	OIP-39-16.5-17
003244 -41	OIP-39-21-22
003244 -42	GP-35-7-8
003244 -43	GP-35-16-17
003244 -44	OIP-04-4-5
003244 -45	OIP-04-15-16
003244 -46	OIP-04-GW-15-20
003244 -47	MW-36-25.5-26
003244 -48	MW-38-23.5-24
003244 -49	GP-31-14-15
003244 -50	OIP-72-10-11
003244 -51	OIP-72-16-17
003244 -52	GP-32-17.5-18.5
003244 -53	GP-32-GW-14-19
003244 -54	OIP-68-13.5-14
003244 -55	OIP-68-14-14.5
003244 -56	OIP-68-10-11
003244 -57	OIP-68D-10-11
003244 -58	OIP-68-GW-13-18
003244 -59	OIP-69-GW-12-17
003244 -60	OIP-69-14.5-15
003244 -61	OIP-69-11-12
003244 -62	OIP-54-15-16
003244 -63	OIP-54-18-19
003244 -64	GP-31-GW-13.5-18.5
003244 -65	OIP-02-14-15
003244 -66	OIP-02-GW-14.5-19.5
003244 -67	OIP-02D-GW-14.5-19.5
003244 -68	OIP-02-5-5.5
003244 -69	OIP-15-15-16
003244 -70	MW-37-27.5-28
003244 -71	MW-37-27.5-28 D
003244 -72	P3-0-0.5
003244 -73	P4-0-0.5
003244 -74	P5-0-0.5
003244 -75	P6-0.5-1.0
003244 -76	P6-0.5-1.0
003244 -77	OIP-64-14-15

CASE NARRATIVE (continued)

Laboratory ID	Floyd-Snider
003244 -78	GP-36-22-23
003244 -79	GP-36-13-14
003244 -80	OIP-15-20-21
003244 -81	GP-37-12-14
003244 -82	GP-37D-12-14
003244 -83	GP-36-16-17
003244 -84	OIP-15-23-24
003244 -85	OIP-15-GW-14-19
003244 -86	OIP-73-13-14
003244 -87	OIP-73D-13-14
003244 -88	OIP-73-9-10
003244 -89	OIP-67-11-12
003244 -90	OIP-67-GW-14-19
003244 -91	OIP-67-18-19
003244 -92	OIP-67-7-8
003244 -93	OIP-67-14.5-15
003244 -94	MW-39-2-4
003244 -95	MW-39-8-9
003244 -96	MW-39-13-14
003244 -97	MW-39-18.5-20
003244 -98	GP-38-11-11.5
003244 -99	OIP-18-19-19.5
003244 -100	OIP-20-11-11.5
003244 -101	OIP-20-19-19.5
003244 -102	OIP-19-19-20
003244 -103	OIP-21-18-19
003244 -104	OIP-06-27-28
003244 -105	OIP-06-29-30
003244 -106	OIP-06-GW-25-30
003244 -107	OIP-05-27-28
003244 -108	OIP-05-29-30
003244 -109	Trip BlanK

Sample OIP-67-14.5-15 was sent to Fremont Analytical for EPH and VPH analyses. The report is enclosed.

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

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

RE: 003244
Work Order Number: 2003439

April 13, 2020

Attention Michael Erdahl:

Fremont Analytical, Inc. received 1 sample(s) on 3/30/2020 for the analyses presented in the following report.

Extractable Petroleum Hydrocarbons by NWEPH
Sample Moisture (Percent Moisture)
Volatile Petroleum Hydrocarbons by NWVPH

This report consists of the following:

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

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

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT:	Friedman & Bruya
Project:	003244
Work Order:	2003439

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2003439-001	01P-67-14.5-15	03/12/2020 12:30 PM	03/30/2020 10:26 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2003439**
Date: **4/13/2020**

CLIENT: Friedman & Bruya
Project: 003244

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

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

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

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

Qualifiers:

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

Acronyms:

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

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003439-001
Client Sample ID: **01P-67-14.5-15**

Collection Date: 3/12/2020 12:30:00 PM
Matrix: Soil

Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 27953   Analyst: DW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C8-C10)	41.7	22.9	*H	mg/Kg-dry	1	4/9/2020 5:25:00 PM
Aliphatic Hydrocarbon (C10-C12)	62.4	11.5	H	mg/Kg-dry	1	4/9/2020 5:25:00 PM
Aliphatic Hydrocarbon (C12-C16)	205	11.5	H	mg/Kg-dry	1	4/9/2020 5:25:00 PM
Aliphatic Hydrocarbon (C16-C21)	231	11.5	H	mg/Kg-dry	1	4/9/2020 5:25:00 PM
Aliphatic Hydrocarbon (C21-C34)	21.8	11.5	H	mg/Kg-dry	1	4/9/2020 5:25:00 PM
Aromatic Hydrocarbon (C8-C10)	ND	11.5	*H	mg/Kg-dry	1	4/10/2020 12:53:00 AM
Aromatic Hydrocarbon (C10-C12)	13.9	11.5	H	mg/Kg-dry	1	4/10/2020 12:53:00 AM
Aromatic Hydrocarbon (C12-C16)	56.6	11.5	H	mg/Kg-dry	1	4/10/2020 12:53:00 AM
Aromatic Hydrocarbon (C16-C21)	185	11.5	H	mg/Kg-dry	1	4/10/2020 12:53:00 AM
Aromatic Hydrocarbon (C21-C34)	19.3	11.5	H	mg/Kg-dry	1	4/10/2020 12:53:00 AM
Surr: 1-Chlorooctadecane	66.1	60 - 140	H	%Rec	1	4/9/2020 5:25:00 PM
Surr: o-Terphenyl	76.0	60 - 140	H	%Rec	1	4/10/2020 12:53:00 AM

NOTES:
* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 27971   Analyst: CR

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Aliphatic Hydrocarbon (C5-C6)	5.42	1.95	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
Aliphatic Hydrocarbon (C6-C8)	119	2.78	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
Aliphatic Hydrocarbon (C8-C10)	145	15.6	DH	mg/Kg-dry	10	4/3/2020 1:38:38 AM
Aliphatic Hydrocarbon (C10-C12)	234	16.7	DH	mg/Kg-dry	10	4/3/2020 1:38:38 AM
Aromatic Hydrocarbon (C8-C10)	118	33.4	DH	mg/Kg-dry	10	4/3/2020 1:38:38 AM
Aromatic Hydrocarbon (C10-C12)	438	6.68	DH	mg/Kg-dry	10	4/3/2020 1:38:38 AM
Aromatic Hydrocarbon (C12-C13)	776	77.9	DEH	mg/Kg-dry	10	4/3/2020 1:38:38 AM
Benzene	ND	0.668	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
Toluene	ND	0.779	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
Ethylbenzene	1.88	0.779	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
m,p-Xylene	ND	1.45	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
o-Xylene	2.60	0.668	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
Naphthalene	11.8	0.557	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
Methyl tert-butyl ether (MTBE)	ND	0.557	H	mg/Kg-dry	1	4/3/2020 3:03:31 AM
Surr: 1,4-Difluorobenzene	112	65 - 140	H	%Rec	1	4/3/2020 3:03:31 AM
Surr: Bromofluorobenzene	127	65 - 140	H	%Rec	1	4/3/2020 3:03:31 AM

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.
Analyte detections should be confirmed by GCMS.

Analytical Report

Work Order: **2003439**
Date Reported: **4/13/2020**

Client: Friedman & Bruya
Project: 003244
Lab ID: 2003439-001
Client Sample ID: **01P-67-14.5-15**

Collection Date: 3/12/2020 12:30:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R58366		Analyst: CJ
Percent Moisture	23.2	0.500		wt%	1	3/31/2020 12:32:09 PM

Work Order:	2003439
CLIENT:	Friedman & Bruya
Project:	003244

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **MB-27953** SampType: **MBLK** Units: **mg/Kg** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **MBLKS** Batch ID: **27953** Analysis Date: **4/9/2020** SeqNo: **1169816**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	ND	20.0									*
Aliphatic Hydrocarbon (C10-C12)	ND	10.0									
Aliphatic Hydrocarbon (C12-C16)	ND	10.0									
Aliphatic Hydrocarbon (C16-C21)	ND	10.0									
Aliphatic Hydrocarbon (C21-C34)	ND	10.0									
Surr: 1-Chlorooctadecane	76.3		100.0		76.3	60	140				

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **LCS-27953** SampType: **LCS** Units: **mg/Kg** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **LCSS** Batch ID: **27953** Analysis Date: **4/9/2020** SeqNo: **1169815**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	143	20.0	250.0	0	57.1	70	130				S
Aliphatic Hydrocarbon (C10-C12)	101	10.0	125.0	0	80.9	70	130				
Aliphatic Hydrocarbon (C12-C16)	109	10.0	125.0	0	87.1	70	130				
Aliphatic Hydrocarbon (C16-C21)	107	10.0	125.0	0	85.5	70	130				
Aliphatic Hydrocarbon (C21-C34)	102	10.0	125.0	0	81.5	70	130				
Surr: 1-Chlorooctadecane	86.9		100.0		86.9	60	140				

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

Sample ID: **2003360-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **BATCH** Batch ID: **27953** Analysis Date: **4/9/2020** SeqNo: **1169814**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	39.4	24.0						19.53	67.5	25	*
Aliphatic Hydrocarbon (C10-C12)	15.0	12.0						5.153	97.9	25	
Aliphatic Hydrocarbon (C12-C16)	ND	12.0						0		25	
Aliphatic Hydrocarbon (C16-C21)	ND	12.0						0		25	
Aliphatic Hydrocarbon (C21-C34)	ND	12.0						0		25	
Surr: 1-Chlorooctadecane	76.4		120.0		63.7	60	140		0		

Work Order: 2003439
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **2003360-001ADUP**	SampType: **DUP**	Units: **mg/Kg-dry**	Prep Date: **3/31/2020**	RunNo: **58545**	
Client ID: **BATCH**	Batch ID: **27953**		Analysis Date: **4/9/2020**	SeqNo: **1169814**	

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **2003360-001AMS**	SampType: **MS**	Units: **mg/Kg-dry**	Prep Date: **3/31/2020**	RunNo: **58545**	
Client ID: **BATCH**	Batch ID: **27953**		Analysis Date: **4/9/2020**	SeqNo: **1169817**	

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	160	23.3	291.1	19.53	48.3	70	130				S
Aliphatic Hydrocarbon (C10-C12)	95.4	11.6	145.5	5.153	62.0	70	130				S
Aliphatic Hydrocarbon (C12-C16)	112	11.6	145.5	0	77.1	70	130				
Aliphatic Hydrocarbon (C16-C21)	114	11.6	145.5	0	78.3	70	130				
Aliphatic Hydrocarbon (C21-C34)	125	11.6	145.5	0	86.2	70	130				
Surr: 1-Chlorooctadecane	83.7		116.4		71.9	60	140				

NOTES:
S - Outlying spike recovery observed (low bias).

Sample ID: **2003360-001AMSD**	SampType: **MSD**	Units: **mg/Kg-dry**	Prep Date: **3/31/2020**	RunNo: **58545**	
Client ID: **BATCH**	Batch ID: **27953**		Analysis Date: **4/9/2020**	SeqNo: **1169818**	

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	147	22.3	279.3	19.53	45.7	70	130	160.0	8.42	30	S
Aliphatic Hydrocarbon (C10-C12)	102	11.2	139.6	5.153	69.7	70	130	95.40	7.13	30	S
Aliphatic Hydrocarbon (C12-C16)	120	11.2	139.6	0	86.2	70	130	112.3	6.96	30	
Aliphatic Hydrocarbon (C16-C21)	123	11.2	139.6	0	88.4	70	130	113.9	8.01	30	
Aliphatic Hydrocarbon (C21-C34)	132	11.2	139.6	0	94.2	70	130	125.5	4.71	30	
Surr: 1-Chlorooctadecane	89.3		111.7		80.0	60	140		0		

NOTES:
S - Outlying spike recovery observed (low bias).

Work Order: 2003439
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **MB-27953** SampType: **MBLK** Units: **mg/Kg** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **MBLKS** Batch ID: **27953** Analysis Date: **4/9/2020** SeqNo: **1169825**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	10.0									*
Aromatic Hydrocarbon (C10-C12)	ND	10.0									
Aromatic Hydrocarbon (C12-C16)	ND	10.0									
Aromatic Hydrocarbon (C16-C21)	ND	10.0									
Aromatic Hydrocarbon (C21-C34)	ND	10.0									
Surr: o-Terphenyl	101		100.0		101	60	140				

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **LCS-27953** SampType: **LCS** Units: **mg/Kg** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **LCSS** Batch ID: **27953** Analysis Date: **4/9/2020** SeqNo: **1169824**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	139	10.0	250.0	0	55.6	70	130				S
Aromatic Hydrocarbon (C10-C12)	115	10.0	125.0	0	91.9	70	130				
Aromatic Hydrocarbon (C12-C16)	130	10.0	125.0	0	104	70	130				
Aromatic Hydrocarbon (C16-C21)	136	10.0	125.0	0	109	70	130				
Aromatic Hydrocarbon (C21-C34)	93.9	10.0	125.0	0	75.1	70	130				
Surr: o-Terphenyl	106		100.0		106	60	140				

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

Sample ID: **2003360-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **BATCH** Batch ID: **27953** Analysis Date: **4/9/2020** SeqNo: **1169823**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	12.0						0		25	*
Aromatic Hydrocarbon (C10-C12)	ND	12.0						0		25	
Aromatic Hydrocarbon (C12-C16)	ND	12.0						0		25	
Aromatic Hydrocarbon (C16-C21)	ND	12.0						0		25	
Aromatic Hydrocarbon (C21-C34)	ND	12.0						0		25	
Surr: o-Terphenyl	91.5		120.0		76.2	60	140		0		

Date: *4/13/2020*

Work Order: 2003439
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: **2003360-001ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **BATCH** Batch ID: **27953** Analysis Date: **4/9/2020** SeqNo: **1169823**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:
* - Flagged value is not within established control limits.

Sample ID: **2003360-001AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **BATCH** Batch ID: **27953** Analysis Date: **4/9/2020** SeqNo: **1169826**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	139	11.6	291.1	0	47.8	70	130				S
Aromatic Hydrocarbon (C10-C12)	116	11.6	145.5	0	79.9	70	130				
Aromatic Hydrocarbon (C12-C16)	136	11.6	145.5	0	93.5	70	130				
Aromatic Hydrocarbon (C16-C21)	150	11.6	145.5	0	103	70	130				
Aromatic Hydrocarbon (C21-C34)	123	11.6	145.5	0	84.5	70	130				
Surr: o-Terphenyl	106		116.4		90.9	60	140				

NOTES:
S - Outlying spike recovery observed (low bias).

Sample ID: **2003360-001AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **3/31/2020** RunNo: **58545**
Client ID: **BATCH** Batch ID: **27953** Analysis Date: **4/10/2020** SeqNo: **1169827**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	126	11.2	279.3	0	45.1	70	130	139.0	9.86	30	S
Aromatic Hydrocarbon (C10-C12)	104	11.2	139.6	0	74.3	70	130	116.3	11.4	30	
Aromatic Hydrocarbon (C12-C16)	127	11.2	139.6	0	90.8	70	130	136.0	6.99	30	
Aromatic Hydrocarbon (C16-C21)	138	11.2	139.6	0	98.9	70	130	149.9	8.19	30	
Aromatic Hydrocarbon (C21-C34)	119	11.2	139.6	0	84.9	70	130	122.9	3.64	30	
Surr: o-Terphenyl	99.3		111.7		88.8	60	140		0		

NOTES:
S - Outlying spike recovery observed (low bias).

Work Order: 2003439
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **LCS-27971** SampType: **LCS** Units: **mg/Kg** Prep Date: **4/2/2020** RunNo: **58459**
Client ID: **LCSS** Batch ID: **27971** Analysis Date: **4/2/2020** SeqNo: **1168168**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	34.2	1.75	30.00	0	114	70	130				
Aliphatic Hydrocarbon (C6-C8)	12.6	2.50	10.00	0	126	70	130				
Aliphatic Hydrocarbon (C8-C10)	11.4	1.40	10.00	0	114	70	130				
Aliphatic Hydrocarbon (C10-C12)	9.94	1.50	10.00	0	99.4	70	130				
Aromatic Hydrocarbon (C8-C10)	45.8	3.00	40.00	0	114	70	130				
Aromatic Hydrocarbon (C10-C12)	9.44	0.600	10.00	0	94.4	70	130				
Aromatic Hydrocarbon (C12-C13)	10.4	7.00	10.00	0	104	70	130				
Benzene	11.5	0.600	10.00	0	115	70	130				
Toluene	11.6	0.700	10.00	0	116	70	130				
Ethylbenzene	11.7	0.700	10.00	0	117	70	130				
m,p-Xylene	23.5	1.30	20.00	0	117	70	130				
o-Xylene	11.6	0.600	10.00	0	116	70	130				
Naphthalene	8.25	0.500	10.00	0	82.5	70	130				
Methyl tert-butyl ether (MTBE)	11.2	0.500	10.00	0	112	70	130				
Surr: 1,4-Difluorobenzene	2.45		2.500		98.1	65	140				
Surr: Bromofluorobenzene	2.42		2.500		96.6	65	140				

Sample ID: **LCSD-27971** SampType: **LCSD** Units: **mg/Kg** Prep Date: **4/2/2020** RunNo: **58459**
Client ID: **LCSS02** Batch ID: **27971** Analysis Date: **4/2/2020** SeqNo: **1168169**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	35.8	1.75	30.00	0	119	70	130	34.21	4.51	20	
Aliphatic Hydrocarbon (C6-C8)	10.6	2.50	10.00	0	106	70	130	12.60	16.9	20	
Aliphatic Hydrocarbon (C8-C10)	11.2	1.40	10.00	0	112	70	130	11.43	1.68	20	
Aliphatic Hydrocarbon (C10-C12)	10.9	1.50	10.00	0	109	70	130	9.939	9.05	20	
Aromatic Hydrocarbon (C8-C10)	45.3	3.00	40.00	0	113	70	130	45.79	0.988	20	
Aromatic Hydrocarbon (C10-C12)	10.4	0.600	10.00	0	104	70	130	9.443	9.57	20	
Aromatic Hydrocarbon (C12-C13)	10.5	7.00	10.00	0	105	70	130	10.39	1.12	20	
Benzene	11.4	0.600	10.00	0	114	70	130	11.51	1.35	20	
Toluene	11.5	0.700	10.00	0	115	70	130	11.64	1.41	20	

Work Order: 2003439
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **LCSD-27971** SampType: **LCSD** Units: **mg/Kg** Prep Date: **4/2/2020** RunNo: **58459**
Client ID: **LCSS02** Batch ID: **27971** Analysis Date: **4/2/2020** SeqNo: **1168169**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ethylbenzene	11.5	0.700	10.00	0	115	70	130	11.69	1.55	20	
m,p-Xylene	23.1	1.30	20.00	0	116	70	130	23.47	1.55	20	
o-Xylene	11.5	0.600	10.00	0	115	70	130	11.55	0.649	20	
Naphthalene	8.20	0.500	10.00	0	82.0	70	130	8.252	0.688	20	
Methyl tert-butyl ether (MTBE)	10.8	0.500	10.00	0	108	70	130	11.16	3.04	20	
Surr: 1,4-Difluorobenzene	2.53		2.500		101	65	140		0		
Surr: Bromofluorobenzene	2.46		2.500		98.5	65	140		0		

Sample ID: **MB-27971** SampType: **MBLK** Units: **mg/Kg** Prep Date: **4/2/2020** RunNo: **58459**
Client ID: **MBLKS** Batch ID: **27971** Analysis Date: **4/2/2020** SeqNo: **1168170**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	1.75		0	0						
Aliphatic Hydrocarbon (C6-C8)	ND	2.50		0	0						
Aliphatic Hydrocarbon (C8-C10)	ND	1.40		0	0						
Aliphatic Hydrocarbon (C10-C12)	ND	1.50		0	0						
Aromatic Hydrocarbon (C8-C10)	ND	3.00		0	0						
Aromatic Hydrocarbon (C10-C12)	ND	0.600		0	0						
Aromatic Hydrocarbon (C12-C13)	ND	7.00		0	0						
Benzene	ND	0.600		0	0						
Toluene	ND	0.700		0	0						
Ethylbenzene	ND	0.700		0	0						
m,p-Xylene	ND	1.30		0	0						
o-Xylene	ND	0.600		0	0						
Naphthalene	ND	0.500		0	0						
Methyl tert-butyl ether (MTBE)	ND	0.500		0	0						
Surr: 1,4-Difluorobenzene	2.56		2.500		102	65	140				
Surr: Bromofluorobenzene	2.57		2.500		103	65	140				

Work Order: 2003439
CLIENT: Friedman & Bruya
Project: 003244

QC SUMMARY REPORT

Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: **2003439-001BDUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **4/2/2020** RunNo: **58459**
Client ID: **01P-67-14.5-15** Batch ID: **27971** Analysis Date: **4/3/2020** SeqNo: **1168164**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	19.5		0	0			0		25	DH
Aliphatic Hydrocarbon (C6-C8)	105	27.8		0	0			103.4	1.96	25	DH
Aliphatic Hydrocarbon (C8-C10)	148	15.6		0	0			145.2	1.82	25	DH
Aliphatic Hydrocarbon (C10-C12)	265	16.7		0	0			233.7	12.6	25	DH
Aromatic Hydrocarbon (C8-C10)	121	33.4		0	0			117.8	2.32	25	DH
Aromatic Hydrocarbon (C10-C12)	443	6.68		0	0			438.1	1.13	25	DH
Aromatic Hydrocarbon (C12-C13)	786	77.9		0	0			775.8	1.35	25	DH
Benzene	ND	6.68		0	0			0		25	DH
Toluene	ND	7.79		0	0			0		25	DH
Ethylbenzene	ND	7.79		0	0			0		25	DH
m,p-Xylene	ND	14.5		0	0			0		25	DH
o-Xylene	ND	6.68		0	0			0		25	DH
Naphthalene	31.1	5.57		0	0			28.37	9.13	25	DH
Methyl tert-butyl ether (MTBE)	ND	5.57		0	0			0		25	DH
Surr: 1,4-Difluorobenzene	29.5		27.83		106	65	140		0		DH
Surr: Bromofluorobenzene	29.6		27.83		106	65	140		0		DH

Sample Log-In Check List

Client Name: **FB**
Work Order Number: **2003439**
Logged by: **Carissa True**
Date Received: **3/30/2020 10:26:00 AM**

Chain of Custody

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

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes ☐ No ☑ Not Required ☐
6. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
7. Were all items received at a temperature of >2°C to 6°C * Yes ☑ No ☐ NA ☐
8. Sample(s) in proper container(s)? Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
10. Are samples properly preserved? Yes ☑ No ☐
11. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
12. Is there headspace in the VOA vials? Yes ☐ No ☐ NA ☑
13. Did all samples containers arrive in good condition(unbroken)? Yes ☑ No ☐
14. Does paperwork match bottle labels? Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
16. Is it clear what analyses were requested? Yes ☑ No ☐
17. Were all holding times able to be met? Yes ☐ No ☑

Special Handling (if applicable)

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

Person Notified: Michael Erdahl
Date: 4/2/2020
By Whom: Carissa True
Via: ☑ eMail ☑ Phone ☐ Fax ☐ In Person
Regarding: Out of hold
Client Instructions: Proceed

19. Additional remarks:

Item Information

Item #	Temp ºC
Cooler 1	0.5
Sample 1	0.6

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2003439

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER FREMONT

PROJECT NAME/NO. 003244

PO # B-162

REMARKS

Page # ______ of ______

TURNAROUND TIME
☑ Standard TAT
☐ 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	Matrix	# of jars	Dioxins/Furans	EPH	VPH								Notes
OIP-67-14.5-15		3/12/20	12:30 ~~0900~~ sp 3/30	S	3		✓	✓								

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:	~~Michael Erdahl~~ Eric Young	Friedman & Bruya	3/30/20	10Am
Received by:	Carter Johnson	FAI	3/30/20	1026
Relinquished by:				
Received by:				

003244

[redacted]

SAMPLE CHAIN OF CUSTODY

ME [redacted] 03-13-20 CI3/VW5/A05/VS5

Page # 1 of 1

Report To Gabe Cisneros

Company Floyd|Snider

Address 601 Union St Suite 600

City, State, ZIP Seattle, WA 98101

Phone 206 292-2078 Email

SAMPLERS (*signature*)	
PROJECT NAME POL-TPH	PO #
REMARKS VOCs 8260 include MTBE, Hexane, EDB, EDC, NAPH, BTEX Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID *	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	VPH / EPH	Lead			V-per CC EP 3/20 Notes
MW-40-10.5-11'	01A-B	3/9/20	1145	Soil	5	✓	✓		X								*Run HCID Archive rest
8 ~~MW-40-11-13'~~																	
8 ~~MW-40-17~~ MW-40-17D	02A-D	↓	1245	↓	4	X	X	X			X			X			Dup.
MW-40-17'	03		1235		4	X	X	X			X			X			
MW-40-24-24.5	04A-E		1330		5				X								*
MW-40-1.0-1.5	05		1530		5				X								*Run HCID Archive rest
OIP-49-10	06		14:05		5	✓	✓		X								Archive VOAs
OIP-49-17	07		14:15		5	✓	✓		X								" "
OIP-47-2-3	08		15:10		5				X								" "
OIP-47-25	09		15:30		5				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	3/13	1644
Received by:	Eric Young	F&B	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244

SAMPLE CHAIN OF CUSTODY

ME 03-13-20

CI3/VW5/A05
VS5

Report To Gabe Cisneros

Company Floyd Snider

Address

City, State, ZIP see page 1

Phone Email

SAMPLERS (*signature*)	
PROJECT NAME POL-TPH	PO #
REMARKS VOCs 8260 : MTBE, EDB Hexane, EDS, Naph, BTEX Project specific RLs? - Yes / No	INVOICE TO

Page # 2 of 11

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	CPAHs EPA 8270	PCBs EPA 8082	Lead	EPH/VPH	Naphthalene		Notes
01P-47-17	10A-H	3/9/20	1535	Soil	8	X	X			X	X		X	X			
01P-47-11-12	11 A-H		15:05		8	X	X			X	X		X	X			
01P-31-17	12A-E		17:20		5				X								Archive VOAs
01P-31-20	13		17:15		5				X								Archive VOAs
GP-33-28-29	14		16:50		5				X								" "
GP-33-14-14.5	15		16:30		5	✓	✓		X								" "
GP-33-14.5-20	16		16:35		5				X								" "
GP-33-24-25	17		16:45		5				X								" "
GP-34-14-15	18		18:10	↓	5				X								" "
GP-34-GW-14-19	19A-H	↓	18:05	GW	8	X	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	Snider/Floyd	3/13	1644
Received by:	Eric Young	F&B	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244
[redacted]

SAMPLE CHAIN OF CUSTODY

ME 03-13-20 [redacted] Page # 3 of 11

CI3/VW5/A05/V55

Report To Gabe Cisneros
Company Floyd/Snider
Address 601 Union Street Ste 600
City, State, ZIP Seattle 98161
Phone ______ Email ______

SAMPLERS (signature)		TURNAROUND TIME ☒ Standard turnaround ☐ RUSH ______ Rush charges authorized by:
PROJECT NAME POL-TPH	PO #	
REMARKS VOC's include MTBE, Hexane, BTEX EDB, EDC & Naphth. Project specific RLs? - Yes / No	INVOICE TO	SAMPLE DISPOSAL ☒ Archive samples ☐ Other ______ Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Lead	VPH/EPH	BTEX 8260		Notes
MW-33-12-12.5	20 A-H	3/9	1720	Soil	8	X	X			X	X		X	X			See Remarks
MW-33-19.5-20	21	3/9	1740	Soil	8	X	X			X	X		X	X			for VOCs 8260
MW-33-22.5-23	22 A-E	3/9	1800	Soil	5				X								Run HCID Archive rest
MW-35-15.5-16	23	3/10	1245	Soil	5				X								〃
MW-34-15-15.5	24		1800		5	X	X				X		X		X		
MW-34-20-20.5	25		1806		5	X	X				X		X		X		
MW-34-24-24.5	26		1812		5	X	X				X		X		X		
MW-34-28-28.5	27		1818		5				X								Run HCID Archive rest
OIP-23-14-15	28 A-H	3/10/20	0935		8	X	X			X	X			X			
OIP-23-19-20	29	3/10/20	0945		8	X	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	3/13	1645
Received by:	Eric Cown	FEB	3/13/20	1645
Relinquished by:				
Received by:		Samples received at 4 °C		

003244
[redacted]

SAMPLE CHAIN OF CUSTODY

ME 03-13-20

[redacted] # 4 of 11

CI3/VW5/A05
V55

Report To Gabe Cisneros
Company Floyd Snider
Address
City, State, ZIP see page 1
Phone Email

SAMPLERS (signature)

PROJECT NAME POL - TPH

PO #

REMARKS See page 1 for VOCs list

INVOICE TO

Project specific RLs? - Yes / No

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TOC	VPH/EPH	Naphthalene		Notes
01P-23-23-24	30 A-H	3/10/20	0955	Soil	8	X	X			X	X			X			
01P-23-29.5-30	31 A-E		10:20		5				X								~~Archive VOAs~~
01P-46-8	32		0850		1								X				
01P-46-10-11	33 A-E		0845		5				X								Archive VOAs
01P-46-14	34		0840		5				X								Archive VOAs
01P-70-8	35		1130		5				X								Archive VOAs
01P-70-12-14	36		1145		5				X								Archive VOAs
01P-70-GW-10-15	37 A-H		12:00	GW	8	X	X	X			X				X		
01P-57-14	38 A-E		12:50	Soil	5				X								Archive VOAs
01P-39-15-15.5	39		1342	Soil	5	X	X	X	~~X~~ RD		X						~~Archive VOAs~~ RD.

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	3/13	1644
Received by:	[illegible]	FaB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244

SAMPLE CHAIN OF CUSTODY

ME 03-13-20

03/VVS/AVS

VSS

Page # 5 of 11

Report To Gabe Cisneros

Company Floyd Snider

Address

City, State, ZIP see page 1

Phone Email

SAMPLERS (*signature*)

PROJECT NAME PCL-TPH

PO #

REMARKS see page 1 for VOCs list

INVOICE TO

Project specific RLs? - Yes / No

TURNAROUND TIME

☒ Standard turnaround

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☒ Archive samples

☐ Other

Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Naphthalene	Lead	VPH / EPH		Notes
OIP-39-16.5-17	40 A-H	3/10/20	1402	Soil	8	X	X			X	X			X	X		
OIP-39-21-22	41 A-E	↓	1400	↓	5				X								Archive VOAs
GP-35-7-8	42		14:42		5	✓			X								Archive VOAs
GP-35-16-17	43		14:47		5				X								Archive VOAs
OIP-04-4-5	44		16:50		5				X								Archive VOAs
OIP-04-15-16	45		17:08		5				X								Archive VOAs
OIP-04-GW-15-20	46 A-H		17:30	GW	8	X	X	X			X		X				
MW-36-25.5-26	47 A-E	3/11/20	1135	Soil	5				X								Archive VOAs
MW-38-23.5-24	48	↓	1600	Soil	5				X								Archive VOAs
GP-31-14-15	49		1220	Soil	5				X								Archive VOAs

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	3/13	1644
Received by:	Eric Young	FB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244
[redacted]

SAMPLE CHAIN OF CUSTODY ME 03-13-20 [redacted] 03/NW5/A05/V35

Page # 6 of 11

Report To Gabe Cisneros
Company Floyd Snider
Address
City, State, ZIP see page 1
Phone Email

SAMPLERS (signature)

PROJECT NAME
POL-TPH

PO #

REMARKS
See page 1 for list of VOCs

INVOICE TO

Project specific RLs? - Yes / No

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TOC	Naphthalene			Notes
OIP-72-10-11	50 A-E	3/11/20	0950	Soil	5				X								Archive VOAs
OIP-72-16-17	51	↓	1000	↓	5				X								" "
GP ~~OIP~~ - 32-17.5-185	52		1320		5				X								" "
GP 32-GW-14-19	53 A-H		1330	GW	8	X	X	X			X						
OIP-68-13.5-14	54 A-E		1640	Soil	5				X								Archive VOAs
OIP-68-14-14.5	55		1638	↓	1								X				
OIP-68-10-11	56 A-E		1645		5				X								Archive VOAs
OIP-68D-10-11	57		1700		5				X								" "
OIP-68-GW-13-18	58 A-H		1705	GW	8	X	X	X			X			X			
OIP-69-GW-12-17	59	↓	1555	GW	8	X	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	3/13	1644
Received by:	Eric Young	FEB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at	4 °C	

~~003244~~

SAMPLE CHAIN OF CUSTODY

HE 03-13-20

CE3/VW5/A05/U55

Page # 7 of 11

Report To Gabe Cisneros

Company Floyd Snider

Address

City, State, ZIP see page 1

Phone Email

SAMPLERS (signature)

PROJECT NAME POL-TPH

PO #

REMARKS see page 1 for list of VOCs

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME

☒ Standard turnaround

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☒ Archive samples

☐ Other

Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TOCs	Naphthalene	Lead	VPH/EPH	Notes
OIP-69-14.5-15	60 A-F	3/11/20	1540	Soil	6				X				X				Archive VOAs
OIP-69-11-12	61 A-E		1535		5				X								" "
OIP-54-15-16	62 A-E		0845		5	✓			X								" "
OIP-54-18-19	63		0840		1								X				
GP-31-GW-13.5-18.5	64 A-H		1220	GW	8	X	X	X			X						
OIP-02-14-15	65 A-E		1055	Soil	5				X								Archive VOAs
OIP-02-GW-14.5-19.5	66 A-H		1115	GW	8	X	X	X			X			X			
OIP-02D-GW-14.5-19.5	67 A-H		1120	GW	8	X	X	X			X			X			
OIP-02-5-5.5	68 A-E		1640	Soil	5	✓			X								Archive VOAs
OIP-15-15-16	69 A-H	3/12/20	1500	Soil	8	X	X			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	3/13	1644
Received by:	Eric Young	FeB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244 [redacted]

SAMPLE CHAIN OF CUSTODY ME 03-13-20 [redacted]

03/VWS/A05/VSS

Page # 8 of 11

Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union St, Ste 600
City, State, ZIP Seattle, WA
Phone 206 292 2078 Email

SAMPLERS (*signature*)

PROJECT NAME POC

PO #

REMARKS See page 1 for list of VOCs

INVOICE TO

Project specific RLs? - Yes / No

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Lead	VPH | EPH			Notes
MW-37-27.5-28	70 A-E	3/12/20	0930	S	5				X								Archive Vials
MW-37-27.5-28 D	71	↓	0935	S	5				X								~~Archive Vials~~
P3-0-0.5 ~~Feet~~ PO	72		1440	S	5	X	X	X			X						
P4-0-0.5 ~~Feet~~ PO.	73 ↓		1450	S	5	X	X	X			X						
P5-0-0.5 ~~Feet~~ PO	74 A-D		1455	S	15	X	X	X			X						MS/MSD
P6-0.5-1.0 ~~Feet~~ PO	75 A-E		1315	S	5	X	X	X			X						
P6-0.5-1.0 D	76	↓	1320	S	5	X	X	X			X						
OIP-64-14-15	77	3/12	1545	S	5				X								Archive rest
GP-30-22-23	78		1401	S	5				X								Archive VOAs
GP-30-13-14	79 A-H	↓	1347	S	8	X	X		~~X~~ PD	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	3/13	1644
Received by:	Eric [illegible]	F&B	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244

SAMPLE CHAIN OF CUSTODY

ME 03/13/20

Page # 9 of 11

VSS/COS/003 VWS

Report To Gabe Cisneros

Company Floyd Snider

Address

City, State, ZIP See page 1

Phone Email

SAMPLERS (*signature*)

PROJECT NAME POL-TPH

PO #

REMARKS See page 1 for list of VOCs

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME

☒ Standard turnaround

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☒ Archive samples

☐ Other

Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Lead	VPH/EPH	Naphthalene		Notes
01P-15-20-21	80 A-H	3/12/20	1520	Soil	8	X	X			X	X		X	X			
~~01P~~ GP-37-12-14	81 A-E		1315	Soil	5				X								Archive VOAs
RD ~~01P~~ GP-37D-12-14	82 A-E		1320	Soil	5				X								Archive VOAs
GP-36-16-17	83 A-H		1402	Soil	8	X	X			X	X		X	X			
* 01P-64-14-15			1545	Soil	5				X								Archive VOAs
01P-15-23-24	84 A-E		1535	Soil	5				X								Archive VOAs
01P-15-GW-14-19	85 A-H		1515	~~Soil~~ GW	8	X	X	X			X				X		
01P-73-13-14	86 A-E		1045	Soil	5				X								Archive VOAs
01P-73D-13-14	87		1040	Soil	5				X								" "
01P-73-9-10	88		1030	Soil	5				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	3/13	1644
Received by:	Eric Clowne	FEB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244

SAMPLE CHAIN OF CUSTODY

ME 03-13-20

VS5/C05/KI3/VWS

Page # 10 of 11

Report To Gabe Cisneros
Company Floyd Snider
Address See page 1
City, State, ZIP
Phone Email

SAMPLERS (signature)

PROJECT NAME
POL-TPH

PO #

REMARKS
See page 1 for list of VOCs

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	Targeted VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Lead	VPH/EPH	Naphthalene		Notes
01P-67-11-12	89 A-H	3/12/20	1225	Soil	8	X	X			X	X		X	X			
01P-67-GW-14-19	90 A-K		1155	GW	24	X	X	X			X				X		MS/MSD
01P-67-18-19	91 A-E		1240	Soil	5				X								Archive VOAs
01P-67-7-8	92 A-E		1150	Soil	5				X								Archive VOAs
01P-67-14.5-15	93 A-H		1230	Soil	8	X	X			✓	X		X	✓			
MW-39-2-4	94 A-E		0900	Soil	5				X								Archive VOAs
MW-39-8-9	95 A-O		0905	Soil	15	X	X	X			X						MS/MSD
MW-39-13-14	96 A-H		0925	Soil	8	X	X			X	X			X			
MW-39-18.5-20	97 A-O		0930	Soil	15	X	X	X			X						MS/MSD
GP-38-11-11.5	98 A-E	3/13/20	1210	S	5				X								Archive by test

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	3/13	1644
Received by:	Eric [illegible]	F&B	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

003244 [redacted]

SAMPLE CHAIN OF CUSTODY

ME 03-13-20 [redacted] CE3/OW5/A05/VS5

Page # 11 of 11

Report To Gabe Cisneros

Company Floyd|Snider

Address 601 Union St Ste 600

City, State, ZIP Seattle, WA

Phone 206 292-2078 Email

SAMPLERS (signature)	
PROJECT NAME POC-TPH	PO #
REMARKS VOCs include EDB, EDC, MTBE, BTEX Hexane, Naphthalene Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	EDB/EDC	Lead	VPH/EPH	Naphthalene	Notes
01P-18-19-19.5	99 A-E	3/13/20	0841	S	5				X								Archive rest
01P-20-11-11.5	100 A-H		0909	Soil	8	X	X			X	X		X	X	X		EDB/EDC included in VOCs
01P-20-19-19.5	101 A-E		0919		5				X								Archive rest
01P-19-19-20	102 A-O		0830		15				X								MS/MSD
01P-21-18-19	103 A-E		0917		5				X								
01P-06-27-28	104 A E		10:30		5				X								Archive VOAs
01P-06-29-30	105 A-O		10:40		15												Archive/MS/MSD
01P-06-GW-25-30	106 A-H		10:50	GW	8	X	X	X			X					X	
01P-05-27-28	107 A E		11:18	Soil	5				X								Archive VOAs
01P-05-29-30	108 A E		11:20	Soil	5												Archive

* Trip Blank 109 A-N Water 14

NP) 3/16/20

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	3/13	1644
Received by:	Eric Young	FB	3/13/20	1644
Relinquished by:				
Received by:		Samples received at 4 °C		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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www.friedmanandbruya.com

May 19, 2020

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 May 8, 2020 from the POL-TPH 10 E Port Way, Longview, WA, F&BI 005111 project. There are 14 pages included in this report.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
FDS0519R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on May 8, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH 10 E Port Way, Longview, WA, F&BI 005111 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
005111 -01	SVP-01-050820
005111 -02	SVP-101-050820
005111 -03	SVP-02-050820

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-01-050820	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH 10 E Port Way, Longview, WA
Date Collected:	05/08/20	Lab ID:	005111-01 1/3.0
Date Analyzed:	05/14/20	Data File:	051325.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	113	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<90
APH EC9-12 aliphatics	180
APH EC9-10 aromatics	<75

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-101-050820	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH 10 E Port Way, Longview, WA
Date Collected:	05/08/20	Lab ID:	005111-02 1/3.2
Date Analyzed:	05/14/20	Data File:	051326.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<96
APH EC9-12 aliphatics	160
APH EC9-10 aromatics	<80

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-02-050820	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH 10 E Port Way, Longview, WA
Date Collected:	05/08/20	Lab ID:	005111-03 1/3.1
Date Analyzed:	05/14/20	Data File:	051327.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	100
APH EC9-12 aliphatics	350
APH EC9-10 aromatics	<77

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH 10 E Port Way, Longview, WA
Date Collected:	Not Applicable	Lab ID:	00-1054 mb
Date Analyzed:	05/13/20	Data File:	051310.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<30
APH EC9-12 aliphatics	<35
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-01-050820	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH 10 E Port Way, Longview, WA
Date Collected:	05/08/20	Lab ID:	005111-01 1/3.0
Date Analyzed:	05/14/20	Data File:	051325.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	114	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.96	<0.3
Toluene	<57	<15
Ethylbenzene	<1.3	<0.3
m,p-Xylene	<2.6	<0.6
o-Xylene	<1.3	<0.3
Naphthalene	<0.79	<0.15

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-101-050820	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH 10 E Port Way, Longview, WA
Date Collected:	05/08/20	Lab ID:	005111-02 1/3.2
Date Analyzed:	05/14/20	Data File:	051326.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Benzene	<1	<0.32
Toluene	<60	<16
Ethylbenzene	<1.4	<0.32
m,p-Xylene	<2.8	<0.64
o-Xylene	<1.4	<0.32
Naphthalene	<0.84	<0.16

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-02-050820	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH 10 E Port Way, Longview, WA
Date Collected:	05/08/20	Lab ID:	005111-03 1/3.1
Date Analyzed:	05/14/20	Data File:	051327.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	103	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.99	<0.31
Toluene	<58	<15
Ethylbenzene	<1.3	<0.31
m,p-Xylene	3.9	0.89
o-Xylene	1.7	0.39
Naphthalene	<0.81	<0.15

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH 10 E Port Way, Longview, WA
Date Collected:	Not Applicable	Lab ID:	00-1054 mb
Date Analyzed:	05/13/20	Data File:	051310.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	105	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Benzene	<0.32	<0.1
Toluene	<19	<5
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	<0.26	<0.05

Date of Report: 05/19/20
Date Received: 05/08/20
Project: POL-TPH 10 E Port Way, Longview, WA, F&BI 005111
Date Extracted: 05/18/20
Date Analyzed: 05/18/20

RESULTS FROM THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Results Reported as % Helium

Sample ID Laboratory ID	Helium
SVP-01-050820 005111-01	<0.6
SVP-101-050820 005111-02	<0.6
SVP-02-050820 005111-03	<0.6
Method Blank	<0.6

Date of Report: 05/19/20
Date Received: 05/08/20
Project: POL-TPH 10 E Port Way, Longview, WA, F&BI 005111

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	91	70-130
APH EC9-12 aliphatics	ug/m3	67	117	70-130
APH EC9-10 aromatics	ug/m3	67	112	70-130

Date of Report: 05/19/20
Date Received: 05/08/20
Project: POL-TPH 10 E Port Way, Longview, WA, F&BI 005111

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	95	70-130
Toluene	ug/m3	51	95	70-130
Ethylbenzene	ug/m3	59	89	70-130
m,p-Xylene	ug/m3	120	94	70-130
o-Xylene	ug/m3	59	91	70-130
Naphthalene	ug/m3	71	107	70-130

Date of Report: 05/19/20
Date Received: 05/08/20
Project: POL-TPH 10 E Port Way, Longview, WA, F&BI 005111

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Laboratory Code: 005050-01 (Duplicate)

Analyte	Sample Result (%)	Duplicate Result (%)	Relative Percent Difference	Acceptance Criteria
Helium	<0.6	<0.6	nm	0-20

Data Qualifiers & Definitions

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

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 analyte 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 due to sample matrix effects.

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.

005111
[redacted]

SAMPLE CHAIN OF CUSTODY

ME 05-08-20 [redacted] | of 1

Report To Gabe Cisneros
Company Floyd Snider
Address 601 Union St, Suite 600
City, State, ZIP Seattle, WA 98101
Phone 206-292-2078 Email gabe.cisneros@floydsnider.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS
POL-TPH
10 E Port Way, Longview, WA

PO #

NOTES: Run standard analysis in accordance w/ Memo #18

INVOICE TO

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION / ANALYSIS REQUESTED

Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
SVP-01-050820	01	3257	240	IA / [✓ SG]	5/8/20	30	08012	4.5	0810		X		X	X		
SVP-101-050820	02	2297	222	IA / [✓ SG]	5/8/20	30	08002	4.5	0810		X		X	X		
~~SV~~				~~IA / SG~~												
SVP-02-050820	03	3255	224	IA / [✓ SG]	5/8/20	30	0851	4.5	0857		X		X	X		
				IA / SG												
				IA / SG												Samples received at 20 °C
				IA / SG												
				IA / SG												

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:	Gabe Cisneros	FloydSnider	5/7/20	1530
Received by:	VIN H	FBI	5/7/20	1530
Relinquished by:				
Received by:				

FORMS\COC\COCTO-15.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

August 31, 2020

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

Dear Ms King:

Included is the amended report from the testing of material submitted on May 8, 2020 from the POL-TPH, F&BI 005097 project. Per your request, several samples were expanded to the full suite of volatiles, and the PAHs were shortened to the cPAH list.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Gabe Cisneros
FDS0520R.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.

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May 20, 2020

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 May 8, 2020 from the POL-TPH, F&BI 005097 project. There are 115 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. 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
FDS0520R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on May 8, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 005097 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
005097 -01	MW-01-050620
005097 -02	MW-02-050620
005097 -03	MW-07-050620
005097 -04	MW-10-050620
005097 -05	MW-8-050620
005097 -06	MW-35-050620
005097 -07	MW-133-050620
005097 -08	MW-33-050620
005097 -09	MW-23-050620
005097 -10	MW-6-050620
005097 -11	MW-40-050620
005097 -12	MW-34-050620
005097 -13	MW-31-050620
005097 -14	MW-03-050620
005097 -15	UST-4-050620
005097 -16	MW-36-050620
005097 -17	MW-24-050720
005097 -18	MW-25-050720
005097 -19	MW-20-050720
005097 -20	MW-14-050720
005097 -21	MW-18-050720
005097 -22	MW-17-050720
005097 -23	MW-37-050720
005097 -24	MW-39-050720
005097 -25	MW-11-050720
005097 -26	MW-13-050720
005097 -27	MW-27-050720
005097 -28	MW-22-050720
005097 -29	MW-127-050720
005097 -30	MW-38-050720
005097 -31	MW-19-050720
005097 -32	MW-32-050720
005097 -33	MW-16-050720
005097 -34	MW-26-050720
005097 -35	MW-15-050720

CASE NARRATIVE (Continued)

This case narrative encompasses samples received on May 8, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 005097 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
005097 -36	MW-12-050720
005097 -37	MW-29-050620

The dissolved metals samples were filtered at Friedman and Bruya on May 8, 2020 at 12:26. The data were flagged accordingly.

The 8260D matrix spike, matrix spike duplicate, laboratory control sample, and laboratory control sample duplicate exceeded the acceptance criteria for several analytes. The compounds were not detected, therefore the data were acceptable.

Several analytes in the 8270E matrix spike, matrix spike duplicate, and the associated relative percent difference did not meet the acceptance criteria. The laboratory control sample passed the acceptance criteria for these analytes, therefore the results were due to matrix effect.

All other quality control requirements were acceptable.

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/11/20
Date Analyzed: 05/11/20

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 50-150)
MW-01-050620 005097-01	<100	90
MW-02-050620 005097-02	<100	88
MW-07-050620 005097-03	560	106
MW-10-050620 005097-04	450	103
MW-8-050620 005097-05	2,300	89
MW-35-050620 005097-06	<100	93
MW-133-050620 005097-07	130	89
MW-33-050620 005097-08	160	91
MW-23-050620 005097-09	<100	88
MW-6-050620 005097-10	<100	89

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/11/20
Date Analyzed: 05/11/20

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 50-150)
MW-40-050620 005097-11	1,100	92
MW-34-050620 005097-12	<100	96
MW-31-050620 005097-13	<100	88
MW-03-050620 005097-14	260	87
UST-4-050620 005097-15	<100	90
MW-36-050620 005097-16	<100	93
MW-24-050720 005097-17	<100	89
MW-25-050720 005097-18	<100	92
MW-20-050720 005097-19	2,800	91
MW-14-050720 005097-20	<100	91

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/11/20
Date Analyzed: 05/11/20

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 50-150)
MW-18-050720 005097-21	<100	88
MW-17-050720 005097-22	<100	92
MW-37-050720 005097-23	<100	89
MW-39-050720 005097-24	380	91
MW-11-050720 005097-25	<100	91
MW-13-050720 005097-26	<100	92
MW-27-050720 005097-27	<100	92
MW-22-050720 005097-28	<100	93
MW-127-050720 005097-29	<100	89
MW-38-050720 005097-30	<100	93

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/11/20
Date Analyzed: 05/11/20

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 50-150)
MW-19-050720 005097-31	<100	91
MW-32-050720 005097-32	<100	89
MW-16-050720 005097-33	<100	89
MW-26-050720 005097-34	<100	89
MW-15-050720 005097-35	140	92
MW-12-050720 005097-36	470	95
MW-29-050620 005097-37	<100	92
Method Blank 00-878 MB	<100	92
Method Blank 00-879 MB	<100	89

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/08/20
Date Analyzed: 05/08/20

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 47-140)
MW-01-050620 005097-01	<50	<250	67
MW-02-050620 005097-02	310 x	<250	97
MW-07-050620 005097-03	820	<250	91
MW-10-050620 005097-04	340 x	<250	84
MW-8-050620 005097-05	2,100 x	280 x	92
MW-35-050620 005097-06	630 x	<250	97
MW-133-050620 005097-07	850	<250	91
MW-33-050620 005097-08	1,100	<250	116
MW-23-050620 005097-09	<50	<250	89
MW-6-050620 005097-10	780 x	<250	92

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/08/20
Date Analyzed: 05/08/20

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 47-140)
MW-40-050620 005097-11	2,900 x	320 x	83
MW-34-050620 005097-12	1,300 x	<250	94
MW-31-050620 005097-13	<50	<250	68
MW-03-050620 005097-14	1,500 x	590 x	97
UST-4-050620 005097-15	230 x	320 x	100
MW-36-050620 005097-16	<50	<250	92
MW-24-050720 005097-17	<50	<250	102
MW-25-050720 005097-18	<50	<250	102
MW-20-050720 005097-19	1,000 x	290 x	93
MW-14-050720 005097-20	120 x	<250	85

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/08/20
Date Analyzed: 05/08/20

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 47-140)
MW-18-050720 005097-21	<50	<250	99
MW-17-050720 005097-22	67 x	<250	95
MW-37-050720 005097-23	210 x	<250	81
MW-39-050720 005097-24	5,700	950 x	72
MW-11-050720 005097-25	66 x	<250	97
MW-13-050720 005097-26	<50	<250	82
MW-27-050720 005097-27	150 x	<250	92
MW-22-050720 005097-28	<50	<250	92
MW-127-050720 005097-29	190 x	<250	109
MW-38-050720 005097-30	74 x	<250	106

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/08/20
Date Analyzed: 05/08/20

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 47-140)
MW-19-050720 005097-31	<50	<250	91
MW-32-050720 005097-32	<50	<250	99
MW-16-050720 005097-33	84 x	<250	101
MW-26-050720 005097-34	670 x	<250	101
MW-15-050720 005097-35	510 x	<250	123
MW-12-050720 005097-36	130 x	<250	105
MW-29-050620 005097-37	54 x	<250	96
Method Blank 00-1038 MB	<50	<250	96
Method Blank 00-1032 MB	<50	<250	111

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-07-050620 f	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/14/20 12:29	Lab ID:	005097-03
Date Analyzed:	05/14/20	Data File:	005097-03.082
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-050620 f	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/14/20 12:29	Lab ID:	005097-04
Date Analyzed:	05/14/20	Data File:	005097-04.083
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-03-050620 f	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/14/20 12:29	Lab ID:	005097-14
Date Analyzed:	05/14/20	Data File:	005097-14.084
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	UST-4-050620 f	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/14/20 12:29	Lab ID:	005097-15
Date Analyzed:	05/14/20	Data File:	005097-15.085
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank f	Client:	Floyd-Snider
Date Received:	NA	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/14/20 12:29	Lab ID:	I0-282 mb
Date Analyzed:	05/14/20	Data File:	I0-282 mb.080
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-07-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/08/20 12:13	Lab ID:	005097-03
Date Analyzed:	05/08/20	Data File:	005097-03.119
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-10-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/08/20 12:13	Lab ID:	005097-04
Date Analyzed:	05/08/20	Data File:	005097-04.120
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-03-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/08/20 12:13	Lab ID:	005097-14
Date Analyzed:	05/08/20	Data File:	005097-14.123
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	UST-4-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/08/20 12:13	Lab ID:	005097-15
Date Analyzed:	05/08/20	Data File:	005097-15.124
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/08/20 11:53	Lab ID:	I0-266 mb
Date Analyzed:	05/08/20	Data File:	I0-266 mb.053
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-01-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-01 1/2
Date Analyzed:	05/11/20	Data File:	051105.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	66	31	160
Benzo(a)anthracene-d12	83	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-02-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-02 1/2
Date Analyzed:	05/11/20	Data File:	051106.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	67	31	160
Benzo(a)anthracene-d12	81	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-07-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-03 1/2
Date Analyzed:	05/11/20	Data File:	051107.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	78	31	160
Benzo(a)anthracene-d12	96	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-10-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-04 1/2
Date Analyzed:	05/11/20	Data File:	051108.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	75	31	160
Benzo(a)anthracene-d12	94	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-8-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-05 1/2
Date Analyzed:	05/11/20	Data File:	051109.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	71	31	160
Benzo(a)anthracene-d12	93	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-35-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-06 1/2
Date Analyzed:	05/11/20	Data File:	051110.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	81	31	160
Benzo(a)anthracene-d12	105	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-133-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-07 1/2
Date Analyzed:	05/11/20	Data File:	051111.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	68	31	160
Benzo(a)anthracene-d12	80	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-33-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-08 1/2
Date Analyzed:	05/11/20	Data File:	051112.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	63	31	160
Benzo(a)anthracene-d12	74	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-23-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-09 1/2
Date Analyzed:	05/11/20	Data File:	051113.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	72	31	160
Benzo(a)anthracene-d12	92	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-6-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-10 1/2
Date Analyzed:	05/11/20	Data File:	051114.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	66	31	160
Benzo(a)anthracene-d12	85	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-40-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-11 1/2
Date Analyzed:	05/11/20	Data File:	051115.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	76	31	160
Benzo(a)anthracene-d12	94	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-34-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-12 1/2
Date Analyzed:	05/11/20	Data File:	051116.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	87	31	160
Benzo(a)anthracene-d12	101	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-31-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-13 1/2
Date Analyzed:	05/11/20	Data File:	051117.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	82	31	160
Benzo(a)anthracene-d12	93	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-03-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-14 1/2
Date Analyzed:	05/11/20	Data File:	051118.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	80	31	160
Benzo(a)anthracene-d12	95	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	UST-4-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-15 1/2
Date Analyzed:	05/11/20	Data File:	051119.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	85	31	160
Benzo(a)anthracene-d12	89	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-36-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-16 1/2
Date Analyzed:	05/11/20	Data File:	051120.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	84	31	160
Benzo(a)anthracene-d12	87	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-24-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-17 1/2
Date Analyzed:	05/11/20	Data File:	051121.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	84	31	160
Benzo(a)anthracene-d12	88	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-25-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-18 1/2
Date Analyzed:	05/11/20	Data File:	051122.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	84	31	160
Benzo(a)anthracene-d12	92	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-20-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-19 1/2
Date Analyzed:	05/12/20	Data File:	051208.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	83	31	160
Benzo(a)anthracene-d12	103	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-14-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-20 1/2
Date Analyzed:	05/12/20	Data File:	051216.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	74	31	160
Benzo(a)anthracene-d12	84	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-18-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-21 1/2
Date Analyzed:	05/12/20	Data File:	051217.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	78	31	160
Benzo(a)anthracene-d12	96	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-17-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-22 1/2
Date Analyzed:	05/12/20	Data File:	051218.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	82	31	160
Benzo(a)anthracene-d12	101	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-37-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-23 1/2
Date Analyzed:	05/12/20	Data File:	051219.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	40	31	160
Benzo(a)anthracene-d12	49	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	0.045
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-39-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-24 1/2
Date Analyzed:	05/12/20	Data File:	051220.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	81	31	160
Benzo(a)anthracene-d12	96	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-11-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-25 1/2
Date Analyzed:	05/12/20	Data File:	051221.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	76	31	160
Benzo(a)anthracene-d12	94	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-13-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-26 1/2
Date Analyzed:	05/12/20	Data File:	051222.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	77	31	160
Benzo(a)anthracene-d12	98	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-27-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-27 1/2
Date Analyzed:	05/12/20	Data File:	051223.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	79	31	160
Benzo(a)anthracene-d12	94	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-22-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-28 1/2
Date Analyzed:	05/12/20	Data File:	051224.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	78	31	160
Benzo(a)anthracene-d12	103	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-127-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-29 1/2
Date Analyzed:	05/12/20	Data File:	051225.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	83	31	160
Benzo(a)anthracene-d12	97	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-38-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-30 1/2
Date Analyzed:	05/12/20	Data File:	051226.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	80	31	160
Benzo(a)anthracene-d12	99	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-19-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-31 1/2
Date Analyzed:	05/12/20	Data File:	051227.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	86	31	160
Benzo(a)anthracene-d12	101	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-32-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-32 1/2
Date Analyzed:	05/12/20	Data File:	051228.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	83	31	160
Benzo(a)anthracene-d12	102	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-16-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-33 1/2
Date Analyzed:	05/13/20	Data File:	051229.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	85	31	160
Benzo(a)anthracene-d12	99	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-26-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-34 1/2
Date Analyzed:	05/12/20	Data File:	051209.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	80	31	160
Benzo(a)anthracene-d12	103	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-15-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-35 1/2
Date Analyzed:	05/13/20	Data File:	051230.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	84	31	160
Benzo(a)anthracene-d12	90	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-12-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-36 1/2
Date Analyzed:	05/13/20	Data File:	051232.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	83	31	160
Benzo(a)anthracene-d12	99	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	MW-29-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-37 1/2
Date Analyzed:	05/13/20	Data File:	051231.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	81	31	160
Benzo(a)anthracene-d12	104	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	00-1040 mb
Date Analyzed:	05/11/20	Data File:	051104.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	82	31	160
Benzo(a)anthracene-d12	96	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02

Analysis For Semivolatile Compounds By EPA Method 8270E SIM

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	00-1041 mb
Date Analyzed:	05/12/20	Data File:	051215.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	86	31	160
Benzo(a)anthracene-d12	106	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-01-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-01
Date Analyzed:	05/11/20	Data File:	051128.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	105	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-02-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-02
Date Analyzed:	05/11/20	Data File:	051134.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	57	121
Toluene-d8	103	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-07-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-03
Date Analyzed:	05/11/20	Data File:	051135.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	0.45
Toluene	<1
1,2-Dibromoethane (EDB)	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-04
Date Analyzed:	05/11/20	Data File:	051136.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	7.6
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	2.6
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	5.4
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	9.1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	41	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	5.2	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-8-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-05
Date Analyzed:	05/11/20	Data File:	051137.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	103	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	1.1
Toluene	2.0
Ethylbenzene	<1
m,p-Xylene	2.7
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-35-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-06
Date Analyzed:	05/11/20	Data File:	051138.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-133-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-07
Date Analyzed:	05/11/20	Data File:	051139.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-33-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-08
Date Analyzed:	05/11/20	Data File:	051140.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-23-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-09
Date Analyzed:	05/11/20	Data File:	051141.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-6-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-10
Date Analyzed:	05/11/20	Data File:	051142.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	103	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-11
Date Analyzed:	05/11/20	Data File:	051143.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	99	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	7.4
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	4.5
Hexane	28	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	13
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	19
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	430 ve	sec-Butylbenzene	2.9
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	12	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/13/20	Lab ID:	005097-11 1/10
Date Analyzed:	05/13/20	Data File:	051322.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	103	50	150
4-Bromofluorobenzene	103	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	430

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-34-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-12
Date Analyzed:	05/11/20	Data File:	051144.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

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

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	1.3
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-31-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-13
Date Analyzed:	05/11/20	Data File:	051145.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	105	63	127
4-Bromofluorobenzene	102	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-03-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-14
Date Analyzed:	05/11/20	Data File:	051146.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	105	63	127
4-Bromofluorobenzene	97	60	133

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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	UST-4-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-15
Date Analyzed:	05/11/20	Data File:	051147.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

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

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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-36-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-16
Date Analyzed:	05/12/20	Data File:	051148.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	102	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-24-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-17
Date Analyzed:	05/12/20	Data File:	051149.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	105	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-25-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-18
Date Analyzed:	05/12/20	Data File:	051150.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	105	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-20-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-19
Date Analyzed:	05/12/20	Data File:	051151.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	105	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	1.6
Toluene	3.7
Ethylbenzene	5.5
m,p-Xylene	4.3
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-14-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-20
Date Analyzed:	05/12/20	Data File:	051152.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	103	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-18-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-21
Date Analyzed:	05/12/20	Data File:	051153.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	104	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-17-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-22
Date Analyzed:	05/12/20	Data File:	051154.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	105	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-37-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-23
Date Analyzed:	05/12/20	Data File:	051155.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	96	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-39-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-24
Date Analyzed:	05/12/20	Data File:	051156.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	97	60	133

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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-11-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-25
Date Analyzed:	05/12/20	Data File:	051157.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-13-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-26
Date Analyzed:	05/12/20	Data File:	051158.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	104	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-27-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-27
Date Analyzed:	05/12/20	Data File:	051159.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	103	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-22-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-28
Date Analyzed:	05/12/20	Data File:	051160.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	102	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-127-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-29
Date Analyzed:	05/12/20	Data File:	051161.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	96	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-38-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-30
Date Analyzed:	05/12/20	Data File:	051162.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	103	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-19-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-31
Date Analyzed:	05/12/20	Data File:	051163.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

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

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-32-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-32
Date Analyzed:	05/12/20	Data File:	051164.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	103	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-16-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-33
Date Analyzed:	05/12/20	Data File:	051165.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	57	121
Toluene-d8	105	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-26-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-34
Date Analyzed:	05/11/20	Data File:	051118.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	102	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-15-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-35
Date Analyzed:	05/12/20	Data File:	051222.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	105	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-050720	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-36
Date Analyzed:	05/11/20	Data File:	051119.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	102	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	1.9
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	3.5
Hexane	11	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	1.6
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	3.7
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	63	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	2.5	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-29-050620	Client:	Floyd-Snider
Date Received:	05/08/20	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	005097-37
Date Analyzed:	05/12/20	Data File:	051223.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	106	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	00-1007 mb
Date Analyzed:	05/11/20	Data File:	051113.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/11/20	Lab ID:	00-1008 mb
Date Analyzed:	05/11/20	Data File:	051114.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	102	60	133

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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 005097
Date Extracted:	05/13/20	Lab ID:	00-1050 mb
Date Analyzed:	05/13/20	Data File:	051307.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	98	50	150

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

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097
Date Extracted: 05/12/20
Date Analyzed: 05/12/20

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

Results Reported as µg/L (ppb)

Sample ID Laboratory ID	EDB
MW-07-050620 005097-03	<0.01
MW-10-050620 005097-04	<0.01
MW-35-050620 005097-06	<0.01
MW-23-050620 005097-09	<0.01
MW-40-050620 005097-11	<0.01
MW-34-050620 005097-12	<0.01
MW-03-050620 005097-14	<0.01
UST-4-050620 005097-15	<0.01
MW-39-050720 005097-24	<0.01
MW-19-050720 005097-31	<0.01
MW-12-050720 005097-36	<0.01
Method Blank	<0.01

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097

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

Laboratory Code: 005097-34 (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	84	88	53-117	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	98	69-134

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097

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

Laboratory Code: 005097-36 (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	470	65	69	53-117	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	97	69-134

Date of Report: 05/20/20
Date Received: 05/08/20
Project: POL-TPH, F&BI 005097

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

Laboratory Code: 005097-34 (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	800	87	99	50-150	13

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	112	116	63-142	4

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Project: POL-TPH, F&BI 005097

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

Laboratory Code: 005097-36 (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	120	115	64-141	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	102	61-133

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Project: POL-TPH, F&BI 005097

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 005097-15 (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	90	91	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	ug/L (ppb)	10	94	80-120

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

Laboratory Code: 005091-09 x10 (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	<10	96	99	75-125	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	ug/L (ppb)	10	82	80-120

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Project: POL-TPH, F&BI 005097

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

Laboratory Code: 005097-34 1/2 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	2	<0.04	89	91	60-93	2
Chrysene	ug/L (ppb)	2	<0.04	86	88	60-102	2
Benzo(b)fluoranthene	ug/L (ppb)	2	<0.04	70	71	62-91	1
Benzo(k)fluoranthene	ug/L (ppb)	2	<0.04	72	73	51-98	1
Benzo(a)pyrene	ug/L (ppb)	2	<0.04	69	71	60-86	3
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	2	<0.04	59	60	10-98	2
Dibenz(a,h)anthracene	ug/L (ppb)	2	<0.04	59	60	10-97	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benz(a)anthracene	ug/L (ppb)	1	84	60-118
Chrysene	ug/L (ppb)	1	86	66-125
Benzo(b)fluoranthene	ug/L (ppb)	1	69	55-135
Benzo(k)fluoranthene	ug/L (ppb)	1	74	62-125
Benzo(a)pyrene	ug/L (ppb)	1	69	58-127
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	74	36-142
Dibenz(a,h)anthracene	ug/L (ppb)	1	75	37-133

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

Laboratory Code: 005097-36 1/2 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	2	<0.04	86	87	60-93	1
Chrysene	ug/L (ppb)	2	<0.04	83	85	60-102	2
Benzo(b)fluoranthene	ug/L (ppb)	2	<0.04	55 vo	55 vo	62-91	0
Benzo(k)fluoranthene	ug/L (ppb)	2	<0.04	57	58	51-98	2
Benzo(a)pyrene	ug/L (ppb)	2	<0.04	54 vo	54 vo	60-86	0
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	2	<0.04	25	19	10-98	27 vo
Dibenz(a,h)anthracene	ug/L (ppb)	2	<0.04	25	19	10-97	27 vo

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benz(a)anthracene	ug/L (ppb)	1	92	60-118
Chrysene	ug/L (ppb)	1	95	66-125
Benzo(b)fluoranthene	ug/L (ppb)	1	81	55-135
Benzo(k)fluoranthene	ug/L (ppb)	1	80	62-125
Benzo(a)pyrene	ug/L (ppb)	1	78	58-127
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	88	36-142
Dibenz(a,h)anthracene	ug/L (ppb)	1	93	37-133

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Project: POL-TPH, F&BI 005097

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

Laboratory Code: 005097-36 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	50	<1	113	113	10-172	0
Chloromethane	ug/L (ppb)	50	<10	99	96	25-166	3
Vinyl chloride	ug/L (ppb)	50	<0.2	101	101	36-166	0
Bromomethane	ug/L (ppb)	50	<1	108	107	47-169	1
Chloroethane	ug/L (ppb)	50	<1	96	97	46-160	1
Trichlorofluoromethane	ug/L (ppb)	50	<1	105	105	44-165	0
Acetone	ug/L (ppb)	250	<50	82	79	10-182	4
1,1-Dichloroethene	ug/L (ppb)	50	<1	101	102	60-136	1
Hexane	ug/L (ppb)	50	11	126 b	128 b	52-150	2 b
Methylene chloride	ug/L (ppb)	50	<5	103	99	67-132	4
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	<1	101	102	74-127	1
trans-1,2-Dichloroethene	ug/L (ppb)	50	<1	104	103	72-129	1
1,1-Dichloroethane	ug/L (ppb)	50	<1	100	100	70-128	0
2,2-Dichloropropane	ug/L (ppb)	50	<1	155 vo	153	36-154	1
cis-1,2-Dichloroethene	ug/L (ppb)	50	<1	100	99	71-127	1
Chloroform	ug/L (ppb)	50	<1	102	101	65-132	1
2-Butanone (MEK)	ug/L (ppb)	250	<10	96	95	10-129	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	98	98	48-149	0
1,1,1-Trichloroethane	ug/L (ppb)	50	<1	104	104	60-146	0
1,1-Dichloropropene	ug/L (ppb)	50	<1	106	105	69-133	1
Carbon tetrachloride	ug/L (ppb)	50	<1	107	109	56-152	2
Benzene	ug/L (ppb)	50	63	62 b	70 b	76-125	12 b
Trichloroethene	ug/L (ppb)	50	<1	87	87	66-135	0
1,2-Dichloropropane	ug/L (ppb)	50	<1	102	101	78-125	1
Bromodichloromethane	ug/L (ppb)	50	<1	107	106	61-150	1
Dibromomethane	ug/L (ppb)	50	<1	106	105	66-141	1
4-Methyl-2-pentanone	ug/L (ppb)	250	<10	108	107	10-185	1
cis-1,3-Dichloropropene	ug/L (ppb)	50	<1	121	118	72-132	3
Toluene	ug/L (ppb)	50	2.5	99	98	76-122	1
trans-1,3-Dichloropropene	ug/L (ppb)	50	<1	120	118	76-130	2
1,1,2-Trichloroethane	ug/L (ppb)	50	<1	102	101	68-131	1
2-Hexanone	ug/L (ppb)	250	<10	104	103	10-185	1
1,3-Dichloropropane	ug/L (ppb)	50	<1	102	101	71-128	1
Tetrachloroethene	ug/L (ppb)	50	<1	101	100	10-226	1
Dibromochloromethane	ug/L (ppb)	50	<1	110	108	70-139	2
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	<1	105	104	69-134	1
Chlorobenzene	ug/L (ppb)	50	<1	102	100	77-122	2
Ethylbenzene	ug/L (ppb)	50	1.9	102	102	69-135	0
1,1,1,2-Tetrachloroethane	ug/L (ppb)	50	<1	104	103	73-137	1
m,p-Xylene	ug/L (ppb)	100	3.5	103	102	69-135	1
o-Xylene	ug/L (ppb)	50	<1	102	99	60-140	3
Styrene	ug/L (ppb)	50	<1	106	104	71-133	2
Isopropylbenzene	ug/L (ppb)	50	1.6	102	100	65-142	2
Bromoform	ug/L (ppb)	50	<1	112	109	65-142	3
n-Propylbenzene	ug/L (ppb)	50	3.7	107	105	58-144	2
Bromobenzene	ug/L (ppb)	50	<1	103	100	75-124	3
1,3,5-Trimethylbenzene	ug/L (ppb)	50	<1	108	105	66-137	3
1,1,2,2-Tetrachloroethane	ug/L (ppb)	50	<1	132	131	51-154	1
1,2,3-Trichloropropane	ug/L (ppb)	50	<1	104	101	53-150	3
2-Chlorotoluene	ug/L (ppb)	50	<1	105	102	66-127	3
4-Chlorotoluene	ug/L (ppb)	50	<1	107	105	65-130	2
tert-Butylbenzene	ug/L (ppb)	50	<1	105	103	65-137	2
1,2,4-Trimethylbenzene	ug/L (ppb)	50	<1	107	104	59-146	3
sec-Butylbenzene	ug/L (ppb)	50	<1	107	105	64-140	2
p-Isopropyltoluene	ug/L (ppb)	50	<1	109	106	65-141	3
1,3-Dichlorobenzene	ug/L (ppb)	50	<1	105	103	72-123	2
1,4-Dichlorobenzene	ug/L (ppb)	50	<1	105	103	69-126	2
1,2-Dichlorobenzene	ug/L (ppb)	50	<1	103	100	69-128	3
1,2-Dibromo-3-chloropropane	ug/L (ppb)	50	<10	111	105	32-164	6
1,2,4-Trichlorobenzene	ug/L (ppb)	50	<1	111	107	66-136	4
Hexachlorobutadiene	ug/L (ppb)	50	<1	110	107	60-143	3
Naphthalene	ug/L (ppb)	50	<1	108	105	44-164	3
1,2,3-Trichlorobenzene	ug/L (ppb)	50	<1	109	104	69-148	5

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Project: POL-TPH, F&BI 005097

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	50	124	125	25-158	1
Chloromethane	ug/L (ppb)	50	104	110	45-156	6
Vinyl chloride	ug/L (ppb)	50	109	112	50-154	3
Bromomethane	ug/L (ppb)	50	114	120	55-143	5
Chloroethane	ug/L (ppb)	50	106	107	58-146	1
Trichlorofluoromethane	ug/L (ppb)	250	112	112	50-150	0
Acetone	ug/L (ppb)	250	81	83	22-155	2
1,1-Dichloroethene	ug/L (ppb)	50	110	109	67-136	1
Hexane	ug/L (ppb)	50	132	140 vo	57-137	6
Methylene chloride	ug/L (ppb)	50	105	105	39-148	0
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	103	108	64-147	5
trans-1,2-Dichloroethene	ug/L (ppb)	50	108	111	68-128	3
1,1-Dichloroethane	ug/L (ppb)	50	105	107	74-135	2
2,2-Dichloropropane	ug/L (ppb)	50	172 vo	177 vo	55-143	3
cis-1,2-Dichloroethene	ug/L (ppb)	50	103	105	74-136	2
Chloroform	ug/L (ppb)	50	105	107	74-134	2
2-Butanone (MEK)	ug/L (ppb)	250	92	99	37-150	7
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	96	100	66-129	4
1,1,1-Trichloroethane	ug/L (ppb)	50	109	113	74-142	4
1,1-Dichloropropene	ug/L (ppb)	50	108	110	77-129	2
Carbon tetrachloride	ug/L (ppb)	50	114	117	75-158	3
Benzene	ug/L (ppb)	50	100	105	69-134	5
Trichloroethene	ug/L (ppb)	50	88	92	67-133	4
1,2-Dichloropropane	ug/L (ppb)	50	100	105	71-134	5
Bromodichloromethane	ug/L (ppb)	50	107	112	76-132	5
Dibromomethane	ug/L (ppb)	50	104	108	68-132	4
4-Methyl-2-pentanone	ug/L (ppb)	250	100	108	65-138	8
cis-1,3-Dichloropropene	ug/L (ppb)	50	115	122	74-140	6
Toluene	ug/L (ppb)	50	102	106	72-122	4
trans-1,3-Dichloropropene	ug/L (ppb)	50	118	124	80-136	5
1,1,2-Trichloroethane	ug/L (ppb)	50	96	102	75-124	6
2-Hexanone	ug/L (ppb)	250	94	106	60-136	12
1,3-Dichloropropane	ug/L (ppb)	50	97	102	76-126	5
Tetrachloroethene	ug/L (ppb)	50	103	106	76-121	3
Dibromochloromethane	ug/L (ppb)	50	110	115	84-133	4
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	98	107	82-115	9
Chlorobenzene	ug/L (ppb)	50	101	106	83-114	5
Ethylbenzene	ug/L (ppb)	50	105	108	77-124	3
1,1,1,2-Tetrachloroethane	ug/L (ppb)	50	113	114	84-127	1
m,p-Xylene	ug/L (ppb)	100	105	109	81-112	4
o-Xylene	ug/L (ppb)	50	105	108	81-121	3
Styrene	ug/L (ppb)	50	104	110	84-119	6
Isopropylbenzene	ug/L (ppb)	50	109	110	80-117	1
Bromoform	ug/L (ppb)	50	114	120	74-136	5
n-Propylbenzene	ug/L (ppb)	50	111	111	74-126	0
Bromobenzene	ug/L (ppb)	50	99	104	80-121	5
1,3,5-Trimethylbenzene	ug/L (ppb)	50	112	111	78-123	1
1,1,2,2-Tetrachloroethane	ug/L (ppb)	50	130 vo	136 vo	66-126	5
1,2,3-Trichloropropane	ug/L (ppb)	50	100	106	67-124	6
2-Chlorotoluene	ug/L (ppb)	50	108	107	77-127	1
4-Chlorotoluene	ug/L (ppb)	50	106	109	78-128	3
tert-Butylbenzene	ug/L (ppb)	50	112	109	80-123	3
1,2,4-Trimethylbenzene	ug/L (ppb)	50	111	111	79-122	0
sec-Butylbenzene	ug/L (ppb)	50	113	111	80-116	2
p-Isopropyltoluene	ug/L (ppb)	50	114	113	81-123	1
1,3-Dichlorobenzene	ug/L (ppb)	50	105	108	83-113	3
1,4-Dichlorobenzene	ug/L (ppb)	50	103	108	81-112	5
1,2-Dichlorobenzene	ug/L (ppb)	50	104	107	84-112	3
1,2-Dibromo-3-chloropropane	ug/L (ppb)	50	120	116	57-141	3
1,2,4-Trichlorobenzene	ug/L (ppb)	50	116	115	72-130	1
Hexachlorobutadiene	ug/L (ppb)	50	120	117	53-141	3
Naphthalene	ug/L (ppb)	50	113	112	64-133	1
1,2,3-Trichlorobenzene	ug/L (ppb)	50	112	111	65-136	1

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

Laboratory Code: 005097-34 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	<1	113	104	74-127	8
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	95	97	48-149	2
Benzene	ug/L (ppb)	50	<0.35	104	103	76-125	1
Toluene	ug/L (ppb)	50	<1	104	104	76-122	0
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	<1	95	108	69-134	13
Ethylbenzene	ug/L (ppb)	50	<1	107	106	69-135	1
m,p-Xylene	ug/L (ppb)	100	<2	107	107	69-135	0
o-Xylene	ug/L (ppb)	50	<1	111	104	60-140	7
Naphthalene	ug/L (ppb)	50	<1	126	111	44-164	13

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	108	107	64-147	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	100	101	66-129	1
Benzene	ug/L (ppb)	50	105	105	69-134	0
Toluene	ug/L (ppb)	50	105	104	72-122	1
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	109	109	82-115	0
Ethylbenzene	ug/L (ppb)	50	108	108	77-124	0
m,p-Xylene	ug/L (ppb)	100	109	108	81-112	1
o-Xylene	ug/L (ppb)	50	107	106	81-121	1
Naphthalene	ug/L (ppb)	50	114	108	64-133	5

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Project: POL-TPH, F&BI 005097

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	109	112	70-122	3
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	100	101	75-116	1
Benzene	ug/L (ppb)	50	109	109	75-116	0
Toluene	ug/L (ppb)	50	97	100	79-115	3
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	102	101	82-118	1
Ethylbenzene	ug/L (ppb)	50	103	106	83-111	3
m,p-Xylene	ug/L (ppb)	100	103	105	81-112	2
o-Xylene	ug/L (ppb)	50	103	107	81-117	4
Naphthalene	ug/L (ppb)	50	104	110	72-131	6

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 10)
1,2-Dibromoethane	ug/L (ppb)	0.10	114	104	70-130	9

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 analyte 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 due to sample matrix effects.

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.

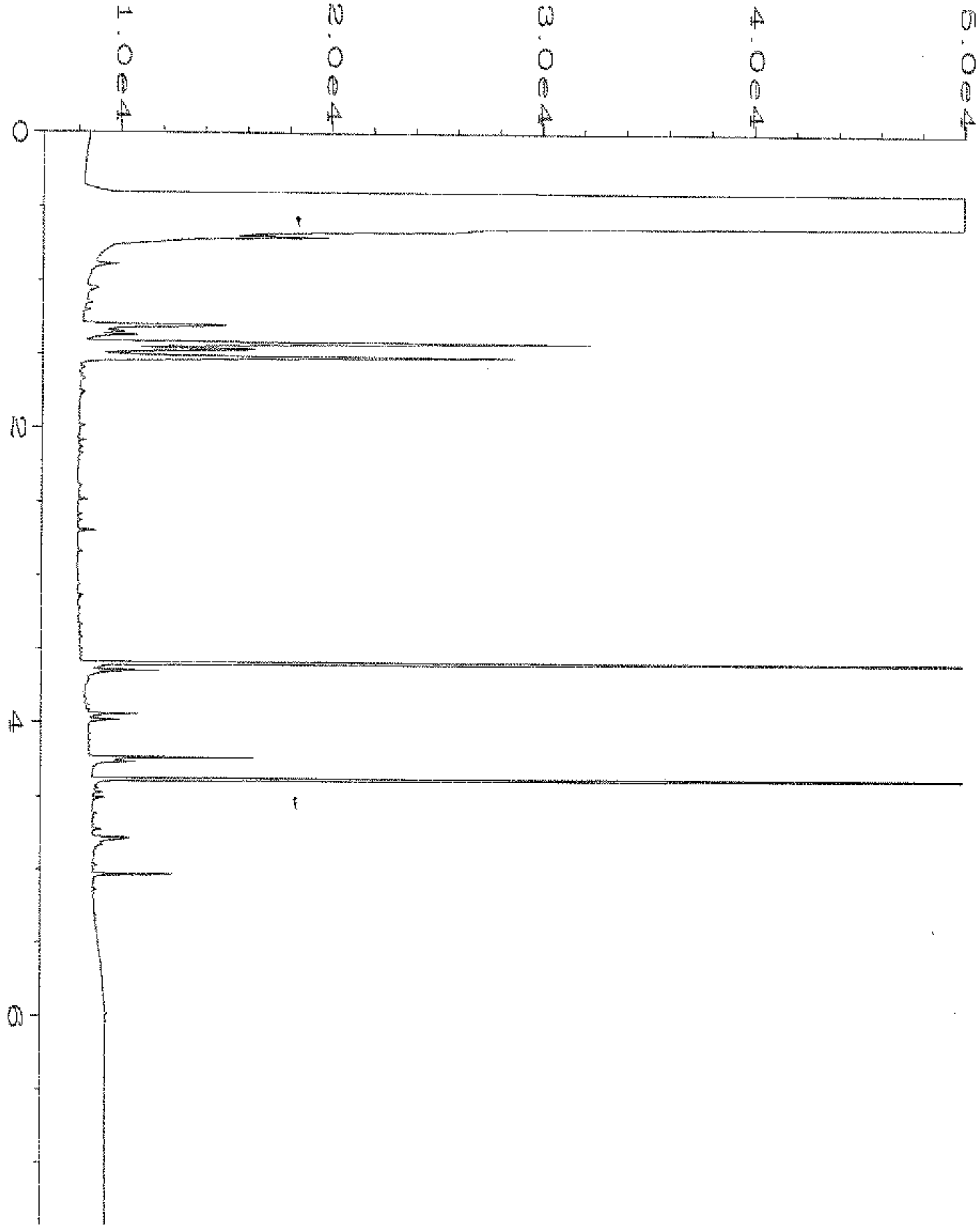
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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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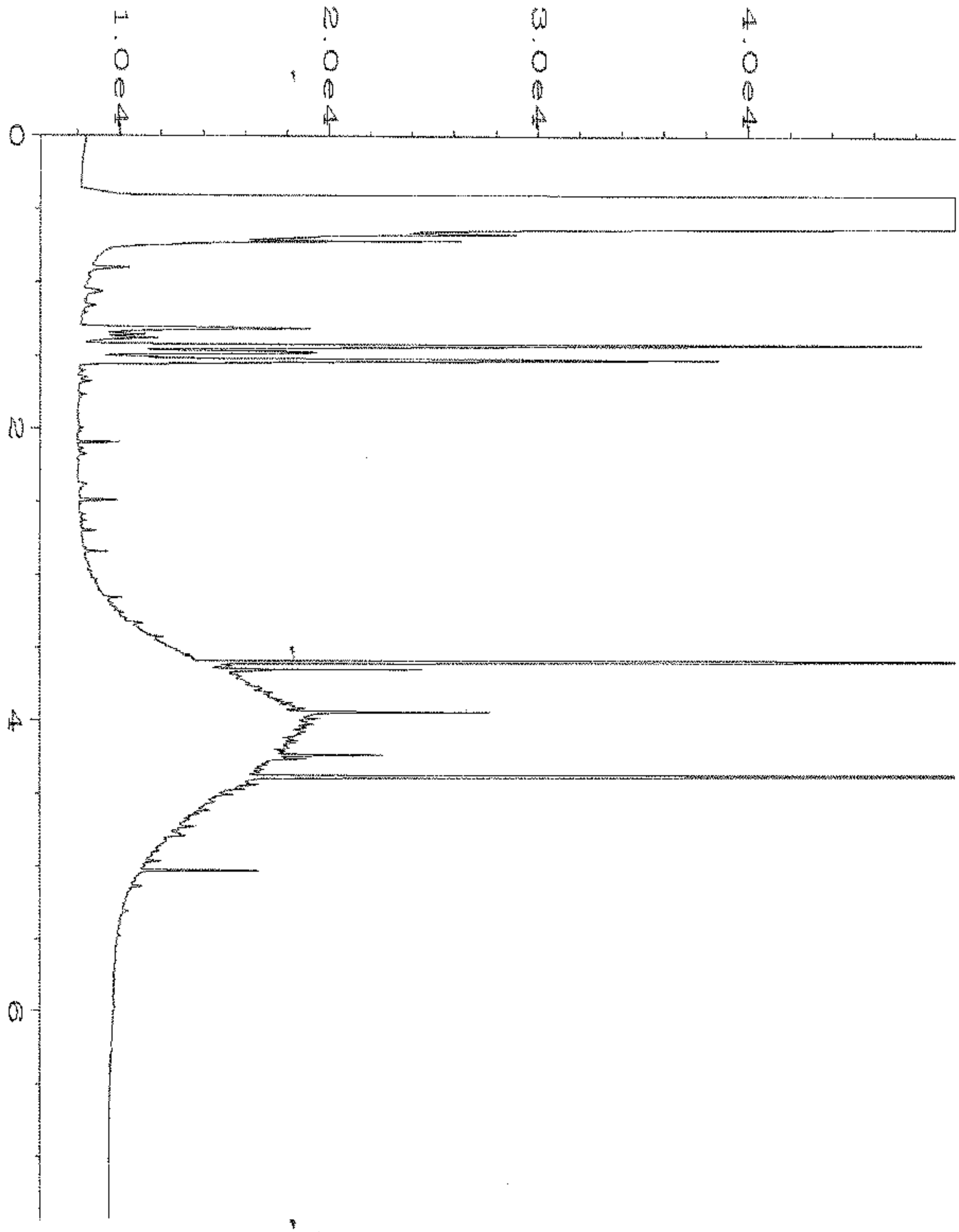
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\012F0501.D
Operator          : TL                               Page Number       : 1
Instrument        : GC1                              Vial Number       : 12
Sample Name       : 005097-01                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 5
Acquired on       : 08 May 20  03:33 PM              Instrument Method: DX.MTH
Report Created on: 11 May 20   09:37 AM              Analysis Method   : DEFAULT.MTH
```



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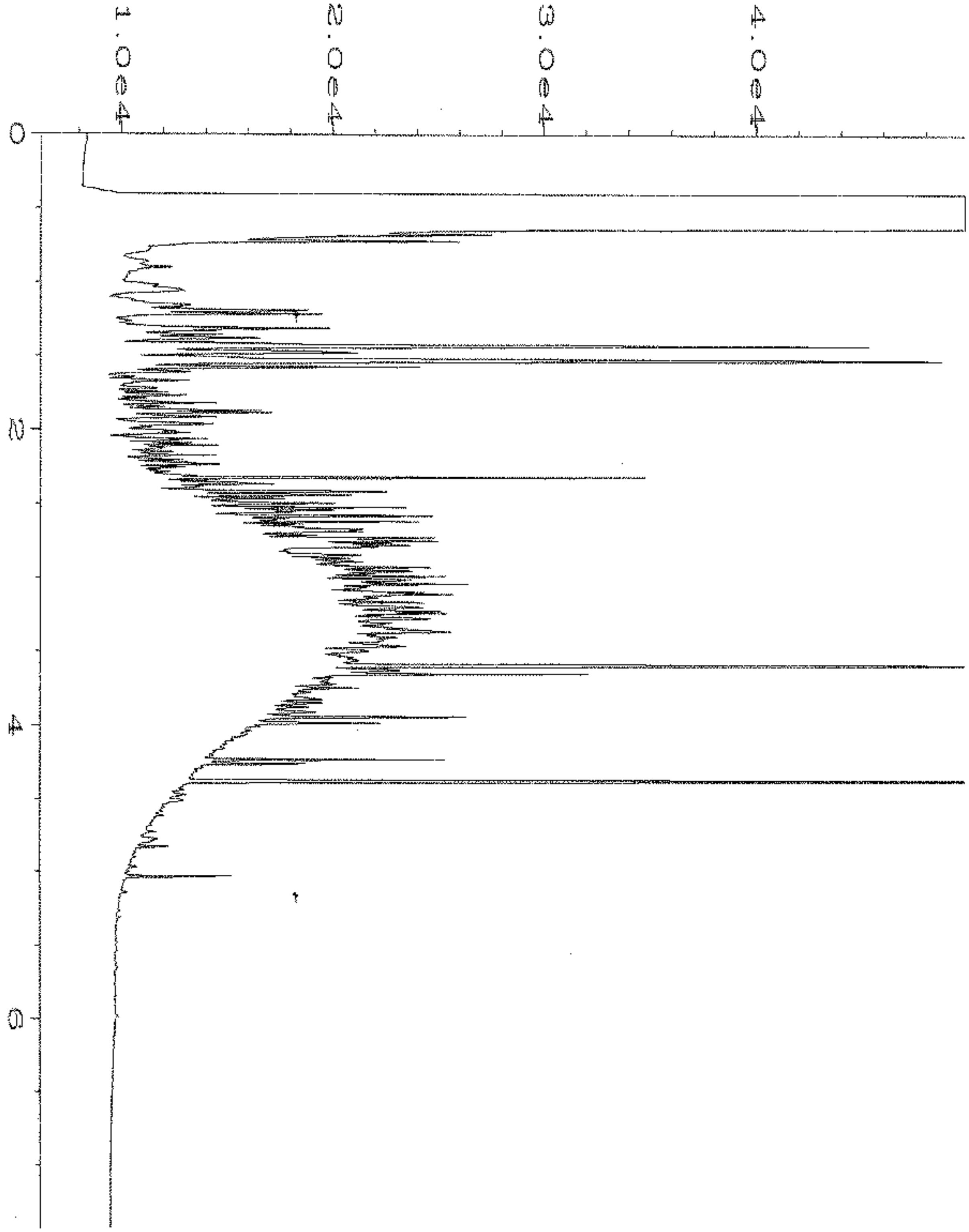
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\013F0501.D
Operator          : TL                                   Page Number       : 1
Instrument        : GC1                                  Vial Number       : 13
Sample Name       : 005097-02                            Injection Number  : 1
Run Time Bar Code:                                       Sequence Line     : 5
Acquired on       : 08 May 20   03:43 PM                 Instrument Method: DX.MTH
Report Created on: 11 May 20   09:37 AM                  Analysis Method   : DEFAULT.MTH
```



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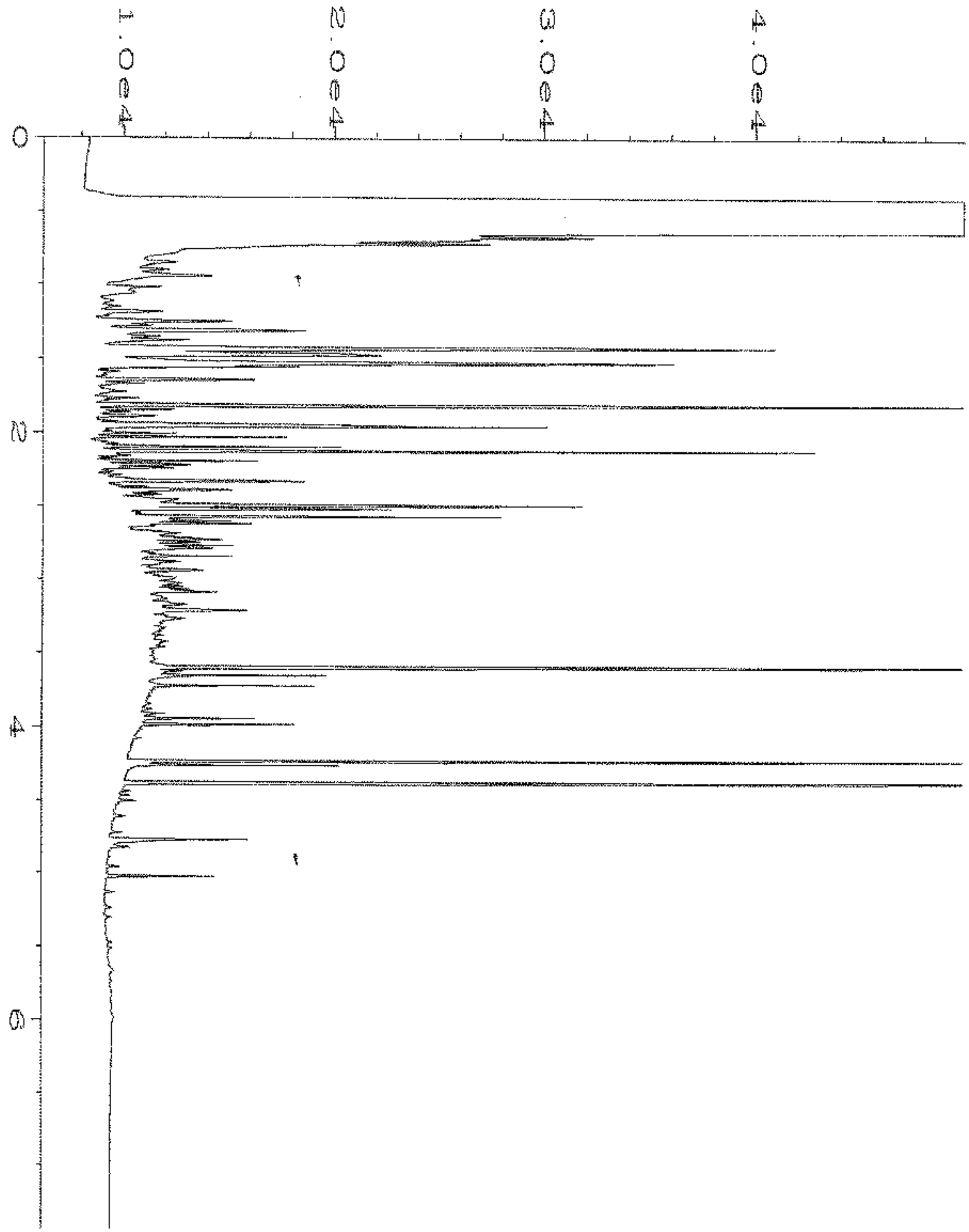
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\014F0501.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC1                                 Vial Number      : 14
Sample Name       : 005097-03                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 5
Acquired on       : 08 May 20  03:54 PM                 Instrument Method: DX.MTH
Report Created on: 11 May 20  09:37 AM                  Analysis Method  : DEFAULT.MTH
```



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Data File Name    : C:\HPCHEM\1\DATA\05-08-20\015F0501.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 15
Sample Name       : 005097-04                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line     : 5
Acquired on       : 08 May 20  04:05 PM             Instrument Method: DX.MTH
Report Created on: 11 May 20  09:37 AM              Analysis Method   : DEFAULT.MTH
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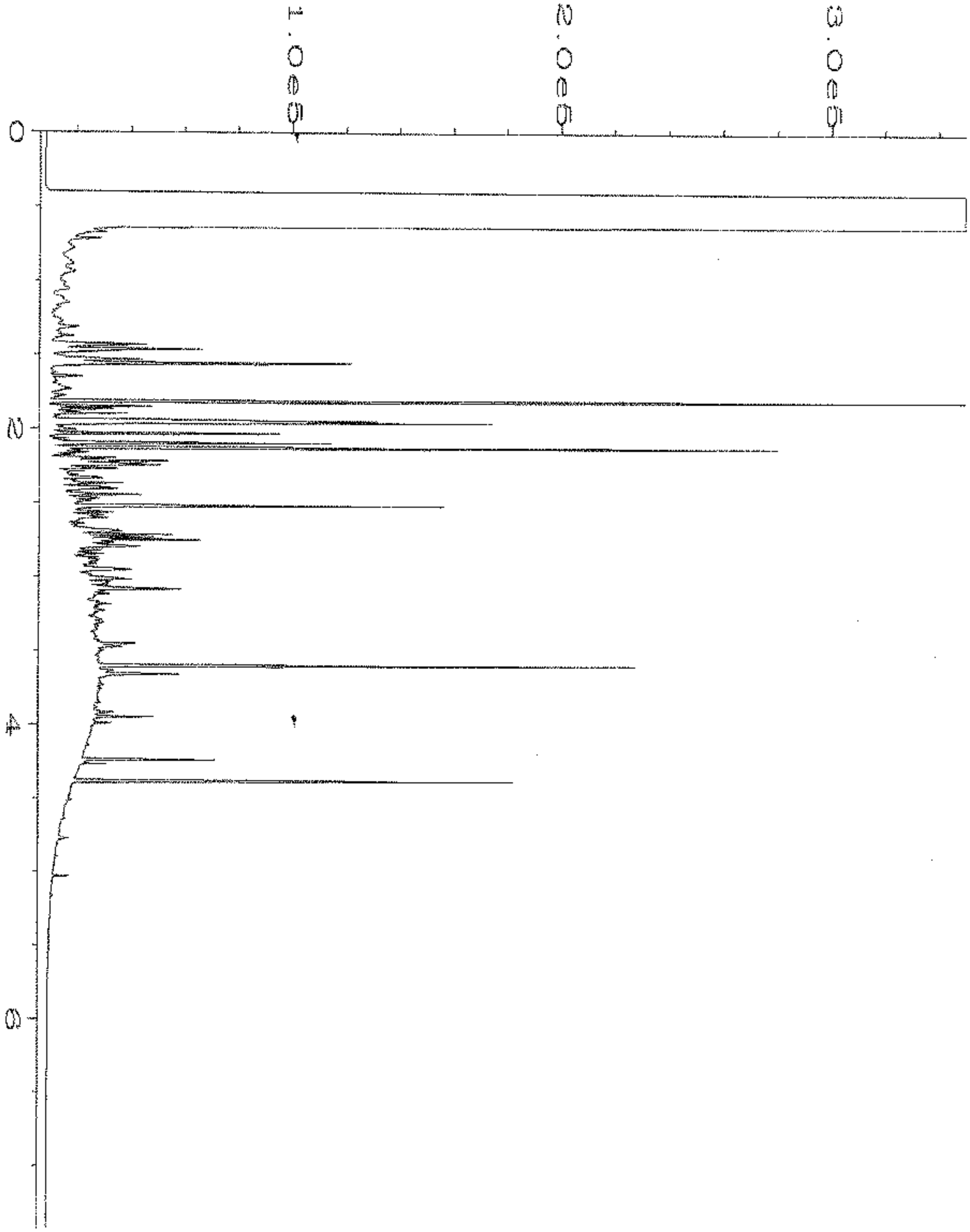
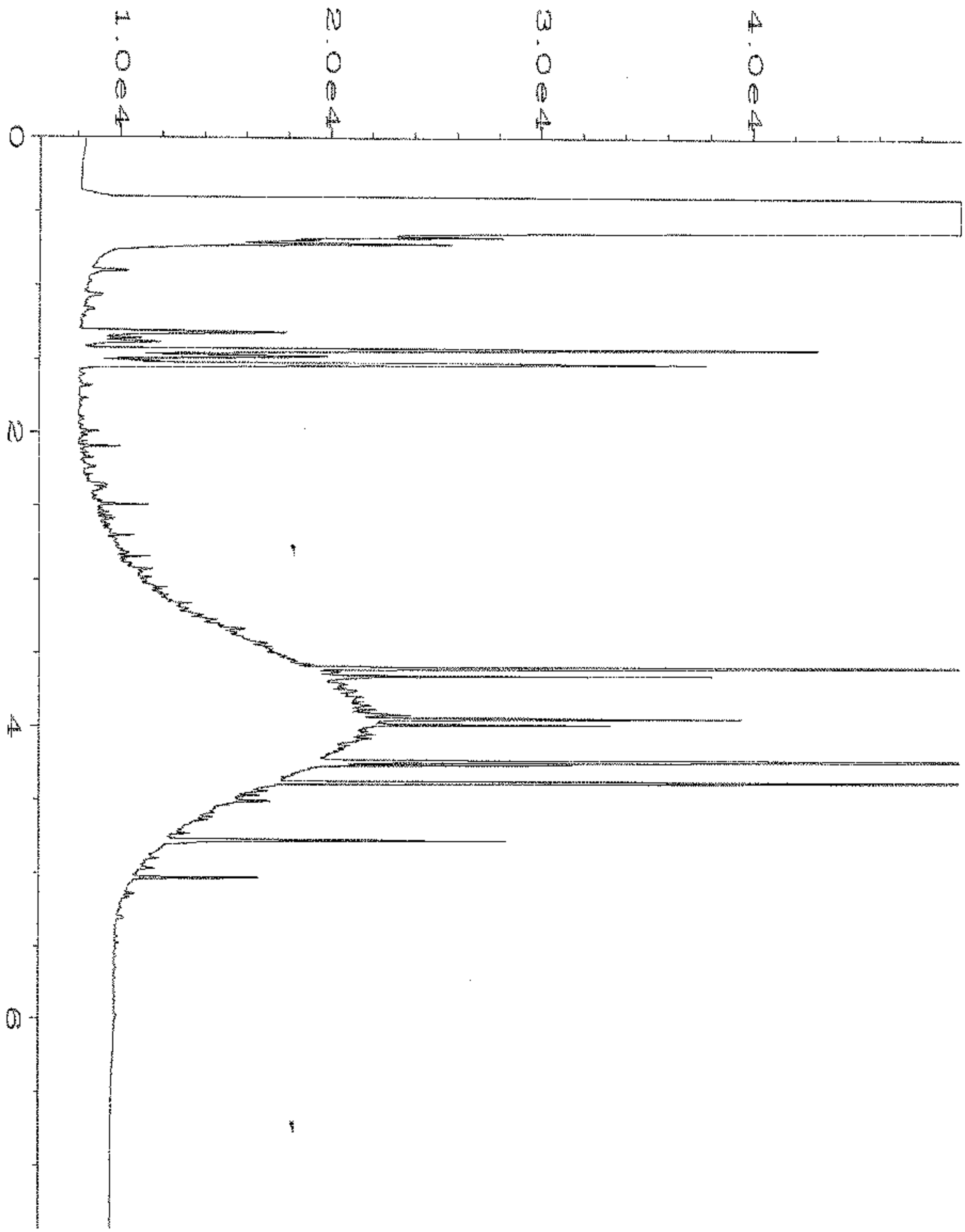


Data File Name : C:\HPCHEM\1\DATA\05-08-20\016F0501.D
Operator : TL
Instrument : GC1
Sample Name : 005097-05
Run Time Bar Code:
Acquired on : 08 May 20 04:17 PM
Report Created on: 11 May 20 09:37 AM

Page Number : 1
Vial Number : 16
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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Data File Name    : C:\HPCHEM\1\DATA\05-08-20\017F0501.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 17
Sample Name       : 005097-06                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line     : 5
Acquired on       : 08 May 20  04:28 PM             Instrument Method: DX.MTH
Report Created on: 11 May 20  09:37 AM              Analysis Method  : DEFAULT.MTH
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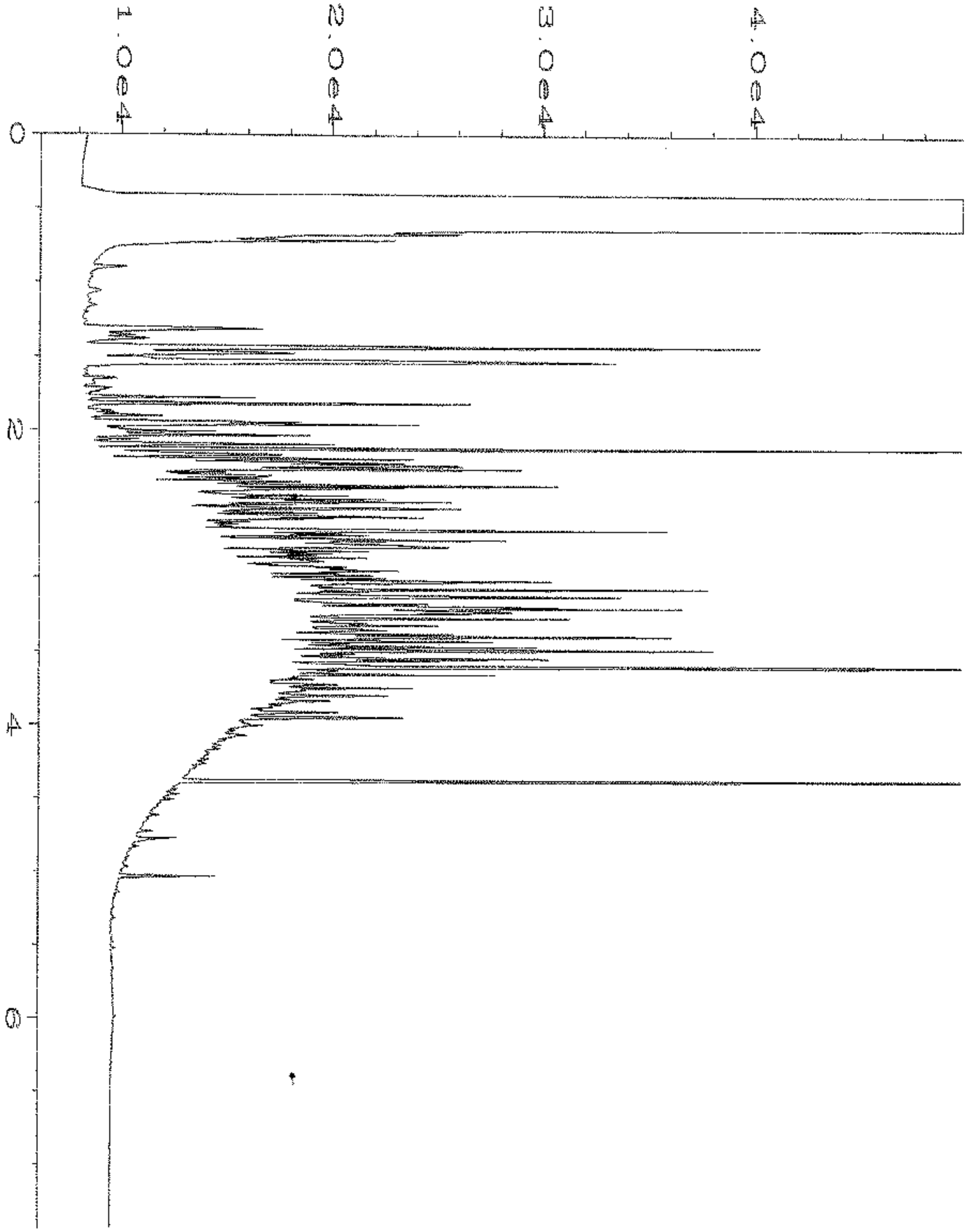

```
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\018F0501.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 18
Sample Name       : 005097-07                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 5
Acquired on       : 08 May 20  04:40 PM             Instrument Method: DX.MTH
Report Created on: 11 May 20  09:38 AM              Analysis Method  : DEFAULT.MTH
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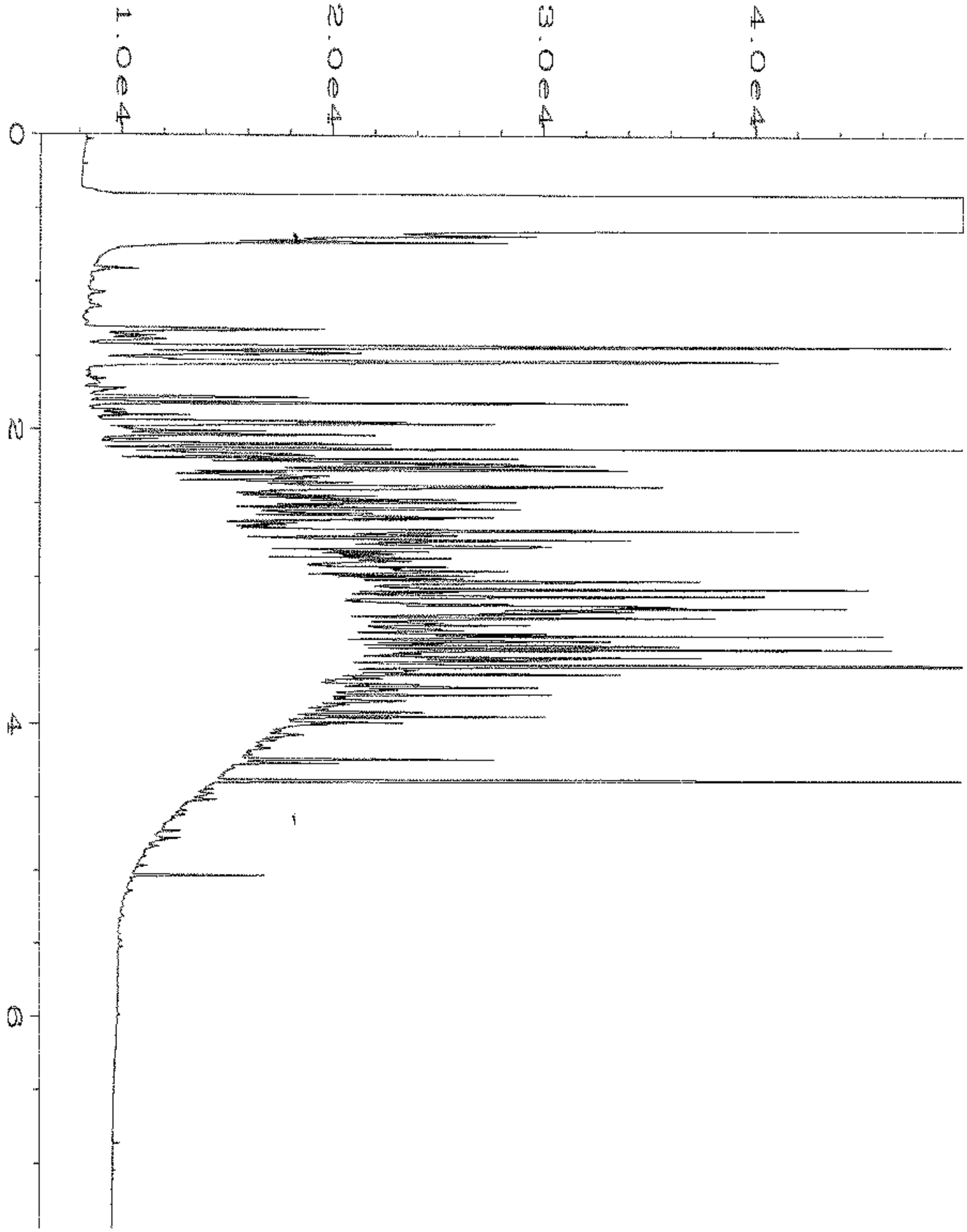

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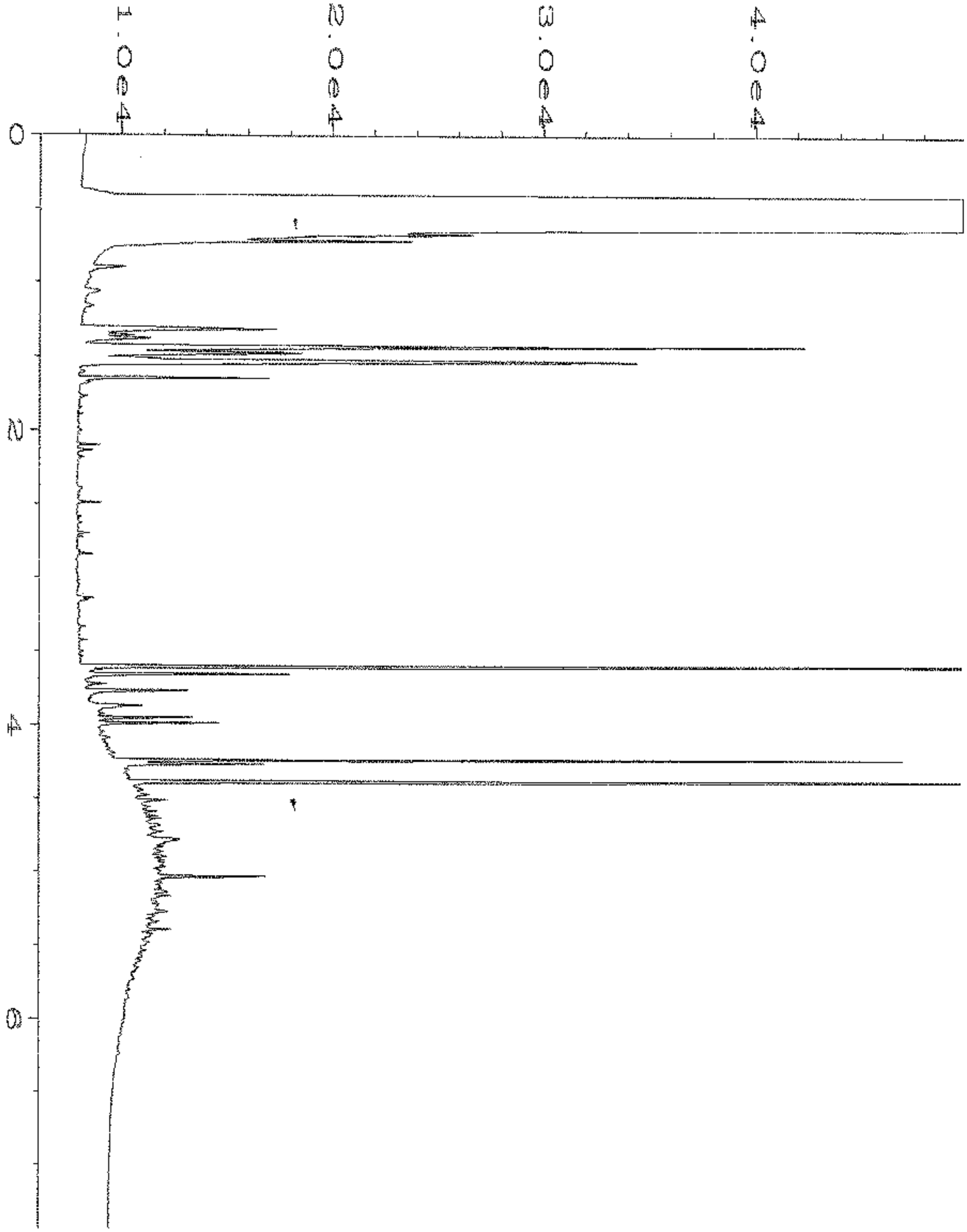
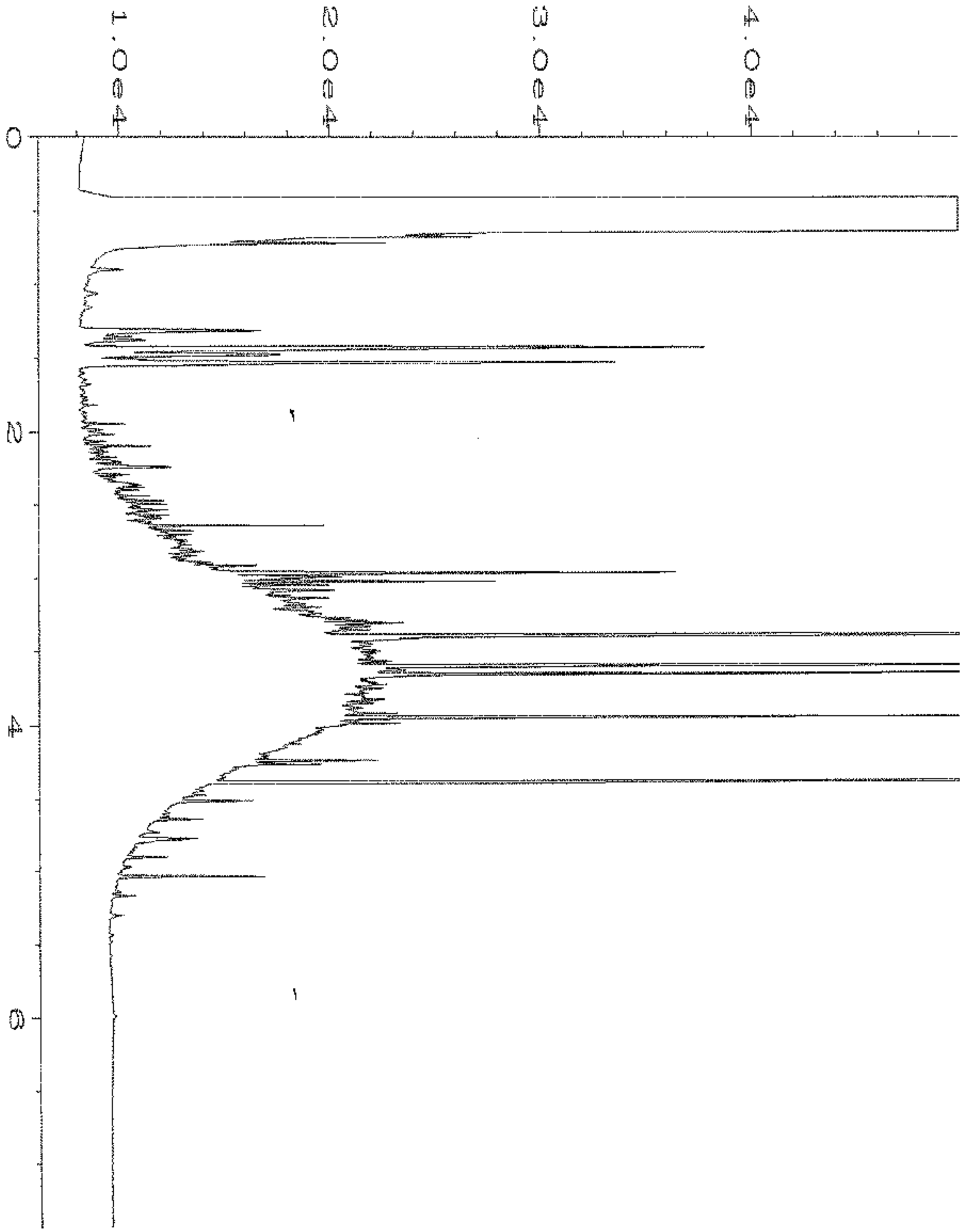
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\019F0501.D
Operator          : TL                                 Page Number      : 1
Instrument        : GC1                                Vial Number      : 19
Sample Name       : 005097-08                          Injection Number : 1
Run Time Bar Code:                                     Sequence Line    : 5
Acquired on       : 08 May 20  04:51 PM                Instrument Method: DX.MTH
Report Created on: 11 May 20  09:38 AM                 Analysis Method  : DEFAULT.MTH
```



Data File Name : C:\HPCHEM\1\DATA\05-08-20\020F0501.D

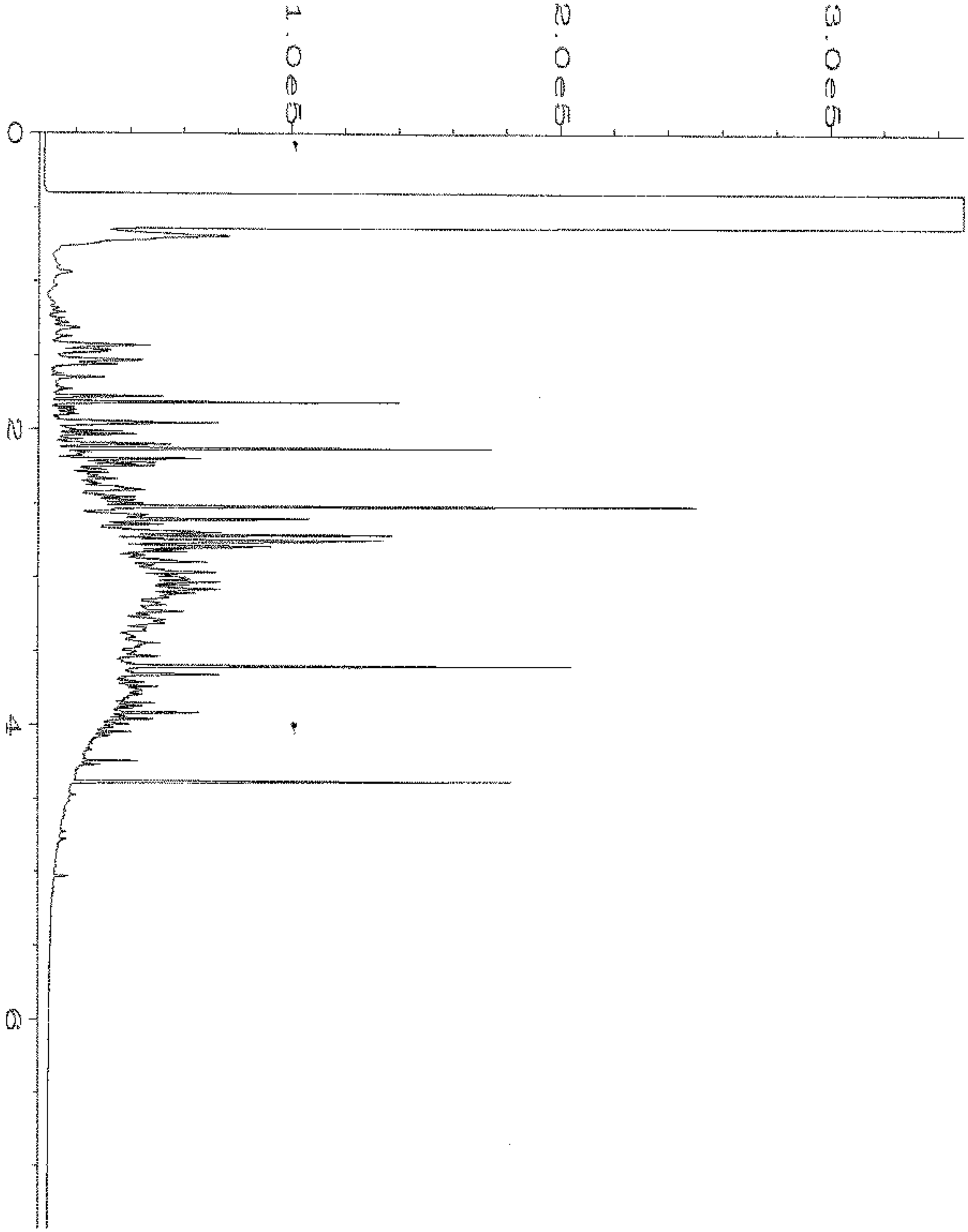
Operator : TL
Instrument : GC1
Sample Name : 005097-09
Run Time Bar Code:
Acquired on : 08 May 20 05:03 PM
Report Created on: 11 May 20 09:38 AM

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\05-08-20\021F0501.D
Operator : TL
Instrument : GC1
Sample Name : 005097-10
Run Time Bar Code:
Acquired on : 08 May 20 05:14 PM
Report Created on: 11 May 20 09:38 AM

Page Number : 1
Vial Number : 21
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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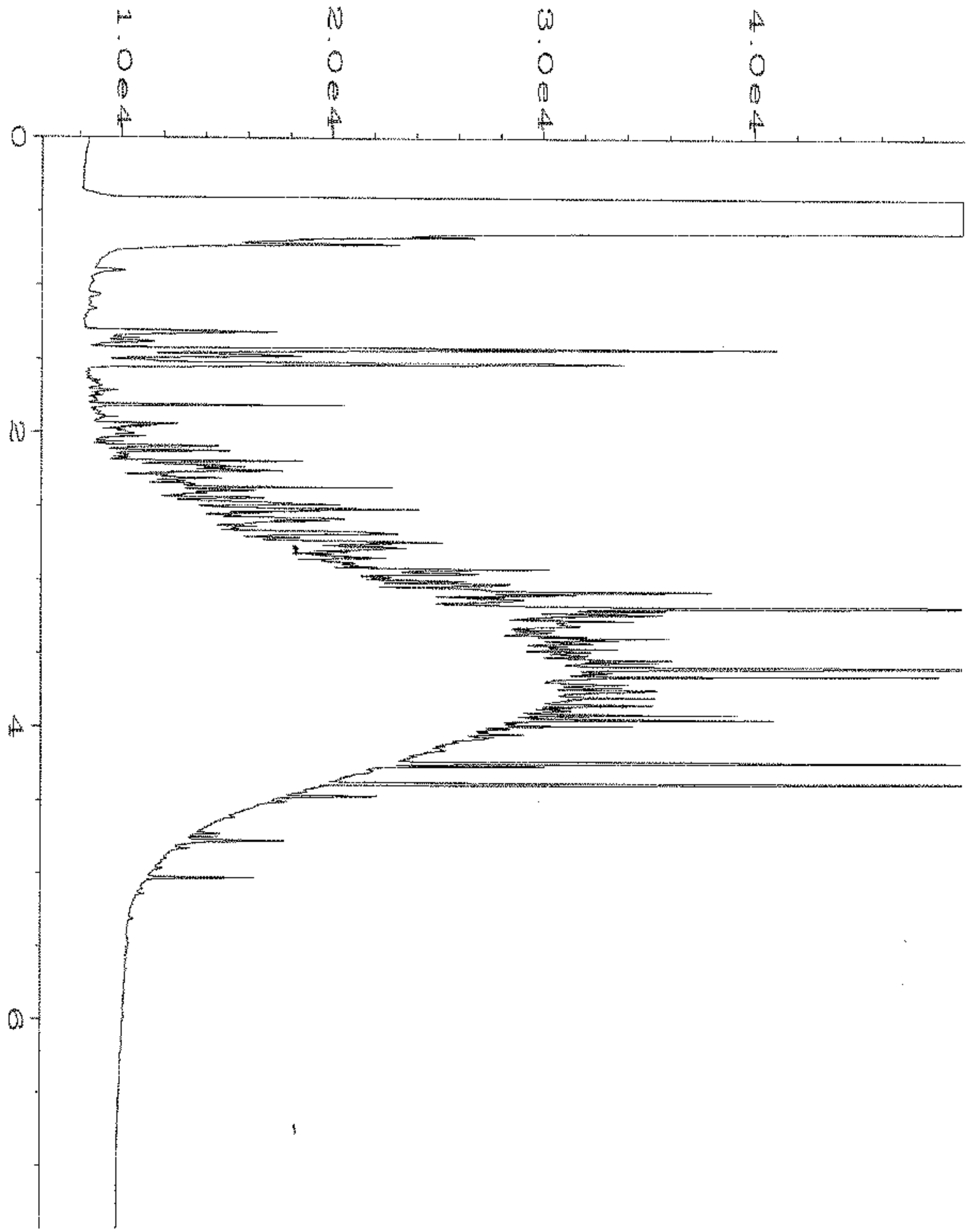
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\022F0501.D
Operator          : TL                             Page Number       : 1
Instrument        : GC1                            Vial Number       : 22
Sample Name       : 005097-11                      Injection Number  : 1
Run Time Bar Code:                                 Sequence Line     : 5
Acquired on       : 08 May 20  05:26 PM            Instrument Method: DX.MTH
Report Created on: 11 May 20  09:39 AM             Analysis Method   : DEFAULT.MTH
```



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Data File Name    : C:\HPCHEM\1\DATA\05-08-20\023F0501.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 23
Sample Name       : 005097-12                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 5
Acquired on       : 08 May 20   05:37 PM            Instrument Method: DX.MTH
Report Created on: 11 May 20   09:39 AM             Analysis Method   : DEFAULT.MTH
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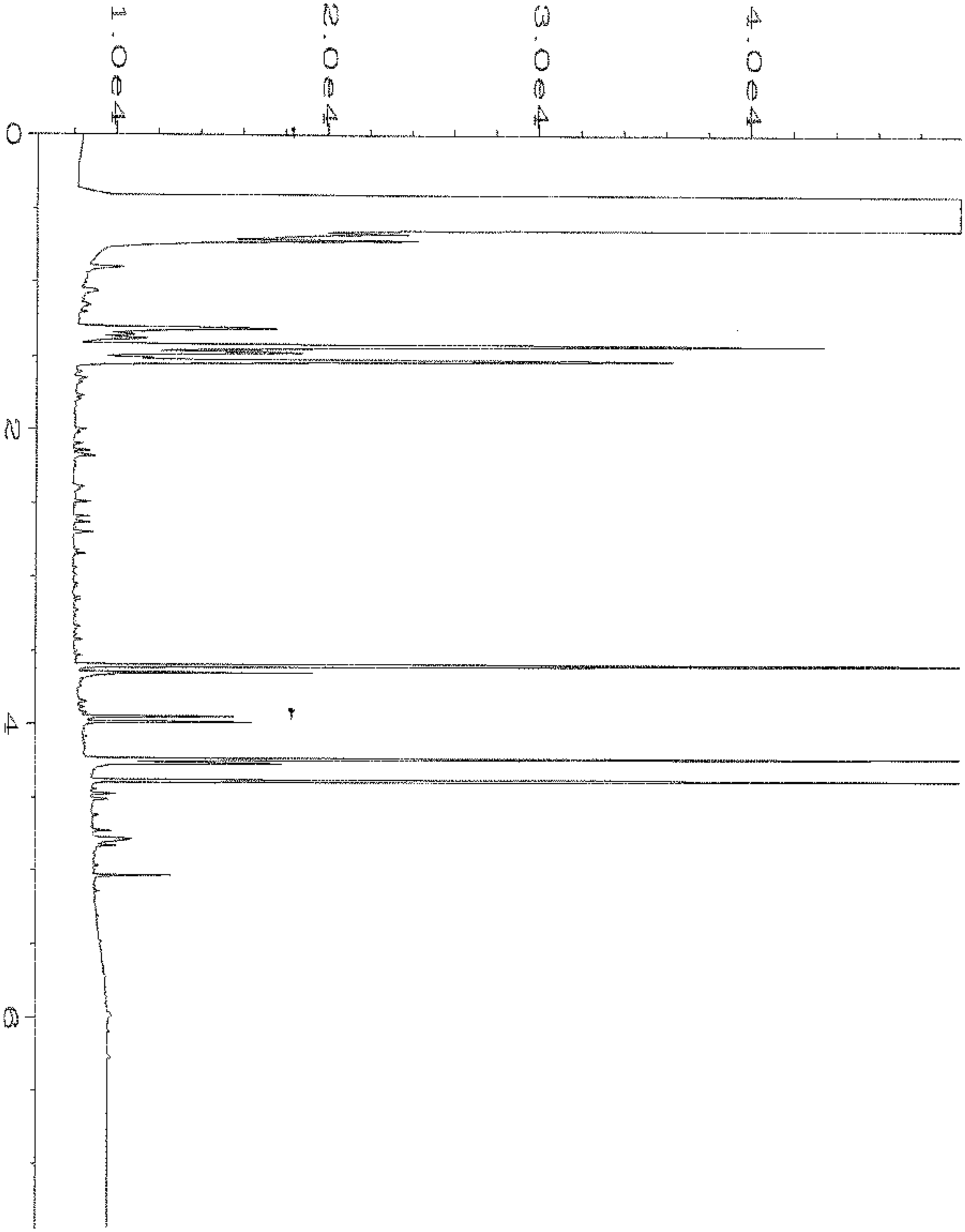

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Data File Name    : C:\HPCHEM\1\DATA\05-08-20\024F0501.D
Operator          : TL                               Page Number      : 1
Instrument        : GC1                              Vial Number      : 24
Sample Name       : 005097-13                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 5
Acquired on       : 08 May 20   05:49 PM             Instrument Method: DX.MTH
Report Created on: 11 May 20   09:39 AM              Analysis Method  : DEFAULT.MTH
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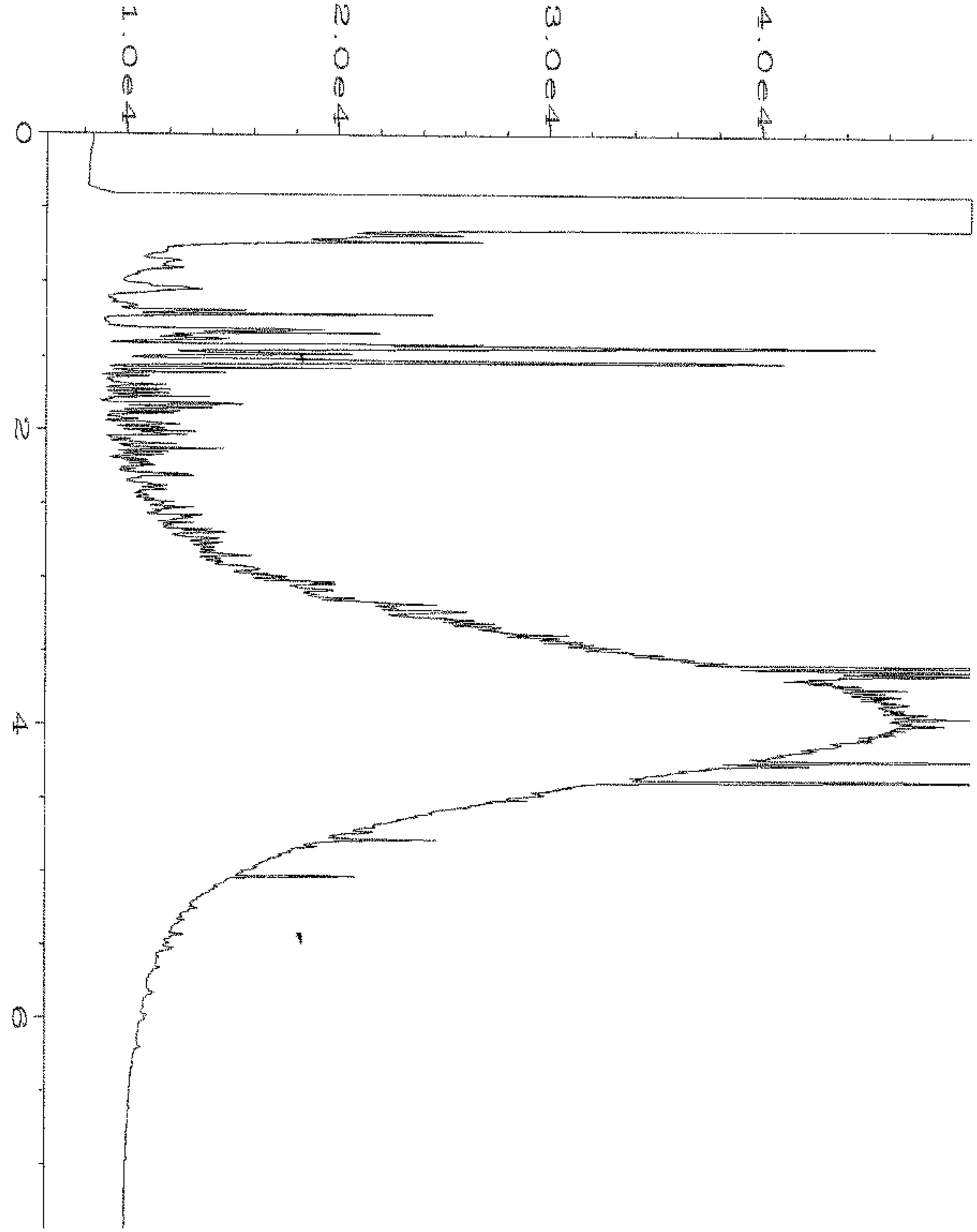
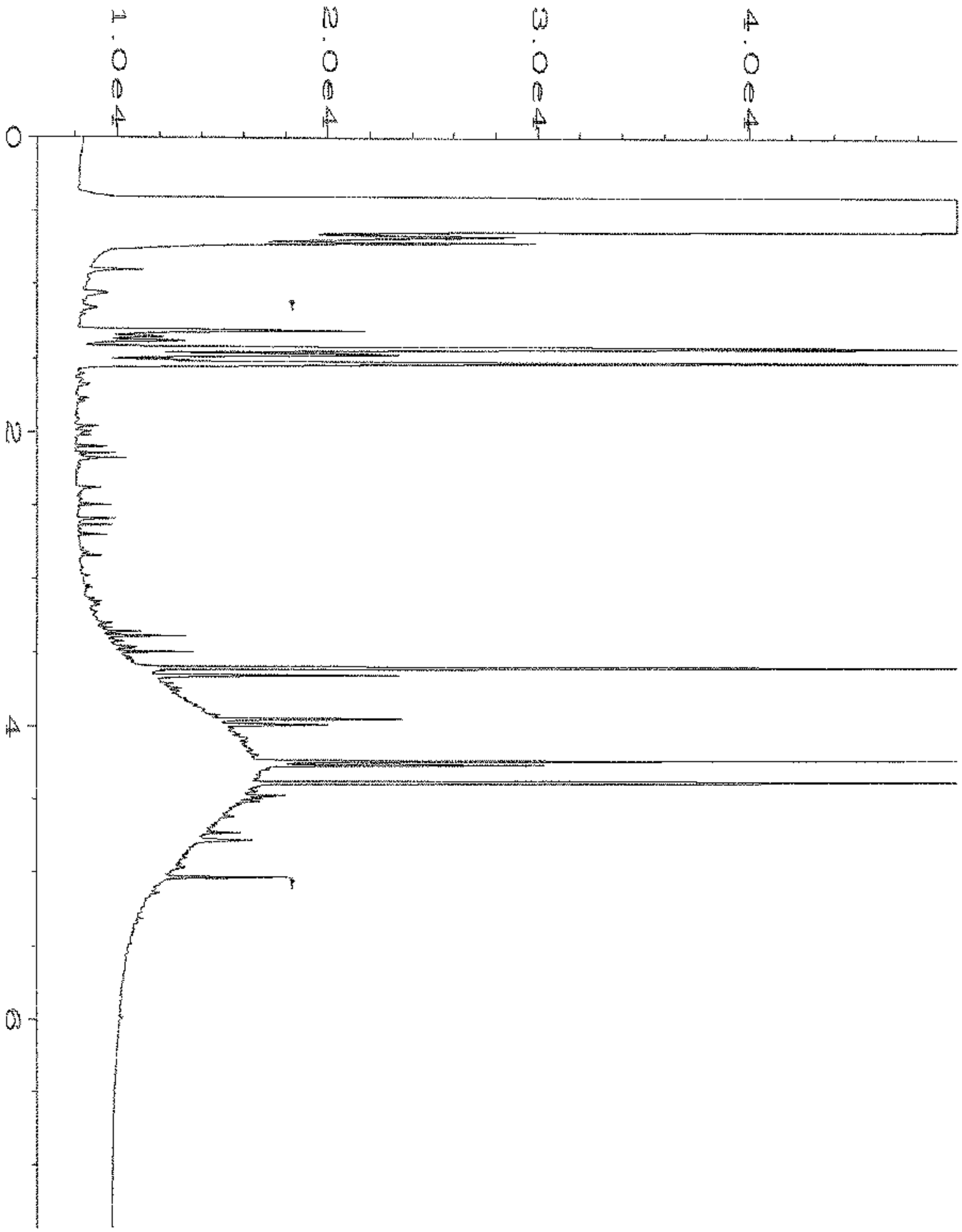


```
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\025F0501.D
Operator          : TL                            Page Number      : 1
Instrument        : GC1                           Vial Number      : 25
Sample Name       : 005097-14                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 5
Acquired on       : 08 May 20   06:00 PM          Instrument Method: DX.MTH
Report Created on: 11 May 20   09:39 AM           Analysis Method  : DEFAULT.MTH
```



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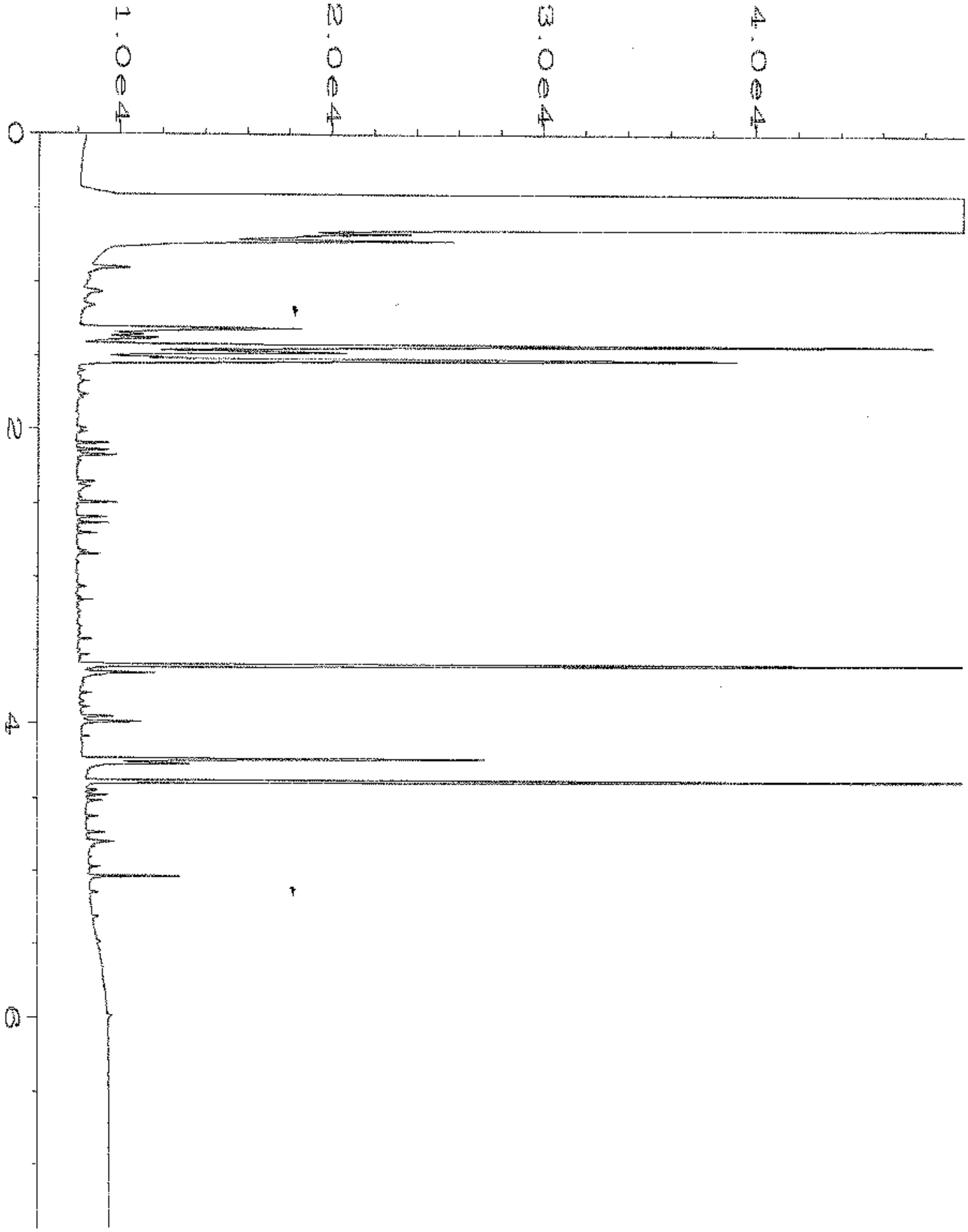
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\026F0701.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 26
Sample Name       : 005097-15                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 7
Acquired on       : 08 May 20   06:34 PM            Instrument Method: DX.MTH
Report Created on: 11 May 20   09:40 AM             Analysis Method   : DEFAULT.MTH
```



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Data File Name    : C:\HPCHEM\1\DATA\05-08-20\027F0701.D
Operator          : TL                                        Page Number      : 1
Instrument        : GC1                                       Vial Number      : 27
Sample Name       : 005097-16                                 Injection Number : 1
Run Time Bar Code:                                            Sequence Line    : 7
Acquired on       : 08 May 20   06:46 PM                      Instrument Method: DX.MTH
Report Created on: 11 May 20   09:40 AM                       Analysis Method  : DEFAULT.MTH
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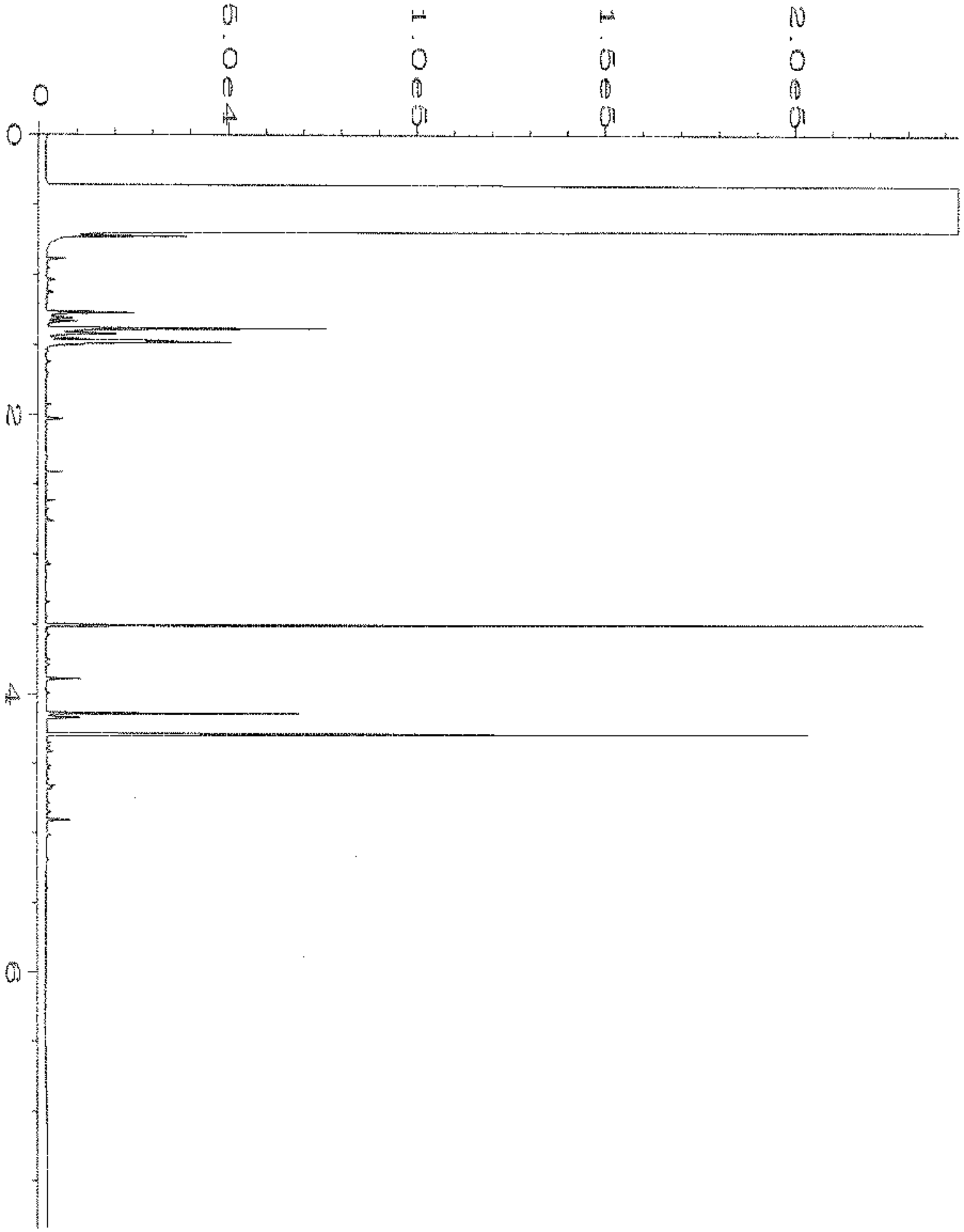

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Data File Name    : C:\HPCHEM\4\DATA\05-08-20\021F0701.D
Operator          : TL                                    Page Number      : 1
Instrument        : GC#4                                  Vial Number      : 21
Sample Name       : 005097-17                             Injection Number : 1
Run Time Bar Code:                                        Sequence Line    : 7
Acquired on       : 08 May 20   04:30 PM                  Instrument Method: DX.MTH
Report Created on: 11 May 20   08:18 AM                   Analysis Method  : DEFAULT.MTH
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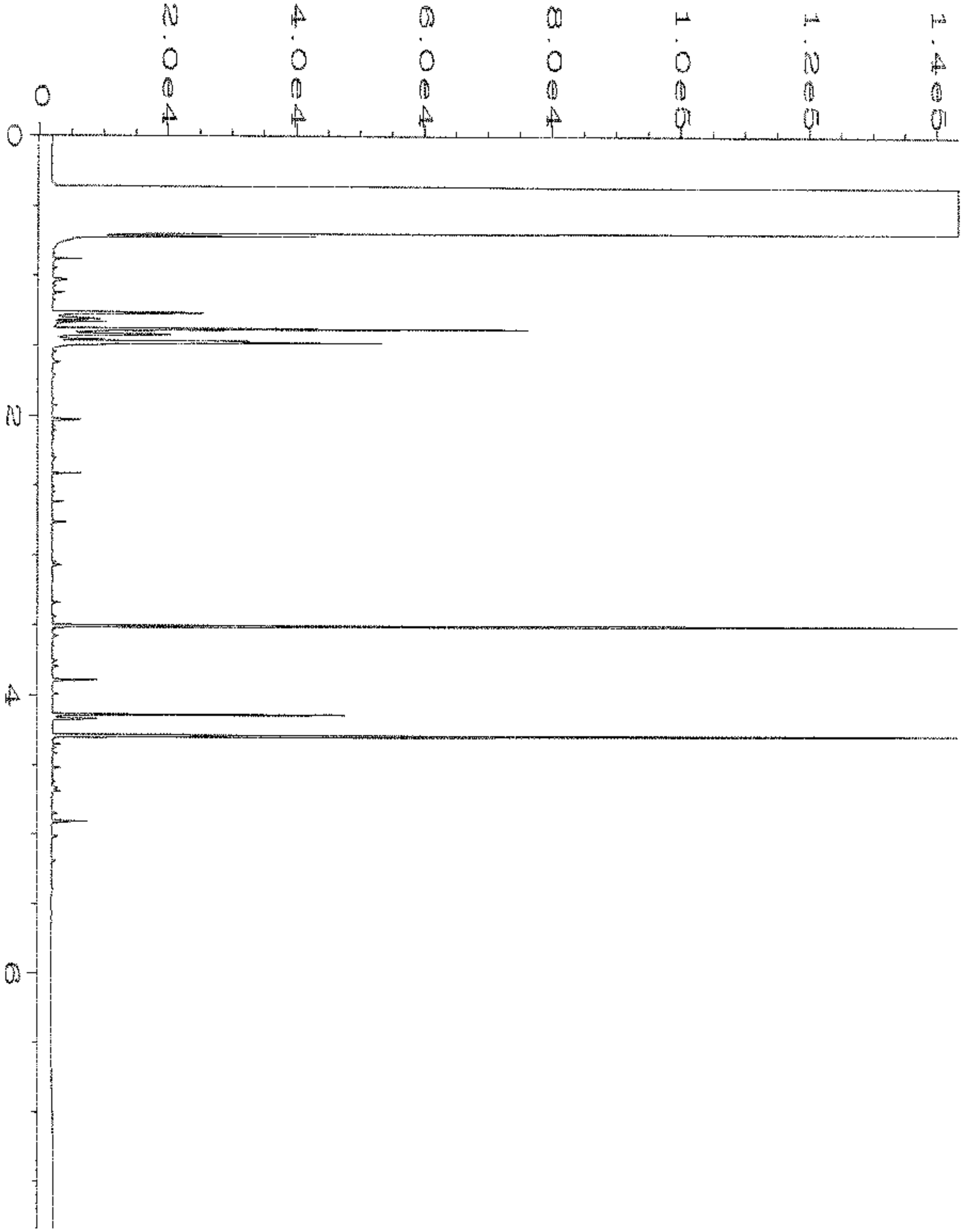
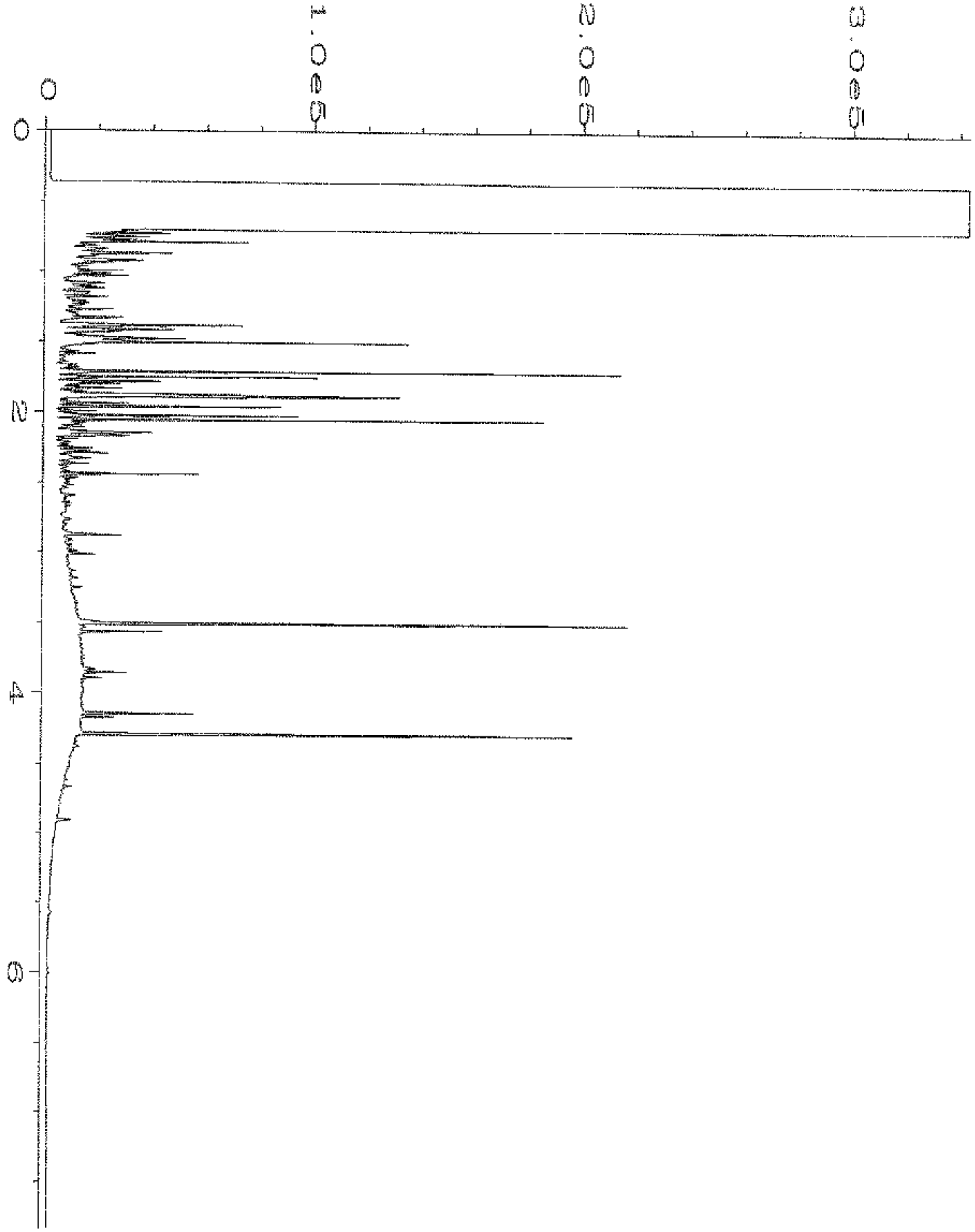


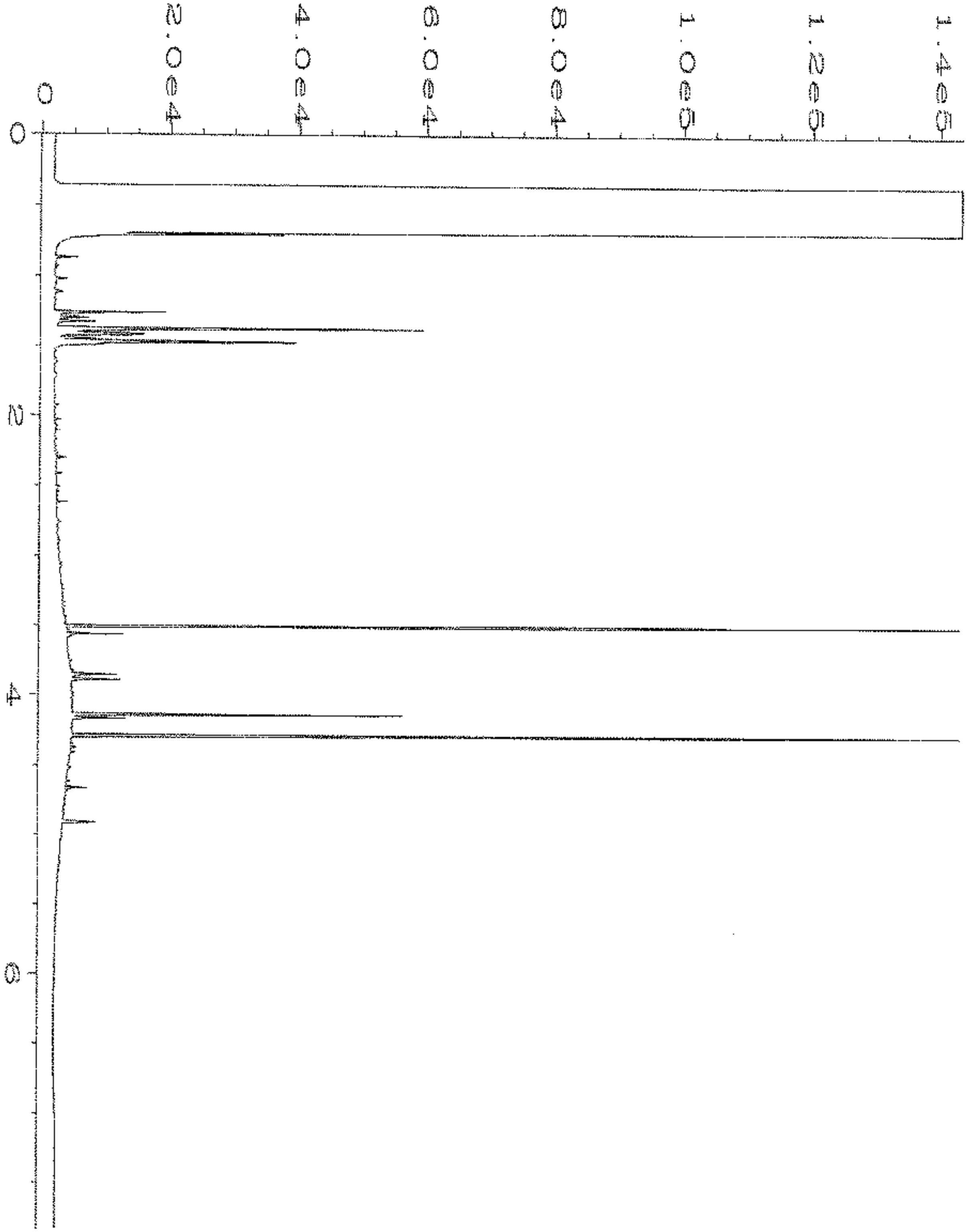
Data File Name   : C:\HPCHEM\4\DATA\05-08-20\022F0701.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 005097-18
Run Time Bar Code:
Acquired on   : 08 May 20   04:42 PM
Report Created on: 11 May 20   08:19 AM

Page Number   : 1
Vial Number   : 22
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



Data File Name : C:\HPCHEM\4\DATA\05-08-20\023F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 005097-19
Run Time Bar Code:
Acquired on : 08 May 20 04:54 PM
Report Created on: 11 May 20 08:20 AM

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\4\DATA\05-08-20\024F0701.D
Operator          : TL                            Page Number      : 1
Instrument        : GC#4                          Vial Number      : 24
Sample Name       : 005097-20                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 7
Acquired on       : 08 May 20  05:06 PM           Instrument Method: DX.MTH
Report Created on: 11 May 20  08:20 AM            Analysis Method  : DEFAULT.MTH
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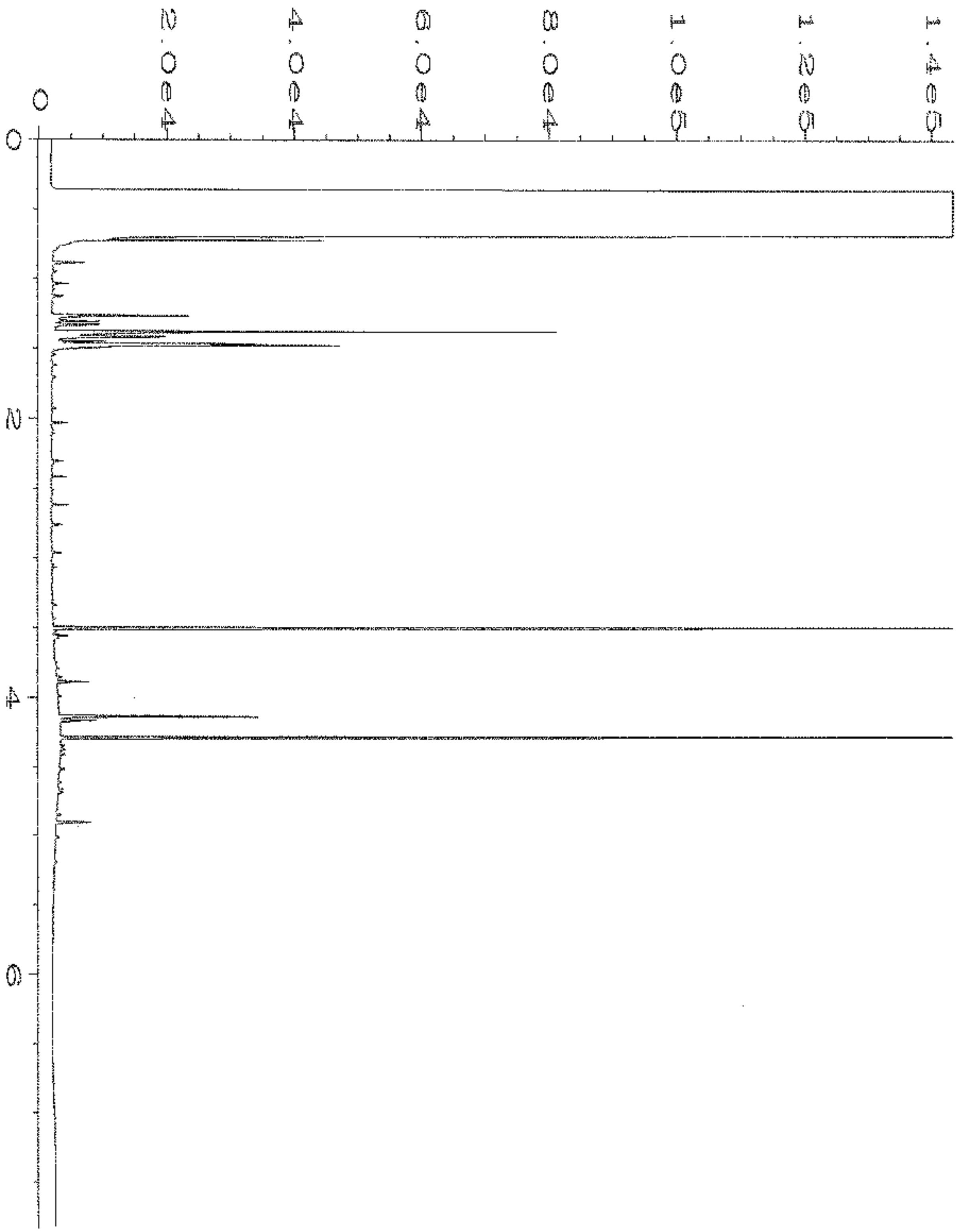

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Data File Name    : C:\HPCHEM\4\DATA\05-08-20\025F0701.D
Operator          : TL                              Page Number       : 1
Instrument        : GC#4                            Vial Number       : 25
Sample Name       : 005097-21                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 7
Acquired on       : 08 May 20   05:18 PM            Instrument Method: DX.MTH
Report Created on: 11 May 20   08:21 AM             Analysis Method   : DEFAULT.MTH
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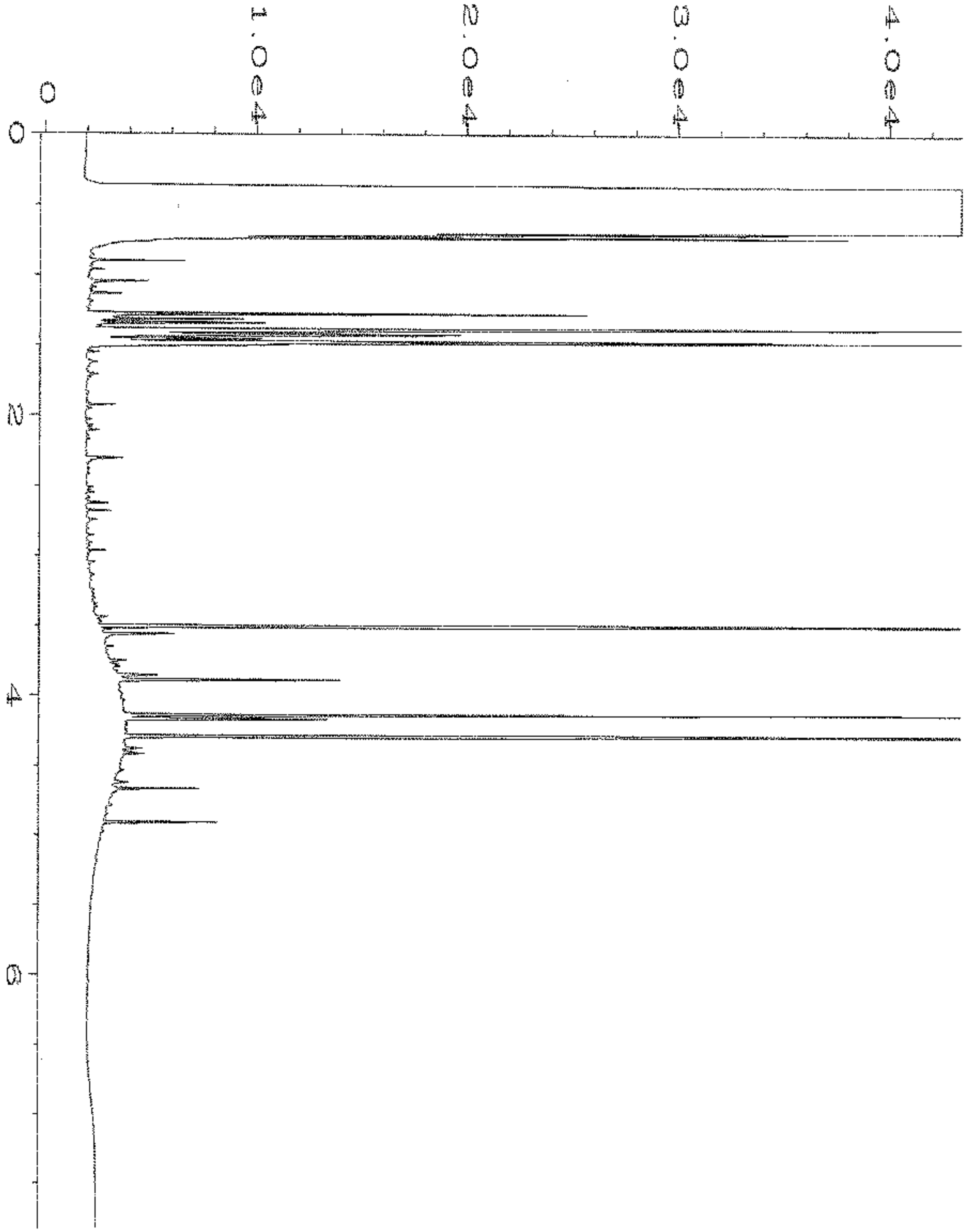

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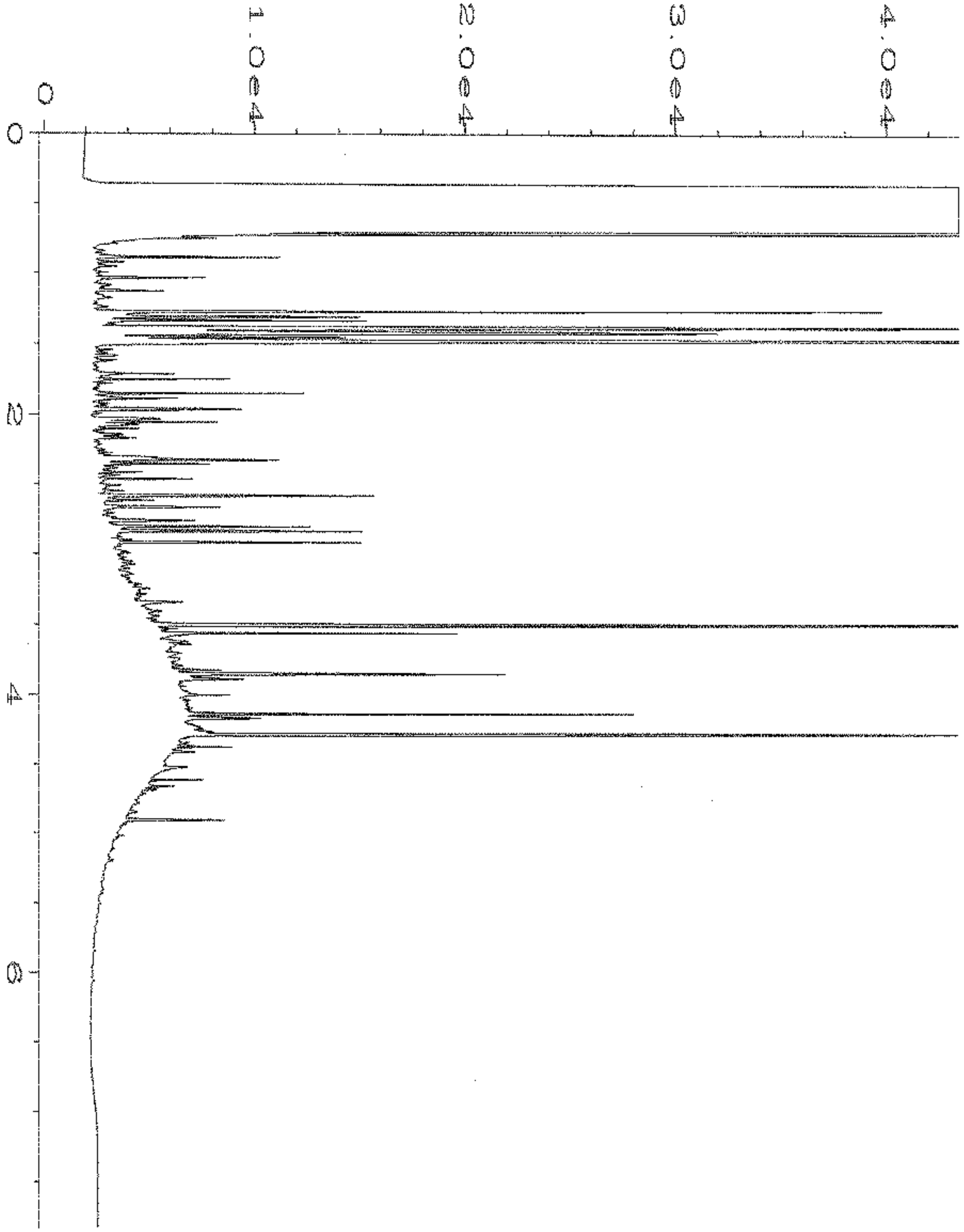
Data File Name    : C:\HPCHEM\4\DATA\05-08-20\026F0701.D
Operator          : TL                              Page Number       : 1
Instrument        : GC#4                            Vial Number       : 26
Sample Name       : 005097-22                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 7
Acquired on       : 08 May 20   05:30 PM            Instrument Method: DX.MTH
Report Created on: 11 May 20   08:21 AM             Analysis Method   : DEFAULT.MTH
```



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Data File Name    : C:\HPCHEM\4\DATA\05-08-20\027F0701.D
Operator          : TL                              Page Number      : 1
Instrument        : GC#4                            Vial Number      : 27
Sample Name       : 005097-23                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 7
Acquired on       : 08 May 20   05:42 PM            Instrument Method: DX.MTH
Report Created on: 11 May 20   08:21 AM             Analysis Method  : DEFAULT.MTH
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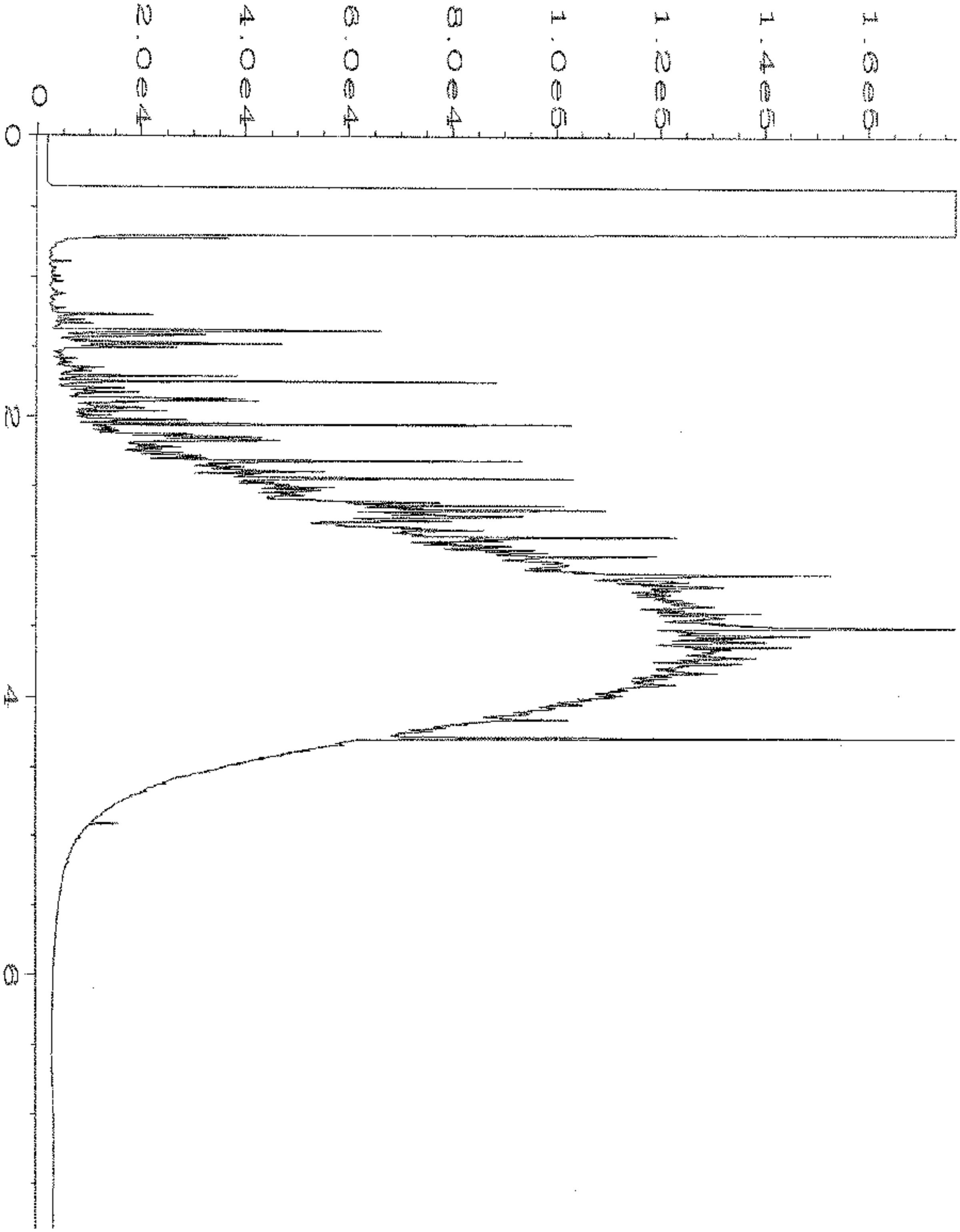

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Data File Name    : C:\HPCHEM\4\DATA\05-08-20\028F0701.D
Operator          : TL                              Page Number      : 1
Instrument        : GC#4                            Vial Number      : 28
Sample Name       : 005097-24                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 7
Acquired on       : 08 May 20  05:54 PM             Instrument Method: DX.MTH
Report Created on: 11 May 20  08:22 AM              Analysis Method  : DEFAULT.MTH
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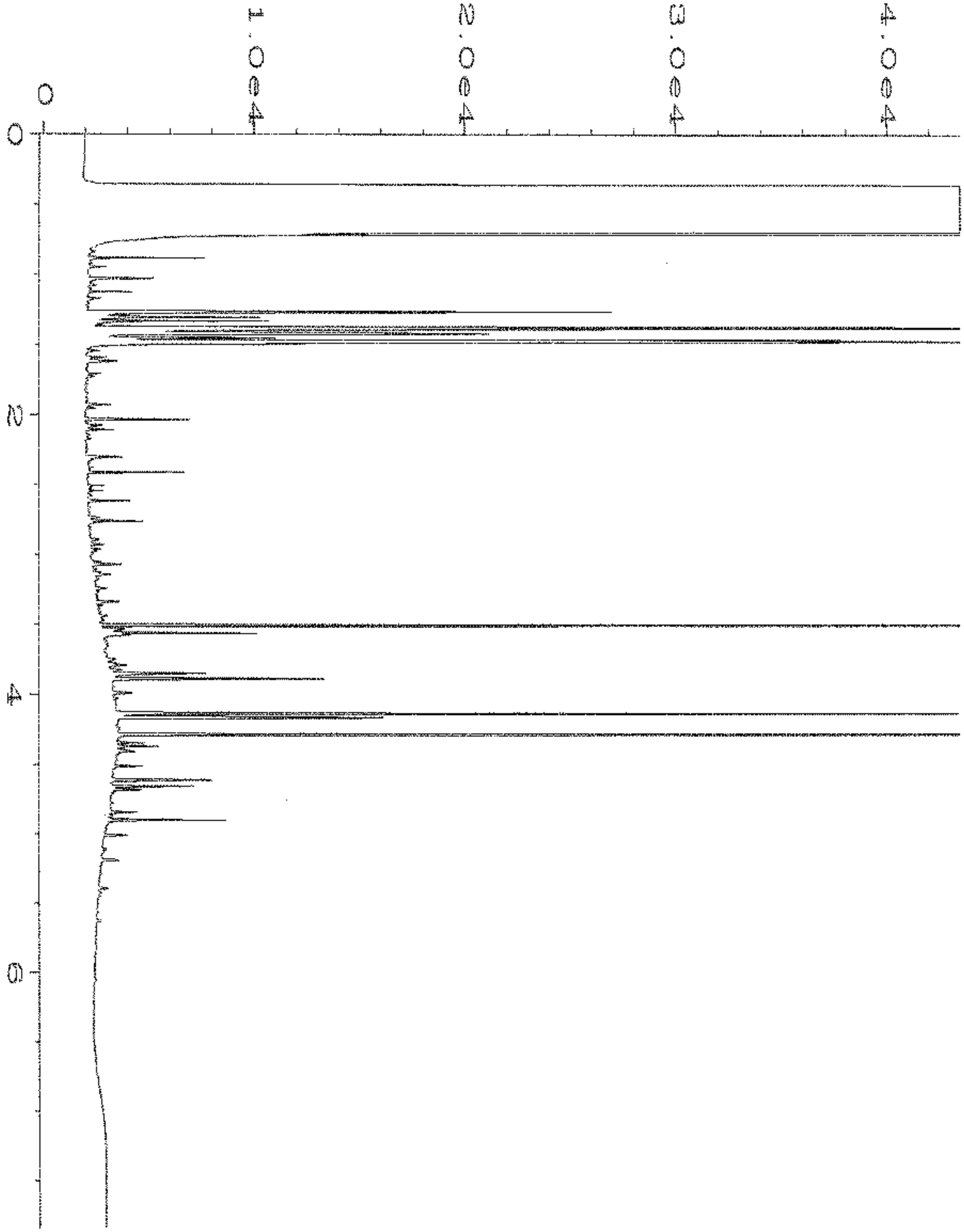

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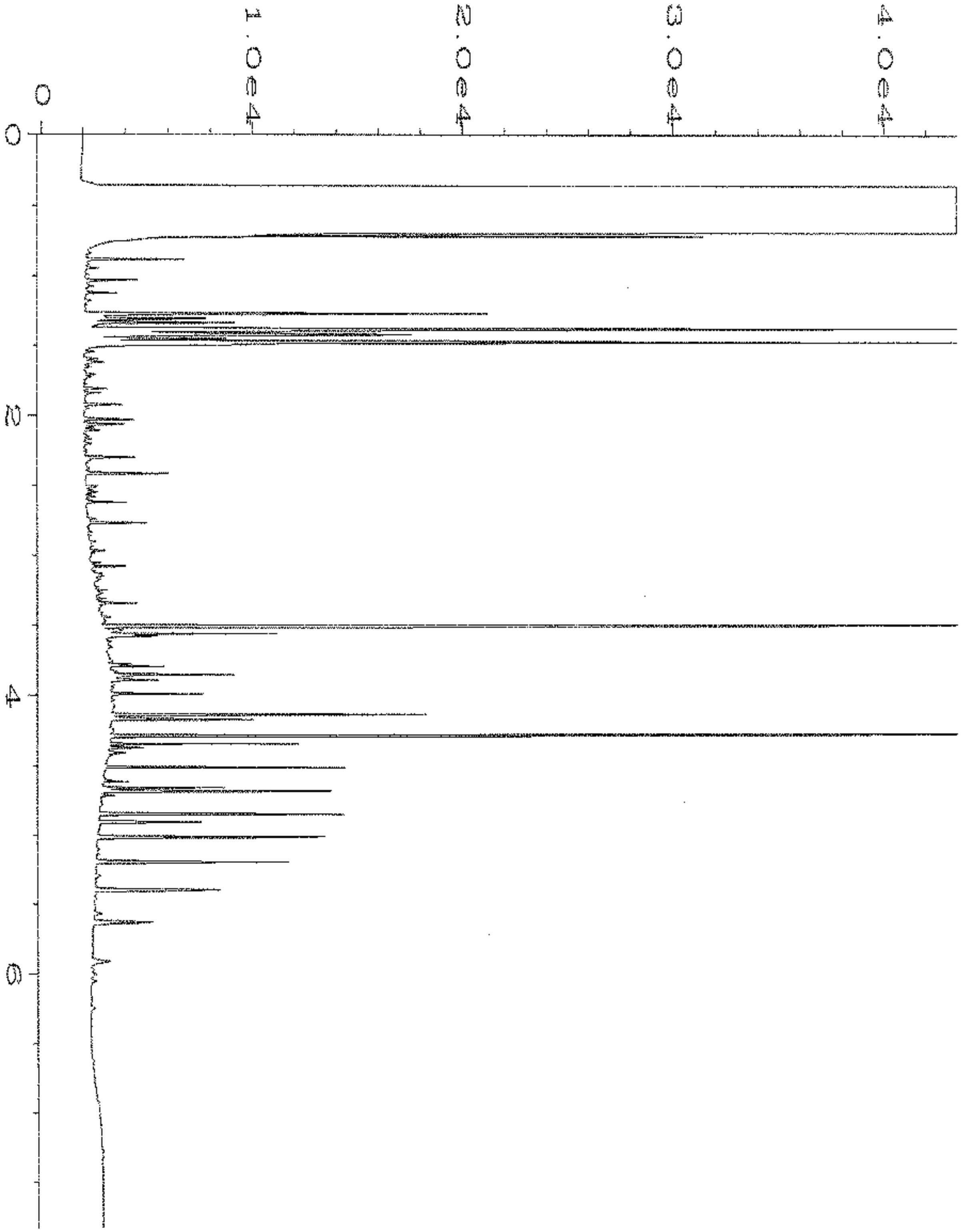
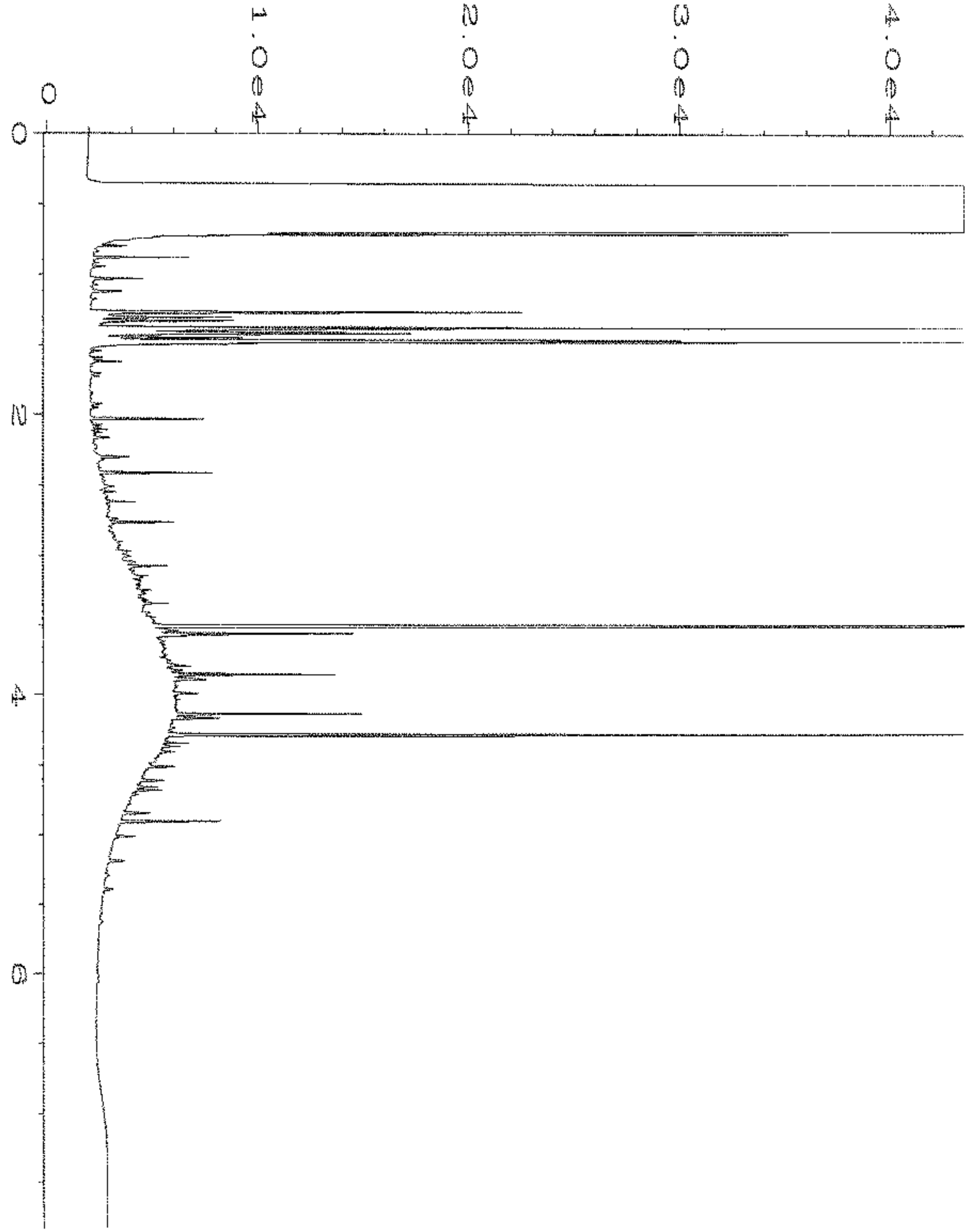
Data File Name    : C:\HPCHEM\4\DATA\05-08-20\029F0701.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC#4                                Vial Number       : 29
Sample Name       : 005097-25                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line     : 7
Acquired on       : 08 May 20   06:06 PM                Instrument Method: DX.MTH
Report Created on: 11 May 20   08:22 AM                 Analysis Method   : DEFAULT.MTH
```



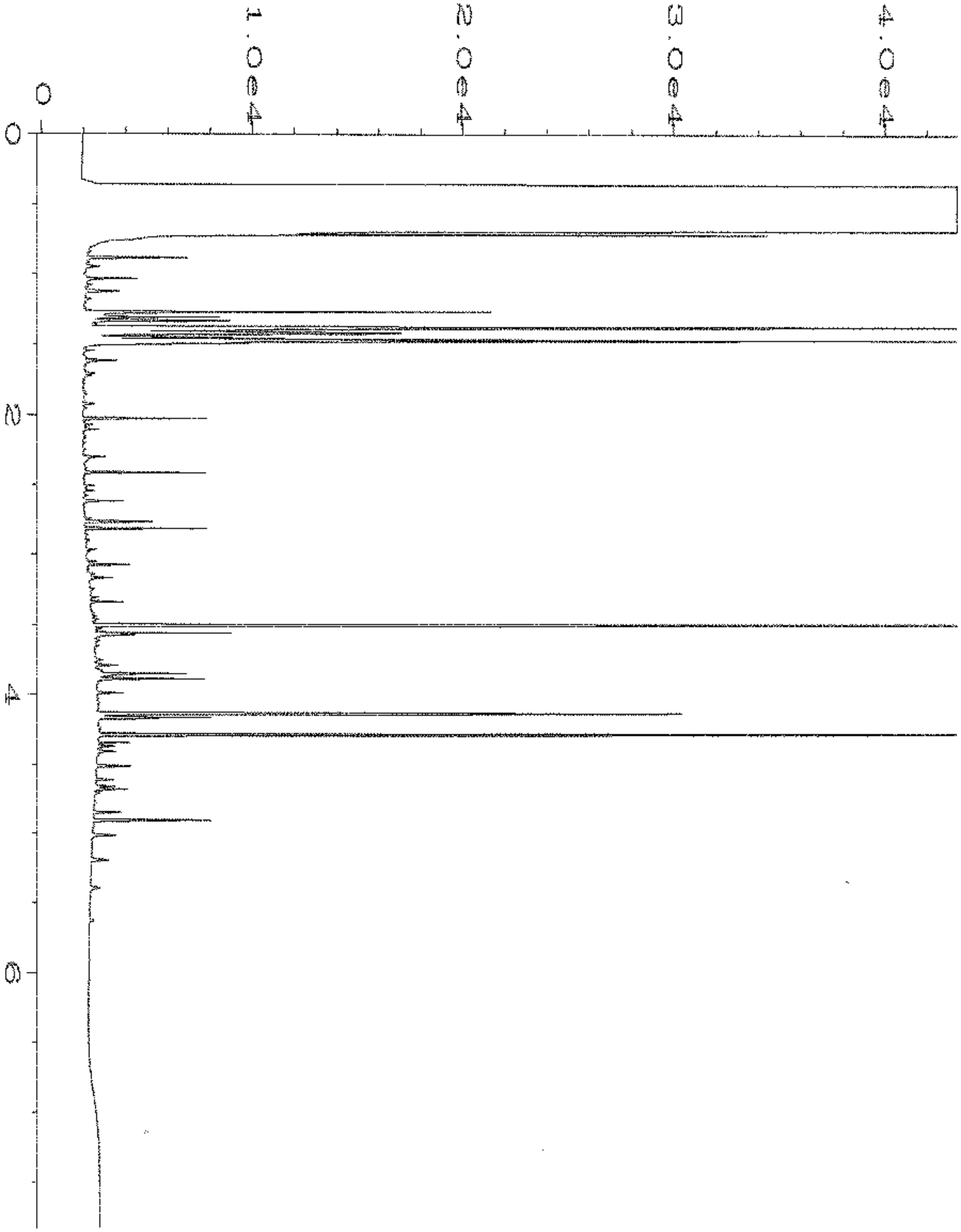
Data File Name   : C:\HPCHEM\4\DATA\05-08-20\030F0701.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 005097-26
Run Time Bar Code:
Acquired on   : 08 May 20   06:18 PM
Report Created on: 11 May 20   08:23 AM

Page Number   : 1
Vial Number   : 30
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



Data File Name : C:\HPCHEM\4\DATA\05-08-20\031F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 005097-27
Run Time Bar Code:
Acquired on : 08 May 20 06:30 PM
Report Created on: 11 May 20 08:23 AM

Page Number : 1
Vial Number : 31
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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Data File Name    : C:\HPCHEM\4\DATA\05-08-20\032F0701.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC#4                                Vial Number       : 32
Sample Name       : 005097-28                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 7
Acquired on       : 08 May 20   06:42 PM                Instrument Method: DX.MTH
Report Created on: 11 May 20   08:23 AM                 Analysis Method   : DEFAULT.MTH
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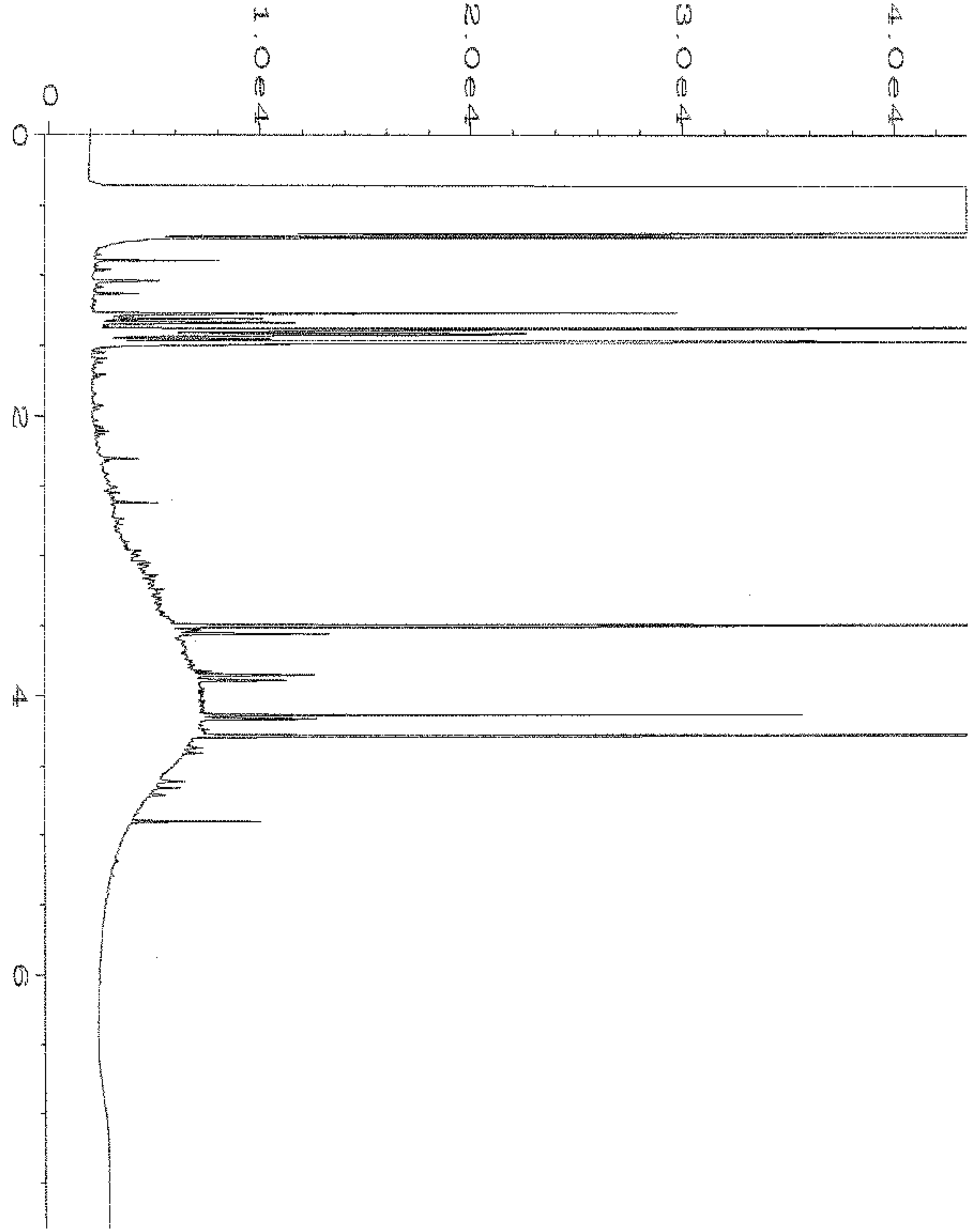

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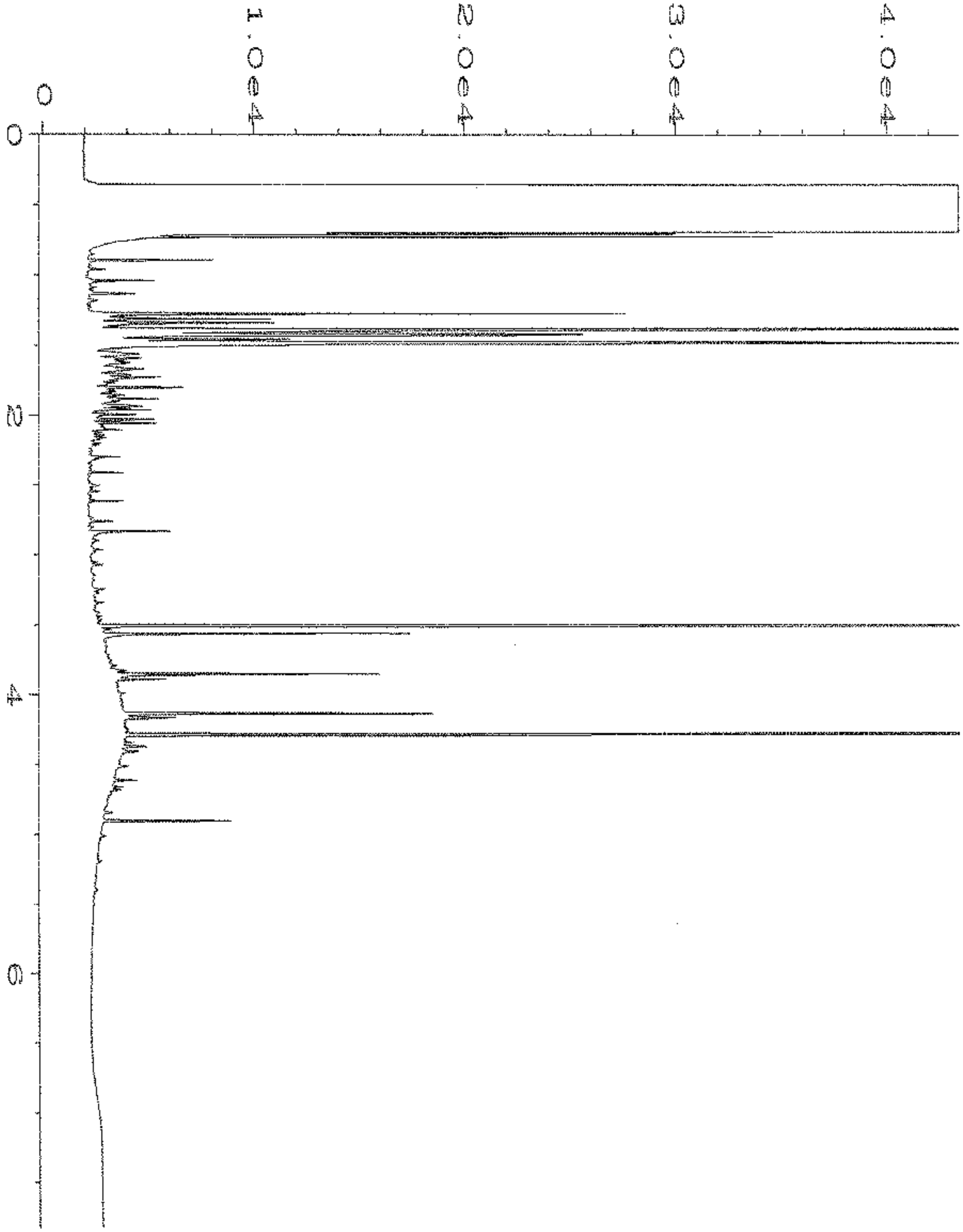
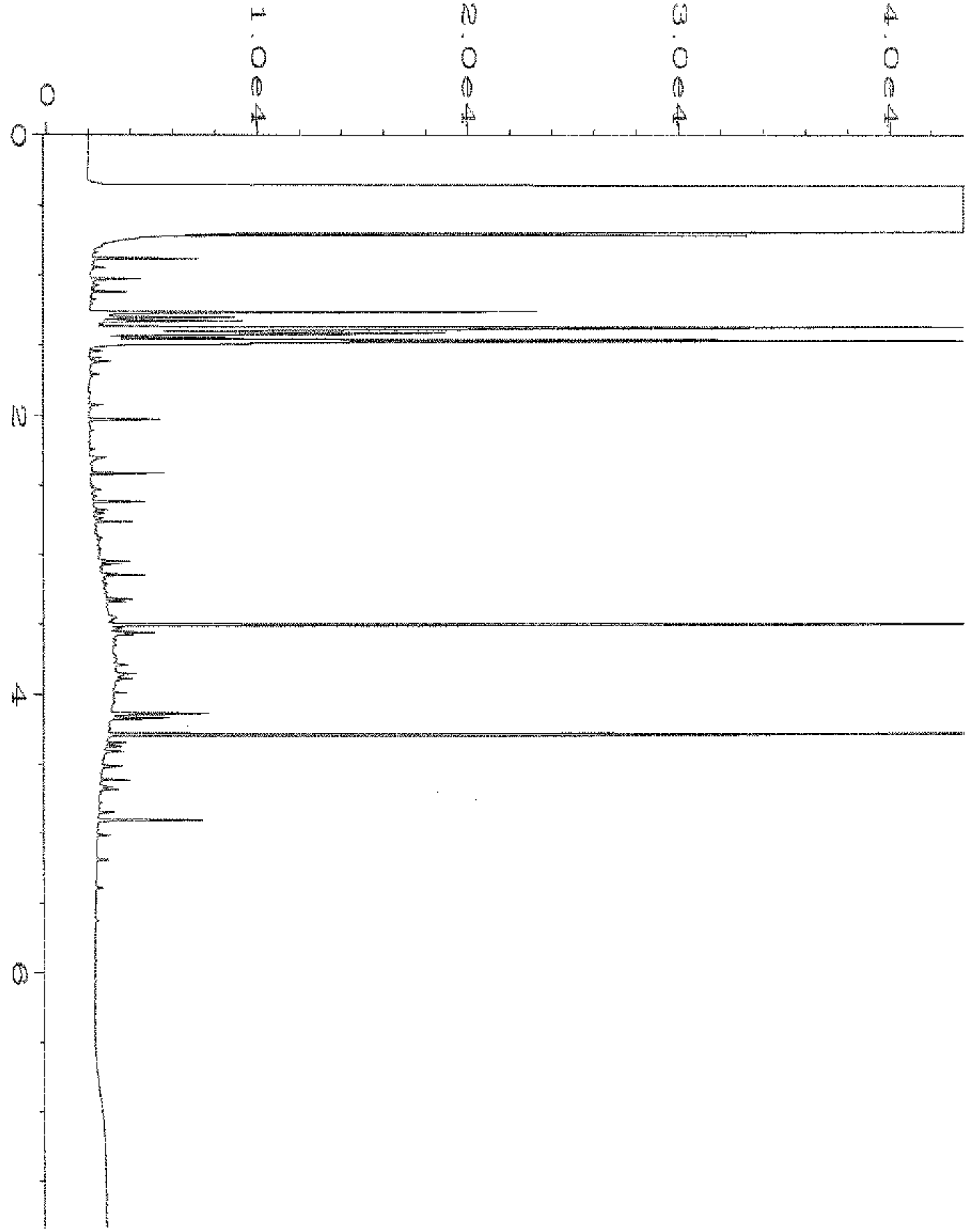
Data File Name    : C:\HPCHEM\4\DATA\05-08-20\033F0701.D
Operator          : TL                          Page Number      : 1
Instrument        : GC#4                        Vial Number      : 33
Sample Name       : 005097-29                   Injection Number : 1
Run Time Bar Code:                              Sequence Line    : 7
Acquired on       : 08 May 20   06:54 PM        Instrument Method: DX.MTH
Report Created on: 11 May 20   08:23 AM        Analysis Method  : DEFAULT.MTH
```



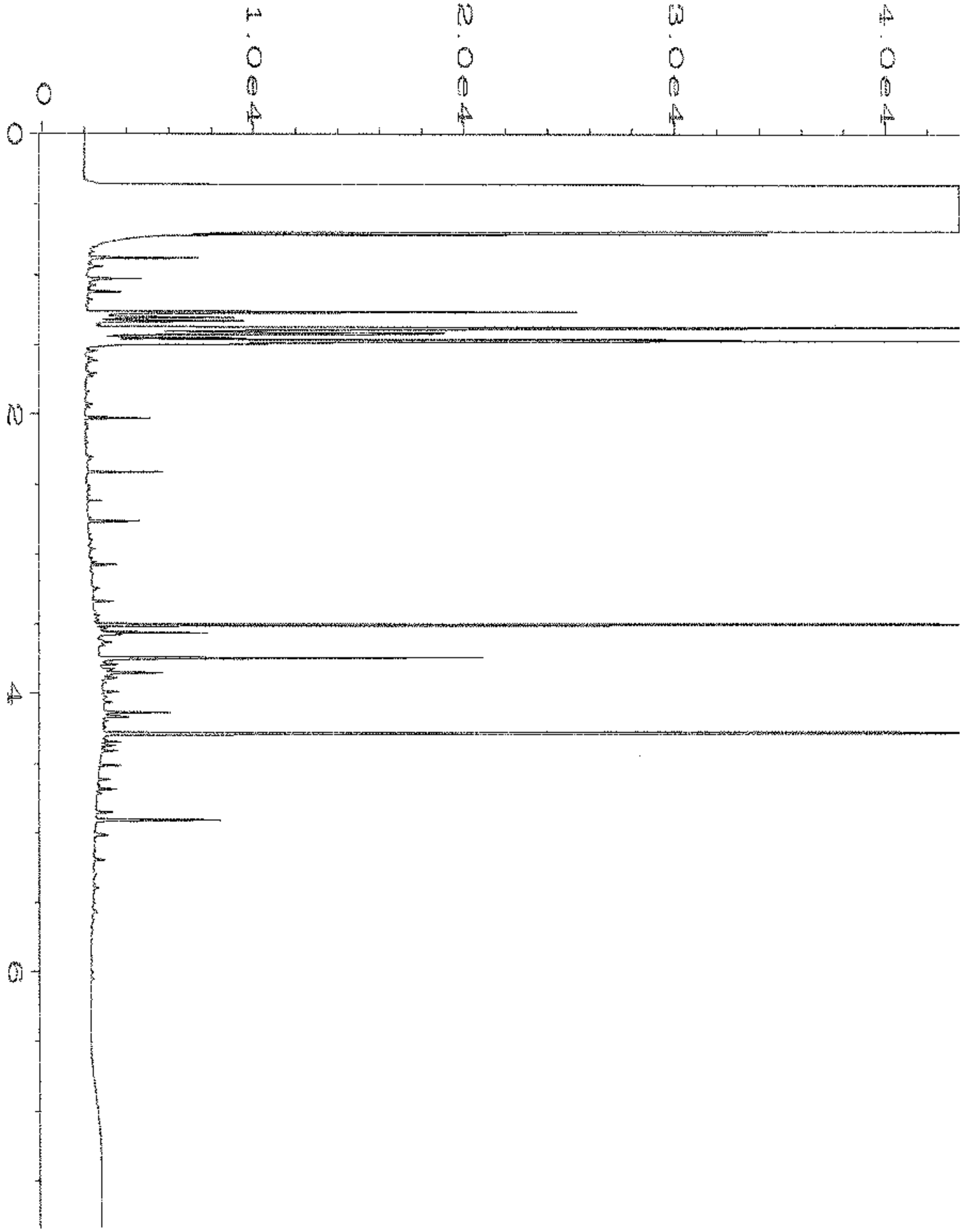
Data File Name : C:\HPCHEM\4\DATA\05-08-20\034F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 005097-30
Run Time Bar Code:
Acquired on : 08 May 20 07:07 PM
Report Created on: 11 May 20 08:24 AM

Page Number : 1
Vial Number : 34
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

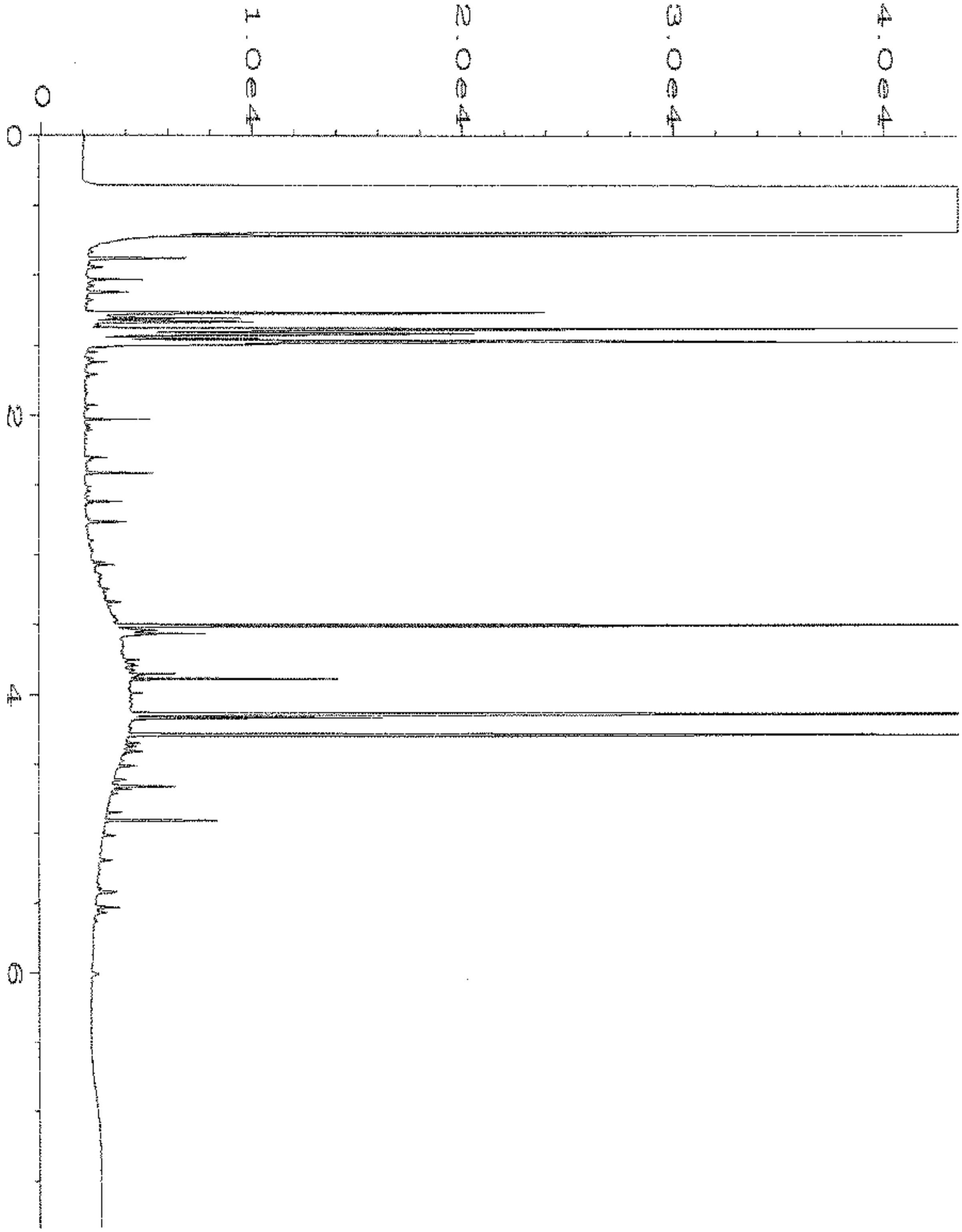


Data File Name : C:\HPCHEM\4\DATA\05-08-20\035F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 005097-31
Run Time Bar Code:
Acquired on : 08 May 20 07:19 PM
Report Created on: 11 May 20 08:24 AM

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



Data File Name   : C:\HPCHEM\4\DATA\05-08-20\036F0701.D
Operator   : TL   Page Number   : 1
Instrument   : GC#4   Vial Number   : 36
Sample Name   : 005097-32   Injection Number : 1
Run Time Bar Code: Sequence Line   : 7
Acquired on   : 08 May 20   07:31 PM   Instrument Method: DX.MTH
Report Created on: 11 May 20   08:24 AM   Analysis Method   : DEFAULT.MTH



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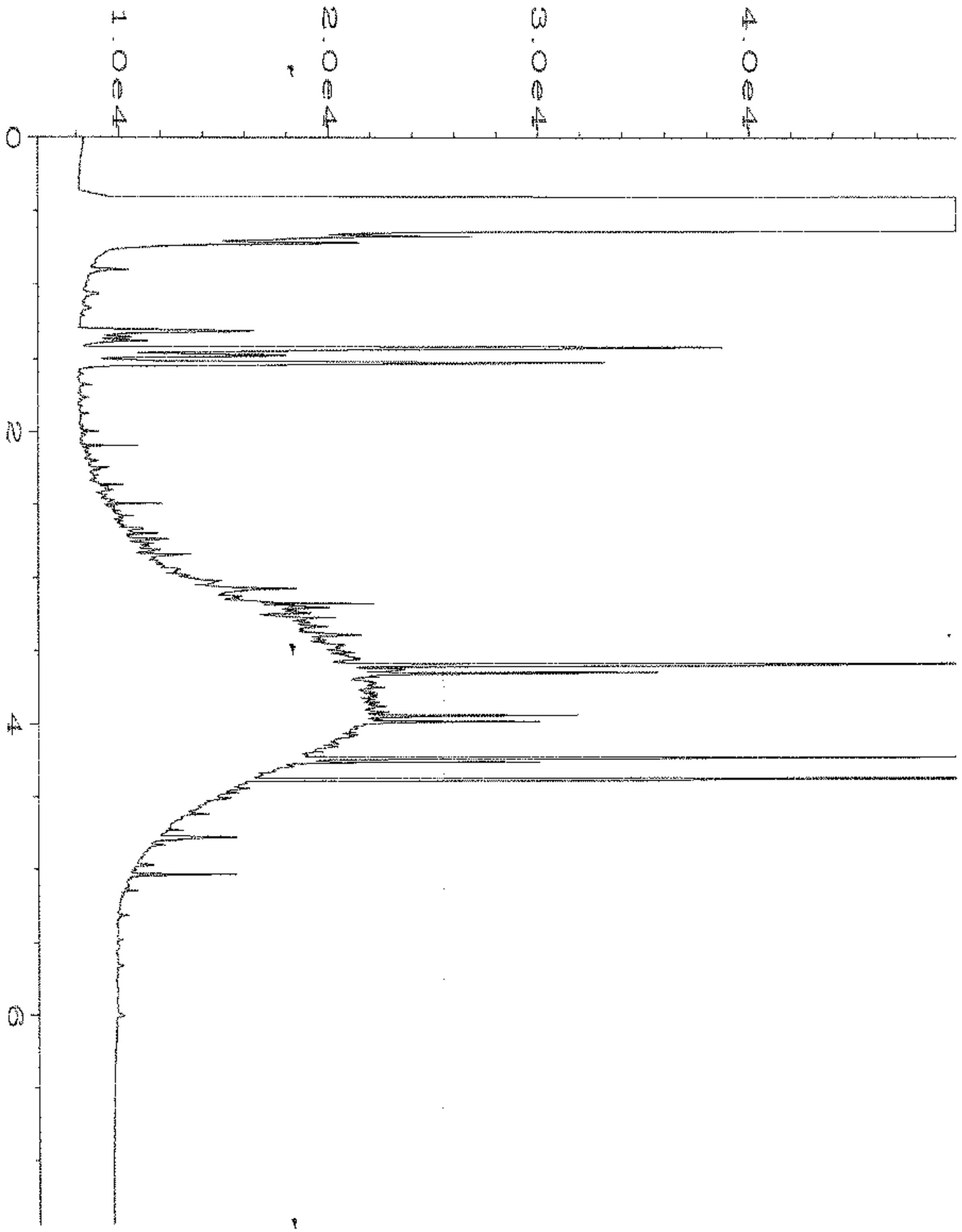
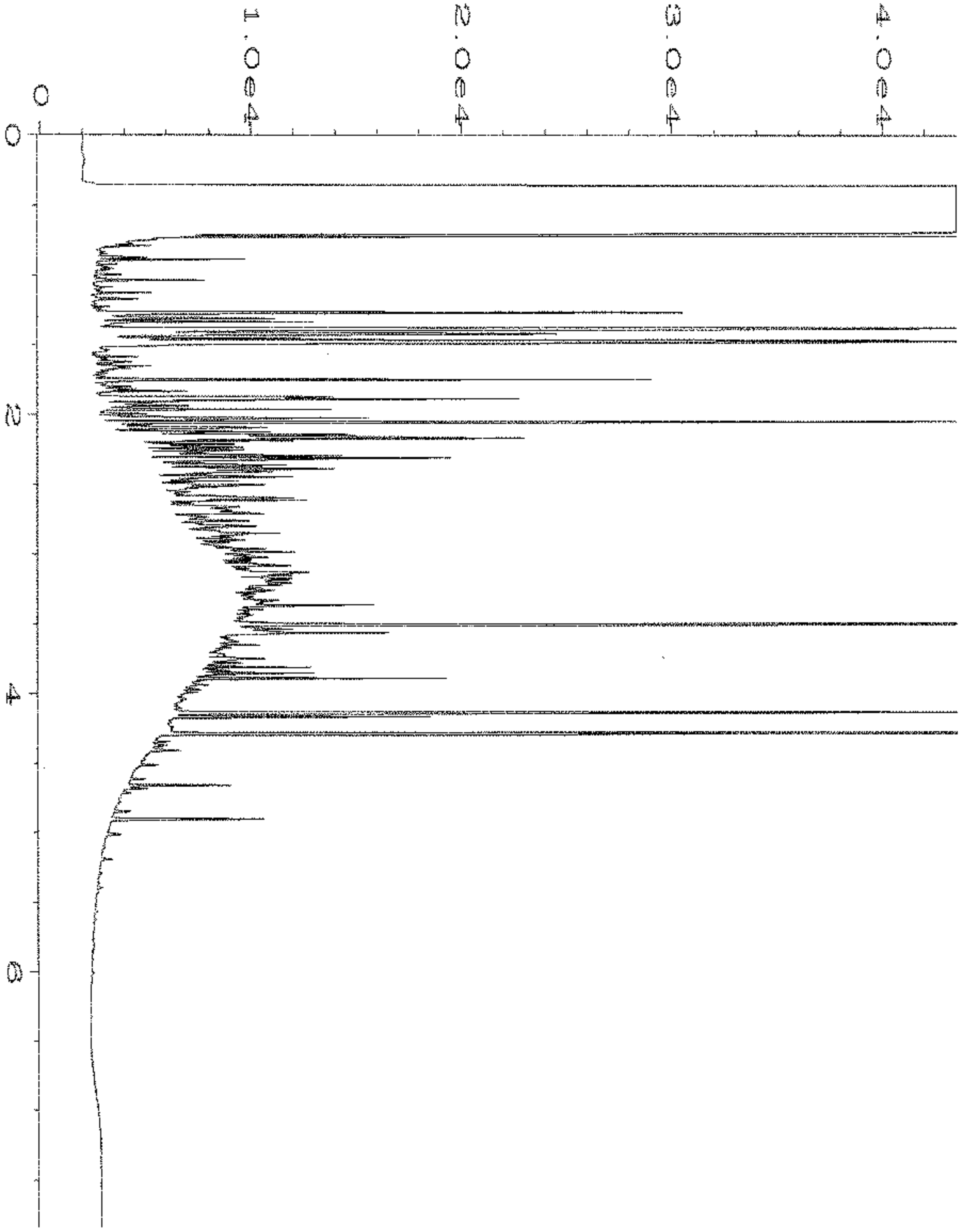
Data File Name    : C:\HPCHEM\4\DATA\05-08-20\037F0701.D
Operator          : TL                              Page Number       : 1
Instrument        : GC#4                            Vial Number       : 37
Sample Name       : 005097-33                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line     : 7
Acquired on       : 08 May 20   07:43 PM            Instrument Method: DX.MTH
Report Created on: 11 May 20   08:25 AM             Analysis Method   : DEFAULT.MTH
```

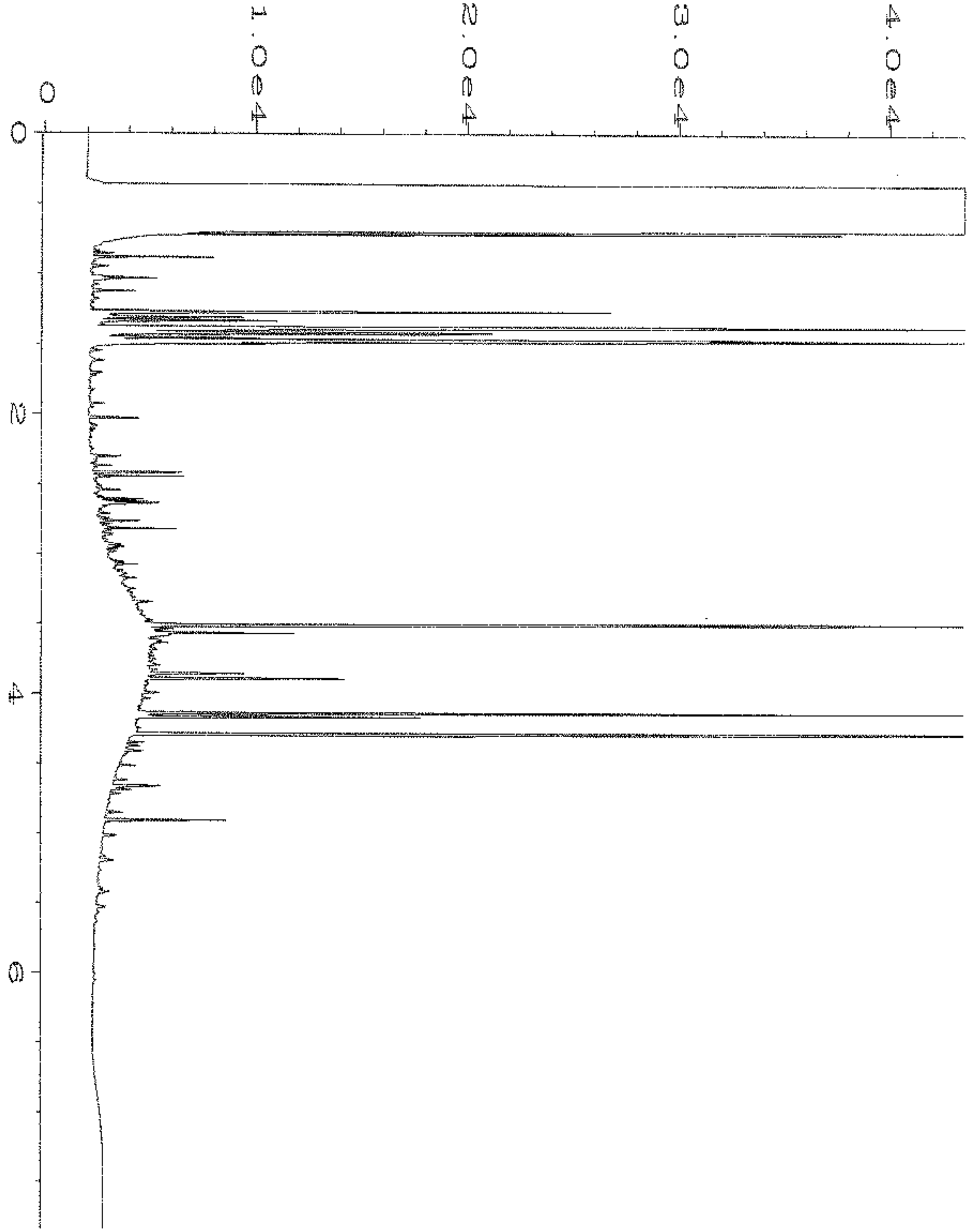


```
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\028F0701.D
Operator          : TL                                  Page Number        : 1
Instrument        : GC1                                 Vial Number        : 28
Sample Name       : 005097-34                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line      : 7
Acquired on       : 08 May 20   06:57 PM                Instrument Method: DX.MTH
Report Created on: 11 May 20   09:41 AM                 Analysis Method    : DEFAULT.MTH
```

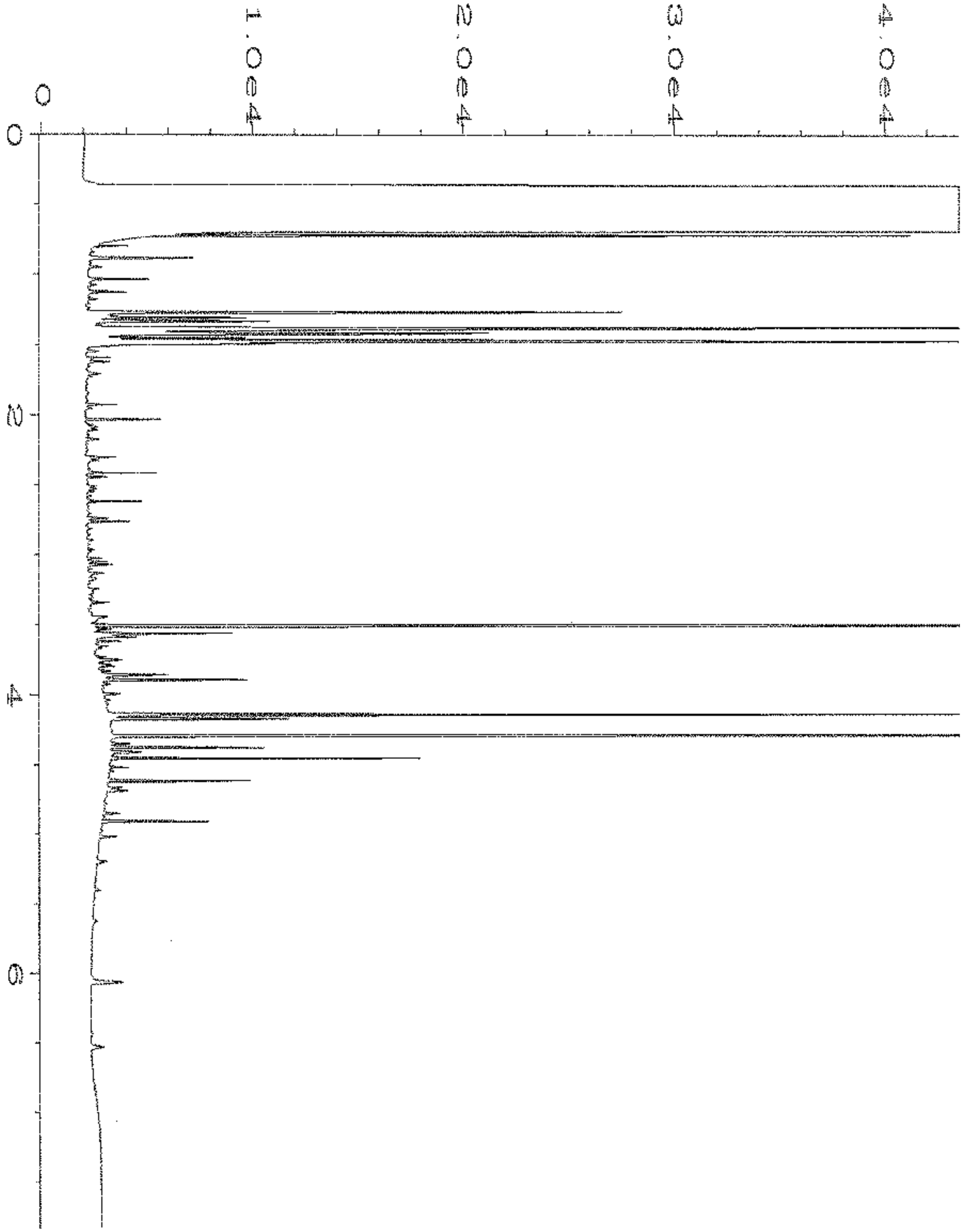


Data File Name : C:\HPCHEM\4\DATA\05-08-20\038F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 005097-35
Run Time Bar Code:
Acquired on : 08 May 20 07:55 PM
Report Created on: 11 May 20 08:25 AM

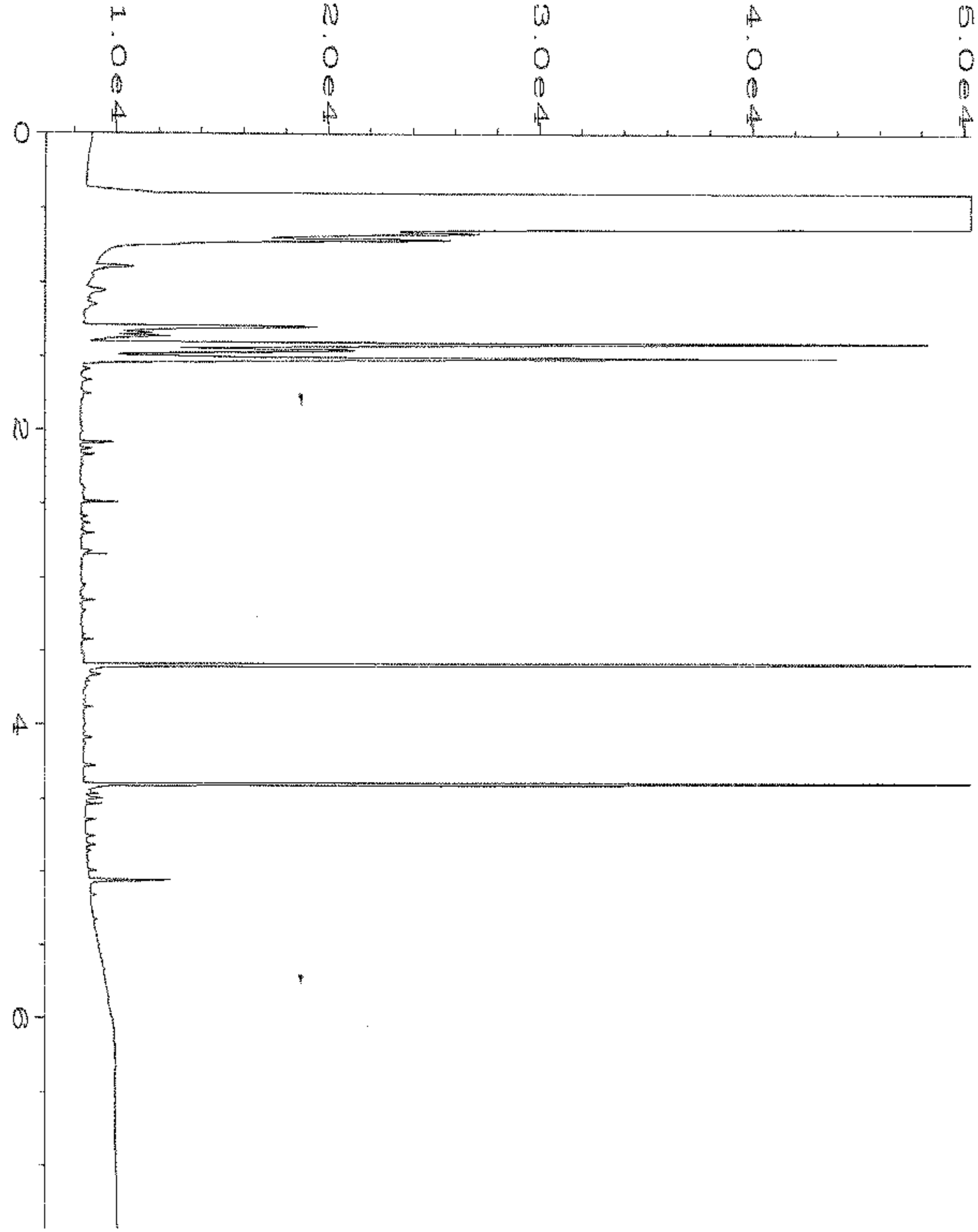
Page Number : 1
Vial Number : 38
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



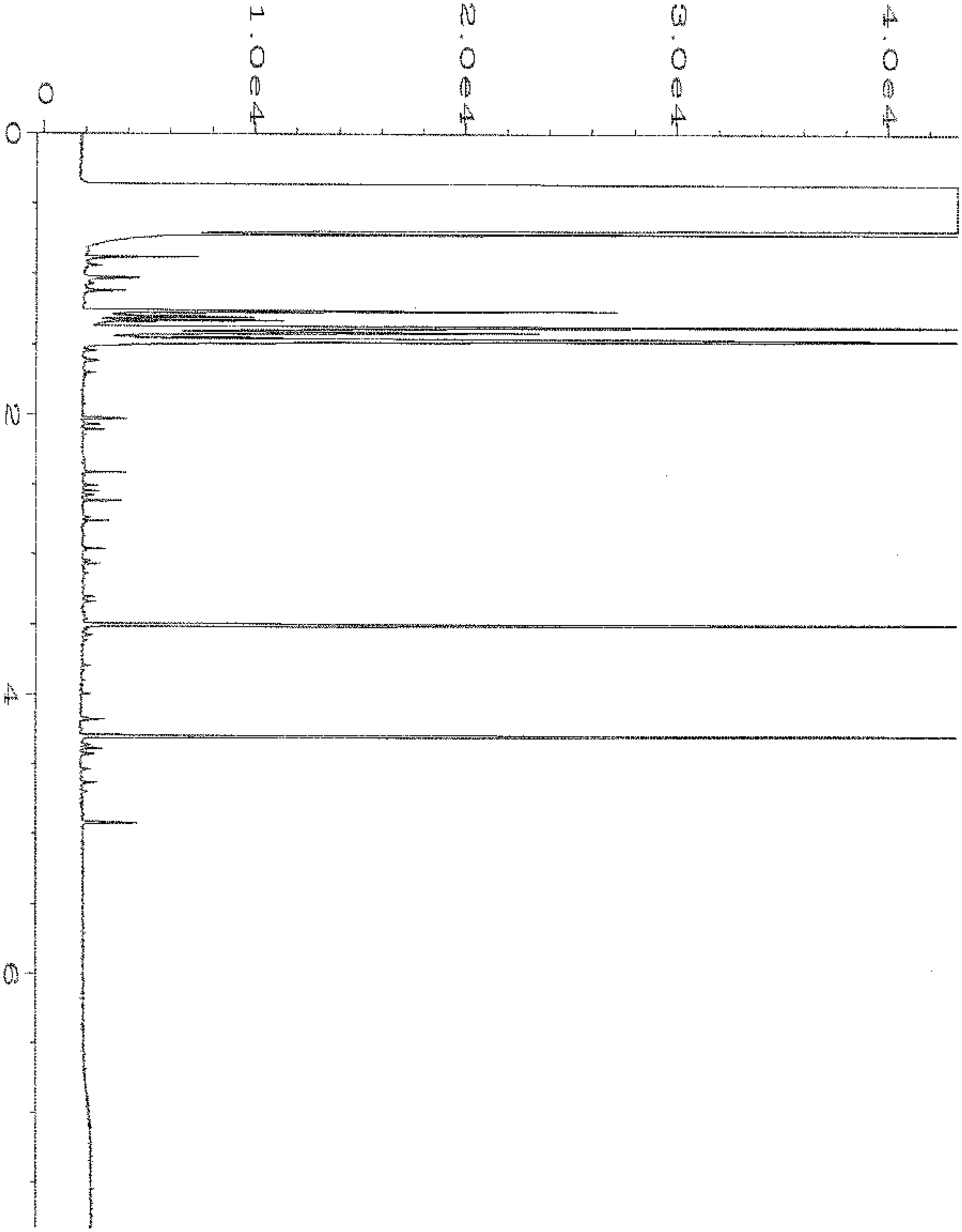
```
Data File Name    : C:\HPCHEM\4\DATA\05-08-20\039F0701.D
Operator          : TL                           Page Number      : 1
Instrument        : GC#4                         Vial Number      : 39
Sample Name       : 005097-36                    Injection Number : 1
Run Time Bar Code:                               Sequence Line    : 7
Acquired on       : 08 May 20  08:07 PM          Instrument Method: DX.MTH
Report Created on: 11 May 20  08:25 AM           Analysis Method  : DEFAULT.MTH
```



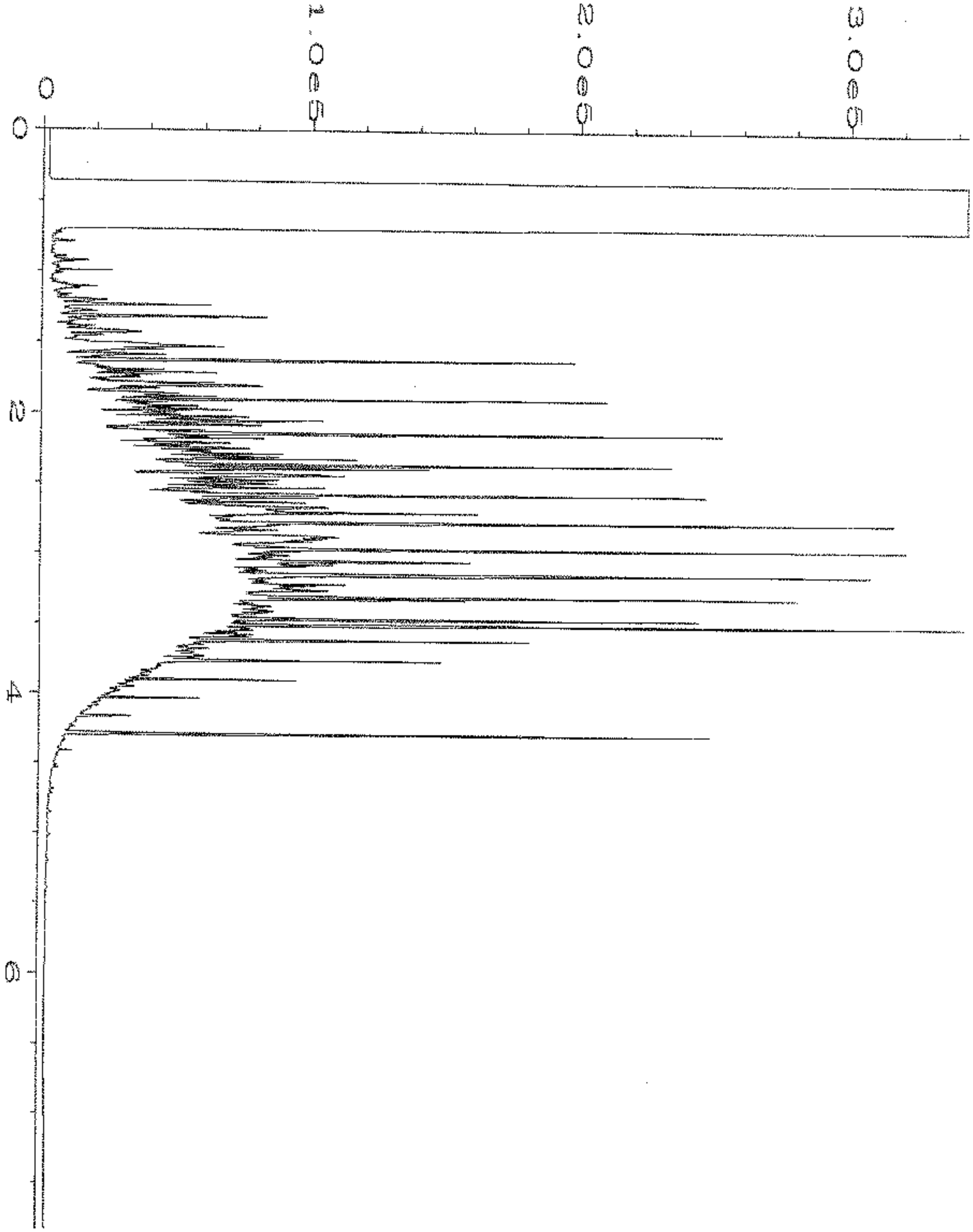
```
Data File Name    : C:\HPCHEM\4\DATA\05-08-20\040F0701.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC#4                                Vial Number       : 40
Sample Name       : 005097-37                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 7
Acquired on       : 08 May 20   08:19 PM                Instrument Method: DX.MTH
Report Created on: 11 May 20   08:26 AM                 Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\05-08-20\006F0301.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 6
Sample Name       : 00-1032 mb                      Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 3
Acquired on       : 08 May 20   01:56 PM            Instrument Method: DX.MTH
Report Created on: 11 May 20   09:53 AM             Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\4\DATA\05-08-20\015F0501.D
Operator          : TL                                    Page Number      : 1
Instrument        : GC#4                                  Vial Number      : 15
Sample Name       : 00-1038 mb                            Injection Number : 1
Run Time Bar Code:                                        Sequence Line    : 5
Acquired on       : 08 May 20  02:55 PM                   Instrument Method: DX.MTH
Report Created on: 11 May 20  08:40 AM                    Analysis Method  : DEFAULT.MTH
```



Data File Name   : C:\HPCHEM\4\DATA\05-08-20\005F0801.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 1000 Dx 59-162B
Run Time Bar Code:
Acquired on   : 08 May 20 08:43 PM
Report Created on: 11 May 20 08:40 AM

Page Number   : 1
Vial Number   : 5
Injection Number : 1
Sequence Line   : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

005097 [redacted]

SAMPLE CHAIN OF CUSTODY

ME 05/08/20 VW5/AD4/AU5

[redacted] Page # 1 of 4

Report To Gabe Cisneros
Company Floyd Snider
Address 601 Union St, Suite 600
City, State, ZIP Seattle, WA 98101
Phone 206 292-2078 Email gabe.cisneros@floydsnider.com

SAMPLERS (*signature*)

PROJECT NAME: POL - TPH

PO #

REMARKS *Select VOCs: ~~VOCs~~ include: EDB, EDC, MTBE, and Naphthalene

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
[✓ Default] Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	* Full VOCs EPA 8260	cPAHs PAHs EPA 8270	PCBs EPA 8082	Lead, total	Lead, diss.	Select VOCs*	EDB by 8011	⊗ per GC 5/8/20 mi Notes All PAHs per
MW-01-050620	01 A-H	5/6/20	1324	GW	8	X	X	X			X						GC 5/15/20 aus
MW-02-050620	02 A-H		1208		8	X	X	X			X						
MW-07-050620	03 A-J		1422		10	X	X	X		~~X~~	X		X	X	X	⊗	Not Field Filtered
MW-10-050620	04 A-J		1221		10	X	X	X		X	X		X	X	X	⊗	
MW-8-050620	05 A-H		1155		8	X	X	X			X						Full list
MW-35-050620	06		1035		8	X	X	X		X	X					⊗	
MW-133-050620	07		1601		8	X	X	X			X						
MW-33-050620	08		1547		8	X	X	X			X						
MW-23-050620	09		1555		8	X	X	X		X	X					⊗	
MW-6-050620	10		1454		8	X	X	X			X						

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Adia Jumper	Floyd Snider	5/8/20	1005
Received by:	Nhan Phan	FeBI	5/8/20	1005
Relinquished by:				
Received by:		Samples received at 3 °C		

005097
[redacted]

SAMPLE CHAIN OF CUSTODY

ME 05/08/20 vw5/AD4/AD5

[redacted] Page # 2 of 4

Report To Gabe Cisneros
Company Floyd Snider
Address
City, State, ZIP see page 1
Phone Email

SAMPLERS (*signature*)	
PROJECT NAME POL-TPH	PO #
REMARKS Select VOCs = EDB, EDC, MTBE, Naphthalene Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
[✓ Default] Dispose after 30 days

						ANALYSES REQUESTED												
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260 *full	~~PAHs~~ cPAHs EPA 8270	PCBs EPA 8082	total Lead	diss Lead *	Select VOCS	EDB by 8011	Notes
MW-40-050620	11 A-H	5/6/20	1440	GW	8	X	X	X		X	X					⊗	
MW-34-050620	12		1051		8	X	X	X		X	X					⊗	
MW-31-050620	13		1305		8	X	X	X			X						
MW-03-050620	14 A-J		1254		10	X	X	X			X		X	X	X	⊗	*Not Filtered
UST-4-050620	15 A-J		1504		10	X	X	X			X		X	X	X	⊗	*Not Filtered
MW-36-050620	16 A-H		1708		8	X	X	X			X						
MW-24-050720	17	5/7/20	0947		8	X	X	X			X						
MW-25-050720	18		1107		8	X	X	X			X						
MW-20-050720	19		12:27		8	X	X	X			X						
MW-14-050720	20		14:14		8	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:	Adia Jumper	Floyd Snider	5/8/20	1005
Received by:	Nhan Phan	FeBI	5/8/20	1005
Relinquished by:				
Received by:		Samples received at 3 °C		

005097
[redacted]

SAMPLE CHAIN OF CUSTODY ME 05/08/20 [redacted] VWS/ADY/ADS

Report To Gabe Cisneros
Company Floyd Snider
Address
City, State, ZIP see page 1
Phone ______ Email ______

SAMPLERS (signature)		Page # 3 of 4
PROJECT NAME POL - TPH	PO #	TURNAROUND TIME ☒ Standard turnaround ☐ RUSH ______ Rush charges authorized by:
REMARKS Project specific RLs? - Yes / No	INVOICE TO	SAMPLE DISPOSAL ☐ Archive samples ☐ Other ______ [✓ Default:] Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	EDB by 8011				Notes
MW-18-050720	21 A-H	5/7/20	1308	GW	8	X	X	X			X						
MW-17-050720	22		1103		8	X	X	X			X						
MW-37-050720	23		0845		8	X	X	X			X						
MW-39-050720	24		1344		8	X	X	X		X	X		(x)				
MW-11-050720	25		1237		8	X	X	X			X						
MW-13-050720	26		1138		8	X	X	X			X						
MW-27-050720	27		1027		8	X	X	X			X						
MW-22-050720	28		0927		8	X	X	X			X						
MW-127-050720	29		1041		8	X	X	X			X						
MW-38-050720	30		0836		8	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:	Adia Jumper	Floyd Snider	5/8/20	1005
Received by:	Nhan Phan	FEBI	5/8/20	1005
Relinquished by:				
Received by:		Samples received at 3 °C		

005097

SAMPLE CHAIN OF CUSTODY

ME 05/08/20 VW5/A14/ A05

Report To Gabe Cisneros

Company Floyd Snider

Address see page 1

City, State, ZIP

Phone — — Email

SAMPLERS (*signature*)

PROJECT NAME POL-TPH

PO #

REMARKS

INVOICE TO

Project specific RLs? - Yes / No

Page # 4 of 4

TURNAROUND TIME

☒ Standard turnaround

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☐ Archive samples

☐ Other

[✓ Default]: Dispose after 30 days

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260 * Full	PAHs EPA 8270 PAH cPAH	PCBs EPA 8082	EDB by 8011			Notes
MW-19-050720	31 A-H	5/7/20	1429	GW	8	X	X	X		X	X		ⓧ			✓ per GC 5/8/20 ME
MW-32-050720	32		0841		8	X	X	X			X					
MW-16-050720	33		1151		8	X	X	X			X					
MW-26-050720	34 A-X		1011		24	X	X	X			X					MS/MSD
MW-15-050720	35 A-H		1321		8	X	X	X			X					
MW-12-050720	36 A-X		1441		24	X	X	X		X	X		ⓧ			MS/MSD
MW-29-050620	37 A-H	5/6/20	1541	GW	8	✓	✓	✓			✓					Added at lab (NP) 5/8/20

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Adia Jumper	Floyd Snider	5/8/20	1005
Received by:		Nhan Phan	FeBI	5/8/20	1005
Relinquished by:					
Received by:			Samples received	at 3 °C	

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Floyd | Snider
Gabe Cisneros
601 Union St., Suite 600
Seattle, WA 98101

RE: POL - TPH
Work Order Number: 2005072

May 15, 2020

Attention Gabe Cisneros:

Fremont Analytical, Inc. received 15 sample(s) on 5/8/2020 for the analyses presented in the following report.

Biochemical Oxygen Demand by SM 5210B
Chemical Oxygen Demand by SM 5220D
Dissolved Gases by RSK-175
Dissolved Metals by EPA Method 200.8
Ion Chromatography by EPA Method 300.0
Total Alkalinity by SM 2320B

This report consists of the following:

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

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

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT: Floyd | Snider
Project: POL - TPH
Work Order: 2005072

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2005072-001	MW-31-050620	05/06/2020 1:05 PM	05/08/2020 10:21 AM
2005072-002	MW-10-050620	05/06/2020 12:21 PM	05/08/2020 10:21 AM
2005072-003	MW-40-050620	05/06/2020 2:40 PM	05/08/2020 10:21 AM
2005072-004	MW-29-050620	05/06/2020 3:41 PM	05/08/2020 10:21 AM
2005072-005	MW-23-050620	05/06/2020 3:55 PM	05/08/2020 10:21 AM
2005072-006	MW-14-050720	05/07/2020 2:14 PM	05/08/2020 10:21 AM
2005072-007	MW-20-050720	05/07/2020 12:27 PM	05/08/2020 10:21 AM
2005072-008	MW-25-050720	05/07/2020 11:07 AM	05/08/2020 10:21 AM
2005072-009	MW-24-050720	05/07/2020 9:47 AM	05/08/2020 10:21 AM
2005072-010	MW-18-050720	05/07/2020 1:08 PM	05/08/2020 10:21 AM
2005072-011	MW-17-050720	05/07/2020 11:03 AM	05/08/2020 10:21 AM
2005072-012	MW-19-050720	05/07/2020 2:29 PM	05/08/2020 10:21 AM
2005072-013	MW-22-050720	05/07/2020 9:27 AM	05/08/2020 10:21 AM
2005072-014	MW-12-050720	05/07/2020 2:41 PM	05/08/2020 10:21 AM
2005072-015	Trip Blank	04/27/2020 1:03 PM	05/08/2020 10:21 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2005072**

Date: **5/15/2020**

CLIENT: Floyd | Snider

Project: POL - TPH

I. SAMPLE RECEIPT:

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

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

Qualifiers:

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

Acronyms:

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

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2005072-001
Client Sample ID: **MW-31-050620**

Collection Date: 5/6/2020 1:05:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	ND	0.00863		mg/L	1	5/12/2020 11:43:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	5.60	0.500	DH	mg/L	5	5/11/2020 11:39:00 AM
Sulfate	17.0	1.50	D	mg/L	5	5/11/2020 11:39:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	ND	2.00		µg/L	1	5/13/2020 5:17:12 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	229	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Collection Date: 5/6/2020 12:21:00 PM
Project: POL - TPH
Lab ID: 2005072-002
Matrix: Groundwater
Client Sample ID: **MW-10-050620**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	1.64	0.0345	D	mg/L	4	5/12/2020 1:49:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	ND	0.100	H	mg/L	1	5/8/2020 10:13:00 PM
Sulfate	0.780	0.300		mg/L	1	5/8/2020 10:13:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	663	2.00		µg/L	1	5/13/2020 5:21:46 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	42.9	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2005072-003
Client Sample ID: **MW-40-050620**

Collection Date: 5/6/2020 2:40:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Biochemical Oxygen Demand by SM 5210B				Batch ID: R59167		Analyst: SS
Biochemical Oxygen Demand	11.1	2.00	H	mg/L	1	5/8/2020 6:45:00 PM
Chemical Oxygen Demand by SM 5220D				Batch ID: R59170		Analyst: WF
Chemical Oxygen Demand	46.1	10.0		mg/L	1	5/13/2020 6:03:13 PM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Collection Date: 5/6/2020 3:41:00 PM
Project: POL - TPH
Lab ID: 2005072-004
Matrix: Groundwater
Client Sample ID: **MW-29-050620**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	0.00971	0.00863		mg/L	1	5/12/2020 11:52:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	2.37	0.100	H	mg/L	1	5/8/2020 10:36:00 PM
Sulfate	9.87	0.300		mg/L	1	5/8/2020 10:36:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	ND	2.00		µg/L	1	5/13/2020 5:26:20 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	46.8	2.50		mg/L	1	5/15/2020 9:20:51 AM

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2005072-005
Client Sample ID: **MW-23-050620**

Collection Date: 5/6/2020 3:55:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	0.770	0.0345	D	mg/L	4	5/12/2020 1:22:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	ND	0.200	DH	mg/L	2	5/8/2020 10:59:00 PM
Sulfate	3.30	0.600	D	mg/L	2	5/8/2020 10:59:00 PM
NOTES: Diluted due to matrix.						
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	2,050	2.00		µg/L	1	5/13/2020 5:30:54 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	102	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Collection Date: 5/7/2020 2:14:00 PM
Project: POL - TPH
Lab ID: 2005072-006
Matrix: Groundwater
Client Sample ID: **MW-14-050720**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	ND	0.00863		mg/L	1	5/12/2020 12:28:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	3.13	0.100	E	mg/L	1	5/8/2020 11:22:00 PM
Nitrate (as N)	3.02	0.200	DH	mg/L	2	5/11/2020 12:02:00 PM
Sulfate	7.26	0.300		mg/L	1	5/8/2020 11:22:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	5.97	2.00		µg/L	1	5/13/2020 5:35:28 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	205	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Collection Date: 5/7/2020 12:27:00 PM
Project: POL - TPH
Lab ID: 2005072-007
Matrix: Groundwater
Client Sample ID: **MW-20-050720**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Biochemical Oxygen Demand by SM 5210B				Batch ID: R59167		Analyst: SS
Biochemical Oxygen Demand	44.8	2.00		mg/L	1	5/8/2020 6:45:00 PM
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	5.89	0.173	DE	mg/L	20	5/12/2020 1:52:00 PM

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	ND	0.200	D	mg/L	2	5/8/2020 11:46:00 PM
Sulfate	0.686	0.600	D	mg/L	2	5/8/2020 11:46:00 PM

NOTES:
Diluted due to matrix.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	2,970	20.0	D	µg/L	10	5/15/2020 9:17:50 AM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	429	2.50		mg/L	1	5/15/2020 9:20:51 AM
Chemical Oxygen Demand by SM 5220D				Batch ID: R59170		Analyst: WF
Chemical Oxygen Demand	69.0	10.0		mg/L	1	5/13/2020 6:03:13 PM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2005072-008
Client Sample ID: **MW-25-050720**

Collection Date: 5/7/2020 11:07:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	2.05	0.0863	D	mg/L	10	5/12/2020 1:57:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	5/9/2020 12:09:00 AM
Sulfate	4.12	0.300		mg/L	1	5/9/2020 12:09:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	723	2.00		µg/L	1	5/13/2020 5:53:47 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	78.0	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2005072-009
Client Sample ID: **MW-24-050720**
Collection Date: 5/7/2020 9:47:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	0.0157	0.00863		mg/L	1	5/12/2020 12:38:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	0.884	0.100		mg/L	1	5/9/2020 1:18:00 AM
Sulfate	5.23	0.300		mg/L	1	5/9/2020 1:18:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	9.06	2.00		µg/L	1	5/13/2020 5:58:21 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	107	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Collection Date: 5/7/2020 1:08:00 PM
Project: POL - TPH
Lab ID: 2005072-010
Matrix: Groundwater
Client Sample ID: **MW-18-050720**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	ND	0.00863		mg/L	1	5/12/2020 12:40:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	0.956	0.100		mg/L	1	5/9/2020 1:41:00 AM
Sulfate	4.02	0.300		mg/L	1	5/9/2020 1:41:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	3.53	2.00		µg/L	1	5/13/2020 6:02:55 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	87.8	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2005072-011
Client Sample ID: **MW-17-050720**
Collection Date: 5/7/2020 11:03:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	ND	0.00863		mg/L	1	5/12/2020 12:42:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	0.878	0.100		mg/L	1	5/9/2020 2:04:00 AM
Sulfate	3.31	0.300		mg/L	1	5/9/2020 2:04:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	2.48	2.00		µg/L	1	5/13/2020 6:07:29 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	205	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2005072-012
Client Sample ID: MW-19-050720

Collection Date: 5/7/2020 2:29:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	ND	0.00863		mg/L	1	5/12/2020 12:47:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	5.72	0.100	E	mg/L	1	5/9/2020 2:27:00 AM
Nitrate (as N)	5.25	0.500	DH	mg/L	5	5/11/2020 12:25:00 PM
Sulfate	10.1	0.300		mg/L	1	5/9/2020 2:27:00 AM

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	ND	2.00		µg/L	1	5/13/2020 6:12:03 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	107	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Collection Date: 5/7/2020 9:27:00 AM
Project: POL - TPH
Lab ID: 2005072-013
Matrix: Groundwater
Client Sample ID: **MW-22-050720**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	0.975	0.0345	D	mg/L	4	5/12/2020 1:46:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	0.113	0.100		mg/L	1	5/9/2020 3:37:00 AM
Sulfate	ND	0.300		mg/L	1	5/9/2020 3:37:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	788	2.00		µg/L	1	5/13/2020 6:16:37 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	151	2.50		mg/L	1	5/15/2020 9:20:51 AM

Analytical Report

Work Order: **2005072**
Date Reported: **5/15/2020**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2005072-014
Client Sample ID: **MW-12-050720**

Collection Date: 5/7/2020 2:41:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R59181		Analyst: AD
Methane	0.0611	0.00863		mg/L	1	5/12/2020 12:59:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 28280		Analyst: SS
Nitrate (as N)	0.924	0.100		mg/L	1	5/9/2020 4:00:00 AM
Sulfate	0.496	0.300		mg/L	1	5/9/2020 4:00:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 28310		Analyst: CO
Manganese	23.2	2.00		µg/L	1	5/13/2020 6:21:10 PM
Total Alkalinity by SM 2320B				Batch ID: R59195		Analyst: WF
Alkalinity, Total (As CaCO3)	53.6	2.50		mg/L	1	5/15/2020 9:20:51 AM

Date: *5/15/2020*

Work Order: 2005072
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Biochemical Oxygen Demand by SM 5210B

Sample ID:	**MB-59167**	SampType:	**MBLK**	Units:	**mg/L**	Prep Date:	**5/8/2020**
Client ID:	**MBLKW**	Batch ID:	**R59167**			Analysis Date:	**5/8/2020**

RunNo: **59167**
SeqNo: **1182209**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Biochemical Oxygen Demand	ND	2.00									

Sample ID:	**LCS-59167**	SampType:	**LCS**	Units:	**mg/L**	Prep Date:	**5/8/2020**
Client ID:	**LCSW**	Batch ID:	**R59167**			Analysis Date:	**5/8/2020**

RunNo: **59167**
SeqNo: **1182210**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Biochemical Oxygen Demand	173	2.00	198.0	0	87.2	84.6	115.4				

Sample ID:	**2005072-003ADUP**	SampType:	**DUP**	Units:	**mg/L**	Prep Date:	**5/8/2020**
Client ID:	**MW-40-050620**	Batch ID:	**R59167**			Analysis Date:	**5/8/2020**

RunNo: **59167**
SeqNo: **1182212**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Biochemical Oxygen Demand	ND	2.00						11.13	200	20	RH

NOTES:
R - High RPD due to low analyte concentration. In this range, high RPD's may be expected.

Work Order: 2005072
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Chemical Oxygen Demand by SM 5220D

Sample ID: **MB-R59170** SampType: **MBLK** Units: **mg/L** Prep Date: **5/13/2020** RunNo: **59170**
Client ID: **MBLKW** Batch ID: **R59170** Analysis Date: **5/13/2020** SeqNo: **1182259**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	ND	10.0									

Sample ID: **LCS-R59170** SampType: **LCS** Units: **mg/L** Prep Date: **5/13/2020** RunNo: **59170**
Client ID: **LCSW** Batch ID: **R59170** Analysis Date: **5/13/2020** SeqNo: **1182260**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	75.9	10.0	75.00	0	101	83.8	113				

Sample ID: **2005072-003BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **5/13/2020** RunNo: **59170**
Client ID: **MW-40-050620** Batch ID: **R59170** Analysis Date: **5/13/2020** SeqNo: **1182262**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	50.2	10.0						46.06	8.66	30	

Sample ID: **2005072-003BMS** SampType: **MS** Units: **mg/L** Prep Date: **5/13/2020** RunNo: **59170**
Client ID: **MW-40-050620** Batch ID: **R59170** Analysis Date: **5/13/2020** SeqNo: **1182263**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	122	10.0	75.00	46.06	101	56.9	126				

Sample ID: **2005072-003BMSD** SampType: **MSD** Units: **mg/L** Prep Date: **5/13/2020** RunNo: **59170**
Client ID: **MW-40-050620** Batch ID: **R59170** Analysis Date: **5/13/2020** SeqNo: **1182264**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	122	10.0	75.00	46.06	101	56.9	126	122.1	0.285	30	

Date: *5/15/2020*

Work Order: 2005072
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **MB-R59181A** SampType: **MBLK** Units: **mg/L** Prep Date: **5/12/2020** RunNo: **59181**
Client ID: **MBLKW** Batch ID: **R59181** Analysis Date: **5/12/2020** SeqNo: **1182562**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00863									

Sample ID: **LCS-R59181** SampType: **LCS** Units: **mg/L** Prep Date: **5/12/2020** RunNo: **59181**
Client ID: **LCSW** Batch ID: **R59181** Analysis Date: **5/12/2020** SeqNo: **1182561**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	854	0.00863	1,000	0	85.4	70	130				

Sample ID: **2005072-001BREP** SampType: **REP** Units: **mg/L** Prep Date: **5/12/2020** RunNo: **59181**
Client ID: **MW-31-050620** Batch ID: **R59181** Analysis Date: **5/12/2020** SeqNo: **1182536**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00863						0		30	

Work Order: 2005072
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-28310** SampType: **MBLK** Units: **µg/L** Prep Date: **5/12/2020** RunNo: **59185**
Client ID: **MBLKW** Batch ID: **28310** Analysis Date: **5/13/2020** SeqNo: **1182734**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	2.00									

Sample ID: **LCS-28310** SampType: **LCS** Units: **µg/L** Prep Date: **5/12/2020** RunNo: **59185**
Client ID: **LCSW** Batch ID: **28310** Analysis Date: **5/13/2020** SeqNo: **1182735**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	103	2.00	100.0	0	103	85	115				

Sample ID: **MB-28291FB** SampType: **MBLK** Units: **µg/L** Prep Date: **5/12/2020** RunNo: **59185**
Client ID: **MBLKW** Batch ID: **28310** Analysis Date: **5/13/2020** SeqNo: **1182736**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	2.00									

NOTES:
Filter Blank

Sample ID: **2004342-001BDUP** SampType: **DUP** Units: **µg/L** Prep Date: **5/12/2020** RunNo: **59185**
Client ID: **BATCH** Batch ID: **28310** Analysis Date: **5/13/2020** SeqNo: **1182740**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	514	2.00						535.5	4.16	30	

Sample ID: **2004342-001BMS** SampType: **MS** Units: **µg/L** Prep Date: **5/12/2020** RunNo: **59185**
Client ID: **BATCH** Batch ID: **28310** Analysis Date: **5/13/2020** SeqNo: **1182741**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	1,020	2.00	500.0	535.5	96.2	70	130				

Work Order: 2005072
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **2004342-001BMSD**	SampType: **MSD**	Units: **µg/L**	Prep Date: **5/12/2020**	RunNo: **59185**					
Client ID: **BATCH**	Batch ID: **28310**		Analysis Date: **5/13/2020**	SeqNo: **1182742**					

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	1,020	2.00	500.0	535.5	96.0	70	130	1,016	0.0843	30	

Work Order: 2005072
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **LCS-28280** SampType: **LCS** Units: **mg/L** Prep Date: **5/8/2020** RunNo: **59105**
Client ID: **LCSW** Batch ID: **28280** Analysis Date: **5/8/2020** SeqNo: **1180823**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.714	0.100	0.7500	0	95.2	90	110				
Sulfate	3.60	0.300	3.750	0	96.0	90	110				

Sample ID: **MB-28280** SampType: **MBLK** Units: **mg/L** Prep Date: **5/8/2020** RunNo: **59105**
Client ID: **MBLKW** Batch ID: **28280** Analysis Date: **5/8/2020** SeqNo: **1180825**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.100									
Sulfate	ND	0.300									

Sample ID: **2005025-001BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **5/8/2020** RunNo: **59105**
Client ID: **BATCH** Batch ID: **28280** Analysis Date: **5/8/2020** SeqNo: **1180827**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.100						0		20	H
Sulfate	1.76	0.300						1.776	0.905	20	

Sample ID: **2005025-001BMS** SampType: **MS** Units: **mg/L** Prep Date: **5/8/2020** RunNo: **59105**
Client ID: **BATCH** Batch ID: **28280** Analysis Date: **5/8/2020** SeqNo: **1180828**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.722	0.100	0.7500	0.05500	88.9	80	120				H
Sulfate	5.42	0.300	3.750	1.776	97.2	80	120				

Work Order: 2005072
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2005025-001BMSD** SampType: **MSD** Units: **mg/L** Prep Date: **5/8/2020** RunNo: **59105**
Client ID: **BATCH** Batch ID: **28280** Analysis Date: **5/8/2020** SeqNo: **1180829**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.717	0.100	0.7500	0.05500	88.3	80	120	0.7220	0.695	20	H
Sulfate	5.40	0.300	3.750	1.776	96.7	80	120	5.420	0.351	20	

Sample ID: **2005072-012CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **5/8/2020** RunNo: **59105**
Client ID: **MW-19-050720** Batch ID: **28280** Analysis Date: **5/9/2020** SeqNo: **1180851**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	5.72	0.100						5.722	0.0175	20	E
Sulfate	10.1	0.300						10.12	0.178	20	

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Sample ID: **2005072-012CMS** SampType: **MS** Units: **mg/L** Prep Date: **5/8/2020** RunNo: **59105**
Client ID: **MW-19-050720** Batch ID: **28280** Analysis Date: **5/9/2020** SeqNo: **1180852**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	6.52	0.100	0.7500	5.722	106	80	120				E
Sulfate	14.0	0.300	3.750	10.12	103	80	120				

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Work Order: 2005072
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: **MB-R59195** SampType: **MBLK** Units: **mg/L** Prep Date: **5/15/2020** RunNo: **59195**
Client ID: **MBLKW** Batch ID: **R59195** Analysis Date: **5/15/2020** SeqNo: **1182938**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: **LCS-R59195** SampType: **LCS** Units: **mg/L** Prep Date: **5/15/2020** RunNo: **59195**
Client ID: **LCSW** Batch ID: **R59195** Analysis Date: **5/15/2020** SeqNo: **1182939**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	106	2.50	100.0	0	106	94.3	116				

Sample ID: **2005072-001CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **5/15/2020** RunNo: **59195**
Client ID: **MW-31-050620** Batch ID: **R59195** Analysis Date: **5/15/2020** SeqNo: **1182941**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	239	2.50						229.1	4.17	20	

Sample ID: **2005072-014CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **5/15/2020** RunNo: **59195**
Client ID: **MW-12-050720** Batch ID: **R59195** Analysis Date: **5/15/2020** SeqNo: **1182954**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	48.8	2.50						53.62	9.52	20	

Fremont Analytical

Sample Log-In Check List

Client Name:	**FS**	Work Order Number:	**2005072**
Logged by:	**Clare Griggs**	Date Received:	**5/8/2020 10:21:00 AM**

Chain of Custody

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

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes ☑ No ☐ Not Required ☐
6. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
7. Were all items received at a temperature of >2°C to 6°C * Yes ☑ No ☐ NA ☐
8. Sample(s) in proper container(s)? Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
10. Are samples properly preserved? Yes ☑ No ☐
11. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
12. Is there headspace in the VOA vials? Yes ☐ No ☐ NA ☑
13. Did all samples containers arrive in good condition(unbroken)? Yes ☑ No ☐
14. Does paperwork match bottle labels? Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
16. Is it clear what analyses were requested? Yes ☑ No ☐
17. Were all holding times able to be met? Yes ☐ No ☑

Special Handling (if applicable)

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

Person Notified: Gabe Cisneros
Date: 5/11/2020
By Whom: Clare Griggs
Via: ☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding: Hold times, confirming metals analysis.
Client Instructions: Proceed despite hold time. Analyze for Dissolved Mn, not Total Mn.

19. Additional remarks:

Item Information

Item #	Temp ºC
Cooler 1	2.5
Cooler 2	5.0
Sample 1	0.9
Sample 2	0.8

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

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Client:	Floyd Snider
Address:	601 Union St
City, State, Zip:	Seattle, WA
Telephone:	206-292-2078
Fax:	—
Date:	5/6/20
Page:	1 **of:** 2
Project Name:	POL-TPH
Project No:	
Collected by:	P.O., G.C., A.J., T.S.
Location:	Longview
Report To (PM):	Gabe Cisneros
PM Email:	gabe.cisneros@floydsnider.com
Laboratory Project No (internal):	2005072
Special Remarks:	

Sample Disposal: ☐ Return to client ☒ Disposal by lab (after 30 days)

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX Methane	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8) Mn	Total (T) | Dissolved (D)	Anions (IC)***	EDB (8011)	BOD/COD	Alk + Nitrate, Sulfate		# of Bottles	Comments
✓ 1	MW-31-050620	5/6/20	1305	GW			X							X					X		4	
✓ 2	MW-10-050620	5/6/20	1221	GW			X							X					X		4	
✓ 3	MW-40-050620	5/6/20	1440	GW														✓			2	
✓ 4	MW-29-050620	5/6/20	1541	GW			X							X					X		4	
✓ 5	MW-23-050620	5/6/20	1555	GW			X							X					X		4	
✓ 6	MW-14-050720	5/7/20	1414	GW			X							X					X		4	
✓ 7	MW-20-050720	5/7	1227	GW			X							X				X	X		6	
✓ 8	MW-25-050720	5/7	1107	GW			X							X					X		4	
✓ 9	MW-24-050720	5/7	0947	GW			X							X					X		4	
✓ 10	MW-18-050720	5/7	1308	GW			X							X					X		4	

***Matrix:** A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, [✓ GW = Ground Water], SW = Storm Water, WW = Waste Water

****Metals (Circle):** MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg [✓ Mn] Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

*****Anions (Circle):** [✓ Nitrate] Nitrite Chloride [✓ Sulfate] Bromide O-Phosphate Fluoride Nitrate+Nitrite

Turn-around Time:
☒ Standard
☐ 3 Day
☐ 2 Day
☐ Next Day
Same Day ______ *(specify)*

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished x Adri	Date/Time 5/8/20 944	Received x	Date/Time 5/8/20 @ 1024
Relinquished x	Date/Time	Received x	Date/Time

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Date: 5/7/20 **Page:** 2 **of:** 2

Laboratory Project No (internal): 2005072

Special Remarks:

Project Name: POL-TPH

Project No:

Client: Floyd Snider

Address:

City, State, Zip: see page 1

Telephone:

Fax:

Collected by: P.D., T.S., A.J., and G.C.

Location: Longview.

Report To (PM): Gabe Cisneros

PM Email:

Sample Disposal: ☐ Return to client ☒ Disposal by lab (after 30 days)

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8) Mn	Total (T) | Dissolved (D)	Anions (IC)***	EDB (8011)	Methane	Alkalinity	Nitrate, Sulfate		# of Bottles	Comments
1	MW-17-050720	5/7/20	1103	GW										X				X	X	X		4	
2	MW-19-050720	↓	1429	↓										X				X	X	X		4	
3	MW-22-050720	↓	0929	↓										X				X	X	X		4	
4	MW-12-050720	↓	1441	↓										X				X	X	X		4	
5	~~Trip Blank~~																						
6																							
7																							
8																							
9																							
10																							

***Matrix:** A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

****Metals (Circle):** MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg [✓ Mn] Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

*****Anions (Circle):** [✓ Nitrate] Nitrite Chloride [✓ Sulfate] Bromide O-Phosphate Fluoride Nitrate+Nitrite

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x	5/8/20 944	x	~~5/8/~~ 5/8/20 @1024
x		x	

Turn-around Time:

☒ Standard
☐ 3 Day
☐ 2 Day
☐ Next Day
Same Day (specify)

www.fremontanalytical.com

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

August 25, 2020

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 August 11, 2020 from the POL-TPH, F&BI 008152 project. There are 111 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. 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
FDS0825R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on August 11, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 008152 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
008152 -01	MW-37-081020
008152 -02	MW-38-081020
008152 -03	MW-36-081020
008152 -04	MW-136-081020
008152 -05	UST-4-081020
008152 -06	MW-34-081020
008152 -07	MW-35-081020
008152 -08	MW-31-081020
008152 -09	MW-27-081020
008152 -10	MW-26-081020
008152 -11	MW-19-081020
008152 -12	MW-6-081020
008152 -13	MW-01-081020
008152 -14	MW-39-081020
008152 -15	MW-13-081020
008152 -16	MW-2-081020
008152 -17	MW-15-081020
008152 -18	MW-10-081020
008152 -19	MW-3-081020
008152 -20	MW-8-081020
008152 -21	MW-22-081120
008152 -22	MW-30-081120
008152 -23	MW-32-081120
008152 -24	T-2-081120
008152 -25	MW-25-081120
008152 -26	MW-17-081120
008152 -27	MW-40-081120
008152 -28	MW-33-081120
008152 -29	MW-23-081120
008152 -30	MW-29-081120
008152 -31	MW-18-081120
008152 -32	MW-24-081120
008152 -33	MW-7-081120
008152 -34	MW-107-081120
008152 -35	MW-12-081120
008152 -36	MW-28-081120

CASE NARRATIVE (continued)

Laboratory ID	Floyd-Snider
008152 -37	MW-14-081120

The 8260D laboratory control sample exceeded the acceptance criteria for chloroethane and bromomethane. In addition, the 8260D matrix spike for 1,2-dibromo-3-chloropropane exceeded the acceptance criteria. The compounds were not detected, therefore the data were acceptable.

The 8260D matrix spike and matrix spike duplicate failed the relative percent difference for methylene chloride. The analytes were not detected therefore the data were acceptable.

Several 8270E surrogates exceeded the acceptance criteria. cPAHs were not associated with the surrogates, therefore the data were acceptable.

All other quality control requirements were acceptable.

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/12/20 and 08/13/20
Date Analyzed: 08/12/20 and 08/13/20

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-37-081020 008152-01	120	94
MW-38-081020 008152-02	<100	97
MW-36-081020 008152-03	<100	93
MW-136-081020 008152-04	<100	91
UST-4-081020 008152-05	<100	93
MW-34-081020 008152-06	130	93
MW-35-081020 008152-07	<100	95
MW-31-081020 008152-08	<100	92
MW-27-081020 008152-09	<100	93
MW-26-081020 008152-10	<100	94

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/12/20 and 08/13/20
Date Analyzed: 08/12/20 and 08/13/20

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-19-081020 008152-11	<100	96
MW-6-081020 008152-12	<100	95
MW-01-081020 008152-13	<100	94
MW-39-081020 008152-14	510	104
MW-13-081020 008152-15	<100	95
MW-2-081020 008152-16	<100	93
MW-15-081020 008152-17	120	91
MW-10-081020 008152-18	4,100	84
MW-3-081020 008152-19	570	95
MW-8-081020 008152-20	3,000	86

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/12/20 and 08/13/20
Date Analyzed: 08/12/20 and 08/13/20

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-22-081120 008152-21	<100	93
MW-30-081120 008152-22	<100	93
MW-32-081120 008152-23	<100	93
T-2-081120 008152-24	<100	94
MW-25-081120 008152-25	<100	96
MW-17-081120 008152-26	<100	94
MW-40-081120 008152-27	2,000	110
MW-33-081120 008152-28	150	93
MW-23-081120 008152-29	<100	94
MW-29-081120 008152-30	<100	94

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/12/20 and 08/13/20
Date Analyzed: 08/12/20 and 08/13/20

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-18-081120 008152-31	<100	94
MW-24-081120 008152-32	<100	93
MW-7-081120 008152-33	1,200	112
MW-107-081120 008152-34	1,300	117
MW-12-081120 008152-35	7,100	87
MW-28-081120 008152-36	<100	92
MW-14-081120 008152-37	<100	93
Method Blank 00-1785 MB	<100	93
Method Blank 00-1788 MB	<100	94

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/12/20 and 08/13/20
Date Analyzed: 08/12/20 and 08/13/20

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-37-081020 008152-01	<50	<250	ip
MW-38-081020 008152-02	57 x	<250	93
MW-36-081020 008152-03	<50	<250	92
MW-136-081020 008152-04	<50	<250	85
UST-4-081020 008152-05	57 x	<250	98
MW-34-081020 008152-06	1,500 x	290 x	86
MW-35-081020 008152-07	670 x	260 x	98
MW-31-081020 008152-08	<50	<250	98
MW-27-081020 008152-09	110 x	<250	88
MW-26-081020 008152-10	610 x	<250	97

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/12/20 and 08/13/20
Date Analyzed: 08/12/20 and 08/13/20

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-19-081020 008152-11	76 x	<250	95
MW-6-081020 008152-12	1,900 x	360 x	98
MW-01-081020 008152-13	<50	<250	95
MW-39-081020 008152-14	6,500 x	790 x	103
MW-13-081020 008152-15	60 x	<250	98
MW-2-081020 008152-16	640 x	330 x	80
MW-15-081020 008152-17	300 x	<250	100
MW-10-081020 008152-18	1,400 x	<250	96
MW-3-081020 008152-19	1,100 x	410 x	97
MW-8-081020 008152-20	2,400 x	370 x	95

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/12/20 and 08/13/20
Date Analyzed: 08/12/20 and 08/13/20

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-22-081120 008152-21	<50	<250	93
MW-30-081120 008152-22	1,100 x	480 x	87
MW-32-081120 008152-23	<50	<250	91
T-2-081120 008152-24	<50	<250	80
MW-25-081120 008152-25	<50	<250	94
MW-17-081120 008152-26	62 x	<250	94
MW-40-081120 008152-27	3,400	330 x	97
MW-33-081120 008152-28	930	<250	97
MW-23-081120 008152-29	<50	<250	86
MW-29-081120 008152-30	<50	<250	87

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/12/20 and 08/13/20
Date Analyzed: 08/12/20 and 08/13/20

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-18-081120 008152-31	<50	<250	87
MW-24-081120 008152-32	<50	<250	98
MW-7-081120 008152-33	1,200	<250	95
MW-107-081120 008152-34	1,200	<250	87
MW-12-081120 008152-35	2,100	<250	94
MW-28-081120 008152-36	5,200 x	890 x	93
MW-14-081120 008152-37	230 x	<250	89
Method Blank 00-1840 MB	<50	<250	91
Method Blank 00-1841 MB	<50	<250	86

Analysis For Total Metals By EPA Method 6020B

Client ID:	UST-4-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-05
Date Analyzed:	08/12/20	Data File:	008152-05.114
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-10-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-18
Date Analyzed:	08/12/20	Data File:	008152-18.115
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-3-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-19
Date Analyzed:	08/12/20	Data File:	008152-19.116
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-7-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-33
Date Analyzed:	08/12/20	Data File:	008152-33.117
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-107-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-34
Date Analyzed:	08/12/20	Data File:	008152-34.118
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	I0-464 mb2
Date Analyzed:	08/12/20	Data File:	I0-464 mb2.045
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-37-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-01
Date Analyzed:	08/12/20	Data File:	081219.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

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

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	2.5
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-38-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-02
Date Analyzed:	08/12/20	Data File:	081220.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-36-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-03
Date Analyzed:	08/12/20	Data File:	081221.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-136-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-04
Date Analyzed:	08/12/20	Data File:	081222.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	UST-4-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-05
Date Analyzed:	08/12/20	Data File:	081223.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	95	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-34-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-06
Date Analyzed:	08/12/20	Data File:	081224.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	94	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	1.4
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	1.2
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-35-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-07
Date Analyzed:	08/12/20	Data File:	081225.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	50	150
Toluene-d8	95	50	150
4-Bromofluorobenzene	93	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-31-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-08
Date Analyzed:	08/12/20	Data File:	081226.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	50	150
Toluene-d8	96	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-27-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-09
Date Analyzed:	08/12/20	Data File:	081227.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	50	150
Toluene-d8	95	50	150
4-Bromofluorobenzene	95	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-26-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-10
Date Analyzed:	08/12/20	Data File:	081228.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	95	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-19-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-11
Date Analyzed:	08/12/20	Data File:	081229.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-6-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-12
Date Analyzed:	08/12/20	Data File:	081230.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-01-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-13
Date Analyzed:	08/12/20	Data File:	081231.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-39-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-14
Date Analyzed:	08/12/20	Data File:	081232.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	96	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	8.5
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	9.4
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	2.3
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		
Naphthalene	<1		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-13-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-15
Date Analyzed:	08/12/20	Data File:	081233.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	72	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-2-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-16
Date Analyzed:	08/12/20	Data File:	081234.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	96	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-15-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-17
Date Analyzed:	08/12/20	Data File:	081235.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	50	150
Toluene-d8	95	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-18
Date Analyzed:	08/12/20	Data File:	081236.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	50	150
Toluene-d8	109	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	60
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	20
Hexane	49	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	30
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	64
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	120	sec-Butylbenzene	3.2
Trichloroethene	<1	p-Isopropyltoluene	1.1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	19	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-3-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-19
Date Analyzed:	08/12/20	Data File:	081237.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	94	50	150

Compounds:	Concentration ug/L (ppb)
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	1.2
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-8-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-20
Date Analyzed:	08/12/20	Data File:	081238.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	50	150
Toluene-d8	106	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	1.0
Toluene	1.8
Ethylbenzene	<1
m,p-Xylene	3.2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-22-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-21
Date Analyzed:	08/13/20	Data File:	081311.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	96	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-30-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-22
Date Analyzed:	08/13/20	Data File:	081312.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	96	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-32-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-23
Date Analyzed:	08/13/20	Data File:	081313.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	T-2-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-24
Date Analyzed:	08/13/20	Data File:	081314.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	95	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-25-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-25
Date Analyzed:	08/13/20	Data File:	081315.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-17-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-26
Date Analyzed:	08/13/20	Data File:	081316.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	93	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-27
Date Analyzed:	08/13/20	Data File:	081317.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	1.1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	2.0
Hexane	10	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	3.9
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	5.0
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	240 ve	sec-Butylbenzene	1.2
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	6.3	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-27 1/10
Date Analyzed:	08/13/20	Data File:	081308.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<10	1,3-Dichloropropane	<10
Chloromethane	<100	Tetrachloroethene	<10
Vinyl chloride	<2	Dibromochloromethane	<10
Bromomethane	<50	1,2-Dibromoethane (EDB)	<10
Chloroethane	<10	Chlorobenzene	<10
Trichlorofluoromethane	<10	Ethylbenzene	<10
Acetone	<500	1,1,1,2-Tetrachloroethane	<10
1,1-Dichloroethene	<10	m,p-Xylene	<20
Hexane	<50	o-Xylene	<10
Methylene chloride	<50	Styrene	<10
Methyl t-butyl ether (MTBE)	<10	Isopropylbenzene	<10
trans-1,2-Dichloroethene	<10	Bromoform	<50
1,1-Dichloroethane	<10	n-Propylbenzene	<10
2,2-Dichloropropane	<10	Bromobenzene	<10
cis-1,2-Dichloroethene	<10	1,3,5-Trimethylbenzene	<10
Chloroform	<10	1,1,2,2-Tetrachloroethane	<10
2-Butanone (MEK)	<200	1,2,3-Trichloropropane	<10
1,2-Dichloroethane (EDC)	<10	2-Chlorotoluene	<10
1,1,1-Trichloroethane	<10	4-Chlorotoluene	<10
1,1-Dichloropropene	<10	tert-Butylbenzene	<10
Carbon tetrachloride	<10	1,2,4-Trimethylbenzene	<10
Benzene	310	sec-Butylbenzene	<10
Trichloroethene	<10	p-Isopropyltoluene	<10
1,2-Dichloropropane	<10	1,3-Dichlorobenzene	<10
Bromodichloromethane	<10	1,4-Dichlorobenzene	<10
Dibromomethane	<10	1,2-Dichlorobenzene	<10
4-Methyl-2-pentanone	<100	1,2-Dibromo-3-chloropropane	<100
cis-1,3-Dichloropropene	<10	1,2,4-Trichlorobenzene	<10
Toluene	<10	Hexachlorobutadiene	<10
trans-1,3-Dichloropropene	<10	Naphthalene	<10
1,1,2-Trichloroethane	<10	1,2,3-Trichlorobenzene	<10
2-Hexanone	<100		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-33-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-28
Date Analyzed:	08/13/20	Data File:	081318.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	96	50	150
4-Bromofluorobenzene	81	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-23-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-29
Date Analyzed:	08/13/20	Data File:	081319.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-29-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-30
Date Analyzed:	08/13/20	Data File:	081320.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	50	150
Toluene-d8	85	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-18-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-31
Date Analyzed:	08/13/20	Data File:	081321.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-24-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-32
Date Analyzed:	08/13/20	Data File:	081322.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	95	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-7-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-33
Date Analyzed:	08/13/20	Data File:	081323.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	0.56
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-107-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-34
Date Analyzed:	08/13/20	Data File:	081324.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
Benzene	0.58
Toluene	<1
1,2-Dibromoethane (EDB)	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1
Naphthalene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-35
Date Analyzed:	08/13/20	Data File:	081325.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	50	150
Toluene-d8	113	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	42
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	54
Hexane	150	o-Xylene	1.3
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	33
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	72
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	3.3
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	1.0
Benzene	560 ve	sec-Butylbenzene	3.5
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	38	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-35 1/10
Date Analyzed:	08/13/20	Data File:	081309.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	50	150
Toluene-d8	102	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<10	1,3-Dichloropropane	<10
Chloromethane	<100	Tetrachloroethene	<10
Vinyl chloride	<2	Dibromochloromethane	<10
Bromomethane	<50	1,2-Dibromoethane (EDB)	<10
Chloroethane	<10	Chlorobenzene	<10
Trichlorofluoromethane	<10	Ethylbenzene	46
Acetone	<500	1,1,1,2-Tetrachloroethane	<10
1,1-Dichloroethene	<10	m,p-Xylene	57
Hexane	190	o-Xylene	<10
Methylene chloride	<50	Styrene	<10
Methyl t-butyl ether (MTBE)	<10	Isopropylbenzene	34
trans-1,2-Dichloroethene	<10	Bromoform	<50
1,1-Dichloroethane	<10	n-Propylbenzene	82
2,2-Dichloropropane	<10	Bromobenzene	<10
cis-1,2-Dichloroethene	<10	1,3,5-Trimethylbenzene	<10
Chloroform	<10	1,1,2,2-Tetrachloroethane	<10
2-Butanone (MEK)	<200	1,2,3-Trichloropropane	<10
1,2-Dichloroethane (EDC)	<10	2-Chlorotoluene	<10
1,1,1-Trichloroethane	<10	4-Chlorotoluene	<10
1,1-Dichloropropene	<10	tert-Butylbenzene	<10
Carbon tetrachloride	<10	1,2,4-Trimethylbenzene	<10
Benzene	910	sec-Butylbenzene	<10
Trichloroethene	<10	p-Isopropyltoluene	<10
1,2-Dichloropropane	<10	1,3-Dichlorobenzene	<10
Bromodichloromethane	<10	1,4-Dichlorobenzene	<10
Dibromomethane	<10	1,2-Dichlorobenzene	<10
4-Methyl-2-pentanone	<100	1,2-Dibromo-3-chloropropane	<100
cis-1,3-Dichloropropene	<10	1,2,4-Trichlorobenzene	<10
Toluene	42	Hexachlorobutadiene	<10
trans-1,3-Dichloropropene	<10	Naphthalene	<10
1,1,2-Trichloroethane	<10	1,2,3-Trichlorobenzene	<10
2-Hexanone	<100		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-28-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-36
Date Analyzed:	08/13/20	Data File:	081332.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-14-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-37
Date Analyzed:	08/13/20	Data File:	081327.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	00-1743 mb
Date Analyzed:	08/12/20	Data File:	081218.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	96	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	00-1746 mb
Date Analyzed:	08/13/20	Data File:	081309.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	AEN

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	107	50	150
Toluene-d8	96	50	150
4-Bromofluorobenzene	95	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<5	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<5	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<5
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<20	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-37-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-01 1/2
Date Analyzed:	08/13/20	Data File:	081307.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	36	15	33
Phenol-d6	28	10	20
Nitrobenzene-d5	71	17	143
2-Fluorobiphenyl	65	50	150
2,4,6-Tribromophenol	76	50	150
Terphenyl-d14	78	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-38-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-02 1/2
Date Analyzed:	08/13/20	Data File:	081308.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	10	15	33
Phenol-d6	14	10	20
Nitrobenzene-d5	83	17	143
2-Fluorobiphenyl	81	50	150
2,4,6-Tribromophenol	31	50	150
Terphenyl-d14	99	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-36-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-03 1/2
Date Analyzed:	08/13/20	Data File:	081309.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	32	15	33
Phenol-d6	24	10	20
Nitrobenzene-d5	74	17	143
2-Fluorobiphenyl	77	50	150
2,4,6-Tribromophenol	79	50	150
Terphenyl-d14	95	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-136-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-04 1/2
Date Analyzed:	08/13/20	Data File:	081310.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	40	15	33
Phenol-d6	29	10	20
Nitrobenzene-d5	88	17	143
2-Fluorobiphenyl	85	50	150
2,4,6-Tribromophenol	83	50	150
Terphenyl-d14	92	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	UST-4-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-05 1/2
Date Analyzed:	08/13/20	Data File:	081311.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	36	15	33
Phenol-d6	26	10	20
Nitrobenzene-d5	75	17	143
2-Fluorobiphenyl	68	50	150
2,4,6-Tribromophenol	88	50	150
Terphenyl-d14	95	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-34-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-06 1/2
Date Analyzed:	08/13/20	Data File:	081312.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	40	15	33
Phenol-d6	28	10	20
Nitrobenzene-d5	87	17	143
2-Fluorobiphenyl	77	50	150
2,4,6-Tribromophenol	100	50	150
Terphenyl-d14	91	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-35-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-07 1/2
Date Analyzed:	08/14/20	Data File:	081405.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	39	15	99
Phenol-d6	27	11	65
Nitrobenzene-d5	84	10	145
2-Fluorobiphenyl	77	16	138
2,4,6-Tribromophenol	90	12	132
Terphenyl-d14	96	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-31-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-08 1/2
Date Analyzed:	08/13/20	Data File:	081314.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	43	15	33
Phenol-d6	31	10	20
Nitrobenzene-d5	89	17	143
2-Fluorobiphenyl	89	50	150
2,4,6-Tribromophenol	98	50	150
Terphenyl-d14	101	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-27-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-09 1/2
Date Analyzed:	08/13/20	Data File:	081315.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	39	15	33
Phenol-d6	30	10	20
Nitrobenzene-d5	89	17	143
2-Fluorobiphenyl	81	50	150
2,4,6-Tribromophenol	91	50	150
Terphenyl-d14	94	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-26-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-10 1/2
Date Analyzed:	08/13/20	Data File:	081316.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	37	15	33
Phenol-d6	27	10	20
Nitrobenzene-d5	78	17	143
2-Fluorobiphenyl	79	50	150
2,4,6-Tribromophenol	104	50	150
Terphenyl-d14	97	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-19-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-11 1/2
Date Analyzed:	08/13/20	Data File:	081308.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	25	15	99
Phenol-d6	23	11	65
Nitrobenzene-d5	71	10	145
2-Fluorobiphenyl	72	16	138
2,4,6-Tribromophenol	64	12	132
Terphenyl-d14	99	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-6-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-12 1/2
Date Analyzed:	08/13/20	Data File:	081309.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	20	15	99
Phenol-d6	21	11	65
Nitrobenzene-d5	72	10	145
2-Fluorobiphenyl	72	16	138
2,4,6-Tribromophenol	68	12	132
Terphenyl-d14	101	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-01-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-13 1/2
Date Analyzed:	08/13/20	Data File:	081310.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	22	15	99
Phenol-d6	25	11	65
Nitrobenzene-d5	85	10	145
2-Fluorobiphenyl	78	16	138
2,4,6-Tribromophenol	56	12	132
Terphenyl-d14	103	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-39-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-14 1/2
Date Analyzed:	08/13/20	Data File:	081311.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	30	15	99
Phenol-d6	27	11	65
Nitrobenzene-d5	77	10	145
2-Fluorobiphenyl	78	16	138
2,4,6-Tribromophenol	89	12	132
Terphenyl-d14	101	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-13-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-15 1/2
Date Analyzed:	08/13/20	Data File:	081312.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	41	15	99
Phenol-d6	29	11	65
Nitrobenzene-d5	80	10	145
2-Fluorobiphenyl	76	16	138
2,4,6-Tribromophenol	83	12	132
Terphenyl-d14	95	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

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Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-2-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-16 1/2
Date Analyzed:	08/13/20	Data File:	081313.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	29	15	99
Phenol-d6	26	11	65
Nitrobenzene-d5	78	10	145
2-Fluorobiphenyl	78	16	138
2,4,6-Tribromophenol	84	12	132
Terphenyl-d14	104	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-15-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-17 1/2
Date Analyzed:	08/13/20	Data File:	081314.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	40	15	99
Phenol-d6	30	11	65
Nitrobenzene-d5	89	10	145
2-Fluorobiphenyl	88	16	138
2,4,6-Tribromophenol	90	12	132
Terphenyl-d14	102	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-10-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-18 1/2
Date Analyzed:	08/13/20	Data File:	081315.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	32	15	99
Phenol-d6	26	11	65
Nitrobenzene-d5	72	10	145
2-Fluorobiphenyl	76	16	138
2,4,6-Tribromophenol	97	12	132
Terphenyl-d14	97	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-3-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-19 1/2
Date Analyzed:	08/13/20	Data File:	081316.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	37	15	99
Phenol-d6	29	11	65
Nitrobenzene-d5	87	10	145
2-Fluorobiphenyl	80	16	138
2,4,6-Tribromophenol	96	12	132
Terphenyl-d14	101	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-8-081020	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-20 1/2.5
Date Analyzed:	08/14/20	Data File:	081406.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	47	15	99
Phenol-d6	43	11	65
Nitrobenzene-d5	73	10	145
2-Fluorobiphenyl	75	16	138
2,4,6-Tribromophenol	90	12	132
Terphenyl-d14	90	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-22-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-21 1/2
Date Analyzed:	08/12/20	Data File:	081205.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	37 vo	15	33
Phenol-d6	26 vo	10	20
Nitrobenzene-d5	83	17	143
2-Fluorobiphenyl	81	50	150
2,4,6-Tribromophenol	68	50	150
Terphenyl-d14	96	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-30-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-22 1/2
Date Analyzed:	08/12/20	Data File:	081206.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	38 vo	15	33
Phenol-d6	27 vo	10	20
Nitrobenzene-d5	81	17	143
2-Fluorobiphenyl	84	50	150
2,4,6-Tribromophenol	94	50	150
Terphenyl-d14	104	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-32-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-23 1/2
Date Analyzed:	08/12/20	Data File:	081207.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	24	15	33
Phenol-d6	21 vo	10	20
Nitrobenzene-d5	81	17	143
2-Fluorobiphenyl	82	50	150
2,4,6-Tribromophenol	58	50	150
Terphenyl-d14	93	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	T-2-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-24 1/2
Date Analyzed:	08/12/20	Data File:	081208.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	41 vo	15	33
Phenol-d6	28 vo	10	20
Nitrobenzene-d5	86	17	143
2-Fluorobiphenyl	84	50	150
2,4,6-Tribromophenol	87	50	150
Terphenyl-d14	99	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-25-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-25 1/2
Date Analyzed:	08/12/20	Data File:	081209.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	36 vo	15	33
Phenol-d6	25 vo	10	20
Nitrobenzene-d5	80	17	143
2-Fluorobiphenyl	75	50	150
2,4,6-Tribromophenol	78	50	150
Terphenyl-d14	94	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-17-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-26 1/2
Date Analyzed:	08/12/20	Data File:	081210.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	38 vo	15	33
Phenol-d6	26 vo	10	20
Nitrobenzene-d5	81	17	143
2-Fluorobiphenyl	78	50	150
2,4,6-Tribromophenol	87	50	150
Terphenyl-d14	101	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-40-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-27 1/2
Date Analyzed:	08/12/20	Data File:	081211.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	40 vo	15	33
Phenol-d6	28 vo	10	20
Nitrobenzene-d5	82	17	143
2-Fluorobiphenyl	81	50	150
2,4,6-Tribromophenol	88	50	150
Terphenyl-d14	96	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-33-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-28 1/2
Date Analyzed:	08/12/20	Data File:	081212.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	38 vo	15	33
Phenol-d6	27 vo	10	20
Nitrobenzene-d5	86	17	143
2-Fluorobiphenyl	87	50	150
2,4,6-Tribromophenol	96	50	150
Terphenyl-d14	99	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-23-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-29 1/2
Date Analyzed:	08/13/20	Data File:	081213.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	37 vo	15	33
Phenol-d6	25 vo	10	20
Nitrobenzene-d5	76	17	143
2-Fluorobiphenyl	73	50	150
2,4,6-Tribromophenol	76	50	150
Terphenyl-d14	86	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-29-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-30 1/2
Date Analyzed:	08/13/20	Data File:	081214.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	45 vo	15	33
Phenol-d6	32 vo	10	20
Nitrobenzene-d5	88	17	143
2-Fluorobiphenyl	82	50	150
2,4,6-Tribromophenol	79	50	150
Terphenyl-d14	96	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-18-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-31 1/2
Date Analyzed:	08/13/20	Data File:	081215.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	38 vo	15	33
Phenol-d6	27 vo	10	20
Nitrobenzene-d5	85	17	143
2-Fluorobiphenyl	80	50	150
2,4,6-Tribromophenol	73	50	150
Terphenyl-d14	95	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-24-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-32 1/2
Date Analyzed:	08/13/20	Data File:	081216.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	28	15	33
Phenol-d6	24 vo	10	20
Nitrobenzene-d5	79	17	143
2-Fluorobiphenyl	75	50	150
2,4,6-Tribromophenol	62	50	150
Terphenyl-d14	94	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-7-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-33 1/2
Date Analyzed:	08/13/20	Data File:	081217.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	32	15	33
Phenol-d6	25 vo	10	20
Nitrobenzene-d5	81	17	143
2-Fluorobiphenyl	74	50	150
2,4,6-Tribromophenol	72	50	150
Terphenyl-d14	89	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-107-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-34 1/2
Date Analyzed:	08/13/20	Data File:	081218.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	38 vo	15	33
Phenol-d6	28 vo	10	20
Nitrobenzene-d5	82	17	143
2-Fluorobiphenyl	78	50	150
2,4,6-Tribromophenol	82	50	150
Terphenyl-d14	97	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-12-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	008152-35 1/2
Date Analyzed:	08/13/20	Data File:	081219.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	38 vo	15	33
Phenol-d6	28 vo	10	20
Nitrobenzene-d5	79	17	143
2-Fluorobiphenyl	76	50	150
2,4,6-Tribromophenol	89	50	150
Terphenyl-d14	91	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-28-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-36 1/2
Date Analyzed:	08/13/20	Data File:	081317.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	13	15	99
Phenol-d6	19	11	65
Nitrobenzene-d5	74	10	145
2-Fluorobiphenyl	70	16	138
2,4,6-Tribromophenol	47	12	132
Terphenyl-d14	84	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-14-081120	Client:	Floyd-Snider
Date Received:	08/11/20	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	008152-37 1/2
Date Analyzed:	08/13/20	Data File:	081318.D
Matrix:	Water	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	31	15	99
Phenol-d6	27	11	65
Nitrobenzene-d5	82	10	145
2-Fluorobiphenyl	72	16	138
2,4,6-Tribromophenol	74	12	132
Terphenyl-d14	94	35	138

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/12/20	Lab ID:	00-1831 mb2
Date Analyzed:	08/12/20	Data File:	081204.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	22	15	33
Phenol-d6	14	10	20
Nitrobenzene-d5	84	17	143
2-Fluorobiphenyl	85	50	150
2,4,6-Tribromophenol	66	50	150
Terphenyl-d14	98	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 008152
Date Extracted:	08/13/20	Lab ID:	00-1842 mb
Date Analyzed:	08/13/20	Data File:	081306.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	22	15	33
Phenol-d6	15	10	20
Nitrobenzene-d5	93	17	143
2-Fluorobiphenyl	94	50	150
2,4,6-Tribromophenol	73	50	150
Terphenyl-d14	100	50	150

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/17/20
Date Analyzed: 08/17/20

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

Results Reported as µg/L (ppb)

Sample ID Laboratory ID	EDB
UST-4-081020 008152-05	<0.01
MW-34-081020 008152-06	<0.01
MW-35-081020 008152-07	<0.01
MW-19-081020 008152-11	<0.01
MW-39-081020 008152-14	<0.01
MW-10-081020 008152-18	<0.01
MW-3-081020 008152-19	<0.01
T-2-081120 008152-24	<0.01
MW-40-081120 008152-27	<0.01
MW-23-081120 008152-29	<0.01

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152
Date Extracted: 08/17/20
Date Analyzed: 08/17/20

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

Results Reported as μg/L (ppb)

Sample ID Laboratory ID	EDB
MW-7-081120 008152-33	<0.01
MW-107-081120 008152-34	<0.01
MW-12-081120 008152-35	<0.01
MW-28-081120 008152-36	<0.01
Method Blank	<0.01

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152

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

Laboratory Code: 008152-20 (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	3,000	105	102	53-117	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	106	69-134

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152

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

Laboratory Code: 008152-30 (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	91	94	53-117	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	108	69-134

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152

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

Laboratory Code: 008152-20 (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	2,500	109	107	50-150	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	80	63-142

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152

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

Laboratory Code: 008152-30 (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	102	108	50-150	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	108	63-142

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152

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

Laboratory Code: 008141-01 (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	87	89	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	ug/L (ppb)	10	88	80-120

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152

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

Laboratory Code: 008152-20 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	10	<1	107	115	50-150	7
Chloromethane	ug/L (ppb)	10	<10	103	106	50-150	3
Vinyl chloride	ug/L (ppb)	10	<0.2	110	117	50-150	6
Bromomethane	ug/L (ppb)	10	<5	134	140	50-150	4
Chloroethane	ug/L (ppb)	10	<1	128	139	50-150	8
Trichlorofluoromethane	ug/L (ppb)	10	<1	109	120	50-150	10
Acetone	ug/L (ppb)	50	<50	103	110	50-150	7
1,1-Dichloroethene	ug/L (ppb)	10	<1	110	126	50-150	14
Hexane	ug/L (ppb)	10	17	96 b	104 b	50-150	8 b
Methylene chloride	ug/L (ppb)	10	<5	97	112	50-150	14
Methyl t-butyl ether (MTBE)	ug/L (ppb)	10	<1	101	108	50-150	7
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	102	110	50-150	8
1,1-Dichloroethane	ug/L (ppb)	10	<1	102	110	50-150	8
2,2-Dichloropropane	ug/L (ppb)	10	<1	93	97	50-150	4
cis-1,2-Dichloroethene	ug/L (ppb)	10	<1	102	110	50-150	8
Chloroform	ug/L (ppb)	10	<1	106	117	50-150	10
2-Butanone (MEK)	ug/L (ppb)	50	<20	95	86	50-150	10
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<1	100	100	50-150	0
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	101	108	50-150	7
1,1-Dichloropropene	ug/L (ppb)	10	<1	98	99	50-150	1
Carbon tetrachloride	ug/L (ppb)	10	<1	92	105	50-150	13
Benzene	ug/L (ppb)	10	1.0	99	100	50-150	1
Trichloroethene	ug/L (ppb)	10	<1	95	96	50-150	1
1,2-Dichloropropane	ug/L (ppb)	10	<1	113	112	50-150	1
Bromodichloromethane	ug/L (ppb)	10	<1	112	112	50-150	0
Dibromomethane	ug/L (ppb)	10	<1	100	100	50-150	0
4-Methyl-2-pentanone	ug/L (ppb)	50	<10	105	100	50-150	5
cis-1,3-Dichloropropene	ug/L (ppb)	10	<1	91	82	50-150	10
Toluene	ug/L (ppb)	10	1.8	99	98	50-150	1
trans-1,3-Dichloropropene	ug/L (ppb)	10	<1	89	83	50-150	7
1,1,2-Trichloroethane	ug/L (ppb)	10	<1	139	141	50-150	1
2-Hexanone	ug/L (ppb)	50	<10	102	95	50-150	7
1,3-Dichloropropane	ug/L (ppb)	10	<1	93	85	50-150	9
Tetrachloroethene	ug/L (ppb)	10	<1	98	97	50-150	1
Dibromochloromethane	ug/L (ppb)	10	<1	92	93	50-150	1
1,2-Dibromoethane (EDB)	ug/L (ppb)	10	<1	99	94	50-150	5
Chlorobenzene	ug/L (ppb)	10	<1	98	94	50-150	4
Ethylbenzene	ug/L (ppb)	10	<1	101	103	50-150	2
1,1,1,2-Tetrachloroethane	ug/L (ppb)	10	<1	99	101	50-150	2
m,p-Xylene	ug/L (ppb)	20	3.2	95	97	50-150	2
o-Xylene	ug/L (ppb)	10	<1	98	102	50-150	4
Styrene	ug/L (ppb)	10	<1	98	97	50-150	1
Isopropylbenzene	ug/L (ppb)	10	42	105 b	128 b	50-150	20 b
Bromoform	ug/L (ppb)	10	<5	91	89	50-150	2
n-Propylbenzene	ug/L (ppb)	10	99	0 b	0 b	50-150	0
Bromobenzene	ug/L (ppb)	10	<1	87	79	50-150	10
1,3,5-Trimethylbenzene	ug/L (ppb)	10	<1	88	81	50-150	8
1,1,2,2-Tetrachloroethane	ug/L (ppb)	10	<1	100	92	50-150	8
1,2,3-Trichloropropane	ug/L (ppb)	10	<1	85	76	50-150	11
2-Chlorotoluene	ug/L (ppb)	10	<1	88	81	50-150	8
4-Chlorotoluene	ug/L (ppb)	10	<1	84	75	50-150	11
tert-Butylbenzene	ug/L (ppb)	10	<1	89	80	50-150	11
1,2,4-Trimethylbenzene	ug/L (ppb)	10	<1	87	80	50-150	8
sec-Butylbenzene	ug/L (ppb)	10	6.0	84 b	71 b	50-150	17 b
p-Isopropyltoluene	ug/L (ppb)	10	<1	91	84	50-150	8
1,3-Dichlorobenzene	ug/L (ppb)	10	<1	85	76	50-150	11
1,4-Dichlorobenzene	ug/L (ppb)	10	<1	86	76	50-150	12
1,2-Dichlorobenzene	ug/L (ppb)	10	<1	87	82	50-150	6
1,2-Dibromo-3-chloropropane	ug/L (ppb)	10	<10	156 vo	150	50-150	4
1,2,4-Trichlorobenzene	ug/L (ppb)	10	<1	87	84	50-150	4
Hexachlorobutadiene	ug/L (ppb)	10	<1	89	82	50-150	8
Naphthalene	ug/L (ppb)	10	<1	94	90	50-150	4
1,2,3-Trichlorobenzene	ug/L (ppb)	10	<1	89	86	50-150	3

Date of Report: 08/25/20
Date Received: 08/11/20
Project: POL-TPH, F&BI 008152

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	10	113	106	70-130	6
Chloromethane	ug/L (ppb)	10	109	109	70-130	0
Vinyl chloride	ug/L (ppb)	10	112	110	70-130	2
Bromomethane	ug/L (ppb)	10	129	129	70-130	0
Chloroethane	ug/L (ppb)	10	131 vo	126	70-130	4
Trichlorofluoromethane	ug/L (ppb)	10	114	109	70-130	4
Acetone	ug/L (ppb)	50	108	115	64-131	6
1,1-Dichloroethene	ug/L (ppb)	10	117	113	70-130	3
Hexane	ug/L (ppb)	10	105	106	70-130	1
Methylene chloride	ug/L (ppb)	10	121	145	29-192	18
Methyl t-butyl ether (MTBE)	ug/L (ppb)	10	98	99	70-130	1
trans-1,2-Dichloroethene	ug/L (ppb)	10	101	100	70-130	1
1,1-Dichloroethane	ug/L (ppb)	10	100	99	70-130	1
2,2-Dichloropropane	ug/L (ppb)	10	122	111	70-130	9
cis-1,2-Dichloroethene	ug/L (ppb)	10	100	99	70-130	1
Chloroform	ug/L (ppb)	10	98	99	70-130	1
2-Butanone (MEK)	ug/L (ppb)	50	92	96	70-130	4
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	95	98	70-130	3
1,1,1-Trichloroethane	ug/L (ppb)	10	100	99	70-130	1
1,1-Dichloropropene	ug/L (ppb)	10	93	97	70-130	4
Carbon tetrachloride	ug/L (ppb)	10	103	100	70-130	3
Benzene	ug/L (ppb)	10	98	99	70-130	1
Trichloroethene	ug/L (ppb)	10	88	90	70-130	2
1,2-Dichloropropane	ug/L (ppb)	10	95	97	70-130	2
Bromodichloromethane	ug/L (ppb)	10	99	101	70-130	2
Dibromomethane	ug/L (ppb)	10	96	104	70-130	8
4-Methyl-2-pentanone	ug/L (ppb)	50	101	102	70-130	1
cis-1,3-Dichloropropene	ug/L (ppb)	10	97	103	70-130	6
Toluene	ug/L (ppb)	10	96	100	70-130	4
trans-1,3-Dichloropropene	ug/L (ppb)	10	97	102	70-130	5
1,1,2-Trichloroethane	ug/L (ppb)	10	96	100	70-130	4
2-Hexanone	ug/L (ppb)	50	95	101	70-130	6
1,3-Dichloropropane	ug/L (ppb)	10	91	93	70-130	2
Tetrachloroethene	ug/L (ppb)	10	99	102	70-130	3
Dibromochloromethane	ug/L (ppb)	10	96	101	70-130	5
1,2-Dibromoethane (EDB)	ug/L (ppb)	10	93	101	70-130	8
Chlorobenzene	ug/L (ppb)	10	94	100	70-130	6
Ethylbenzene	ug/L (ppb)	10	98	101	70-130	3
1,1,1,2-Tetrachloroethane	ug/L (ppb)	10	99	100	70-130	1
m,p-Xylene	ug/L (ppb)	20	94	97	70-130	3
o-Xylene	ug/L (ppb)	10	96	98	70-130	2
Styrene	ug/L (ppb)	10	94	98	70-130	4
Isopropylbenzene	ug/L (ppb)	10	100	101	70-130	1
Bromoform	ug/L (ppb)	10	99	104	63-206	5
n-Propylbenzene	ug/L (ppb)	10	100	103	70-130	3
Bromobenzene	ug/L (ppb)	10	98	102	70-130	4
1,3,5-Trimethylbenzene	ug/L (ppb)	10	101	102	70-130	1
1,1,2,2-Tetrachloroethane	ug/L (ppb)	10	107	112	70-130	5
1,2,3-Trichloropropane	ug/L (ppb)	10	94	101	70-130	7
2-Chlorotoluene	ug/L (ppb)	10	97	99	70-130	2
4-Chlorotoluene	ug/L (ppb)	10	97	101	70-130	4
tert-Butylbenzene	ug/L (ppb)	10	101	103	70-130	2
1,2,4-Trimethylbenzene	ug/L (ppb)	10	100	101	70-130	1
sec-Butylbenzene	ug/L (ppb)	10	102	104	70-130	2
p-Isopropyltoluene	ug/L (ppb)	10	102	105	70-130	3
1,3-Dichlorobenzene	ug/L (ppb)	10	95	101	70-130	6
1,4-Dichlorobenzene	ug/L (ppb)	10	97	102	70-130	5
1,2-Dichlorobenzene	ug/L (ppb)	10	100	103	70-130	3
1,2-Dibromo-3-chloropropane	ug/L (ppb)	10	109	106	70-130	3
1,2,4-Trichlorobenzene	ug/L (ppb)	10	100	103	70-130	3
Hexachlorobutadiene	ug/L (ppb)	10	102	102	70-130	0
Naphthalene	ug/L (ppb)	10	101	102	70-130	1
1,2,3-Trichlorobenzene	ug/L (ppb)	10	98	100	70-130	2

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Project: POL-TPH, F&BI 008152

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

Laboratory Code: 008152-30 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	10	<1	108	110	50-150	2
Chloromethane	ug/L (ppb)	10	<10	105	105	50-150	0
Vinyl chloride	ug/L (ppb)	10	<0.2	108	109	50-150	1
Bromomethane	ug/L (ppb)	10	<5	130	126	50-150	3
Chloroethane	ug/L (ppb)	10	<1	125	125	50-150	0
Trichlorofluoromethane	ug/L (ppb)	10	<1	106	108	50-150	2
Acetone	ug/L (ppb)	50	<50	108	93	50-150	15
1,1-Dichloroethene	ug/L (ppb)	10	<1	107	112	50-150	5
Hexane	ug/L (ppb)	10	<5	106	105	50-150	1
Methylene chloride	ug/L (ppb)	10	<5	96	123	50-150	25 vo
Methyl t-butyl ether (MTBE)	ug/L (ppb)	10	<1	98	100	50-150	2
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	100	102	50-150	2
1,1-Dichloroethane	ug/L (ppb)	10	<1	98	100	50-150	2
2,2-Dichloropropane	ug/L (ppb)	10	<1	105	98	50-150	7
cis-1,2-Dichloroethene	ug/L (ppb)	10	<1	99	101	50-150	2
Chloroform	ug/L (ppb)	10	<1	98	97	50-150	1
2-Butanone (MEK)	ug/L (ppb)	50	<20	92	91	50-150	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<1	97	97	50-150	0
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	96	97	50-150	1
1,1-Dichloropropene	ug/L (ppb)	10	<1	96	97	50-150	1
Carbon tetrachloride	ug/L (ppb)	10	<1	94	95	50-150	1
Benzene	ug/L (ppb)	10	<0.35	100	99	50-150	1
Trichloroethene	ug/L (ppb)	10	<1	90	89	50-150	1
1,2-Dichloropropane	ug/L (ppb)	10	<1	94	94	50-150	0
Bromodichloromethane	ug/L (ppb)	10	<1	93	94	50-150	1
Dibromomethane	ug/L (ppb)	10	<1	97	101	50-150	4
4-Methyl-2-pentanone	ug/L (ppb)	50	<10	100	100	50-150	0
cis-1,3-Dichloropropene	ug/L (ppb)	10	<1	90	90	50-150	0
Toluene	ug/L (ppb)	10	<1	99	97	50-150	2
trans-1,3-Dichloropropene	ug/L (ppb)	10	<1	90	86	50-150	5
1,1,2-Trichloroethane	ug/L (ppb)	10	<1	98	96	50-150	2
2-Hexanone	ug/L (ppb)	50	<10	99	98	50-150	1
1,3-Dichloropropane	ug/L (ppb)	10	<1	92	93	50-150	1
Tetrachloroethene	ug/L (ppb)	10	<1	101	97	50-150	4
Dibromochloromethane	ug/L (ppb)	10	<1	88	87	50-150	1
1,2-Dibromoethane (EDB)	ug/L (ppb)	10	<1	98	97	50-150	1
Chlorobenzene	ug/L (ppb)	10	<1	99	96	50-150	3
Ethylbenzene	ug/L (ppb)	10	<1	100	99	50-150	1
1,1,1,2-Tetrachloroethane	ug/L (ppb)	10	<1	93	94	50-150	1
m,p-Xylene	ug/L (ppb)	20	<2	96	95	50-150	1
o-Xylene	ug/L (ppb)	10	<1	98	96	50-150	2
Styrene	ug/L (ppb)	10	<1	98	97	50-150	1
Isopropylbenzene	ug/L (ppb)	10	<1	101	100	50-150	1
Bromoform	ug/L (ppb)	10	<5	85	84	50-150	1
n-Propylbenzene	ug/L (ppb)	10	<1	99	95	50-150	4
Bromobenzene	ug/L (ppb)	10	<1	99	98	50-150	1
1,3,5-Trimethylbenzene	ug/L (ppb)	10	<1	97	94	50-150	3
1,1,2,2-Tetrachloroethane	ug/L (ppb)	10	<1	106	103	50-150	3
1,2,3-Trichloropropane	ug/L (ppb)	10	<1	95	93	50-150	2
2-Chlorotoluene	ug/L (ppb)	10	<1	95	93	50-150	2
4-Chlorotoluene	ug/L (ppb)	10	<1	96	93	50-150	3
tert-Butylbenzene	ug/L (ppb)	10	<1	97	94	50-150	3
1,2,4-Trimethylbenzene	ug/L (ppb)	10	<1	97	95	50-150	2
sec-Butylbenzene	ug/L (ppb)	10	<1	99	96	50-150	3
p-Isopropyltoluene	ug/L (ppb)	10	<1	100	97	50-150	3
1,3-Dichlorobenzene	ug/L (ppb)	10	<1	98	95	50-150	3
1,4-Dichlorobenzene	ug/L (ppb)	10	<1	97	96	50-150	1
1,2-Dichlorobenzene	ug/L (ppb)	10	<1	100	96	50-150	4
1,2-Dibromo-3-chloropropane	ug/L (ppb)	10	<10	91	93	50-150	2
1,2,4-Trichlorobenzene	ug/L (ppb)	10	<1	99	97	50-150	2
Hexachlorobutadiene	ug/L (ppb)	10	<1	98	97	50-150	1
Naphthalene	ug/L (ppb)	10	<1	100	97	50-150	3
1,2,3-Trichlorobenzene	ug/L (ppb)	10	<1	98	95	50-150	3

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Project: POL-TPH, F&BI 008152

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	10	109	106	70-130	3
Chloromethane	ug/L (ppb)	10	110	108	70-130	2
Vinyl chloride	ug/L (ppb)	10	111	112	70-130	1
Bromomethane	ug/L (ppb)	10	140 vo	130	70-130	7
Chloroethane	ug/L (ppb)	10	127	130	70-130	2
Trichlorofluoromethane	ug/L (ppb)	10	108	111	70-130	3
Acetone	ug/L (ppb)	50	105	103	64-131	2
1,1-Dichloroethene	ug/L (ppb)	10	113	116	70-130	3
Hexane	ug/L (ppb)	10	96	98	70-130	2
Methylene chloride	ug/L (ppb)	10	98	109	29-192	11
Methyl t-butyl ether (MTBE)	ug/L (ppb)	10	98	99	70-130	1
trans-1,2-Dichloroethene	ug/L (ppb)	10	101	102	70-130	1
1,1-Dichloroethane	ug/L (ppb)	10	99	100	70-130	1
2,2-Dichloropropane	ug/L (ppb)	10	110	111	70-130	1
cis-1,2-Dichloroethene	ug/L (ppb)	10	100	102	70-130	2
Chloroform	ug/L (ppb)	10	98	100	70-130	2
2-Butanone (MEK)	ug/L (ppb)	50	89	88	70-130	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	96	96	70-130	0
1,1,1-Trichloroethane	ug/L (ppb)	10	98	99	70-130	1
1,1-Dichloropropene	ug/L (ppb)	10	94	92	70-130	2
Carbon tetrachloride	ug/L (ppb)	10	95	97	70-130	2
Benzene	ug/L (ppb)	10	97	98	70-130	1
Trichloroethene	ug/L (ppb)	10	87	88	70-130	1
1,2-Dichloropropane	ug/L (ppb)	10	93	93	70-130	0
Bromodichloromethane	ug/L (ppb)	10	95	95	70-130	0
Dibromomethane	ug/L (ppb)	10	96	96	70-130	0
4-Methyl-2-pentanone	ug/L (ppb)	50	96	97	70-130	1
cis-1,3-Dichloropropene	ug/L (ppb)	10	93	94	70-130	1
Toluene	ug/L (ppb)	10	96	98	70-130	2
trans-1,3-Dichloropropene	ug/L (ppb)	10	93	94	70-130	1
1,1,2-Trichloroethane	ug/L (ppb)	10	94	97	70-130	3
2-Hexanone	ug/L (ppb)	50	93	94	70-130	1
1,3-Dichloropropane	ug/L (ppb)	10	89	90	70-130	1
Tetrachloroethene	ug/L (ppb)	10	96	99	70-130	3
Dibromochloromethane	ug/L (ppb)	10	94	96	70-130	2
1,2-Dibromoethane (EDB)	ug/L (ppb)	10	93	96	70-130	3
Chlorobenzene	ug/L (ppb)	10	94	96	70-130	2
Ethylbenzene	ug/L (ppb)	10	97	99	70-130	2
1,1,1,2-Tetrachloroethane	ug/L (ppb)	10	96	100	70-130	4
m,p-Xylene	ug/L (ppb)	20	93	95	70-130	2
o-Xylene	ug/L (ppb)	10	95	98	70-130	3
Styrene	ug/L (ppb)	10	94	97	70-130	3
Isopropylbenzene	ug/L (ppb)	10	99	101	70-130	2
Bromoform	ug/L (ppb)	10	94	92	63-206	2
n-Propylbenzene	ug/L (ppb)	10	96	99	70-130	3
Bromobenzene	ug/L (ppb)	10	98	100	70-130	2
1,3,5-Trimethylbenzene	ug/L (ppb)	10	96	98	70-130	2
1,1,2,2-Tetrachloroethane	ug/L (ppb)	10	104	109	70-130	5
1,2,3-Trichloropropane	ug/L (ppb)	10	94	97	70-130	3
2-Chlorotoluene	ug/L (ppb)	10	94	97	70-130	3
4-Chlorotoluene	ug/L (ppb)	10	94	97	70-130	3
tert-Butylbenzene	ug/L (ppb)	10	95	98	70-130	3
1,2,4-Trimethylbenzene	ug/L (ppb)	10	95	99	70-130	4
sec-Butylbenzene	ug/L (ppb)	10	98	101	70-130	3
p-Isopropyltoluene	ug/L (ppb)	10	98	100	70-130	2
1,3-Dichlorobenzene	ug/L (ppb)	10	94	97	70-130	3
1,4-Dichlorobenzene	ug/L (ppb)	10	97	98	70-130	1
1,2-Dichlorobenzene	ug/L (ppb)	10	98	101	70-130	3
1,2-Dibromo-3-chloropropane	ug/L (ppb)	10	99	104	70-130	5
1,2,4-Trichlorobenzene	ug/L (ppb)	10	97	100	70-130	3
Hexachlorobutadiene	ug/L (ppb)	10	96	97	70-130	1
Naphthalene	ug/L (ppb)	10	99	101	70-130	2
1,2,3-Trichlorobenzene	ug/L (ppb)	10	98	100	70-130	2

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Project: POL-TPH, F&BI 008152

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR SEMIVOLATILES BY EPA METHOD 8270E

Laboratory Code: 008152-30 1/2 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	10	<0.04	100	98	50-150	2
Chrysene	ug/L (ppb)	10	<0.04	98	97	50-150	1
Benzo(a)pyrene	ug/L (ppb)	10	<0.04	90	90	50-150	0
Benzo(b)fluoranthene	ug/L (ppb)	10	<0.04	111	91	50-150	20
Benzo(k)fluoranthene	ug/L (ppb)	10	<0.04	92	94	50-150	2
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	10	<0.04	94	89	50-150	5
Dibenz(a,h)anthracene	ug/L (ppb)	10	<0.04	95	93	50-150	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	5	96	94	70-130	2
Chrysene	ug/L (ppb)	5	99	96	70-130	3
Benzo(a)pyrene	ug/L (ppb)	5	87	86	70-130	1
Benzo(b)fluoranthene	ug/L (ppb)	5	89	101	70-130	13
Benzo(k)fluoranthene	ug/L (ppb)	5	87	85	70-130	2
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	5	89	89	70-130	0
Dibenz(a,h)anthracene	ug/L (ppb)	5	92	91	70-130	1

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Project: POL-TPH, F&BI 008152

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR SEMIVOLATILES BY EPA METHOD 8270E

Laboratory Code: 008152-20 1/2 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	10	<0.05	86	88	50-150	2
Chrysene	ug/L (ppb)	10	<0.05	84	85	50-150	1
Benzo(a)pyrene	ug/L (ppb)	10	<0.05	87	88	50-150	1
Benzo(b)fluoranthene	ug/L (ppb)	10	<0.05	86	87	50-150	1
Benzo(k)fluoranthene	ug/L (ppb)	10	<0.05	83	85	50-150	2
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	10	<0.05	82	84	50-150	2
Dibenz(a,h)anthracene	ug/L (ppb)	10	<0.05	81	83	50-150	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	5	98	102	70-130	4
Chrysene	ug/L (ppb)	5	97	102	70-130	5
Benzo(a)pyrene	ug/L (ppb)	5	87	92	70-130	6
Benzo(b)fluoranthene	ug/L (ppb)	5	105	114	70-130	8
Benzo(k)fluoranthene	ug/L (ppb)	5	88	92	70-130	4
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	5	92	95	57-141	3
Dibenz(a,h)anthracene	ug/L (ppb)	5	95	98	57-137	3

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Project: POL-TPH, F&BI 008152

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 10)
1,2-Dibromoethane	ug/L (ppb)	0.10	93	95	70-130	2

Data Qualifiers & Definitions

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

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 analyte 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 due to sample matrix effects.

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.

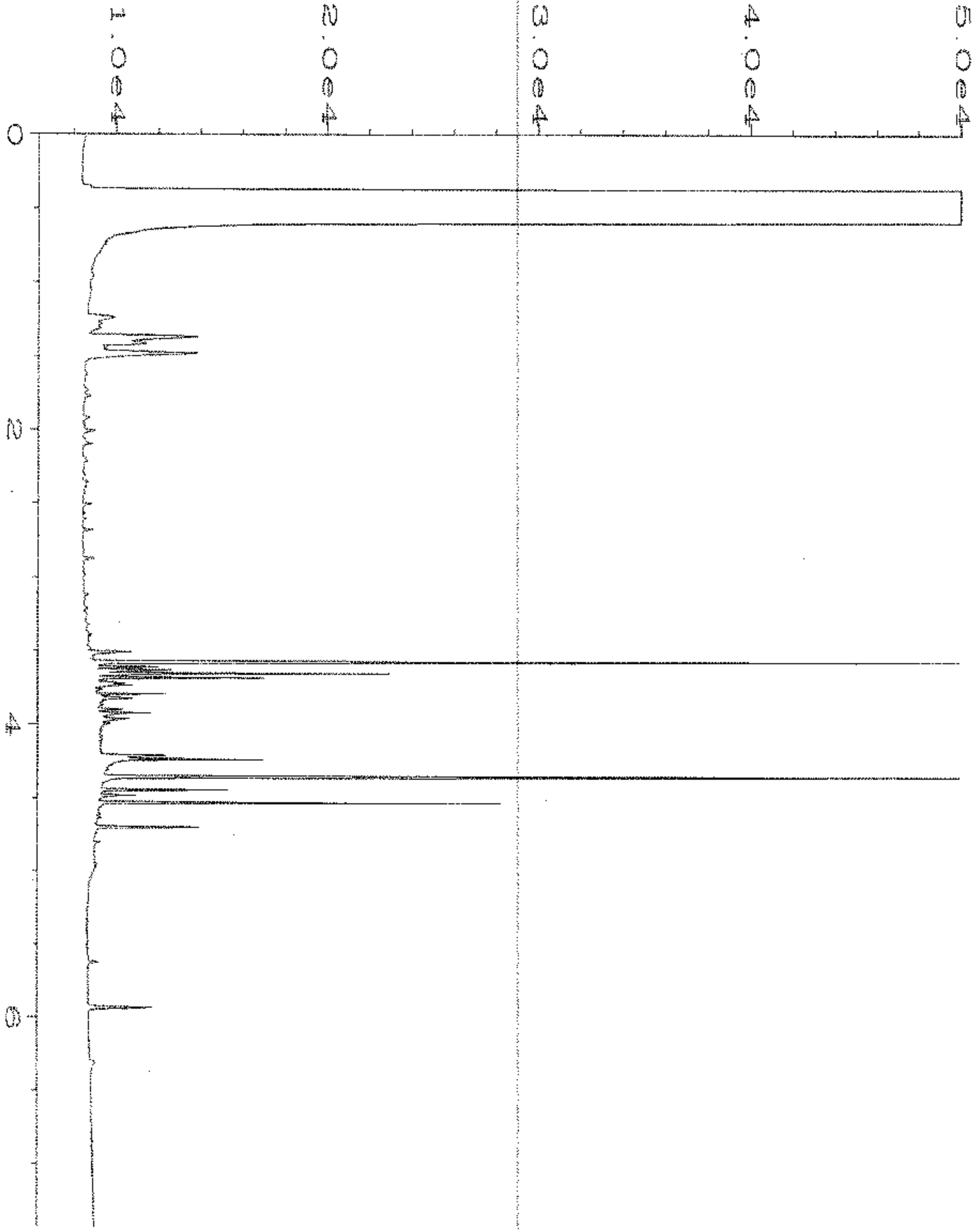
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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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Sample Name       : 008152-01                    Injection Number  : 1
Run Time Bar Code:                               Sequence Line     : 9
Acquired on       : 13 Aug 20   06:09 PM         Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:46 AM          Analysis Method   : DEFAULT.MTH
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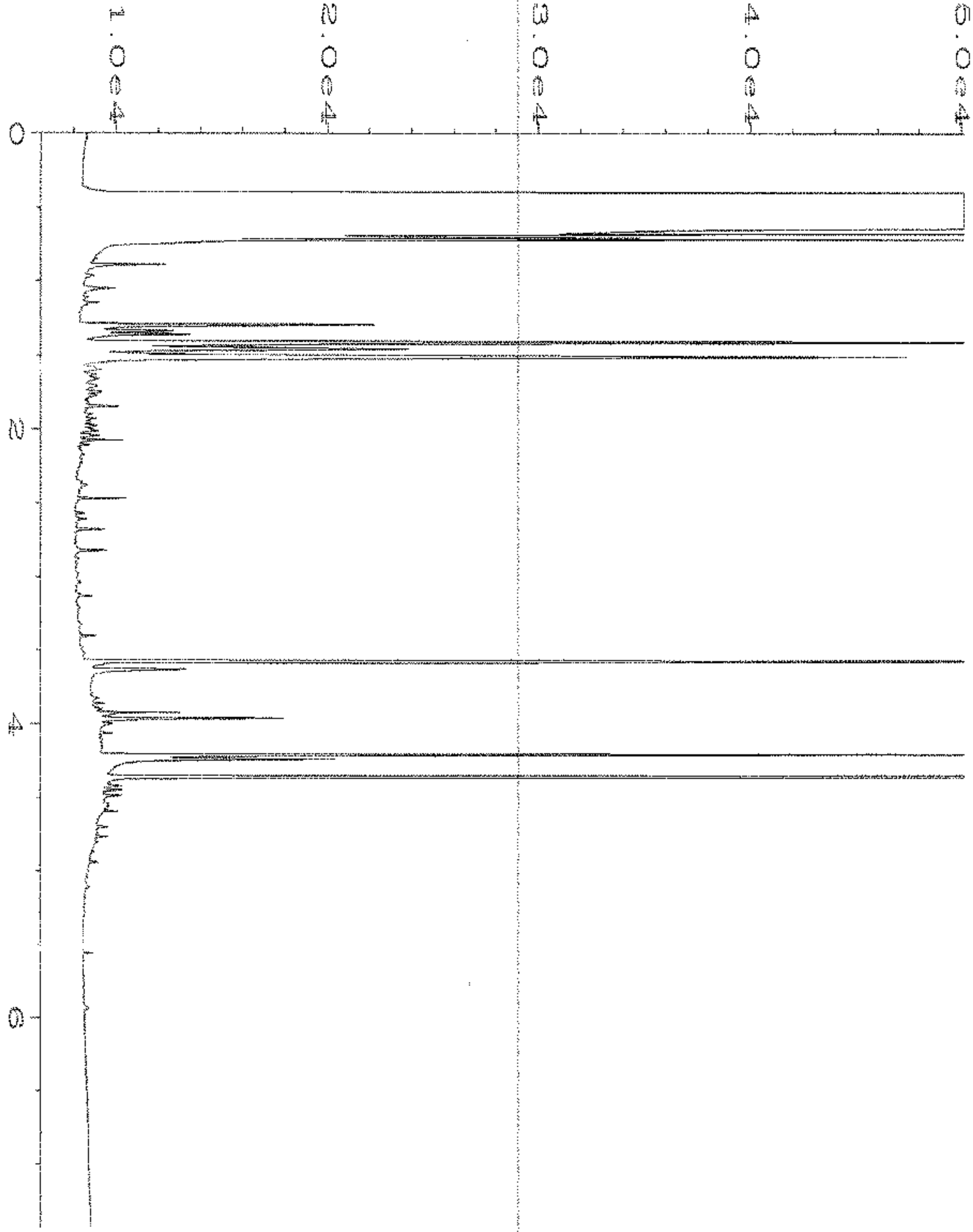

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Instrument        : GC1                         Vial Number      : 24
Sample Name       : 008152-02                   Injection Number : 1
Run Time Bar Code:                              Sequence Line    : 9
Acquired on       : 13 Aug 20   06:21 PM        Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:47 AM         Analysis Method  : DEFAULT.MTH
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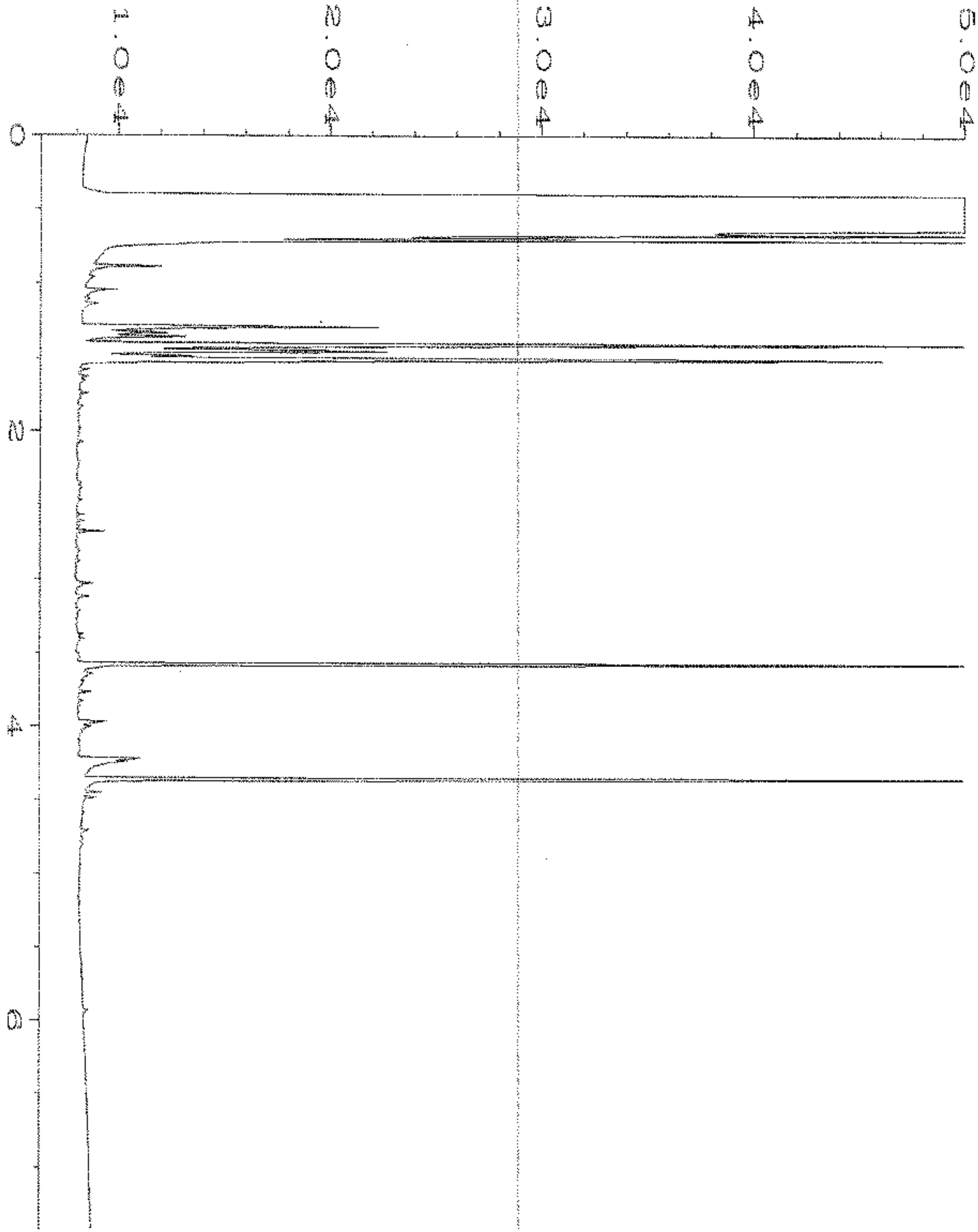

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Instrument        : GC1                             Vial Number       : 25
Sample Name       : 008152-03                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 9
Acquired on       : 13 Aug 20   06:33 PM            Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:47 AM             Analysis Method   : DEFAULT.MTH
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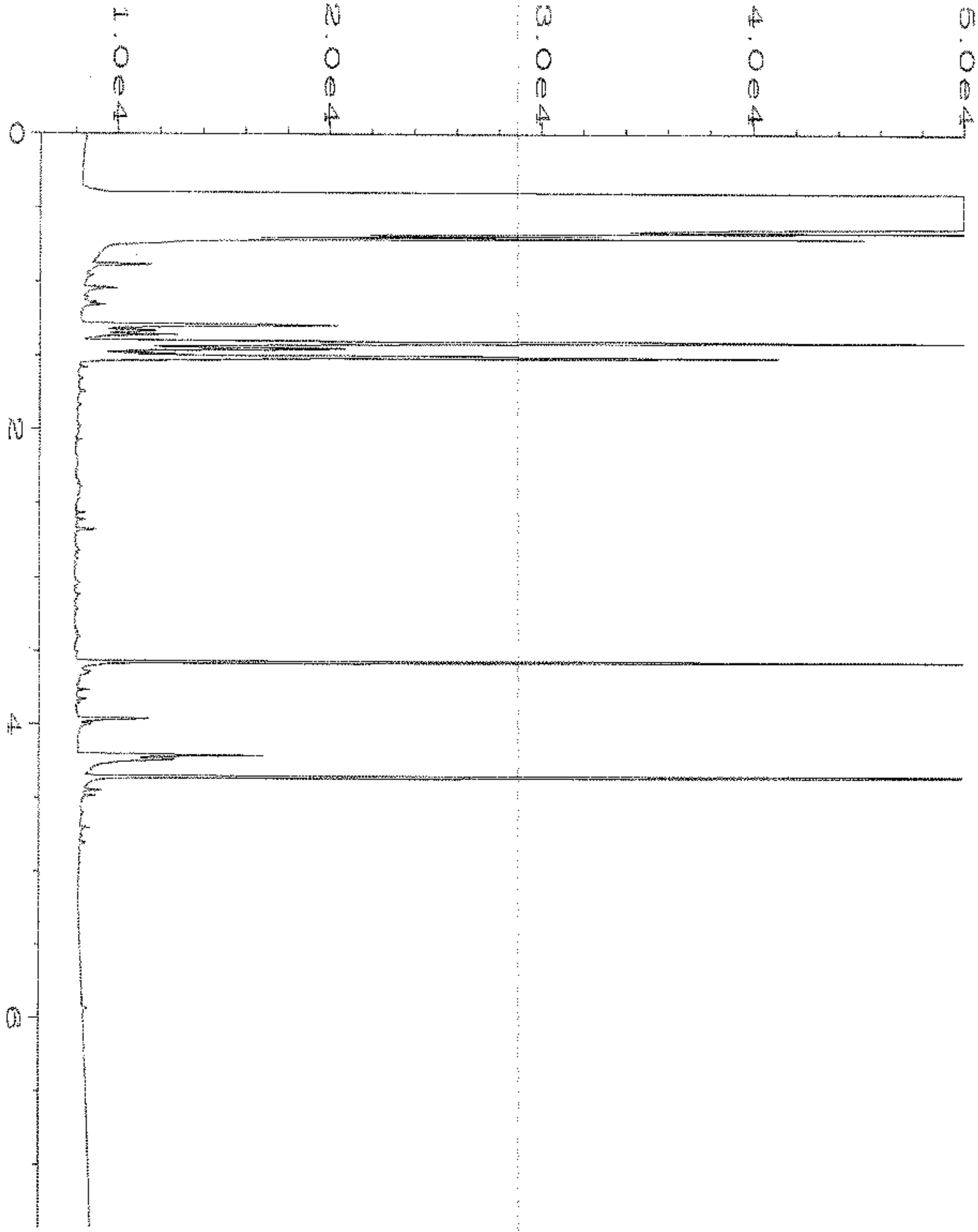

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Instrument        : GC1                             Vial Number      : 26
Sample Name       : 008152-04                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 9
Acquired on       : 13 Aug 20   06:45 PM            Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:47 AM             Analysis Method  : DEFAULT.MTH
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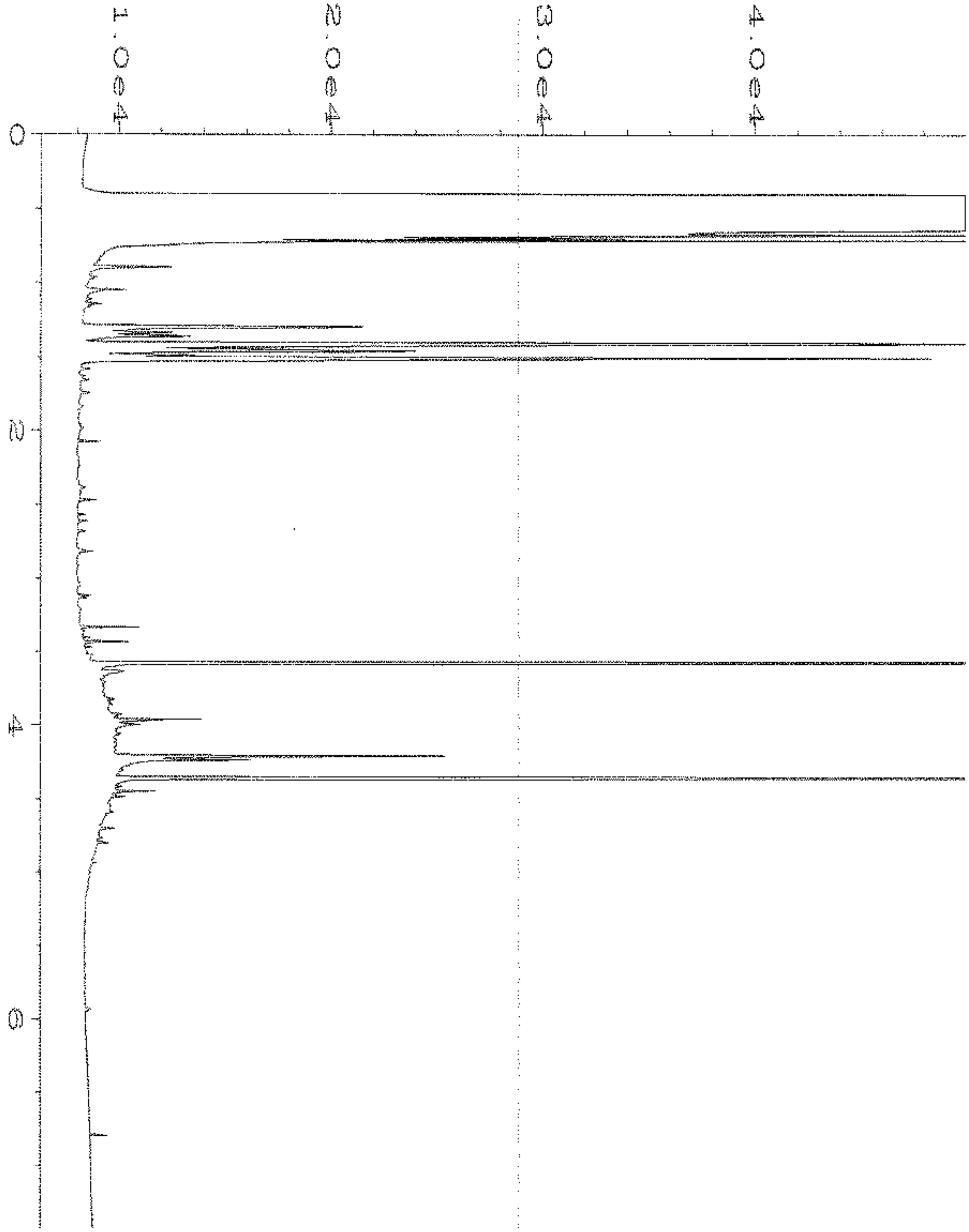

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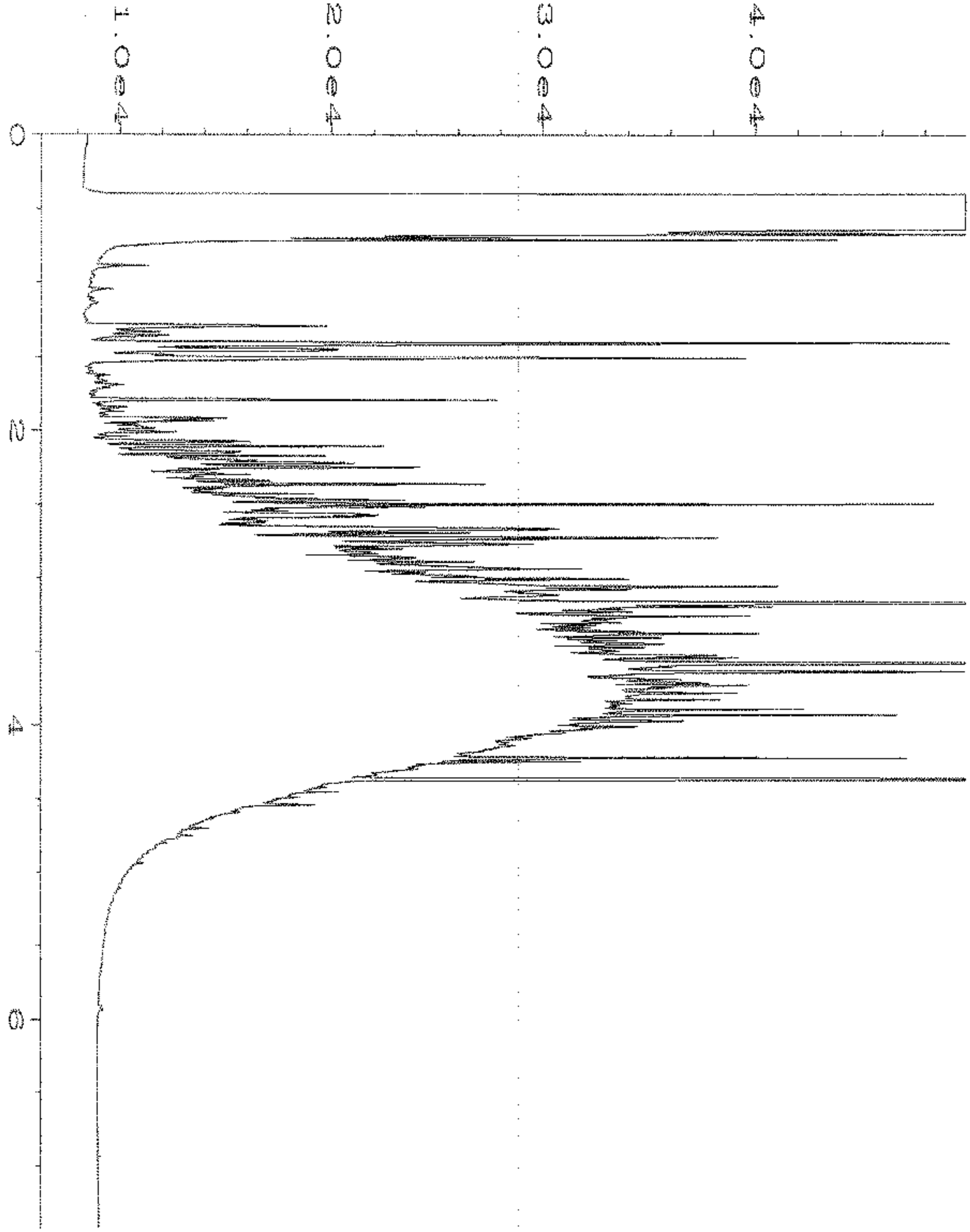
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\027F0901.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 27
Sample Name       : 008152-05                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 9
Acquired on       : 13 Aug 20  06:56 PM             Instrument Method: DX.MTH
Report Created on: 14 Aug 20  08:47 AM              Analysis Method  : DEFAULT.MTH
```



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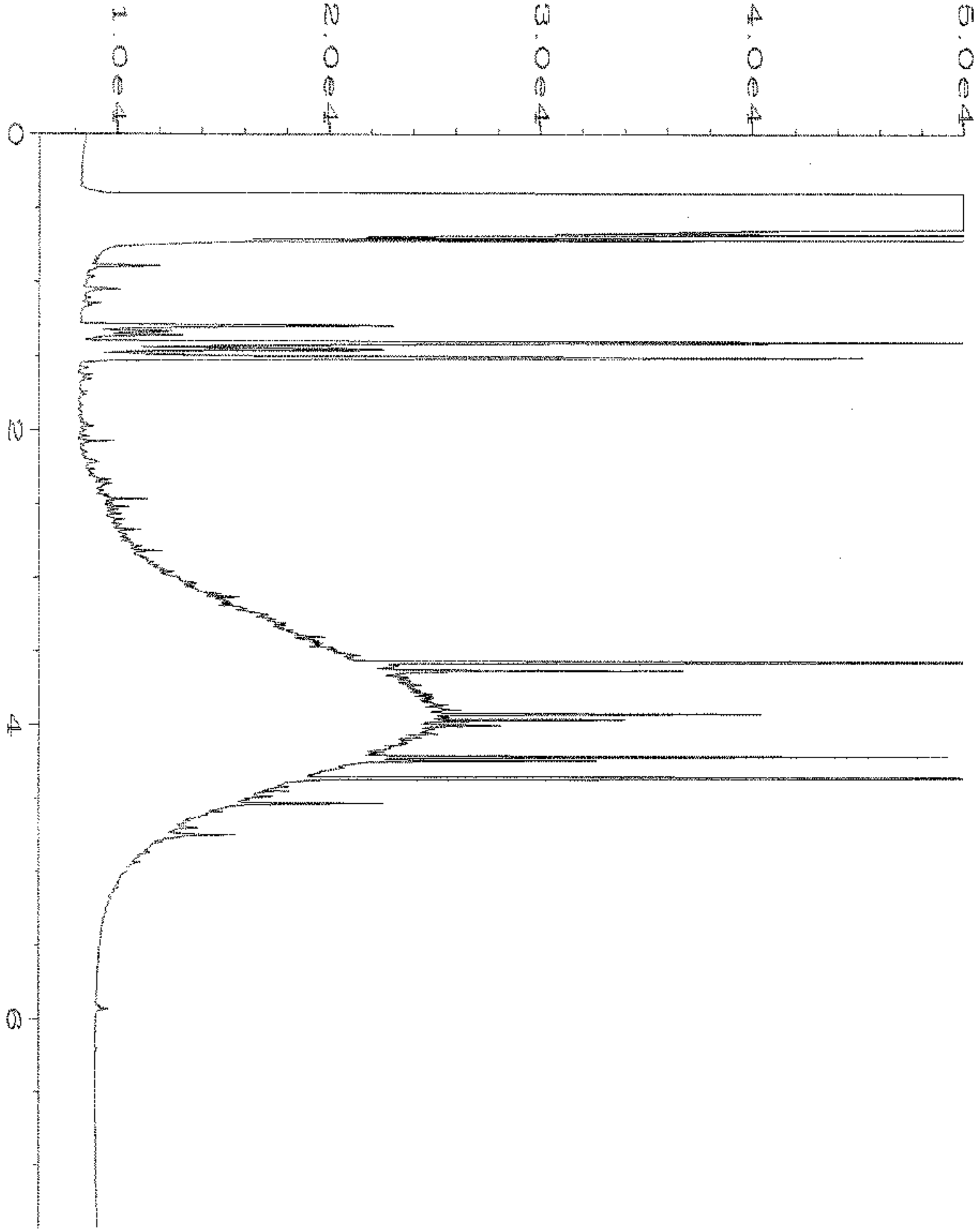
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\028F0901.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 28
Sample Name       : 008152-06                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 9
Acquired on       : 13 Aug 20   07:08 PM            Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:48 AM            Analysis Method   : DEFAULT.MTH
```



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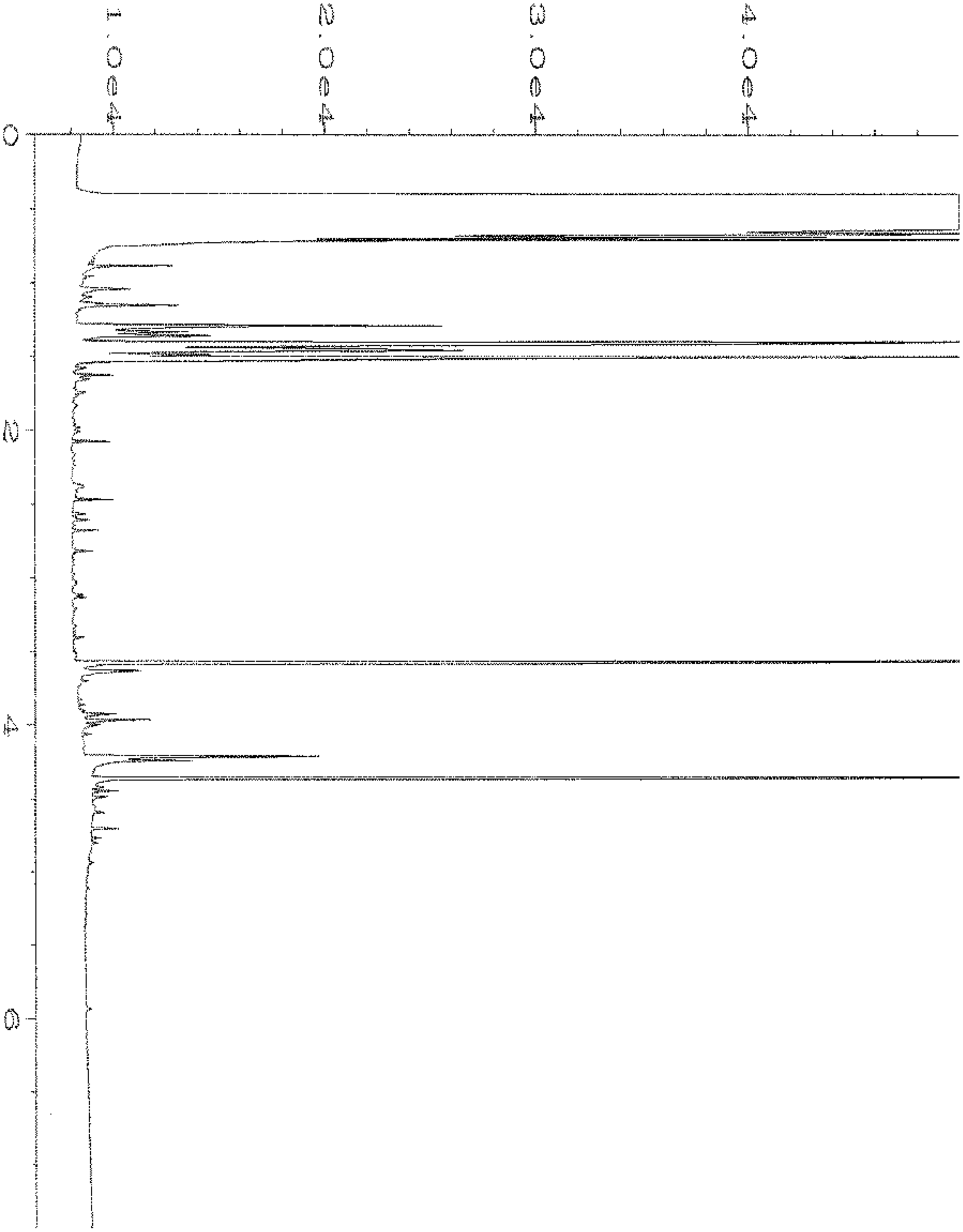
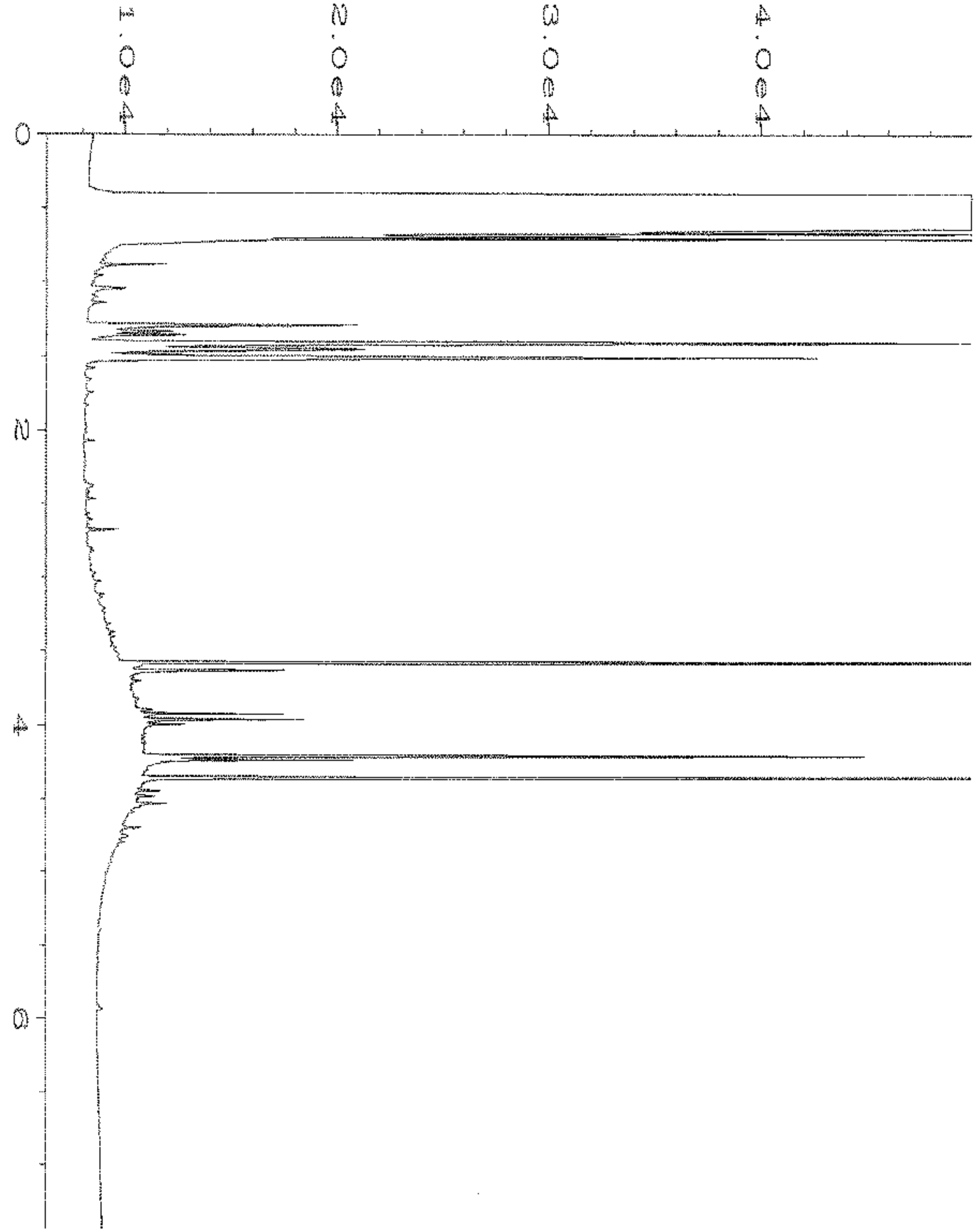
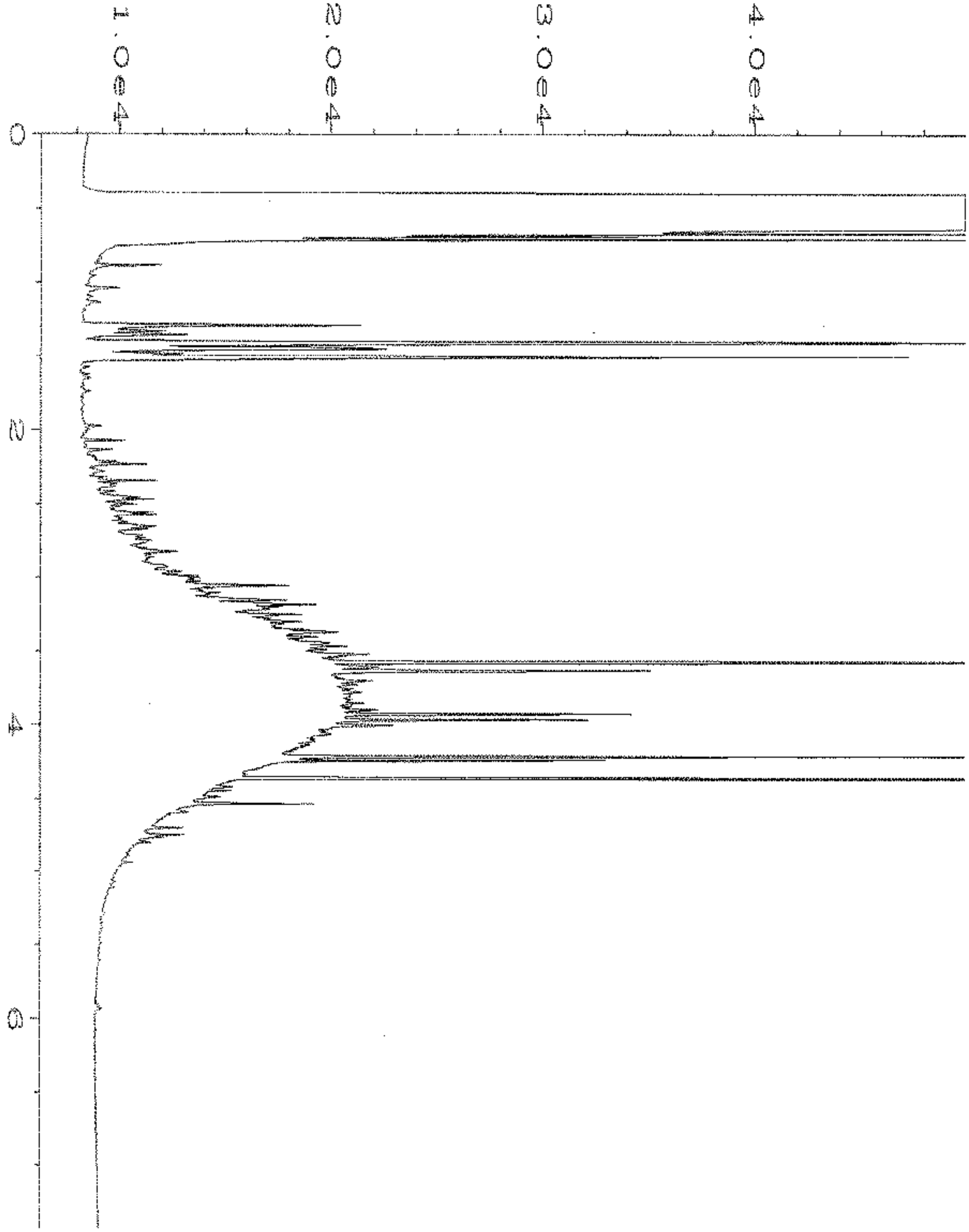
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\029F0901.D
Operator          : TL                          Page Number      : 1
Instrument        : GC1                         Vial Number      : 29
Sample Name       : 008152-07                   Injection Number : 1
Run Time Bar Code:                              Sequence Line    : 9
Acquired on       : 13 Aug 20   07:20 PM        Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:48 AM         Analysis Method  : DEFAULT.MTH
```



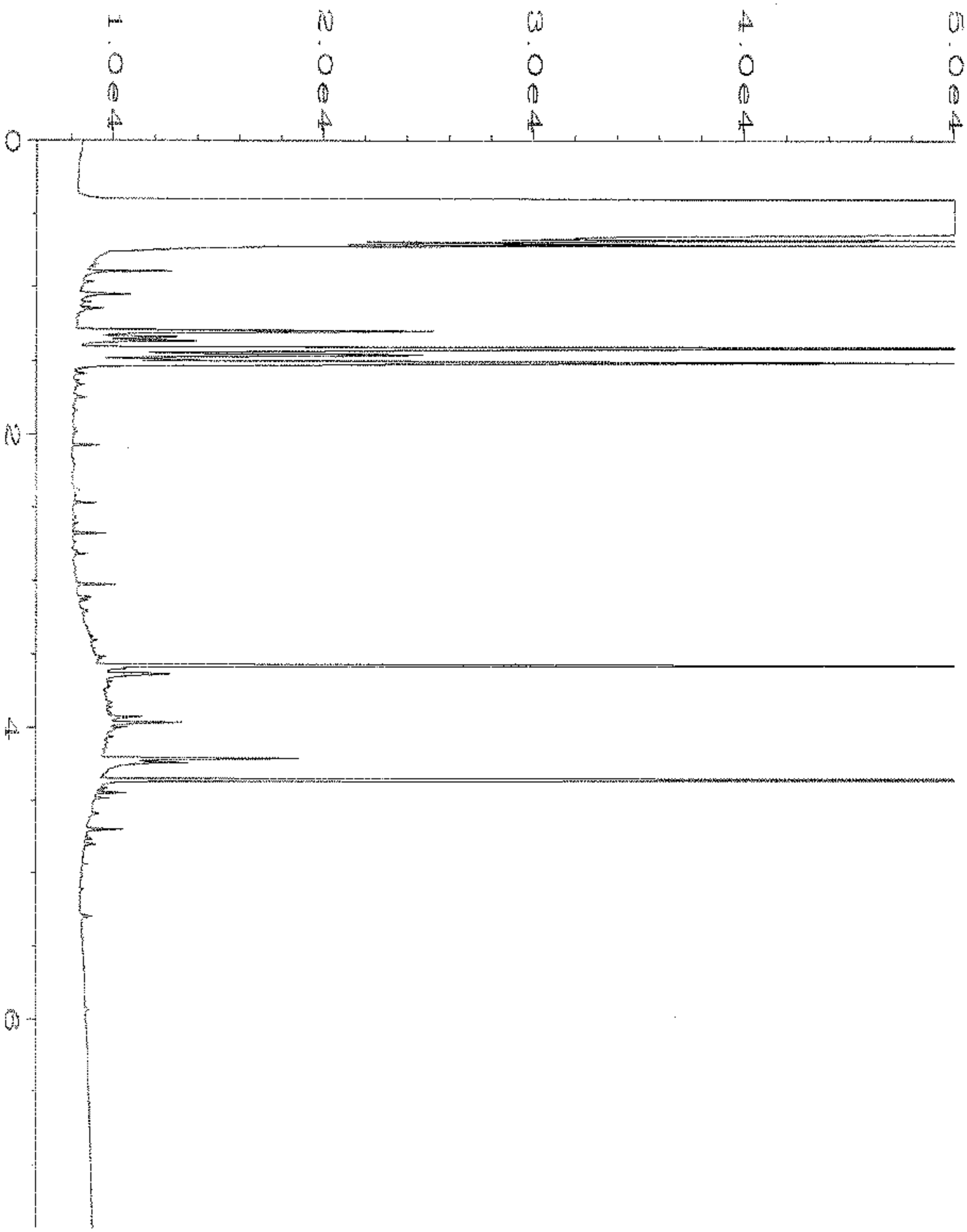
```
Data File Name   : C:\HPCHEM\1\DATA\08-13-20\030F0901.D
Operator         : TL                                  Page Number      : 1
Instrument       : GC1                                 Vial Number      : 30
Sample Name      : 008152-08                           Injection Number : 1
Run Time Bar Code:                                     Sequence Line    : 9
Acquired on      : 13 Aug 20  07:32 PM                 Instrument Method: DX.MTH
Report Created on: 14 Aug 20  08:48 AM                 Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\031F0901.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 31
Sample Name       : 008152-09                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 9
Acquired on       : 13 Aug 20   07:44 PM            Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:48 AM             Analysis Method  : DEFAULT.MTH
```

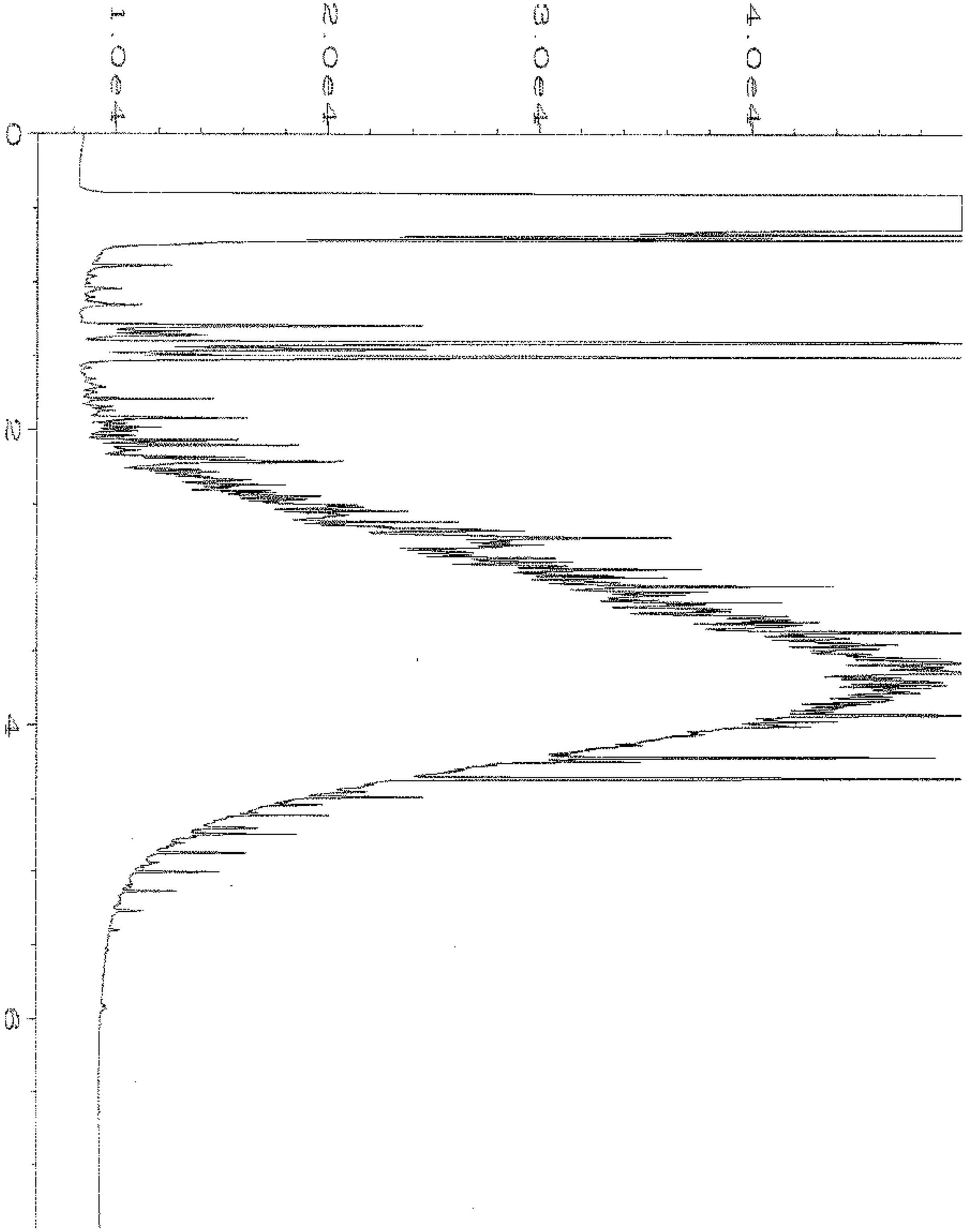


```
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\032F0901.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 32
Sample Name       : 008152-10                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 9
Acquired on       : 13 Aug 20   07:55 PM            Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:48 AM             Analysis Method  : DEFAULT.MTH
```



Data File Name   : C:\HPCHEM\1\DATA\08-13-20\033F1101.D
Operator   : TL
Instrument   : GC1
Sample Name   : 008152-11
Run Time Bar Code:
Acquired on   : 13 Aug 20   08:31 PM
Report Created on: 14 Aug 20   08:48 AM

Page Number   : 1
Vial Number   : 33
Injection Number : 1
Sequence Line   : 11
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



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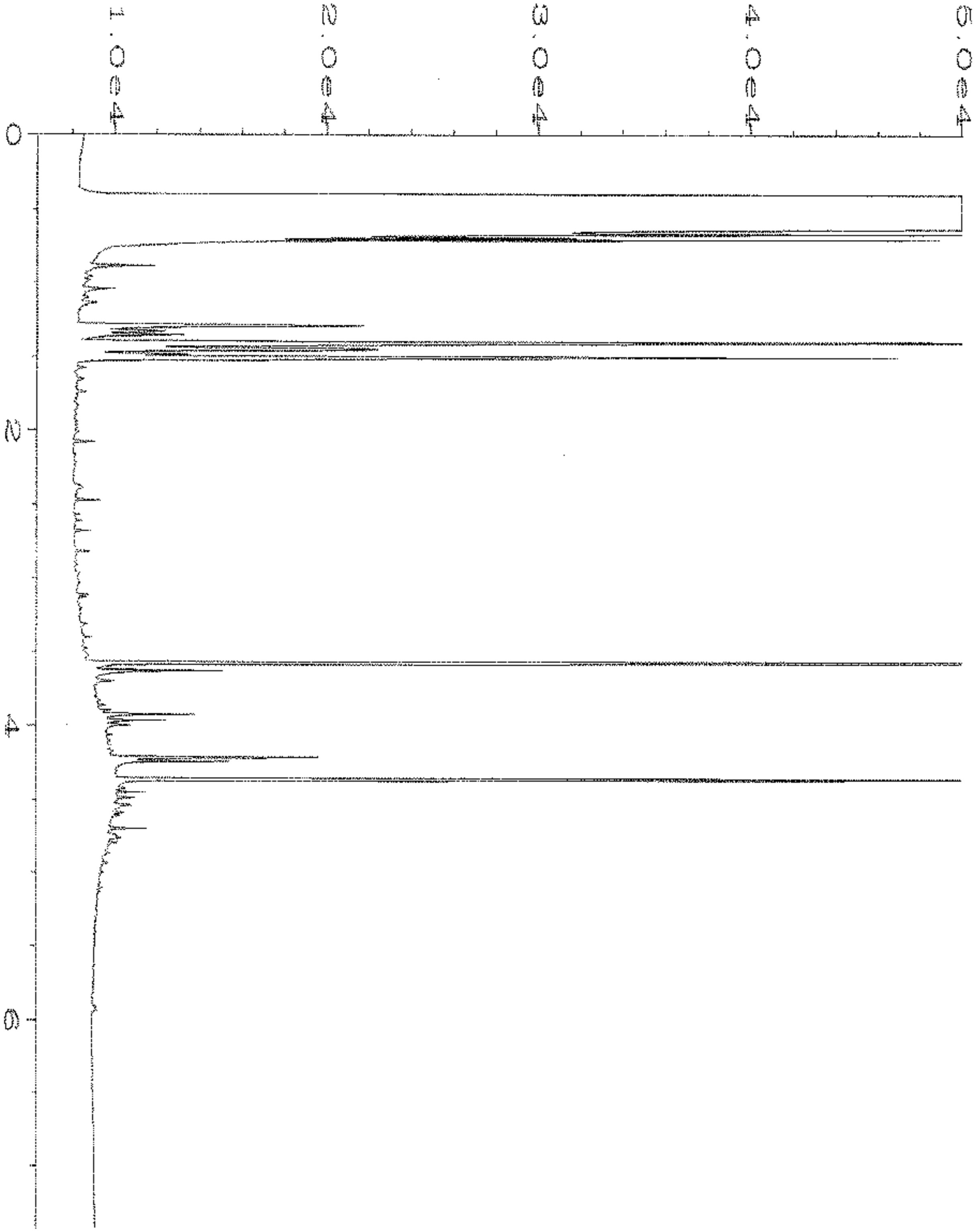
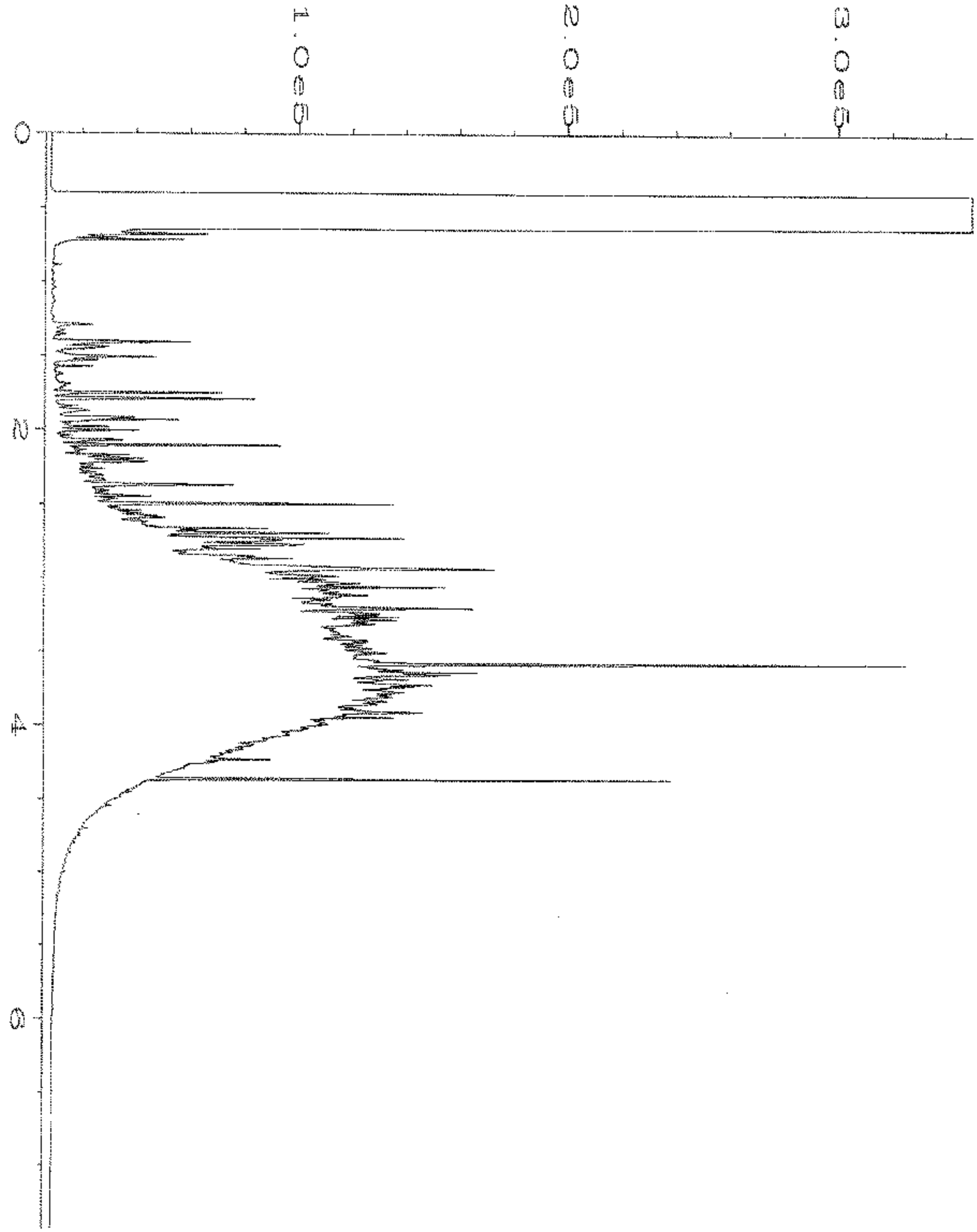
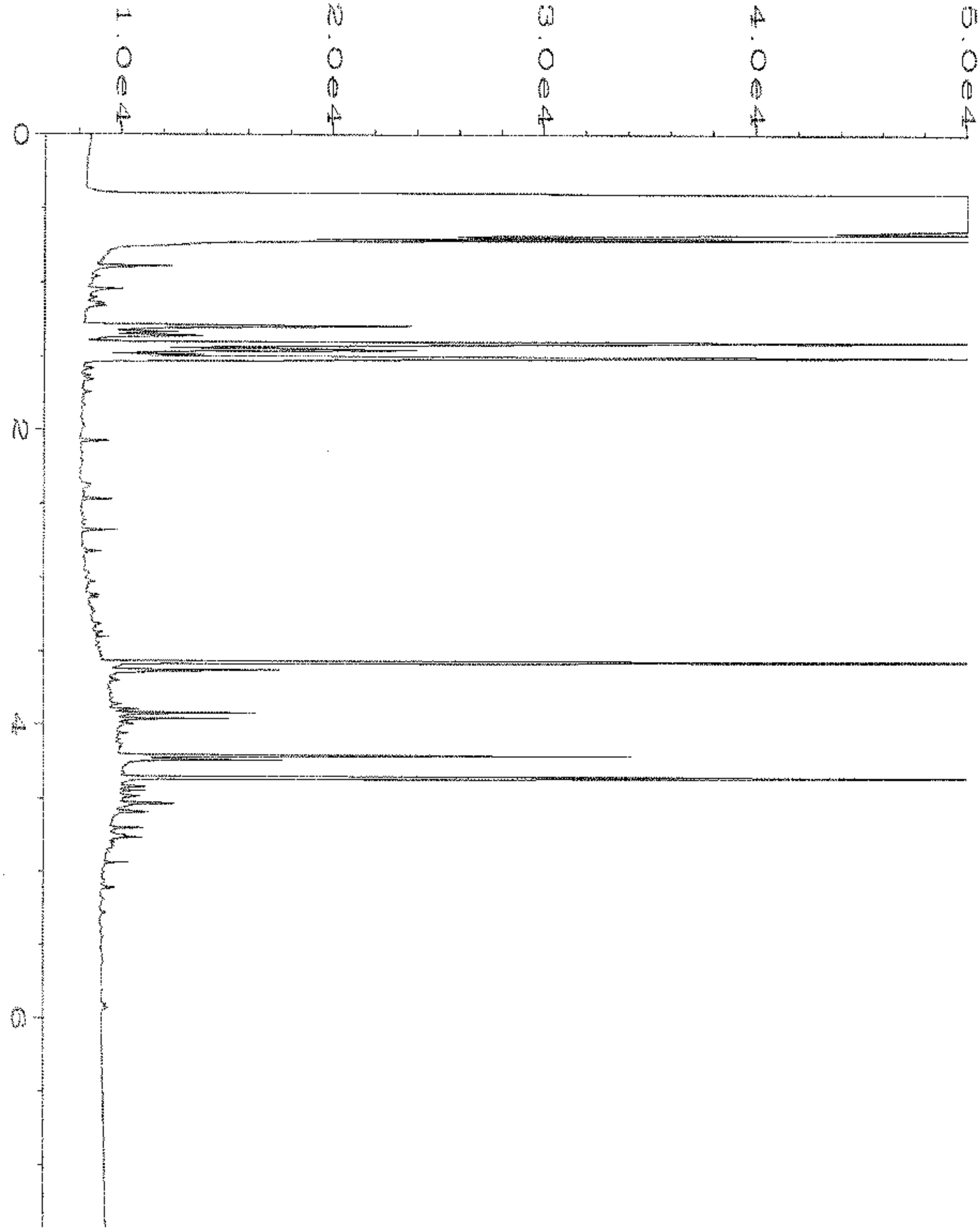
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\034F1101.D
Operator          : TL                               Page Number      : 1
Instrument        : GC1                              Vial Number      : 34
Sample Name       : 008152-12                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 11
Acquired on       : 13 Aug 20   08:43 PM             Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:48 AM              Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\035F1101.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC1                                 Vial Number      : 35
Sample Name       : 008152-13                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 11
Acquired on       : 13 Aug 20   08:54 PM                Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:49 AM                 Analysis Method  : DEFAULT.MTH
```

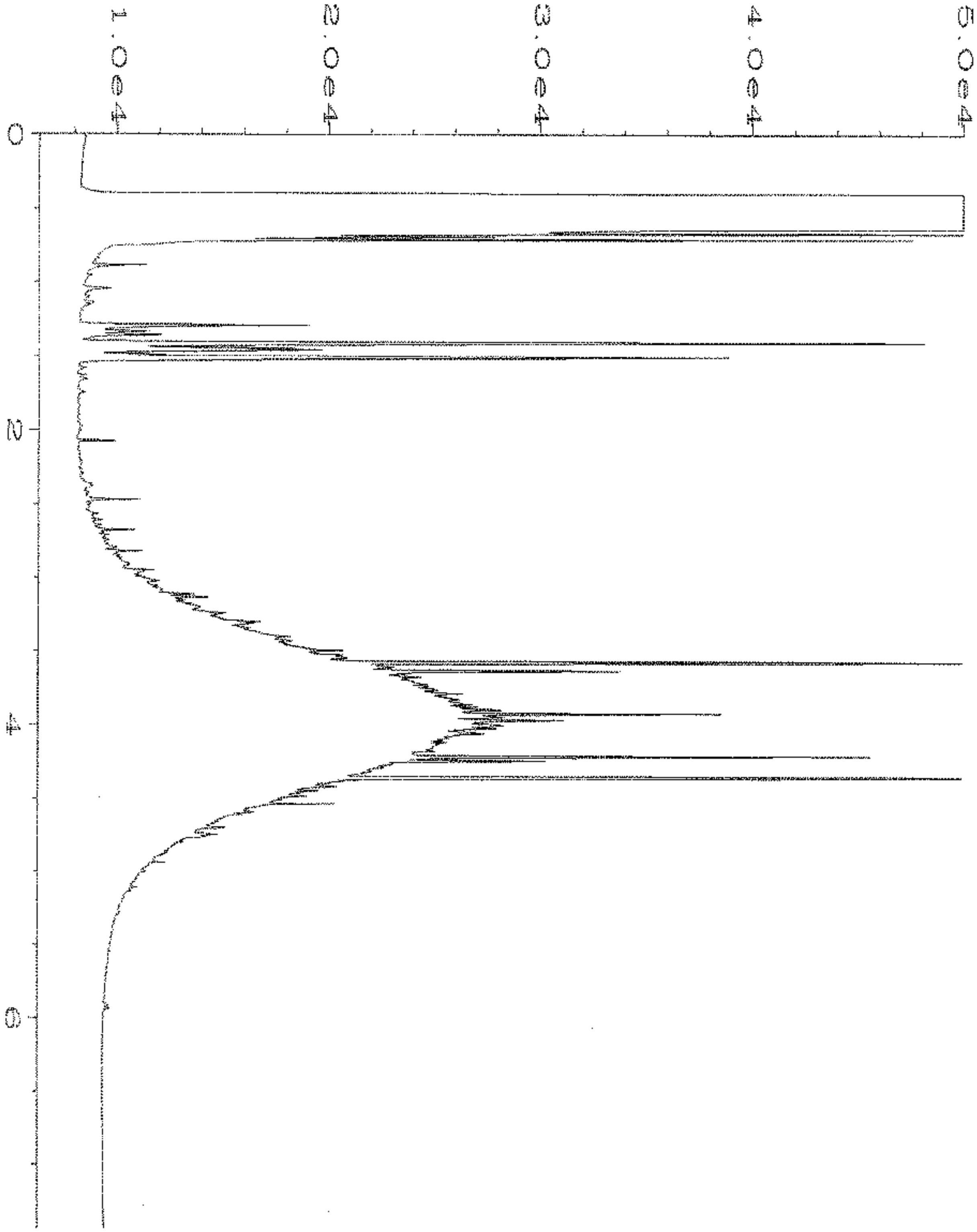


```
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\036F1101.D
Operator          : TL                                Page Number       : 1
Instrument        : GC1                               Vial Number       : 36
Sample Name       : 008152-14                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line     : 11
Acquired on       : 13 Aug 20   09:06 PM              Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:49 AM               Analysis Method   : DEFAULT.MTH
```



Data File Name : C:\HPCHEM\1\DATA\08-13-20\037F1101.D
Operator : TL
Instrument : GC1
Sample Name : 008152-15
Run Time Bar Code:
Acquired on : 13 Aug 20 09:18 PM
Report Created on: 14 Aug 20 08:49 AM

Page Number : 1
Vial Number : 37
Injection Number : 1
Sequence Line : 11
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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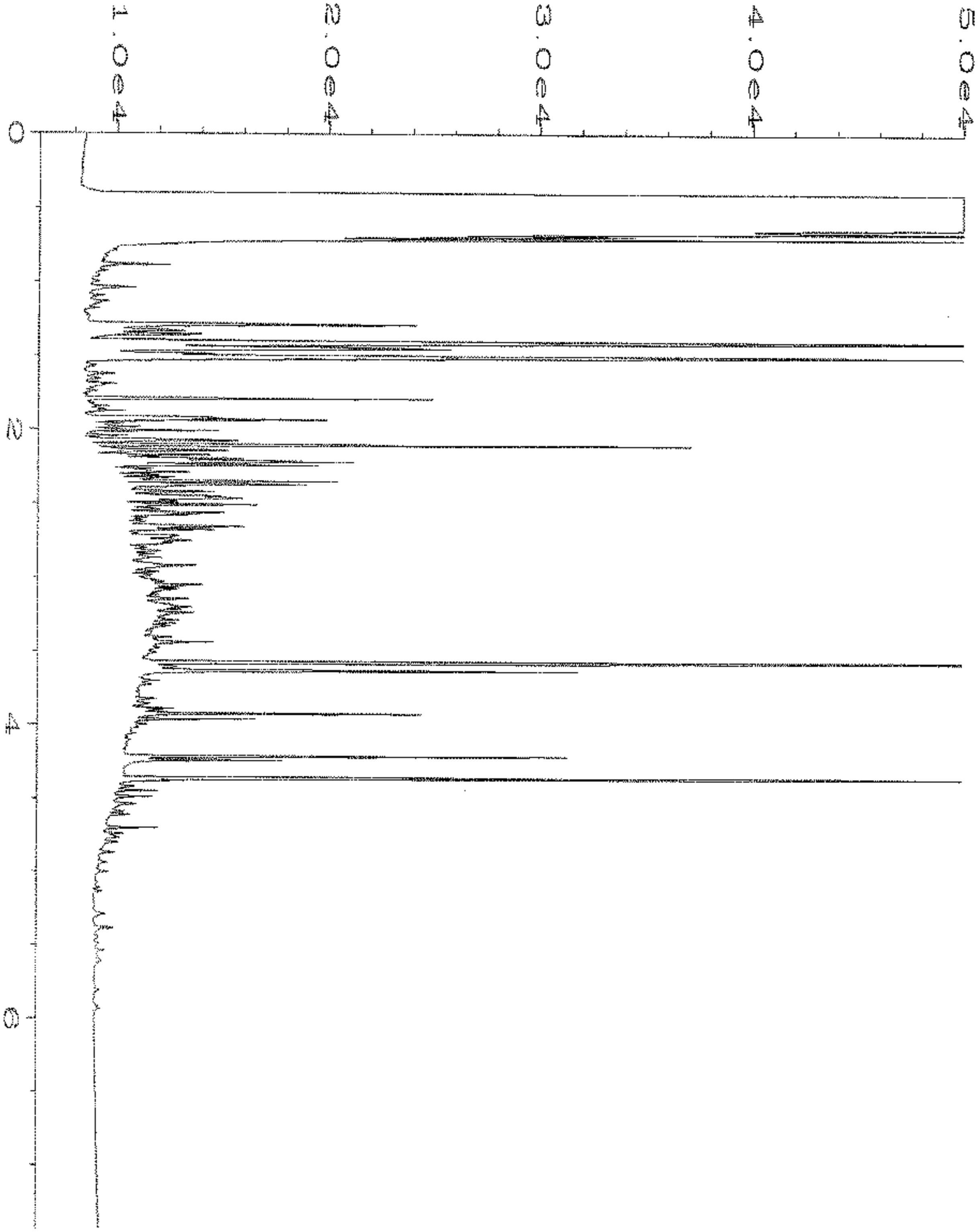
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\038F1101.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC1                                 Vial Number      : 38
Sample Name       : 008152-16                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 11
Acquired on       : 13 Aug 20   09:30 PM                Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:49 AM                 Analysis Method  : DEFAULT.MTH
```



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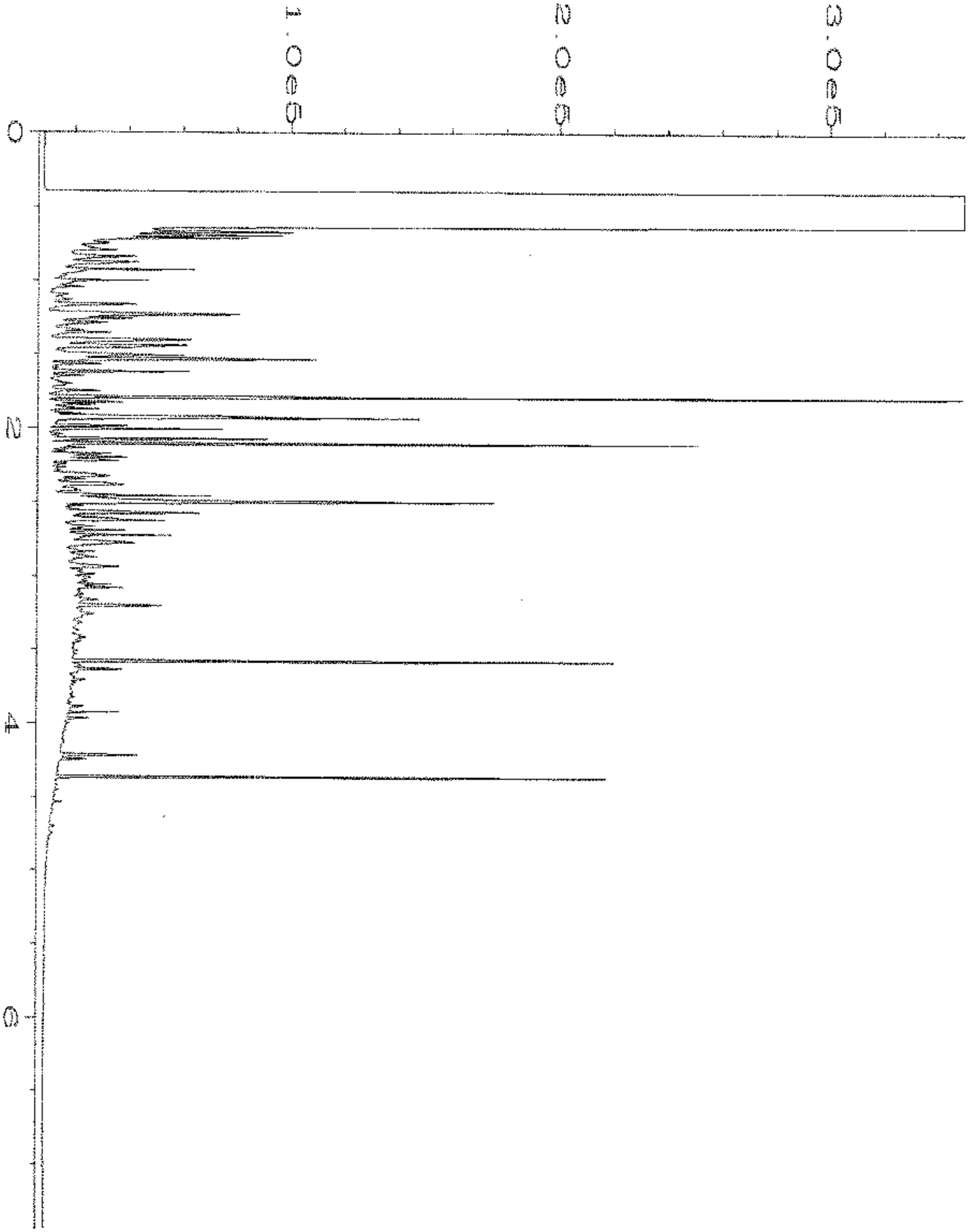
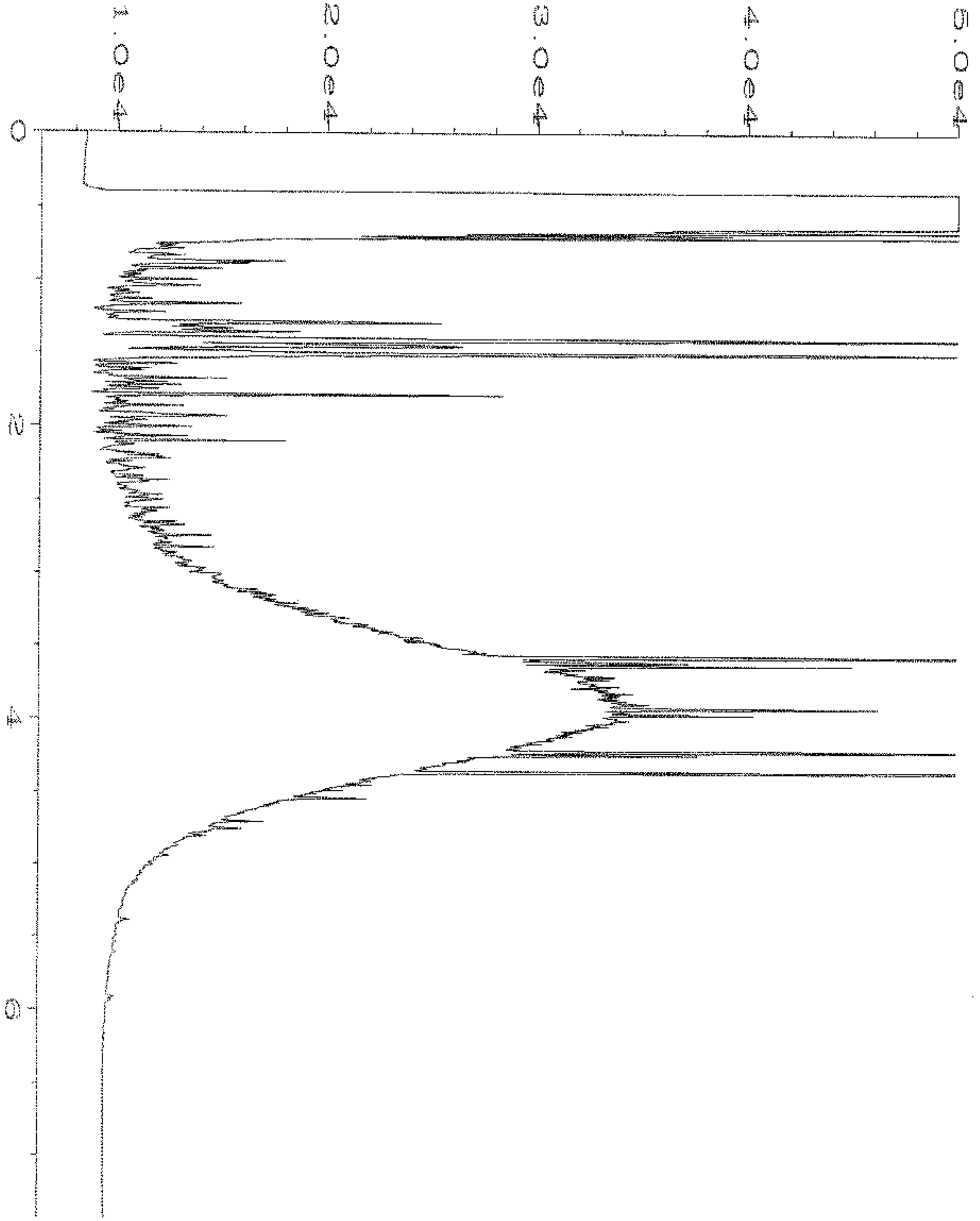
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\039F1101.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC1                                 Vial Number      : 39
Sample Name       : 008152-17                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 11
Acquired on       : 13 Aug 20   09:42 PM                Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:49 AM                 Analysis Method  : DEFAULT.MTH
```



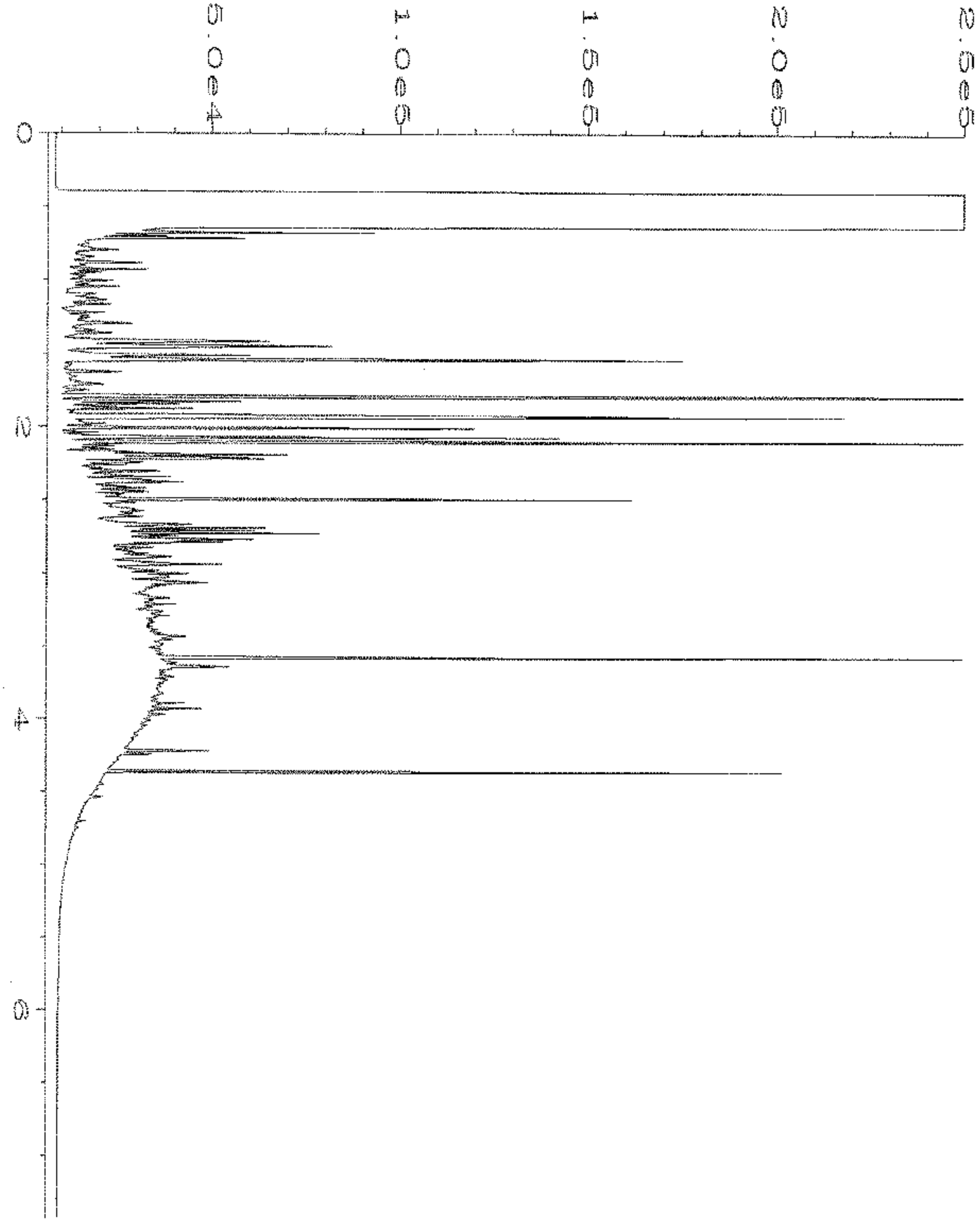
Data File Name : C:\HPCHEM\1\DATA\08-13-20\040F1101.D
Operator : TL
Instrument : GC1
Sample Name : 008152-18
Run Time Bar Code:
Acquired on : 13 Aug 20 09:54 PM
Report Created on: 14 Aug 20 08:50 AM

Page Number : 1
Vial Number : 40
Injection Number : 1
Sequence Line : 11
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



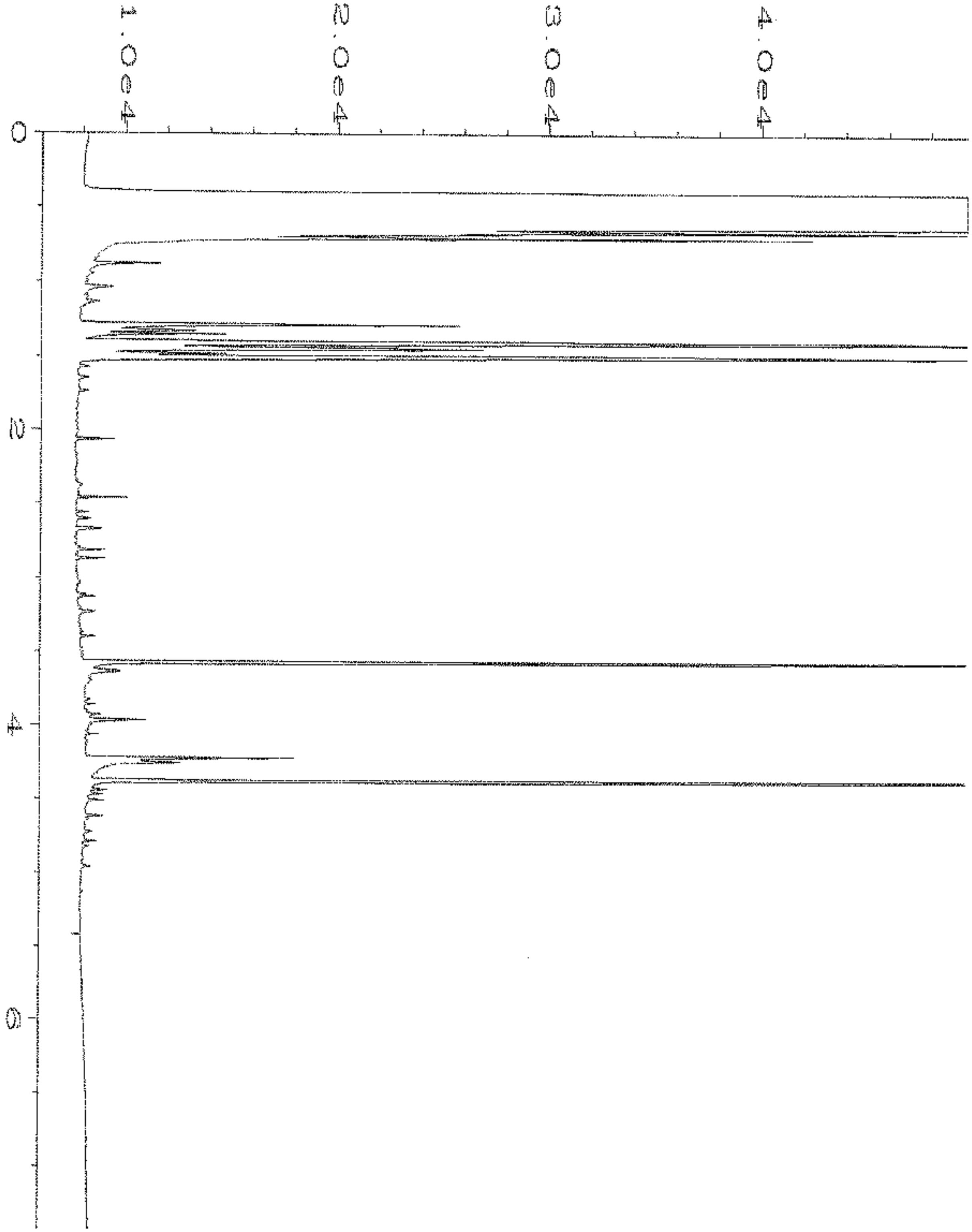
Data File Name : C:\HPCHEM\1\DATA\08-13-20\041F1101.D
Operator : TL
Instrument : GC1
Sample Name : 008152-19
Run Time Bar Code:
Acquired on : 13 Aug 20 10:05 PM
Report Created on: 14 Aug 20 08:50 AM

Page Number : 1
Vial Number : 41
Injection Number : 1
Sequence Line : 11
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



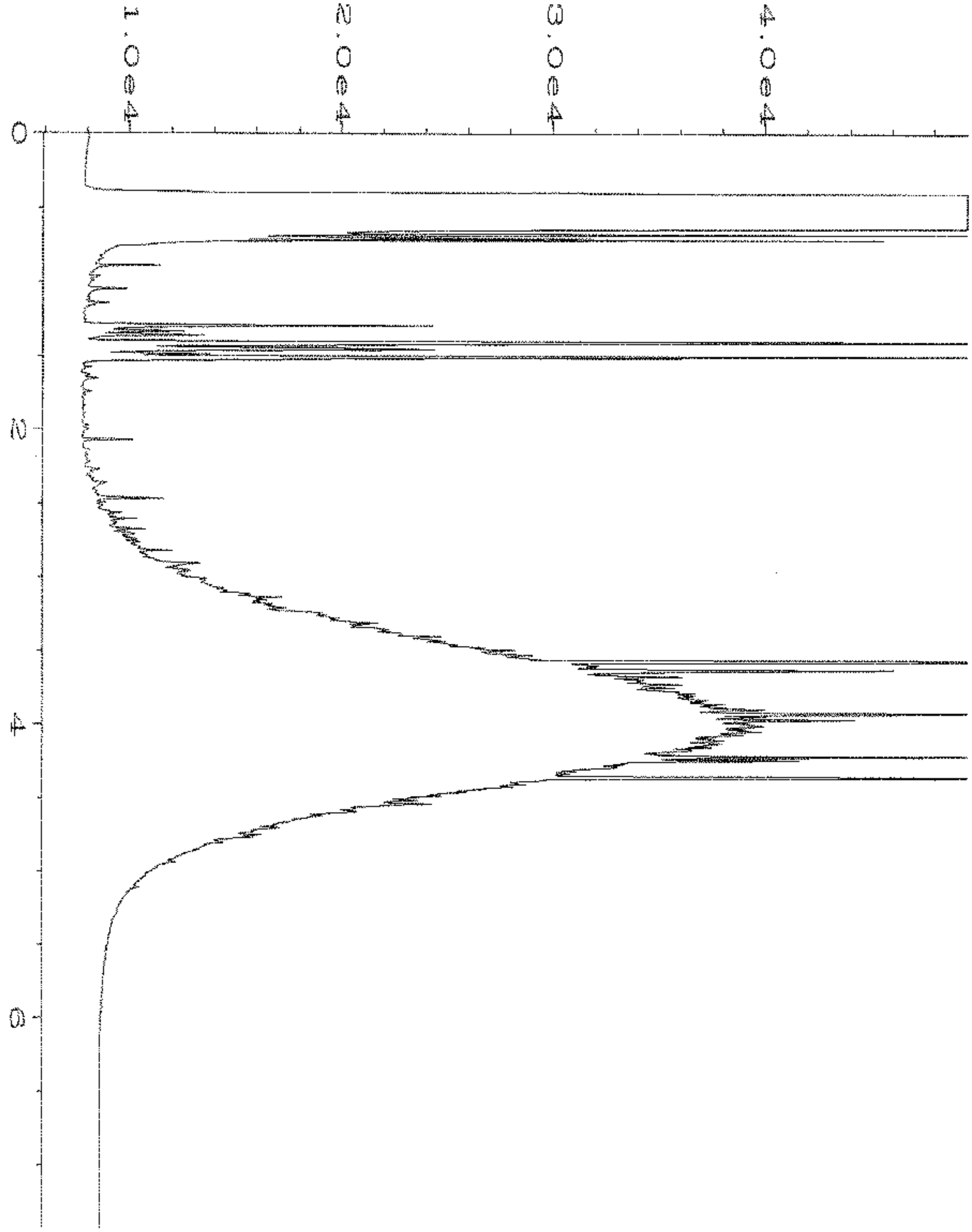
Data File Name : C:\HPCHEM\1\DATA\08-13-20\042F1101.D
Operator : TL
Instrument : GC1
Sample Name : 008152-20
Run Time Bar Code:
Acquired on : 13 Aug 20 10:17 PM
Report Created on: 14 Aug 20 08:50 AM

Page Number : 1
Vial Number : 42
Injection Number : 1
Sequence Line : 11
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name   : C:\HPCHEM\1\DATA\08-12-20\018F0701.D
Operator   : TL
Instrument   : GC1
Sample Name   : 008152-21
Run Time Bar Code:
Acquired on   : 12 Aug 20   02:02 PM
Report Created on: 13 Aug 20   08:11 AM

Page Number   : 1
Vial Number   : 18
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



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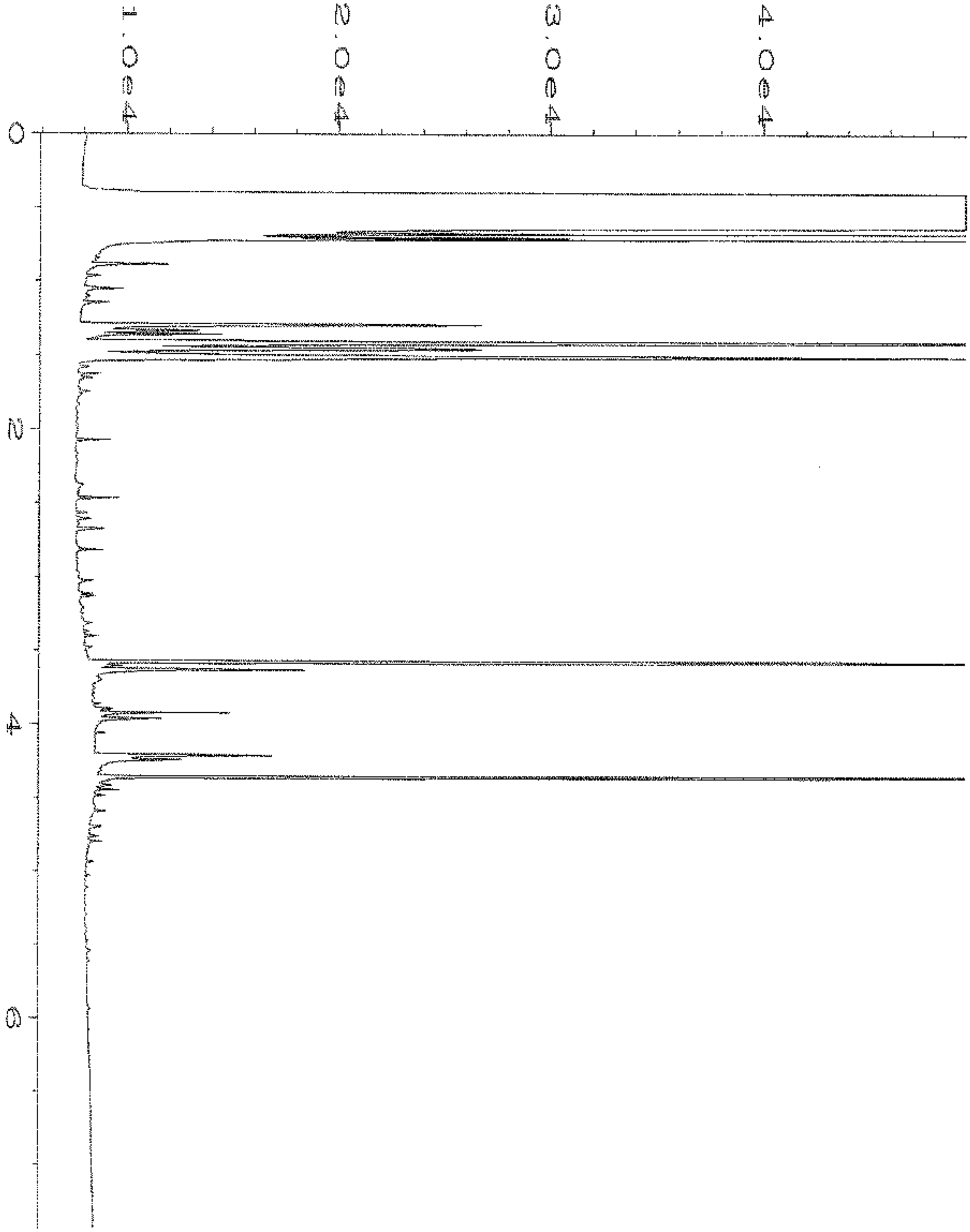
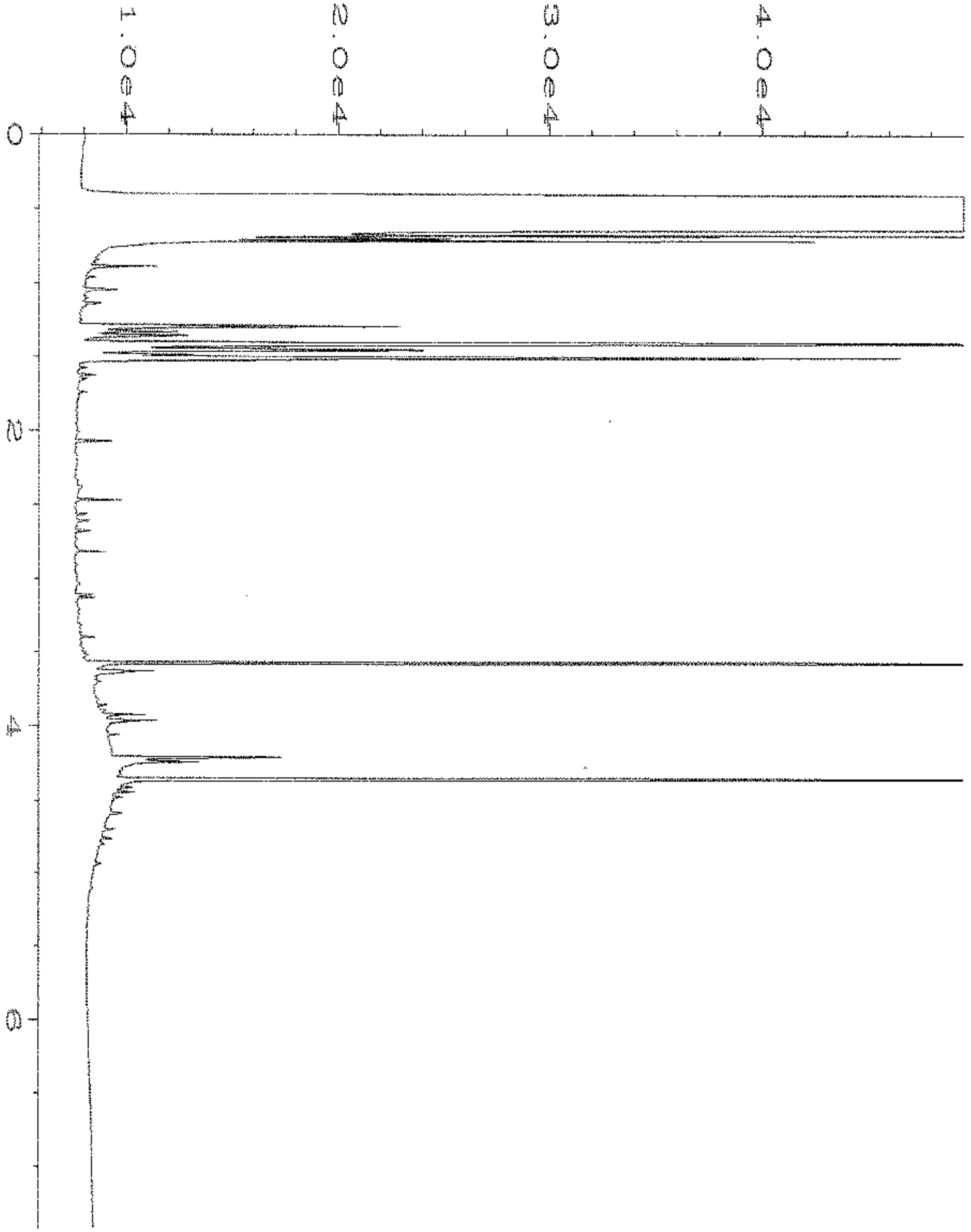
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\019F0701.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 19
Sample Name       : 008152-22                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line     : 7
Acquired on       : 12 Aug 20   02:11 PM            Instrument Method: DX.MTH
Report Created on: 13 Aug 20   08:11 AM            Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\020F0701.D
Operator          : TL                                   Page Number      : 1
Instrument        : GC1                                  Vial Number      : 20
Sample Name       : 008152-23                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line    : 7
Acquired on       : 12 Aug 20   02:23 PM                 Instrument Method: DX.MTH
Report Created on: 13 Aug 20   08:11 AM                  Analysis Method  : DEFAULT.MTH
```



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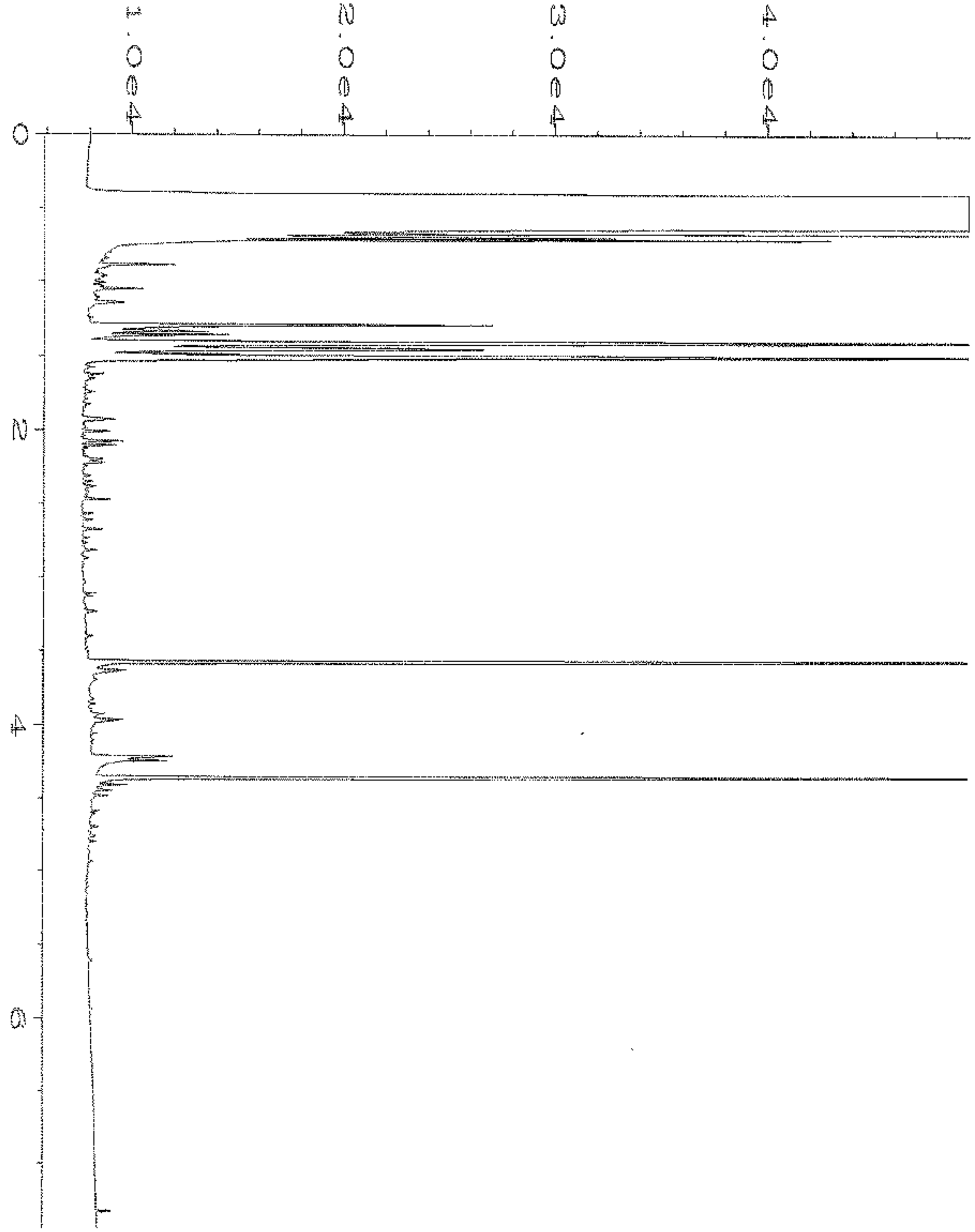
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\021F0701.D
Operator          : TL                          Page Number       : 1
Instrument        : GC1                         Vial Number       : 21
Sample Name       : 008152-24                   Injection Number : 1
Run Time Bar Code:                              Sequence Line     : 7
Acquired on       : 12 Aug 20   02:34 PM        Instrument Method: DX.MTH
Report Created on: 13 Aug 20   08:12 AM        Analysis Method   : DEFAULT.MTH
```



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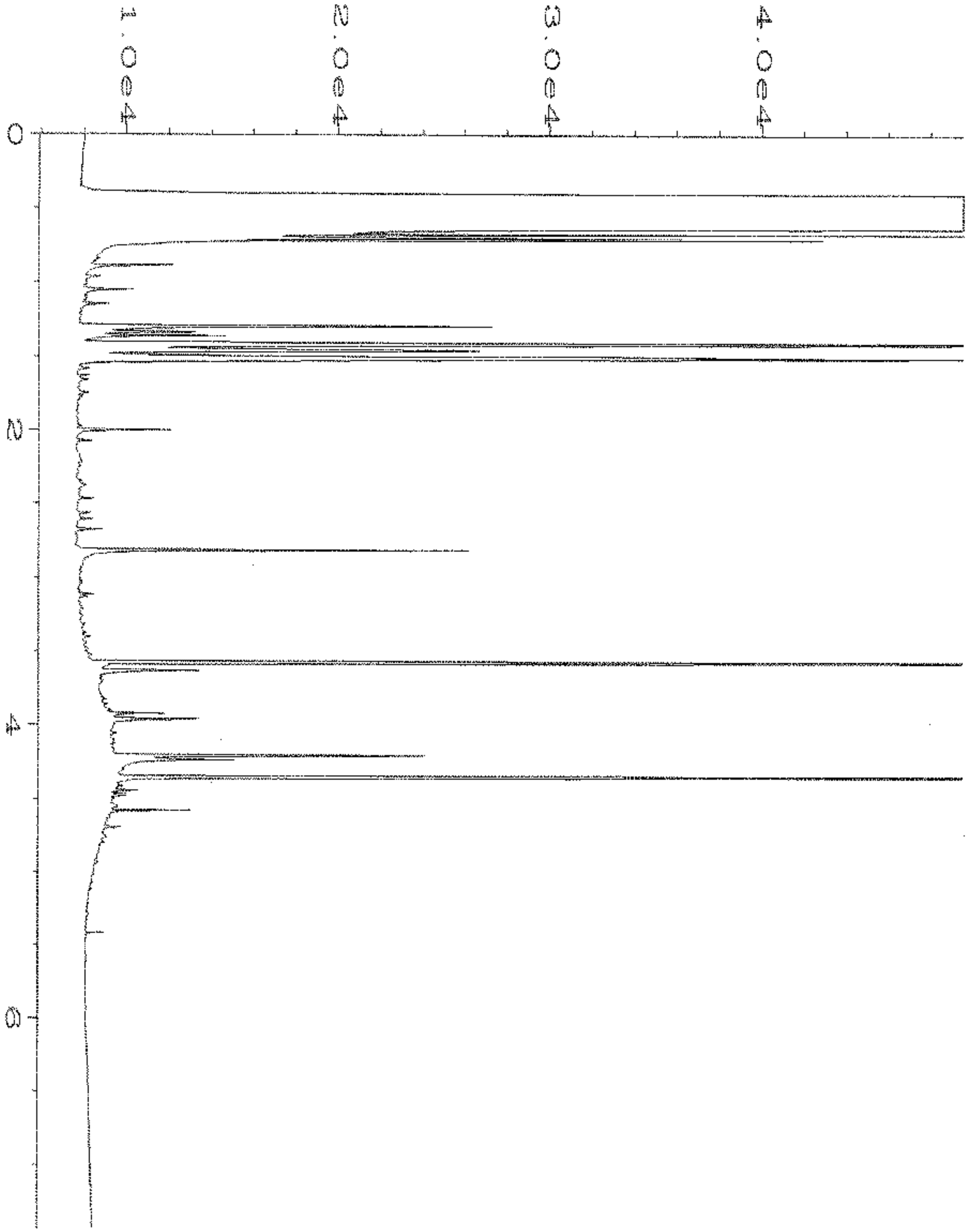
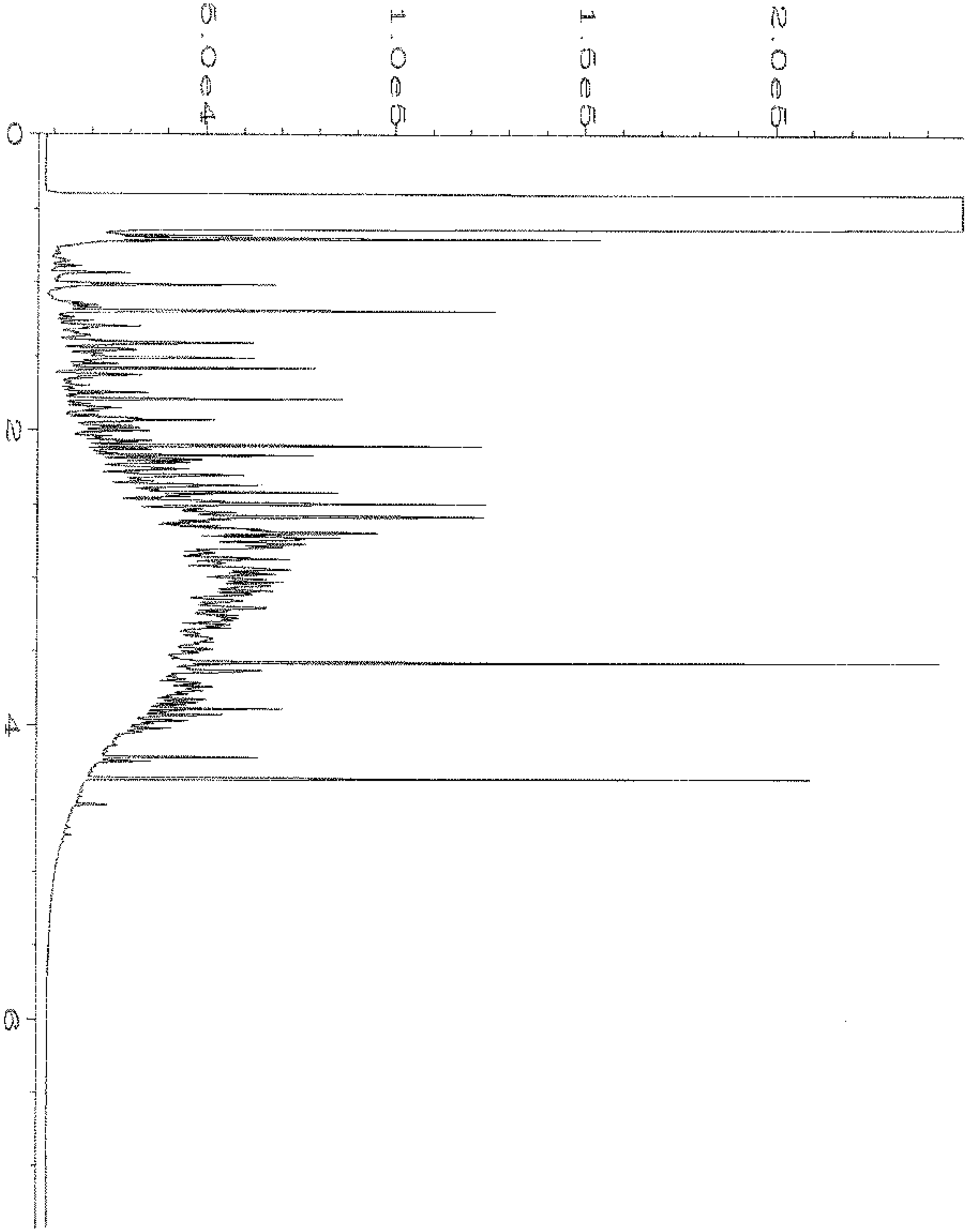
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\022F0701.D
Operator          : TL                               Page Number      : 1
Instrument        : GC1                              Vial Number      : 22
Sample Name       : 008152-25                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 7
Acquired on       : 12 Aug 20  02:46 PM              Instrument Method: DX.MTH
Report Created on: 13 Aug 20  08:12 AM               Analysis Method  : DEFAULT.MTH
```

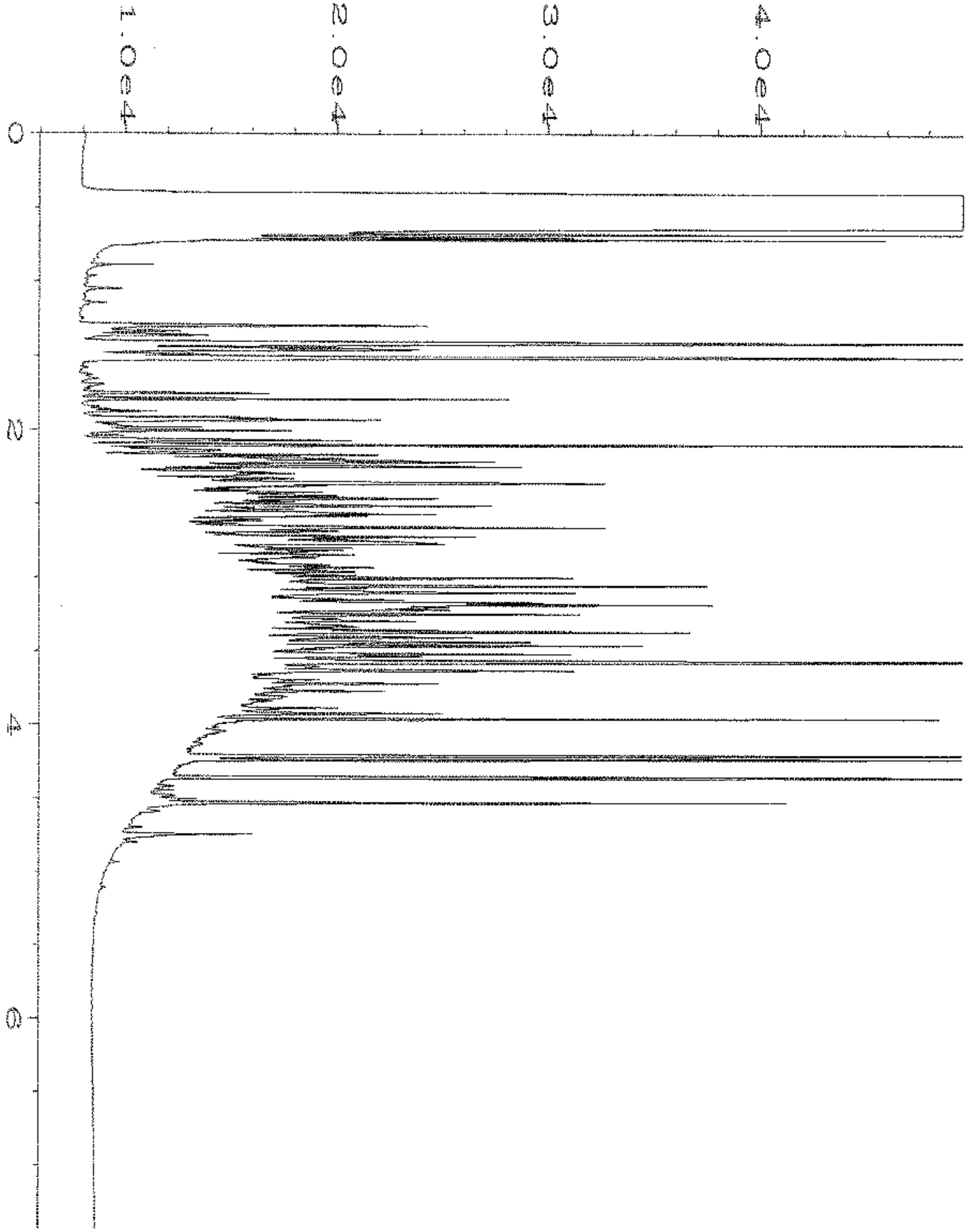


Data File Name : C:\HPCHEM\1\DATA\08-12-20\023F0701.D
Operator : TL
Instrument : GC1
Sample Name : 008152-26
Run Time Bar Code:
Acquired on : 12 Aug 20 02:58 PM
Report Created on: 13 Aug 20 08:12 AM

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\024F0701.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC1                                 Vial Number      : 24
Sample Name       : 008152-27                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 7
Acquired on       : 12 Aug 20   03:09 PM                Instrument Method: DX.MTH
Report Created on: 13 Aug 20   08:12 AM                 Analysis Method  : DEFAULT.MTH
```



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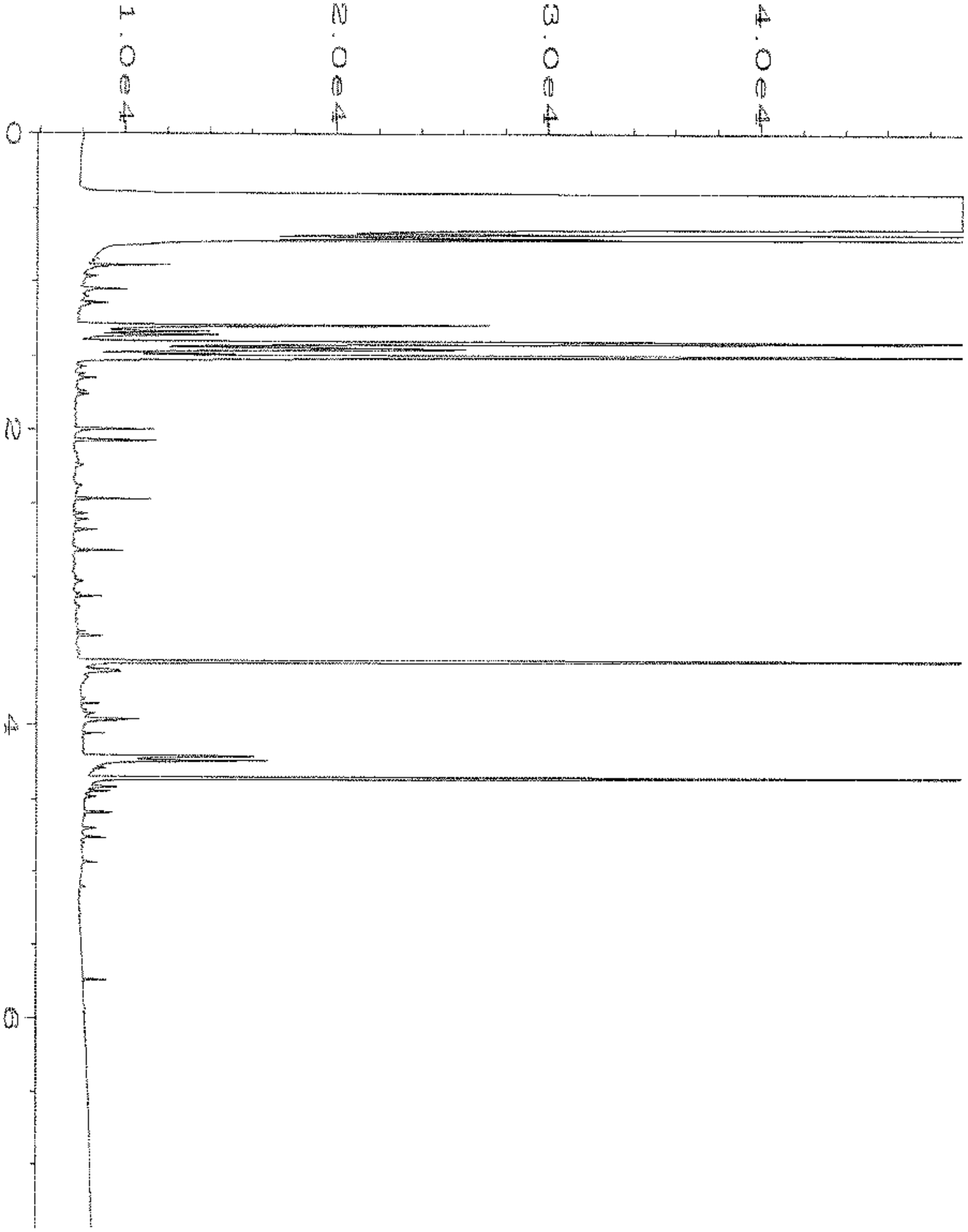
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\025F0701.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC1                                 Vial Number      : 25
Sample Name       : 008152-28                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 7
Acquired on       : 12 Aug 20  03:21 PM                 Instrument Method: DX.MTH
Report Created on: 13 Aug 20  08:12 AM                  Analysis Method  : DEFAULT.MTH
```



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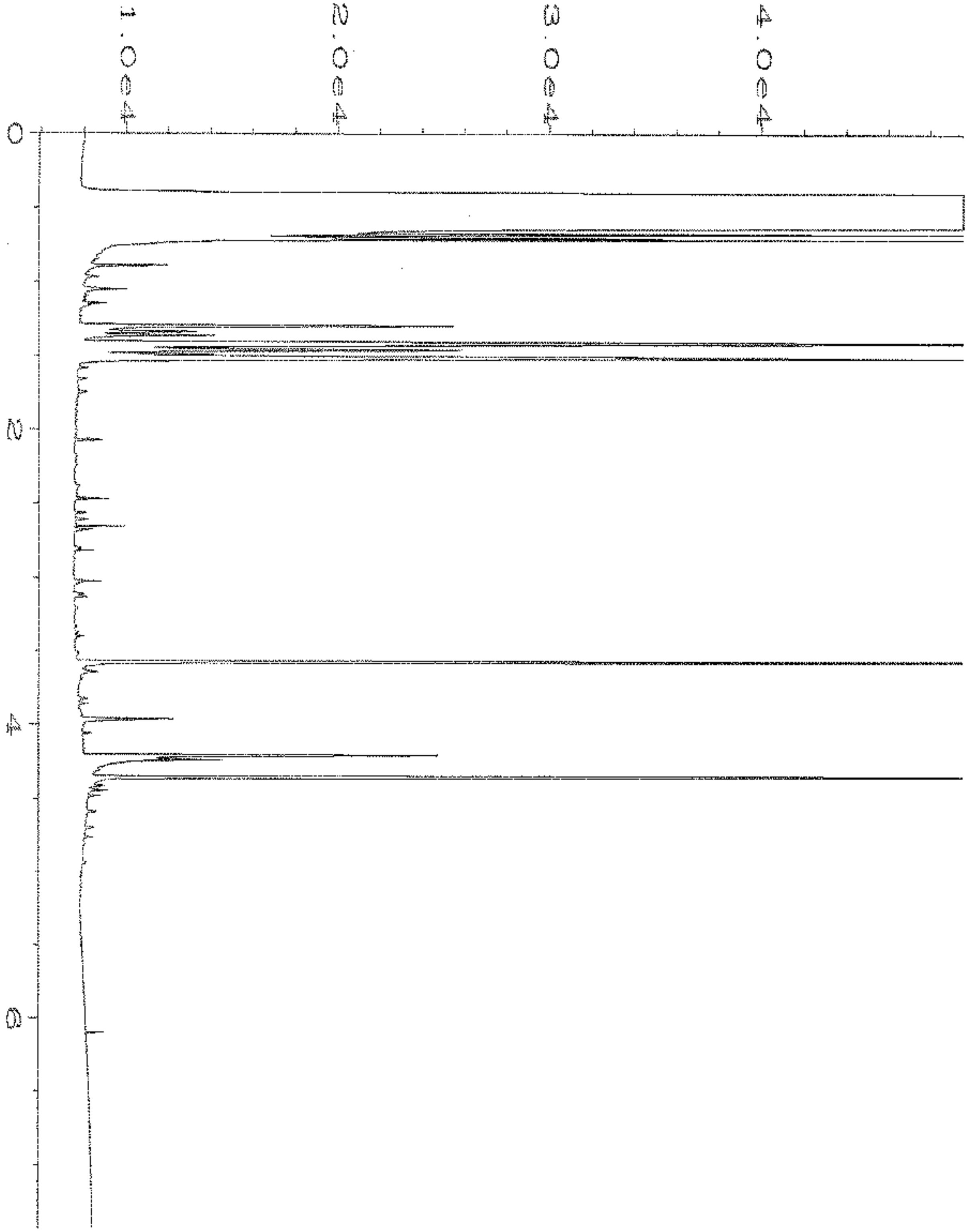
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\026F0701.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC1                                 Vial Number      : 26
Sample Name       : 008152-29                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 7
Acquired on       : 12 Aug 20   03:32 PM                Instrument Method: DX.MTH
Report Created on: 13 Aug 20   08:12 AM                 Analysis Method  : DEFAULT.MTH
```



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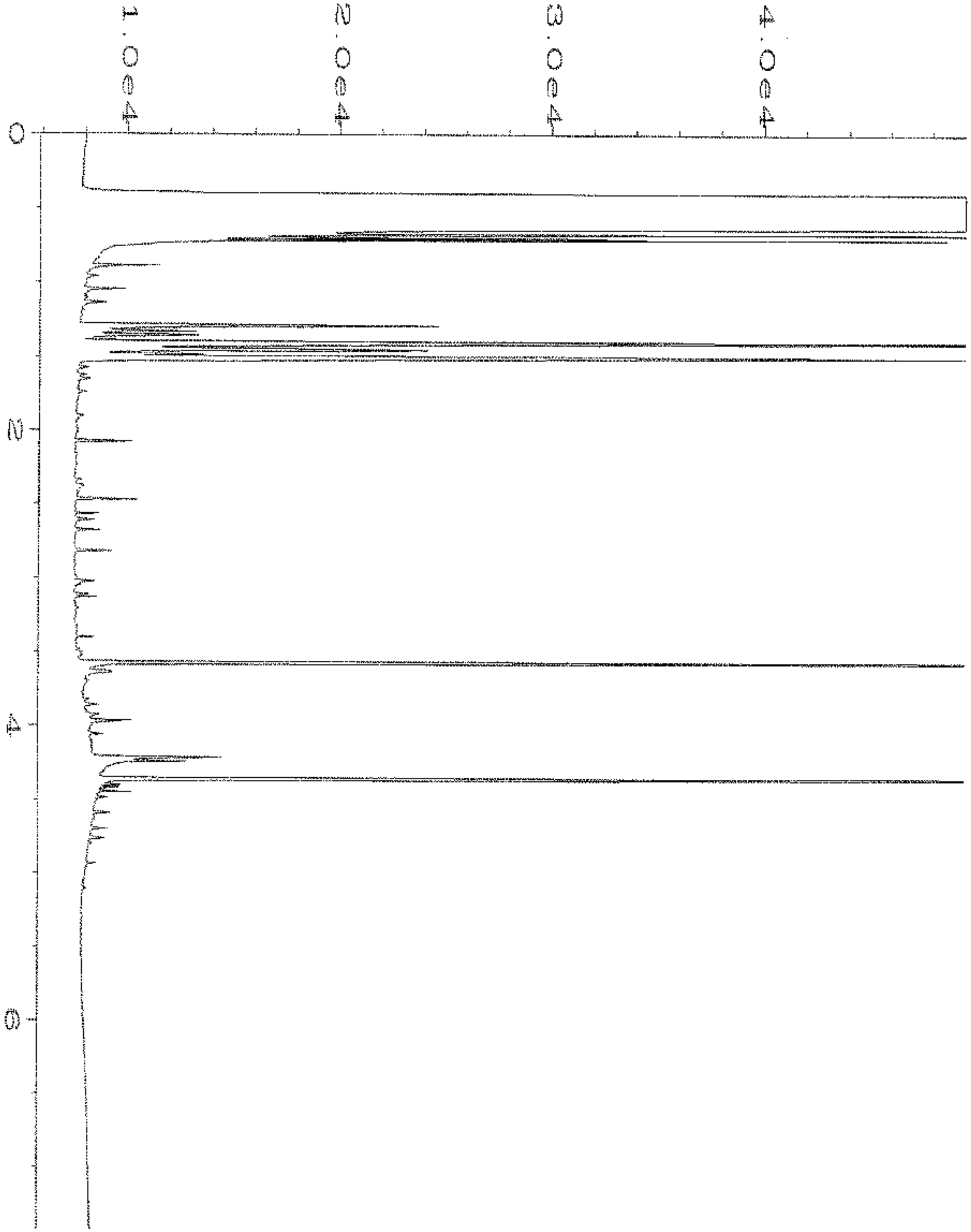
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\027F0701.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC1                                 Vial Number       : 27
Sample Name       : 008152-30                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line     : 7
Acquired on       : 12 Aug 20   03:44 PM                Instrument Method: DX.MTH
Report Created on: 13 Aug 20   08:12 AM                 Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\030F0701.D
Operator          : TL                               Page Number        : 1
Instrument        : GC1                              Vial Number        : 30
Sample Name       : 008152-31                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line      : 7
Acquired on       : 12 Aug 20   04:19 PM             Instrument Method: DX.MTH
Report Created on: 13 Aug 20   08:17 AM              Analysis Method   : DEFAULT.MTH
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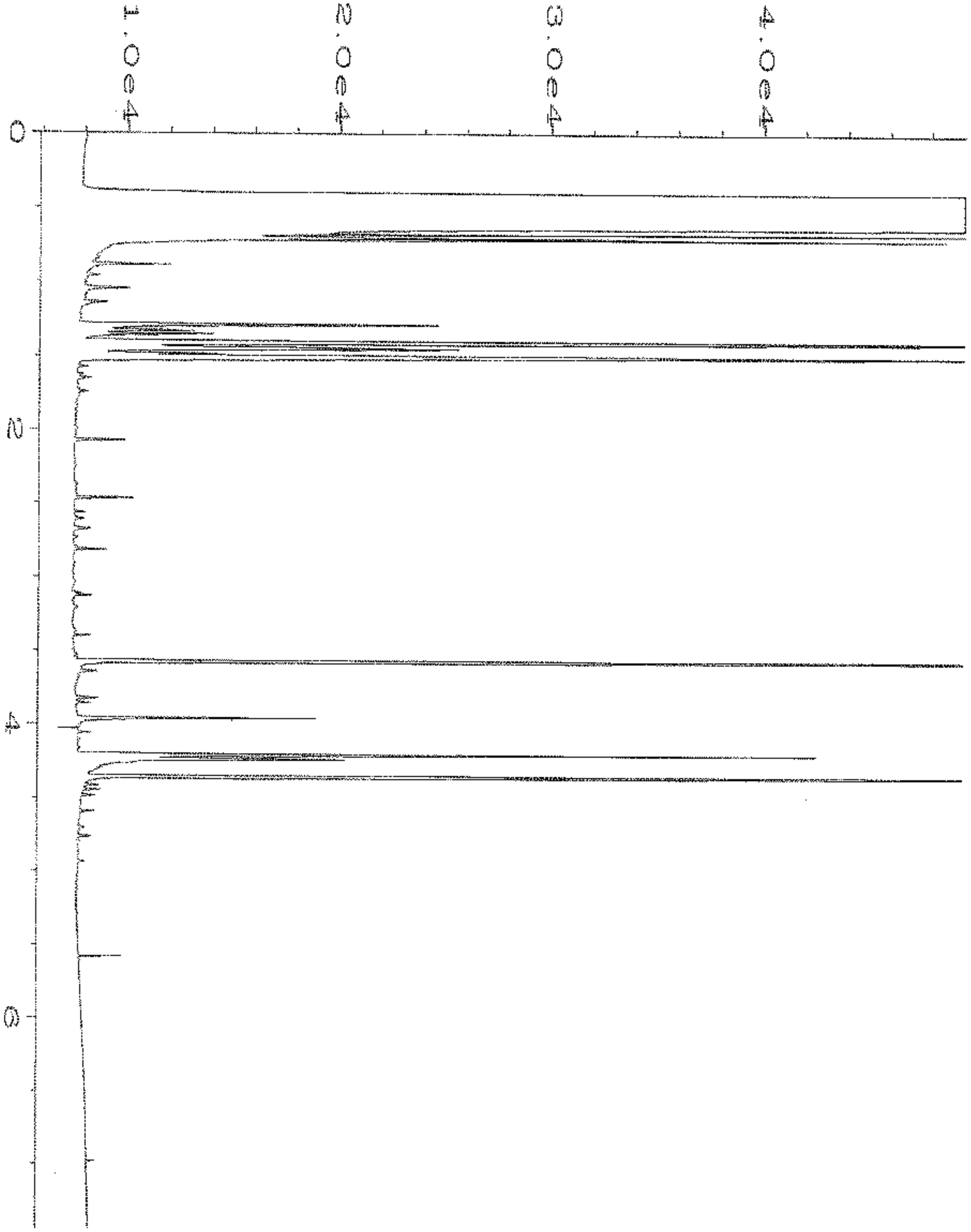

```
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\031F0901.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 31
Sample Name       : 008152-32                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 9
Acquired on       : 12 Aug 20  04:55 PM             Instrument Method: DX.MTH
Report Created on: 13 Aug 20  08:17 AM              Analysis Method  : DEFAULT.MTH
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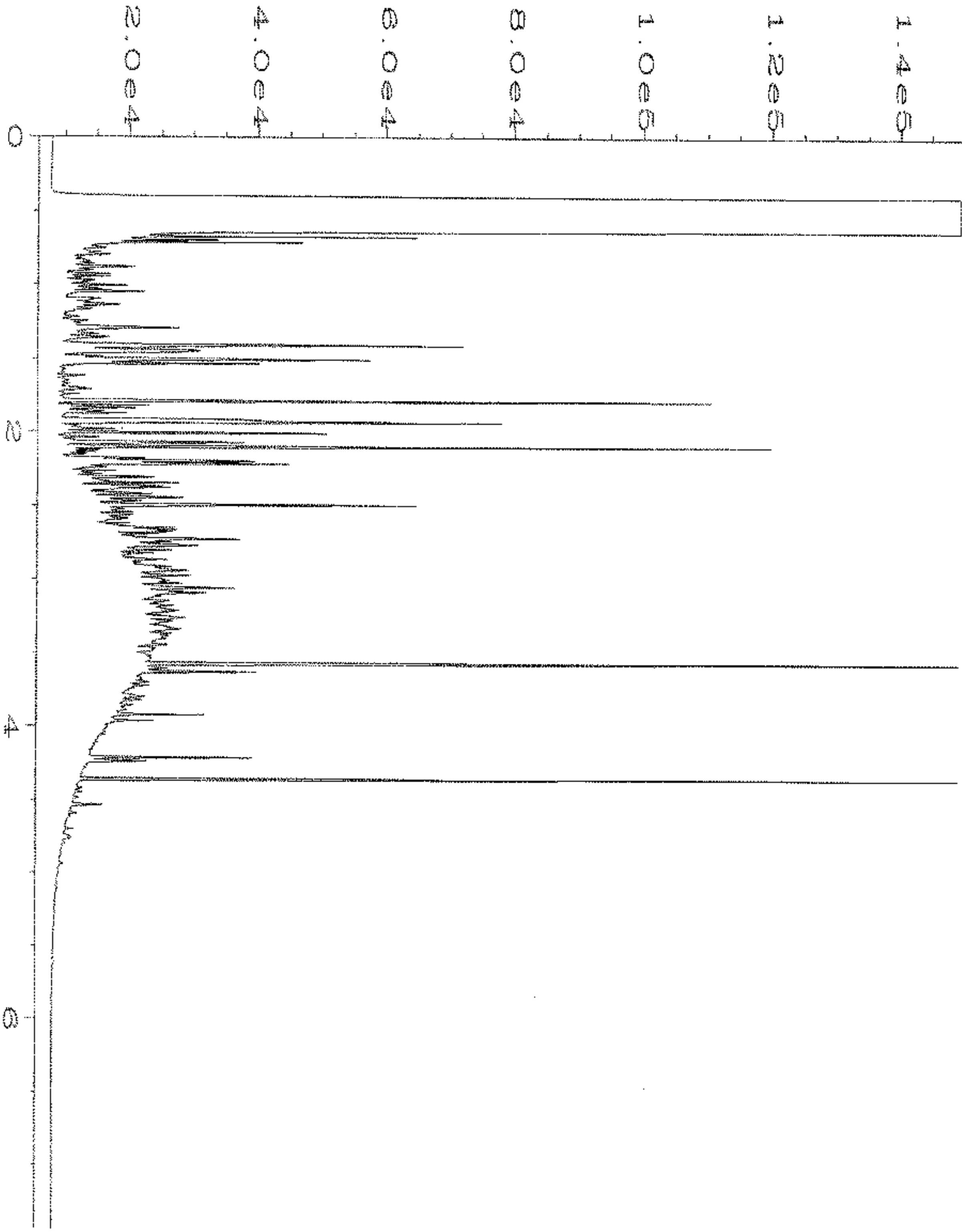
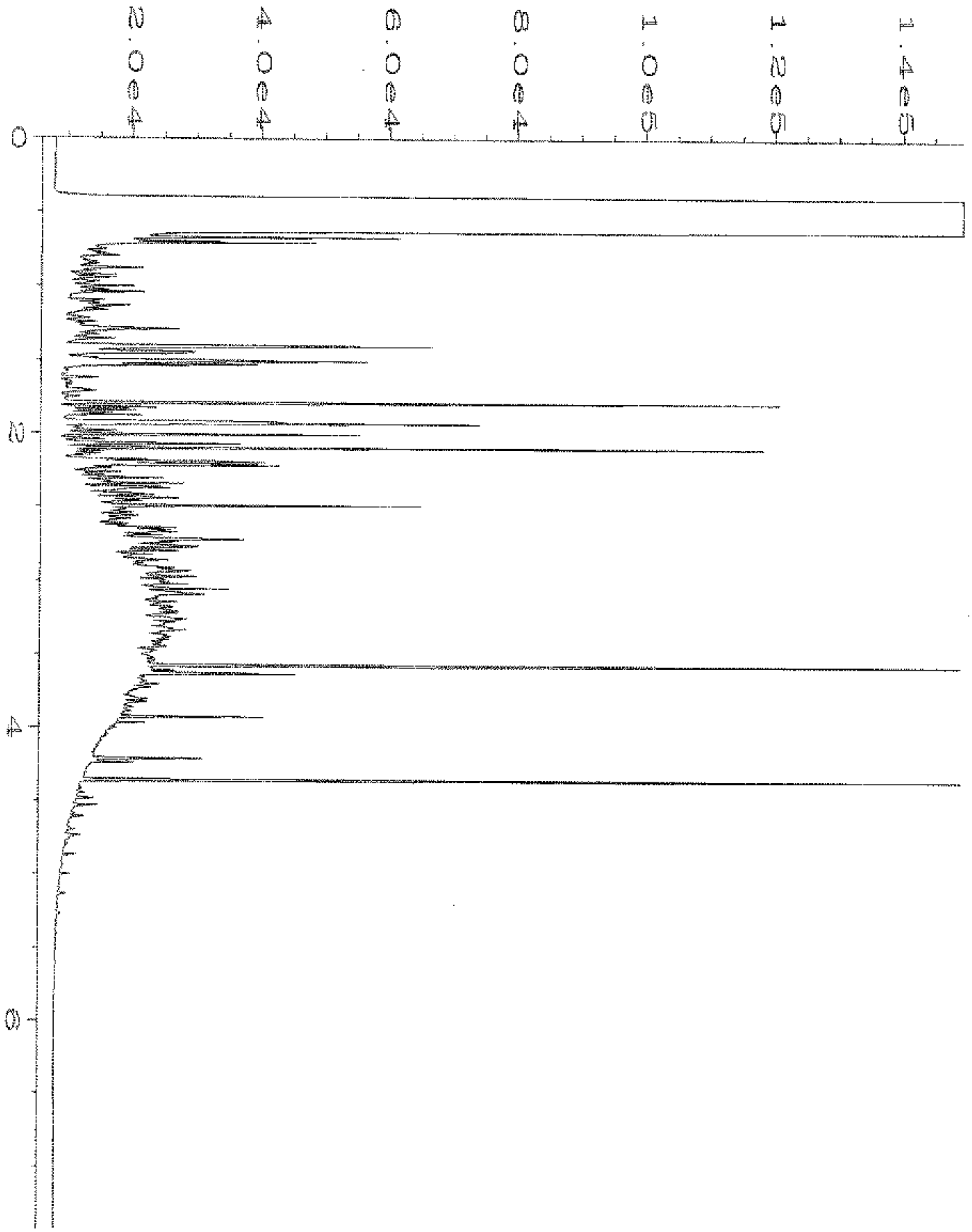


Data File Name   : C:\HPCHEM\1\DATA\08-12-20\032F0901.D
Operator   : TL
Instrument   : GC1
Sample Name   : 008152-33
Run Time Bar Code:
Acquired on   : 12 Aug 20   05:06 PM
Report Created on: 13 Aug 20   08:17 AM

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



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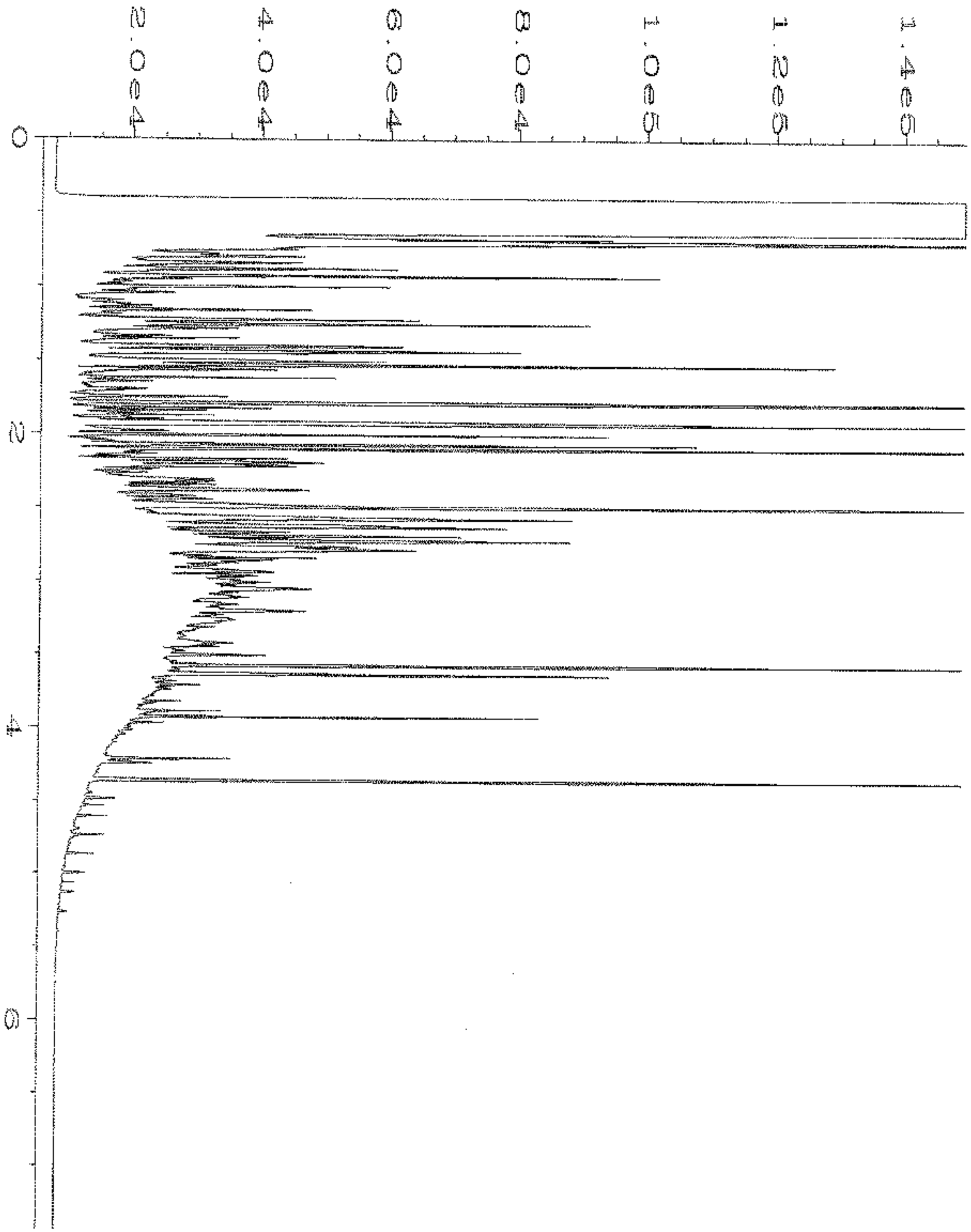
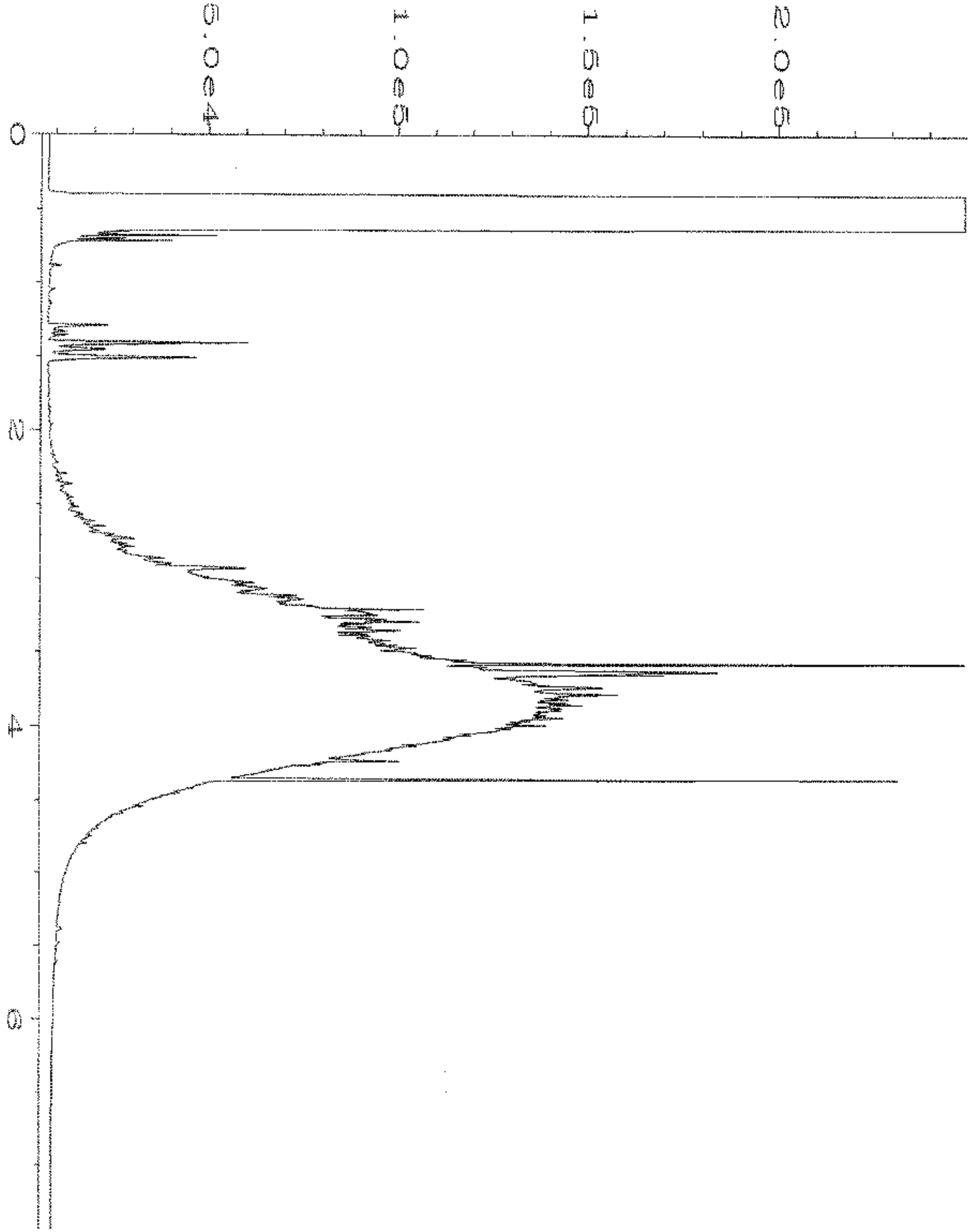
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\033F0901.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 33
Sample Name       : 008152-34                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 9
Acquired on       : 12 Aug 20  05:18 PM             Instrument Method: DX.MTH
Report Created on: 13 Aug 20  08:17 AM              Analysis Method  : DEFAULT.MTH
```



Data File Name   : C:\HPCHEM\1\DATA\08-12-20\034F0901.D
Operator   : TL
Instrument   : GC1
Sample Name   : 008152-35
Run Time Bar Code:
Acquired on   : 12 Aug 20   05:30 PM
Report Created on: 13 Aug 20   08:17 AM

Page Number   : 1
Vial Number   : 34
Injection Number : 1
Sequence Line   : 9
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\08-12-20\035F0901.D
Operator          : TL                                 Page Number      : 1
Instrument        : GC1                                Vial Number      : 35
Sample Name       : 008152-36                          Injection Number : 1
Run Time Bar Code:                                     Sequence Line    : 9
Acquired on       : 12 Aug 20  05:41 PM                Instrument Method: DX.MTH
Report Created on: 13 Aug 20  08:18 AM                 Analysis Method  : DEFAULT.MTH
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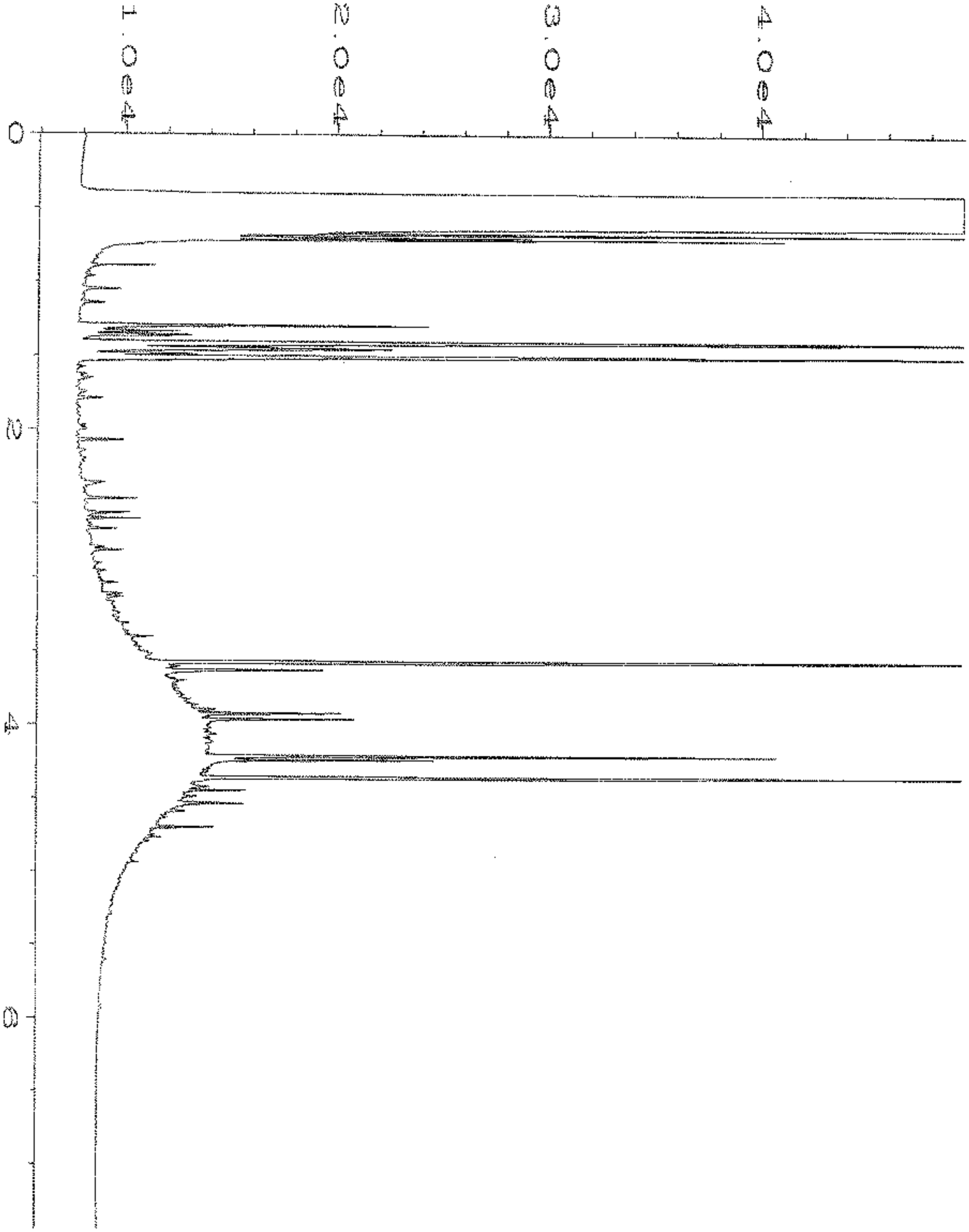
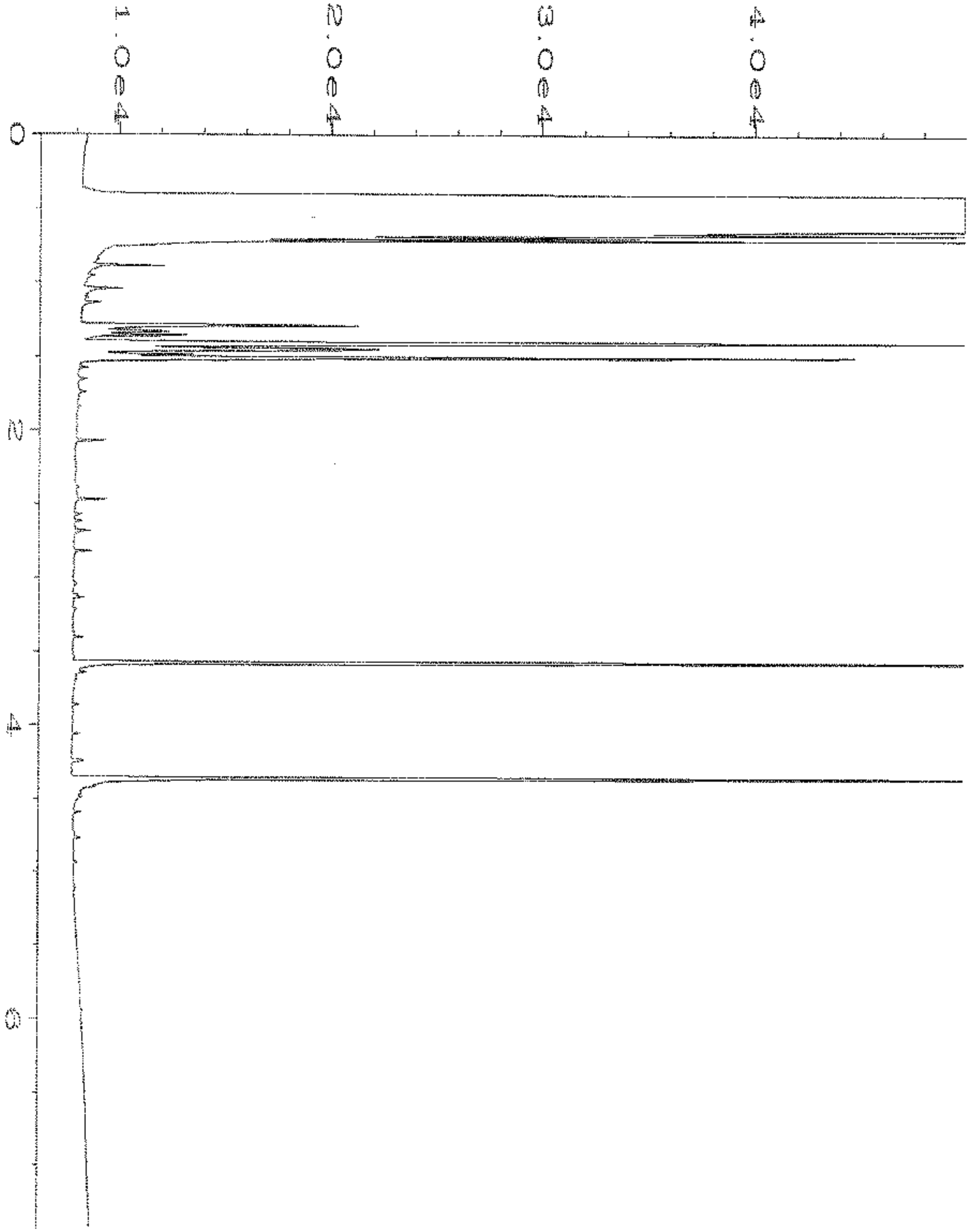


Data File Name : C:\HPCHEM\1\DATA\08-12-20\036F0901.D
Operator : TL
Instrument : GC1
Sample Name : 008152-37
Run Time Bar Code:
Acquired on : 12 Aug 20 05:53 PM
Report Created on: 13 Aug 20 08:18 AM

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



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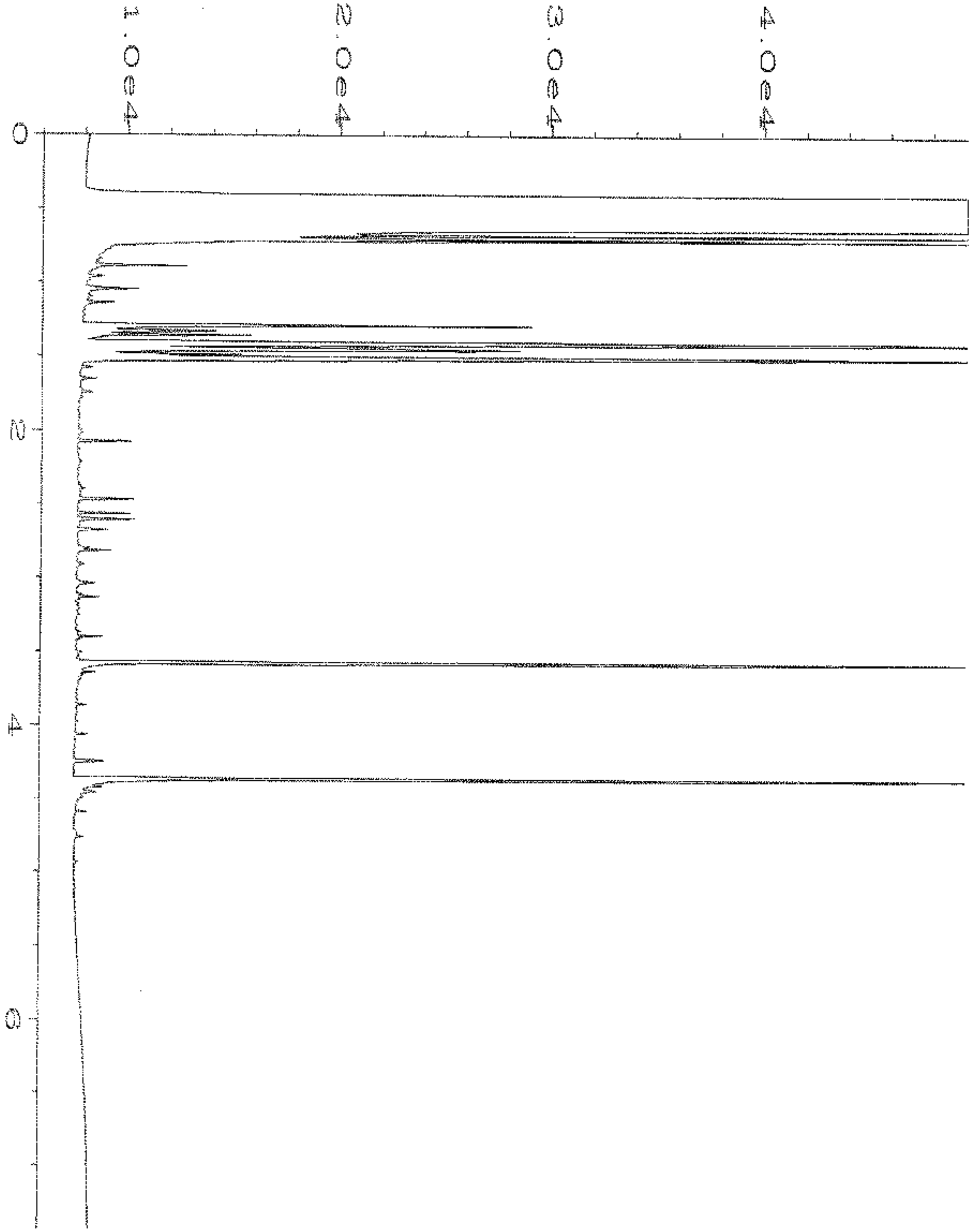
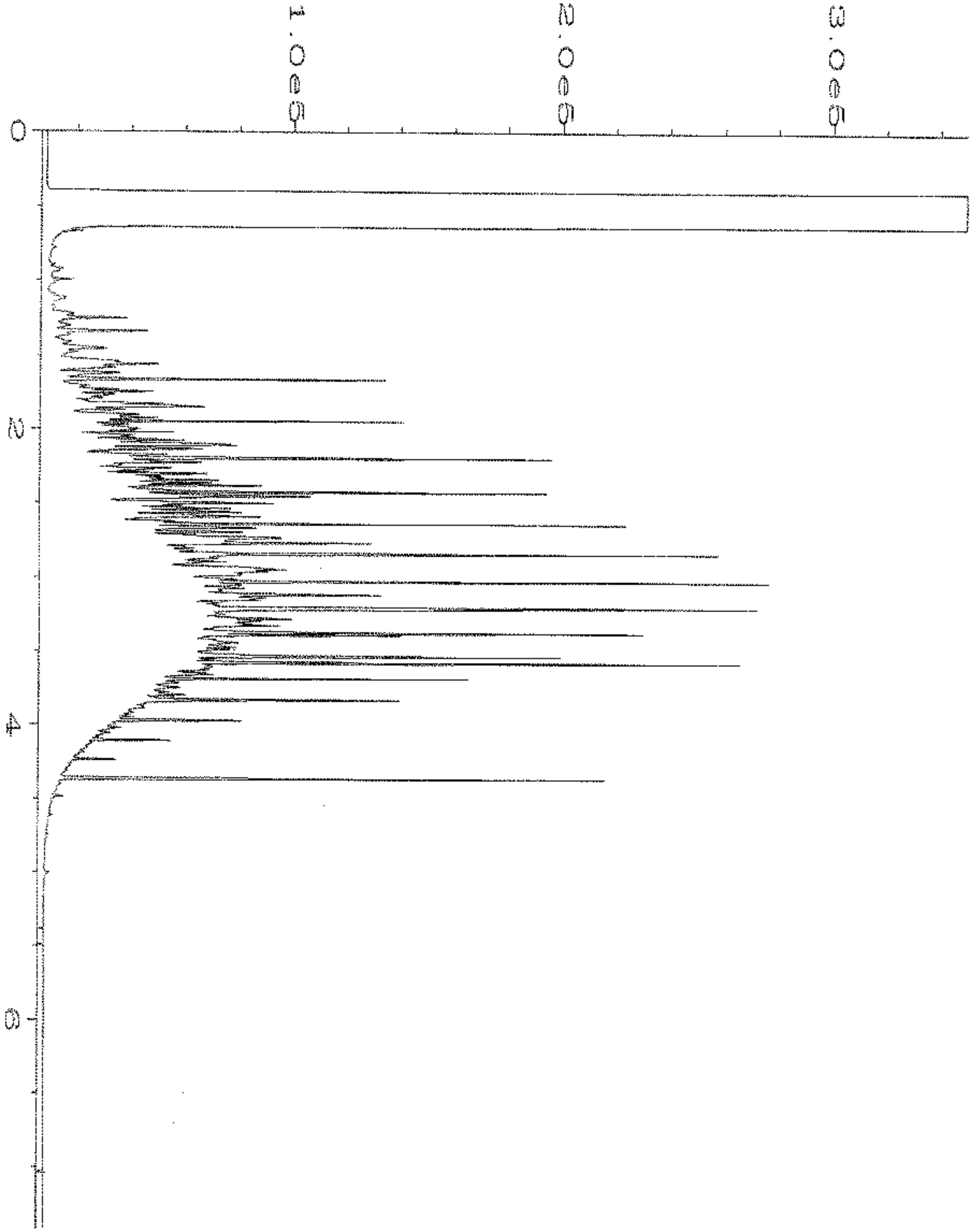
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\020F0901.D
Operator          : TL                               Page Number       : 1
Instrument        : GC1                              Vial Number       : 20
Sample Name       : 00-1840 mb                       Injection Number : 1
Run Time Bar Code:                                   Sequence Line     : 9
Acquired on       : 13 Aug 20   05:34 PM             Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:50 AM              Analysis Method   : DEFAULT.MTH
```

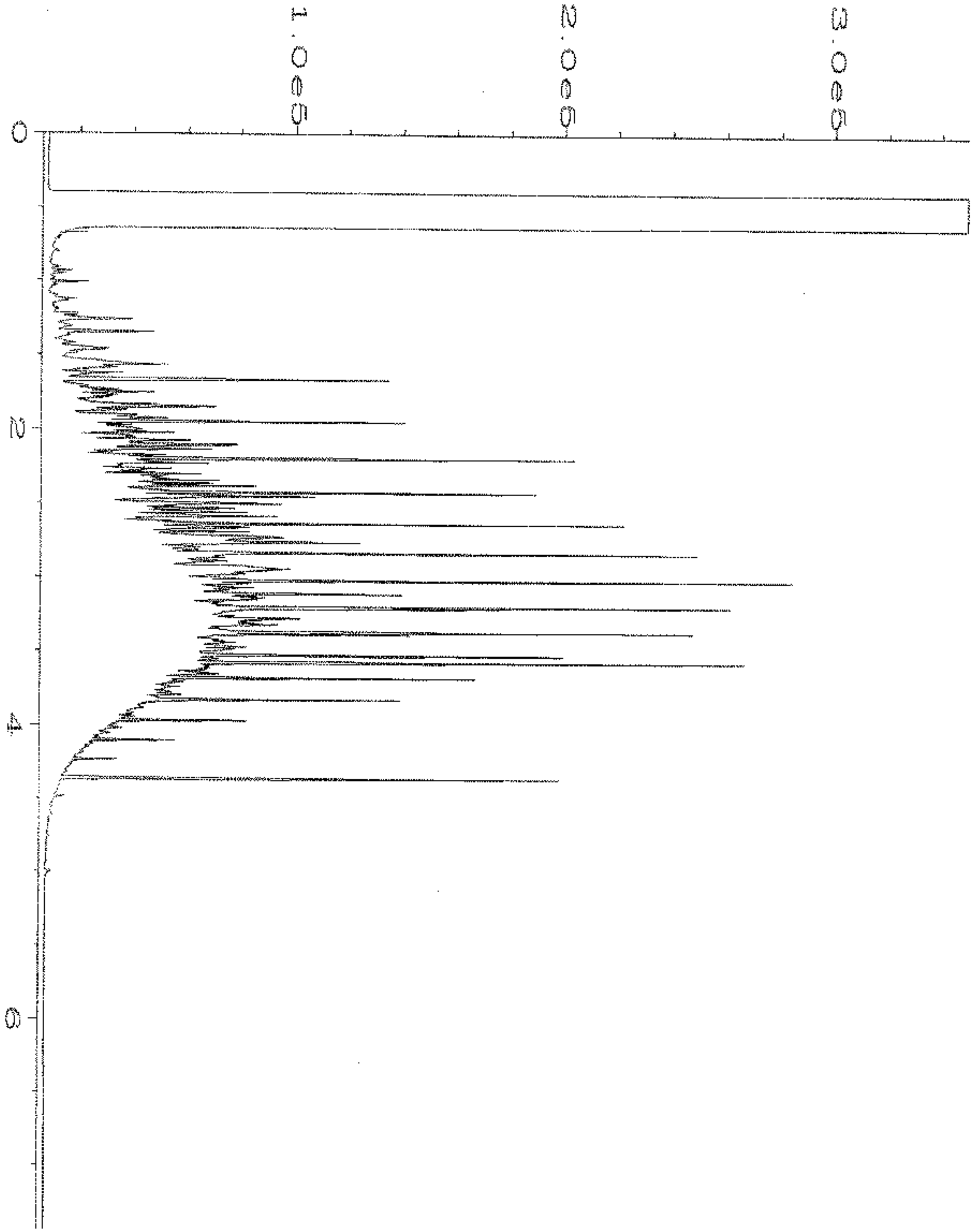


Data File Name : C:\HPCHEM\1\DATA\08-12-20\014F0501.D
Operator : TL
Instrument : GC1
Sample Name : 00-1841 mb
Run Time Bar Code:
Acquired on : 12 Aug 20 12:48 PM
Report Created on: 13 Aug 20 08:18 AM

Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\08-13-20\005F0601.D
Operator          : TL                                    Page Number       : 1
Instrument        : GC1                                   Vial Number       : 5
Sample Name       : 1000 Dx 60-170B                       Injection Number : 1
Run Time Bar Code:                                        Sequence Line     : 6
Acquired on       : 13 Aug 20   02:12 PM                  Instrument Method: DX.MTH
Report Created on: 14 Aug 20   08:50 AM                   Analysis Method   : DEFAULT.MTH
```



Data File Name : C:\HPCHEM\1\DATA\08-12-20\005F0601.D
Operator : TL
Instrument : GC1
Sample Name : 1000 Dx 60-170B
Run Time Bar Code:
Acquired on : 12 Aug 20 01:45 PM
Report Created on: 13 Aug 20 08:18 AM

Page Number : 1
Vial Number : 5
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

008162

SAMPLE CHAIN OF CUSTODY

ME 08-11-20 AI4/VW5/C05

Page # 1 of 4

Report To Gabe Cisneros
Company Floyd|Snider
Address 601 Union St. Ste 600
City, State, ZIP Seattle 98101
Phone 292-2078 Email

SAMPLERS (*signature*)	
PROJECT NAME POL-TPH	PO #
REMARKS Project specific RLs? - Yes / No	INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
[✓ Default: Dispose after 30 days]

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	~~PAHs~~ cPAHs 8270D	Lead 6020	EDB, EDC, MTBE Naphtha	EDB 8011	Notes
MW-37-081020	01 A-H	8/10/20	1157	W	8	X	X	X					X				⊗ per GC
MW-38-081020	02		1249	W	8	X	X	X					X				8/12/20 MG
MW-36-081020	03		1349	W	8	X	X	X					X				
MW-136-081020	04		1341	W	8	X	X	X					X				
UST-4-081020	05A-I		1451	W	9	X	X	X					X	X	X	⊗	
MW-34-081020	06 A-H		1552	W	8	X	X			X			X			⊗	
MW-35-081020	07		1643	W	8	X	X			X			X			⊗	
MW-31-081020	08		1730	W	8	X	X	X					X				
MW-27-081020	09		1418	GW	8	X	X	X					X				
MW-26-081020	10		1315	GW	8	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:	Tyler Scott	FS	8/11	18:48
Received by:	BISRAT TADESSE	FBI	|	|
Relinquished by:				
Received by:		Samples received at 3 °C		

008152

SAMPLE CHAIN OF CUSTODY

ME 08-11-20 C05/VS5/ AIY

Report To Gabe Cisneros
Company Floyd Snider
Address see page 1
City, State, ZIP
Phone Email

SAMPLERS (signature)	
PROJECT NAME POL-TPH	PO #
REMARKS Project specific RLs? - Yes / No	INVOICE TO

Page # 2 of 4

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
[✓ Default]: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	~~BTEX~~ 8260 [illegible] EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	~~cPAHs~~ PAHs 8270D	Lead 6020	EDB, EDC, MTBE Naphthalene	EDB Soil	Notes
MW-19-081020	11A-H	8/10/20	16:50	GW	8	X	X	X		X			X			ⓧ	Time 1615 TB 8/12
MW-6-081020	12		1355	GW	8	X	X	X					X				
MW-01-081020	13		1245	GW	8	X	X	X					X				
MW-39-081020	14		1505	GW	8	X	X	X		X			X			ⓧ	
MW-13-081020	15		1559	GW	8	X	X	X					X				
MW-2-081020	16		1630	GW	8	X	X	X					X				
MW-15-081020	17		1745	GW	8	X	X	X					X				
MW-10-081020	18A-I		1717	GW	9	X	X	X		X			X	X	X	ⓧ	
MW-3-081020	19		1445	GW	9	X	X	X					X	X	X	ⓧ	
MW-8-081020	20A-R		1338	GW	18	X	X	X					X				MS/MSD

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Tyler Scott	ES	8/11	18:48
Received by:	BISRAT TADESSE	FBI	|	|
Relinquished by:				
Received by:				

008152
[redacted]

SAMPLE CHAIN OF ~~C~~USTODY

ME 08-11-20 [redacted] AI4/VW5/C05

Page # ~~2~~ 3 of 4

Report To Gabe Cisneros
Company Floyd Snider
Address 601 Union St. Ste 600
City, State, ZIP Seattle, WA 98101
Phone 292-2078 Email gabe.cisneros@floydsnider.com

SAMPLERS (signature)

PROJECT NAME	PO #
POL-TPH	

REMARKS	INVOICE TO
Project specific RLs? - Yes / No	POL-TPH Task 4

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
[✓ Default] Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021B~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	cPAHs 8270D SIM			EDB 8011	Notes
MW-22-081120	21 A-H	8/11/20	0814	W	8	X	X	X					X				
MW-30-081120	22	8/11	0921	W	8	X	X	X					X				
MW-32-081120	23		1016	W	8	X	X	X					X				
T-2-081120	24		1103	W	8	X	X	X		X			X			⊗	
MW-25-081120	25		1203	W	8	X	X	X					X				
MW-17-081120	26		1225	GW	8	X	X	X					X				
MW-40-081120	27		1339	GW	8	X	X	X		X			X			⊗	
MW-33-081120	28		1103	GW	8	X	X	X					X				
MW-23-081120	29		0826	GW	8	X	X	X		X			X			⊗	
MW-29-081120	30 A-R		0929	GW	18	X	X	X					X				MS/MSD

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Tyler Scott	FS	8/11	18:40
Received by:	Bisrat Tadesse	FBI	8/11	18:40
Relinquished by:				
Received by:				

Samples received at R °C

008152

[redacted]

SAMPLE CHAIN OF CUSTODY

ME 08-11-20 [redacted] AI4/VW5/C05

Page # 4 of 4

Report To Gabe Cisneros

Company Floyd | Snider

Address 601 Union St. Ste 600

City, State, ZIP Seattle 98101

Phone Email

SAMPLERS (*signature*)

PROJECT NAME	PO #
POL-TPH	

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~~ PAH, PAHs 8270D SIM	lead - total	EDB, EDC MTBE, Naphth		EDB 8011	Notes
MW-18-081120	31 A-H	8/11/20	1004	GW	8		X	X	X			X					
MW-24-081120	32		0841	GW	8		X	X	X			X					
MW-7-081120	33 A-J		0900	GW	10		X	X	X			X	X	X		ⓧ	
MW-107-081120	34		0905	GW	10		X	X	X			X	X	X		ⓧ	
MW-12-081120	35 A-H		1310	GW	8		X	X	X	X		X				ⓧ	
MW-28-081120	36		1134	GW	8		X	X	X	X		X				ⓧ	
MW-14-081120	37		1346	GW	8		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:	Tyler Scott	FS	8/11	18:48
Received by:	BISRAT TADESSE	FBI	|	|
Relinquished by:				
Received by:		Samples received at 2 °C		

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Floyd | Snider
Gabe Cisneros
601 Union St., Suite 600
Seattle, WA 98101

RE: POL-TPH
Work Order Number: 2008153

August 19, 2020

Attention Gabe Cisneros:

Fremont Analytical, Inc. received 15 sample(s) on 8/12/2020 for the analyses presented in the following report.

Dissolved Gases by RSK-175

Dissolved Metals by EPA Method 200.8

Ion Chromatography by EPA Method 300.0

Total Alkalinity by SM 2320B

This report consists of the following:

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

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

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Original

CLIENT: Floyd | Snider
Project: POL-TPH
Work Order: 2008153

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2008153-001	MW-10-081020	08/10/2020 5:17 PM	08/12/2020 5:56 AM
2008153-002	MW-31-081020	08/10/2020 5:38 PM	08/12/2020 5:56 AM
2008153-003	MW-19-081020	08/10/2020 4:50 PM	08/12/2020 5:56 AM
2008153-004	MW-35-081020	08/10/2020 4:43 PM	08/12/2020 5:56 AM
2008153-005	MW-22-081120	08/11/2020 8:14 AM	08/12/2020 5:56 AM
2008153-006	MW-122-081120	08/11/2020 8:21 AM	08/12/2020 5:56 AM
2008153-007	MW-30-081120	08/11/2020 9:21 AM	08/12/2020 5:56 AM
2008153-008	MW-25-081120	08/11/2020 12:03 PM	08/12/2020 5:56 AM
2008153-009	MW-12-081120	08/11/2020 1:10 PM	08/12/2020 5:56 AM
2008153-010	MW-14-081120	08/11/2020 1:46 PM	08/12/2020 5:56 AM
2008153-011	MW-29-081120	08/11/2020 9:29 AM	08/12/2020 5:56 AM
2008153-012	MW-18-081120	08/11/2020 10:04 AM	08/12/2020 5:56 AM
2008153-013	MW-23-081120	08/11/2020 8:26 AM	08/12/2020 5:56 AM
2008153-014	MW-17-081120	08/11/2020 12:25 PM	08/12/2020 5:56 AM
2008153-015	MW-24-081120	08/11/2020 8:41 AM	08/12/2020 5:56 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2008153**
Date: **8/19/2020**

CLIENT: Floyd | Snider
Project: POL-TPH

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

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

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

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

Qualifiers & Acronyms

Qualifiers:

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

Acronyms:

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

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Collection Date: 8/10/2020 5:17:00 PM
Project: POL-TPH
Lab ID: 2008153-001
Matrix: Groundwater
Client Sample ID: **MW-10-081020**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	2.41	0.0863	D	mg/L	10	8/17/2020 3:42:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	ND	0.200	D	mg/L	2	8/12/2020 9:05:00 AM
Sulfate	ND	0.600	D	mg/L	2	8/12/2020 9:05:00 AM
NOTES: Diluted due to high levels of non-target analytes.						
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	2,250	2.00		µg/L	1	8/17/2020 4:49:16 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	117	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-002
Client Sample ID: **MW-31-081020**

Collection Date: 8/10/2020 5:38:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	ND	0.00863		mg/L	1	8/17/2020 3:25:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	4.35	0.200	D	mg/L	2	8/12/2020 9:28:00 AM
Sulfate	17.9	0.600	D	mg/L	2	8/12/2020 9:28:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	ND	2.00		µg/L	1	8/17/2020 4:03:23 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	200	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-003
Client Sample ID: **MW-19-081020**

Collection Date: 8/10/2020 4:50:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	ND	0.00863		mg/L	1	8/17/2020 3:28:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	8.58	0.100	E	mg/L	1	8/12/2020 10:10:00 AM
Nitrate (as N)	7.73	0.400	DH	mg/L	4	8/13/2020 10:01:00 AM
Sulfate	16.0	1.20	D	mg/L	4	8/13/2020 10:01:00 AM

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	ND	2.00		µg/L	1	8/17/2020 4:54:50 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	92.6	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Collection Date: 8/10/2020 4:43:00 PM
Project: POL-TPH
Lab ID: 2008153-004
Matrix: Groundwater
Client Sample ID: **MW-35-081020**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	0.0129	0.00863		mg/L	1	8/17/2020 3:30:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	15.0	0.200	DE	mg/L	2	8/12/2020 10:56:00 AM
Nitrate (as N)	13.0	1.00	DH	mg/L	10	8/13/2020 10:24:00 AM
Sulfate	8.33	0.600	D	mg/L	2	8/12/2020 10:56:00 AM

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	25.8	2.00		µg/L	1	8/17/2020 4:25:40 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	78.0	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-005
Client Sample ID: **MW-22-081120**

Collection Date: 8/11/2020 8:14:00 AM

Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	4.02	0.173	D	mg/L	20	8/17/2020 3:45:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	8/12/2020 11:19:00 AM
Sulfate	0.305	0.300		mg/L	1	8/12/2020 11:19:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	1,090	2.00		µg/L	1	8/17/2020 5:25:57 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	146	2.50		mg/L	1	8/19/2020 10:36:41 AM

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-006
Client Sample ID: **MW-122-081120**
Collection Date: 8/11/2020 8:21:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	2.76	0.173	D	mg/L	20	8/17/2020 4:12:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	8/12/2020 11:42:00 AM
Sulfate	0.301	0.300		mg/L	1	8/12/2020 11:42:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	1,070	2.00		µg/L	1	8/17/2020 5:37:11 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	151	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-007
Client Sample ID: **MW-30-081120**
Collection Date: 8/11/2020 9:21:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	ND	0.00863		mg/L	1	8/17/2020 3:59:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	46.4	0.500	DE	mg/L	5	8/12/2020 12:51:00 PM
Nitrate (as N)	41.6	2.50	DH	mg/L	25	8/13/2020 10:47:00 AM
Sulfate	129	7.50	D	mg/L	25	8/13/2020 10:47:00 AM

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	130	2.00		µg/L	1	8/17/2020 5:42:44 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	136	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-008
Client Sample ID: **MW-25-081120**

Collection Date: 8/11/2020 12:03:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	4.62	0.173	D	mg/L	20	8/17/2020 4:15:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	0.108	0.100		mg/L	1	8/13/2020 11:10:00 AM
Sulfate	0.335	0.300		mg/L	1	8/13/2020 11:10:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	1,430	2.00		µg/L	1	8/17/2020 5:48:18 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	190	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-009
Client Sample ID: **MW-12-081120**

Collection Date: 8/11/2020 1:10:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	4.60	0.173	D	mg/L	20	8/17/2020 5:14:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	8/13/2020 11:33:00 AM
Sulfate	0.309	0.300		mg/L	1	8/13/2020 11:33:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	1,840	2.00		µg/L	1	8/17/2020 5:53:51 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	195	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-010
Client Sample ID: **MW-14-081120**

Collection Date: 8/11/2020 1:46:00 PM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	1.55	0.0863	D	mg/L	10	8/17/2020 5:16:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	0.104	0.100		mg/L	1	8/13/2020 11:56:00 AM
Sulfate	2.36	0.300		mg/L	1	8/13/2020 11:56:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	87.9	2.00		µg/L	1	8/17/2020 5:59:25 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	219	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-011
Client Sample ID: **MW-29-081120**

Collection Date: 8/11/2020 9:29:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	0.0169	0.00863		mg/L	1	8/17/2020 4:50:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	2.22	0.100		mg/L	1	8/12/2020 2:23:00 PM
Sulfate	14.3	0.600	D	mg/L	2	8/13/2020 12:19:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	ND	2.00		µg/L	1	8/17/2020 6:04:58 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	48.8	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2008153-012
Client Sample ID: **MW-18-081120**
Collection Date: 8/11/2020 10:04:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	0.0246	0.00863		mg/L	1	8/17/2020 4:52:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	0.541	0.100		mg/L	1	8/12/2020 2:46:00 PM
Sulfate	3.79	0.300		mg/L	1	8/12/2020 2:46:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	104	2.00		µg/L	1	8/17/2020 6:10:32 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	107	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Client: Floyd | Snider
Collection Date: 8/11/2020 8:26:00 AM
Project: POL-TPH
Lab ID: 2008153-013
Matrix: Groundwater
Client Sample ID: **MW-23-081120**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	0.749	0.0863	D	mg/L	10	8/17/2020 5:18:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	ND	0.400	D	mg/L	4	8/12/2020 3:10:00 PM
Sulfate	7.34	1.20	D	mg/L	4	8/12/2020 3:10:00 PM
NOTES: Diluted due to high levels of non-target analytes.						
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	2,560	20.0	D	µg/L	10	8/19/2020 12:27:01 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	92.6	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Collection Date: 8/11/2020 12:25:00 PM
Project: POL-TPH
Lab ID: 2008153-014
Matrix: Groundwater
Client Sample ID: **MW-17-081120**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	0.190	0.00863		mg/L	1	8/17/2020 5:04:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	0.269	0.100		mg/L	1	8/12/2020 3:33:00 PM
Sulfate	2.00	0.300		mg/L	1	8/12/2020 3:33:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	2.68	2.00		µg/L	1	8/17/2020 6:21:39 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	166	2.50		mg/L	1	8/19/2020 10:36:41 AM

Analytical Report

Work Order: **2008153**
Date Reported: **8/19/2020**

Client: Floyd | Snider
Collection Date: 8/11/2020 8:41:00 AM
Project: POL-TPH
Lab ID: 2008153-015
Matrix: Groundwater
Client Sample ID: **MW-24-081120**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R61228		Analyst: IH
Methane	ND	0.00863		mg/L	1	8/17/2020 5:06:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 29325		Analyst: SS
Nitrate (as N)	0.945	0.100		mg/L	1	8/12/2020 3:56:00 PM
Sulfate	4.75	0.300		mg/L	1	8/12/2020 3:56:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 29362		Analyst: CO
Manganese	6.36	2.00		µg/L	1	8/17/2020 6:38:23 PM
Total Alkalinity by SM 2320B				Batch ID: R61272		Analyst: WF
Alkalinity, Total (As CaCO3)	127	2.50		mg/L	1	8/19/2020 10:36:41 AM

Work Order: 2008153
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: **MB-R61272** SampType: **MBLK** Units: **mg/L** Prep Date: **8/19/2020** RunNo: **61272**
Client ID: **MBLKW** Batch ID: **R61272** Analysis Date: **8/19/2020** SeqNo: **1229183**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: **LCS-R61272** SampType: **LCS** Units: **mg/L** Prep Date: **8/19/2020** RunNo: **61272**
Client ID: **LCSW** Batch ID: **R61272** Analysis Date: **8/19/2020** SeqNo: **1229184**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	103	2.50	100.0	0	103	99.6	108				

Sample ID: **2008153-001CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **8/19/2020** RunNo: **61272**
Client ID: **MW-10-081020** Batch ID: **R61272** Analysis Date: **8/19/2020** SeqNo: **1229186**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	112	2.50						117.0	4.26	20	

Sample ID: **2008153-015CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **8/19/2020** RunNo: **61272**
Client ID: **MW-24-081120** Batch ID: **R61272** Analysis Date: **8/19/2020** SeqNo: **1229201**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	132	2.50						126.8	3.77	20	

Work Order: 2008153
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-29325** SampType: **MBLK** Units: **mg/L** Prep Date: **8/12/2020** RunNo: **61166**
Client ID: **MBLKW** Batch ID: **29325** Analysis Date: **8/12/2020** SeqNo: **1226587**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.100									
Sulfate	ND	0.300									

Sample ID: **LCS-29325** SampType: **LCS** Units: **mg/L** Prep Date: **8/12/2020** RunNo: **61166**
Client ID: **LCSW** Batch ID: **29325** Analysis Date: **8/12/2020** SeqNo: **1226556**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.682	0.100	0.7500	0	90.9	90	110				
Sulfate	3.48	0.300	3.750	0	92.7	90	110				

Sample ID: **2008139-001BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **8/12/2020** RunNo: **61166**
Client ID: **BATCH** Batch ID: **29325** Analysis Date: **8/12/2020** SeqNo: **1226578**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	1.14	0.100						1.149	0.436	20	
Sulfate	13.8	0.300						13.82	0.297	20	

Sample ID: **2008139-001BMS** SampType: **MS** Units: **mg/L** Prep Date: **8/12/2020** RunNo: **61166**
Client ID: **BATCH** Batch ID: **29325** Analysis Date: **8/12/2020** SeqNo: **1226579**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	1.91	0.100	0.7500	1.149	102	80	120				
Sulfate	18.0	0.300	3.750	13.82	113	80	120				E

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Work Order: 2008153
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2008139-001BMSD** SampType: **MSD** Units: **mg/L** Prep Date: **8/12/2020** RunNo: **61166**
Client ID: **BATCH** Batch ID: **29325** Analysis Date: **8/12/2020** SeqNo: **1226580**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	1.92	0.100	0.7500	1.149	103	80	120	1.912	0.574	20	
Sulfate	18.2	0.300	3.750	13.82	116	80	120	18.04	0.729	20	E

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Sample ID: **2008153-005CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **8/12/2020** RunNo: **61166**
Client ID: **MW-22-081120** Batch ID: **29325** Analysis Date: **8/12/2020** SeqNo: **1226581**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.100						0		20	
Sulfate	0.333	0.300						0.3050	8.78	20	

Sample ID: **2008153-005CMS** SampType: **MS** Units: **mg/L** Prep Date: **8/12/2020** RunNo: **61166**
Client ID: **MW-22-081120** Batch ID: **29325** Analysis Date: **8/12/2020** SeqNo: **1226582**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.681	0.100	0.7500	0	90.8	80	120				
Sulfate	3.32	0.300	3.750	0.3050	80.5	80	120				

Work Order: 2008153
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-29362** SampType: **MBLK** Units: **µg/L** Prep Date: **8/17/2020** RunNo: **61249**
Client ID: **MBLKW** Batch ID: **29362** Analysis Date: **8/17/2020** SeqNo: **1228660**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	2.00									

Sample ID: **LCS-29362** SampType: **LCS** Units: **µg/L** Prep Date: **8/17/2020** RunNo: **61249**
Client ID: **LCSW** Batch ID: **29362** Analysis Date: **8/17/2020** SeqNo: **1228663**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	92.4	2.00	100.0	0	92.4	85	115				

Sample ID: **2008170-001BDUP** SampType: **DUP** Units: **µg/L** Prep Date: **8/17/2020** RunNo: **61249**
Client ID: **BATCH** Batch ID: **29362** Analysis Date: **8/17/2020** SeqNo: **1228665**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	2.00						0		30	

Sample ID: **MB-29361FB** SampType: **MBLK** Units: **µg/L** Prep Date: **8/17/2020** RunNo: **61249**
Client ID: **MBLKW** Batch ID: **29362** Analysis Date: **8/17/2020** SeqNo: **1228667**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	2.00									

NOTES:
Filter Blank

Sample ID: **2008170-001BMS** SampType: **MS** Units: **µg/L** Prep Date: **8/17/2020** RunNo: **61249**
Client ID: **BATCH** Batch ID: **29362** Analysis Date: **8/17/2020** SeqNo: **1228672**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	501	2.00	500.0	1.643	99.9	70	130				

Work Order: 2008153
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **2008170-001BMSD** SampType: **MSD** Units: **µg/L** Prep Date: **8/17/2020** RunNo: **61249**
Client ID: **BATCH** Batch ID: **29362** Analysis Date: **8/17/2020** SeqNo: **1228673**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	503	2.00	500.0	1.643	100	70	130	501.0	0.321	30	

Work Order: 2008153
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **MB-R61228** SampType: **MBLK** Units: **mg/L** Prep Date: **8/17/2020** RunNo: **61228**
Client ID: **MBLKW** Batch ID: **R61228** Analysis Date: **8/17/2020** SeqNo: **1228109**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00863									

Sample ID: **LCS-R61228** SampType: **LCS** Units: **mg/L** Prep Date: **8/17/2020** RunNo: **61228**
Client ID: **LCSW** Batch ID: **R61228** Analysis Date: **8/17/2020** SeqNo: **1228108**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	1,120	0.00863	1,000	0	112	70	130				

Sample ID: **2008153-015BREP** SampType: **REP** Units: **mg/L** Prep Date: **8/17/2020** RunNo: **61228**
Client ID: **MW-24-081120** Batch ID: **R61228** Analysis Date: **8/17/2020** SeqNo: **1228101**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00863						0		30	

Fremont Analytical

Sample Log-In Check List

Client Name: **FS**

Work Order Number: **2008153**

Logged by: **Gabrielle Coeuille**

Date Received: **8/12/2020 5:56:00 AM**

Chain of Custody

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

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes ☑ No ☐ Not Present ☐
6. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
7. Were all items received at a temperature of >2°C to 6°C * Yes ☑ No ☐ NA ☐
8. Sample(s) in proper container(s)? Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
10. Are samples properly preserved? Yes ☑ No ☐
11. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
12. Is there headspace in the VOA vials? Yes ☐ No ☑ NA ☐
13. Did all samples containers arrive in good condition(unbroken)? Yes ☑ No ☐
14. Does paperwork match bottle labels? Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
16. Is it clear what analyses were requested? Yes ☑ No ☐
17. Were all holding times able to be met? Yes ☑ No ☐

Special Handling (if applicable)

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

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	2.4
Temp Blank 1	1.6

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

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Date: 8/10/20 **Page:** 1 **of:** 2

Laboratory Project No (internal): 2008153

Project Name: POL-TPH

Special Remarks: Lab Filter samples For Dissolved Mangaese

Client: Floyd Snider

Project No:

Address: 601 Union St, Ste 600

Collected by: P.O., G.C., A.J + T.S

City, State, Zip: Seattle, WA 98101

Location: Longview, WA

Telephone: 206-292-2078

Report To (PM): Gabe Cisneros

Sample Disposal: ☐ Return to client ☒ Disposal by lab (after 30 days)

Fax:

PM Email: gabe.cisneros@floydsnider.com

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	~~BTEX~~ Manganese 200.8	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) | Dissolved (D)	Anions (IC)***	EDB (8011)	Methane RSK-175	Nitrate as N 300.0	Sulfate 300.0	Total Alkalinity SM 2320B	Comments
1 MW-10-081020	8/10/20	17:17	GW			X											X	X	X	X	
2 MW-31-081020	↓	17:38	GW			X											X	X	X	X	
3 MW-19-081020	↓	16:50	GW			X											X	X	X	X	
4 MW-35-081020	↓	16:43	GW			X											X	X	X	X	
5 MW-22-081120	8/11/20	0814	GW			X											X	X	X	X	
6 MW-122-081120	↓	0821	GW			X											X	X	X	X	
7 MW-30-081120	↓	0921	GW			X											X	X	X	X	
8 MW-25-081120	↓	1203	GW			X											X	X	X	X	
9 MW-12-081120	↓	1310	GW			X											X	X	X	X	
10 MW-14-081120	↓	1346	GW			X											X	X	X	X	

***Matrix:** A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

****Metals (Circle):** MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

*****Anions (Circle):** [✓ Nitrate] Nitrite Chloride [✓ Sulfate] Bromide O-Phosphate Fluoride Nitrate+Nitrite

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished x	Date/Time 8/11/20 0657	Received x	Date/Time 8/12/20 5:56A
Relinquished x	Date/Time	Received x	Date/Time

Turn-around Time:

☒ Standard
☐ 3 Day
☐ 2 Day
☐ Next Day
Same Day ______ *(specify)*

COC 1.2 - 2.22.17

www.fremontanalytical.com

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Date: 8/10/20 **Page:** 2 **of:** 2

Laboratory Project No (internal): 2008153

Client: Floyd Snider

Address:

City, State, Zip: see page 1

Telephone:

Fax:

Project Name: POL - TPH

Project No:

Collected by:

Location: see page 1

Report To (PM):

PM Email:

Special Remarks: Lab filter samples for dissolved manganese

Sample Disposal: ☐ Return to client ☒ Disposal by lab (after 30 days)

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / [✓ 200.8])	Total (T) | Dissolved (D)	Anions (IC)***	EDB (8011)	Methane RSK-175	Total Alkalinity SM2320B			Comments
1	MW-29-081120	8/11/20	0929	GW										X	D	X		X	X			
2	~~MW-30-081120~~		~~0921~~	P.O.												P.O.						
3	MW-18-081120	↓	1004	GW										X	D	X		X	X			
4	MW-23-081120		0826	GW										X	D	X		X	X			
5	MW-17-081120		1225	GW										X	D	X		X	X			
6	MW-24-081120		0841	GW										X	D	X		X	X			
7																						
8																						
9																						
10																						

***Matrix:** A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

****Metals (Circle):** MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg [✓ Mn] Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

*****Anions (Circle):** [✓ Nitrate] Nitrite Chloride [✓ Sulfate] Bromide O-Phosphate Fluoride Nitrate+Nitrite

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Turn-around Time:

☒ Standard

☐ 3 Day

☐ 2 Day

☐ Next Day

Same Day ______ *(specify)*

Relinquished x | Date/Time 8/11/20 0657 | Received x | Date/Time 8/12/20 5:56 A

Relinquished x | Date/Time | Received x | Date/Time

Port of Longview TPH Site

Interim Data Report

Appendix F
Soil Parameter Laboratory Data

Harold L Benny & Associates, LLC

Project: Port of Longview
Project #: 2020-020
Client : PanGEO, Inc.

Date Received: March 17, 2020
Date Tested: March 18-25, 2020
Tested By: Harold Benny

CASE NARRATIVE

1. Samples were submitted for analysis on March 17, 2020. Three samples were submitted for archival. The remaining nine samples were submitted for grain size distribution by mechanical analysis according to ASTM D6913, Bulk Density by ASTM E1109, and specific gravity by ASTM D854. From the bulk density and the specific gravity, the porosity was to be calculated. ASTM E1109 is a method used for calculating the density of a waste stream by packing the soil into a mold to minimize void space. For this project, since no particles were found larger than #4 screen, a plexiglass, smaller mold (approximately 2.5 inches in height and 1.75 inches in diameter) was used to determine the bulk density.
2. For the specific gravity values, ASTM D854 was used. Three samples had a higher than expected specific gravity and were re-tested. Two of the three values did not change significantly and the original value was used. These were dark silty sands and the color may have been from Basaltic rocks, which typically have a lot of iron in them. The third value changed significantly and the new value was used in the calculation of porosity.
3. The samples were either dark brown or brown in color. The samples ranged from Silty Sands to Silt/Clay.
4. Many of the samples had small pieces of woody debris in them which probably affected the specific gravity numbers.
5. During the sieving process, a few sieve fractions, notably the #60 and the #100 sieves, needed to be hand sieved to ensure that all finer particles passed through the appropriate sieve.
6. The data is provided in a summary tables and plots.
7. There were no other noted anomalies in the samples or testing for this project.

Reviewed by: HBenny

Harold L Benny & Associates, LLC

Project: Port of Longview
Project #: 2020-020
Date Received: March 17, 2020
Date Tested: March 18, 2020

Client: Floyd - Snider
Tested by: Harold Benny

Percent Finer Than Indicated Size, By ASTM D6913

Sample ID	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#140	#200
MW-33, 7.5-9	100.0	100.0	100.0	99.5	99.0	98.0	95.2	81.3	48.0	28.1	14.2
MW-33, 10-11	100.0	100.0	100.0	100.0	99.9	99.5	98.7	97.7	93.7	85.5	73.7
MW-33, 13-15	100.0	100.0	100.0	98.5	98.0	96.4	86.8	65.4	36.3	22.3	12.5
MW-33, 17.5-19	100.0	100.0	100.0	100.0	99.8	98.8	97.3	95.5	93.1	90.4	86.0
MW-33, 21-23	100.0	100.0	100.0	99.6	99.1	92.0	43.6	12.2	4.9	3.5	2.5
MW-34, 12-13	100.0	100.0	100.0	100.0	99.4	96.5	82.3	54.0	29.8	18.6	11.1
MW-34, 14-16	100.0	100.0	100.0	100.0	99.5	98.7	97.5	95.7	80.9	57.3	35.0
MW-34, 18-20	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.6	95.5	83.3	64.2
MW-34, 20.5-21.5	100.0	100.0	100.0	100.0	100.0	99.8	98.3	94.9	92.5	90.5	88.0

Reviewed by:

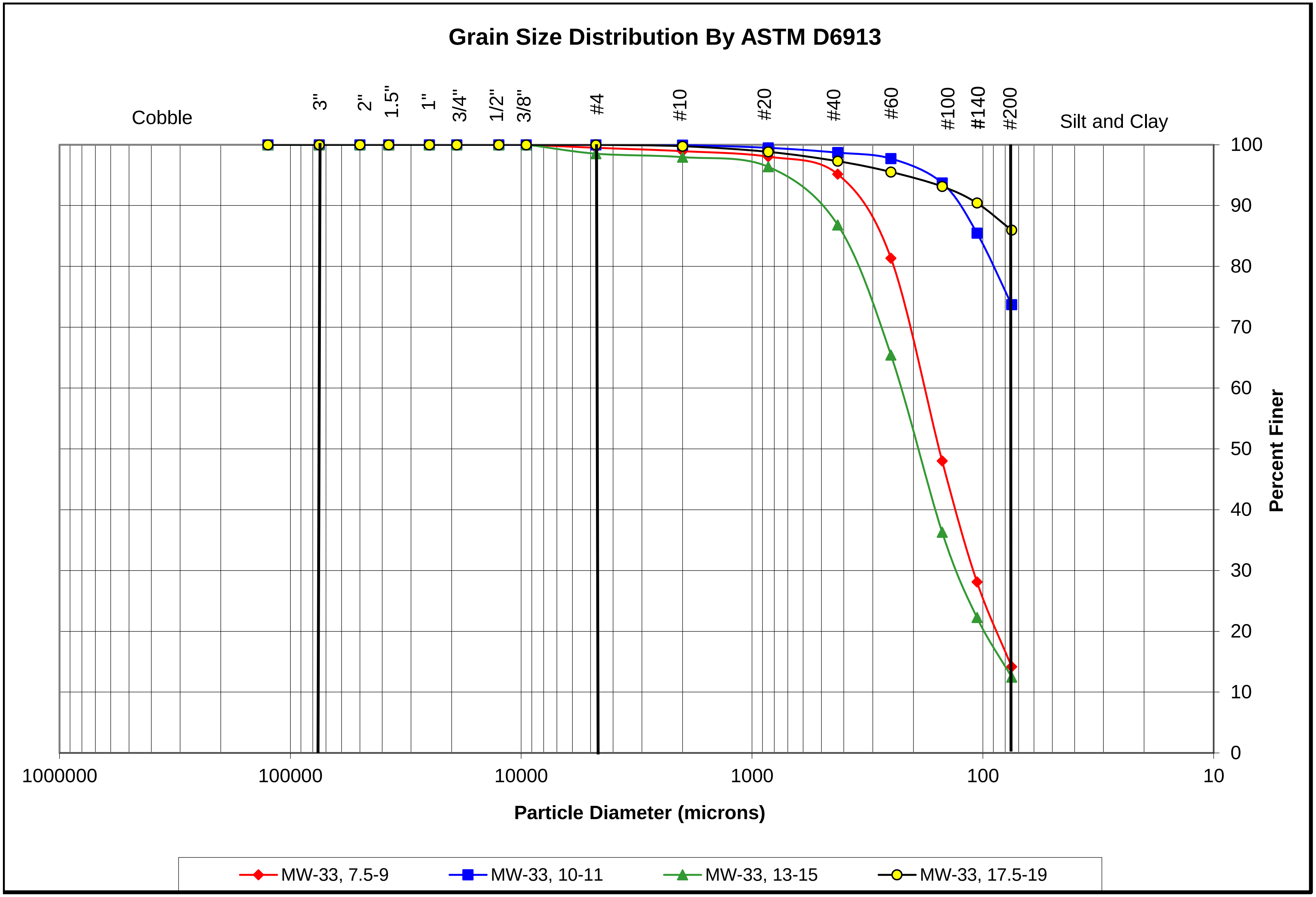
Harold L Benny & Associates, LLC

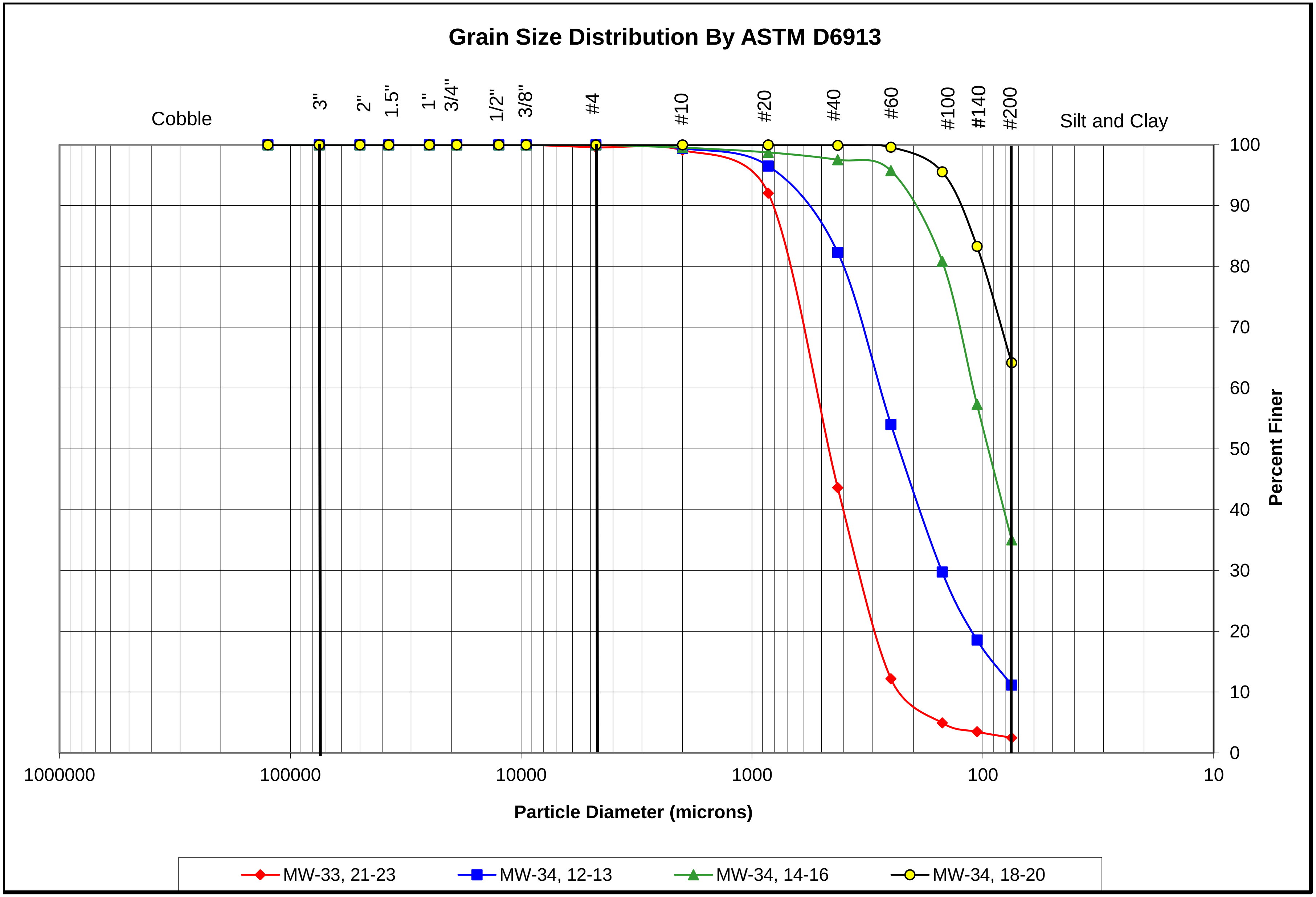
Project: Port of Longview **Client:** Floyd - Snider
Project #: 2020-020
Date Received: March 17, 2020
Date Tested: March 18, 2020 **Tested by:** Harold Benny

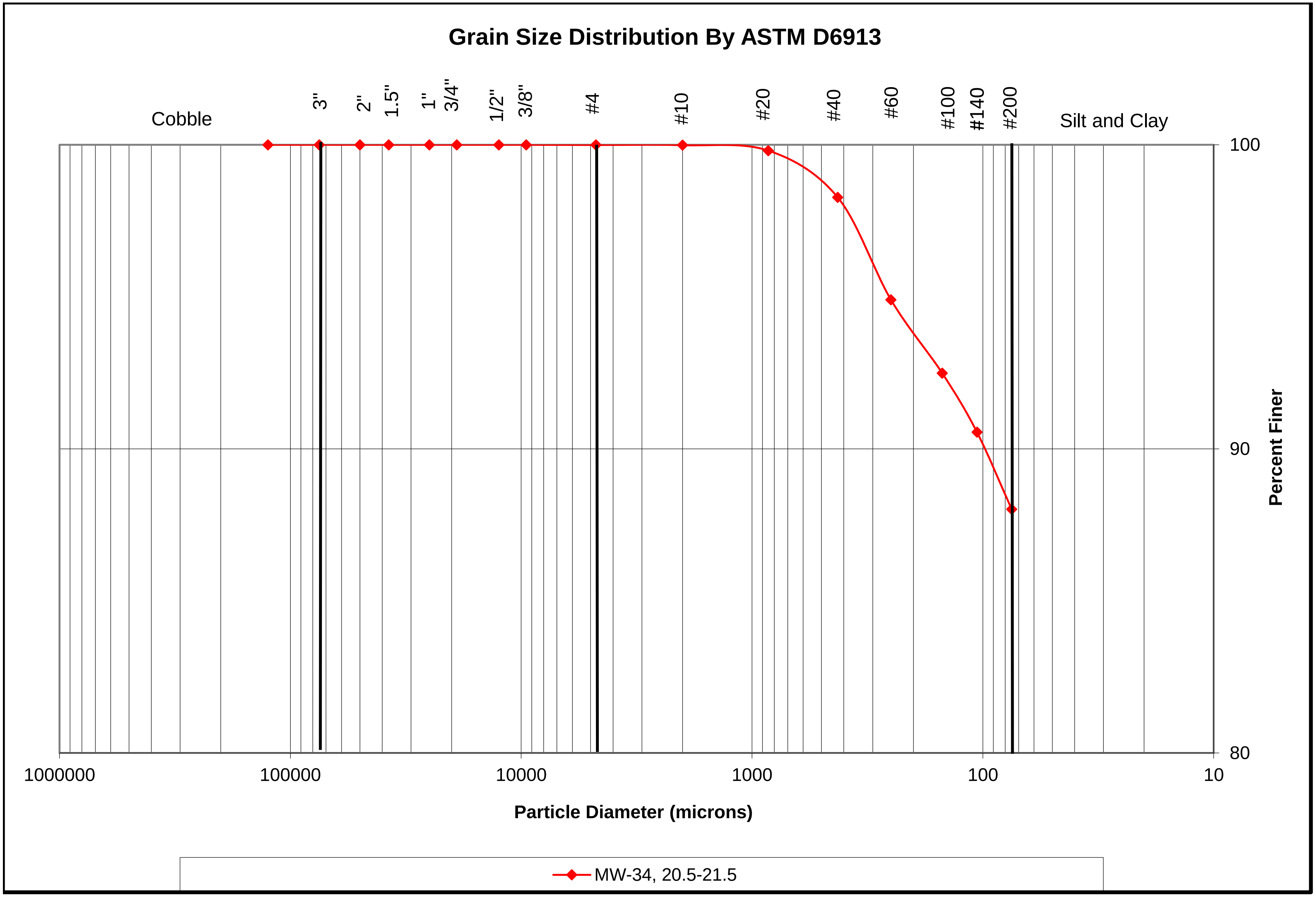
Percent Retained in Each Size Fraction, By ASTM D6913

Sieve Size (microns)	3/4-1/2"	1/2-3/8"	3/8-#4	4750-2000	2000-850	850-425	425-250	250-150	150-106	106-75	< 75
MW-33, 7.5-9	0.0	0.0	0.5	0.6	0.9	2.9	13.8	33.4	19.9	14.0	14.2
MW-33, 10-11	0.0	0.0	0.0	0.1	0.4	0.8	1.0	4.0	8.2	11.7	73.7
MW-33, 13-15	0.0	0.0	1.5	0.6	1.6	9.6	21.4	29.1	14.0	9.8	12.5
MW-33, 17.5-19	0.0	0.0	0.0	0.2	0.9	1.5	1.8	2.4	2.7	4.5	86.0
MW-33, 21-23	0.0	0.0	0.4	0.5	7.1	48.4	31.4	7.2	1.5	1.0	2.5
MW-34, 12-13	0.0	0.0	0.0	0.6	2.9	14.2	28.3	24.3	11.2	7.4	11.1
MW-34, 14-16	0.0	0.0	0.0	0.4	0.8	1.2	1.8	14.9	23.5	22.3	35.0
MW-34, 18-20	0.0	0.0	0.0	0.0	0.0	0.1	0.3	4.1	12.2	19.1	64.2
MW-34, 20.5-21.5	0.0	0.0	0.0	0.0	0.2	1.5	3.4	2.4	1.9	2.5	88.0

Reviewed by:


Grain Size Distribution By ASTM D6913
Cobble
3"
2"
1.5"
1"
3/4"
1/2"
3/8"
#4
#10
#20
#40
#60
#100
#140
#200
Silt and Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
1000000
100000
10000
1000
100
10
Particle Diameter (microns)
MW-33, 7.5-9
MW-33, 10-11
MW-33, 13-15
MW-33, 17.5-19


Grain Size Distribution By ASTM D6913
Cobble
3"
2"
1.5"
1"
3/4"
1/2"
3/8"
#4
#10
#20
#40
#60
#100
#140
#200
Silt and Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
1000000
100000
10000
1000
100
10
Particle Diameter (microns)
MW-33, 21-23
MW-34, 12-13
MW-34, 14-16
MW-34, 18-20


Grain Size Distribution By ASTM D6913
Cobble
3"
2"
1.5"
1"
3/4"
1/2"
3/8"
#4
#10
#20
#40
#60
#100
#140
#200
Silt and Clay
100
90
80
Percent Finer
1000000
100000
10000
1000
100
10
Particle Diameter (microns)
MW-34, 20.5-21.5

Harold L Benny & Associates, LLC

Project: Port of Longview
Project #: 2020-020
Date Received: March 17, 2020
Date Tested: March 18-25, 2020
Client: PanGEO, Inc.
Tested by: Harold Benny

Sample Parameters, ASTM E1109, D845

Sample ID	MW 33	MW 33	MW 33	MW 33	MW 33	MW 34	MW 34	MW 34	MW 34
Depth, ft	7.5-9	10-11	13-15	17.5-19	21-23	12-13	14-16	18-20	20.5-21.5
Sample Description	Dark Brown Silty Sand	Dark Brown Silt / Clay	Dark Brown Silty Sand	Dark Brown Silt / Clay	Dark Brown Sand	Dark Brown Silty Sand	Brown Silty Fine Sand	Brown Silt / Clay	Brown Silt / Clay
Wet Density, pcf	114.7	130.3	115.4	96.3	113.8	113.5	104.4	112.0	106.8
Moisture Content, %	40.3	56.3	37.3	63.5	39.2	35.1	36.2	47.8	55.4
Dry Density, pcf	89.7	86.3	92.2	56.7	89.5	91.7	81.9	82.3	72.4
Specific Gravity	2.718	2.630	2.699	2.554	2.577	2.656	2.679	2.635	2.605
Porosity	0.471	0.583	0.454	0.647	0.445	0.448	0.511	0.501	0.555

Reviewed by: HBenny

Port of Longview TPH Site

Interim Data Report

Appendix G
MTCA Method B and C Calculation Workbooks

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: MW-39-13-14

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	7.575	0.04%
AL_EC >6-8	33.1	0.19%
AL_EC >8-10	199	1.13%
AL_EC >10-12	888	5.05%
AL_EC >12-16	4300	24.44%
AL_EC >16-21	4570	25.98%
AL_EC >21-34	629	3.58%
AR_EC >8-10	54.125	0.31%
AR_EC >10-12	500.5	2.84%
AR_EC >12-16	2680	15.23%
AR_EC >16-21	3290	18.70%
AR_EC >21-34	408.929	2.32%
Benzene	0	0.00%
Toluene	3.075	0.02%
Ethylbenzene	3.075	0.02%
Total Xylenes	5.7	0.03%
Naphthalene	21.5	0.12%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0.071	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	17593.8	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:	800	ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for toluene, ethylbenzene, xylenes and benzo(a)anthracene.

The following constituents have never been detected within this area; therefore, zero was entered: benzene, EDB, EDC, some cPAHs.

No lab data for 1- and 2-Methylnaphthalenes available.

Laboratory values were used for porosity and fraction organic carbon from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average TOC was used.

Default values were used for volumetric water content and soil bulk density.

The default value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. **Refer to WAC 173-340-720, 740, 745, 747, 750**

Site Information

Date:	9/5/2020
Site Name:	POL-TPH
Sample Name:	MW-39-13-14
Measured Soil TPH Concentration, mg/kg:	**17,593.800**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,664	3.10E-08	6.61E+00	Fail
	Method C	33,638	7.69E-09	5.23E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	277	1.05E-10	8.37E+00	Fail
	Target TPH GW Conc. @ 800 ug/L	639	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,663.61**	**33,638.47**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.66E+03	4.69E-09	1.00E+00	YES	3.36E+04	1.47E-08	1.00E+00
Total Risk=1E-5	*NO*	5.68E+06	1.00E-05	2.13E+03	*NO*	2.29E+07	1.00E-05	6.80E+02
Risk of Benzene= 1E-6	NA	NA	NA	NA	NA			
Risk of cPAHs mixture= 1E-6	*NO*	5.68E+05	1.00E-06	2.13E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**412.46**
Protective Soil Concentration, mg/kg	**277.09**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	4.12E+02	2.12E-10	1.00E+00	2.77E+02
Total Risk = 1E-5	*NO*	3.08E+03	1.02E-10	9.41E+00	100% NAPL
Total Risk = 1E-6	*NO*	3.08E+03	1.02E-10	9.41E+00	100% NAPL
Risk of cPAHs mixture= 1E-5	*NO*	3.08E+03	1.02E-10	9.41E+00	100% NAPL
Benzene MCL = 5 ug/L	NA	NA	NA	NA	NA
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 96000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	8.00E+02	1.73E-10	2.00E+00	**6.39E+02**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-20-11-11.5

2. Enter Soil Concentration Measured

☐ Notes for Data Entry ☐ Set Default Hydrogeology
☐ Clear All Soil Concentration Data Entry Cells
☐ Restore All Soil Concentration Data cleared previously

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0.72	0.08%
AL_EC >6-8	25.8	2.84%
AL_EC >8-10	71.3	7.86%
AL_EC >10-12	119	13.11%
AL_EC >12-16	31.8	3.50%
AL_EC >16-21	7.05	0.78%
AL_EC >21-34	7.05	0.78%
AR_EC >8-10	49.586	5.46%
AR_EC >10-12	263.5	29.03%
AR_EC >12-16	279	30.74%
AR_EC >16-21	20.1	2.21%
AR_EC >21-34	20.1	2.21%
Benzene	0	0.00%
Toluene	0.73	0.08%
Ethylbenzene	0.338	0.04%
Total Xylenes	0.876	0.10%
Naphthalene	10.5	1.16%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.01%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.005	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0.005	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	907.585	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: 800 ug/L

REMARK:
Half detection limits were used for AL_EC >5-6, AL_EC >16-21, AL_EC >21-34, ethylbenzene, hexane, benzo(a)anthracene, and chrysene.

The following constituents have never been detected within this area; therefore, zero was entered: benzene, EDB, EDC, some cPAHs.

No lab data for 1- and 2-Methylnaphthalenes available.

Laboratory values were used for porosity and fraction organic carbon from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average TOC was used.

Default values were used for volumetric water content and soil bulk density.

Sample collected above groundwater and thick silt layer; therefore, the default value of 20 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-20-11-11.5
Measured Soil TPH Concentration, mg/kg: **907.585**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,157	5.31E-09	4.21E-01	Pass
	Method C	34,696	1.32E-09	2.62E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	909	6.31E-11	9.99E-01	Pass
	Target TPH GW Conc. @ 800 ug/L	100% NAPL	NA	NA	Pass

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,157.29**	**34,695.92**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.16E+03	1.26E-08	1.00E+00	YES	3.47E+04	5.04E-08	1.00E+00
Total Risk=1E-5	*NO*	1.71E+06	1.00E-05	7.93E+02	*NO*	6.89E+06	1.00E-05	1.99E+02
Risk of Benzene= 1E-6	NA	NA	NA	NA	NA			
Risk of cPAHs mixture= 1E-6	*NO*	1.71E+05	1.00E-06	7.93E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**260.25**
Protective Soil Concentration, mg/kg	**908.75**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.60E+02	6.31E-11	1.00E+00	9.09E+02
Total Risk = 1E-5	*NO*	7.72E+02	1.39E-11	3.04E+00	100% NAPL
Total Risk = 1E-6	*NO*	7.72E+02	1.39E-11	3.04E+00	100% NAPL
Risk of cPAHs mixture= 1E-5	*NO*	7.72E+02	1.39E-11	3.04E+00	100% NAPL
Benzene MCL = 5 ug/L	NA	NA	NA	NA	NA
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 152000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	7.72E+02	1.39E-11	3.04E+00	**100% NAPL**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-23-14-15

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	8.325	0.07%
AL_EC >6-8	12.05	0.10%
AL_EC >8-10	137	1.17%
AL_EC >10-12	629	5.39%
AL_EC >12-16	2910	24.93%
AL_EC >16-21	3110	26.64%
AL_EC >21-34	467	4.00%
AR_EC >8-10	24.775	0.21%
AR_EC >10-12	436.1	3.74%
AR_EC >12-16	909	7.79%
AR_EC >16-21	2660	22.79%
AR_EC >21-34	320.917	2.75%
Benzene	0	0.00%
Toluene	3.375	0.03%
Ethylbenzene	3.375	0.03%
Total Xylenes	6.25	0.05%
Naphthalene	36.9	0.32%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0.058	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	11674.275	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:	800	ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for toluene, ethylbenzene, xylenes, hexane, and benzo(a)anthracene.

The following constituents have never been detected within this area; therefore, zero was entered: benzene, EDB, EDC, some cPAHs.

No lab data for 1- and 2-Methylnaphthalenes available.

Laboratory values were used for porosity and fraction organic carbon from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average TOC was used.

Default values were used for volumetric water content and soil bulk density.

The default value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-23-14-15
Measured Soil TPH Concentration, mg/kg: **11,674.275**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,584	2.97E-08	4.52E+00	Fail
	Method C	32,840	7.38E-09	3.56E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protectior	242	1.61E-10	9.63E+00	Fail
	Target TPH GW Conc. @ 800 ug/L	755	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,584.08**	**32,840.43**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.58E+03	6.58E-09	1.00E+00	YES	3.28E+04	2.08E-08	1.00E+00
Total Risk=1E-5	*NO*	3.93E+06	1.00E-05	1.52E+03	*NO*	1.58E+07	1.00E-05	4.82E+02
Risk of Benzene= 1E-6	NA	NA	NA	NA	NA			
Risk of cPAHs mixture= 1E-6	*NO*	3.93E+05	1.00E-06	1.52E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**329.65**
Protective Soil Concentration, mg/kg	**241.73**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.30E+02	2.85E-10	1.00E+00	2.42E+02
Total Risk = 1E-5	*NO*	3.16E+03	1.55E-10	1.18E+01	100% NAPL
Total Risk = 1E-6	*NO*	3.16E+03	1.55E-10	1.18E+01	100% NAPL
Risk of cPAHs mixture= 1E-5	*NO*	3.16E+03	1.55E-10	1.18E+01	100% NAPL
Benzene MCL = 5 ug/L	NA	NA	NA	NA	NA
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 96000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	8.00E+02	2.31E-10	2.57E+00	**7.55E+02**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-30-20-21

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0.78	0.01%
AL_EC >6-8	6.23	0.06%
AL_EC >8-10	32.8	0.34%
AL_EC >10-12	154	1.58%
AL_EC >12-16	1250	12.80%
AL_EC >16-21	1680	17.20%
AL_EC >21-34	1960	20.07%
AR_EC >8-10	17.2855	0.18%
AR_EC >10-12	48.07	0.49%
AR_EC >12-16	527	5.40%
AR_EC >16-21	1730	17.71%
AR_EC >21-34	2320	23.76%
Benzene	0	0.00%
Toluene	0.3115	0.00%
Ethylbenzene	0.3115	0.00%
Total Xylenes	0.703	0.01%
Naphthalene	8.03	0.08%
1-Methyl Naphthalene	13	0.13%
2-Methyl Naphthalene	15	0.15%
n-Hexane	0	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.05	0.00%
Benzo(b)fluoranthene	0.24	0.00%
Benzo(k)fluoranthene	0.05	0.00%
Benzo(a)pyrene	0.4	0.00%
Chrysene	2	0.02%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0.05	0.00%
Sum	9766.3115	100.00%

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for toluene, ethylbenzene, benzo(a)anthracene, benzo(k)fluoranthracene, and indeno(1,2,3-cd)pyrene.

The following constituents have never been detected within this area; therefore, zero was entered: benzene,MTBE, n-hexane, EDB, EDC,and DiBenz(a,h)anthracene.

Laboratory values were used for porosity from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected.

Default values were used for TOC, volumetric water content, and soil bulk density.

The default value of 1 was used for the dilution factor to be conservative.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:	800	ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-30-20-21
Measured Soil TPH Concentration, mg/kg: **9,766.312**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,206	4.43E-06	3.23E+00	Fail
	Method C	37,085	1.10E-06	2.63E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	20	6.15E-09	4.94E+00	Fail
	Target TPH GW Conc. @ 800 ug/L	122	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,205.86**	**37,084.78**
Most Stringent Criterion	**Risk of cPAHs mixture= 1E-6**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	*NO*	3.02E+03	1.37E-06	1.00E+00	YES	3.71E+04	4.17E-06	1.00E+00
Total Risk=1E-5	*NO*	2.21E+04	1.00E-05	7.30E+00	*NO*	8.88E+04	1.00E-05	2.40E+00
Risk of Benzene= 1E-6	NA	NA	NA	NA	NA			
Risk of cPAHs mixture= 1E-6	YES	2.21E+03	1.00E-06	7.30E-01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**343.58**
Protective Soil Concentration, mg/kg	**20.32**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.44E+02	7.96E-09	1.00E+00	2.03E+01
Total Risk = 1E-5	*NO*	1.31E+03	6.14E-09	4.99E+00	100% NAPL
Total Risk = 1E-6	*NO*	1.31E+03	6.14E-09	4.99E+00	100% NAPL
Risk of cPAHs mixture= 1E-5	*NO*	1.31E+03	6.14E-09	4.99E+00	100% NAPL
Benzene MCL = 5 ug/L	NA	NA	NA	NA	NA
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 161000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	8.00E+02	6.58E-09	2.79E+00	**1.22E+02**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-42-17-17.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	238	1.41%
AL_EC >6-8	597	3.53%
AL_EC >8-10	915	5.41%
AL_EC >10-12	1330	7.86%
AL_EC >12-16	4090	24.17%
AL_EC >16-21	3540	20.92%
AL_EC >21-34	992	5.86%
AR_EC >8-10	152.2	0.90%
AR_EC >10-12	512.8	3.03%
AR_EC >12-16	1240	7.33%
AR_EC >16-21	2620	15.48%
AR_EC >21-34	502.47	2.97%
Benzene	2.4	0.01%
Toluene	0.99	0.01%
Ethylbenzene	42.7	0.25%
Total Xylenes	4.1	0.02%
Naphthalene	23.2	0.14%
1-Methyl Naphthalene	41	0.24%
2-Methyl Naphthalene	29	0.17%
n-Hexane	45	0.27%
MTBE	3.385	0.02%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.13	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0.4	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	16921.775	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: 800 ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for Toluene, Xylenes.

The following constituents have never been detected within this area; therefore, zero was entered: EDB, EDC, cPAHs, some cPAHs.

Laboratory values were used for Site-Specific porosity and fraction organic carbon. Average values were used from similar soil types at the depth the sample was collected.

Default values were used for volumetric water content and soil bulk density.

Although the sample was collected above groundwater, the default value of 1 was used for the dilution factor to be conservative.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-42-17-17.5
Measured Soil TPH Concentration, mg/kg: **16,921.775**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,698	2.96E-07	6.27E+00	Fail
	Method C	35,814	5.84E-08	4.72E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protectior	64	4.57E-04	2.21E+01	Fail
	Target TPH GW Conc. @ 800 ug/L	333	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	**Method C: Industrial Land Use**
Protective Soil Concentration, TPH mg/kg	**2,697.69**	**35,814.06**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	**Protective Soil Concentration @Method B**				**Protective Soil Concentration @Method C**			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.70E+03	4.72E-08	1.00E+00	YES	3.58E+04	1.24E-07	1.00E+00
Total Risk=1E-5	*NO*	5.71E+05	1.00E-05	2.12E+02	*NO*	2.90E+06	1.00E-05	8.09E+01
Risk of Benzene= 1E-6	*NO*	1.28E+05	2.24E-06	4.75E+01	NA			
Risk of cPAHs mixture= 1E-6	*NO*	1.03E+05	1.81E-06	3.83E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**MTBE = 20 ug/L**
Protective Ground Water Concentration, ug/L	**159.68**
Protective Soil Concentration, mg/kg	**64.12**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	*NO*	4.14E+02	1.09E-05	1.00E+00	1.67E+02
Total Risk = 1E-5	*NO*	3.79E+02	1.00E-05	9.16E-01	1.53E+02
Total Risk = 1E-6	YES	3.81E+01	1.00E-06	9.20E-02	1.53E+01
Risk of cPAHs mixture= 1E-5	*NO*	1.79E+04	6.66E-04	2.86E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	2.39E+02	6.29E-06	5.77E-01	9.61E+01
MTBE = 20 ug/L	YES	1.60E+02	4.20E-06	3.86E-01	6.41E+01

Note: 100% NAPL is 92000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	8.00E+02	2.17E-05	1.94E+00	**3.33E+02**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: **Refer to WAC 173-340-720, 740,745, 747, 750**

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-47-11-12

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	244	5.40%
AL_EC >6-8	827	18.29%
AL_EC >8-10	332	7.34%
AL_EC >10-12	465	10.28%
AL_EC >12-16	6.65	0.15%
AL_EC >16-21	6.65	0.15%
AL_EC >21-34	6.65	0.15%
AR_EC >8-10	302	6.68%
AR_EC >10-12	1009	22.31%
AR_EC >12-16	1230	27.20%
AR_EC >16-21	6.65	0.15%
AR_EC >21-34	6.65	0.15%
Benzene		0.00%
Toluene		0.00%
Ethylbenzene		0.00%
Total Xylenes		0.00%
Naphthalene	41	0.91%
1-Methyl Naphthalene		0.00%
2-Methyl Naphthalene		0.00%
n-Hexane	23	0.51%
MTBE	15.8	0.35%
Ethylene Dibromide (EDB)		0.00%
1,2 Dichloroethane (EDC)		0.00%
Benzo(a)anthracene		0.00%
Benzo(b)fluoranthene		0.00%
Benzo(k)fluoranthene		0.00%
Benzo(a)pyrene		0.00%
Chrysene		0.00%
Dibenz(a,h)anthracene		0.00%
Indeno(1,2,3-cd)pyrene		0.00%
Sum	4522.05	100.00%

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for AL_EC>12-16, AL_EC>16-21, AL_EC>21-34, AR_EC>16-21, AR_EC>21-34, toluene, ethylbenzene, and xylenes.

The following constituents have never been detected within this area; therefore, zero was entered: EDB, EDC, cPAHs.

No lab data for 1- and 2-Methylnaphthalenes available.

Laboratory values were used for Site-Specific porosity and fraction organic carbon. Average values were used from similar soil types at the depth the sample was collected.

Default values were used for volumetric water content and soil bulk density.

Sample was collected above the groundwater table; therefore the default value of 20 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:	800	ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-47-11-12
Measured Soil TPH Concentration, mg/kg: **4,522.050**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,854	0.00E+00	1.58E+00	Fail
	Method C	47,031	0.00E+00	9.61E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	73	0.00E+00	1.74E+00	Fail
	Target TPH GW Conc. @ 800 ug/L	1,345	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,854.00**	**47,031.14**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.85E+03	0.00E+00	1.00E+00	YES	4.70E+04	0.00E+00	9.99E-01
Total Risk=1E-5	NA	NA	NA	NA	NA	NA	NA	NA
Risk of Benzene= 1E-6	NA	NA	NA	NA	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**MTBE = 20 ug/L**
Protective Ground Water Concentration, ug/L	**47.65**
Protective Soil Concentration, mg/kg	**73.41**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	*NO*	7.16E+02	0.00E+00	1.00E+00	1.16E+03
Total Risk = 1E-5	NA	NA	NA	NA	NA
Total Risk = 1E-6	NA	NA	NA	NA	NA
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	NA	NA	NA	NA	NA
MTBE = 20 ug/L	YES	4.76E+01	0.00E+00	6.79E-02	7.34E+01

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	8.00E+02	0.00E+00	1.10E+00	**1.35E+03**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: **Refer to WAC 173-340-720, 740,745, 747, 750**

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-47-17

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	7.24	0.56%
AL_EC >6-8	106	8.25%
AL_EC >8-10	100	7.79%
AL_EC >10-12	111	8.64%
AL_EC >12-16		0.00%
AL_EC >16-21		0.00%
AL_EC >21-34		0.00%
AR_EC >8-10	114.44	8.91%
AR_EC >10-12	342.5	26.67%
AR_EC >12-16	422	32.86%
AR_EC >16-21	17.8	1.39%
AR_EC >21-34	27	2.10%
Benzene	0	0.00%
Toluene	0.734	0.06%
Ethylbenzene	12	0.93%
Total Xylenes	3.56	0.28%
Naphthalene	18.5	1.44%
1-Methyl Naphthalene		0.00%
2-Methyl Naphthalene		0.00%
n-Hexane	1.3	0.10%
MTBE	0.254	0.02%
Ethylene Dibromide (EDB)		0.00%
1,2 Dichloroethane (EDC)		0.00%
Benzo(a)anthracene	0	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	1284.328	100.00%

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for MTBE.

The following constituents have never been detected within this area; therefore, zero was entered: AL_EC>12-16, AL_EC>16-21, AL_EC>21-34, EDB, EDC, cPAHs.

No lab data for 1- and 2-Methylnaphthalenes available.

Laboratory values were used for Site-Specific porosity and fraction organic carbon. Average values were used from similar soil types at the depth the sample was collected.

Default values were used for volumetric water content and soil bulk density.

The default value of 1 was used for the dilution factor to be conservative.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:	800	ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. **Refer to WAC 173-340-720, 740, 745, 747, 750**

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-47-17
Measured Soil TPH Concentration, mg/kg: **1,284.328**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,398	0.00E+00	5.36E-01	Pass
	Method C	38,621	0.00E+00	3.33E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protectior	Use A2.2	0.00E+00	2.83E+01	Fail
	Target TPH GW Conc. @ 800 ug/L	94	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	**Method C: Industrial Land Use**
Protective Soil Concentration, TPH mg/kg	**2,398.06**	**38,621.44**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	**Protective Soil Concentration @Method B**				**Protective Soil Concentration @Method C**			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.40E+03	0.00E+00	1.00E+00	YES	3.86E+04	0.00E+00	1.00E+00
Total Risk=1E-5	NA	NA	NA	NA	NA	NA	NA	NA
Risk of Benzene= 1E-6	NA	NA	NA	NA	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**350.81**
Protective Soil Concentration, mg/kg	**42.57**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.51E+02	0.00E+00	1.00E+00	4.26E+01
Total Risk = 1E-5	NA	NA	NA	NA	NA
Total Risk = 1E-6	NA	NA	NA	NA	NA
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	NA	NA	NA	NA	NA
MTBE = 20 ug/L	*NO*	5.53E+02	0.00E+00	1.57E+00	6.48E+01

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	8.00E+02	0.00E+00	2.27E+00	**9.38E+01**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-66-12-12.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0	0.00%
AL_EC >6-8	36.2	2.15%
AL_EC >8-10	243	14.41%
AL_EC >10-12	198	11.74%
AL_EC >12-16	266	15.77%
AL_EC >16-21	199	11.80%
AL_EC >21-34	44.5	2.64%
AR_EC >8-10	54.53	3.23%
AR_EC >10-12	190.03	11.27%
AR_EC >12-16	168.4	9.99%
AR_EC >16-21	176	10.44%
AR_EC >21-34	93	5.52%
Benzene	0.223	0.01%
Toluene	0.12	0.01%
Ethylbenzene	0.7	0.04%
Total Xylenes	1.87	0.11%
Naphthalene	9.97	0.59%
1-Methyl Naphthalene	1.7	0.10%
2-Methyl Naphthalene	1.9	0.11%
n-Hexane	1.1	0.07%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	1686.243	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: 800 ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for Benzene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, EDC, cPAHs.

No lab data for 1- and 2-Methylnaphthalenes available.

Laboratory values were used for porosity and fraction organic carbon from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average TOC was used

Default values were used for volumetric water content and soil bulk density.

The sample was collected above groundwater, the default value of 20 was used for the dilution factor to be conservative.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-66-12-12.5
Measured Soil TPH Concentration, mg/kg: **1,686.243**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc RISK @	With Measured Soil Conc HI @	Does Measured Soil Conc Pass or Fail?
Protection of Soil Direct Contact: Human Health	Method B	2,339	1.23E-08	7.21E-01	Pass
	Method C	34,553	1.64E-09	4.88E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	2,405	4.66E-06	7.33E-01	Pass
	Target TPH GW Conc. @ 800 ug/L	100% NAPL	NA	NA	Pass

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,338.87**	**34,552.53**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.34E+03	1.70E-08	1.00E+00	YES	3.46E+04	3.37E-08	1.00E+00
Total Risk=1E-5	*NO*	1.37E+06	1.00E-05	5.87E+02	*NO*	1.03E+07	1.00E-05	2.97E+02
Risk of Benzene= 1E-6	*NO*	1.37E+05	1.00E-06	5.87E+01	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**Benzene MCL = 5 ug/L**
Protective Ground Water Concentration, ug/L	**204.40**
Protective Soil Concentration, mg/kg	**2404.64**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	*NO*	2.22E+02	7.16E-06	1.00E+00	2.83E+03
Total Risk = 1E-5	*NO*	2.69E+02	1.00E-05	1.24E+00	4.44E+03
Total Risk = 1E-6	YES	4.71E+01	1.00E-06	1.93E-01	3.30E+02
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	YES	2.04E+02	6.29E-06	9.14E-01	2.40E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	4.29E+02	2.92E-05	2.23E+00	**100% NAPL**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-67-11-12

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	16.93	0.13%
AL_EC >6-8	248	1.90%
AL_EC >8-10	544	4.16%
AL_EC >10-12	796	6.09%
AL_EC >12-16	1480	11.32%
AL_EC >16-21	1500	11.47%
AL_EC >21-34	330	2.52%
AR_EC >8-10	485.3	3.71%
AR_EC >10-12	1821.1	13.92%
AR_EC >12-16	4290	32.80%
AR_EC >16-21	1230	9.40%
AR_EC >21-34	253	1.93%
Benzene	5.9	0.05%
Toluene	5.65	0.04%
Ethylbenzene	6.9	0.05%
Total Xylenes	12.8	0.10%
Naphthalene	48.9	0.37%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.32	0.00%
MTBE	4.93	0.04%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	13079.73	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: 800 ug/L

REMARK:
Half detection limits were used for Benzene, toluene, ethylbenzene.

The following constituents have never been detected within this area; therefore, zero was entered: EDB, EDC, cPAHs.

No lab data for 1- and 2-Methylnaphthalenes available.

Laboratory values were used for porosity and fraction organic carbon from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average TOC was used.

Default values were used for volumetric water content and soil bulk density.

The sample was collected above groundwater; however, the default value of 1 was used for the dilution factor to be conservative.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-67-11-12
Measured Soil TPH Concentration, mg/kg: **13,079.730**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc RISK @	With Measured Soil Conc HI @	Does Measured Soil Conc Pass or Fail?
Protection of Soil Direct Contact: Human Health	Method B	2,485	3.25E-07	5.27E+00	Fail
	Method C	34,814	4.35E-08	3.76E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	30	1.25E-03	6.24E+01	Fail
	Target TPH GW Conc. @ 800 ug/L	161	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,484.93**	**34,814.31**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.48E+03	6.17E-08	1.00E+00	YES	3.48E+04	1.16E-07	1.00E+00
Total Risk=1E-5	*NO*	4.03E+05	1.00E-05	1.62E+02	*NO*	3.01E+06	1.00E-05	8.64E+01
Risk of Benzene= 1E-6	*NO*	4.03E+04	1.00E-06	1.62E+01	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**Benzene MCL = 5 ug/L**
Protective Ground Water Concentration, ug/L	**151.29**
Protective Soil Concentration, mg/kg	**30.35**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	*NO*	2.81E+02	1.17E-05	1.00E+00	5.64E+01
Total Risk = 1E-5	*NO*	2.41E+02	1.00E-05	8.55E-01	4.83E+01
Total Risk = 1E-6	YES	2.40E+01	1.00E-06	8.54E-02	4.83E+00
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	YES	1.51E+02	6.29E-06	5.38E-01	3.04E+01
MTBE = 20 ug/L	*NO*	1.70E+02	7.06E-06	6.04E-01	3.41E+01

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	8.00E+02	3.33E-05	2.84E+00	**1.61E+02**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 09/05/20
Site Name: POL-TPH
Sample Name: OIP-67-14.5-15

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	4.42	0.18%
AL_EC >6-8	119	4.76%
AL_EC >8-10	145	5.80%
AL_EC >10-12	234	9.37%
AL_EC >12-16	205	8.20%
AL_EC >16-21	231	9.25%
AL_EC >21-34	21.8	0.87%
AR_EC >8-10	113.52	4.54%
AR_EC >10-12	426.2	17.06%
AR_EC >12-16	776	31.06%
AR_EC >16-21	185	7.40%
AR_EC >21-34	19.3	0.77%
Benzene	0.334	0.01%
Toluene	0.779	0.03%
Ethylbenzene	1.88	0.08%
Total Xylenes	2.6	0.10%
Naphthalene	11.8	0.47%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	1	0.04%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0	0.00%
Benzo(b)fluoranthene	0	0.00%
Benzo(k)fluoranthene	0	0.00%
Benzo(a)pyrene	0	0.00%
Chrysene	0	0.00%
Dibenz(a,h)anthracene	0	0.00%
Indeno(1,2,3-cd)pyrene	0	0.00%
Sum	2498.633	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: 800 ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for benzene, toluene.

The following constituents have never been detected within this area; therefore, zero was entered: EDB, EDC, cPAHs.

No lab data for 1- and 2-Methylnaphthalenes available.

Laboratory values were used for porosity and fraction organic carbon from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average TOC was used.

Default values were used for volumetric water content and soil bulk density.

The default value of 1 was used for the dilution factor to be conservative.

A2 Soil Cleanup Levels: Calculation and Summary of Results. **Refer to WAC 173-340-720, 740, 745, 747, 750**

Site Information

Date: 9/5/2020
Site Name: POL-TPH
Sample Name: OIP-67-14.5-15
Measured Soil TPH Concentration, mg/kg: **2,498.633**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,470	1.84E-08	1.01E+00	Fail
	Method C	36,388	2.46E-09	6.87E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protectior	62	1.33E-04	2.65E+01	Fail
	Target TPH GW Conc. @ 800 ug/L	165	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,470.15**	**36,387.93**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.47E+03	1.82E-08	1.00E+00	YES	3.64E+04	3.59E-08	1.00E+00
Total Risk=1E-5	*NO*	1.36E+06	1.00E-05	5.50E+02	*NO*	1.01E+07	1.00E-05	2.79E+02
Risk of Benzene= 1E-6	*NO*	1.36E+05	1.00E-06	5.50E+01	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**298.33**
Protective Soil Concentration, mg/kg	**61.59**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.98E+02	3.78E-06	1.00E+00	6.16E+01
Total Risk = 1E-5	*NO*	7.89E+02	1.00E-05	2.64E+00	1.63E+02
Total Risk = 1E-6	YES	7.86E+01	1.00E-06	2.64E-01	1.63E+01
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	*NO*	4.96E+02	6.29E-06	1.66E+00	1.02E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 800 ug/L	8.00E+02	1.01E-05	2.68E+00	**1.65E+02**

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix B
MTCA Method B and C Calculation Workbooks

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: GP-18-27-28

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	1.18	0.03%
AL_EC >6-8	1.305	0.04%
AL_EC >8-10	7.71	0.22%
AL_EC >10-12	74.9	2.13%
AL_EC >12-16	365	10.39%
AL_EC >16-21	388	11.04%
AL_EC >21-34	374	10.64%
AR_EC >8-10	8.025	0.23%
AR_EC >10-12	27.475	0.78%
AR_EC >12-16	316.975	9.02%
AR_EC >16-21	1020	29.03%
AR_EC >21-34	915.39	26.05%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0.025	0.00%
1-Methyl Naphthalene	10	0.28%
2-Methyl Naphthalene	0.025	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.86	0.02%
Benzo(b)fluoranthene	0.25	0.01%
Benzo(k)fluoranthene	0.25	0.01%
Benzo(a)pyrene	0.25	0.01%
Chrysene	1.5	0.04%
Dibenz(a,h)anthracene	0.25	0.01%
Indeno(1,2,3-cd)pyrene	0.25	0.01%
Sum	3513.86	100.00%

Notes for Data Entry | **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, benzene, toluene, ethylbenzene, total xylenes, naphthalene, and 2-methyl napththalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ______ ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: GP-18-27-28
Measured Soil TPH Concentration, mg/kg: **3,513.860**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,091	9.80E-07	1.68E+00	Fail
	Method C	29,420	2.43E-07	1.19E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	521	4.20E-05	2.21E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,091.02**	**29,419.65**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.09E+03	5.83E-07	1.00E+00	YES	2.94E+04	2.04E-06	1.00E+00
Total Risk=1E-5	*NO*	3.59E+04	1.00E-05	1.71E+01	*NO*	1.44E+05	1.00E-05	4.91E+00
Risk of Benzene= 1E-6	*NO*	4.25E+06	1.19E-03	2.03E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	5.90E+03	1.64E-06	2.82E+00				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**Total Risk = 1E-5**
Protective Ground Water Concentration, ug/L	**413.31**
Protective Soil Concentration, mg/kg	**521.41**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	*NO*	4.46E+02	1.11E-05	1.00E+00	5.85E+02
Total Risk = 1E-5	YES	4.13E+02	1.00E-05	9.38E-01	5.21E+02
Total Risk = 1E-6	YES	5.37E+01	1.00E-06	1.34E-01	4.88E+01
Risk of cPAHs mixture= 1E-5	*NO*	1.65E+03	9.43E-05	3.97E+00	100% NAPL
Benzene MCL = 5 ug/L	*NO*	1.10E+03	4.54E-05	2.32E+00	4.07E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 110000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Calculation Summary

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: GP-27-14-14.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis	Composition Ratio
	mg/kg	%
Petroleum EC Fraction		
AL_EC >5-6	1.01	0.01%
AL_EC >6-8	1.135	0.02%
AL_EC >8-10	9.41	0.14%
AL_EC >10-12	154	2.24%
AL_EC >12-16	949	13.80%
AL_EC >16-21	1080	15.71%
AL_EC >21-34	879	12.78%
AR_EC >8-10	10.525	0.15%
AR_EC >10-12	48.45	0.70%
AR_EC >12-16	560.8	8.16%
AR_EC >16-21	1900	27.63%
AR_EC >21-34	1252.94	18.22%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0.05	0.00%
1-Methyl Naphthalene	15	0.22%
2-Methyl Naphthalene	7.2	0.10%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	2	0.03%
Benzo(b)fluoranthene	0.35	0.01%
Benzo(k)fluoranthene	0.05	0.00%
Benzo(a)pyrene	0.65	0.01%
Chrysene	3.8	0.06%
Dibenz(a,h)anthracene	0.16	0.00%
Indeno(1,2,3-cd)pyrene	0.05	0.00%
Sum	6875.82	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.5125	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.2125	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ________ ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, Benzene, Toluene, Ethylbenzene, Total Xylenes, Naphthalene, n-Hexane, and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. In this particular sample 0.25 feet of silty sand followed by 0.25 feet of silt was logged; therefore an average site-specific porosity for sand and silt (0.5125; average of 0.466 for sand and 0.559 for silt) was used for the input. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: GP-27-14-14.5
Measured Soil TPH Concentration, mg/kg: **6,875.820**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc RISK @	With Measured Soil Conc HI @	Does Measured Soil Conc Pass or Fail?
Protection of Soil Direct Contact: Human Health	Method B	2,058	1.83E-06	3.34E+00	Fail
	Method C	30,226	4.54E-07	2.27E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	499	4.22E-05	3.21E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,057.73**	**30,225.63**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.06E+03	5.48E-07	1.00E+00	YES	3.02E+04	2.00E-06	1.00E+00
Total Risk=1E-5	*NO*	3.76E+04	1.00E-05	1.83E+01	*NO*	1.51E+05	1.00E-05	5.01E+00
Risk of Benzene= 1E-6	*NO*	8.32E+06	2.22E-03	4.05E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	5.48E+03	1.46E-06	2.66E+00				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**369.02**
Protective Soil Concentration, mg/kg	**498.57**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.69E+02	7.14E-06	1.00E+00	4.99E+02
Total Risk = 1E-5	*NO*	4.67E+02	1.00E-05	1.24E+00	7.28E+02
Total Risk = 1E-6	YES	6.52E+01	1.00E-06	1.86E-01	6.58E+01
Risk of cPAHs mixture= 1E-5	*NO*	1.46E+03	6.79E-05	4.55E+00	100% NAPL
Benzene MCL = 5 ug/L	*NO*	1.24E+03	4.97E-05	3.62E+00	1.13E+04
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 135000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/09/22
Site Name: POL-TPH
Sample Name: GP-36-13-14

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	13.15	0.25%
AL_EC >6-8	44.45	0.86%
AL_EC >8-10	167	3.22%
AL_EC >10-12	352	6.80%
AL_EC >12-16	1240	23.94%
AL_EC >16-21	1180	22.79%
AL_EC >21-34	246	4.75%
AR_EC >8-10	47.3	0.91%
AR_EC >10-12	115.9	2.24%
AR_EC >12-16	608	11.74%
AR_EC >16-21	969	18.71%
AR_EC >21-34	169.786	3.28%
Benzene	0.25	0.00%
Toluene	0.27	0.01%
Ethylbenzene	4.7	0.09%
Total Xylenes	1.5	0.03%
Naphthalene	1.1	0.02%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	18	0.35%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.064	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	5178.62	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

REMARK:
Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, AR_EC>8-10, and some cPAHs

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for 1- and 2-Methylnapthalenes avaliable.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/9/2022
Site Name: POL-TPH
Sample Name: GP-36-13-14
Measured Soil TPH Concentration, mg/kg: **5,178.620**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,639	6.42E-08	3.16E+00	Fail
	Method C	28,361	1.44E-08	1.83E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	247	8.36E-05	7.26E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,639.49**	**28,360.59**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.64E+03	2.03E-08	1.00E+00	YES	2.84E+04	7.86E-08	1.00E+00
Total Risk=1E-5	*NO*	8.07E+05	1.00E-05	4.92E+02	*NO*	3.61E+06	1.00E-05	1.27E+02
Risk of Benzene= 1E-6	*NO*	3.76E+05	4.66E-06	2.29E+02	NA			
Risk of cPAHs mixture= 1E-6	*NO*	1.03E+05	1.27E-06	6.27E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**384.71**
Protective Soil Concentration, mg/kg	**246.94**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.85E+02	5.51E-06	1.00E+00	2.47E+02
Total Risk = 1E-5	*NO*	6.47E+02	1.00E-05	1.65E+00	4.52E+02
Total Risk = 1E-6	YES	7.13E+01	1.00E-06	1.86E-01	4.47E+01
Risk of cPAHs mixture= 1E-5	*NO*	3.70E+03	2.37E-04	1.37E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	4.35E+02	6.29E-06	1.13E+00	2.82E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 95000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/09/22
Site Name: POL-TPH
Sample Name: GP-36-16-17

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	30.6	0.29%
AL_EC >6-8	403	3.77%
AL_EC >8-10	443	4.14%
AL_EC >10-12	824	7.70%
AL_EC >12-16	2360	22.06%
AL_EC >16-21	2340	21.87%
AL_EC >21-34	518	4.84%
AR_EC >8-10	178.8	1.67%
AR_EC >10-12	560	5.23%
AR_EC >12-16	817	7.64%
AR_EC >16-21	1780	16.64%
AR_EC >21-34	399.674	3.74%
Benzene	0.61	0.01%
Toluene	0.47	0.00%
Ethylbenzene	7.6	0.07%
Total Xylenes	2.6	0.02%
Naphthalene	2	0.02%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	32	0.30%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.091	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.11	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	10699.68	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

REMARK:
Half reporting limits were used for some cPAHs

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for 1- and 2-Methylnapthalenes avaliable.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/9/2022
Site Name: POL-TPH
Sample Name: GP-36-16-17
Measured Soil TPH Concentration, mg/kg: **10,699.680**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc RISK @	With Measured Soil Conc HI @	Does Measured Soil Conc Pass or Fail?
Protection of Soil Direct Contact: Human Health	Method B	1,618	9.33E-08	6.61E+00	Fail
	Method C	28,339	1.93E-08	3.78E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	164	1.51E-04	1.57E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	**Method C: Industrial Land Use**
Protective Soil Concentration, TPH mg/kg	**1,617.76**	**28,338.82**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	**Protective Soil Concentration @Method B**				**Protective Soil Concentration @Method C**			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.62E+03	1.41E-08	1.00E+00	YES	2.83E+04	5.12E-08	1.00E+00
Total Risk=1E-5	*NO*	1.15E+06	1.00E-05	7.09E+02	*NO*	5.54E+06	1.00E-05	1.95E+02
Risk of Benzene= 1E-6	*NO*	3.19E+05	2.78E-06	1.97E+02	NA			
Risk of cPAHs mixture= 1E-6	*NO*	1.79E+05	1.56E-06	1.11E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**316.93**
Protective Soil Concentration, mg/kg	**164.13**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.17E+02	4.33E-06	1.00E+00	1.64E+02
Total Risk = 1E-5	*NO*	6.99E+02	1.00E-05	2.20E+00	3.81E+02
Total Risk = 1E-6	YES	7.32E+01	1.00E-06	2.31E-01	3.79E+01
Risk of cPAHs mixture= 1E-5	*NO*	5.28E+03	2.69E-04	2.15E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	4.56E+02	6.29E-06	1.44E+00	2.38E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 93000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/10/22
Site Name: POL-TPH
Sample Name: MW-33-12-12.5

Notes for Data Entry | **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	7.575	0.06%
AL_EC >6-8	12.4	0.09%
AL_EC >8-10	109	0.80%
AL_EC >10-12	686	5.04%
AL_EC >12-16	3280	24.08%
AL_EC >16-21	2970	21.80%
AL_EC >21-34	721	5.29%
AR_EC >8-10	52.525	0.39%
AR_EC >10-12	758	5.56%
AR_EC >12-16	2160	15.86%
AR_EC >16-21	2380	17.47%
AR_EC >21-34	485.75	3.57%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.1	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	13622.74	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:	500	ug/L

REMARK:
Half reporting limits were used for benzene, toluene, ethylbenzene, total xylenes, n-hexane, and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene avaliable.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/10/2022
Site Name: POL-TPH
Sample Name: MW-33-12-12.5
Measured Soil TPH Concentration, mg/kg: **13,622.740**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,752	5.17E-08	7.78E+00	Fail
	Method C	30,191	1.27E-08	4.51E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	202	3.34E-06	1.19E+01	Fail
	Target TPH GW Conc. @ 500 ug/L	304	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	**Method C: Industrial Land Use**
Protective Soil Concentration, TPH mg/kg	**1,751.81**	**30,190.83**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	**Protective Soil Concentration @Method B**				**Protective Soil Concentration @Method C**			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.75E+03	6.65E-09	1.00E+00	YES	3.02E+04	2.82E-08	1.00E+00
Total Risk=1E-5	*NO*	2.64E+06	1.00E-05	1.50E+03	*NO*	1.07E+07	1.00E-05	3.54E+02
Risk of Benzene= 1E-6	*NO*	1.65E+07	6.26E-05	9.42E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	2.68E+05	1.02E-06	1.53E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**340.00**
Protective Soil Concentration, mg/kg	**201.75**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.40E+02	1.03E-07	1.00E+00	2.02E+02
Total Risk = 1E-5	*NO*	3.77E+03	5.44E-06	1.41E+01	100% NAPL
Total Risk = 1E-6	*NO*	1.94E+03	1.00E-06	6.23E+00	2.23E+03
Risk of cPAHs mixture= 1E-5	*NO*	3.77E+03	5.44E-06	1.41E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	3.77E+03	5.44E-06	1.41E+01	100% NAPL
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 96000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	5.00E+02	1.55E-07	1.47E+00	**3.04E+02**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: MW-39-13-14

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis	Composition Ratio
	mg/kg	%
Petroleum EC Fraction		
AL_EC >5-6	7.575	0.04%
AL_EC >6-8	33.1	0.19%
AL_EC >8-10	199	1.13%
AL_EC >10-12	888	5.05%
AL_EC >12-16	4300	24.44%
AL_EC >16-21	4570	25.98%
AL_EC >21-34	629	3.58%
AR_EC >8-10	62.825	0.36%
AR_EC >10-12	522	2.97%
AR_EC >12-16	2680	15.24%
AR_EC >16-21	3290	18.70%
AR_EC >21-34	408.779	2.32%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.071	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	17590.74	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for Benzene, Toluene, Ethylbenzene, Total Xylenes, n-Hexane, and some cPAHs.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: MW-39-13-14
Measured Soil TPH Concentration, mg/kg: **17,590.740**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,771	5.13E-08	9.93E+00	Fail
	Method C	30,439	1.26E-08	5.78E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	296	2.89E-06	7.23E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,771.42**	**30,439.15**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.77E+03	5.17E-09	1.00E+00	YES	3.04E+04	2.19E-08	1.00E+00
Total Risk=1E-5	*NO*	3.43E+06	1.00E-05	1.94E+03	*NO*	1.39E+07	1.00E-05	4.57E+02
Risk of Benzene= 1E-6	*NO*	2.13E+07	6.21E-05	1.20E+04	NA			
Risk of cPAHs mixture= 1E-6	*NO*	3.48E+05	1.02E-06	1.97E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**412.00**
Protective Soil Concentration, mg/kg	**296.02**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	4.12E+02	1.17E-07	1.00E+00	2.96E+02
Total Risk = 1E-5	*NO*	2.78E+03	4.26E-06	8.22E+00	100% NAPL
Total Risk = 1E-6	*NO*	1.71E+03	1.00E-06	4.37E+00	3.05E+03
Risk of cPAHs mixture= 1E-5	*NO*	2.78E+03	4.26E-06	8.22E+00	100% NAPL
Benzene MCL = 5 ug/L	*NO*	2.78E+03	4.26E-06	8.22E+00	100% NAPL
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 96000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/10/22
Site Name: POL-TPH
Sample Name: OIP-08-19-20

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0	0.00%
AL_EC >6-8	269	1.74%
AL_EC >8-10	820	5.29%
AL_EC >10-12	1070	6.90%
AL_EC >12-16	3280	21.16%
AL_EC >16-21	2820	18.19%
AL_EC >21-34	870	5.61%
AR_EC >8-10	394.8	2.55%
AR_EC >10-12	1360	8.77%
AR_EC >12-16	2121	13.68%
AR_EC >16-21	1990	12.84%
AR_EC >21-34	392.658	2.53%
Benzene	1.1	0.01%
Toluene	0.74	0.00%
Ethylbenzene	27	0.17%
Total Xylenes	3.2	0.02%
Naphthalene	0	0.00%
1-Methyl Naphthalene	32	0.21%
2-Methyl Naphthalene	27	0.17%
n-Hexane	23	0.15%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.057	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.16	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	15501.84	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:	500	ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for AL_EC >5-6 and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for napthalene was avaliable.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation, a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/10/2022
Site Name: POL-TPH
Sample Name: OIP-08-19-20
Measured Soil TPH Concentration, mg/kg: **15,501.840**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,621	1.34E-06	9.57E+00	Fail
	Method C	28,930	3.26E-07	5.36E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	108	2.60E-04	2.75E+01	Fail
	Target TPH GW Conc. @ 500 ug/L	192	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,620.60**	**28,930.44**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.62E+03	1.40E-07	1.00E+00	YES	2.89E+04	6.09E-07	1.00E+00
Total Risk=1E-5	*NO*	1.15E+05	1.00E-05	7.12E+01	*NO*	4.75E+05	1.00E-05	1.64E+01
Risk of Benzene= 1E-6	*NO*	2.56E+05	2.22E-05	1.58E+02	NA			
Risk of cPAHs mixture= 1E-6	*NO*	2.77E+05	2.40E-05	1.71E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**282.38**
Protective Soil Concentration, mg/kg	**108.17**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.82E+02	5.00E-06	1.00E+00	1.08E+02
Total Risk = 1E-5	*NO*	5.61E+02	1.00E-05	1.99E+00	2.17E+02
Total Risk = 1E-6	YES	5.63E+01	1.00E-06	1.99E-01	2.16E+01
Risk of cPAHs mixture= 1E-5	*NO*	7.58E+03	3.72E-04	3.32E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	4.97E+02	8.84E-06	1.76E+00	1.91E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 94000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	5.00E+02	8.89E-06	1.77E+00	**1.92E+02**

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Calculation Summary

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-15-15-16

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0.425	0.01%
AL_EC >6-8	0.785	0.02%
AL_EC >8-10	11.3	0.29%
AL_EC >10-12	154	3.98%
AL_EC >12-16	1060	27.38%
AL_EC >16-21	1090	28.15%
AL_EC >21-34	313	8.08%
AR_EC >8-10	5.575	0.14%
AR_EC >10-12	30.7	0.79%
AR_EC >12-16	203	5.24%
AR_EC >16-21	736	19.01%
AR_EC >21-34	266.825	6.89%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.025	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	3872.025	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:	500	ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, AL_EC >8-10, AR_EC >8-10, Benzene, Toluene, Ethylbenzene, Total Xylenes, n-Hexane, and cPAHs.

No lab data for 1- and 2-Methylnaphthalenes and naphthalene available.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-15-15-16
Measured Soil TPH Concentration, mg/kg: **3,872.025**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,716	5.07E-08	2.26E+00	Fail
	Method C	29,091	1.25E-08	1.33E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	961	5.50E-06	1.86E+00	Fail
	Target TPH GW Conc. @ 500 ug/L	1,669	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,716.11**	**29,090.91**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.72E+03	2.25E-08	1.00E+00	YES	2.91E+04	9.39E-08	1.00E+00
Total Risk=1E-5	*NO*	7.64E+05	1.00E-05	4.45E+02	*NO*	3.10E+06	1.00E-05	1.07E+02
Risk of Benzene= 1E-6	*NO*	4.69E+06	6.14E-05	2.73E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	7.76E+04	1.02E-06	4.52E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**382.04**
Protective Soil Concentration, mg/kg	**961.28**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.82E+02	1.65E-06	1.00E+00	9.61E+02
Total Risk = 1E-5	*NO*	8.64E+02	1.00E-05	2.46E+00	9.31E+03
Total Risk = 1E-6	YES	2.84E+02	1.00E-06	7.67E-01	5.69E+02
Risk of cPAHs mixture= 1E-5	*NO*	1.07E+03	2.10E-05	3.35E+00	100% NAPL
Benzene MCL = 5 ug/L	*NO*	7.29E+02	6.29E-06	1.98E+00	4.62E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 95000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	5.00E+02	2.72E-06	1.30E+00	**1.67E+03**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-20-11-11.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0.72	0.08%
AL_EC >6-8	25.8	2.84%
AL_EC >8-10	71.3	7.86%
AL_EC >10-12	119	13.12%
AL_EC >12-16	31.8	3.51%
AL_EC >16-21	7.05	0.78%
AL_EC >21-34	7.05	0.78%
AR_EC >8-10	50.58	5.58%
AR_EC >10-12	263.5	29.06%
AR_EC >12-16	279	30.76%
AR_EC >16-21	20.1	2.22%
AR_EC >21-34	20.065	2.21%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.11	0.01%
Total Xylenes	0.11	0.01%
Naphthalene	10.5	1.16%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.01%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.005	0.00%
Benzo(b)fluoranthene	0.005	0.00%
Benzo(k)fluoranthene	0.005	0.00%
Benzo(a)pyrene	0.005	0.00%
Chrysene	0.005	0.00%
Dibenz(a,h)anthracene	0.005	0.00%
Indeno(1,2,3-cd)pyrene	0.005	0.00%
Sum	906.885	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for AL_EC >5-6, AL_EC >16-21, AR_EC >21-34, Benzene, Toluene, n-Hexane, and some cPAHs.

No lab data for 1-Methyl Naphthalene and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-20-11-11.5
Measured Soil TPH Concentration, mg/kg: **906.885**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,724	1.08E-08	5.26E-01	Pass
	Method C	32,455	2.59E-09	2.79E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	45	6.84E-06	1.92E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,724.48**	**32,454.52**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.72E+03	2.05E-08	1.00E+00	YES	3.25E+04	9.26E-08	1.00E+00
Total Risk=1E-5	*NO*	8.40E+05	1.00E-05	4.87E+02	*NO*	3.50E+06	1.00E-05	1.08E+02
Risk of Benzene= 1E-6	*NO*	1.10E+06	1.31E-05	6.37E+02	NA			
Risk of cPAHs mixture= 1E-6	*NO*	9.09E+04	1.08E-06	5.27E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**263.21**
Protective Soil Concentration, mg/kg	**44.98**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.63E+02	3.44E-07	1.00E+00	4.50E+01
Total Risk = 1E-5	*NO*	6.71E+03	1.00E-05	2.61E+01	1.37E+03
Total Risk = 1E-6	*NO*	7.66E+02	1.00E-06	2.91E+00	1.31E+02
Risk of cPAHs mixture= 1E-5	*NO*	1.47E+04	6.37E-05	6.00E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	4.65E+03	6.29E-06	1.78E+01	8.31E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 152000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-23-14-15

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	8.325	0.07%
AL_EC >6-8	12.05	0.10%
AL_EC >8-10	137	1.17%
AL_EC >10-12	629	5.39%
AL_EC >12-16	2910	24.93%
AL_EC >16-21	3110	26.65%
AL_EC >21-34	467	4.00%
AR_EC >8-10	34.325	0.29%
AR_EC >10-12	436.1	3.74%
AR_EC >12-16	909	7.79%
AR_EC >16-21	2660	22.79%
AR_EC >21-34	320.792	2.75%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	36.9	0.32%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.058	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	11670.94	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

Notes for Data Entry
Set Default Hydrogeology
Clear All Soil Concentration Data Entry Cells
Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for Benzene, Toluene, Ethylbenzene, Total Xylenes, n-Hexane, and some cPAHs.

No lab data for 1-Methyl Naphthalene and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-23-14-15
Measured Soil TPH Concentration, mg/kg: **11,670.940**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc RISK @	With Measured Soil Conc HI @	Does Measured Soil Conc Pass or Fail?
Protection of Soil Direct Contact: Human Health	Method B	1,645	5.11E-08	7.09E+00	Fail
	Method C	27,861	1.26E-08	4.19E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	223	3.66E-06	9.06E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,644.97**	**27,860.63**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.64E+03	7.21E-09	1.00E+00	YES	2.79E+04	3.01E-08	1.00E+00
Total Risk=1E-5	*NO*	2.28E+06	1.00E-05	1.39E+03	*NO*	9.26E+06	1.00E-05	3.32E+02
Risk of Benzene= 1E-6	*NO*	1.41E+07	6.19E-05	8.59E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	2.32E+05	1.02E-06	1.41E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**277.51**
Protective Soil Concentration, mg/kg	**222.55**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.78E+02	1.33E-07	1.00E+00	2.23E+02
Total Risk = 1E-5	*NO*	2.68E+03	6.53E-06	1.11E+01	100% NAPL
Total Risk = 1E-6	*NO*	1.21E+03	1.00E-06	4.53E+00	1.87E+03
Risk of cPAHs mixture= 1E-5	*NO*	2.68E+03	6.53E-06	1.11E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	2.65E+03	6.29E-06	1.09E+01	7.01E+04
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 96000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/09/22
Site Name: POL-TPH
Sample Name: OIP-23-19-20

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	7.48	0.02%
AL_EC >6-8	39.4	0.09%
AL_EC >8-10	623	1.42%
AL_EC >10-12	2820	6.41%
AL_EC >12-16	12100	27.52%
AL_EC >16-21	11300	25.70%
AL_EC >21-34	1560	3.55%
AR_EC >8-10	109.894	0.25%
AR_EC >10-12	1020	2.32%
AR_EC >12-16	3970	9.03%
AR_EC >16-21	9510	21.63%
AR_EC >21-34	912.485	2.08%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.081	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.42	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.16	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.23	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	43973.34	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ________ ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for AL_EC >5-6, benzene, toluene, ethylbenzene, and some cPAHs.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/9/2022
Site Name: POL-TPH
Sample Name: OIP-23-19-20
Measured Soil TPH Concentration, mg/kg: **43,973.340**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,567	7.13E-08	2.81E+01	Fail
	Method C	26,993	1.76E-08	1.63E+00	Fail
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	335	1.53E-06	6.38E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,567.36**	**26,992.69**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.57E+03	2.54E-09	1.00E+00	YES	2.70E+04	1.08E-08	1.00E+00
Total Risk=1E-5	*NO*	6.17E+06	1.00E-05	3.94E+03	*NO*	2.50E+07	1.00E-05	9.26E+02
Risk of Benzene= 1E-6	*NO*	5.32E+07	8.63E-05	3.40E+04	NA			
Risk of cPAHs mixture= 1E-6	*NO*	6.24E+05	1.01E-06	3.98E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**338.27**
Protective Soil Concentration, mg/kg	**334.53**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.38E+02	5.27E-08	1.00E+00	3.35E+02
Total Risk = 1E-5	*NO*	1.98E+03	1.73E-06	6.61E+00	100% NAPL
Total Risk = 1E-6	*NO*	1.69E+03	1.00E-06	5.49E+00	1.25E+04
Risk of cPAHs mixture= 1E-5	*NO*	1.98E+03	1.73E-06	6.61E+00	100% NAPL
Benzene MCL = 5 ug/L	*NO*	1.98E+03	1.73E-06	6.61E+00	100% NAPL
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 95000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-23-23-24

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis	Composition Ratio
	mg/kg	%
Petroleum EC Fraction		
AL_EC >5-6	13.275	0.17%
AL_EC >6-8	19.15	0.25%
AL_EC >8-10	69.6	0.90%
AL_EC >10-12	300	3.87%
AL_EC >12-16	1600	20.67%
AL_EC >16-21	1770	22.86%
AL_EC >21-34	261	3.37%
AR_EC >8-10	22.925	0.30%
AR_EC >10-12	323	4.17%
AR_EC >12-16	1680	21.70%
AR_EC >16-21	1520	19.63%
AR_EC >21-34	162.825	2.10%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.025	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	7742.19	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, AL_EC >8- 10, benzene, toluene, ethylbenzene, total xylenes, n-hexane, and cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for 1- and 2-Methylnaphthalenes and naphthalenes available.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-23-23-24
Measured Soil TPH Concentration, mg/kg: **7,742.190**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,963	5.07E-08	3.94E+00	Fail
	Method C	33,031	1.25E-08	2.34E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	232	4.35E-06	8.17E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,963.47**	**33,031.50**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.96E+03	1.29E-08	1.00E+00	YES	3.30E+04	5.33E-08	1.00E+00
Total Risk=1E-5	*NO*	1.53E+06	1.00E-05	7.78E+02	*NO*	6.20E+06	1.00E-05	1.88E+02
Risk of Benzene= 1E-6	*NO*	9.37E+06	6.14E-05	4.77E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	1.55E+05	1.02E-06	7.91E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**440.94**
Protective Soil Concentration, mg/kg	**232.19**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	4.41E+02	2.08E-07	1.00E+00	2.32E+02
Total Risk = 1E-5	*NO*	3.66E+03	9.41E-06	1.08E+01	100% NAPL
Total Risk = 1E-6	*NO*	1.53E+03	1.00E-06	3.46E+00	1.18E+03
Risk of cPAHs mixture= 1E-5	*NO*	3.66E+03	9.41E-06	1.08E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	3.34E+03	6.29E-06	9.49E+00	1.63E+04
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 98000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Calculation Summary

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-30-20-21

Notes for Data Entry **Set Default Hydrogeology**
Clear All Soil Concentration Data Entry Cells
Restore All Soil Concentration Data cleared previously

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0.655	0.01%
AL_EC >6-8	6.23	0.06%
AL_EC >8-10	32.8	0.34%
AL_EC >10-12	154	1.58%
AL_EC >12-16	1250	12.80%
AL_EC >16-21	1680	17.21%
AL_EC >21-34	1960	20.08%
AR_EC >8-10	18.212	0.19%
AR_EC >10-12	48.07	0.49%
AR_EC >12-16	527	5.40%
AR_EC >16-21	1730	17.72%
AR_EC >21-34	2317.16	23.73%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.063	0.00%
Naphthalene	8.03	0.08%
1-Methyl Naphthalene	13	0.13%
2-Methyl Naphthalene	15	0.15%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.05	0.00%
Benzo(b)fluoranthene	0.24	0.00%
Benzo(k)fluoranthene	0.05	0.00%
Benzo(a)pyrene	0.4	0.00%
Chrysene	2	0.02%
Dibenz(a,h)anthracene	0.05	0.00%
Indeno(1,2,3-cd)pyrene	0.05	0.00%
Sum	9763.25	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ______ ug/L

REMARK:
Half reporting limits were used for AL_EC >5-6, Benzene, Toluene, Ethylbenzene, Total Xylenes, n-Hexane, and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-30-20-21
Measured Soil TPH Concentration, mg/kg: **9,763.250**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,331	1.11E-06	4.19E+00	Fail
	Method C	34,457	2.76E-07	2.83E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	650	3.09E-05	3.58E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,330.68**	**34,456.93**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.33E+03	2.65E-07	1.00E+00	YES	3.45E+04	9.74E-07	1.00E+00
Total Risk=1E-5	*NO*	8.78E+04	1.00E-05	3.77E+01	*NO*	3.54E+05	1.00E-05	1.03E+01
Risk of Benzene= 1E-6	*NO*	1.18E+07	1.35E-03	5.07E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	1.59E+04	1.81E-06	6.83E+00				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**310.55**
Protective Soil Concentration, mg/kg	**650.19**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.11E+02	5.57E-06	1.00E+00	6.50E+02
Total Risk = 1E-5	*NO*	4.69E+02	1.00E-05	1.53E+00	1.31E+03
Total Risk = 1E-6	YES	7.32E+01	1.00E-06	2.37E-01	1.07E+02
Risk of cPAHs mixture= 1E-5	*NO*	1.23E+03	4.59E-05	4.79E+00	100% NAPL
Benzene MCL = 5 ug/L	*NO*	1.11E+03	3.82E-05	4.20E+00	2.26E+04
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 161000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-47-17-17.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	238	1.41%
AL_EC >6-8	597	3.53%
AL_EC >8-10	915	5.41%
AL_EC >10-12	1330	7.86%
AL_EC >12-16	4090	24.17%
AL_EC >16-21	3540	20.92%
AL_EC >21-34	992	5.86%
AR_EC >8-10	152.2	0.90%
AR_EC >10-12	512.8	3.03%
AR_EC >12-16	1245	7.36%
AR_EC >16-21	2620	15.49%
AR_EC >21-34	502.345	2.97%
Benzene	2.4	0.01%
Toluene	0.99	0.01%
Ethylbenzene	42.7	0.25%
Total Xylenes	4.1	0.02%
Naphthalene	23.2	0.14%
1-Methyl Naphthalene	38	0.22%
2-Methyl Naphthalene	27	0.16%
n-Hexane	45	0.27%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.13	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.4	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	16918.39	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ______ ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half detection limits were used for Toluene, Xylenes, and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-47-17-17.5
Measured Soil TPH Concentration, mg/kg: **16,918.390**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,543	1.66E-06	1.10E+01	Fail
	Method C	27,274	3.96E-07	6.20E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	96	5.01E-04	2.18E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,542.67**	**27,274.41**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.54E+03	1.51E-07	1.00E+00	YES	2.73E+04	6.39E-07	1.00E+00
Total Risk=1E-5	*NO*	1.02E+05	1.00E-05	6.62E+01	*NO*	4.27E+05	1.00E-05	1.57E+01
Risk of Benzene= 1E-6	*NO*	1.28E+05	1.25E-05	8.30E+01	NA			
Risk of cPAHs mixture= 1E-6	*NO*	2.46E+05	2.41E-05	1.60E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**Benzene MCL = 5 ug/L**
Protective Ground Water Concentration, ug/L	**208.82**
Protective Soil Concentration, mg/kg	**95.67**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	*NO*	3.31E+02	1.22E-05	1.00E+00	1.52E+02
Total Risk = 1E-5	*NO*	2.72E+02	1.00E-05	8.21E-01	1.25E+02
Total Risk = 1E-6	YES	2.71E+01	1.00E-06	8.18E-02	1.25E+01
Risk of cPAHs mixture= 1E-5	*NO*	5.65E+03	7.15E-04	2.83E+01	100% NAPL
Benzene MCL = 5 ug/L	YES	2.09E+02	7.68E-06	6.31E-01	9.57E+01
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 92000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Calculation Summary

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-47-11-12

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	263.4	5.81%
AL_EC >6-8	827	18.25%
AL_EC >8-10	332	7.33%
AL_EC >10-12	465	10.26%
AL_EC >12-16	6.65	0.15%
AL_EC >16-21	6.65	0.15%
AL_EC >21-34	6.65	0.15%
AR_EC >8-10	297.8	6.57%
AR_EC >10-12	1009	22.27%
AR_EC >12-16	1230	27.14%
AR_EC >16-21	6.65	0.15%
AR_EC >21-34	6.615	0.15%
Benzene	0.015	0.00%
Toluene	0.12	0.00%
Ethylbenzene	27	0.60%
Total Xylenes	2.2	0.05%
Naphthalene	41	0.90%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	3.6	0.08%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.005	0.00%
Benzo(b)fluoranthene	0.005	0.00%
Benzo(k)fluoranthene	0.005	0.00%
Benzo(a)pyrene	0.005	0.00%
Chrysene	0.005	0.00%
Dibenz(a,h)anthracene	0.005	0.00%
Indeno(1,2,3-cd)pyrene	0.005	0.00%
Sum	4531.385	100.00%

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for benzene and some cPAHs

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-47-11-12
Measured Soil TPH Concentration, mg/kg: **4,531.385**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,384	1.08E-08	1.90E+00	Fail
	Method C	45,763	2.59E-09	9.90E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	Use A2.2	4.91E-06	3.46E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,384.42**	**45,763.08**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.38E+03	5.68E-09	1.00E+00	YES	4.58E+04	2.61E-08	1.00E+00
Total Risk=1E-5	*NO*	4.19E+06	1.00E-05	1.76E+03	*NO*	1.75E+07	1.00E-05	3.83E+02
Risk of Benzene= 1E-6	*NO*	5.49E+06	1.31E-05	2.30E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	4.54E+05	1.08E-06	1.90E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**451.98**
Protective Soil Concentration, mg/kg	**56.09**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	4.52E+02	8.54E-08	1.00E+00	5.61E+01
Total Risk = 1E-5	*NO*	1.68E+04	1.00E-05	4.21E+01	3.61E+04
Total Risk = 1E-6	*NO*	5.43E+03	1.00E-06	1.20E+01	6.52E+02
Risk of cPAHs mixture= 1E-5	*NO*	1.70E+04	1.10E-05	4.29E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	1.51E+04	6.29E-06	3.75E+01	7.21E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 91000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-66-12-12.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0	0.00%
AL_EC >6-8	36.2	2.15%
AL_EC >8-10	243	14.41%
AL_EC >10-12	198	11.74%
AL_EC >12-16	266	15.78%
AL_EC >16-21	199	11.80%
AL_EC >21-34	44.5	2.64%
AR_EC >8-10	56.93	3.38%
AR_EC >10-12	199.975	11.86%
AR_EC >12-16	168.4	9.99%
AR_EC >16-21	176	10.44%
AR_EC >21-34	92.825	5.51%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.12	0.01%
Total Xylenes	0.05	0.00%
Naphthalene	0.025	0.00%
1-Methyl Naphthalene	1.7	0.10%
2-Methyl Naphthalene	1.9	0.11%
n-Hexane	1.1	0.07%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.025	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	1685.94	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for benzene, toluene, ethylbenzene, total xylenes, and cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date:	10/11/2022
Site Name:	POL-TPH
Sample Name:	OIP-66-12-12.5
Measured Soil TPH Concentration, mg/kg:	**1,685.940**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,334	1.16E-07	1.26E+00	Fail
	Method C	24,278	2.87E-08	6.94E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	92	1.46E-05	1.24E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,333.67**	**24,277.57**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.33E+03	9.16E-08	1.00E+00	YES	2.43E+04	4.13E-07	1.00E+00
Total Risk=1E-5	*NO*	1.46E+05	1.00E-05	1.09E+02	*NO*	5.88E+05	1.00E-05	2.42E+01
Risk of Benzene= 1E-6	*NO*	2.04E+06	1.40E-04	1.53E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	3.38E+04	2.32E-06	2.53E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**244.69**
Protective Soil Concentration, mg/kg	**91.66**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.45E+02	9.77E-07	1.00E+00	9.17E+01
Total Risk = 1E-5	*NO*	2.23E+03	1.00E-05	9.05E+00	1.04E+03
Total Risk = 1E-6	*NO*	2.50E+02	1.00E-06	1.02E+00	9.38E+01
Risk of cPAHs mixture= 1E-5	*NO*	7.80E+03	5.92E-05	3.06E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	3.06E+03	1.46E-05	1.24E+01	1.68E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 146000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Calculation Summary

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-67-11-12

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis	Composition Ratio
	mg/kg	%
Petroleum EC Fraction		
AL_EC >5-6	16.93	0.13%
AL_EC >6-8	248	1.90%
AL_EC >8-10	544	4.16%
AL_EC >10-12	796	6.09%
AL_EC >12-16	1480	11.33%
AL_EC >16-21	1500	11.48%
AL_EC >21-34	330	2.53%
AR_EC >8-10	504.888	3.86%
AR_EC >10-12	1821.1	13.94%
AR_EC >12-16	4290	32.84%
AR_EC >16-21	1230	9.42%
AR_EC >21-34	252.097	1.93%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.062	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	48.9	0.37%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.32	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.08	0.00%
Benzo(b)fluoranthene	0.63	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.093	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	13063.29	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here:		ug/L

Notes for Data Entry **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for benzene, toluene, total xylenes, and some cPAHs.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specfic measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-67-11-12
Measured Soil TPH Concentration, mg/kg: **13,063.290**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,116	1.39E-07	6.17E+00	Fail
	Method C	37,613	3.44E-08	3.47E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	88	3.18E-06	2.91E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**2,116.46**	**37,613.26**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.12E+03	2.25E-08	1.00E+00	YES	3.76E+04	9.90E-08	1.00E+00
Total Risk=1E-5	*NO*	9.41E+05	1.00E-05	4.45E+02	*NO*	3.80E+06	1.00E-05	1.01E+02
Risk of Benzene= 1E-6	*NO*	1.58E+07	1.68E-04	7.47E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	9.47E+04	1.01E-06	4.47E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**353.61**
Protective Soil Concentration, mg/kg	**87.87**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.54E+02	4.69E-08	1.00E+00	8.79E+01
Total Risk = 1E-5	*NO*	1.02E+04	4.99E-06	3.31E+01	100% NAPL
Total Risk = 1E-6	*NO*	5.35E+03	1.00E-06	1.63E+01	2.10E+03
Risk of cPAHs mixture= 1E-5	*NO*	1.02E+04	4.99E-06	3.31E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	1.02E+04	4.99E-06	3.31E+01	100% NAPL
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 154000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22
Site Name: POL-TPH
Sample Name: OIP-67-14.5-15

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	4.42	0.18%
AL_EC >6-8	119	4.76%
AL_EC >8-10	145	5.81%
AL_EC >10-12	234	9.37%
AL_EC >12-16	205	8.21%
AL_EC >16-21	231	9.25%
AL_EC >21-34	21.8	0.87%
AR_EC >8-10	117.925	4.72%
AR_EC >10-12	426.2	17.06%
AR_EC >12-16	776	31.07%
AR_EC >16-21	185	7.41%
AR_EC >21-34	19.125	0.77%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	11.8	0.47%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	1	0.04%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.025	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	2497.56	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ______ ug/L

Notes for Data Entry | **Set Default Hydrogeology**

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:
Half reporting limits were used for Benzene, Toluene, Ethylbenzene, Total Xylenes, and cPAHs.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022
Site Name: POL-TPH
Sample Name: OIP-67-14.5-15
Measured Soil TPH Concentration, mg/kg: **2,497.560**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc RISK @	With Measured Soil Conc HI @	Does Measured Soil Conc Pass or Fail?
Protection of Soil Direct Contact: Human Health	Method B	1,991	5.07E-08	1.25E+00	Fail
	Method C	36,300	1.25E-08	6.88E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	Use A2.2	6.01E-06	2.17E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,990.72**	**36,299.79**
Most Stringent Criterion	**HI =1**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.99E+03	4.04E-08	1.00E+00	YES	3.63E+04	1.82E-07	1.00E+00
Total Risk=1E-5	*NO*	4.93E+05	1.00E-05	2.47E+02	*NO*	2.00E+06	1.00E-05	5.51E+01
Risk of Benzene= 1E-6	*NO*	3.02E+06	6.14E-05	1.52E+03	NA			
Risk of cPAHs mixture= 1E-6	*NO*	5.01E+04	1.02E-06	2.52E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**HI=1**
Protective Ground Water Concentration, ug/L	**331.72**
Protective Soil Concentration, mg/kg	**76.11**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.32E+02	2.09E-07	1.00E+00	7.61E+01
Total Risk = 1E-5	*NO*	8.51E+03	1.00E-05	2.84E+01	5.09E+03
Total Risk = 1E-6	*NO*	1.65E+03	1.00E-06	4.93E+00	3.60E+02
Risk of cPAHs mixture= 1E-5	*NO*	1.14E+04	2.46E-05	3.85E+01	100% NAPL
Benzene MCL = 5 ug/L	*NO*	6.87E+03	6.29E-06	2.23E+01	2.65E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 151000 mg/kg TPH.

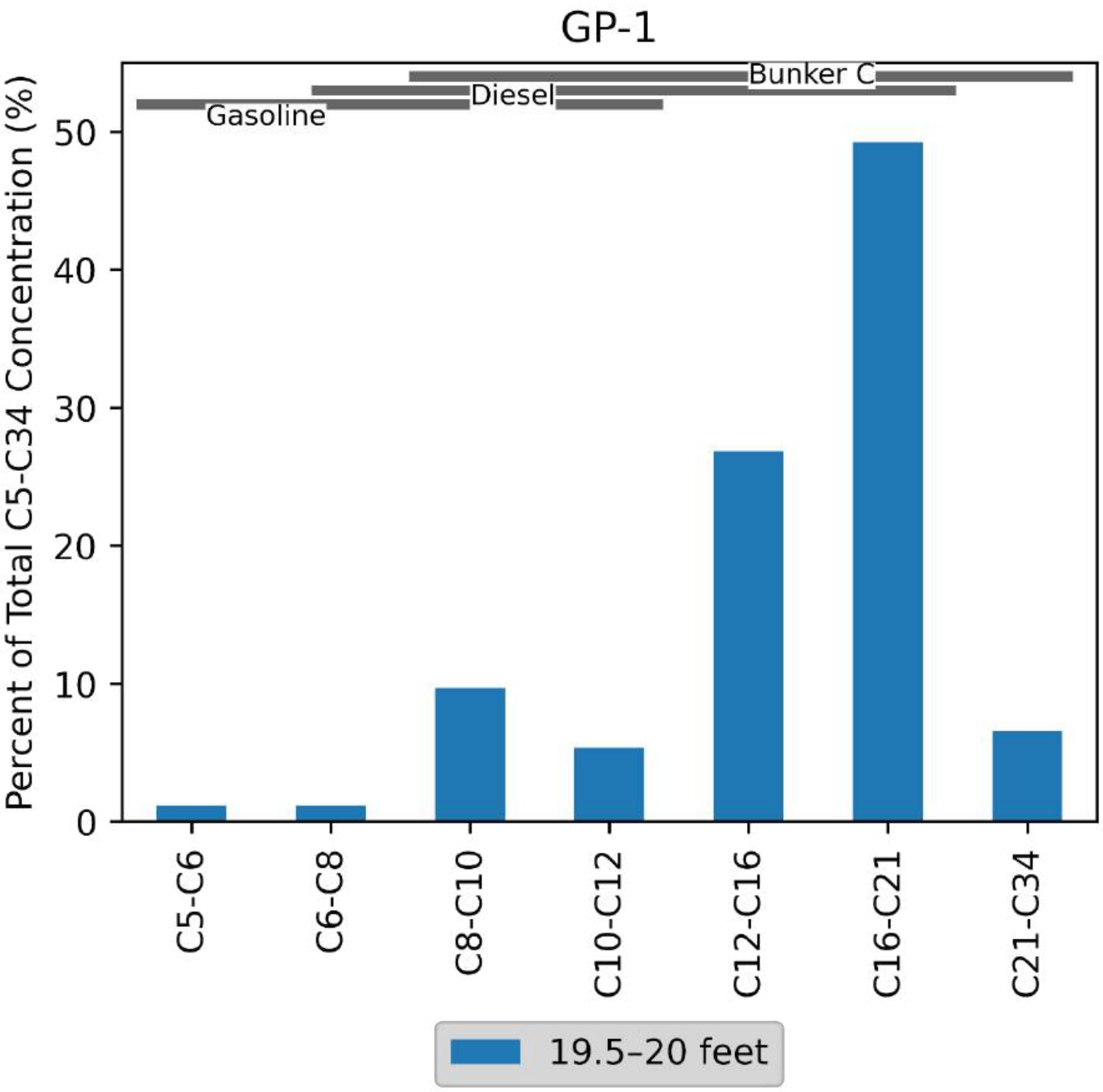
3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix C
EPH/VPH Plots



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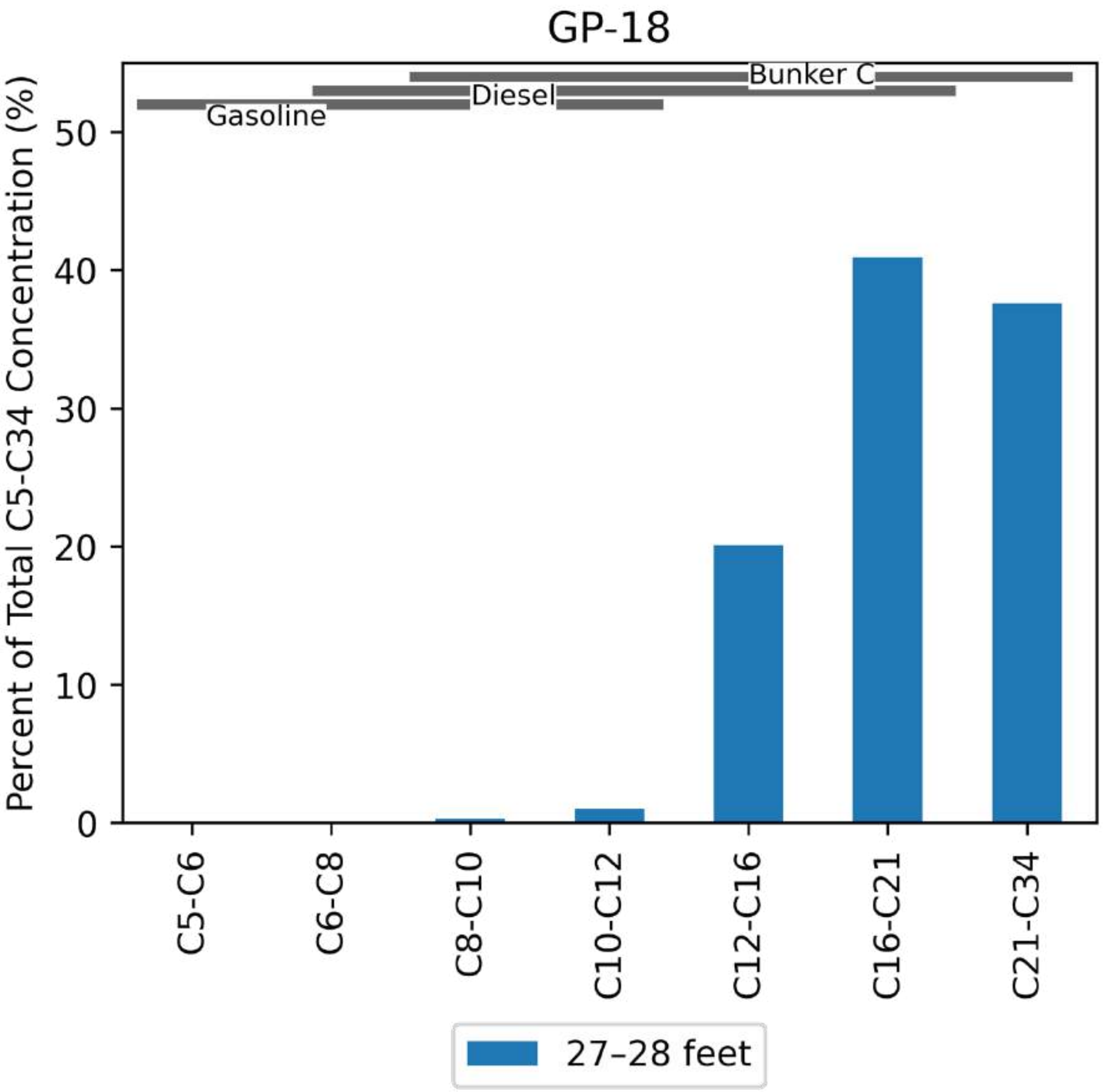
Remedial Investigation/Feasibility Study
Port of Longview TPH Site
Longview, Washington

Figure C.1
EPH/VPH Plot for GP-1

5/28/2021



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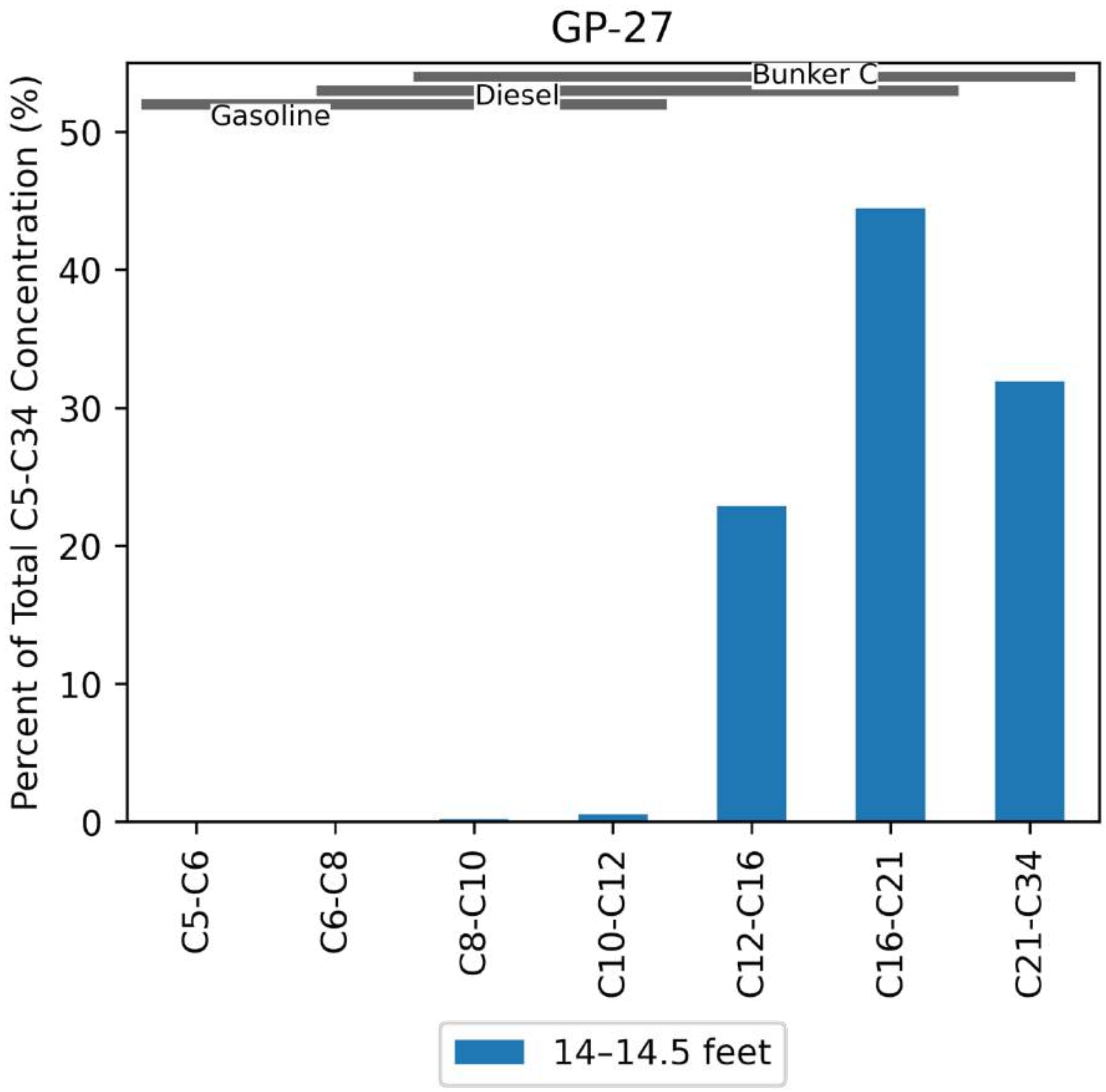
Port of Longview TPH Site
Longview, Washington

Figure C.2
EPH/VPH Plot for GP-18

5/28/2021



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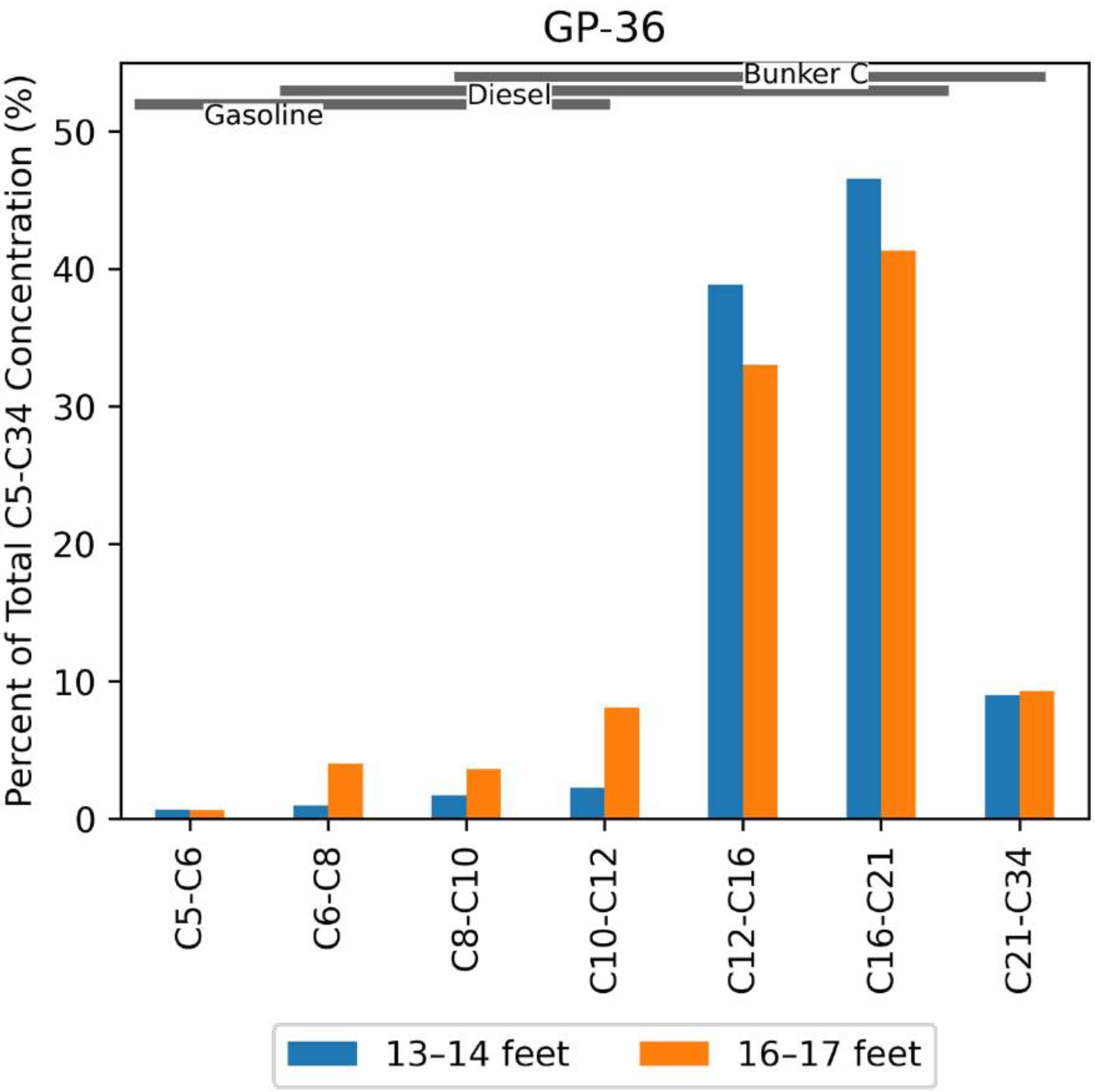
Longview, Washington

Figure C.3
EPH/VPH Plot for GP-27

5/28/2021



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Port of Longview TPH Site
Longview, Washington

Figure C.4
EPH/VPH Plot for GP-36

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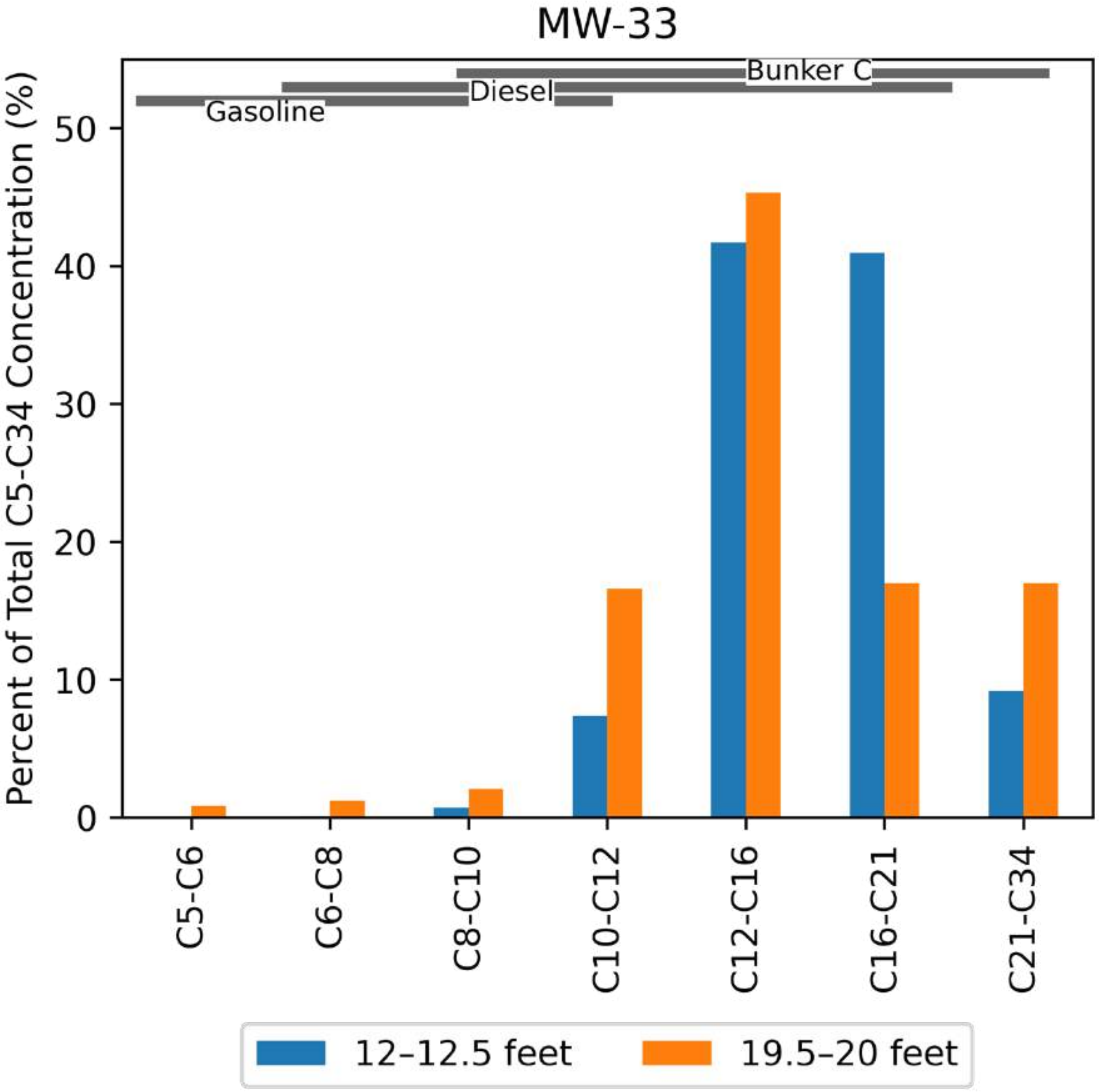

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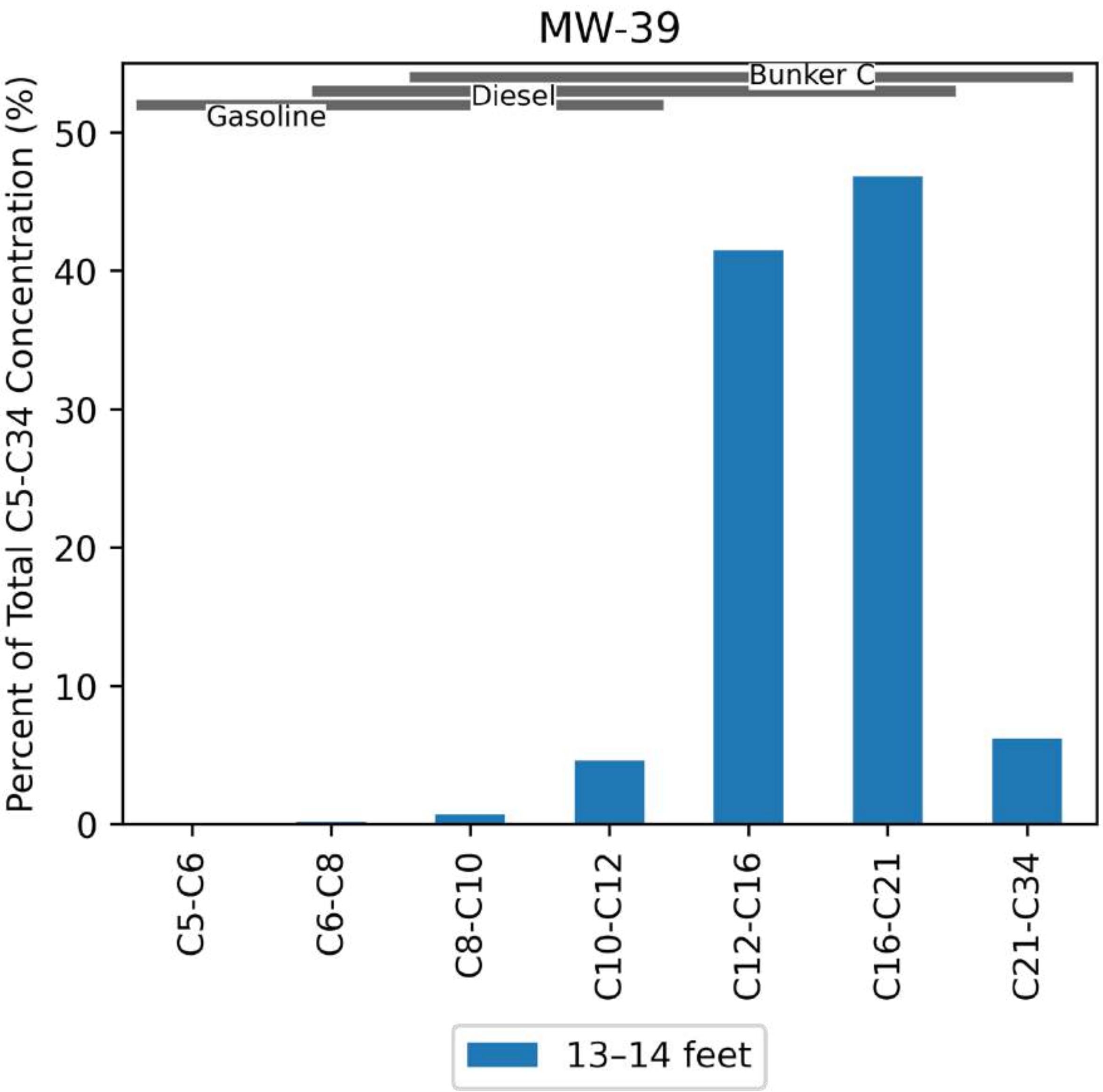
Port of Longview TPH Site
Longview, Washington

Figure C.5
EPH/VPH Plot for MW-33

5/28/2021



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Longview, Washington

Figure C.6
EPH/VPH Plot for MW-39

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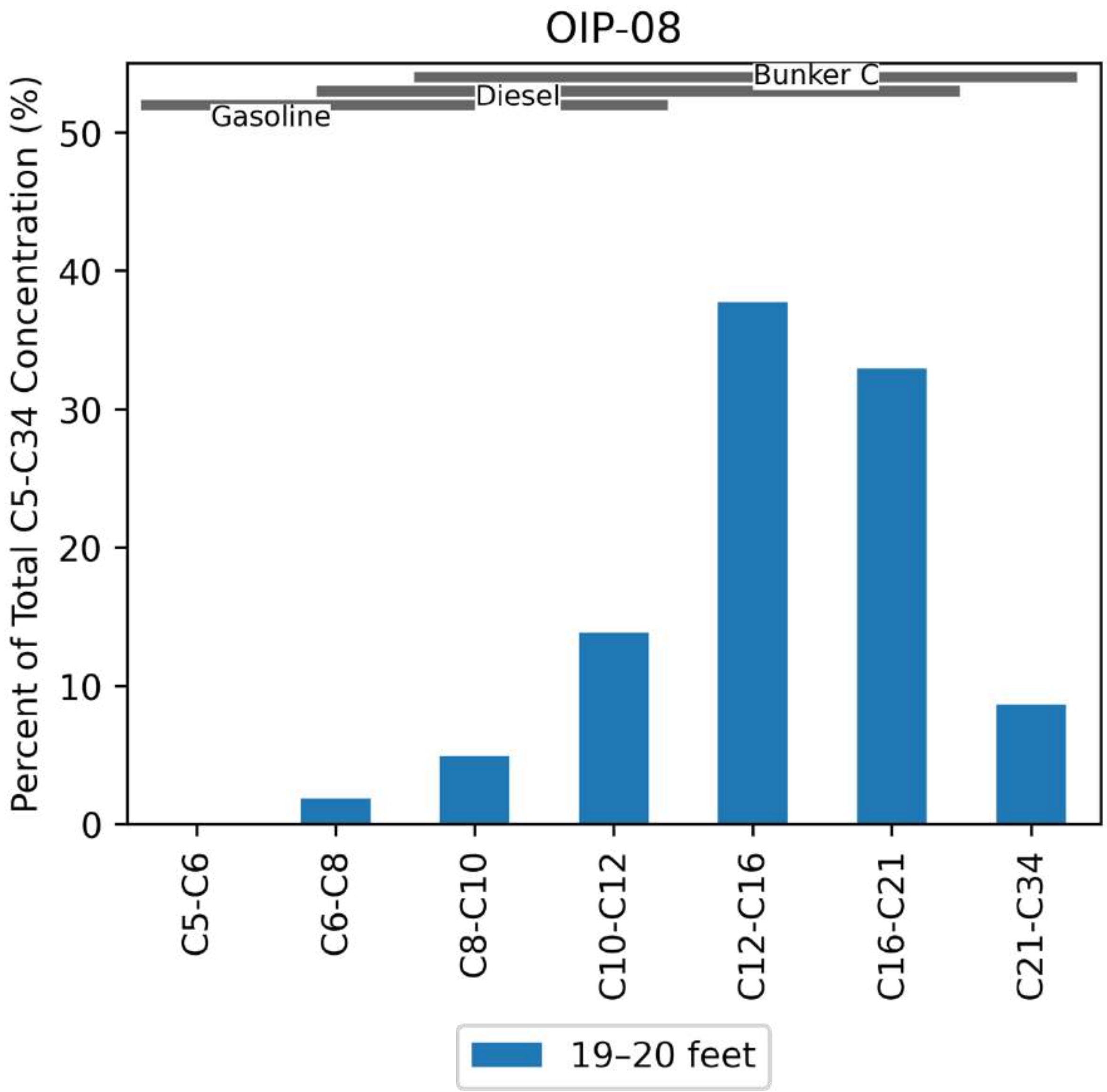

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Port of Longview TPH Site
Longview, Washington

Figure C.7
EPH/VPH Plot for OIP-08

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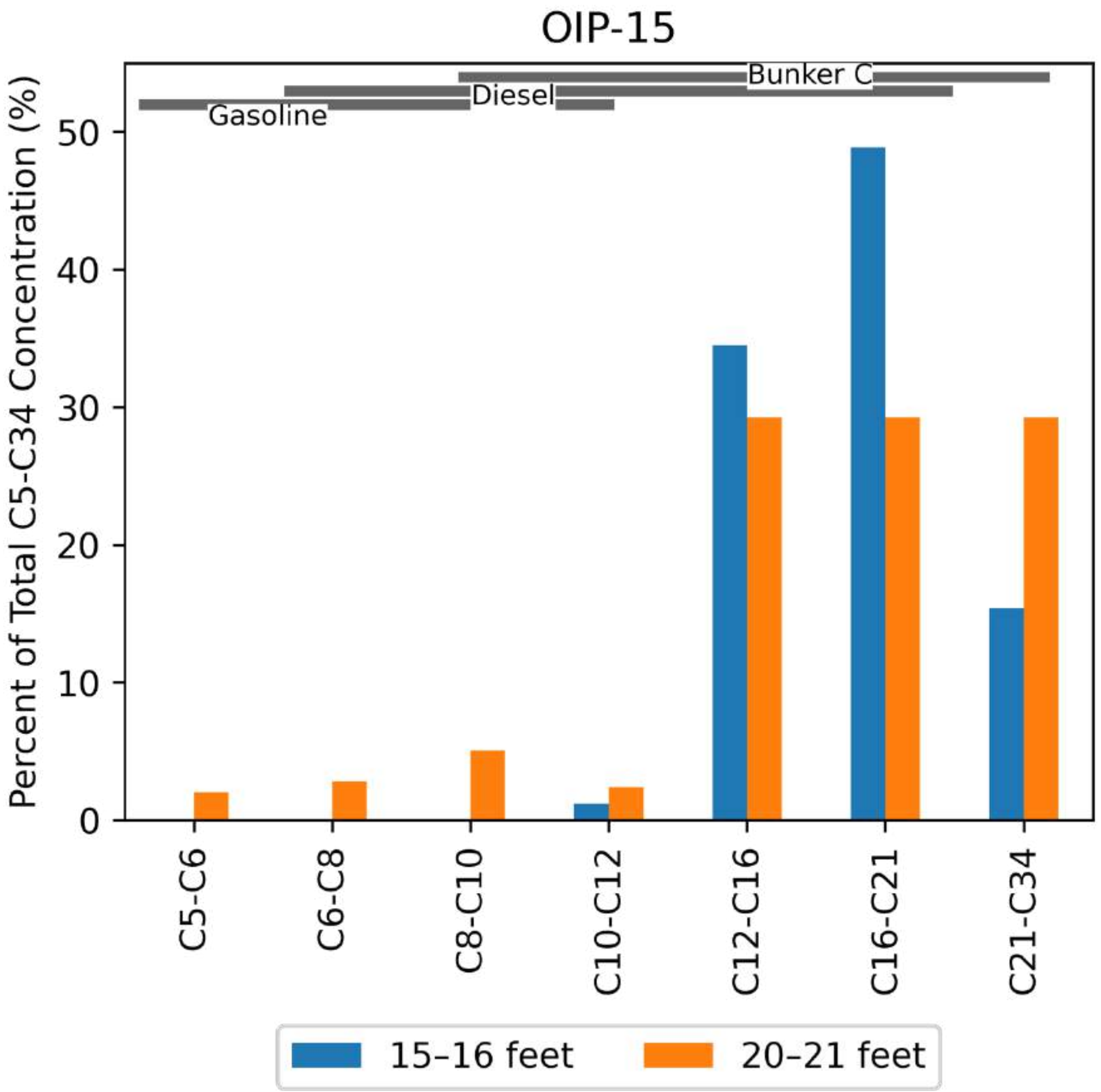

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Longview, Washington

Figure C.8
EPH/VPH Plot for OIP-15

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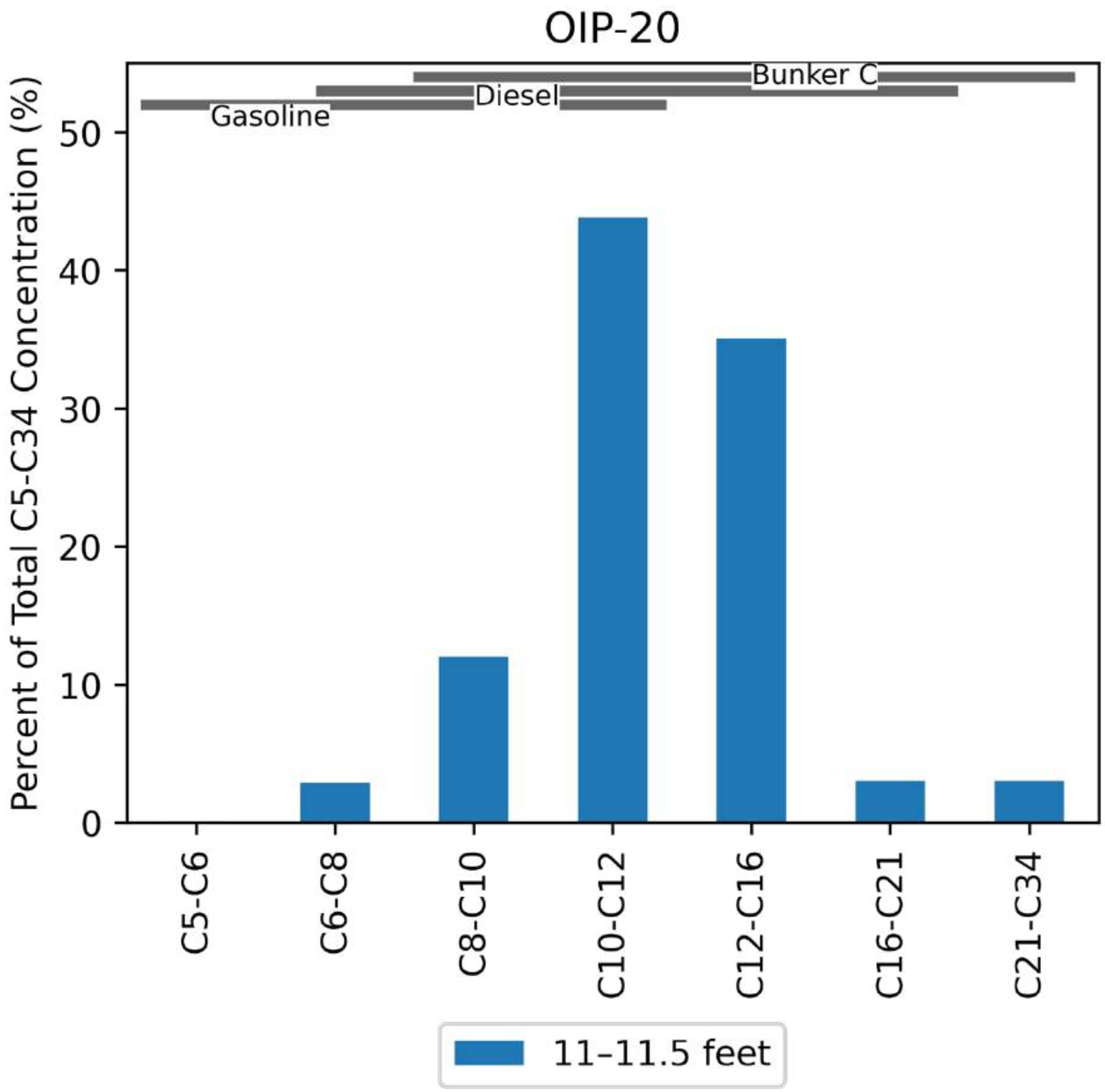

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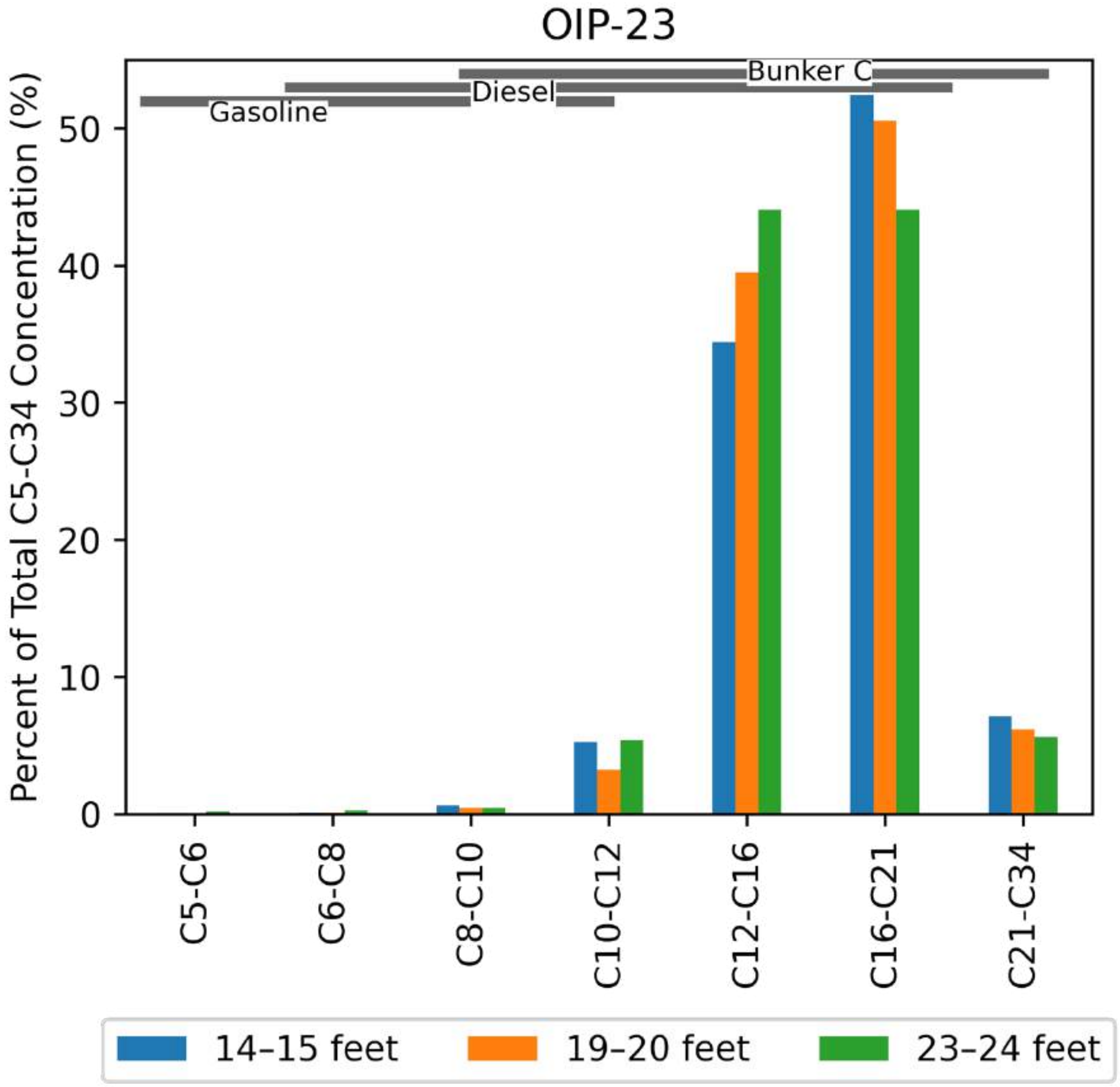
Longview, Washington

Figure C.9
EPH/VPH Plot for OIP-20

5/28/2021



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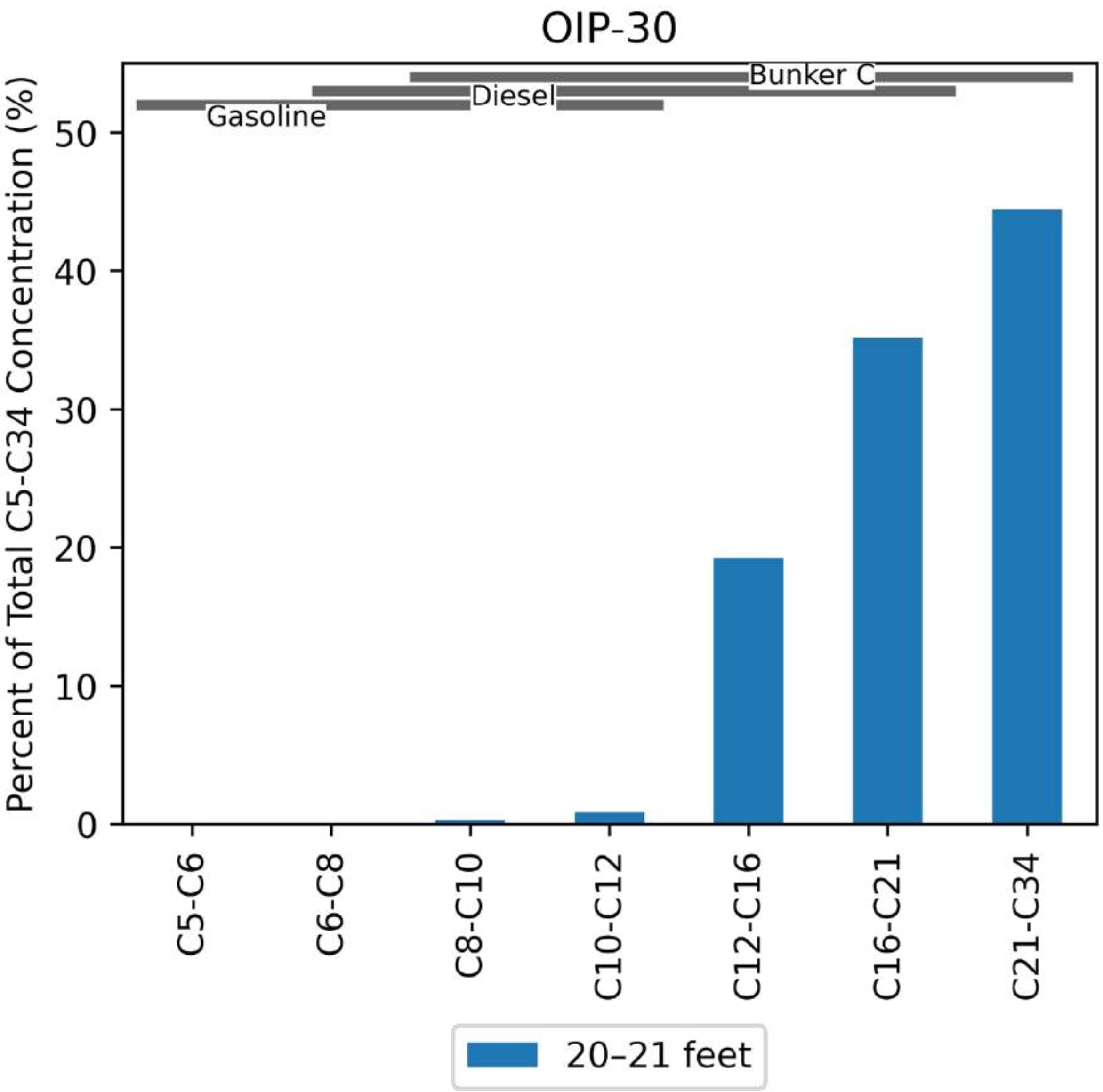
Remedial Investigation/Feasibility Study
Port of Longview TPH Site
Longview, Washington

Figure C.10
EPH/VPH Plot for OIP-23

5/28/2021



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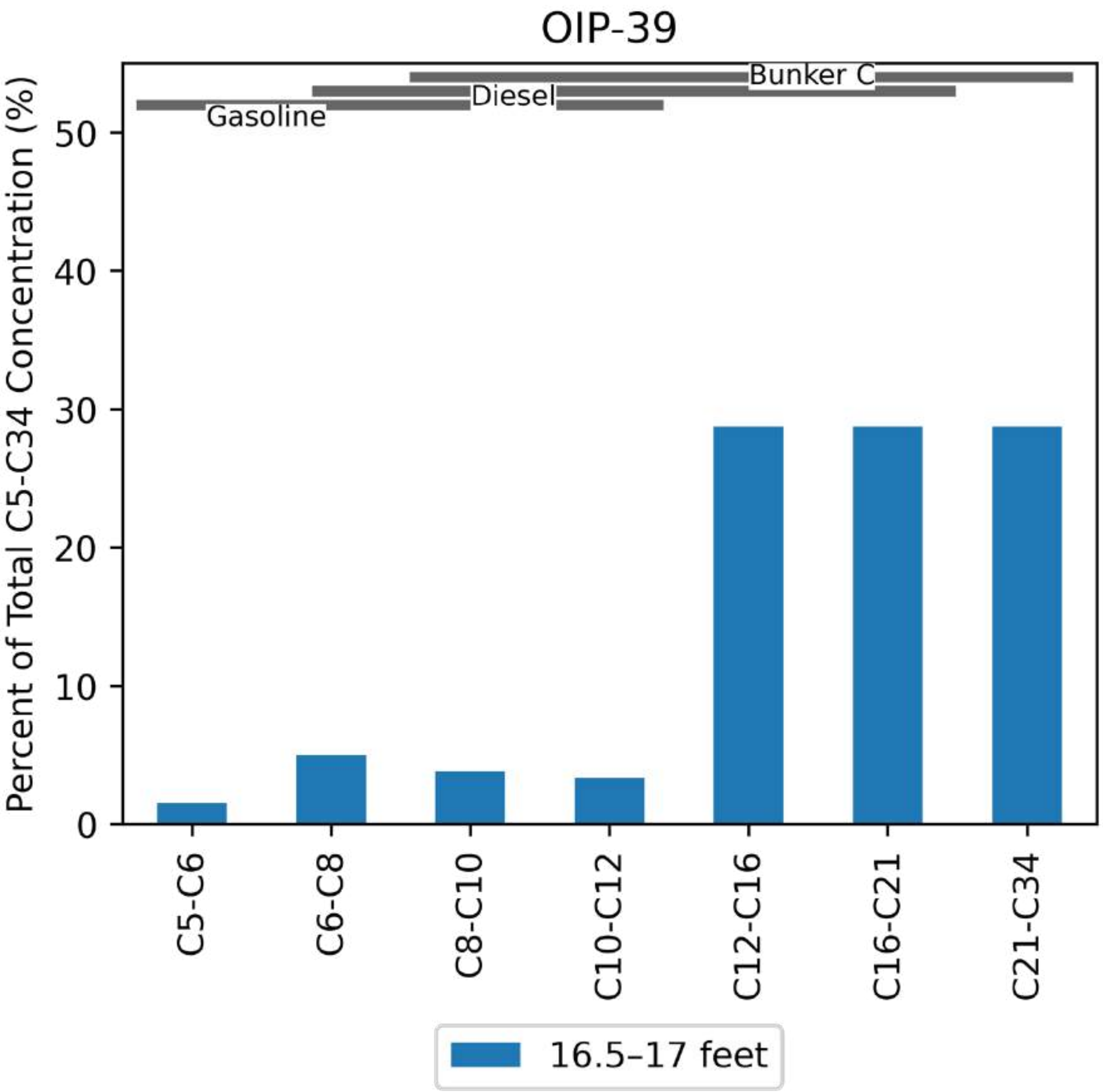
Remedial Investigation/Feasibility Study
Port of Longview TPH Site
Longview, Washington

Figure C.11
EPH/VPH Plot for OIP-30

5/28/2021



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Port of Longview TPH Site
Longview, Washington

Figure C.12
EPH/VPH Plot for OIP-39

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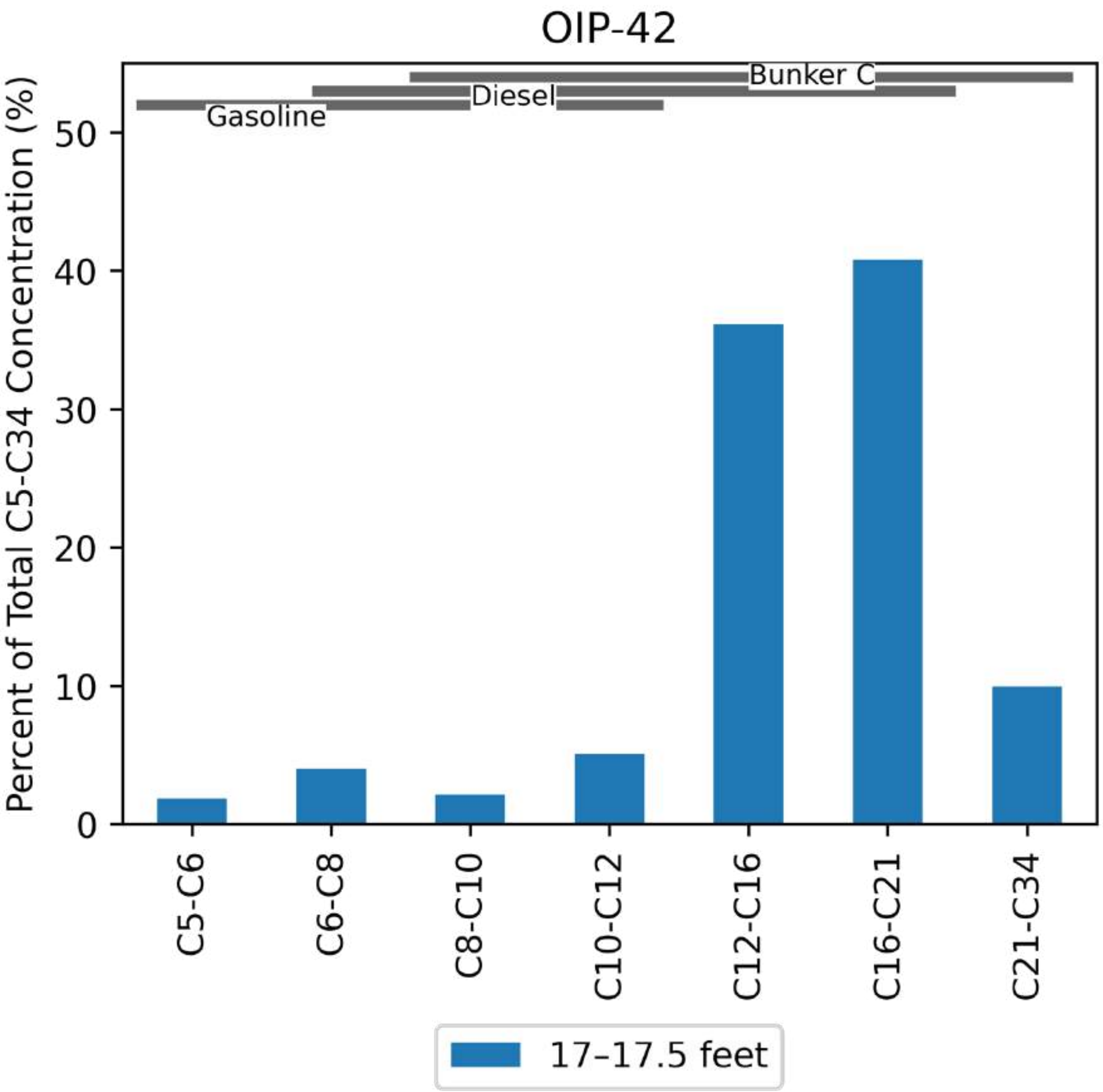

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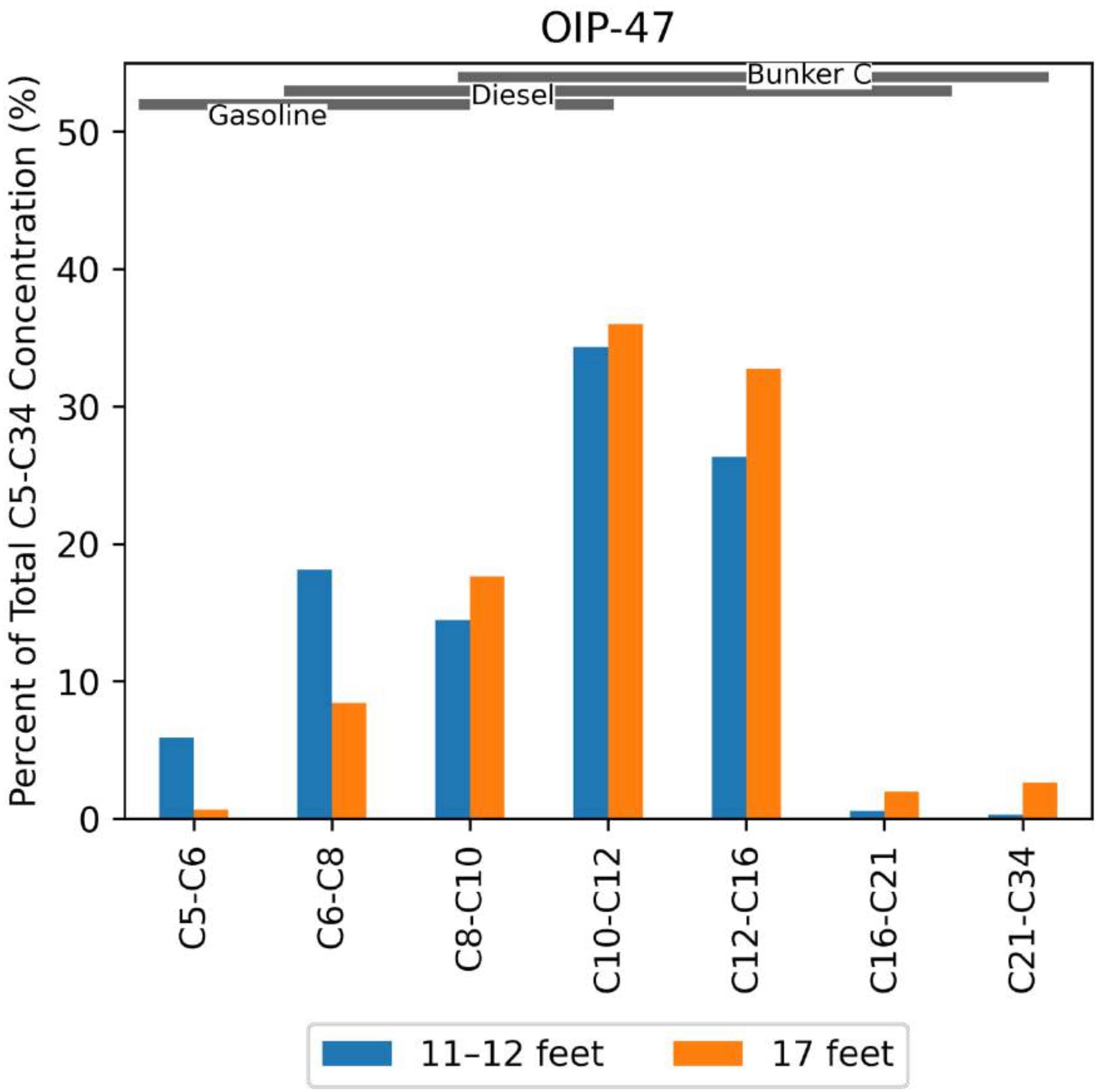
Port of Longview TPH Site
Longview, Washington

Figure C.13
EPH/VPH Plot for OIP-42

5/28/2021



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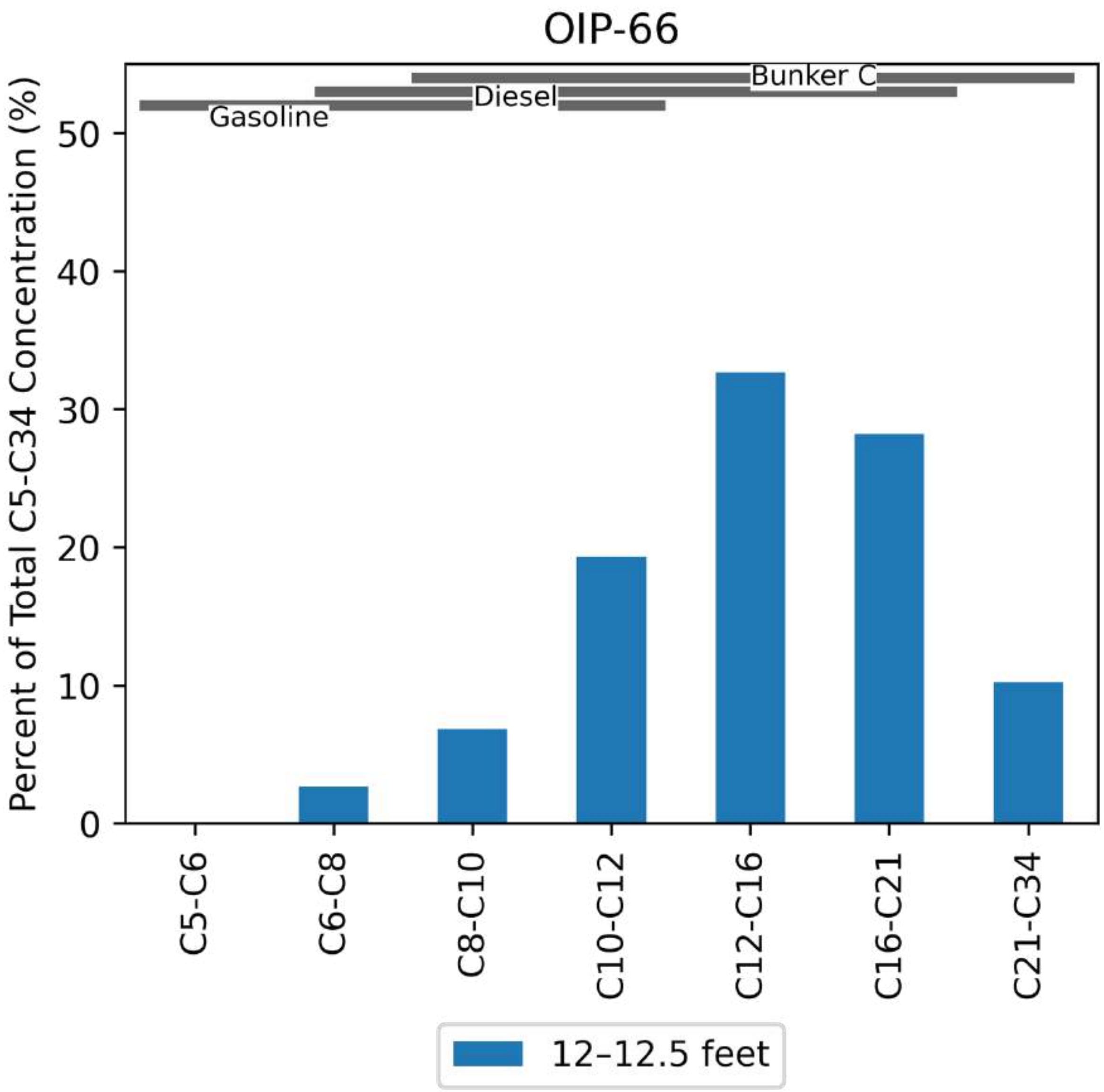
Remedial Investigation/Feasibility Study
Port of Longview TPH Site
Longview, Washington

Figure C.14
EPH/VPH Plot for OIP-47

5/28/2021



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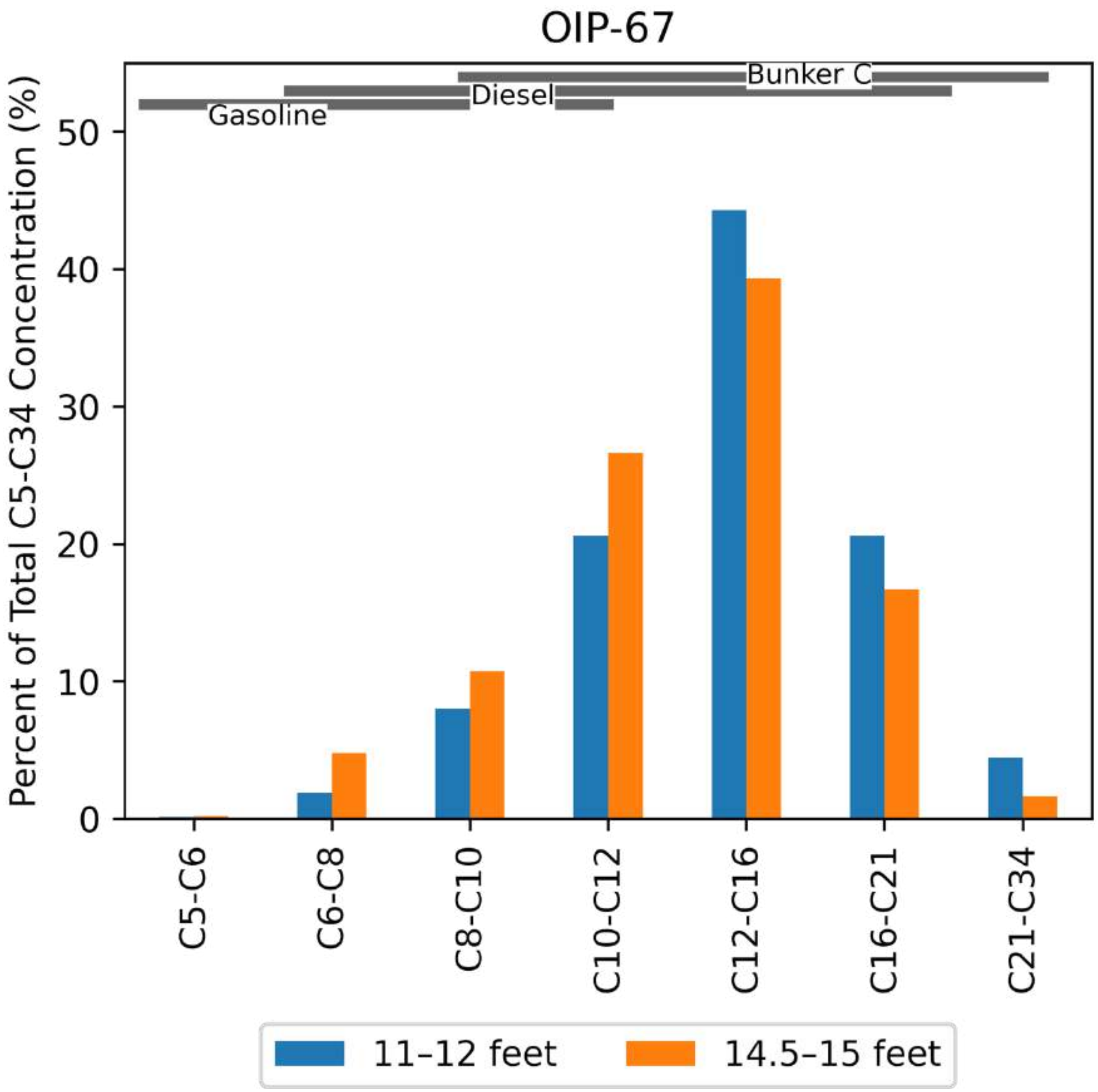
Remedial Investigation/Feasibility Study
Port of Longview TPH Site
Longview, Washington

Figure C.15
EPH/VPH Plot for OIP-66

5/28/2021



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Port of Longview TPH Site
Longview, Washington

Figure C.16
EPH/VPH Plot for OIP-67

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Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix D
Monitored Natural Attenuation at Port of Longview TPH Site

Appendix D
Monitored Natural Attenuation at Port of Longview TPH Site

INTRODUCTION AND PURPOSE

Monitored natural attenuation (MNA) is the observed, unaided reduction of contaminant concentration and mass by using the natural assimilative capacity of a groundwater/soil system in situ. This ubiquitous process includes a variety of physical, chemical, or biological attributes under favorable conditions to reduce the toxicity, mobility, and concentration of contaminants without human intervention. The reduction in concentrations is due primarily to several fate and transport processes including destructive processes, such as biodegradation, and nondestructive mechanisms, such as dilution, sorption, volatilization, and dispersion (USEPA 1999).

Natural attenuation processes typically occur at all contaminated sites, but to varying degrees of effectiveness depending on the types and concentrations of contaminants present and the physical, chemical, and biological characteristics of the soil and groundwater. One of the most important components of natural attenuation at a petroleum-contaminated site is biodegradation. Contaminant biodegradation is largely based upon microbial respiration. In respiration, microbes gain energy from the consumption or oxidation of electron donors coupled to the utilization or reduction of electron acceptors. Contaminants will either serve as electron donors or electron acceptors. For example, during the aerobic metabolism of petroleum hydrocarbons in the biodegradation process, oxygen is the electron acceptor, while hydrocarbons are the electron donors and may eventually be oxidized completely to CO_2. Under anaerobic conditions, alternative electron acceptors, such as nitrate and sulfate, may be utilized in contaminant oxidation in the absence of oxygen. In general, biodegradation processes follow an order of favorable electron acceptor availability: $O_2 \rightarrow Mn^{4+} \rightarrow NO^{3-} \rightarrow Fe^{3+} \rightarrow SO_4^{2-} \rightarrow CH_4 \rightarrow CO_2$. The microbes will utilize the next available electron acceptor in the above order when one acceptor is scarce or absent.

The occurrence of biodegradation can be determined from site analytical monitoring of the changes in groundwater bulk geochemistry, the presence of metabolic by-products, and the depletion of electron acceptors and donors. As a result, several chemical compounds in groundwater, including nitrate, manganese, ferrous iron, sulfate, methane, and total alkalinity can be measured and used as indicators of natural attenuation. Their presence, or absence, in comparison to background levels and dissolved oxygen (DO) levels can therefore be used to infer biodegradative processes. DO levels and oxidation-reduction potential (ORP) are used to assess whether biodegradation is aerobic or anaerobic.

Typically, these parameters are measured in monitoring well locations throughout light non-aqueous phase liquid (LNAPL) source area and dissolved groundwater contaminant plume as well as upgradient and downgradient locations that are not impacted by contaminants. Parameters are compared to the approximate distances of monitoring locations from the former LNAPL plume boundary and/or source area as well as measured concentrations of diesel-range organics (DRO), oil-range organics (ORO), and/or gasoline-range organics (GRO; Ecology 2005a). MNA is indicated by a depletion in DO, nitrate, and sulfate and increases in manganese (MN^{2+}), ferrous iron (Fe^{3+}), methane (CH_4), and total alkalinity within the contaminant plume.

GROUNDWATER MNA AT THE PORT OF LONGVIEW TPH SITE

Multiple electron acceptors or metabolic byproducts were measured in groundwater to determine if natural attenuation is occurring at the Site. Groundwater samples were collected from 16 monitoring well locations between May 2020 and February 2021 in four quarterly monitoring events designed to capture seasonal variations of Site groundwater conditions. Samples were collected using the methodologies described in the Remedial Investigation Work Plan (RIWP; Floyd|Snider 2019) and analyzed for the following MNA parameters:

- DO by YSI DSS Pro field meter (measured during sampling);
- Nitrate and sulfate by USEPA Method 300.0
- Manganese (soluble) by USEPA Method 200.8
- Total alkalinity (as $CaCO_3$) by SM 2320B
- Methane by RSK-175
- Ferrous Iron (soluble) by Hach Field Test Kit.

To document and assess MNA, Ecology recommends including at least one upgradient location with uncontaminated groundwater; one location within the source (most impacted) area; two wells near the contaminated plume center line; and one downgradient “sentinel” well with uncontaminated groundwater in the sampling plan (Ecology 2005a). Figures 9.2 and 9.3 show the extent of the LNAPL and dissolved-phase GRO and total DRO and ORO plumes at the Site. The dissolved-phase hydrocarbon plumes in the perched water-bearing zone (perched zone) are approximately centered around MW-09 and within the vicinity of MW-28 and extend to the northwest on the west side of Port Way. The dissolved-phase plumes within the alluvial aquifer is approximately centered around MW-09, MW-34, and MW-39 and does not extend to the northwest across Port Way. Consequently, monitoring wells screened in both water-bearing zones were sampled for MNA parameters at different distances from the presumed source area (MW-09 and areas with soil concentrations exceeding their respective residual saturation levels) in addition to upgradient and downgradient locations outside of the plumes. It should be noted that for the purposes of this analysis, there is no measurable LNAPL at present that is detected in a monitoring well within the perched zone source area. However, historically, LNAPL was present at perched zone well MW-16 (Golder 1993). Additionally, soil samples collected at MW-26 and MW-40 within the perched zone contain concentrations that exceed residual saturation levels; therefore, soil within the vicinities of MW-26 and MW-40 can be considered source zone areas.

MNA RESULTS

MNA analytical results for the 16 locations as well as field parameters for all monitoring well locations are shown in Table 4.7. The parameters were interpreted by plotting their concentration in two different approaches: (1) MNA parameters versus total DRO and ORO concentrations and (2) MNA parameters versus the approximate total distance of the monitoring well from the source area. These plots were constructed to document varying levels and stages of biodegradation within the dissolved-phase plumes and uncontaminated groundwater. Separate plots were created for monitoring wells screened in the perched zone and alluvial aquifer as the nature and extents of the dissolved-phase plumes in each water-bearing zone are not identical. The MNA parameters were plotted against total DRO and ORO versus GRO concentrations because the total DRO and ORO plume encompasses the GRO plume and is inferred to be the primary constituent of the LNAPL present at MW-09 (AGRA 1995).

ALLUVIAL AQUIFER

DO data from monitoring wells screened within the alluvial aquifer are shown in Figures D.1 through D.7, which follow the order of favorable electron acceptor availability. DO versus distance, within the alluvial aquifer, shows a decrease in the DO content of groundwater with decreasing distance to the approximate boundary of the LNAPL plume and source area (Figure D.1). Additionally, DO versus total DRO and ORO indicate an exponential decrease of DO content with increasing total DRO and ORO concentration (Figure D.8). These results suggest that natural attenuation due to aerobic respiration is occurring beneath the Site.

Nitrate and sulfate data collected from the alluvial aquifer monitoring wells are shown in Figures D.2, D.5, D.9, and D.12. Nitrate and sulfate results compared to distance from the source area and total DRO and ORO show similar trends to the DO data; lower concentrations are present within the plume area, and higher concentrations are present in areas outside of the plume. These data provide evidence that anaerobic biodegradation in the form of denitrification and sulfate reduction is likely occurring within the alluvial aquifer groundwater plume.

Manganese, ferrous iron, and methane data collected from the alluvial aquifer groundwater are shown in Figures D.3, D.4, D.6, D.10, D.11, and D.13 and show opposite trends to the nitrate, sulfate, and DO data: manganese, ferrous iron, and methane concentrations increase within the groundwater plume and correspond with monitoring well locations with high total DRO and ORO concentrations. These data indicate that anaerobic biodegradation via manganese and iron reduction and methanogenesis is likely occurring within the groundwater plume at the Site. The presence of elevated methane levels within the groundwater plume are indicative of strongly reducing conditions.

Total alkalinity in the form of $CaCO_3$ in alluvial aquifer groundwater data are shown in Figures D.7 and D.14. $CaCO_3$ is a metabolic byproduct of biodegradation and can be expected to increase in areas where microbial activity is occurring. Total alkalinity data, except for MW-31, appear to generally increase with increasing total DRO and ORO concentrations, providing evidence for increased microbial activity within petroleum-impacted groundwater. MW-31 has elevated alkalinity at low total DRO and ORO concentrations with respect to other monitoring wells and the cause is uncertain.

Perched Water-Bearing Zone

DO and average total DRO and ORO concentrations were plotted versus the straight-line distance from each source area (i.e., vicinities of MW-26 or MW-40) for the plumes located in the northern and southern portions of the perched zone (Figures D.15 through D.17). Comparisons of other MNA parameters versus distance from source areas were less useful for assessing the presence of natural attenuation in the perched zone, likely because the dissolved-phase groundwater plume has two different possible source areas and multiple groundwater flow directions. However, all MNA parameters were plotted against the Total DRO and ORO groundwater concentration in each perched zone monitoring well (Figures D.8 through D.14).

Figures D.15 through D.17 also show that average DO generally increases with increasing distance up and down gradient from possible source areas and DO is higher in locations with lower total DRO and ORO concentrations. This indicates that aerobic biodegradation is ongoing or has occurred in groundwater closest to source areas, toward the interior of the plumes. The exception is at locations MW-02, MW-04, and MW-30, which are located downgradient of source areas and are the western extents of the northern and southern plumes. These locations have high average DO and total DRO and ORO concentrations, relative to other sample locations. It is likely that a portion of the total DRO and ORO concentrations are detections of organic material in this area. This is supported by the laboratory reports for samples collected at MW-02, MW-04, and MW-30, which indicate that the chromatograms do not match the fuel standards used for instrument calibration (Table 4.5). Based on these observations, biodegradation has likely occurred at these three locations, and a portion of the total DRO and ORO concentrations detected are metabolic byproducts of biodegradation (e.g., alcohols and organic acids, with possible phenols, aldehydes, ketones). These byproducts have oxygen in their molecules and are not hydrocarbons but are included as DRO detections.

DO, nitrate, and sulfate concentrations in perched zone monitoring wells show strong negative correlations with total DRO and ORO groundwater concentrations. These data provide evidence for denitrification and sulfate reduction occurring at monitoring well locations with petroleum-impacted groundwater. Total alkalinity, manganese, ferrous iron, and methane concentrations do not appear to increase with total DRO and ORO, indicating that iron and manganese reduction, methanogenesis, and $CaCO_3$ production are not ongoing at these locations. It should be noted that the production of methane is the "least energetically preferred" thermodynamic reaction and occurs only when electron acceptors from the other microbial reactions are depleted. A lack of biodegradation of GRO or benzene, which produce higher alkalinity in groundwater, in perched zone groundwater may explain the low groundwater $CaCO_3$ concentrations.

It should be noted that MW-30, which is located west of the Site, consistently showed anomalously high nitrate and sulfate concentrations (almost an order of magnitude higher than other locations); therefore, concentrations were not included in the sulfate or nitrate versus total DRO and ORO plots. These elevated sulfate and nitrate concentrations could indicate an influx of these compounds from another source or that denitrification and/or sulfate reduction are not ongoing at MW-30. As mentioned previously, a portion of the total DRO and ORO concentrations detected in MW-30 may be detections of metabolic byproducts of biodegradation and not all the detections are hydrocarbons, which is why the data do not show a decrease of DO, denitrification, and sulfate reduction or an increase in total alkalinity, manganese, ferrous iron, and methane concentrations.

PLUME STATUS AT THE PORT OF LONGVIEW TPH SITE

For MNA to be considered a feasible cleanup action alternative, natural attenuation must be actively reducing contaminant concentrations at a site. Typically, a contaminant plume expands until it reaches steady state, at which point the mass loading rate of petroleum hydrocarbons from the source area is approximately equal to the natural attenuation rate, and the plume is considered stable. When the natural attenuation rate exceeds the source mass loading rate, the plume begins to shrink over time. Generally, MNA is considered a feasible cleanup action alternative at sites where the contaminant plumes can be shown to be either stable or shrinking.

To evaluate plume status at the Site, historical groundwater data was combined with RI data to create time series plots of contaminant concentrations at select monitoring well locations, both within and around the dissolved-phase plumes, shown in Figures D.18 through D.21. Mann-Kendall non-parametric tests were conducted at select locations using Module 1 of Ecology's natural attenuation data analysis tool package (Ecology 2005b), and results are shown in Figures D.22 through D.25.

Alluvial Aquifer

Time series plots of GRO and total DRO and ORO were generated for alluvial aquifer wells MW-01, MW-06, MW-10, MW-12, MW-22, MW-23, MW-31, and MW-32 (Figures D.18 through D.20). A time series plot of benzene was also constructed for wells MW-03, MW-07, MW-8, MW-10, and MW-12, which are the only locations that have consistently been sampled for benzene throughout the duration of monitoring (Figure D.21). GRO and total DRO and ORO concentrations in perimeter alluvial aquifer monitoring locations MW-01, MW-06, MW-22, MW-23, MW-31, and MW-32 gradually decreased between 1991 and present, and, except for total DRO and ORO results from MW-06, were all below laboratory reporting limits during this time. Although a spike in the total DRO and ORO concentration at MW-06 was observed in August 2020, impacts were not detected in downgradient location MW-01. The consistent lack of GRO and total DRO and ORO detections at perimeter alluvial aquifer monitoring wells indicate that the dissolved-phase groundwater plume in the alluvial aquifer is stable and has not migrated off property within the alluvial aquifer.

MW-10 and MW-12, which are located within the groundwater plume, generally showed decreases in total DRO and ORO, GRO, and benzene over the past approximately 25 years. Despite recent increases in GRO and total DRO and ORO concentrations at both locations, data from the most recent 2021 sampling event indicate that concentrations of the two analytes remain less than historical maximum concentrations. Mann- Kendall analyses at both MW-10 and MW-12 show that total DRO and ORO, GRO, and benzene, toluene, ethylbenzene, and total xylenes (BTEX) contaminant plumes are either shrinking or stable at these locations. These results, coupled with the documented reduction of contaminant concentrations within the dissolved-phase groundwater plume provide additional evidence of ongoing natural attenuation at the Site.

Perched Water-Bearing Zone

Time series plots of GRO and total DRO and ORO were generated for perched zone wells MW-02, MW-17, MW-28, and MW-30 (Figures D.18 through D.20). Although there has been some variability, concentrations of both GRO and total DRO and ORO at perimeter wells MW-02 and MW-30 have remained stable or decreased substantially since the late-1990s, indicating that the plume is stable or shrinking and natural attenuation processes are active at these locations. Mann-Kendall analyses support this observation at both MW-02 and MW-30 and confirm that contaminant plumes at these locations are stable or shrinking. Reductions in contaminant concentrations relative to historical maximums were also observed at locations MW-17 and MW-28, which are located more proximal to the presumed source area(s) and indicate that natural attenuation is ongoing within perched zone groundwater.

RESTORATION TIME FRAME PREDICTIONS AND BIOSCREEN WORKBOOK

Groundwater data collected over the years were insufficient to generate a prediction for the time to reach cleanup levels using Ecology's MNA workbook. Therefore, EPA's Bioscreen Natural Attenuation Decision Support System workbook and groundwater trend data were used to estimate the time to meet cleanup levels based on first-order biodegradation and instantaneous models (EPA 1996).

The preferred alternative proposes to remediate areas with elevated TPH concentrations beneath the rail lines and areas to the west of the rail lines with TPH concentrations in soil exceeding their respective MTCA Method A cleanup levels. Therefore, some areas beneath the rail lines that contain TPH exceedances in soil will rely on natural attenuation. The area within the vicinity of MW-12 has the greatest TPH concentrations and the greatest contaminant mass of the areas that will rely on natural attenuation, so this location serves as an appropriate basis for estimating the site restoration time frame.

The Bioscreen model was used as supporting evidence for the estimated restoration time frames calculated using groundwater concentration trends for MW-12, which is outside the injection extents proposed in Alternatives 3 and 4. Site data including MNA and soil properties were used as inputs. GRO, DRO, and BTEX mass were calculated using recent soil data; historical soil data collected in the early 1990s are likely not representative of current concentrations. If site-specific data were unknown, the default inputs were used, as suggested by the user manual. Figures D.26 and D.27 show the model inputs.

Bioscreen utilizes two biodegradation models: instantaneous and first-order decay. First-order decay incorporates the effects of adsorption, dispersion, and aerobic biodegradation but does not address specific anaerobic decay reactions. The first-order decay model does not account for site-specific information such as the availability of electron acceptors. In addition, it does not assume any biodegradation of dissolved constituents in the source zone. In other words, this model assumes that biodegradation starts immediately downgradient of the source and that it does not depress the concentrations of dissolved organics in the source zone itself. Therefore, the first-order decay is conservative, and the decay rate is likely quicker than predicted by the first-order decay.

Modeling work conducted by GSI indicates that first-order expressions may not be as accurate for describing natural attenuation processes as the instantaneous reaction assumption (Connor et al. 1994). Biodegradation of organic contaminants in groundwater is more difficult to quantify using a first-order decay equation because electron acceptor limitations are not considered. A more accurate prediction of biodegradation effects may be realized by incorporating the instantaneous reaction equation into a transport model. The bioscreen user's manual concludes that the first-order model may underpredict rate of source depletion (USEPA 1996); and the instantaneous reaction model may be more accurate for estimating rate of source depletion (Newell et al. 1995).

The Bioscreen model shows that

- The DRO source area half-life ranges between 2 and 20 years for instantaneous and first-order decay, respectively (Figure D.26); and
- The GRO source area half-life ranges between 5 and 30 years for instantaneous and first-order decay, respectively (Figure D.27).

Because first-order decay would provide a conservative estimate for the reasons described above, the half-life for the source area outside the preferred remedial alternative treatment area will likely fall somewhere in between these results. Areas within the treatment zone of the preferred alternative, where the instantaneous model is more applicable to support natural attenuation after treatment, are likely to have a much shorter restoration time frame.

Additionally, historical GRO and DRO concentrations for MW-12 were plotted over time (Figure D.28). The trendlines show declining concentrations over the past 30 years. The trendlines were extrapolated to show that GRO and DRO concentrations will both meet their respective cleanup levels within 28 to 30 years in areas outside the remedial implementation extent.

CONCLUSIONS

Analytical groundwater results at the Site provide evidence that natural attenuation of groundwater contaminants by various types of biodegradation is occurring in both water-bearing zones. Alluvial aquifer results indicate that both aerobic and anaerobic biodegradation is occurring, particularly within the dissolved-phase plume that surrounds the LNAPL in MW-09. Results from the perched zone show that natural attenuation due to biodegradation processes is ongoing at monitoring well locations with petroleum-impacted groundwater. Furthermore, historical Site groundwater data coupled with Mann-Kendall analyses indicate that the dissolved-phase plumes in both water-bearing zones are stable or shrinking. Additionally, the Bioscreen model and the concentration trendlines for MW-12 show that the GRO and DRO in the area outside the remedial implementation extent will meet their respective groundwater cleanup levels via ongoing natural attenuation. These results provide support for the inclusion of MNA as a viable alternative to reduce groundwater contaminant concentrations.

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LIST OF ATTACHMENTS

Port of Longview TPH Site

Remedial Investigation/Feasibility Study

Appendix D
Monitored Natural Attenuation at Port of Longview TPH Site

Figures

Figure D.1 Dissolved Oxygen vs. Distance (Alluvial)

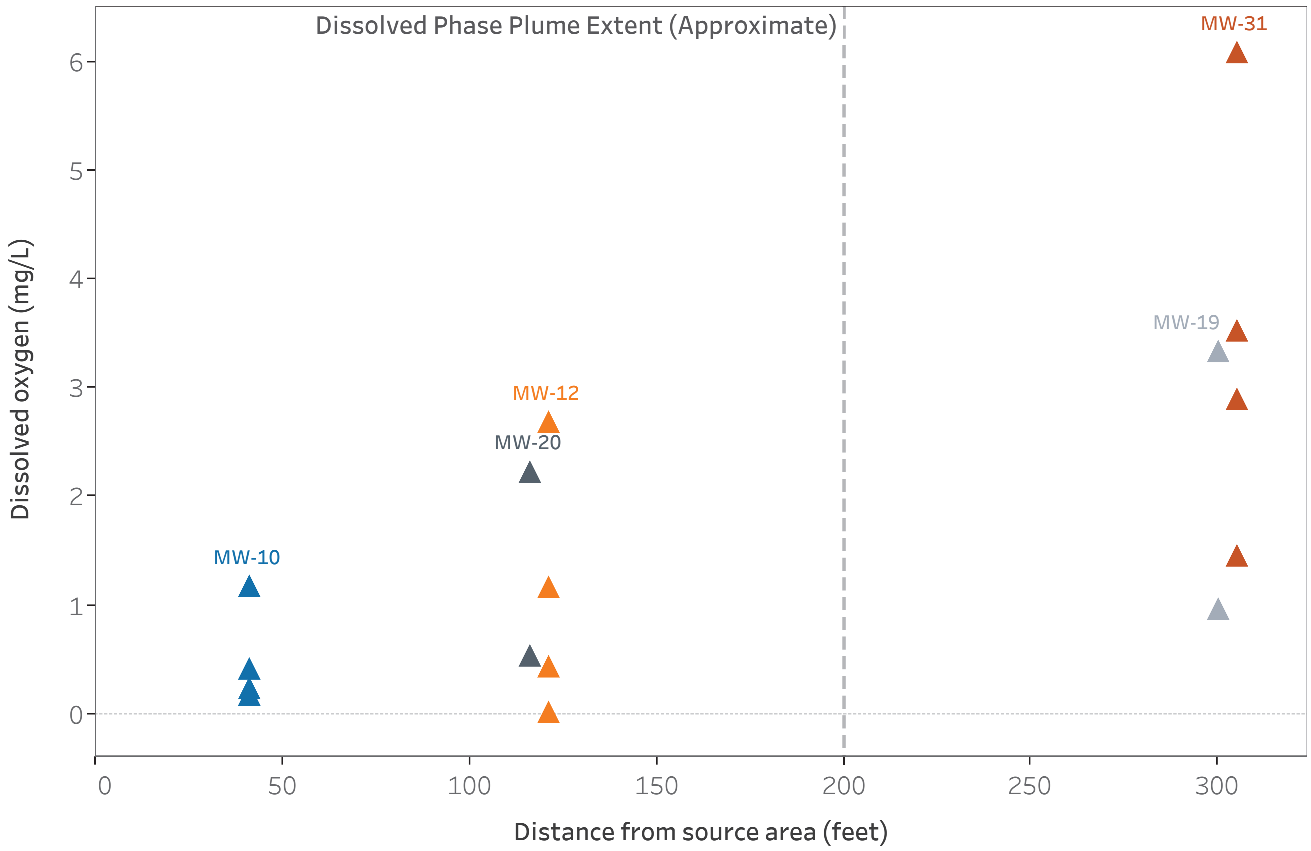


Figure D.2 Nitrate vs. Distance (Alluvial)

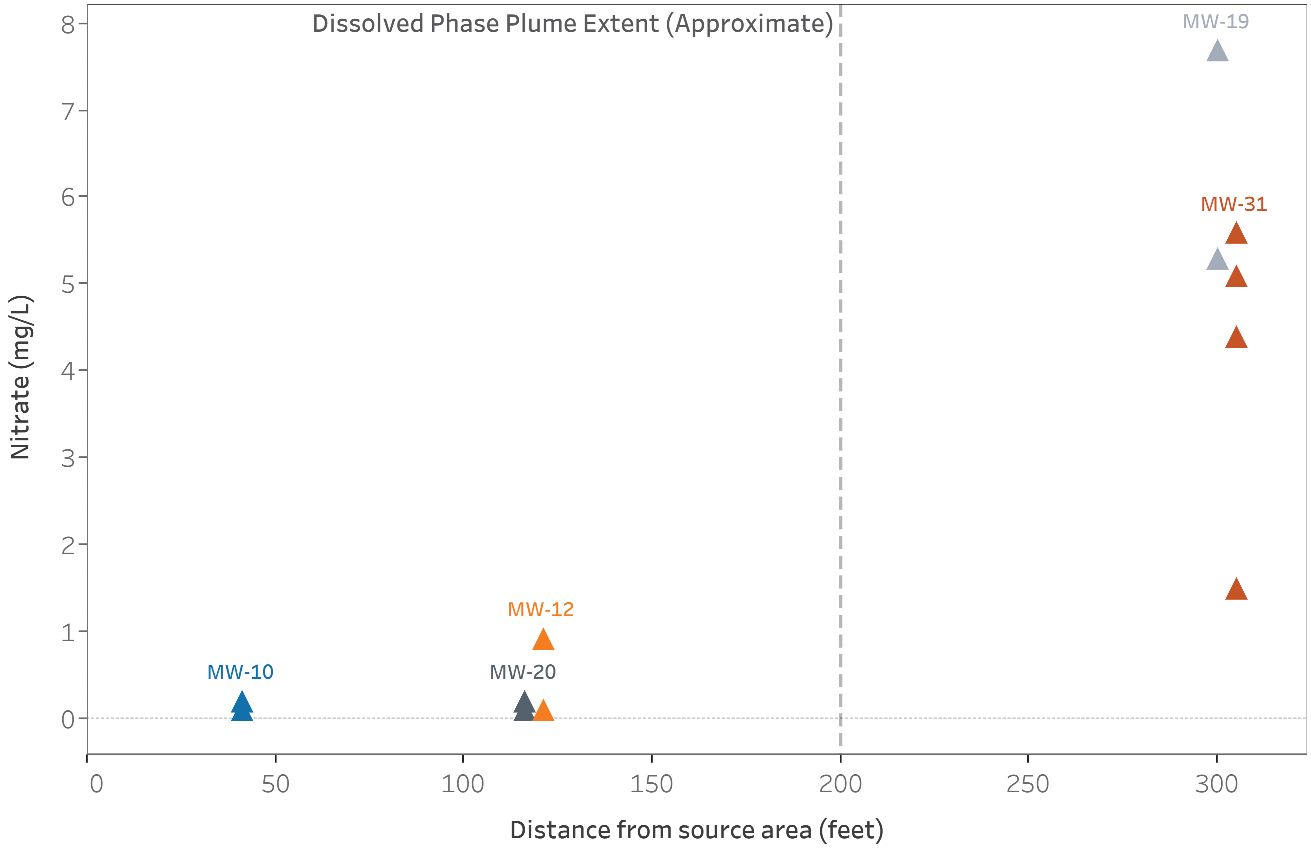


Figure D.3 Ferrous Iron vs. Distance (Alluvial)

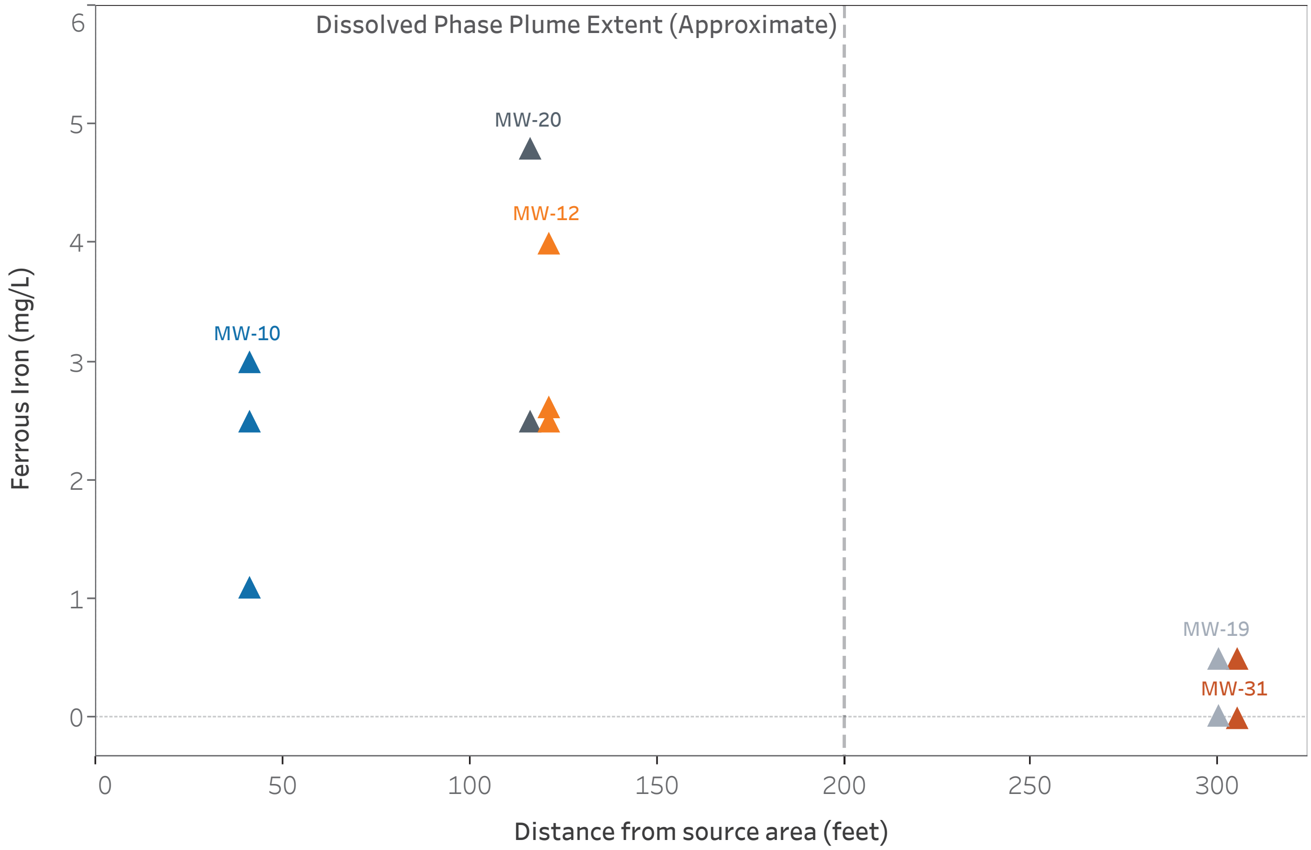


Figure D.4 Total Manganese vs. Distance (Alluvial)

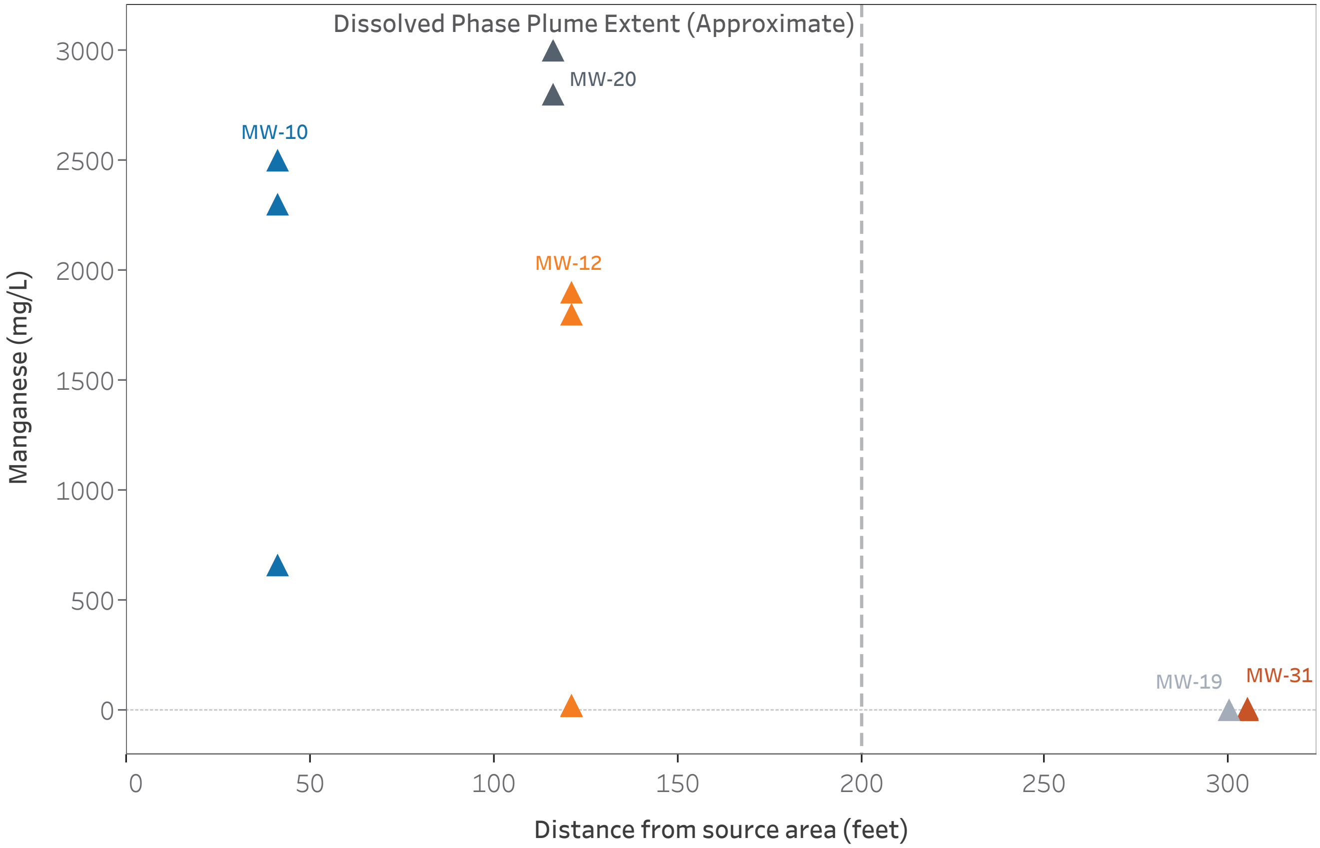


Figure D.5 Sulfate vs. Distance (Alluvial)

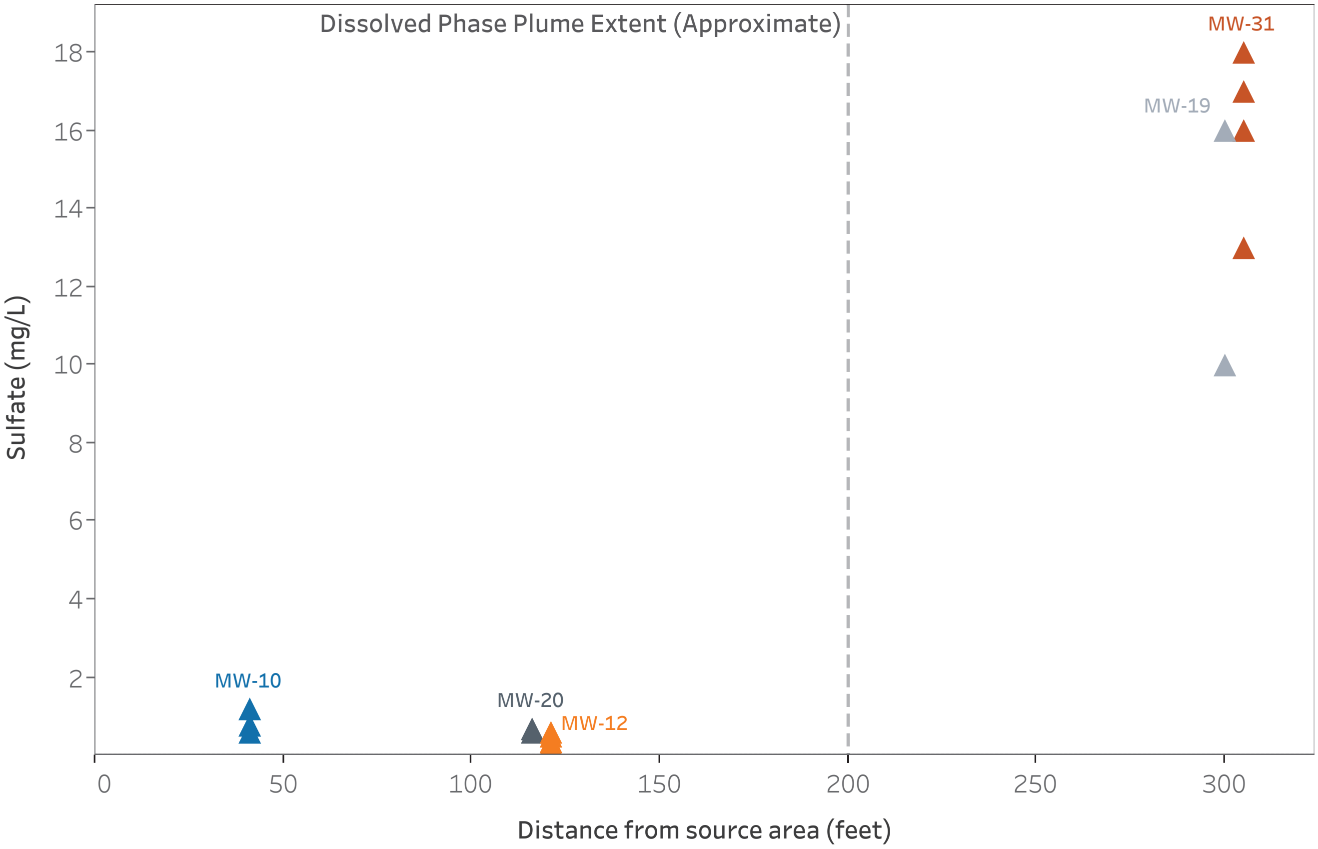


Figure D.6 Methane vs. Distance (Alluvial)

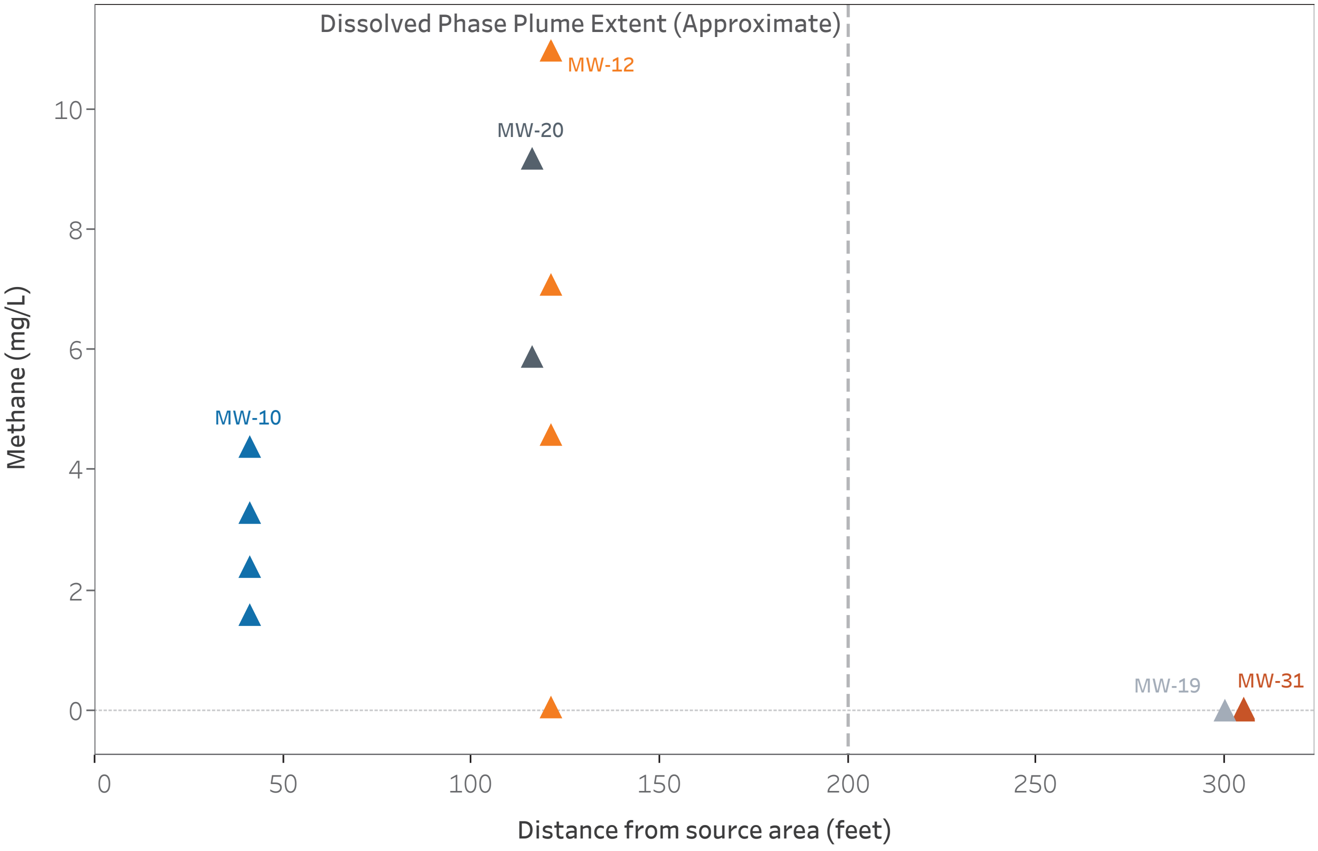


Figure D.7 Total Alkalinity vs. Distance (Alluvial)

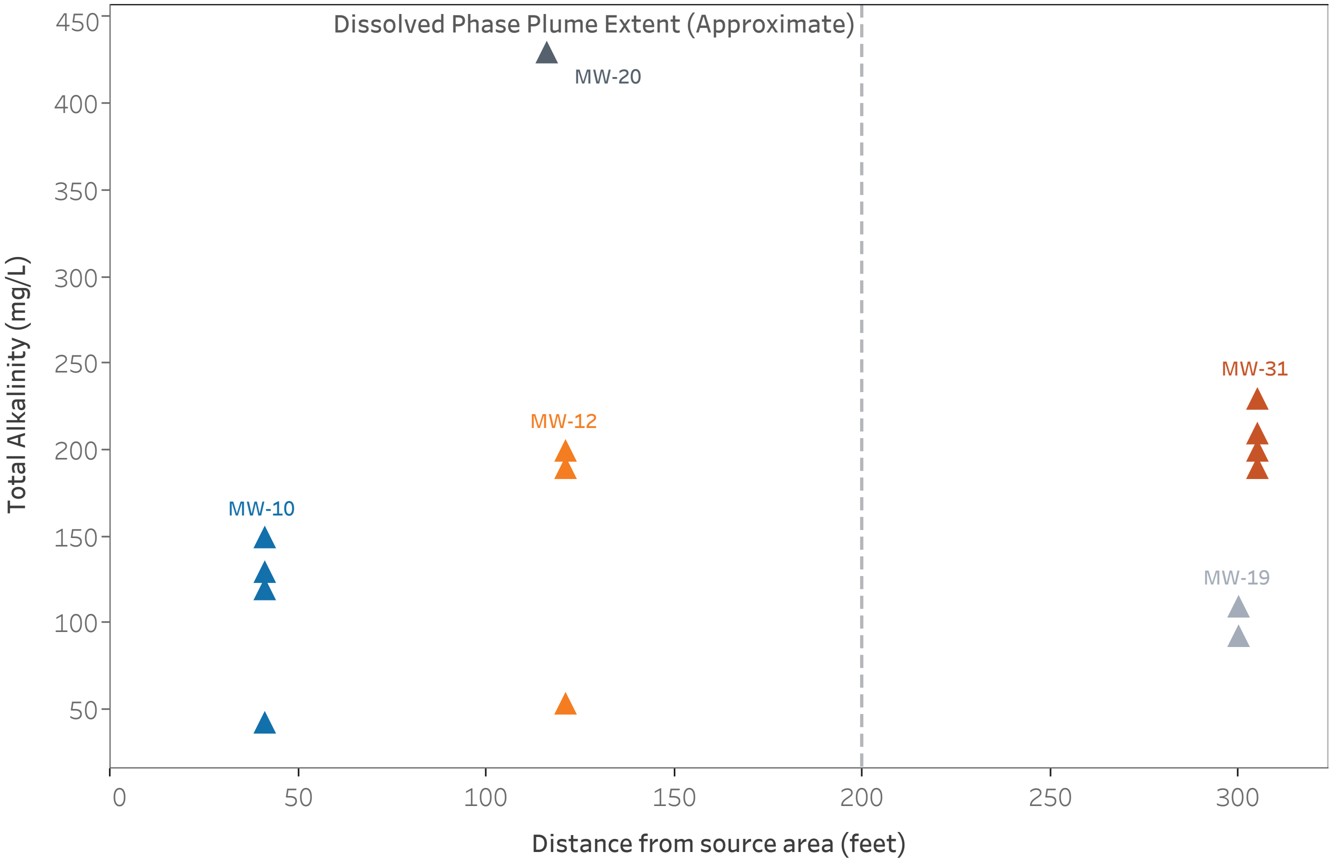


Figure D.8 Dissolved Oxygen vs. Total DRO and ORO

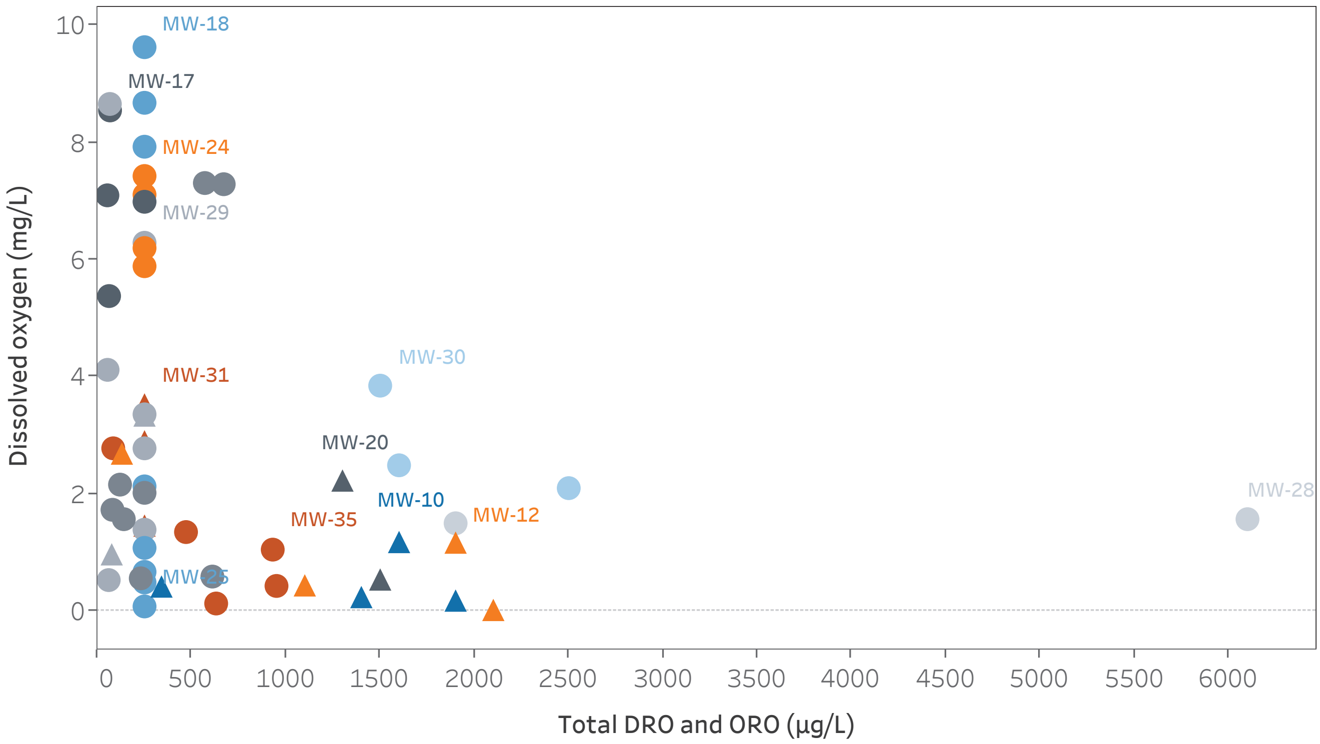


Figure D.9 Nitrate vs. Total DRO and ORO

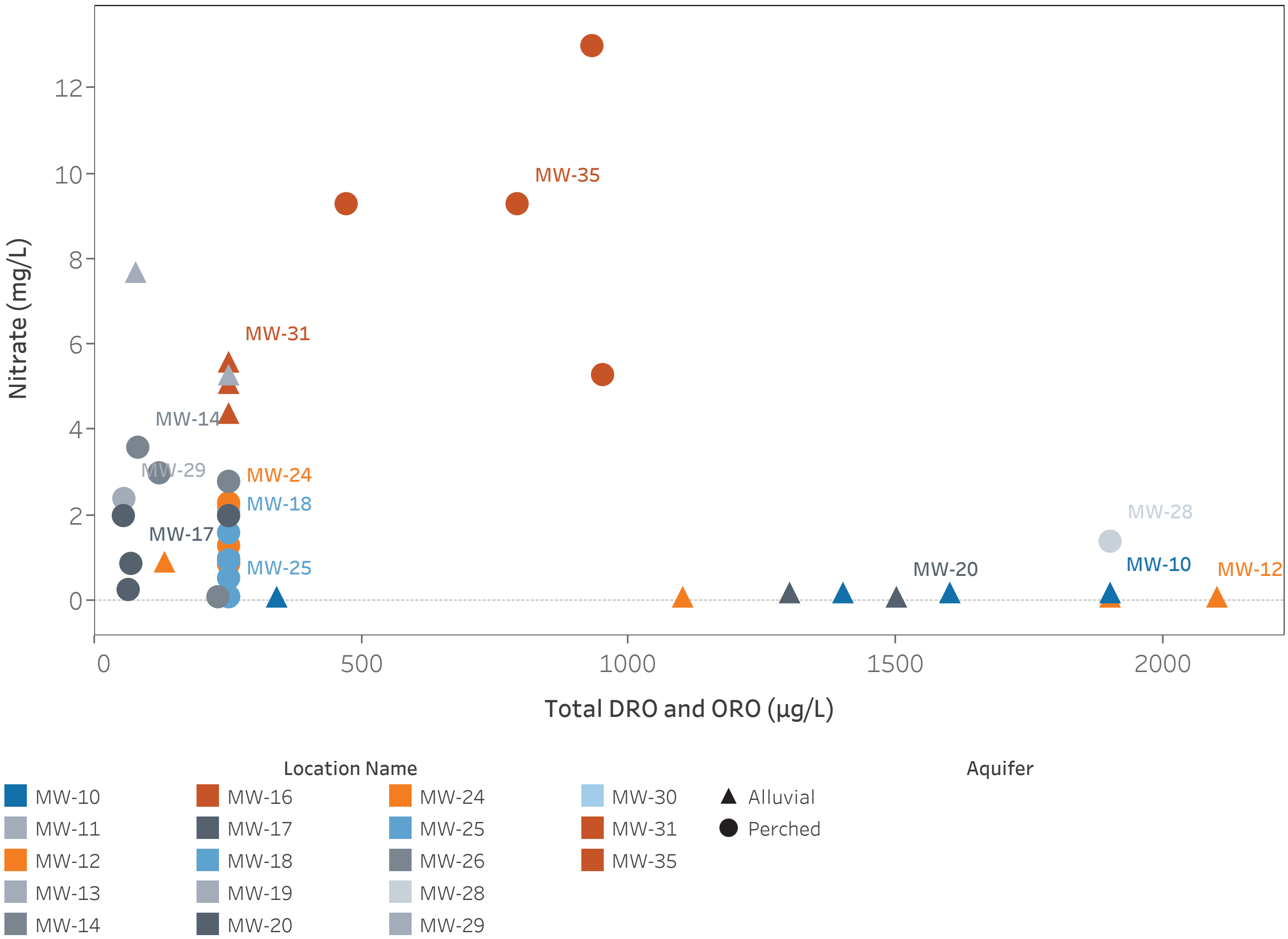


Figure D.10 Ferrous Iron vs. Total DRO and ORO

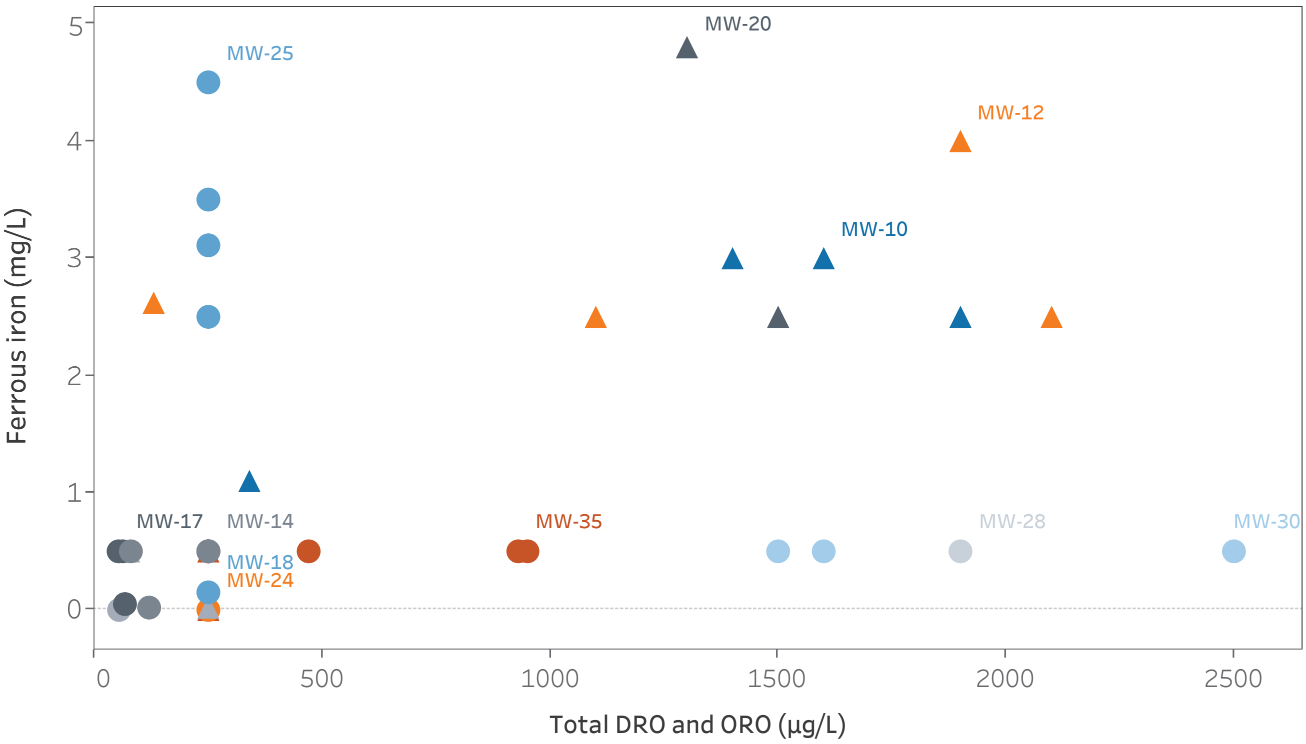


Figure D.11 Total Manganese vs. Total DRO and ORO

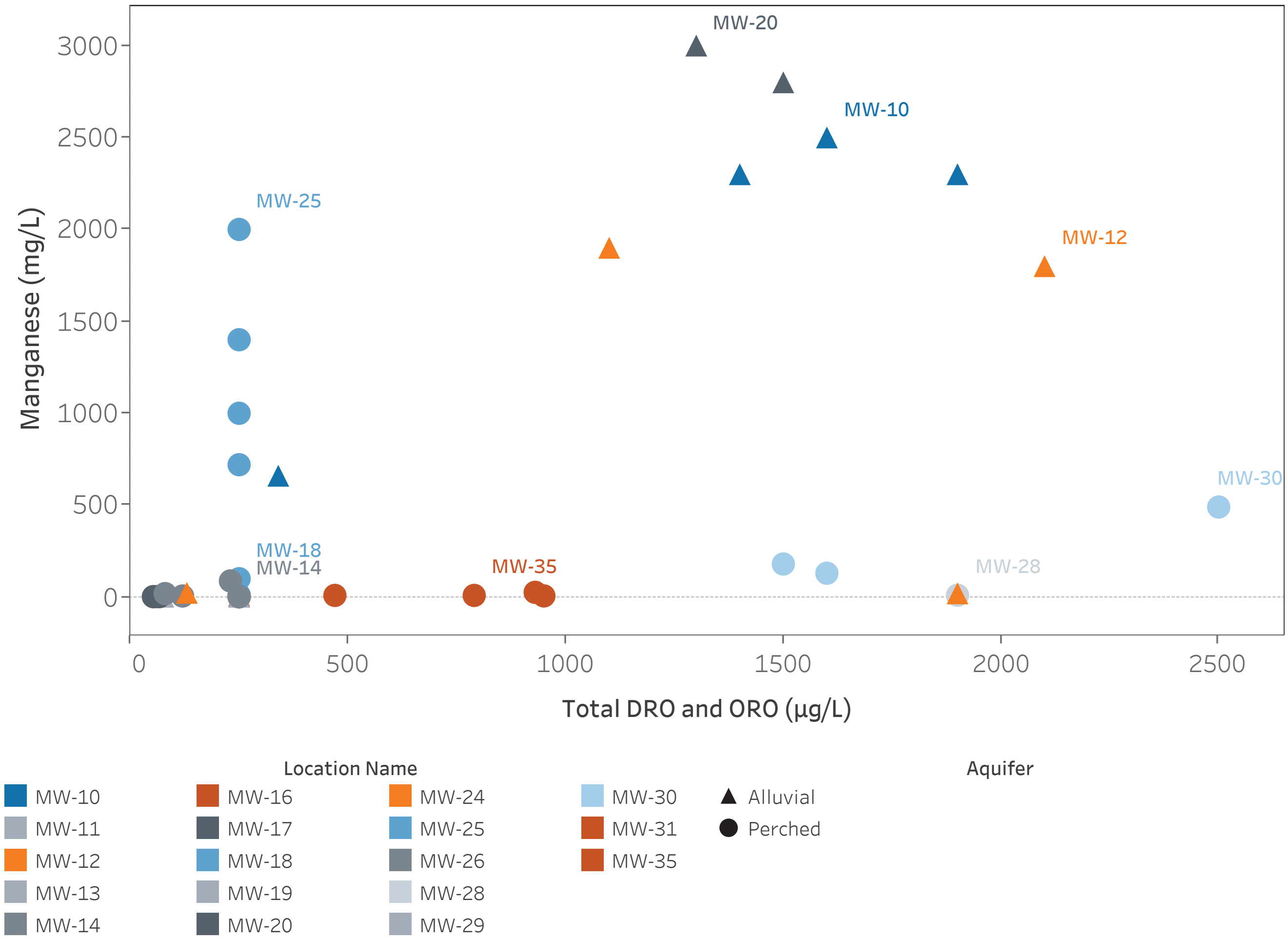


Figure D.12 Sulfate vs. Total DRO and ORO

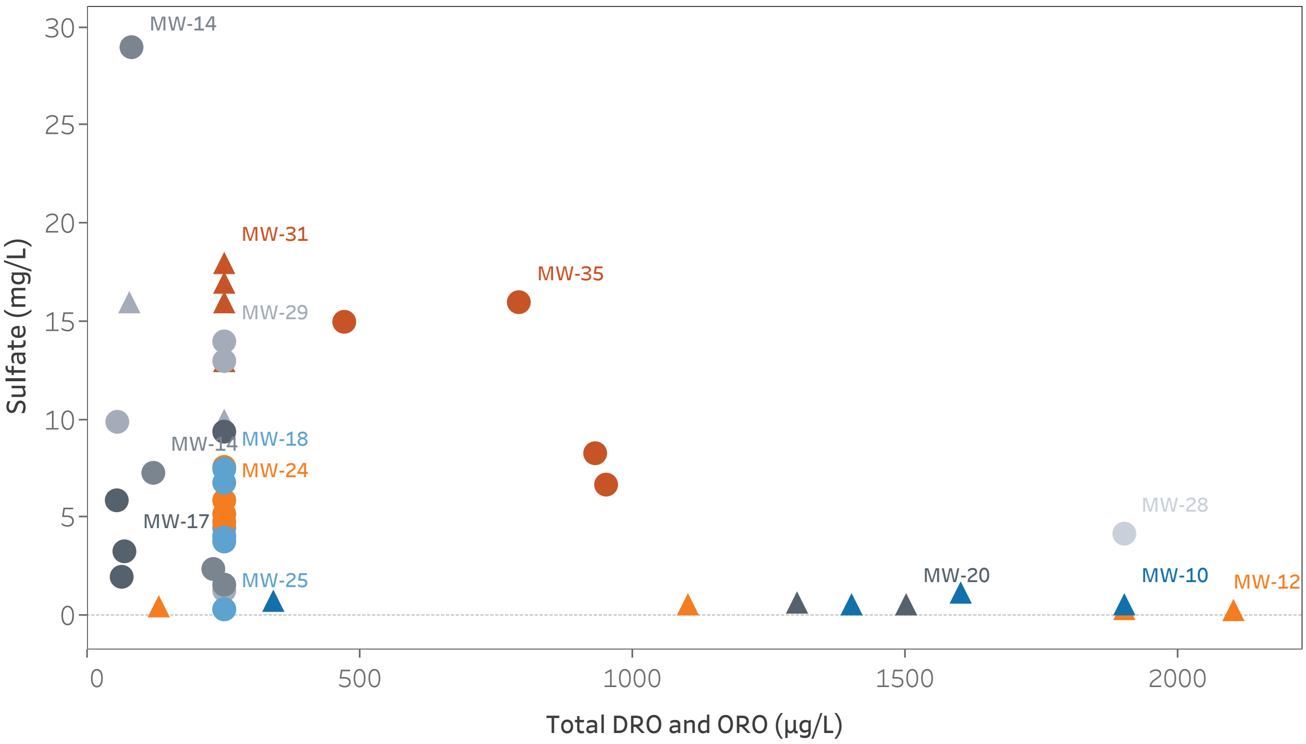


Figure D.13 Methane vs. Total DRO and ORO

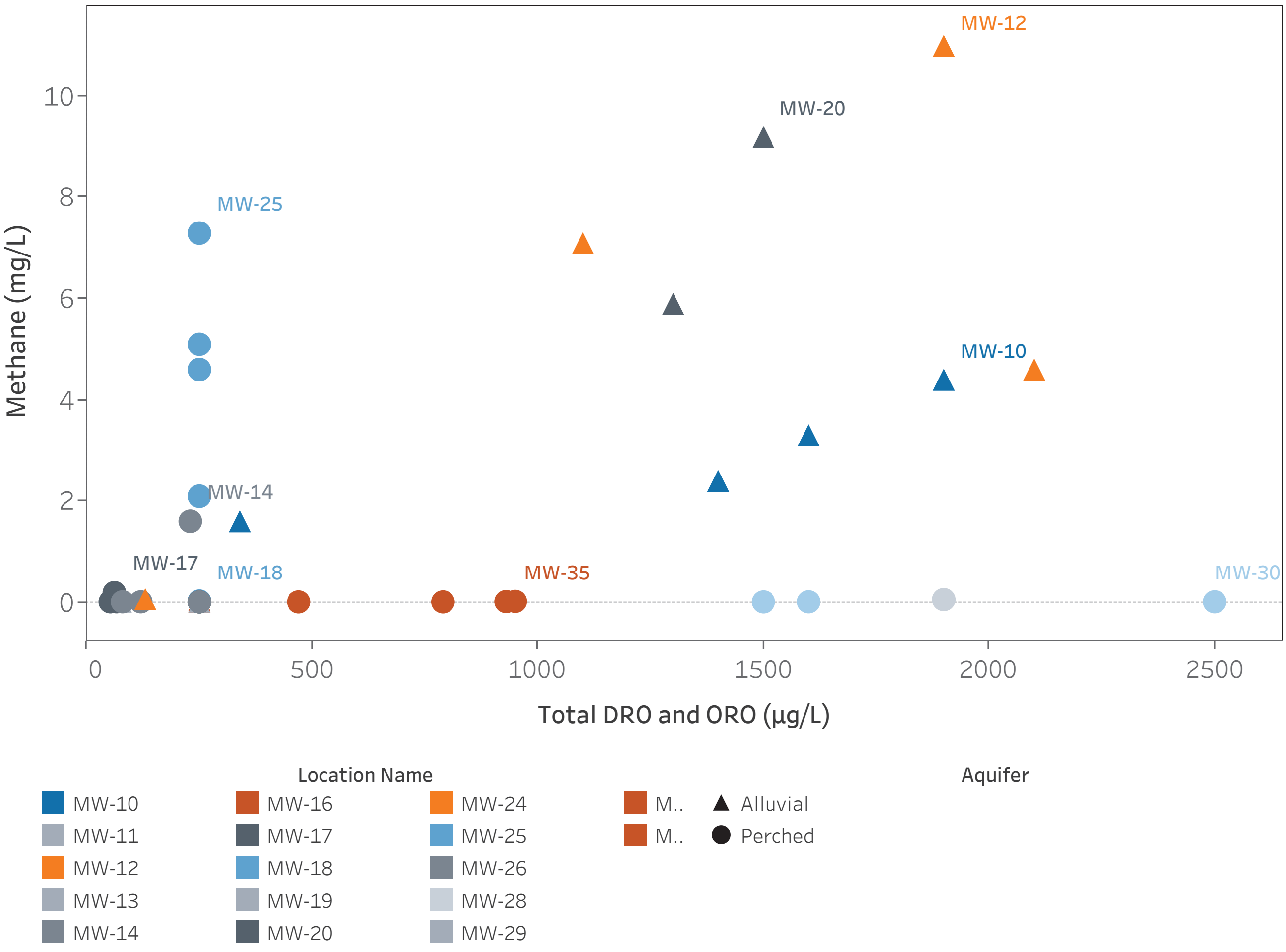


Figure D.14 Total Alkalinity vs. Total DRO and ORO

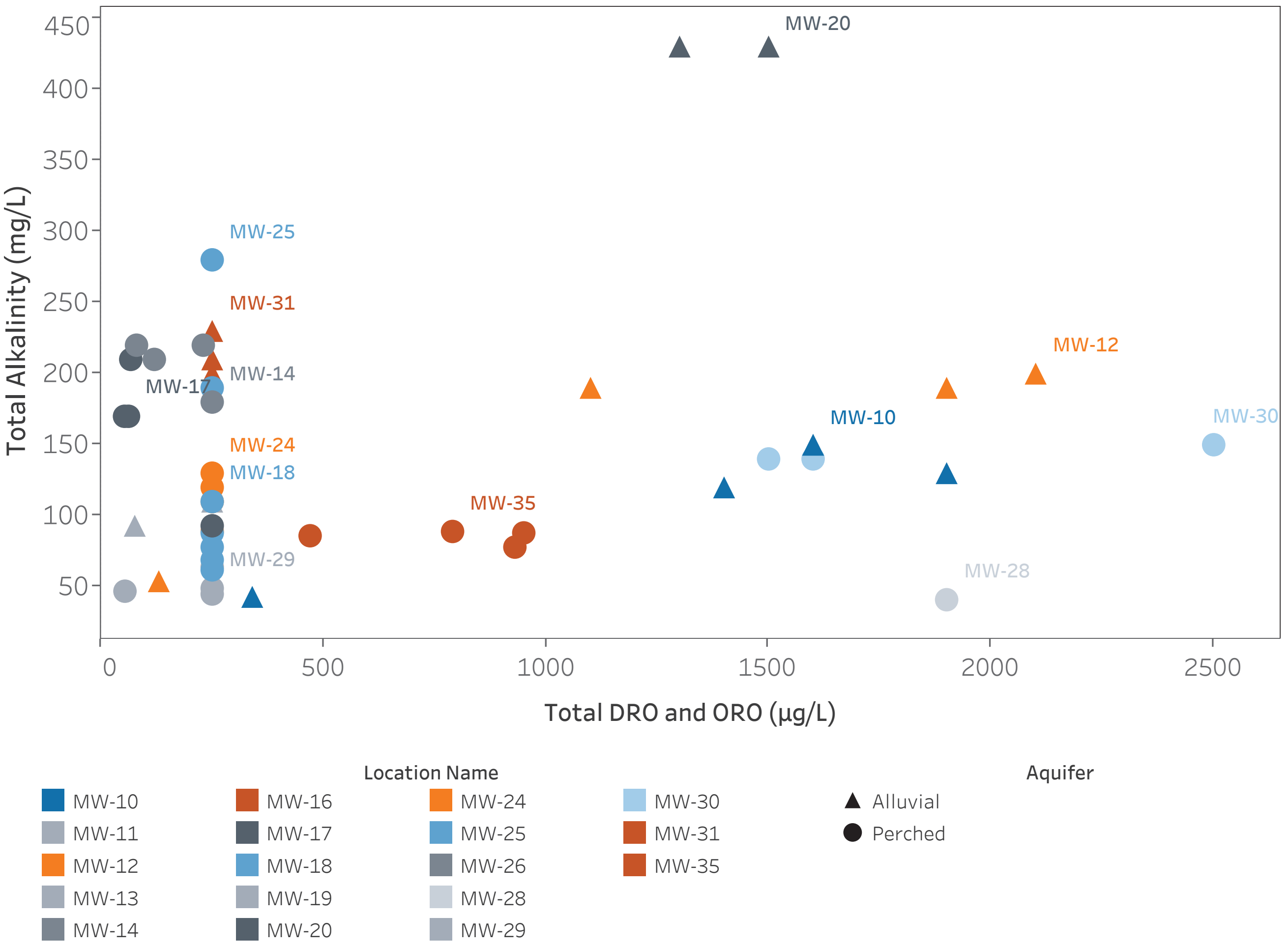


Figure D.15 Dissolved Oxygen and Total DRO and ORO vs. Distance (Perched Zone North)

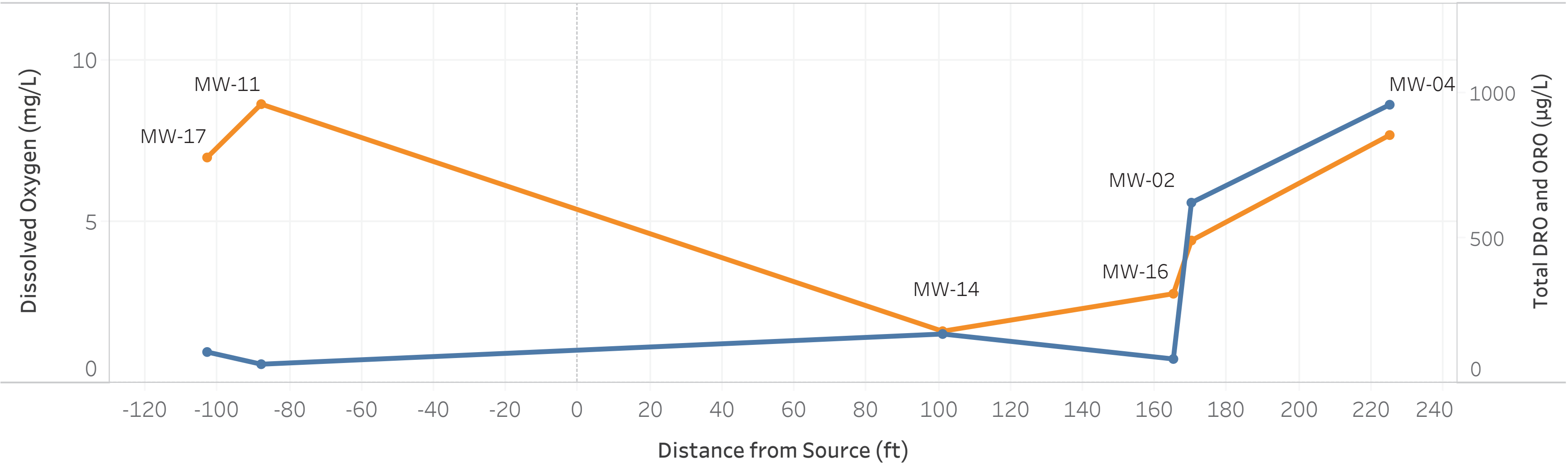
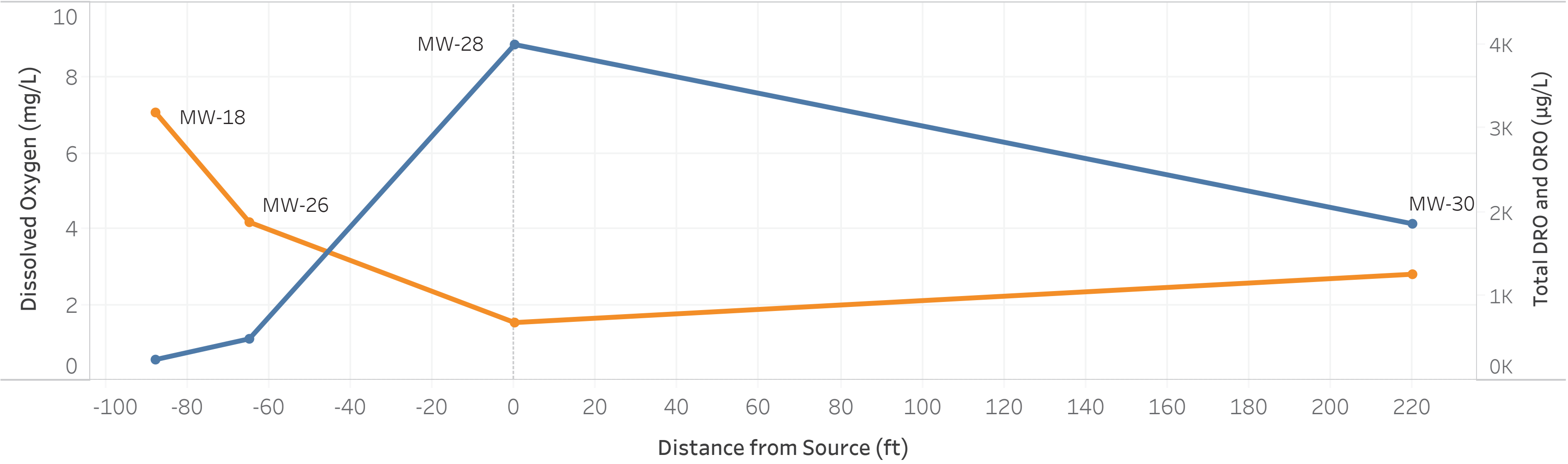


Figure D.16 Dissolved Oxygen and Total DRO and ORO vs. Distance (Perched Zone South)



Legend

🟧 Avg. Dissolved oxygen

🟦 Avg. Total DRO and ORO

Figure D.17 Dissolved Oxygen vs. Distance (Perched)

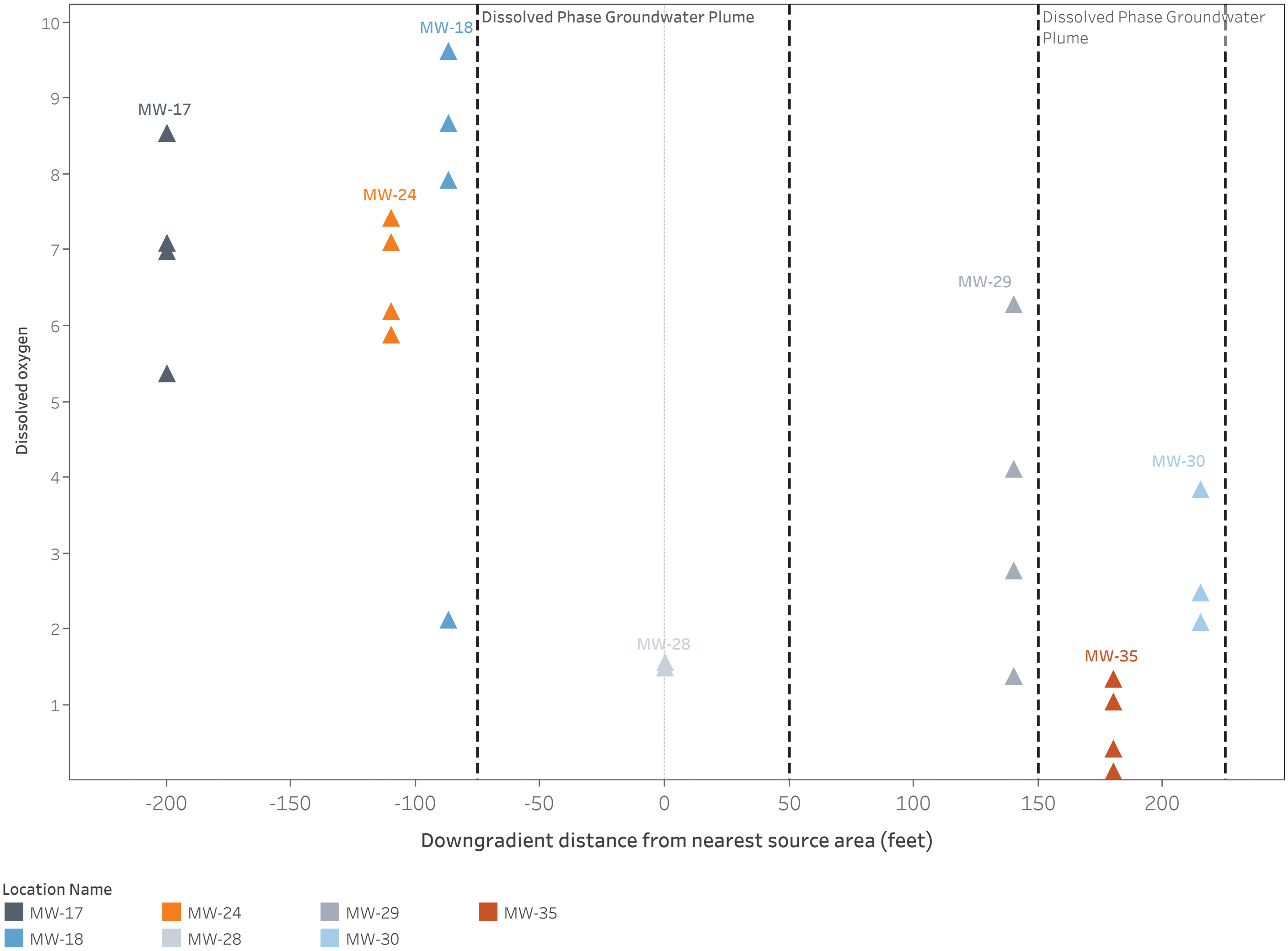


Figure D.18 GRO and Total DRO and ORO Time Series (MW-01, MW-02, MW-06, and MW-10)

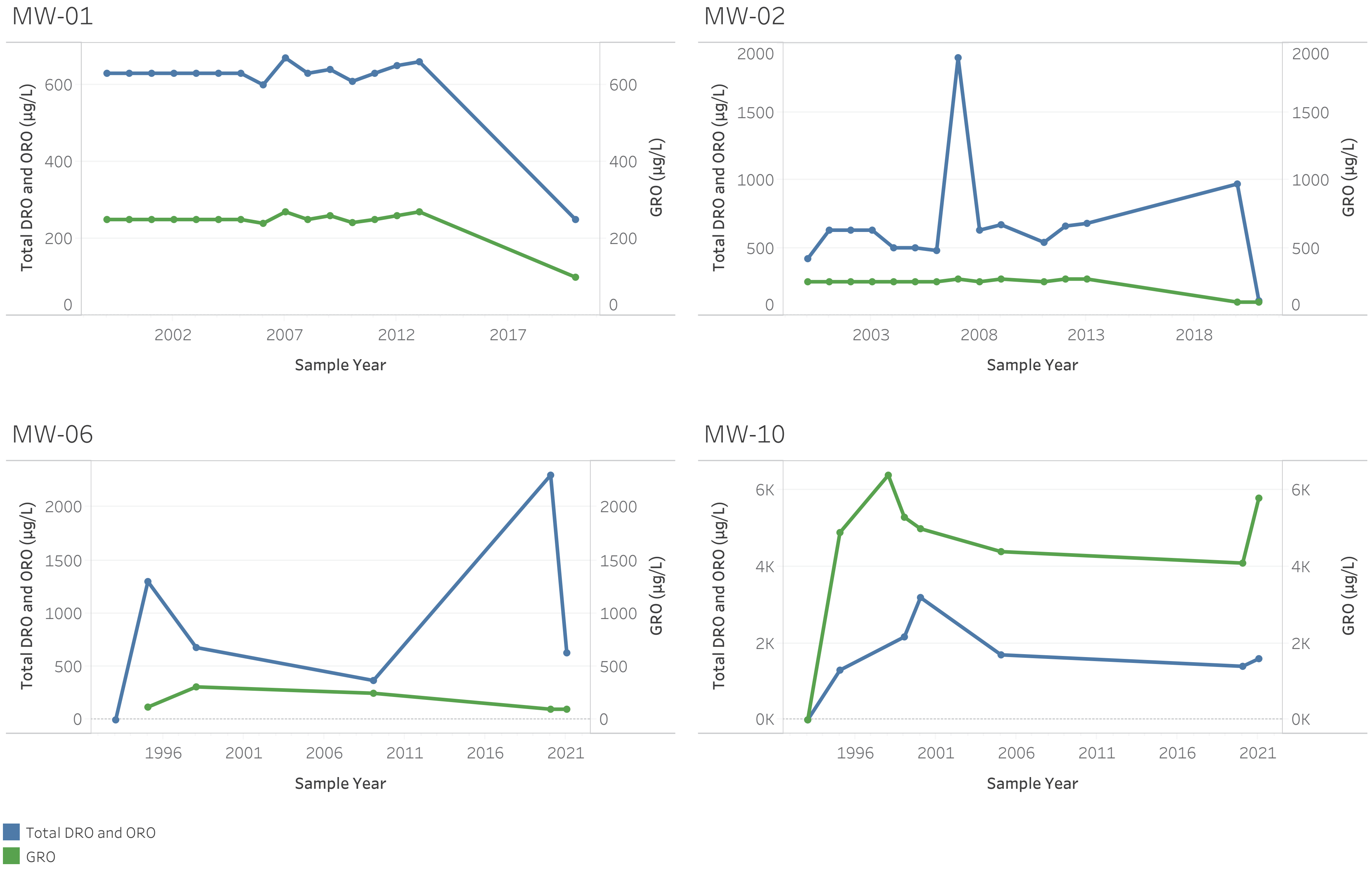


Figure D.19 GRO and Total DRO and ORO Time Series (MW-12, MW-17, MW-22, and MW-23)

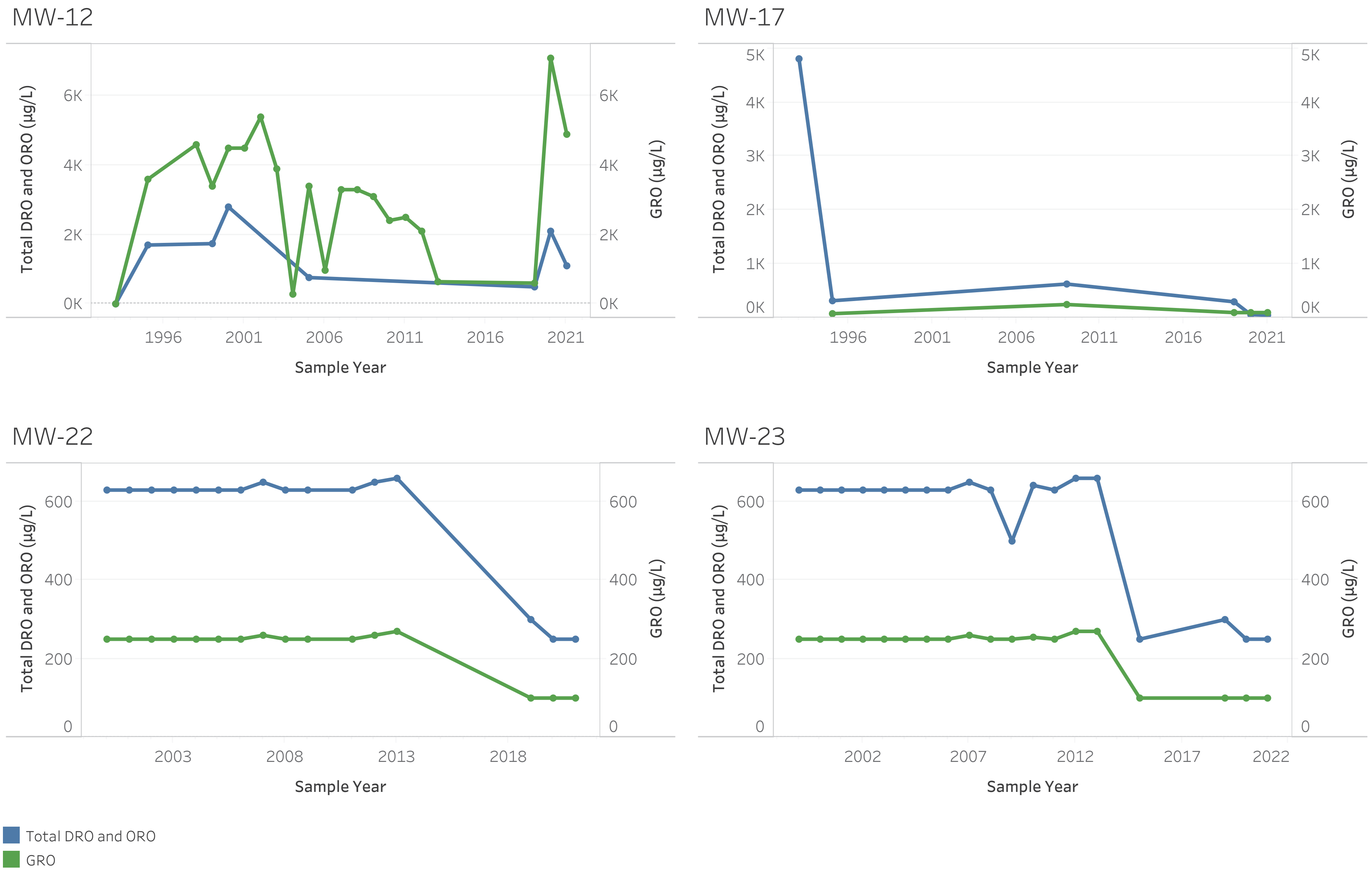


Figure D.20 GRO and Total DRO and ORO Time Series (MW-28, MW-30, MW-31, and MW-32)

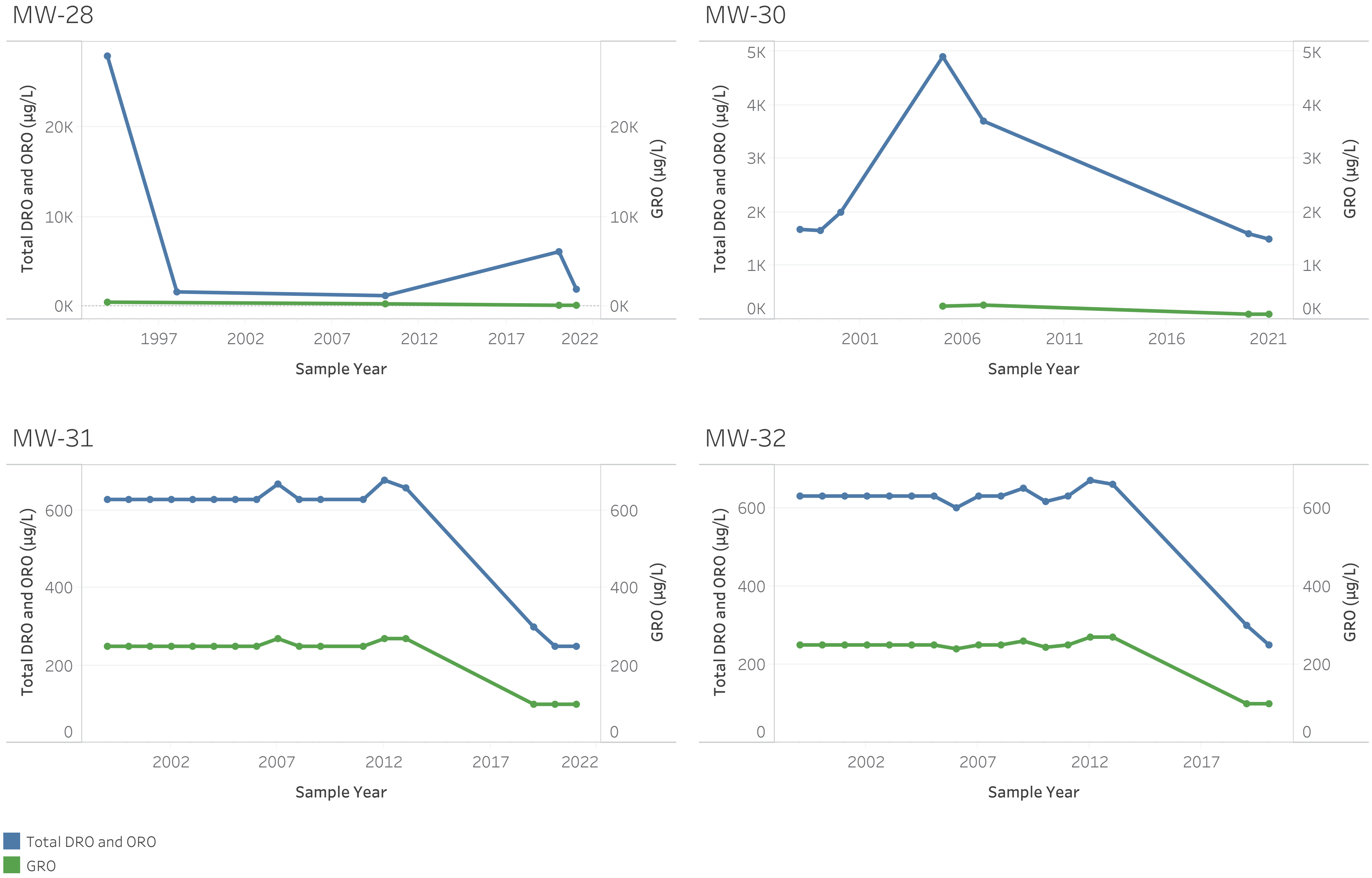
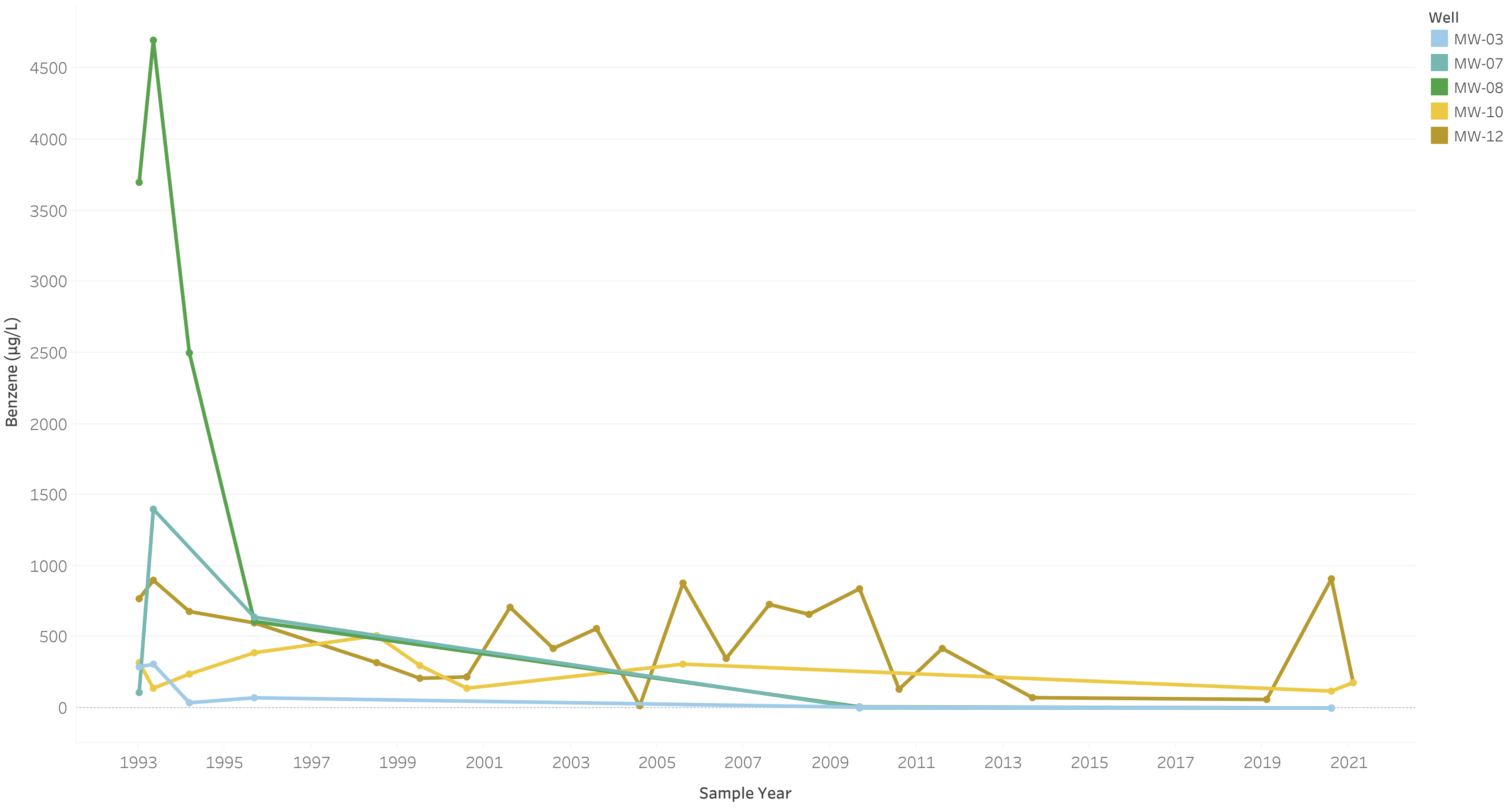


Figure D.21 Benzene Time Series (Alluvial)



Sample Date Month vs. Benzene. Color shows details about Well. The data is filtered on Aquifer, which keeps Alluvial. The view is filtered on Well and Exclusions (Benzene,MONTH(Sample Date),Well). The Well filter keeps MW-03, MW-07, MW-08, MW-10 and MW-12. The Exclusions (Benzene,MONTH(Sample Date),Well) filter keeps 253 members.

Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name: *POL-TPH*
Site Address: *10 E Port Way, Longview, WA*
Additional Description:

Well (Sampling) Location? **MW-02**
Level of Confidence (Decision Criteria)? **85%**

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

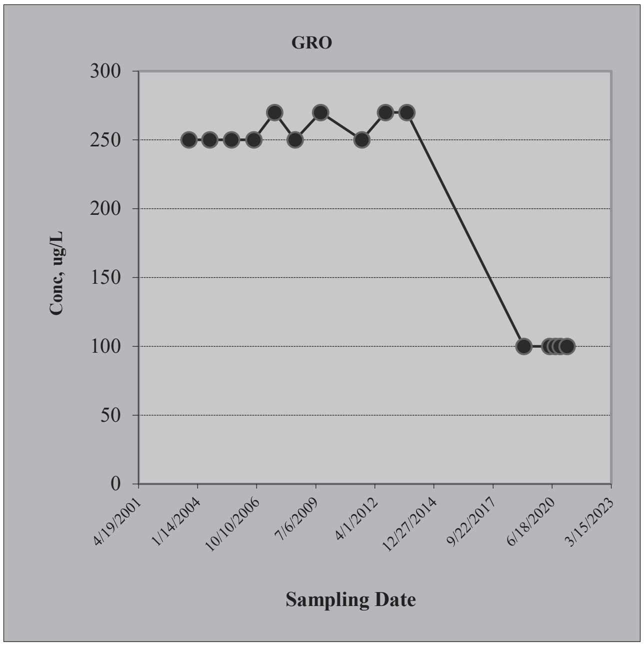
		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
#1	8/21/2003					250	630
#2	8/5/2004					250	500
#3	8/10/2005					250	500
#4	8/21/2006					250	480
#5	8/10/2007	0.5	1	1	1	270	1900
#6	7/22/2008					250	630
#7	9/24/2009					270	670
#8	8/18/2010						
#9	8/26/2011					250	540
#10	9/28/2012					270	660
#11	9/26/2013					270	680
#12	2/27/2019	1	1	1	2	100	300
#13	5/6/2020	0.35	1	1	2	100	310
#14	8/10/2020	0.35	1	1	2	100	970
#15	11/2/2020	0.35	1	1	2	100	1100
#16	2/23/2021	0.35	1	1	2	100	110

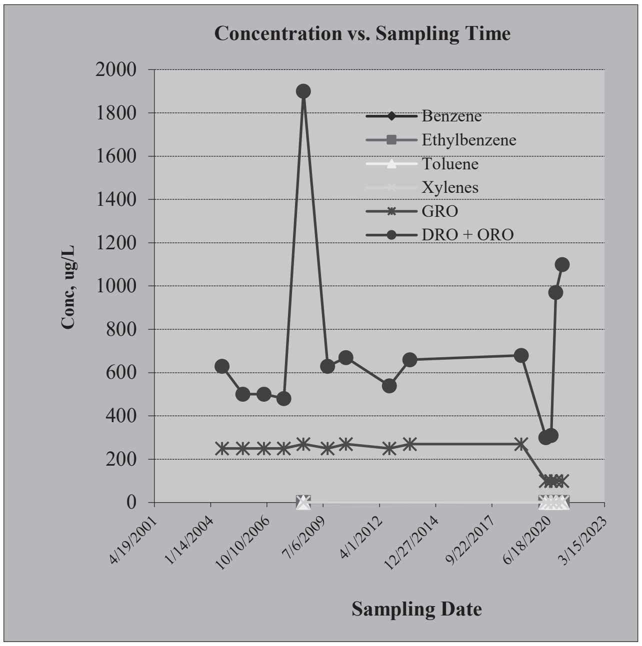
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	**Benzene**	**Ethylbenzene**	**Toluene**	**Xylenes**	**GRO**	**DRO + ORO**
Confidence Level Calculated?	86.40%	-500.00%	-500.00%	76.50%	93.00%	53.90%
Plume Stability?	Shrinking	Stable	Stable	Stable	Shrinking	Stable
Coefficient of Variation?		CV <= 1	CV <= 1	CV <= 1		CV <= 1
Mann-Kendall Statistic "S" value?	-7	0	0	5	-32	3
Number of Sampling Rounds?	6	6	6	6	15	15
Average Concentration?	0.48	1.00	1.00	1.83	205.33	665.33
Standard Deviation?	0.26	0.00	0.00	0.41	77.54	421.03
Coefficient of Variation?	0.54	0.00	0.00	0.22	0.38	0.63
Blank if No Errors found						

3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? **GRO**
Plume Stability? **Shrinking**





Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name:	*POL-TPH*
Site Address:	*10 E Port Way, Longview, WA*
Additional Description:	

Well (Sampling) Location?	**MW-10**
Level of Confidence (Decision Criteria)?	**85%**

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

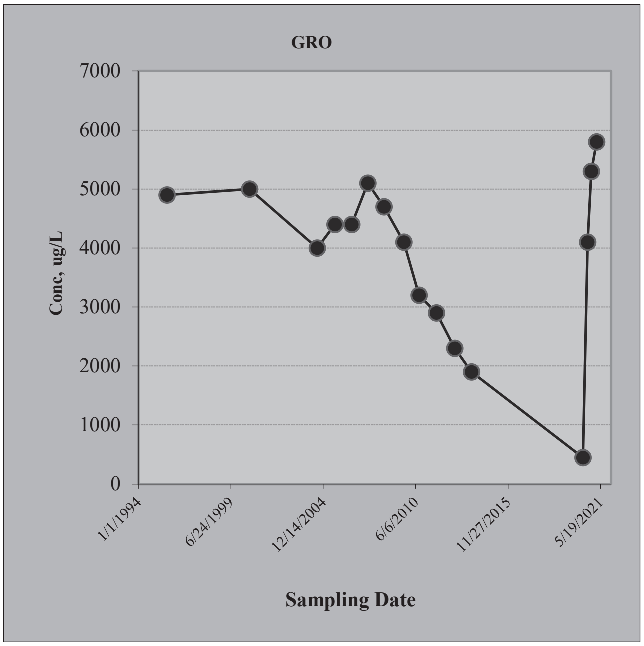
		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
#1	9/13/1995	390	230	57	88	4900	1300
#2	8/3/2000	140	210	50	75	5000	3200
#3	8/5/2004	110	140	21	42	4000	
#4	8/26/2005	310	290	51	77.4	4400	1700
#5	8/21/2006	430	280	65	90	4400	
#6	8/9/2007	360	230	54	90.6	5100	
#7	7/23/2008	340	260	51	65.6	4700	
#8	9/24/2009	160	130	37	54.3	4100	
#9	8/19/2010	70	99	16	22	3200	
#10	8/26/2011	110	130	24	28	2900	
#11	9/28/2012					2300	
#12	9/26/2013	64	55	13	25	1900	
#13	5/6/2020	42	7.6	5	2.5	450	340
#14	8/10/2020	120	60	19	20	4100	1400
#15	11/2/2020	170	83	28	38	5300	1900
#16	2/23/2021	180	68	31	46	5800	1600

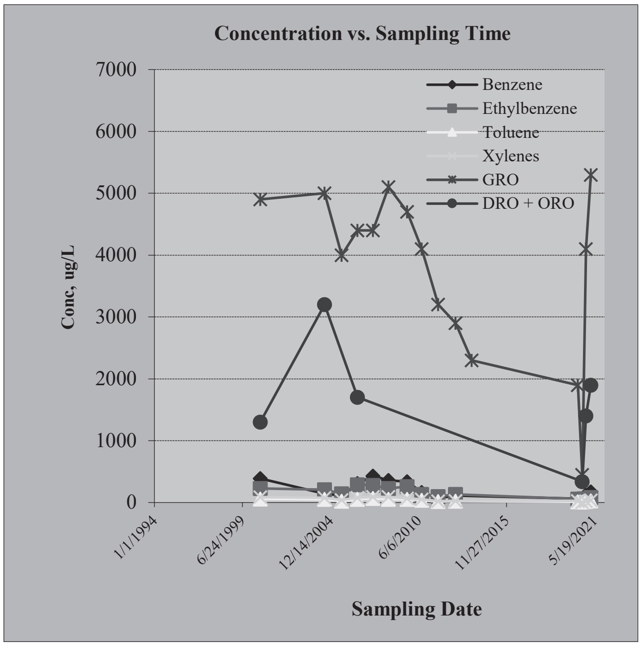
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	**Benzene**	**Ethylbenzene**	**Toluene**	**Xylenes**	**GRO**	**DRO + ORO**
Confidence Level Calculated?	91.60%	99.90%	98.20%	99.20%	84.70%	50.00%
Plume Stability?	Shrinking	Shrinking	Shrinking	Shrinking	Stable	Stable
Coefficient of Variation?					CV <= 1	CV <= 1
Mann-Kendall Statistic "S" value?	-30	-61	-44	-49	-24	1
Number of Sampling Rounds?	15	15	15	15	16	7
Average Concentration?	199.73	151.51	34.80	50.96	3909.38	1634.29
Standard Deviation?	129.77	91.45	18.65	28.77	1423.64	853.36
Coefficient of Variation?	0.65	0.60	0.54	0.56	0.36	0.52
Blank if No Errors found						

3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance?	**GRO**
Plume Stability?	**Stable**





Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name:	*POL-TPH*
Site Address:	*10 E Port Way, Longview, WA*
Additional Description:	

Well (Sampling) Location?	**MW-12**
Level of Confidence (Decision Criteria)?	**85%**

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

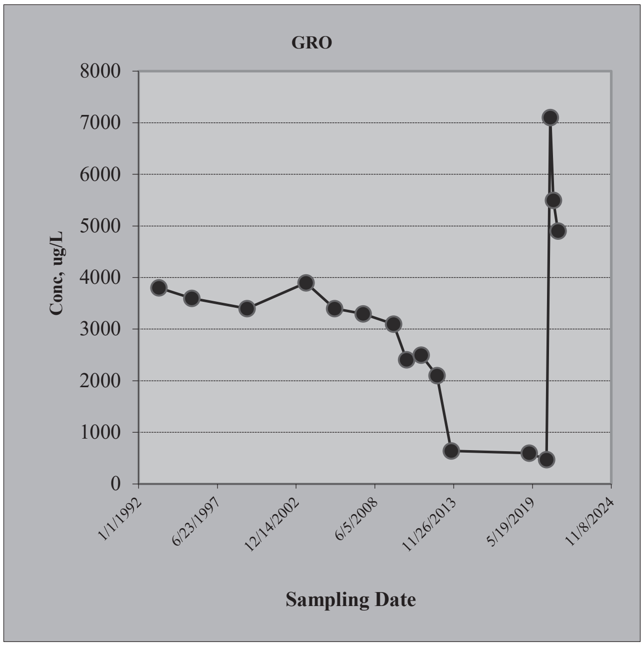
		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
#1	5/27/1993	900	74	67	120	3800	1750
#2	9/13/1995	600	84	56	110	3600	1700
#3	7/16/1999	210	34	24	56	3400	1740
#4	8/21/2003	560	54	40	74.7	3900	
#5	8/11/2005	880	63	52	84	3400	760
#6	8/9/2007	730	48	42	72.2	3300	
#7	9/23/2009	840	44	48	67	3100	
#8	8/19/2010	133	46.1	29.6	52	2410	
#9	8/25/2011	420	24	25	38	2500	
#10	9/27/2012					2100	
#11	9/26/2013	74	13	6	11	640	
#12	2/27/2019	61	3.5	6.4	6.2	600	490
#13	5/6/2020	81	2	2.8	3.6	470	130
#14	8/10/2020	910	46	42	58	7100	2100
#15	11/2/2020	620	39	39	63	5500	1900
#16	2/23/2021	180	36	23	39	4900	1100

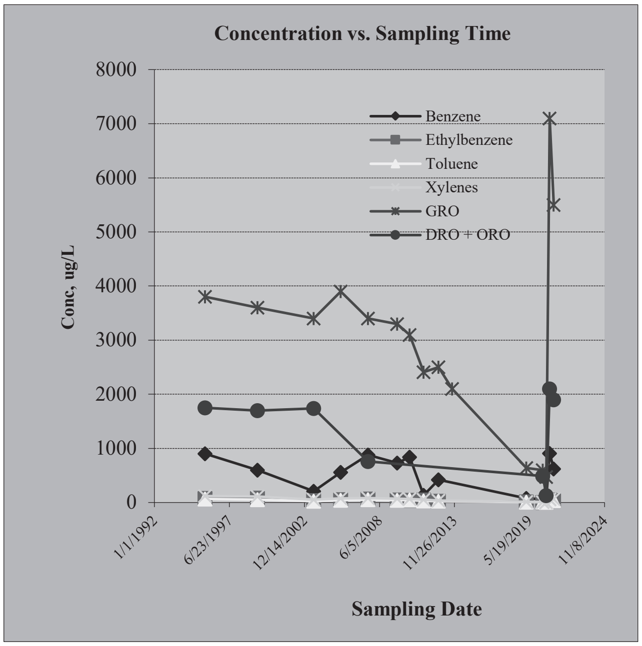
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	**Benzene**	**Ethylbenzene**	**Toluene**	**Xylenes**	**GRO**	**DRO + ORO**
Confidence Level Calculated?	89.90%	99.80%	99.20%	99.90%	91.70%	61.90%
Plume Stability?	Shrinking	Shrinking	Shrinking	Shrinking	Shrinking	Stable
Coefficient of Variation?						CV <= 1
Mann-Kendall Statistic "S" value?	-27	-57	-50	-61	-33	-4
Number of Sampling Rounds?	15	15	15	15	16	9
Average Concentration?	479.93	40.71	33.52	56.98	3170.00	1296.67
Standard Deviation?	331.70	23.57	19.12	34.28	1780.94	699.34
Coefficient of Variation?	0.69	0.58	0.57	0.60	0.56	0.54
Blank if No Errors found						

3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance?	**GRO**
Plume Stability?	**Shrinking**





Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name:	*POL-TPH*
Site Address:	*10 E Port Way, Longview, WA*
Additional Description:	

Well (Sampling) Location?	**MW-30**
Level of Confidence (Decision Criteria)?	**85%**

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

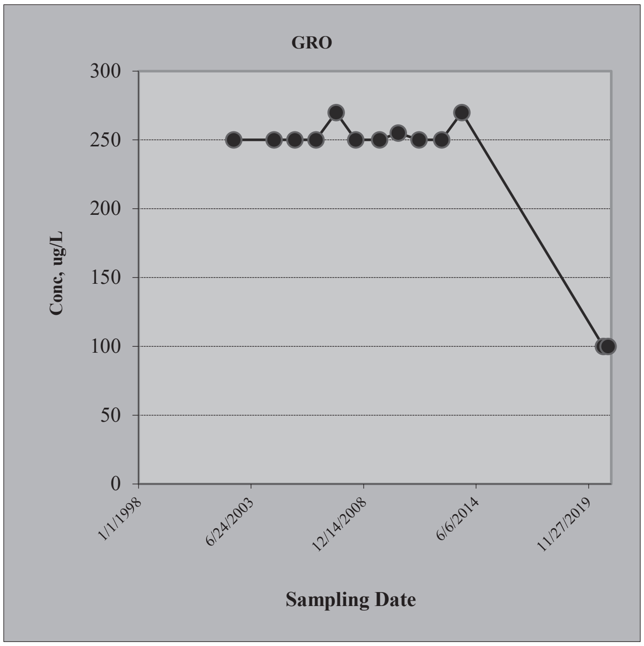
		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
#1	8/24/1998						1680
#2	11/18/1999						1660
#3	8/19/2002					250	
#4	8/5/2004					250	
#5	8/10/2005					250	4900
#6	8/21/2006					250	
#7	8/10/2007	0.5	1	1	1	270	3680
#8	7/23/2008					250	
#9	9/25/2009					250	
#10	8/20/2010					255	
#11	8/26/2011					250	
#12	9/28/2012					250	
#13	9/26/2013					270	
#14	8/11/2020	0.35	1	1	2	100	1600
#15	11/2/2020	0.35	1	1	2	100	2500
#16	2/24/2021	0.35	1	1	2	100	1500

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	**Benzene**	**Ethylbenzene**	**Toluene**	**Xylenes**	**GRO**	**DRO + ORO**
Confidence Level Calculated?	62.50%	37.50%	37.50%	62.50%	86.00%	80.90%
Plume Stability?	Stable	Stable	Stable	Stable	Shrinking	Stable
Coefficient of Variation?	CV <= 1	CV <= 1	CV <= 1	CV <= 1		CV <= 1
Mann-Kendall Statistic "S" value?	-3	0	0	3	-21	-7
Number of Sampling Rounds?	4	4	4	4	14	7
Average Concentration?	0.39	1.00	1.00	1.75	221.07	2502.86
Standard Deviation?	0.08	0.00	0.00	0.50	65.99	1312.78
Coefficient of Variation?	0.19	0.00	0.00	0.29	0.30	0.52
Blank if No Errors found						

3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance?	**GRO**
Plume Stability?	**Shrinking**



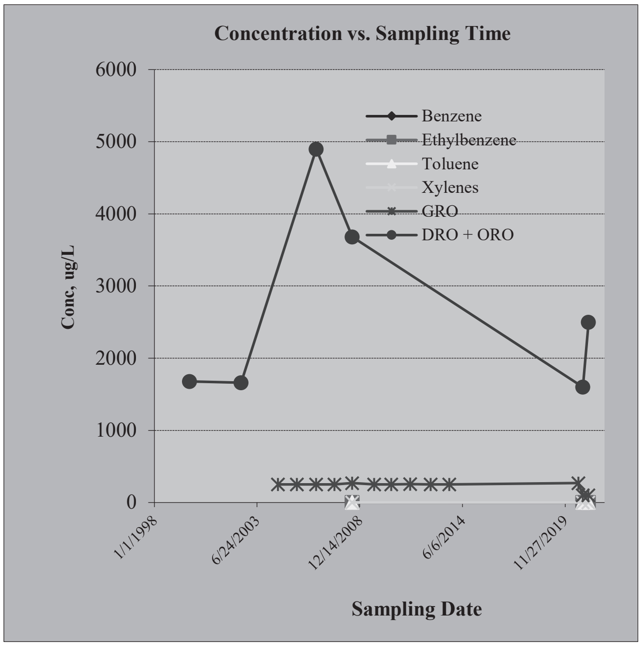
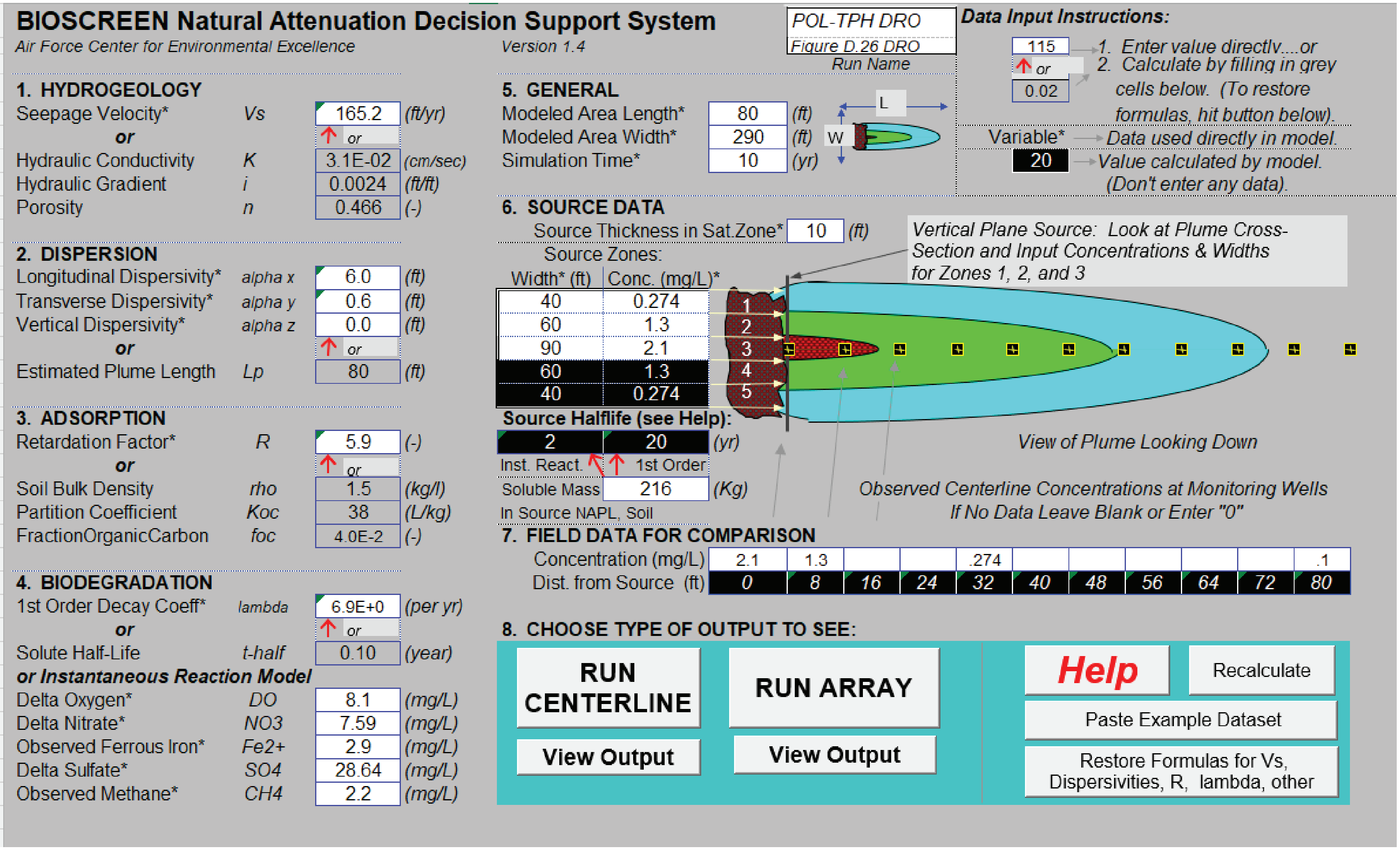


Figure D.26 DRO Bioscreen Inputs



BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence

Version 1.4

POL-TPH DRO

Figure D.26 DRO

Run Name

Data Input Instructions:

115 → 1. Enter value directly....or

or 0.02 → 2. Calculate by filling in grey cells below. (To restore formulas, hit button below).

Variable* → Data used directly in model.

20 → Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	165.2	(ft/yr)
or		or	
Hydraulic Conductivity	K	3.1E-02	(cm/sec)
Hydraulic Gradient	i	0.0024	(ft/ft)
Porosity	n	0.466	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	6.0	(ft)
Transverse Dispersivity*	alpha y	0.6	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	80	(ft)

3. ADSORPTION

Retardation Factor*	R	5.9	(-)
or		or	
Soil Bulk Density	rho	1.5	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	4.0E-2	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	6.9E+0	(per yr)
or		or	
Solute Half-Life	t-half	0.10	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	8.1	(mg/L)
Delta Nitrate*	NO3	7.59	(mg/L)
Observed Ferrous Iron*	Fe2+	2.9	(mg/L)
Delta Sulfate*	SO4	28.64	(mg/L)
Observed Methane*	CH4	2.2	(mg/L)

5. GENERAL

Modeled Area Length*	80	(ft)
Modeled Area Width*	290	(ft)
Simulation Time*	10	(yr)

6. SOURCE DATA

Source Thickness in Sat.Zone* 10 (ft)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3

Source Zones:

Width* (ft)	Conc. (mg/L)*
40	0.274
60	1.3
90	2.1
60	1.3
40	0.274

View of Plume Looking Down

Source Halflife (see Help):

Inst. React.	1st Order	
2	20	(yr)

Soluble Mass 216 (Kg)

In Source NAPL, Soil

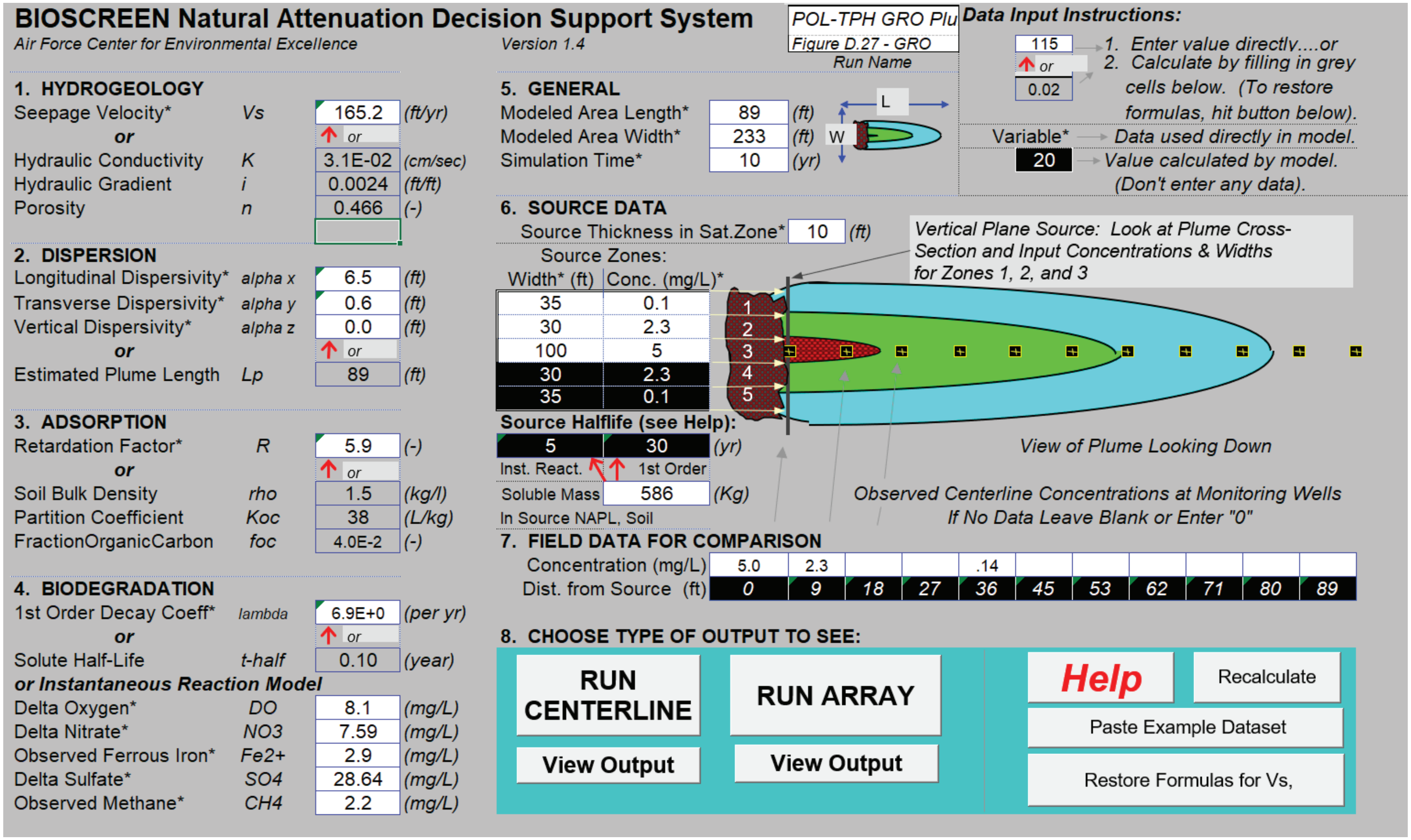
Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)	2.1	1.3			.274						.1
Dist. from Source (ft)	0	8	16	24	32	40	48	56	64	72	80

8. CHOOSE TYPE OF OUTPUT TO SEE:

Figure D.27 GRO Bioscreen Inputs



BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence

Version 1.4

POL-TPH GRO Plu

Figure D.27 - GRO

Run Name

Data Input Instructions:

115 → *1. Enter value directly....or*

↑ *or* *2. Calculate by filling in grey cells below. (To restore formulas, hit button below).*

0.02

Variable* → *Data used directly in model.*

20 → *Value calculated by model. (Don't enter any data).*

1. HYDROGEOLOGY

Seepage Velocity*	*Vs*	165.2	*(ft/yr)*
or		↑ *or*	
Hydraulic Conductivity	*K*	3.1E-02	*(cm/sec)*
Hydraulic Gradient	*i*	0.0024	*(ft/ft)*
Porosity	*n*	0.466	*(-)*

2. DISPERSION

Longitudinal Dispersivity*	*alpha x*	6.5	*(ft)*
Transverse Dispersivity*	*alpha y*	0.6	*(ft)*
Vertical Dispersivity*	*alpha z*	0.0	*(ft)*
or		↑ *or*	
Estimated Plume Length	*Lp*	89	*(ft)*

3. ADSORPTION

Retardation Factor*	*R*	5.9	*(-)*
or		↑ *or*	
Soil Bulk Density	*rho*	1.5	*(kg/l)*
Partition Coefficient	*Koc*	38	*(L/kg)*
FractionOrganicCarbon	*foc*	4.0E-2	*(-)*

4. BIODEGRADATION

1st Order Decay Coeff*	*lambda*	6.9E+0	*(per yr)*
or		↑ *or*	
Solute Half-Life	*t-half*	0.10	*(year)*
or Instantaneous Reaction Model			
Delta Oxygen*	*DO*	8.1	*(mg/L)*
Delta Nitrate*	*NO3*	7.59	*(mg/L)*
Observed Ferrous Iron*	*Fe2+*	2.9	*(mg/L)*
Delta Sulfate*	*SO4*	28.64	*(mg/L)*
Observed Methane*	*CH4*	2.2	*(mg/L)*

5. GENERAL

Modeled Area Length*	89	*(ft)*
Modeled Area Width*	233	*(ft)*
Simulation Time*	10	*(yr)*

6. SOURCE DATA

Source Thickness in Sat.Zone* 10 *(ft)*

Source Zones:

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3

Width* (ft)	Conc. (mg/L)*
35	0.1
30	2.3
100	5
30	2.3
35	0.1

View of Plume Looking Down

Source Halflife (see Help):

5	30	*(yr)*
Inst. React. ↖	↑ 1st Order	

Soluble Mass 586 *(Kg)*
In Source NAPL, Soil

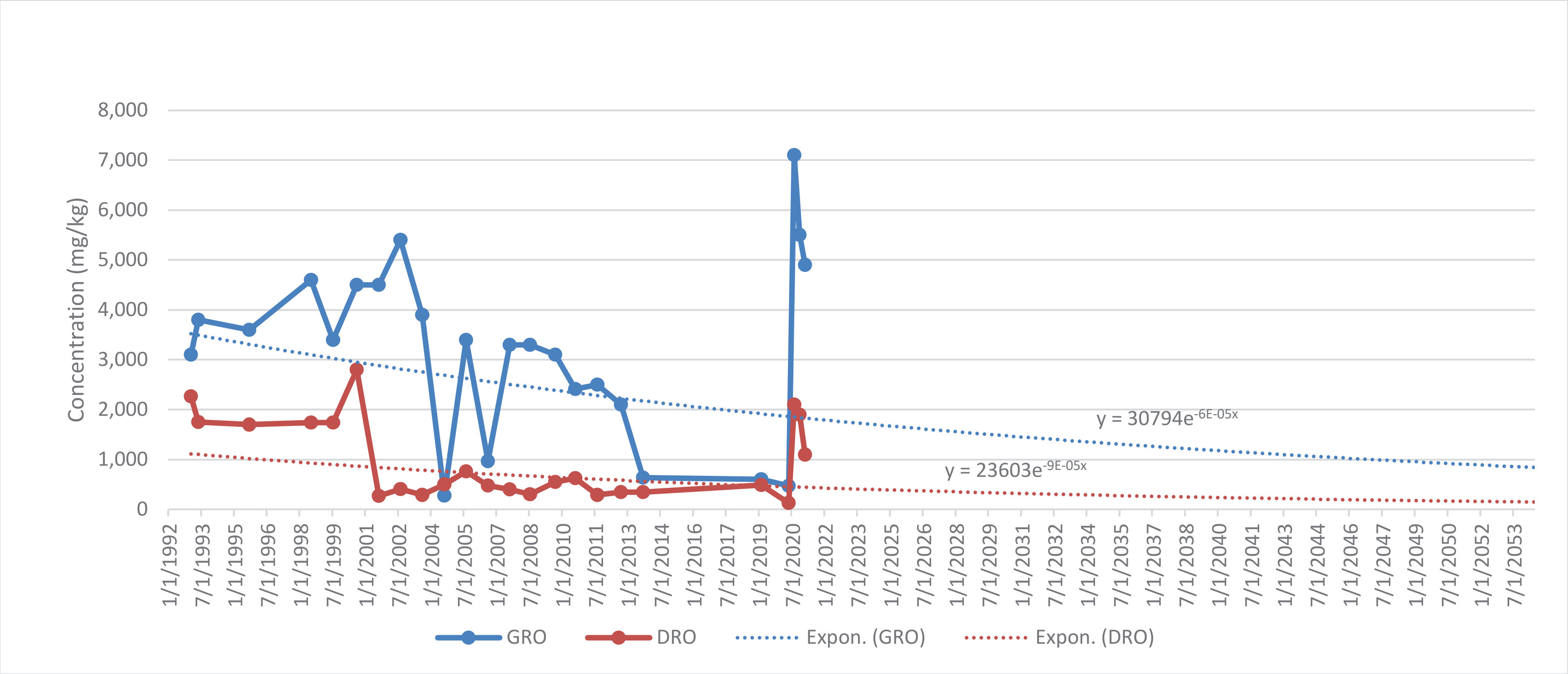
Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)	5.0	2.3			.14						
Dist. from Source (ft)	*0*	*9*	*18*	*27*	*36*	*45*	*53*	*62*	*71*	*80*	*89*

8. CHOOSE TYPE OF OUTPUT TO SEE:

Figure D.28 - MW-12 Trendlines for GRO and DRO Concentrations



Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix E
Laboratory Analytical 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.

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

November 12, 2020

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 November 3, 2020 from the POL-TPH 10E Port Way, Longview WA, F&BI 011053 project. There are 12 pages included in this report.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Megan King
FDS1112R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 3, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH 10E Port Way, Longview WA, F&BI 011053 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
011053 -01	SVP-2-110320
011053 -02	SVP-1-110320
011053 -03	SVP-101-110320

Non-petroleum compounds identified in the air phase hydrocarbon (APH) ranges were subtracted per the MA-APH method.

The 2-propanol concentration for sample SVP-2-110320 exceeded the calibration range. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-2-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-01 1/3.3
Date Analyzed:	11/06/20	Data File:	110524.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	210
APH EC9-12 aliphatics	310
APH EC9-10 aromatics	<82

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-1-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-02 1/3.2
Date Analyzed:	11/06/20	Data File:	110526.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<130
APH EC9-12 aliphatics	480
APH EC9-10 aromatics	82

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-101-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-03 1/3.1
Date Analyzed:	11/06/20	Data File:	110527.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<120
APH EC9-12 aliphatics	480
APH EC9-10 aromatics	86

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	Not Applicable	Lab ID:	00-2659 MB
Date Analyzed:	11/05/20	Data File:	110512.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<40
APH EC9-12 aliphatics	<50
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-2-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-01 1/3.3
Date Analyzed:	11/06/20	Data File:	110524.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

Compounds:	Concentration ug/m3	ppbv
2-Propanol	330 ve	130 ve
Benzene	<1.1	<0.33
Toluene	<62	<16
Ethylbenzene	9.0	2.1
m,p-Xylene	40	9.2
o-Xylene	16	3.6
Naphthalene	<0.86	<0.16

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-1-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-02 1/3.2
Date Analyzed:	11/06/20	Data File:	110526.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

	Concentration	
Compounds:	ug/m3	ppbv
2-Propanol	<28	<11
Benzene	<1	<0.32
Toluene	<60	<16
Ethylbenzene	1.7	0.40
m,p-Xylene	7.4	1.7
o-Xylene	2.9	0.67
Naphthalene	<0.84	<0.16

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-101-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-03 1/3.1
Date Analyzed:	11/06/20	Data File:	110527.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3	ppbv
2-Propanol	<27	<11
Benzene	<0.99	<0.31
Toluene	<58	<15
Ethylbenzene	1.4	0.33
m,p-Xylene	5.9	1.3
o-Xylene	2.3	0.54
Naphthalene	<0.81	<0.15

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	Not Applicable	Lab ID:	00-2659 MB
Date Analyzed:	11/05/20	Data File:	110512.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3	ppbv
2-Propanol	<8.6	<3.5
Benzene	<0.32	<0.1
Toluene	<19	<5
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	<0.26	<0.05

Date of Report: 11/12/20
Date Received: 11/03/20
Project: POL-TPH 10E Port Way, Longview WA, F&BI 011053

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 011053-01 1/3.3 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	210	200	5
APH EC9-12 aliphatics	ug/m3	310	340	9
APH EC9-10 aromatics	ug/m3	<82	<82	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	79	70-130
APH EC9-12 aliphatics	ug/m3	67	88	70-130
APH EC9-10 aromatics	ug/m3	67	107	70-130

Date of Report: 11/12/20
Date Received: 11/03/20
Project: POL-TPH 10E Port Way, Longview WA, F&BI 011053

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 011053-01 1/3.3 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
2-Propanol	ug/m3	330	340	3
Benzene	ug/m3	<1.1	<1.1	nm
Toluene	ug/m3	<62	<62	nm
Ethylbenzene	ug/m3	9.0	9.6	6
m,p-Xylene	ug/m3	40	43	7
o-Xylene	ug/m3	16	17	6
Naphthalene	ug/m3	<0.86	<0.86	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
2-Propanol	ug/m3	33	100	70-130
Benzene	ug/m3	43	101	70-130
Toluene	ug/m3	51	109	70-130
Ethylbenzene	ug/m3	59	93	70-130
m,p-Xylene	ug/m3	120	97	70-130
o-Xylene	ug/m3	59	95	70-130
Naphthalene	ug/m3	71	99	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 analyte 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 due to sample matrix effects.

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.

011053

SAMPLE CHAIN OF CUSTODY MS 11-03-20

Page # 1 of 1

Report To Gabe Cisneros

Company Floyd | Snider

Address 601 Union St. Suite 600

City, State, ZIP Seattle, WA 98101

Phone 206-292-2078 Email gabe.cisneros@floydsnider.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS
PoL-TPH
10 E Port Way, Longview WA

PO #

NOTES: Run Standard analyses in accordance w/ memo #18

INVOICE TO

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION / ANALYSIS REQUESTED

Sample Name	Lab ID 11/3/20 MS	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium	IPA	Notes
SVP-2-110320	~~225~~ 01	2296	225	IA / [✓ SG]	11/3/2020	29.5	1213	4.5	1219		X		X		X	
SVP-1-110320	02	2302	224	IA / [✓ SG]	11/3/20	30	1300	4.5	1306		X		X		X	
SVP-101-110320	03	3385	231	IA / [✓ SG]	11/3/20	30	1300	4.5	1306		✓		✓		✓	
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

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:	Gabe Cisneros	Floyd/Snider	11/3	1829
Received by:	BRYANT TABESSE	FBI	11/3	1829
Relinquished by:				
Received by:		Samples received at 22 °C		

FORMS\COC\COCTO-15.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

November 11, 2020

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

Dear Ms King:

Included are the results from the testing of material submitted on November 3, 2020 from the POL-TPH, F&BI 011055 project. There are 50 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Gabriel Cisneros
FDS1111R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on November 3, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 011055 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
011055 -01	MW-08-110220
011055 -02	MW-10-110220
011055 -03	MW-31-110220
011055 -04	MW-35-110320
011055 -05	MW-34-110220
011055 -06	MW-33-110220
011055 -07	MW-133-110220
011055 -08	MW-40-110220
011055 -09	MW-14-11022020
011055 -10	MW-07-11022020
011055 -11	MW-26-110220
011055 -12	MW-30-110220
011055 -13	MW-36-110220
011055 -14	MW-37-110220
011055 -15	MW-38-110220
011055 -16	T-2-110220
011055 -17	UST-4-110220
011055 -18	UST-104-110220
011055 -19	MW-02-110220
011055 -20	MW-03-110220
011055 -21	MW-15-11022020
011055 -22	MW-39-11022020
011055 -23	MW-06-11022020
011055 -24	MW-12-110320
011055 -25	MW-17-110320
011055 -26	MW-18-110320
011055 -27	MW-22-110320
011055 -28	MW-23-110320
011055 -29	MW-29-110320
011055 -30	MW-24-110320
011055 -31	MW-25-110320

All quality control requirements were acceptable.

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/05/20
Date Analyzed: 11/06/20

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 50-150)
MW-08-110220 011055-01	2,500	89
MW-10-110220 011055-02	5,300	88
MW-31-110220 011055-03	<100	92
MW-35-110320 011055-04	<100	89
MW-34-110220 011055-05	110	89
MW-33-110220 011055-06	170	91
MW-133-110220 011055-07	170	91
MW-40-110220 011055-08	1,600	114
MW-14-11022020 011055-09	<100	90
MW-07-11022020 011055-10	700	103
MW-26-110220 011055-11	<100	96

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/05/20
Date Analyzed: 11/06/20

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 50-150)
MW-30-110220 011055-12	<100	89
MW-36-110220 011055-13	<100	88
MW-37-110220 011055-14	<100	79
MW-38-110220 011055-15	<100	74
T-2-110220 011055-16	<100	88
UST-4-110220 011055-17	<100	90
UST-104-110220 011055-18	<100	88
MW-02-110220 011055-19	<100	91
MW-03-110220 011055-20	370	97
MW-15-11022020 011055-21	180	91
MW-39-11022020 011055-22	370	96

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/05/20
Date Analyzed: 11/06/20

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 50-150)
MW-06-11022020 011055-23	<100	89
MW-12-110320 011055-24	5,500	91
MW-17-110320 011055-25	<100	88
MW-18-110320 011055-26	<100	88
MW-22-110320 011055-27	<100	89
MW-23-110320 011055-28	<100	89
MW-29-110320 011055-29	<100	82
MW-24-110320 011055-30	<100	92
MW-25-110320 011055-31	<100	89
Method Blank 00-2405 MB	<100	96
Method Blank 00-2406 MB	<100	90

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/04/20
Date Analyzed: 11/04/20 and 11/05/20

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-08-110220 011055-01	2,100 x	370 x	94
MW-10-110220 011055-02	1,900 x	<250	101
MW-31-110220 011055-03	<50	<250	89
MW-35-110320 011055-04	620 x	330 x	95
MW-34-110220 011055-05	1,300 x	310 x	95
MW-33-110220 011055-06	890 x	<250	107
MW-133-110220 011055-07	890 x	<250	105
MW-40-110220 011055-08	3,400	400 x	107
MW-14-11022020 011055-09	80 x	<250	95
MW-07-11022020 011055-10	750	<250	102
MW-26-110220 011055-11	570 x	<250	114
MW-30-110220 011055-12	1,600 x	920 x	100

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/04/20
Date Analyzed: 11/04/20 and 11/05/20

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-36-110220 011055-13	<50	<250	101
MW-37-110220 011055-14	160 x	<250	88
MW-38-110220 011055-15	<50	<250	96
T-2-110220 011055-16	<50	<250	88
UST-4-110220 011055-17	<50	<250	100
UST-104-110220 011055-18	<50	<250	96
MW-02-110220 011055-19	630 x	460 x	102
MW-03-110220 011055-20	1,000 x	620 x	93
MW-15-11022020 011055-21	430 x	<250	97
MW-39-11022020 011055-22	5,500 x	1,200 x	118
MW-06-11022020 011055-23	1,300 x	400 x	109
MW-12-110320 011055-24	1,900 x	<250	101

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/04/20
Date Analyzed: 11/04/20 and 11/05/20

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-17-110320 011055-25	<50	<250	88
MW-18-110320 011055-26	<50	<250	107
MW-22-110320 011055-27	<50	<250	92
MW-23-110320 011055-28	<50	<250	100
MW-29-110320 011055-29	<50	<250	111
MW-24-110320 011055-30	<50	<250	91
MW-25-110320 011055-31	<50	<250	98
Method Blank 00-2471 MB	<50	<250	75
Method Blank 00-2472 MB	<50	<250	84

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-08-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-01
Date Analyzed:	11/05/20	Data File:	110520.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	1.1
Toluene	1.9
Ethylbenzene	<1
m,p-Xylene	2.6
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-02
Date Analyzed:	11/06/20	Data File:	110534.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	112	50	150
Toluene-d8	107	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	160 ve
Toluene	28
Ethylbenzene	83
m,p-Xylene	38
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-02 1/10
Date Analyzed:	11/09/20	Data File:	110940.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	170

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-31-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-03
Date Analyzed:	11/05/20	Data File:	110521.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-35-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-04
Date Analyzed:	11/05/20	Data File:	110522.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-34-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-05
Date Analyzed:	11/05/20	Data File:	110523.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	103	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-33-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-06
Date Analyzed:	11/05/20	Data File:	110524.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	103	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-133-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-07
Date Analyzed:	11/05/20	Data File:	110525.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

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

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-08
Date Analyzed:	11/05/20	Data File:	110526.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	57	121
Toluene-d8	106	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	320 ve
Toluene	9.6
Ethylbenzene	3.9
m,p-Xylene	4.5
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-08 1/10
Date Analyzed:	11/07/20	Data File:	110650.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	99	63	127
4-Bromofluorobenzene	96	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	300

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-14-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-09
Date Analyzed:	11/05/20	Data File:	110527.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-07-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-10
Date Analyzed:	11/05/20	Data File:	110538.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-26-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-11
Date Analyzed:	11/05/20	Data File:	110539.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-30-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-12
Date Analyzed:	11/05/20	Data File:	110540.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	57	121
Toluene-d8	101	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-36-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-13
Date Analyzed:	11/05/20	Data File:	110517.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	127	50	150
Toluene-d8	111	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-37-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-14
Date Analyzed:	11/05/20	Data File:	110541.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-38-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-15
Date Analyzed:	11/05/20	Data File:	110542.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	106	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	T-2-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-16
Date Analyzed:	11/05/20	Data File:	110543.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

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

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	UST-4-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-17
Date Analyzed:	11/05/20	Data File:	110544.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	UST-104-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-18
Date Analyzed:	11/05/20	Data File:	110545.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	57	121
Toluene-d8	100	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-02-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-19
Date Analyzed:	11/06/20	Data File:	110546.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	57	121
Toluene-d8	101	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

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-03-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-20
Date Analyzed:	11/06/20	Data File:	110547.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

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

Compounds:	Concentration ug/L (ppb)
Benzene	0.99
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-15-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-21
Date Analyzed:	11/06/20	Data File:	110548.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	105	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-39-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-22
Date Analyzed:	11/05/20	Data File:	110518.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	106	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-06-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-23
Date Analyzed:	11/05/20	Data File:	110519.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	114	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-24
Date Analyzed:	11/06/20	Data File:	110536.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	86	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	104	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	420 ve
Toluene	39
Ethylbenzene	39
m,p-Xylene	62
o-Xylene	1.4

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-24 1/10
Date Analyzed:	11/06/20	Data File:	110535.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	90	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	620

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-17-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-25
Date Analyzed:	11/05/20	Data File:	110520.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	116	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-18-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-26
Date Analyzed:	11/05/20	Data File:	110521.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	50	150
Toluene-d8	110	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-22-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-27
Date Analyzed:	11/05/20	Data File:	110522.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	120	50	150
Toluene-d8	113	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-23-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-28
Date Analyzed:	11/05/20	Data File:	110523.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-29-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-29
Date Analyzed:	11/05/20	Data File:	110524.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-24-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-30
Date Analyzed:	11/05/20	Data File:	110525.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	111	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-25-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-31
Date Analyzed:	11/06/20	Data File:	110526.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	50	150
Toluene-d8	110	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	00-2658 mb
Date Analyzed:	11/05/20	Data File:	110508.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	00-2663 mb
Date Analyzed:	11/05/20	Data File:	110516.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	118	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055

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

Laboratory Code: 011055-08 (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	1,600	103	102	50-150	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	115	70-119

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055

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

Laboratory Code: 011055-13 (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	98	97	50-150	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	110	70-119

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055

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

Laboratory Code: 011055-08 (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	3,500	84	94	50-150	11

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	105	63-142

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055

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

Laboratory Code: 011055-13 (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	100	119	50-150	17

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	95	63-142

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055

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

Laboratory Code: 011055-08 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	320	86 b	83 b	76-125	4 b
Toluene	ug/L (ppb)	10	9.6	94 b	98 b	76-122	4 b
Ethylbenzene	ug/L (ppb)	10	3.9	96 b	100 b	69-135	4 b
m,p-Xylene	ug/L (ppb)	20	4.5	97 b	99 b	69-135	2 b
o-Xylene	ug/L (ppb)	10	<1	99	104	60-140	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)	10	101	97	69-134	4
Toluene	ug/L (ppb)	10	91	94	72-122	3
Ethylbenzene	ug/L (ppb)	10	95	94	77-124	1
m,p-Xylene	ug/L (ppb)	20	94	94	81-112	0
o-Xylene	ug/L (ppb)	10	95	95	81-121	0

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055

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

Laboratory Code: 011055-13 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	101	102	50-150	1
Toluene	ug/L (ppb)	10	<1	96	100	50-150	4
Ethylbenzene	ug/L (ppb)	10	<1	98	102	50-150	4
m,p-Xylene	ug/L (ppb)	20	<2	96	100	50-150	4
o-Xylene	ug/L (ppb)	10	<1	96	101	50-150	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)	10	108	100	70-130	8
Toluene	ug/L (ppb)	10	90	98	70-130	9
Ethylbenzene	ug/L (ppb)	10	101	98	70-130	3
m,p-Xylene	ug/L (ppb)	20	99	96	70-130	3
o-Xylene	ug/L (ppb)	10	100	97	70-130	3

Data Qualifiers & Definitions

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

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 analyte 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 due to sample matrix effects.

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.

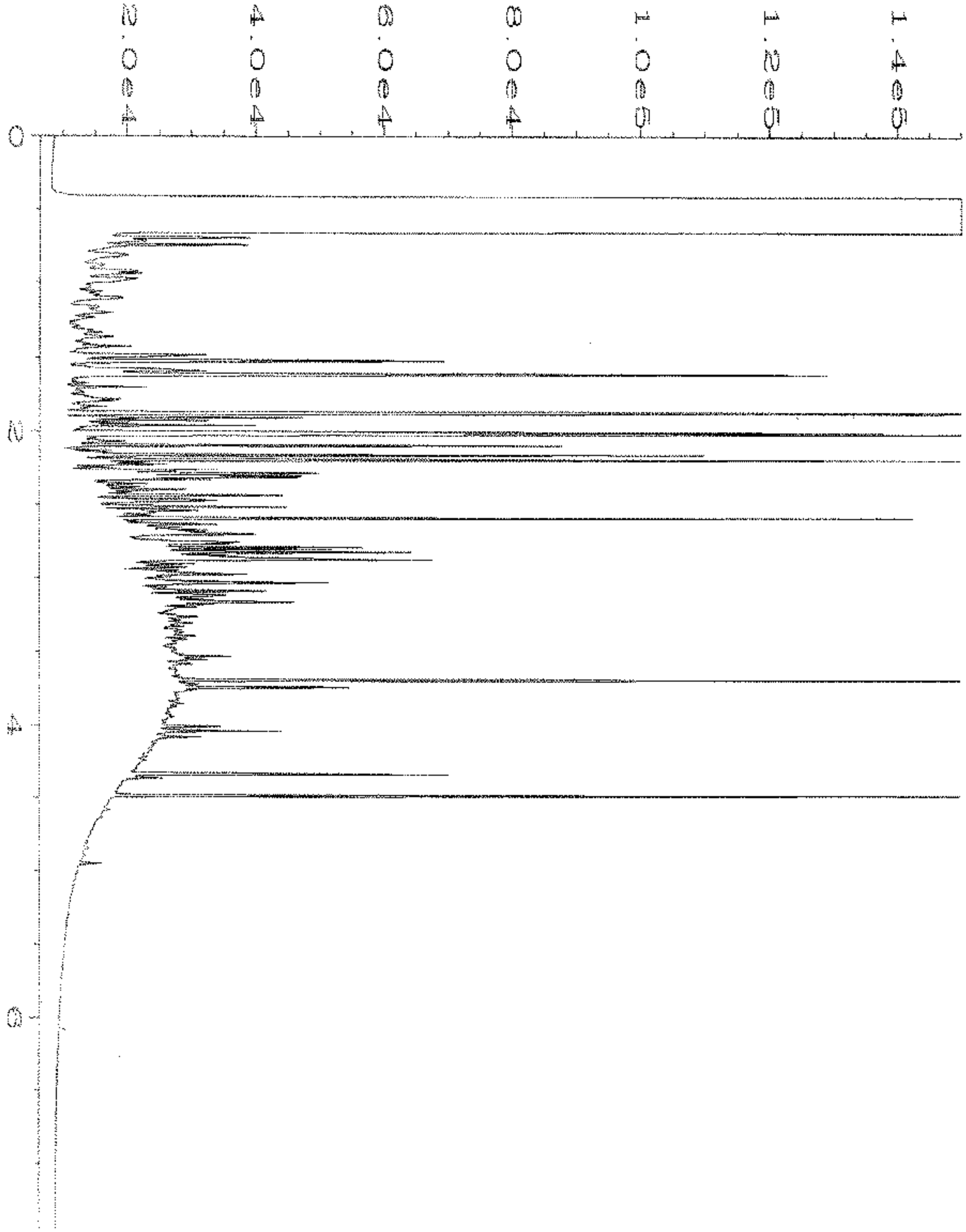
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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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Operator          : TL                          Page Number       : 1
Instrument        : GC1                         Vial Number       : 21
Sample Name       : 011055-01                   Injection Number  : 1
Run Time Bar Code:                              Sequence Line     : 6
Acquired on       : 04 Nov 20  02:40 PM         Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:18 AM          Analysis Method   : DEFAULT.MTH
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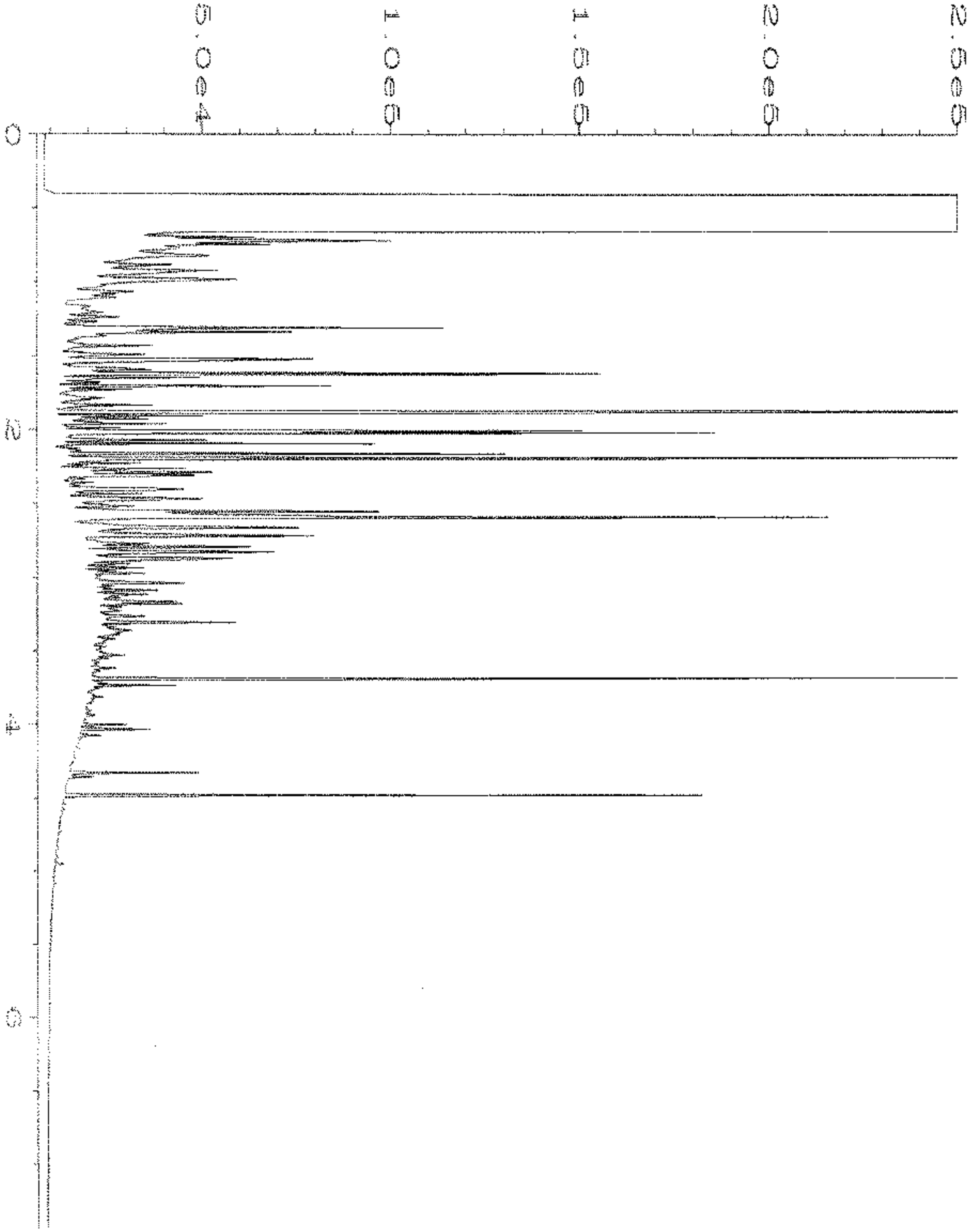

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Instrument        : GC1                           Vial Number      : 22
Sample Name       : 011055-02                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 6
Acquired on       : 04 Nov 20  02:52 PM           Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:18 AM            Analysis Method  : DEFAULT.MTH
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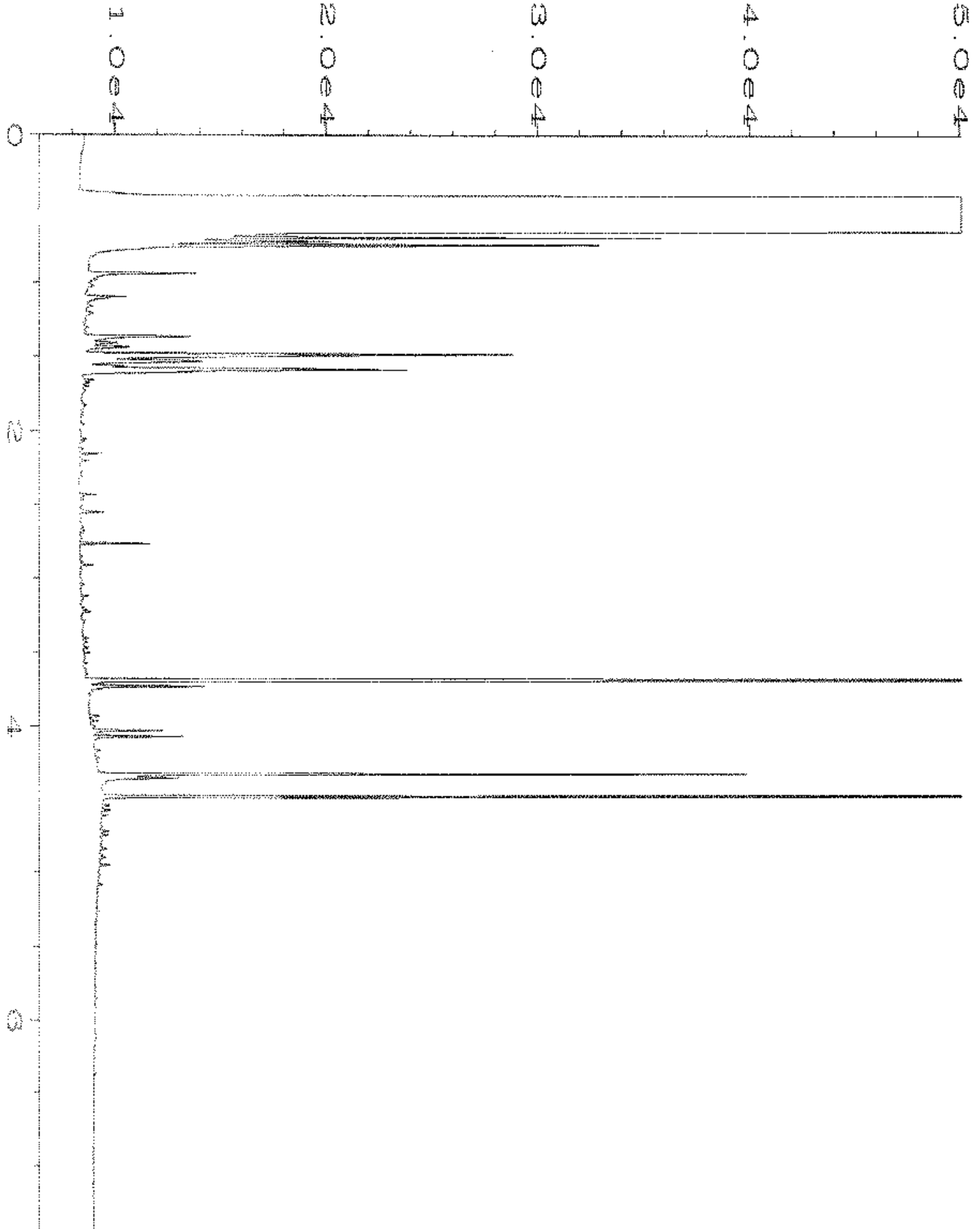

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Operator          : TL                               Page Number      : 1
Instrument        : GC1                              Vial Number      : 23
Sample Name       : 011055-03                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 6
Acquired on       : 04 Nov 20   03:03 PM             Instrument Method: DX.MTH
Report Created on: 05 Nov 20   10:19 AM              Analysis Method  : DEFAULT.MTH
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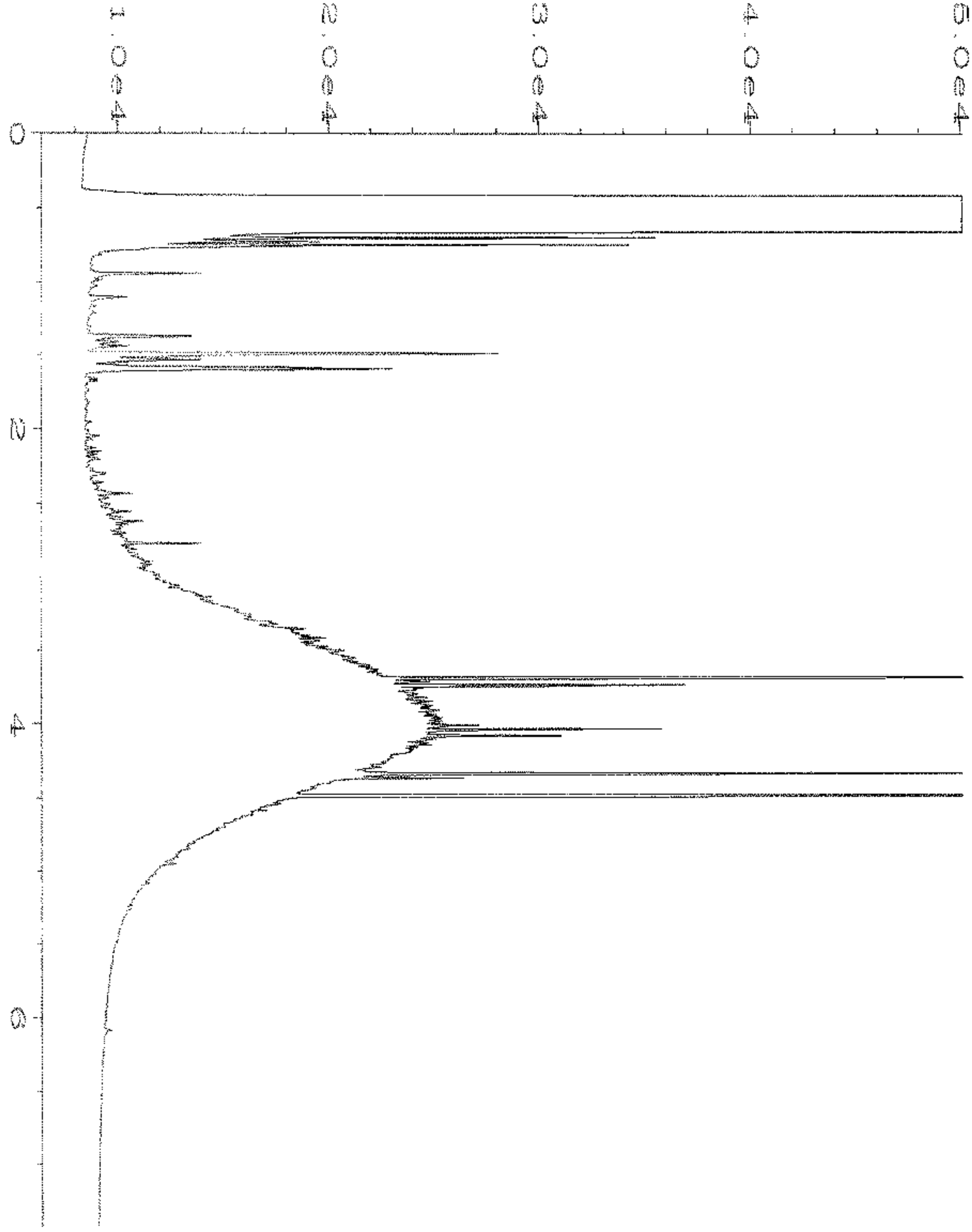

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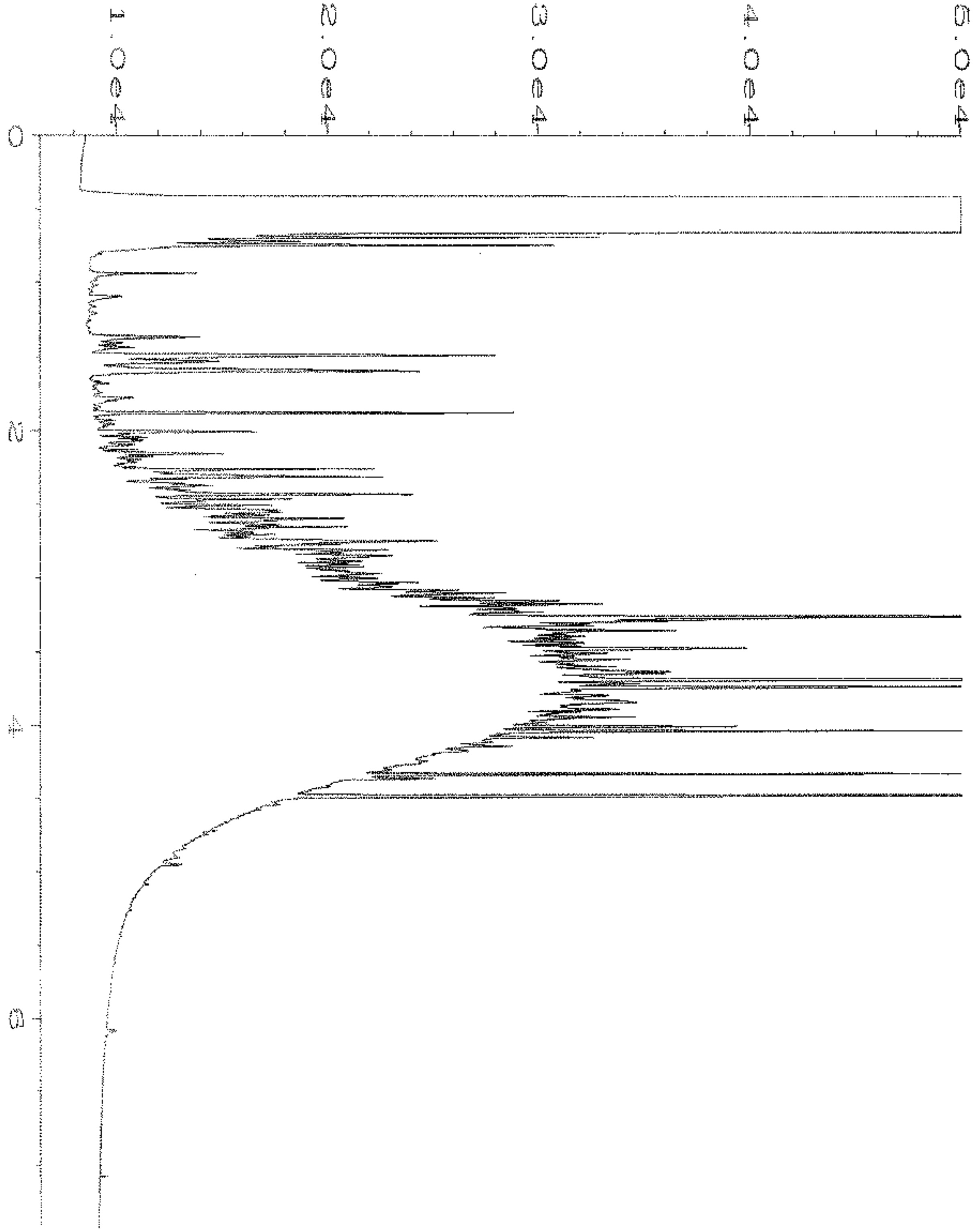
Operator : TL
Instrument : GC1
Sample Name : 011055-04
Run Time Bar Code:
Acquired on : 04 Nov 20 03:15 PM
Report Created on: 05 Nov 20 10:19 AM

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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Operator          : TL                                   Page Number      : 1
Instrument        : GC1                                  Vial Number      : 25
Sample Name       : 011055-05                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line    : 6
Acquired on       : 04 Nov 20  03:27 PM                  Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:19 AM                   Analysis Method  : DEFAULT.MTH
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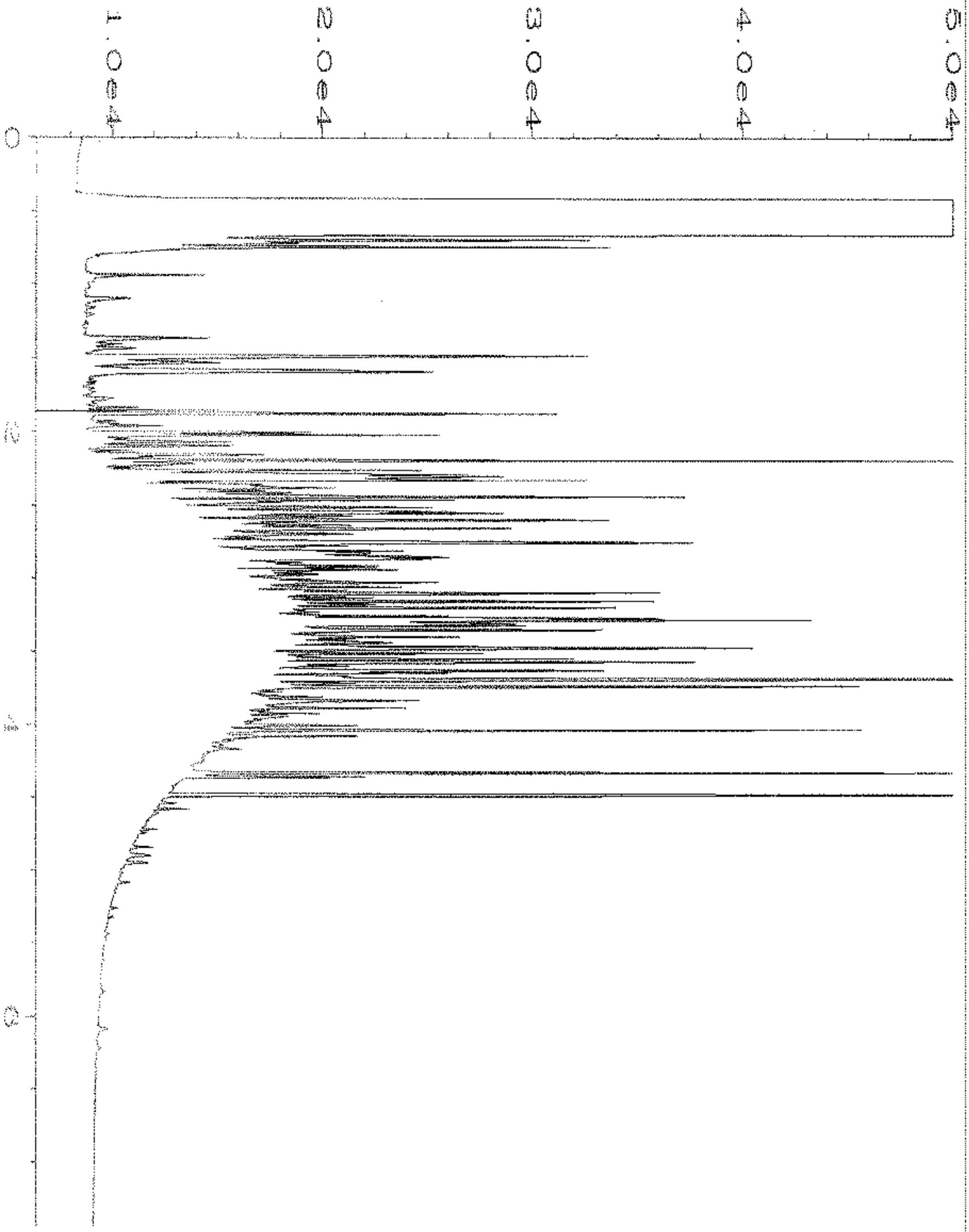

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Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 26
Sample Name       : 011055-06                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 6
Acquired on       : 04 Nov 20  03:38 PM             Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:19 AM              Analysis Method  : DEFAULT.MTH
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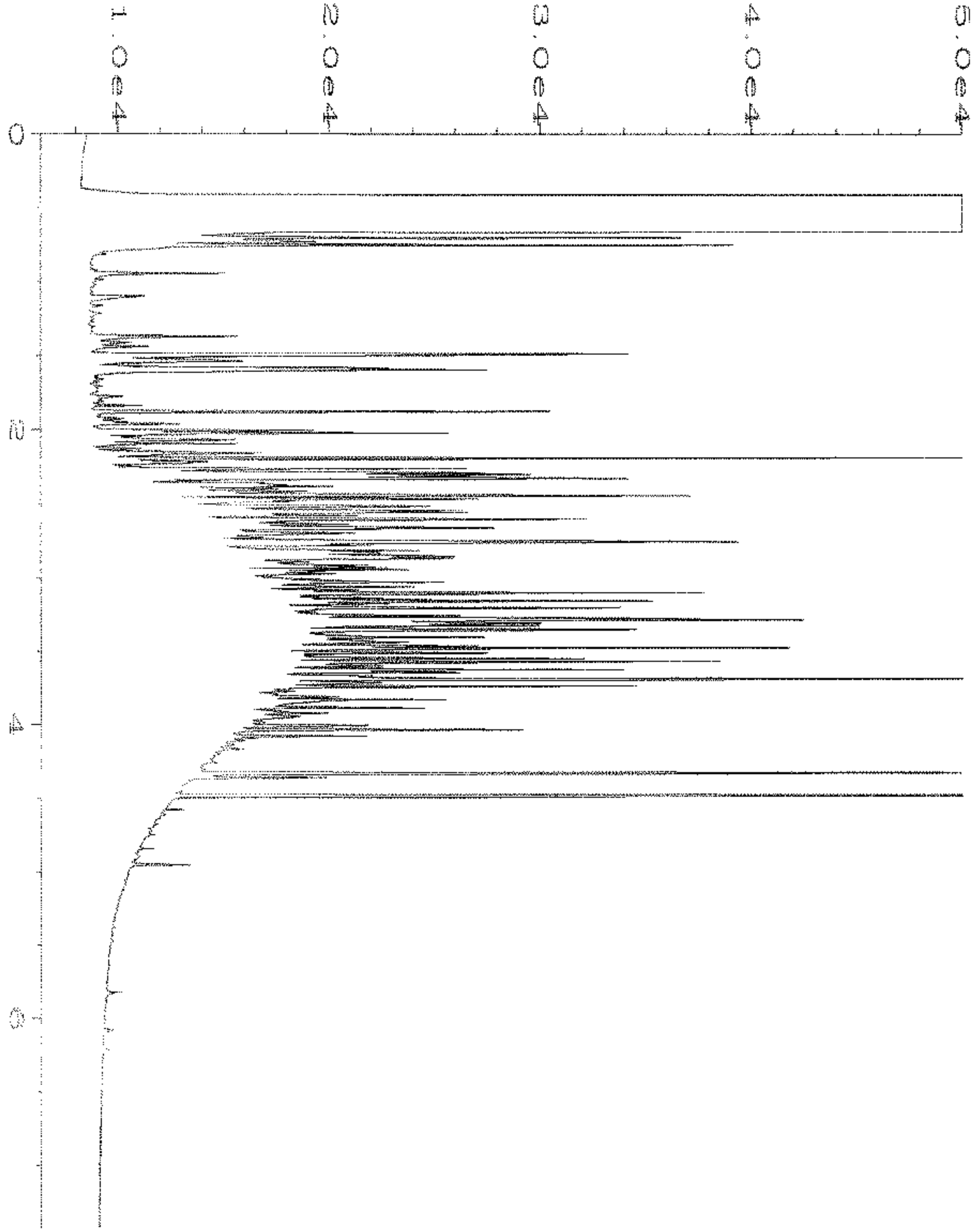

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Operator          : TL                                   Page Number      : 1
Instrument        : GC1                                  Vial Number      : 27
Sample Name       : 011055-07                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line    : 6
Acquired on       : 04 Nov 20  03:50 PM                  Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:19 AM                   Analysis Method  : DEFAULT.MTH
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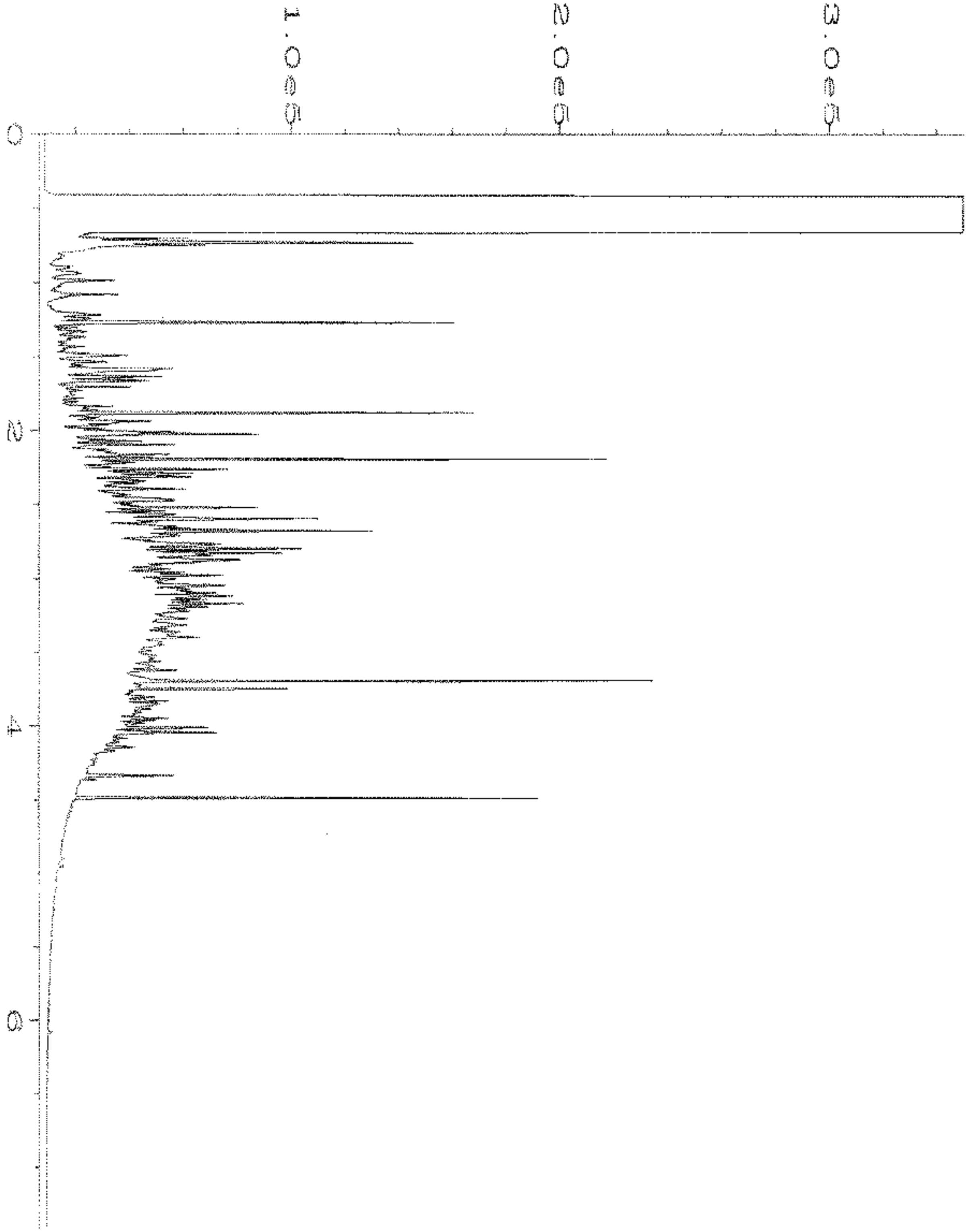

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Operator          : TL                                     Page Number      : 1
Instrument        : GC1                                    Vial Number      : 28
Sample Name       : 011055-08                              Injection Number : 1
Run Time Bar Code:                                         Sequence Line    : 6
Acquired on       : 04 Nov 20  04:02 PM                    Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:20 AM                     Analysis Method  : DEFAULT.MTH
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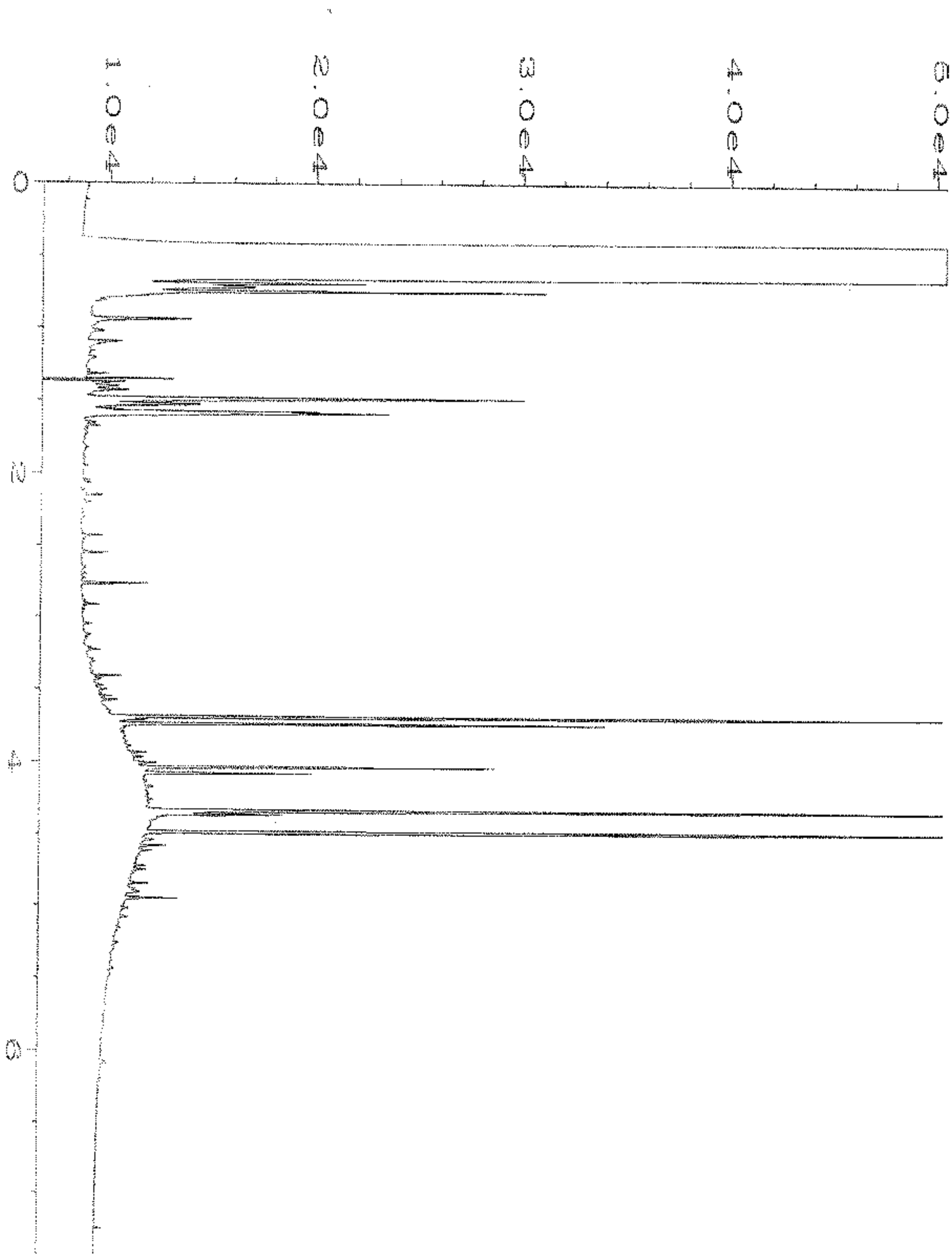

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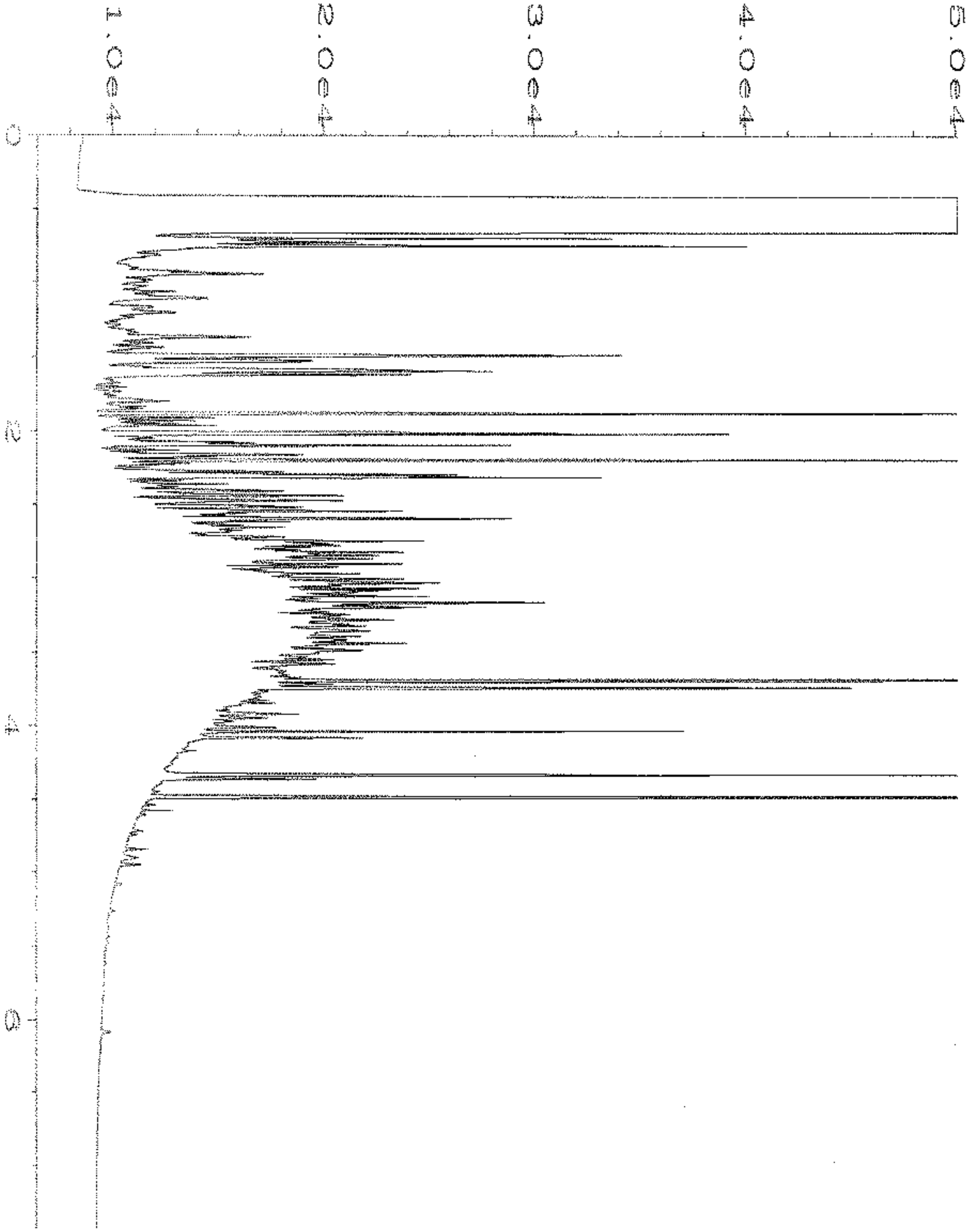
Operator   : TL
Instrument   : GC1
Sample Name   : 011055-09 rr
Run Time Bar Code:
Acquired on   : 05 Nov 20 10:28 AM
Report Created on: 06 Nov 20 10:12 AM

Page Number   : 1
Vial Number   : 15
Injection Number : 1
Sequence Line   : 5
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



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Operator          : TL                                   Page Number      : 1
Instrument        : GC1                                  Vial Number      : 32
Sample Name       : 011055-10                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line    : 8
Acquired on       : 04 Nov 20  05:51 PM                  Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:20 AM                   Analysis Method  : DEFAULT.MTH
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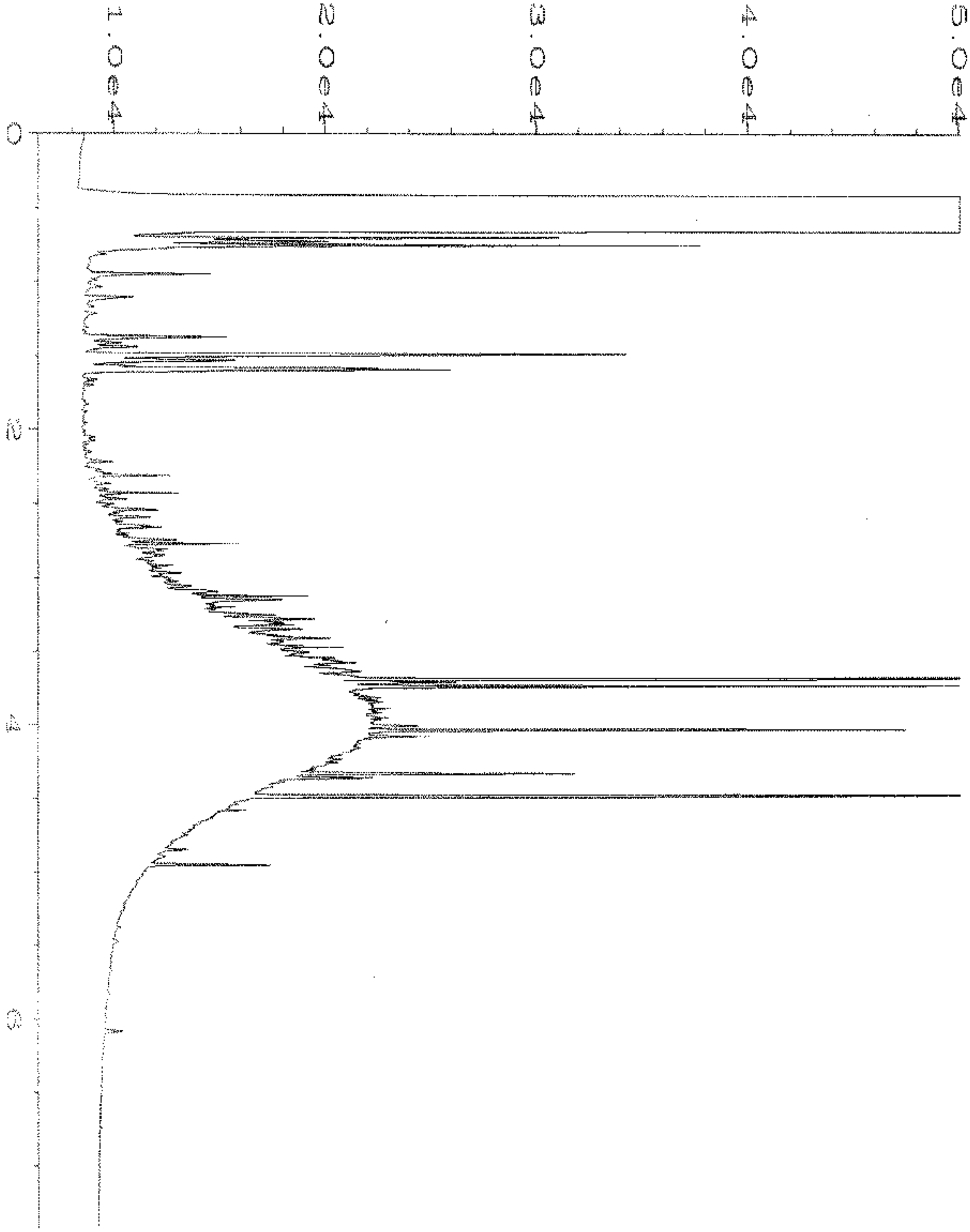

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Operator          : TL                               Page Number       : 1
Instrument        : GC1                              Vial Number       : 33
Sample Name       : 011055-11                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 8
Acquired on       : 04 Nov 20   06:03 PM             Instrument Method: DX.MTH
Report Created on: 05 Nov 20   10:21 AM              Analysis Method   : DEFAULT.MTH
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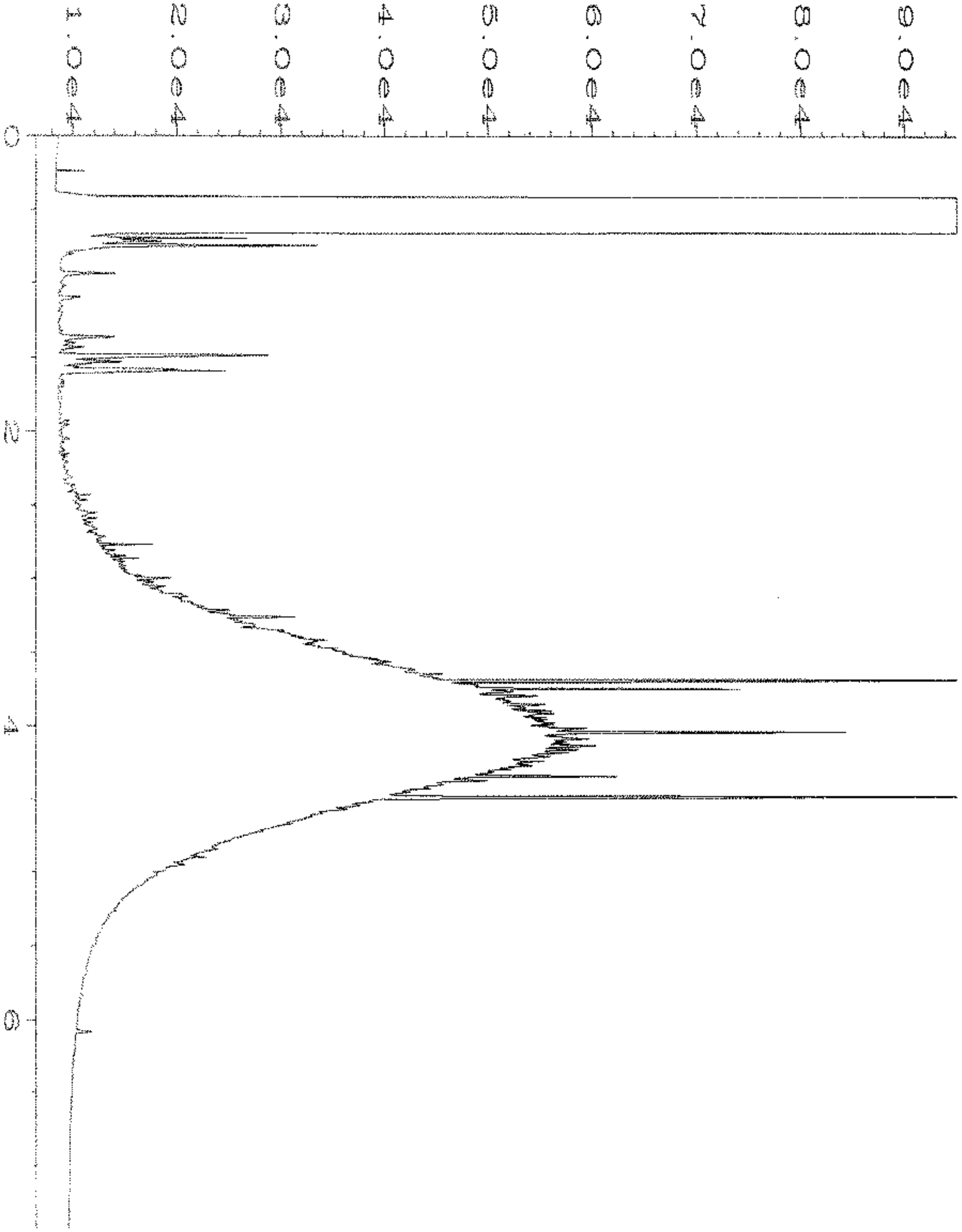

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Operator          : TL                                Page Number       : 1
Instrument        : GC1                               Vial Number       : 36
Sample Name       : 011055-12                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line     : 8
Acquired on       : 04 Nov 20  06:38 PM               Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:21 AM                Analysis Method   : DEFAULT.MTH
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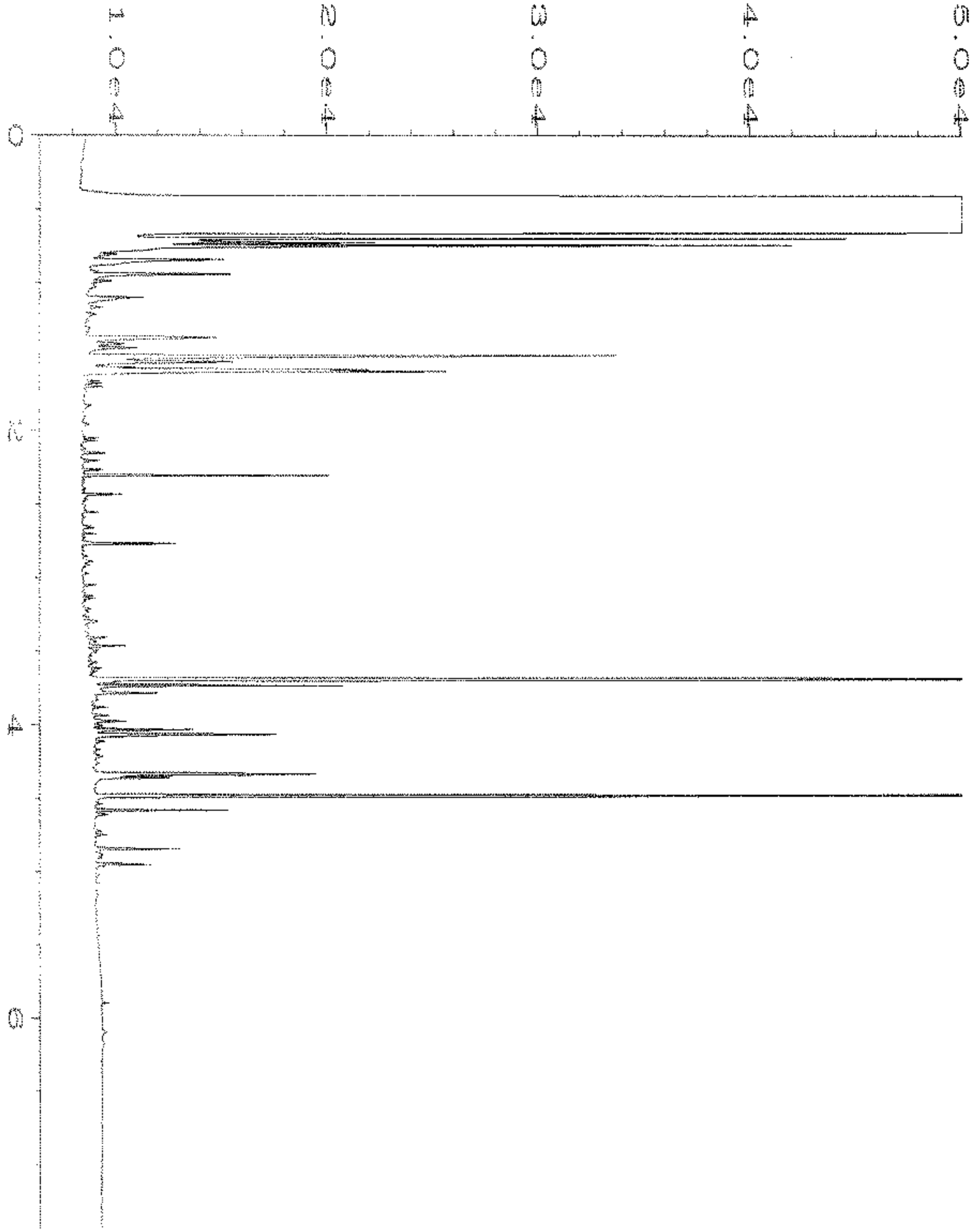

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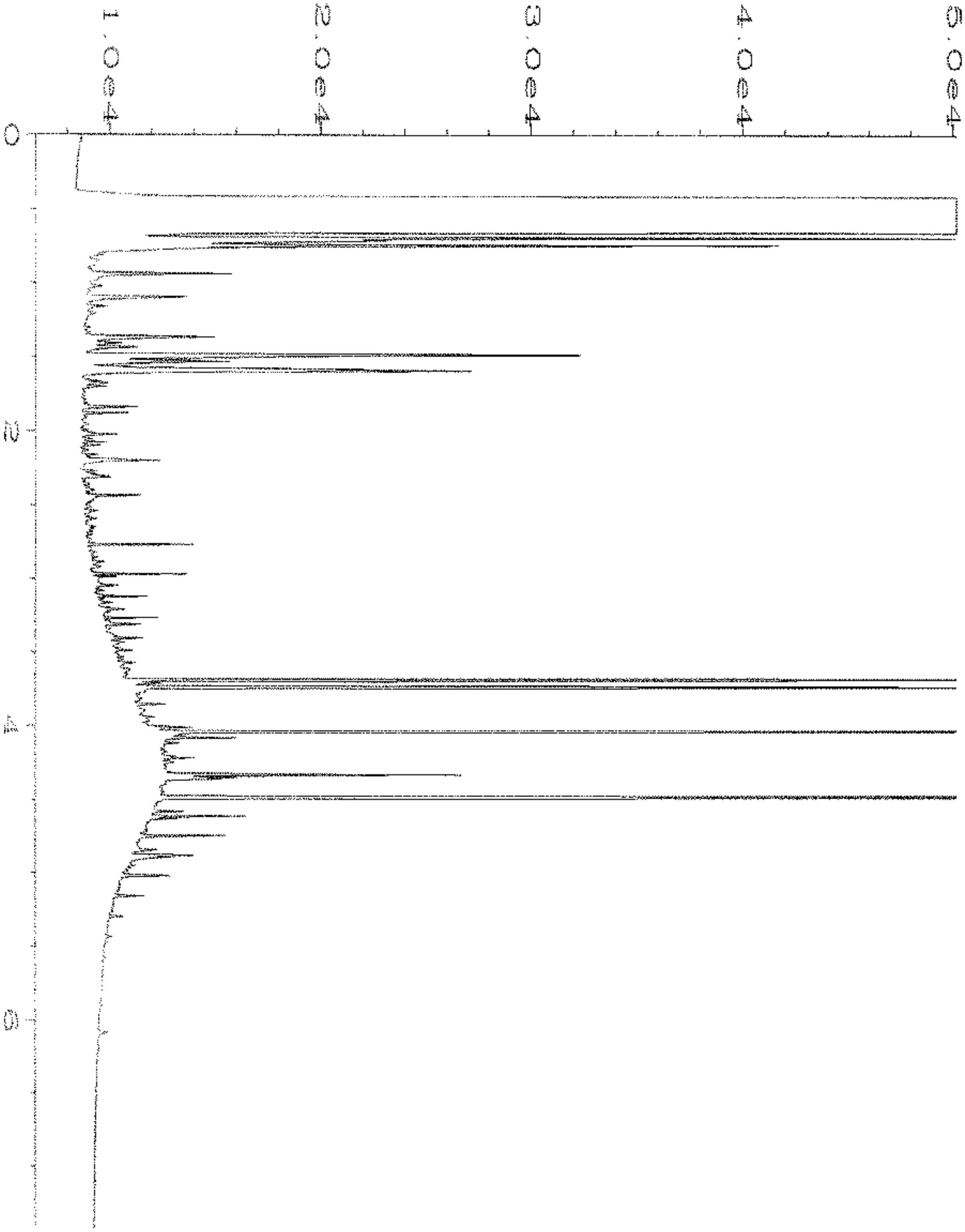
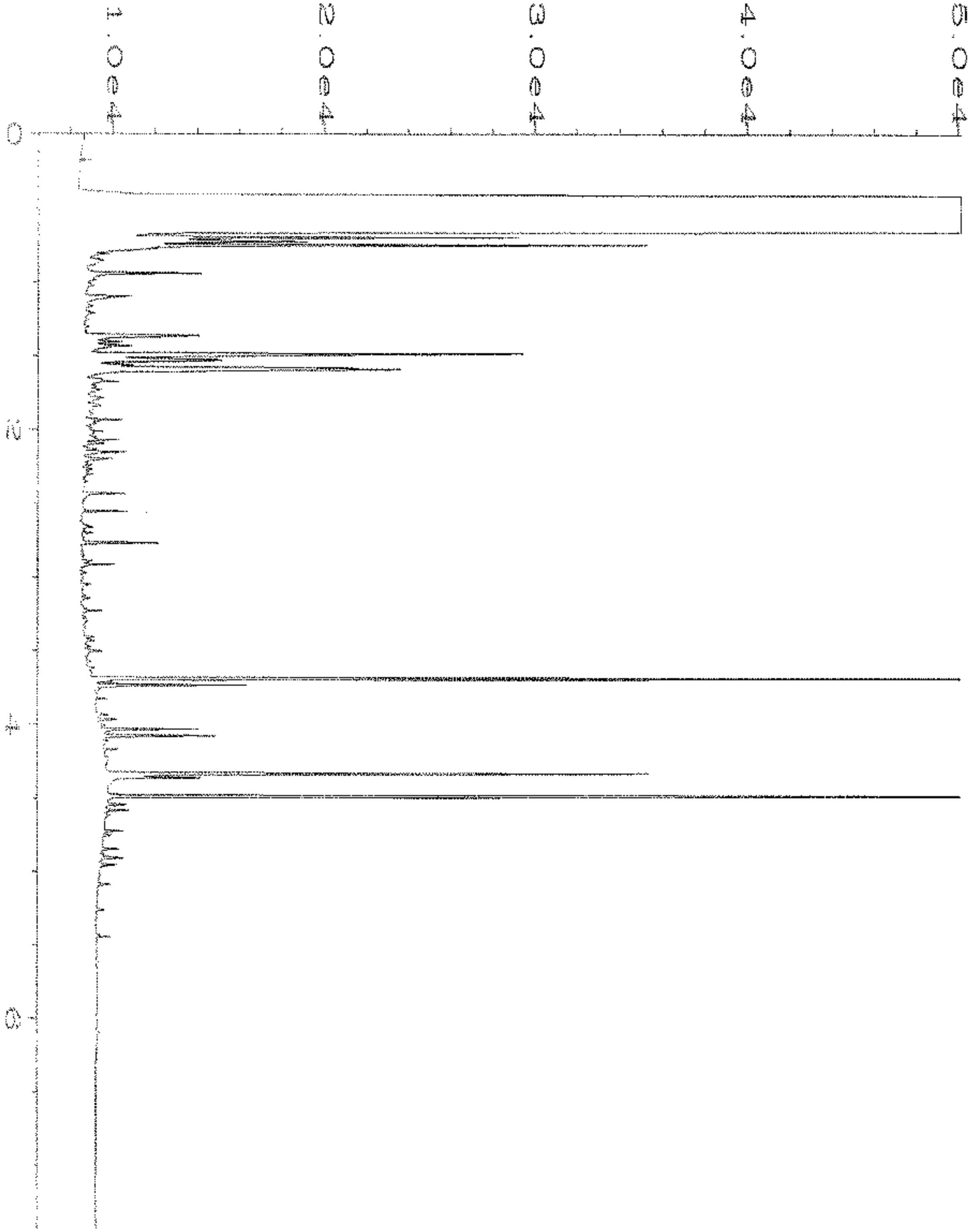
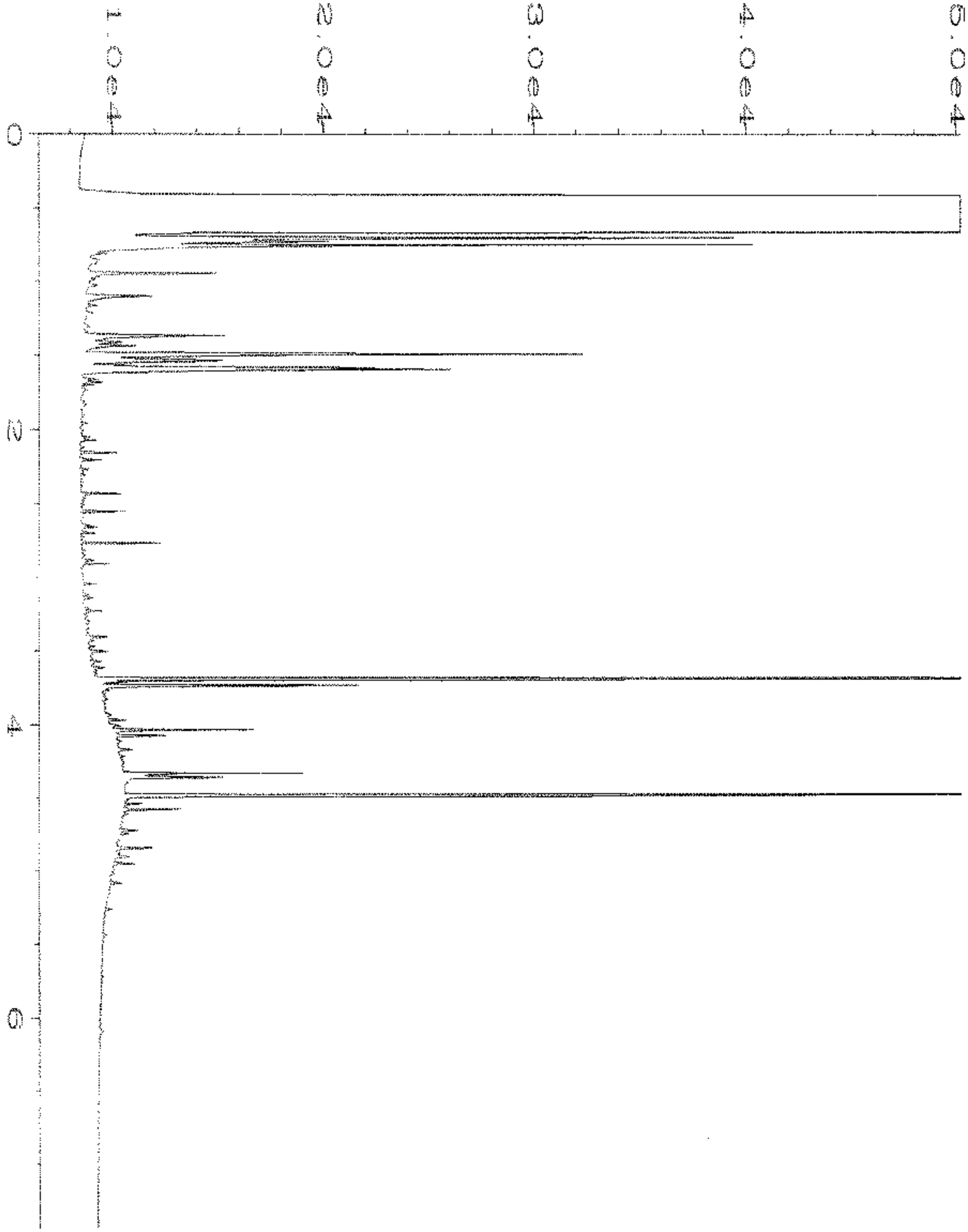
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 37
Sample Name       : 011055-13                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 8
Acquired on       : 04 Nov 20  06:50 PM             Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:21 AM              Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\040F0801.D
Operator          : TL                            Page Number       : 1
Instrument        : GC1                           Vial Number       : 40
Sample Name       : 011055-14                     Injection Number : 1
Run Time Bar Code:                                Sequence Line     : 8
Acquired on       : 04 Nov 20  07:25 PM           Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:21 AM            Analysis Method   : DEFAULT.MTH
```

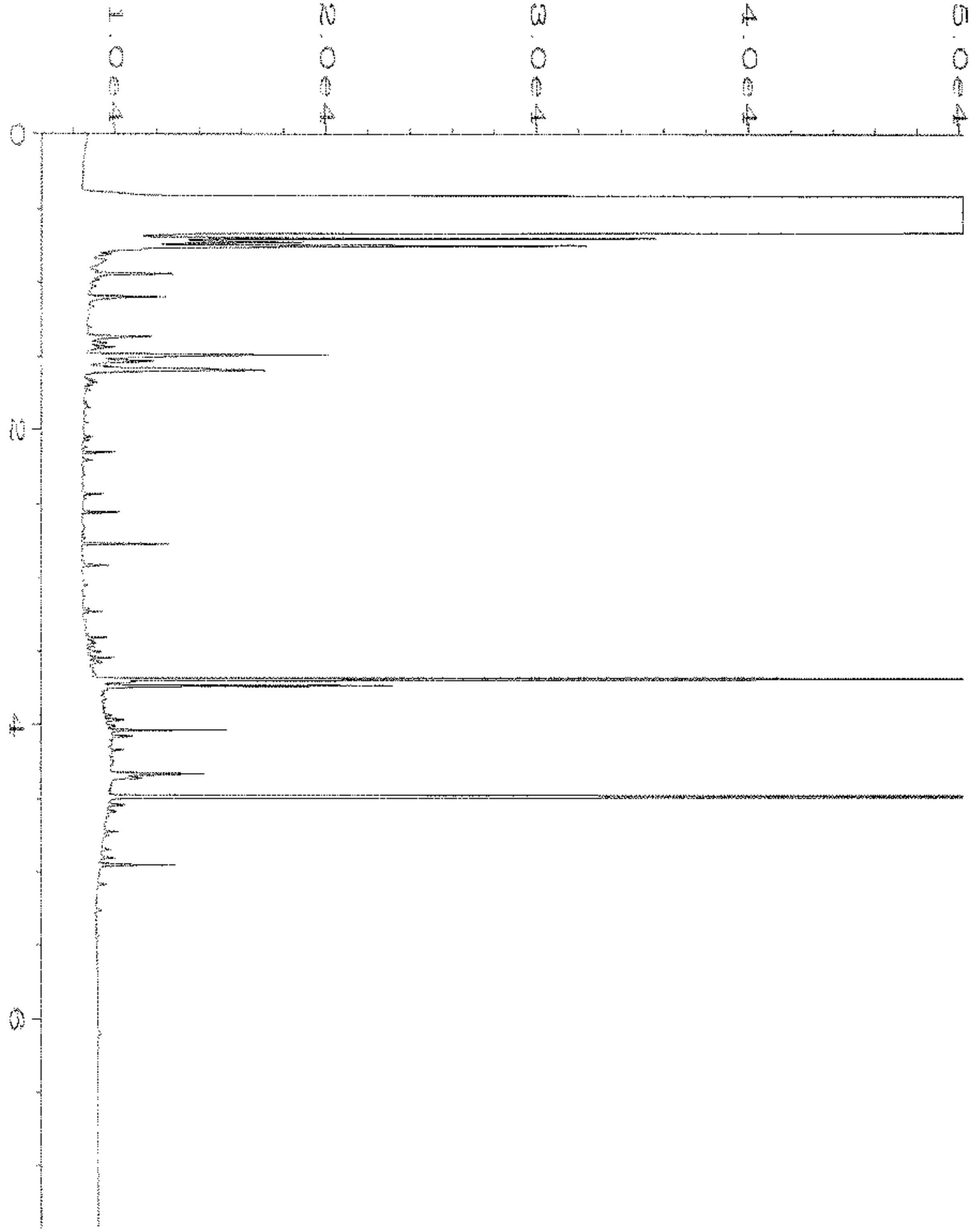


```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\041F0801.D
Operator          : TL                          Page Number      : 1
Instrument        : GC1                         Vial Number      : 41
Sample Name       : 011055-15                   Injection Number : 1
Run Time Bar Code:                              Sequence Line    : 8
Acquired on       : 04 Nov 20  07:37 PM         Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:21 AM          Analysis Method  : DEFAULT.MTH
```

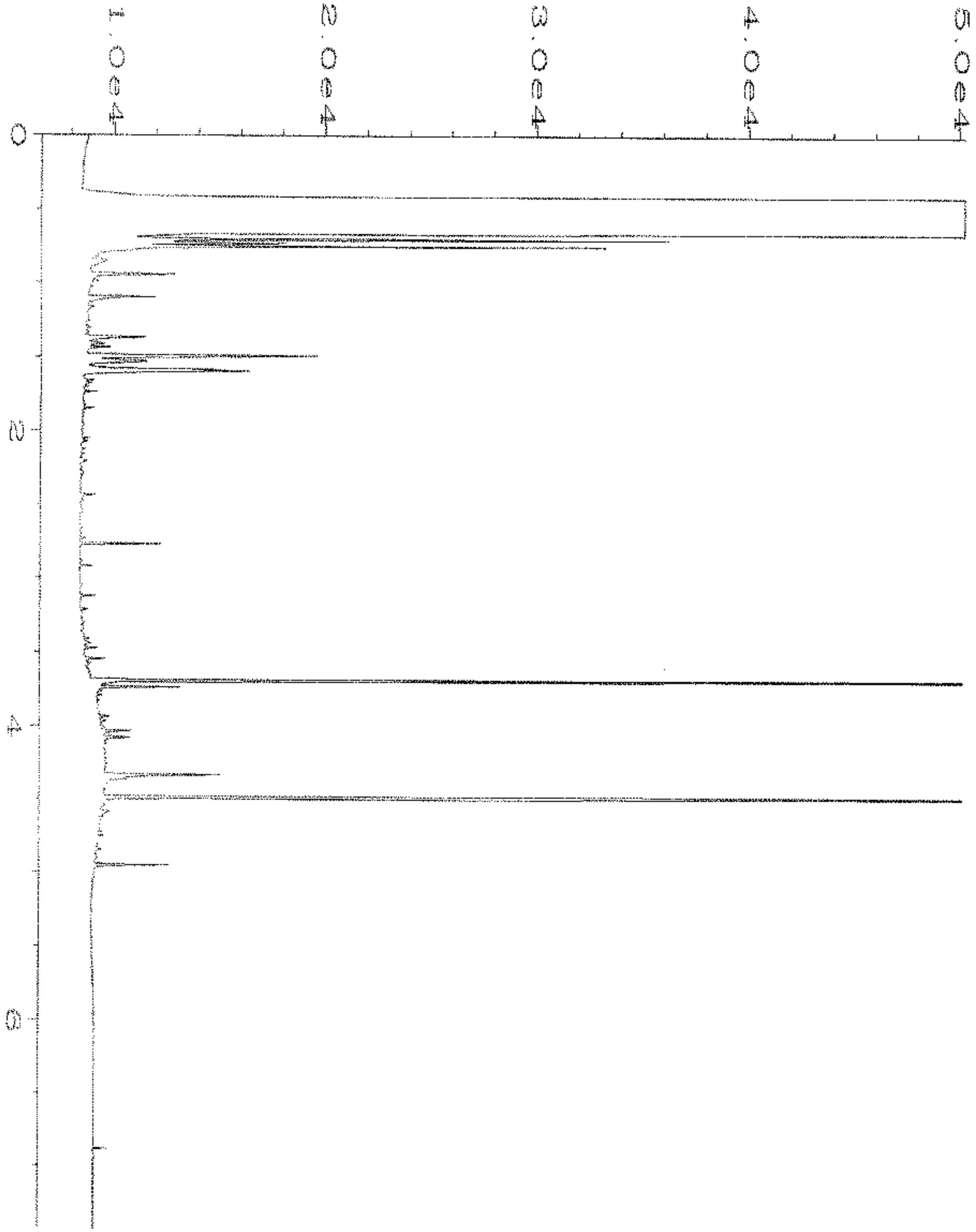


Data File Name : C:\HPCHEM\1\DATA\11-04-20\042F0801.D
Operator : TL
Instrument : GC1
Sample Name : 011055-16
Run Time Bar Code:
Acquired on : 04 Nov 20 07:48 PM
Report Created on: 05 Nov 20 10:22 AM

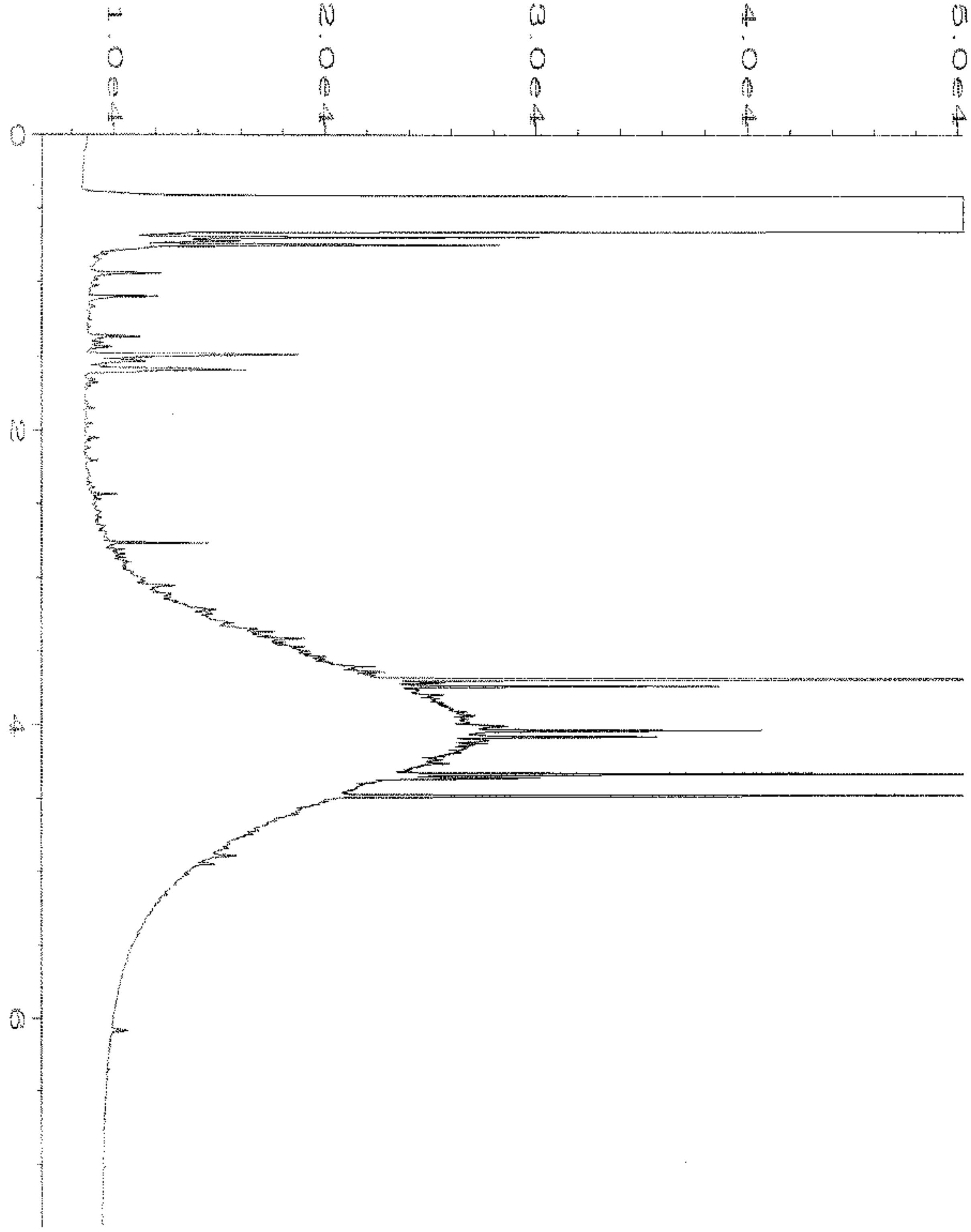
Page Number : 1
Vial Number : 42
Injection Number : 1
Sequence Line : 8
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



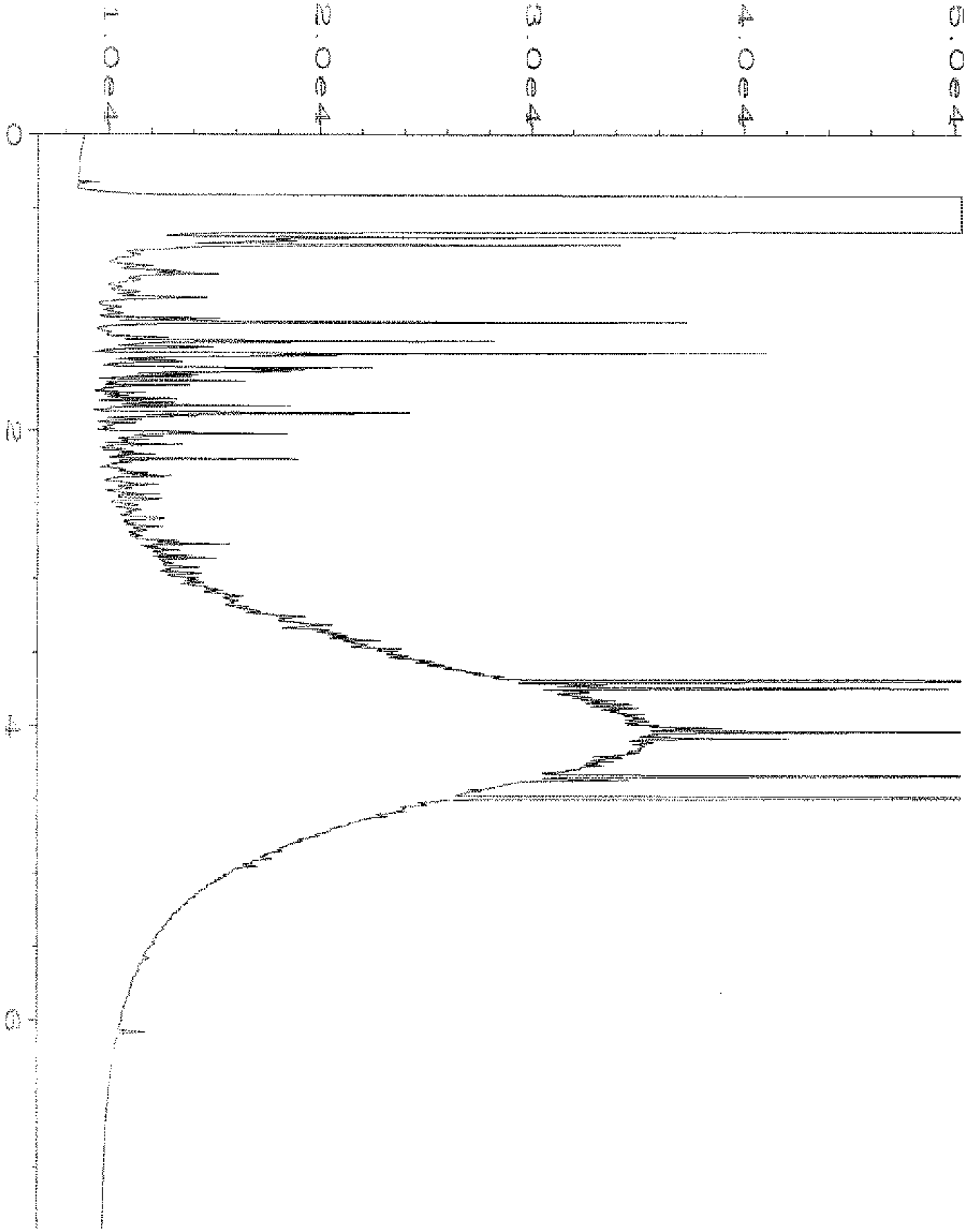
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\043F0801.D
Operator          : TL                               Page Number       : 1
Instrument        : GC1                              Vial Number       : 43
Sample Name       : 011055-17                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 8
Acquired on       : 04 Nov 20  08:00 PM              Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:22 AM               Analysis Method   : DEFAULT.MTH
```



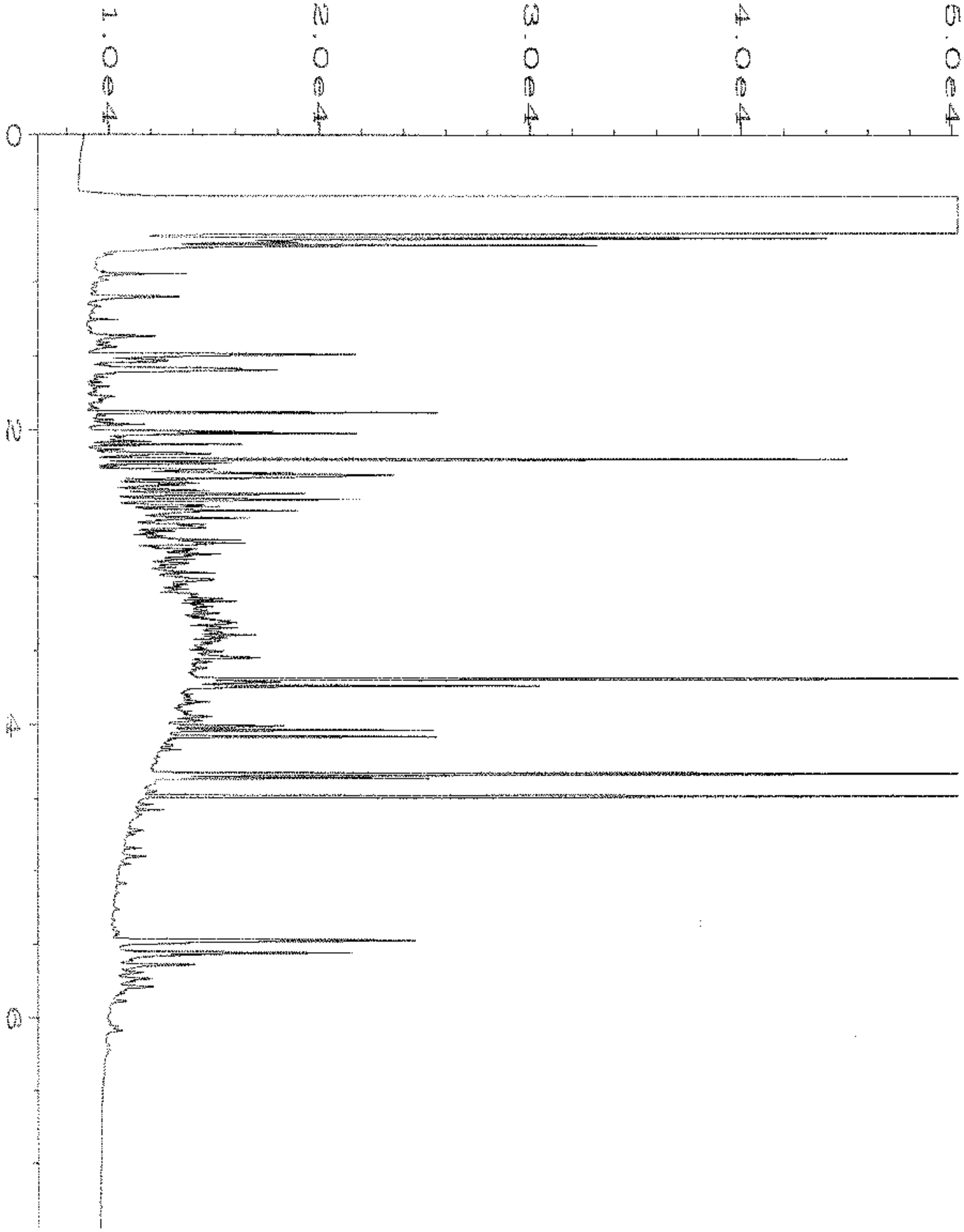
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\044F0801.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 44
Sample Name       : 011055-18                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line     : 8
Acquired on       : 04 Nov 20  08:12 PM             Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:22 AM              Analysis Method   : DEFAULT.MTH
```



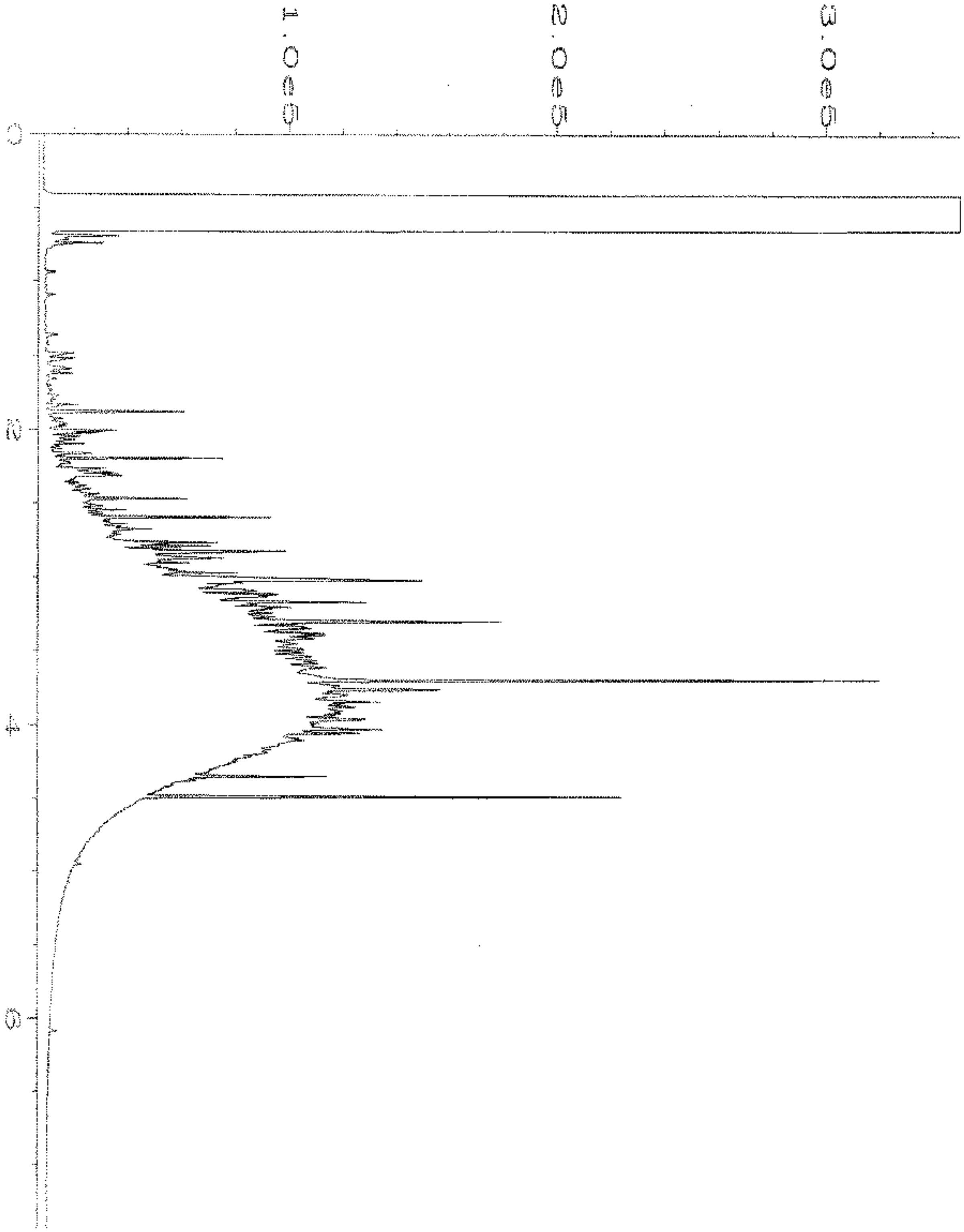
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\045F0801.D
Operator          : TL                             Page Number       : 1
Instrument        : GC1                            Vial Number       : 45
Sample Name       : 011055-19                      Injection Number  : 1
Run Time Bar Code:                                 Sequence Line     : 8
Acquired on       : 04 Nov 20  08:24 PM            Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:22 AM             Analysis Method   : DEFAULT.MTH
```



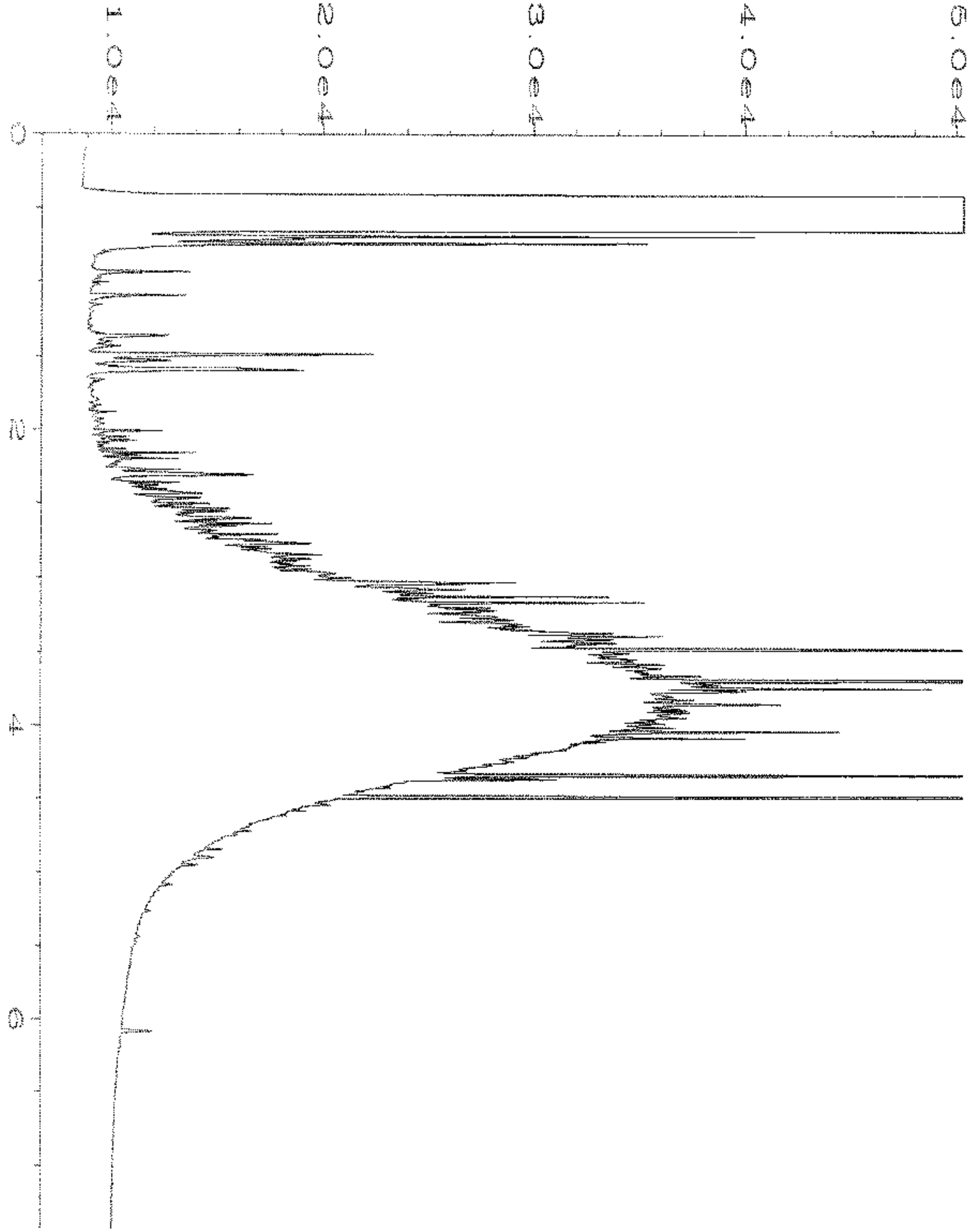
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\046F1001.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 46
Sample Name       : 011055-20                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 10
Acquired on       : 04 Nov 20  08:59 PM             Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:22 AM              Analysis Method  : DEFAULT.MTH
```



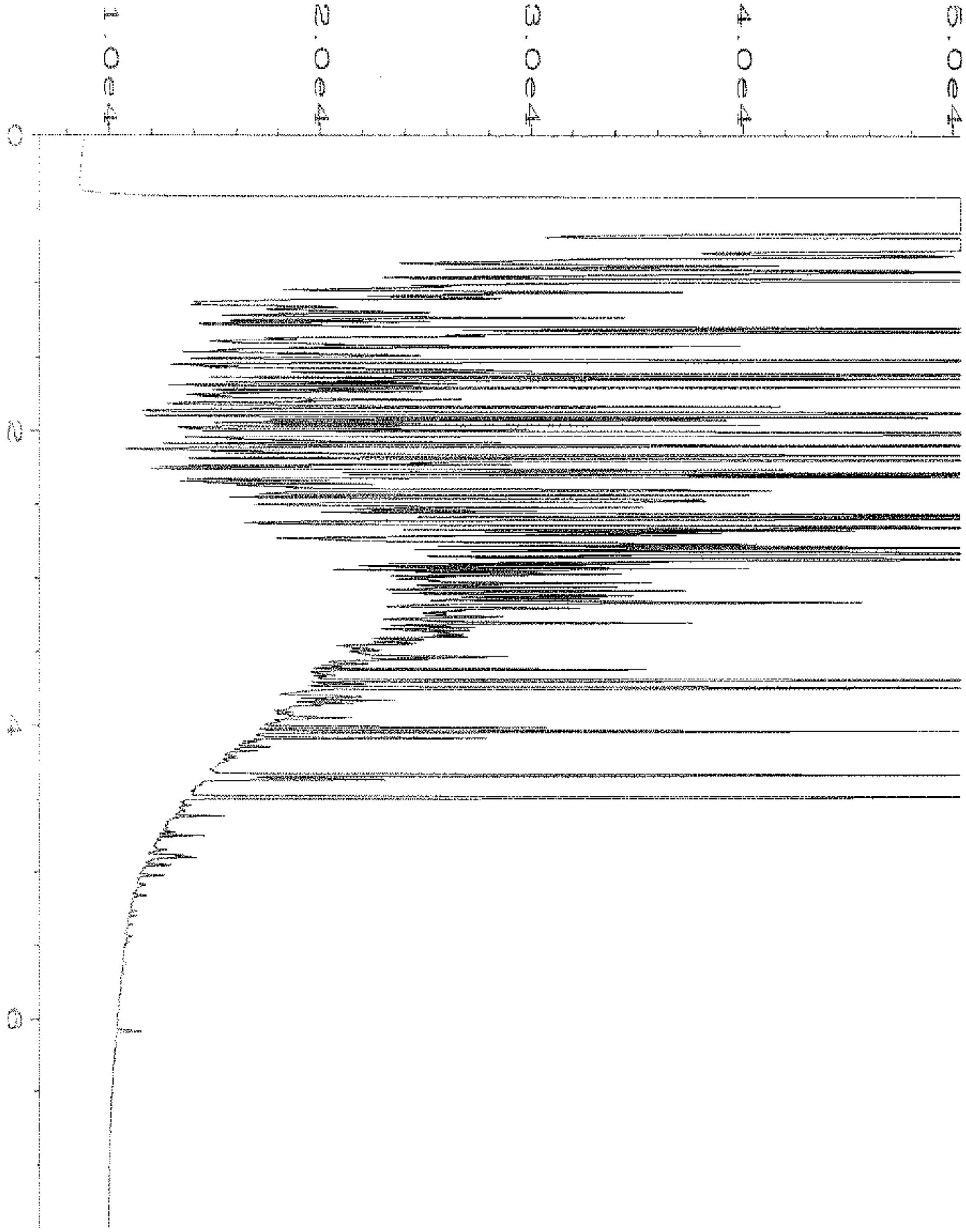
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\047F1001.D
Operator          : TL                                Page Number      : 1
Instrument        : GC1                               Vial Number      : 47
Sample Name       : 011055-21                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line    : 10
Acquired on       : 04 Nov 20  09:10 PM               Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:22 AM                Analysis Method  : DEFAULT.MTH
```



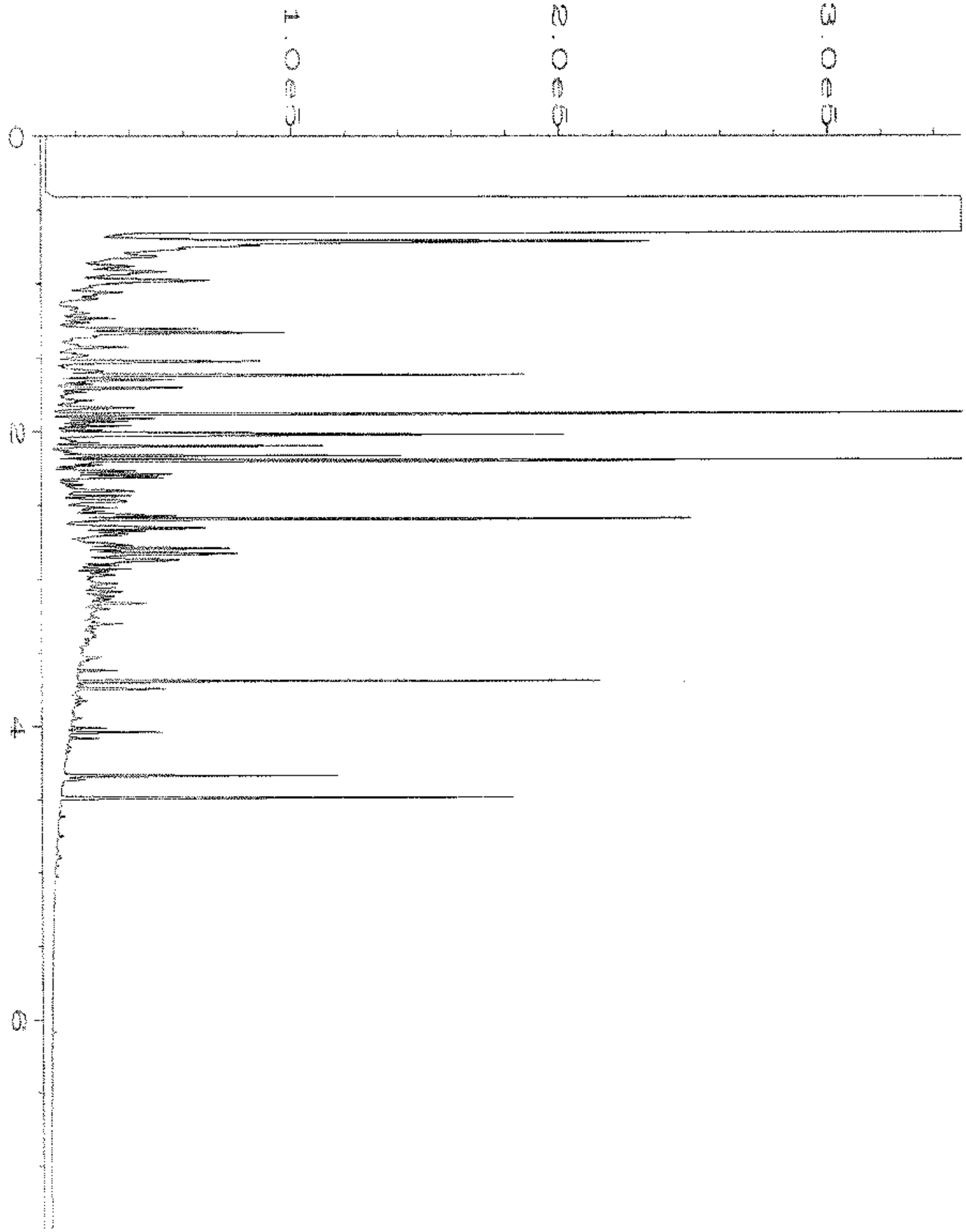
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\048F1001.D
Operator          : TL                                   Page Number       : 1
Instrument        : GC1                                  Vial Number       : 48
Sample Name       : 011055-22                            Injection Number  : 1
Run Time Bar Code:                                       Sequence Line     : 10
Acquired on       : 04 Nov 20   09:22 PM                 Instrument Method: DX.MTH
Report Created on: 05 Nov 20   10:23 AM                  Analysis Method   : DEFAULT.MTH
```



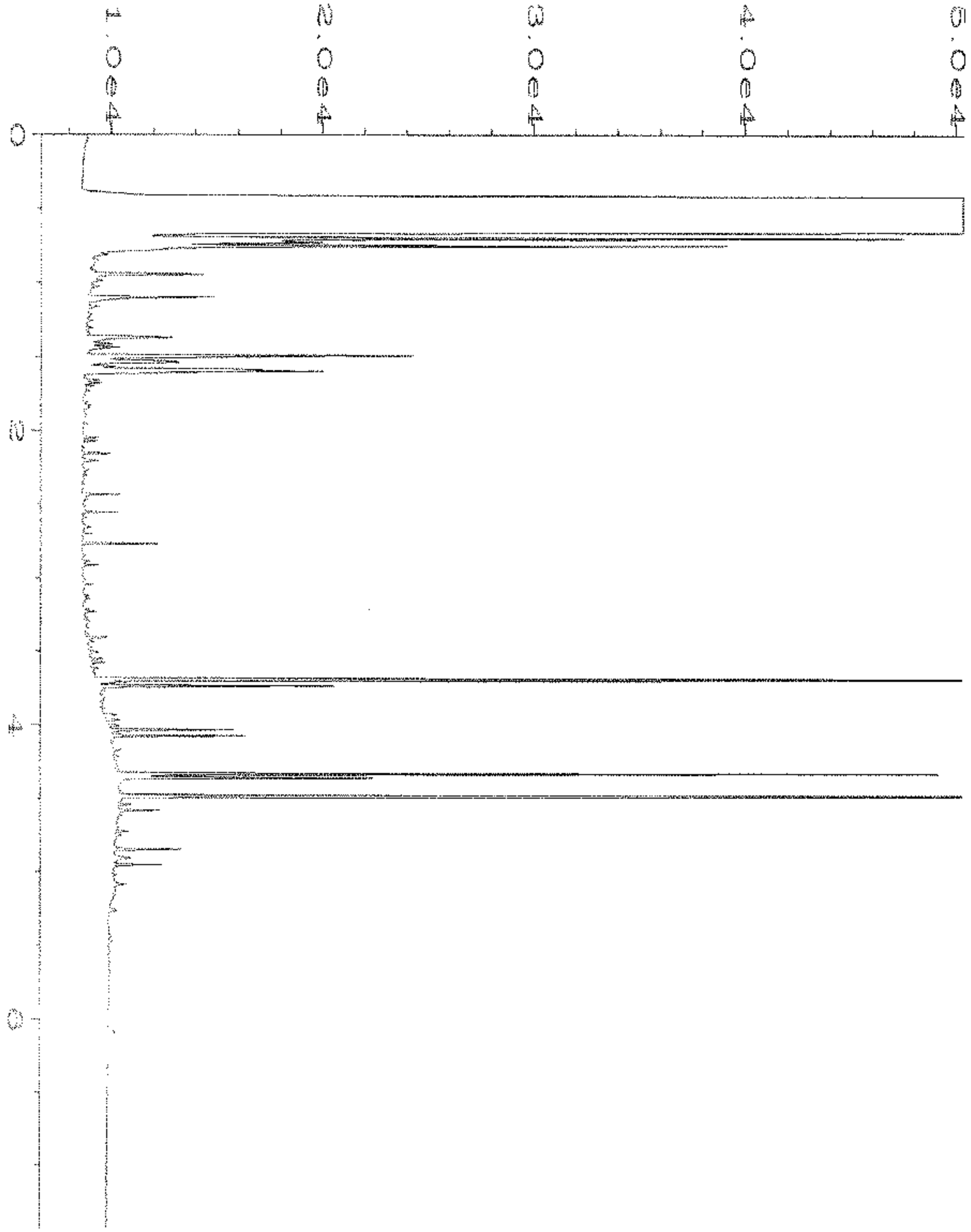
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\049F1001.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 49
Sample Name       : 011055-23                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line     : 10
Acquired on       : 04 Nov 20   09:34 PM            Instrument Method: DX.MTH
Report Created on: 05 Nov 20   10:23 AM             Analysis Method   : DEFAULT.MTH
```



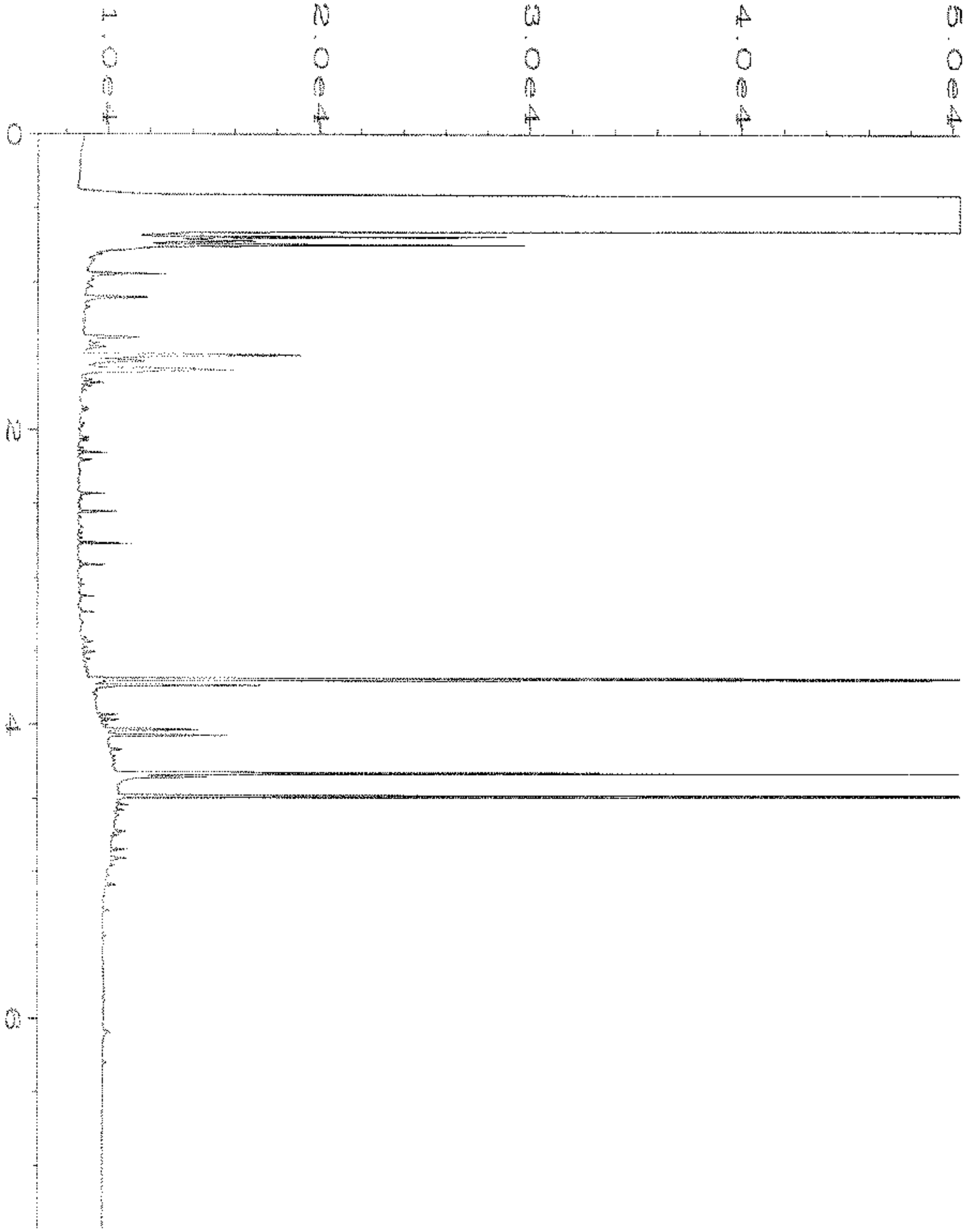
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\050F1001.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 50
Sample Name       : 011055-24                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 10
Acquired on       : 04 Nov 20  09:45 PM             Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:23 AM              Analysis Method  : DEFAULT.MTH
```



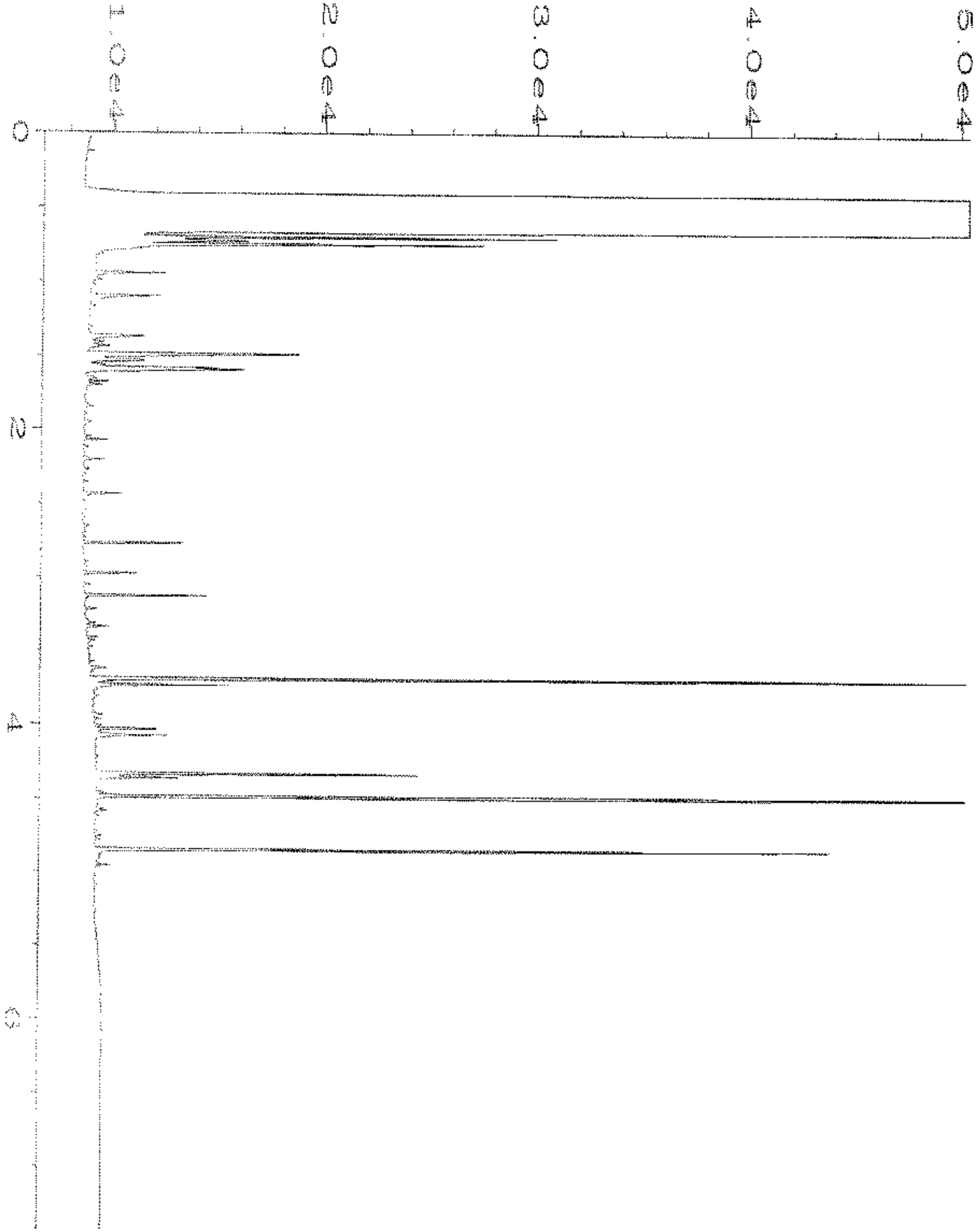
```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\050F1001.D
Operator          : TL                            Page Number       : 1
Instrument        : GC1                           Vial Number       : 50
Sample Name       : 011055-24                     Injection Number  : 1
Run Time Bar Code:                                Sequence Line     : 10
Acquired on       : 04 Nov 20  09:45 PM           Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:24 AM            Analysis Method   : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\051F1001.D
Operator          : TL                             Page Number       : 1
Instrument        : GC1                            Vial Number       : 51
Sample Name       : 011055-25                      Injection Number : 1
Run Time Bar Code:                                 Sequence Line     : 10
Acquired on       : 04 Nov 20   09:57 PM           Instrument Method: DX.MTH
Report Created on: 05 Nov 20   10:24 AM            Analysis Method   : DEFAULT.MTH
```

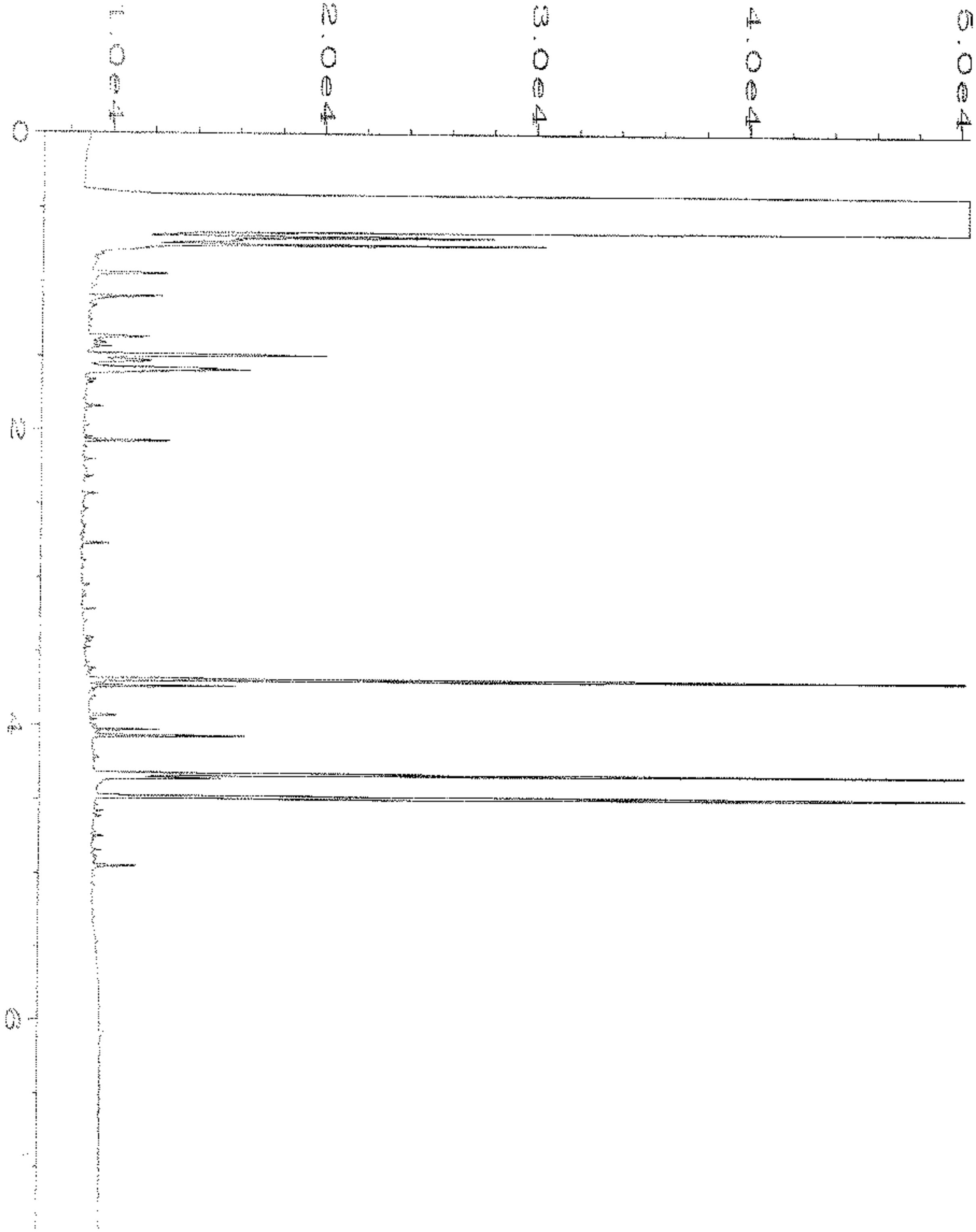


```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\052F1001.D
Operator          : TL                                Page Number       : 1
Instrument        : GC1                               Vial Number       : 52
Sample Name       : 011055-26                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line     : 10
Acquired on       : 04 Nov 20   10:09 PM              Instrument Method: DX.MTH
Report Created on: 05 Nov 20   10:24 AM               Analysis Method   : DEFAULT.MTH
```



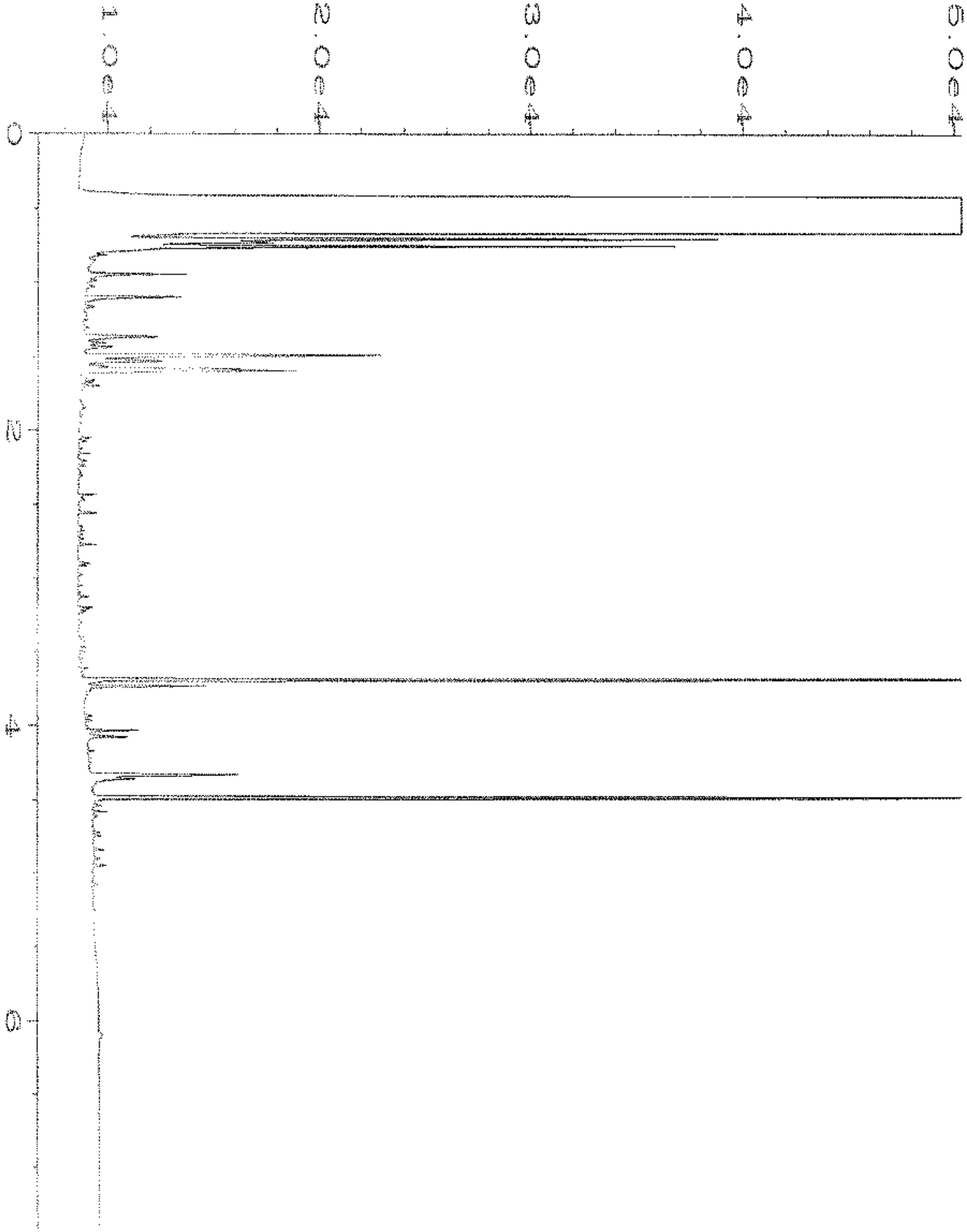
Data File Name : C:\HPCHEM\1\DATA\11-04-20\053F1001.D
Operator : TL
Instrument : GC1
Sample Name : 011055-27
Run Time Bar Code:
Acquired on : 04 Nov 20 10:21 PM
Report Created on: 05 Nov 20 10:24 AM

Page Number : 1
Vial Number : 53
Injection Number : 1
Sequence Line : 10
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

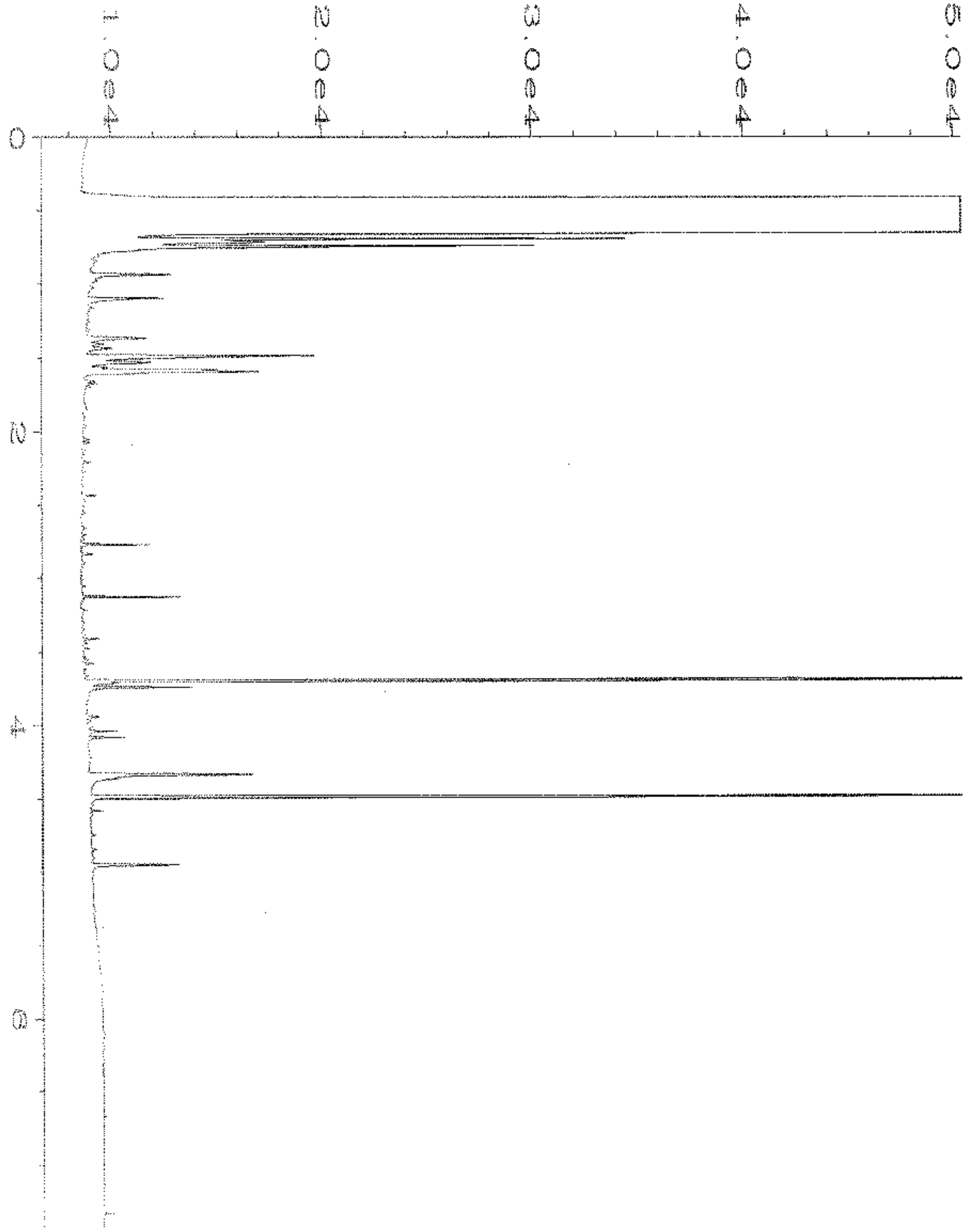


Data File Name : C:\HPCHEM\1\DATA\11-04-20\054F1001.D
Operator : TL
Instrument : GC1
Sample Name : 011055-28
Run Time Bar Code:
Acquired on : 04 Nov 20 10:32 PM
Report Created on: 05 Nov 20 10:24 AM

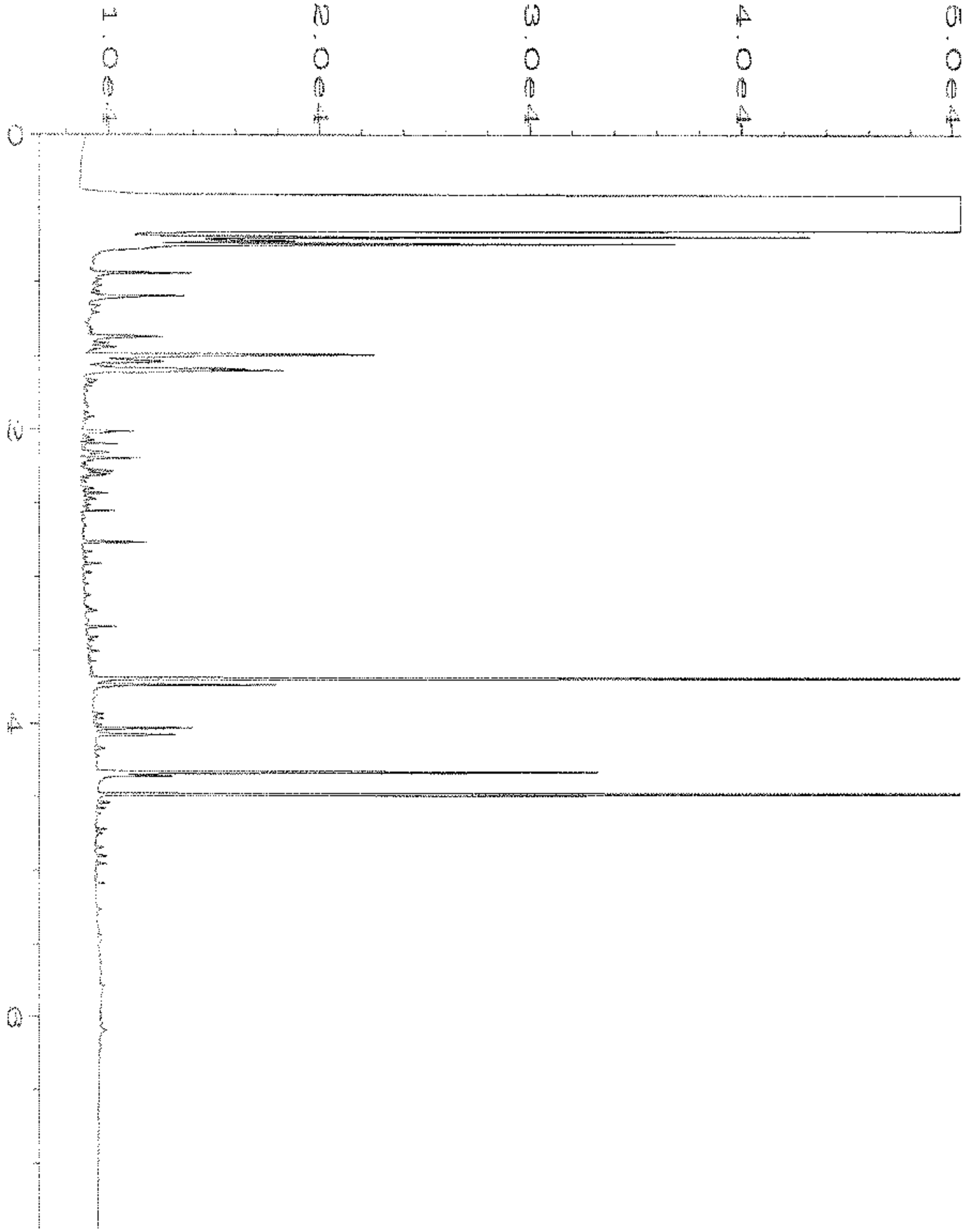
Page Number : 1
Vial Number : 54
Injection Number : 1
Sequence Line : 10
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\055F1001.D
Operator          : TL                                   Page Number      : 1
Instrument        : GC1                                  Vial Number      : 55
Sample Name       : 011055-29                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line    : 10
Acquired on       : 04 Nov 20  10:44 PM                  Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:24 AM                   Analysis Method  : DEFAULT.MTH
```

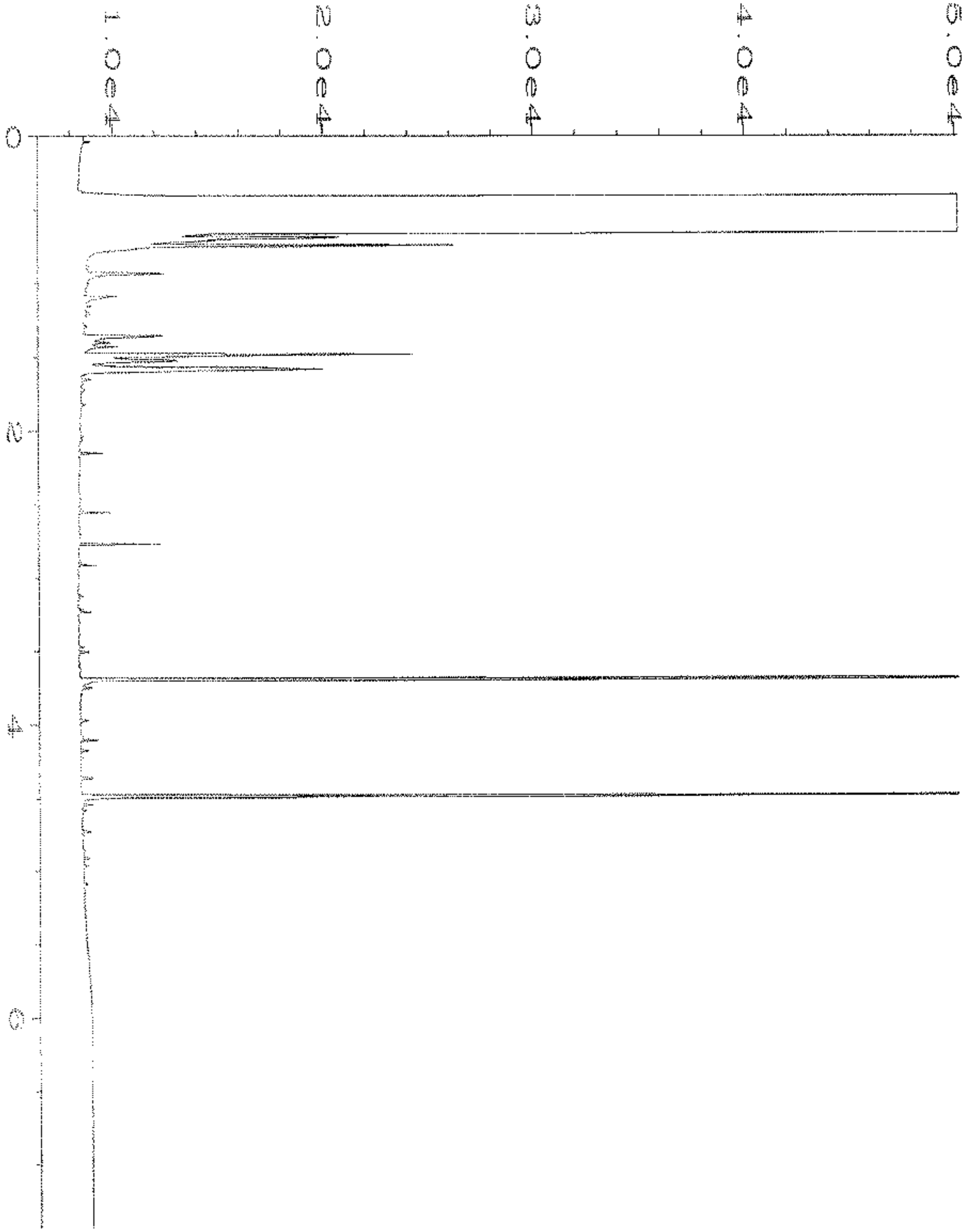


```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\056F1001.D
Operator          : TL                                Page Number      : 1
Instrument        : GC1                               Vial Number      : 56
Sample Name       : 011055-30                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line    : 10
Acquired on       : 04 Nov 20   10:56 PM              Instrument Method: DX.MTH
Report Created on: 05 Nov 20   10:25 AM               Analysis Method  : DEFAULT.MTH
```



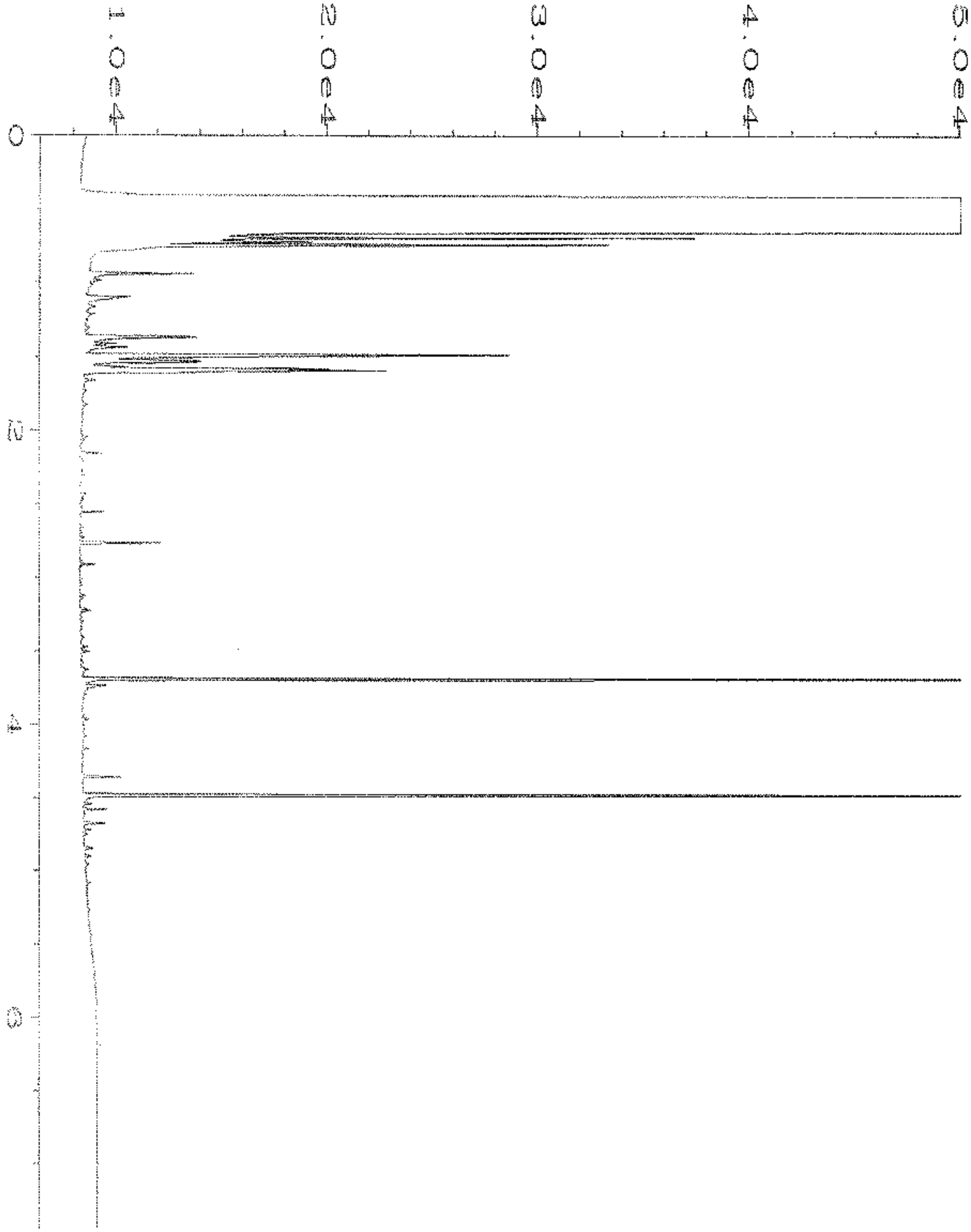
Data File Name   : C:\HPCHEM\1\DATA\11-04-20\057F1001.D
Operator   : TL
Instrument   : GC1
Sample Name   : 011055-31
Run Time Bar Code:
Acquired on   : 04 Nov 20 11:07 PM
Report Created on: 05 Nov 20 10:25 AM

Page Number   : 1
Vial Number   : 57
Injection Number : 1
Sequence Line   : 10
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH

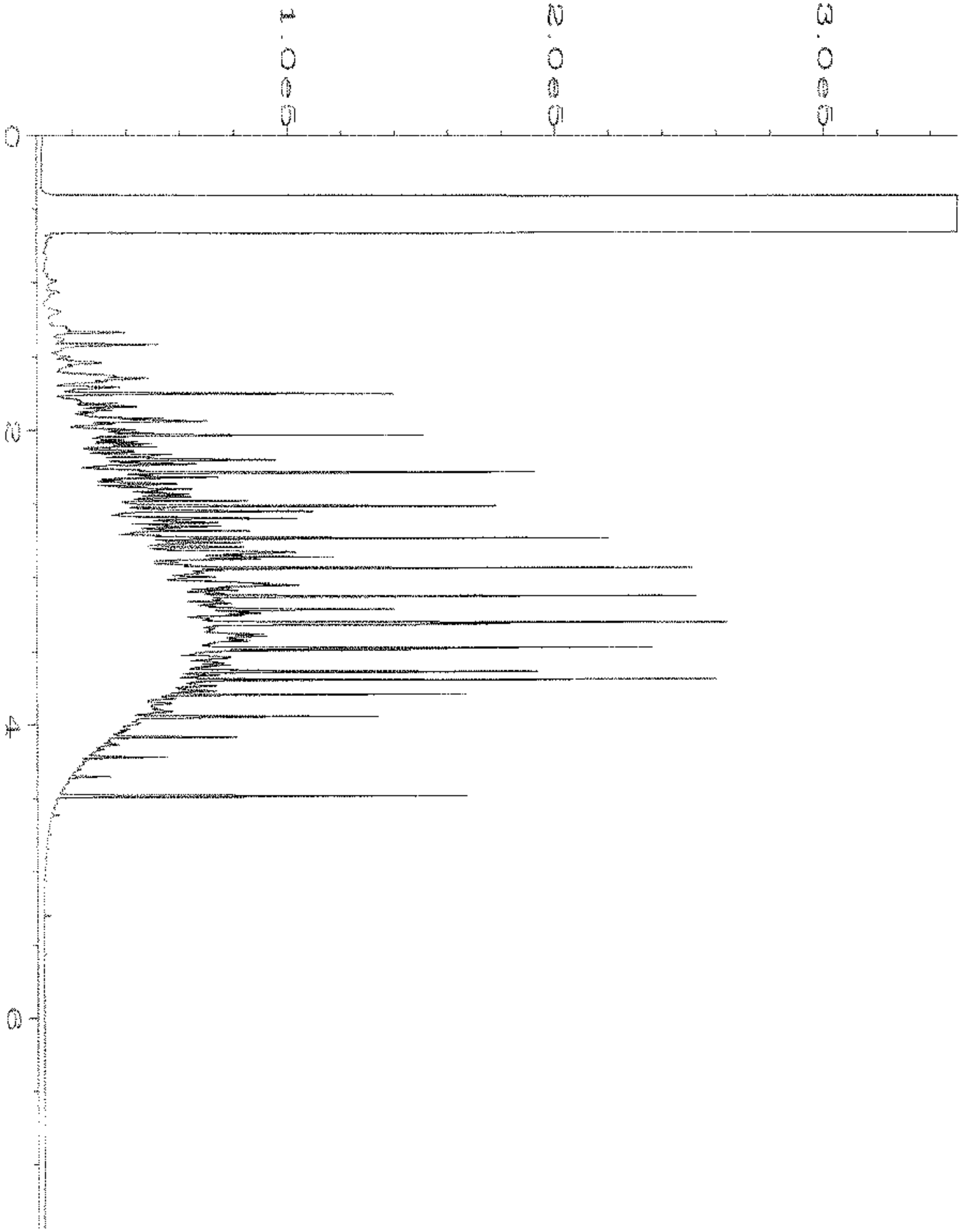


Data File Name : C:\HPCHEM\1\DATA\11-04-20\019F0601.D
Operator : TL
Instrument : GC1
Sample Name : 00-2471 mb
Run Time Bar Code:
Acquired on : 04 Nov 20 02:19 PM
Report Created on: 05 Nov 20 10:25 AM

Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\034F0801.D
Operator          : TL                                Page Number      : 1
Instrument        : GC1                               Vial Number      : 34
Sample Name       : 00-2472 mb                        Injection Number : 1
Run Time Bar Code:                                    Sequence Line    : 8
Acquired on       : 04 Nov 20  06:15 PM               Instrument Method: DX.MTH
Report Created on: 05 Nov 20  10:25 AM                Analysis Method  : DEFAULT.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\11-04-20\005F0501.D
Operator          : TL                                   Page Number        : 1
Instrument        : GC1                                  Vial Number        : 5
Sample Name       : 1000 Dx 61-146C                      Injection Number : 1
Run Time Bar Code:                                       Sequence Line      : 5
Acquired on       : 04 Nov 20   01:52 PM                 Instrument Method: DX.MTH
Report Created on: 05 Nov 20   10:18 AM                  Analysis Method    : DEFAULT.MTH
```

011055

[redacted]

SAMPLE CHAIN OF CUSTODY ME 11-03-20 E04/VW5

[redacted]

Page # 1 of 4

Report To Megan King & Gabe Cisneros

Company Floyd|Snider

Address 601 Union St. Ste 600

City, State, ZIP Seattle, WA

Phone ______ Email ______

SAMPLERS (signature)

PROJECT NAME
POL-TPH

PO #

REMARKS

Project specific RLs? - Yes / [✓ No]

INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH ______
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other ______
[✓ Default:] Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					Notes
MW-08-110220	01 A-6	11/2	1237	W	7	X	X	X									
MW-10-110220	02	↓	1548	W	7	X	X	X									
MW-31-110220	03	↓	1710	W	7	X	X	X									
MW-35-110320	04	11/3	0820	W	7	X	X	X									
MW-34-110220	05	11/2	1540	W	7	X	X	X									
MW-33-110220	06	↓	1435	W	7	X	X	X									
MW-133-110220	07	↓	1440	W	7	X	X	X									
MW-40-110220	08 A-U	↓	1245	W	21	X	X	X									MS/MSD
MW-14-110220	09 A-6	↓	1650	W	7	X	X	X									
MW-07-110220	10	↓	1530	W	7	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	11/3	1829
Received by:	BISRAT TADESSE	FBI	11/3	1829
Relinquished by:				
Received by:		Samples received at 3 °C		

011055

SAMPLE CHAIN OF CUSTODY ME 11-03-20 E04/VW5

Page # 2 of 4

Report To Megan King & Gabe Cisneros
Company Floyd|Snider
Address 601 Union St. Suite 600
City, State, ZIP Seattle, WA 98101
Phone ______ Email gabe.cisneros@floydsnider.com

SAMPLERS (*signature*)

PROJECT NAME	PO #
POL-TPH	

REMARKS	INVOICE TO
Select VOCs include MTBE, EDB, EDC, & Naphth	

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 X	TPH-Gasoline X	BTEX by ~~8021B~~ 8260	VOCs by 8260C	SVOCs by 8270D	~~PAHs~~ cPAHs 8270D SIM	Total lead 6020B	Dissolved lead 6020B	Select VOCs		Notes
MW-26-110220	11 A-6	11/2	1458	W	7		/	/	/								
MW-30-110220	12		1641	W	7		/	/	/								
MW-36-110220	13 A-		1323	W	21		/	/	/								MS/MSD
MW-37-110220	14 A-6		1203	W	7		/	/	/								
MW-38-110220	15		1241	W	7		/	/	/								
T-2-110220	16		1553	W	7		/	/	/								
UST-4-110220	17		1413	W	7		/	/	/								
UST-104-110220	18		1421	W	7		/	/	/								
MW-02-110220	19		1444	W	7		/	/	/								
MW-03-110220	20		1355	W	7		/	/	/								

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	11/3/20	1829
Received by:	Bisrat Todesse	FBI	|	|
Relinquished by:				
Received by:		Samples received at 3 °C		

011055

SAMPLE CHAIN OF CUSTODY

ME 11-03-20 E04/UW5

Page # 3 of 4

Report To Megan King & Gabe Cisneros

Company Floyd|Snider

Address 601 Union St. Ste 600

City, State, ZIP Seattle, WA 98101

Phone______ Email______

SAMPLERS (*signature*)

PROJECT NAME
POL-TPH

PO #

REMARKS
Select VOCs include:
MTBE, EDB, EDC, & Naphthalenes

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 X	TPH-Gasoline X	BTEX by ~~8021B~~ 8260	VOCs by 8260C	SVOCs by 8270D	~~PAHs~~ cPAHs 8270D SIM	8260 Select VOCs	Total lead 6020B	Dissolved lead		Notes
MW-15-11022020	21 A-G	11/2	1425	W	7		X	X	X								
MW-39-11022020	22	↓	1250	W	7		X	X	X								
MW-06-11022020	23		1200	W	7		X	X	X								
MW-12-110320	24	11/3/20	1000	GW	7		X	X	X								
MW-17-110320	25		1017		7		X	X	X								
MW-18-110320	26		0918		7		X	X	X								
MW-22-110320	27		0831		7		X	X	X								
MW-23-110320	28		0840		7		X	X	X								
MW-29-110320	29		0933		7		X	X	X								
MW-24-110320	30	↓	0935	↓	7		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	11/3	1829
Received by:	BISRAT TADESSE	FBI	11/3	1829
Relinquished by:				
Received by:		Samples received at 3 °C		

011055

SAMPLE CHAIN OF CUSTODY

ME 11-03-20

E24/VW5

Page # 4 of 4

Report To Megan + Gabe

Company Floyd Snider

Address

City, State, ZIP See page 1

Phone ______ Email ______

SAMPLERS (signature)

PROJECT NAME
POL-TPH

PO #

REMARKS

INVOICE TO

Project specific RLs? - Yes / No

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH ______
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other ______
[✓ Default]: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					Notes
MW-25-110320	31 A-G	11/3/20	1145	GW	7	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	11/3/20	1829
Received by:	Bisrat Tadesse	FBI	11/3/20	|
Relinquished by:				
Received by:		Samples received at 3 °C		

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Floyd | Snider
Gabe Cisneros
601 Union St., Suite 600
Seattle, WA 98101

RE: POL-TPH
Work Order Number: 2011059

November 11, 2020

Attention Gabe Cisneros:

Fremont Analytical, Inc. received 15 sample(s) on 11/4/2020 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Dissolved Metals by EPA Method 200.8
Ion Chromatography by EPA Method 300.0
Total Alkalinity by SM 2320B

This report consists of the following:

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

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

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Original

Date: *11/11/2020*

CLIENT: Floyd | Snider
Project: POL-TPH
Work Order: 2011059

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2011059-001	MW-30-110220	11/02/2020 4:41 PM	11/04/2020 7:40 AM
2011059-002	MW-10-110220	11/02/2020 3:48 PM	11/04/2020 7:40 AM
2011059-003	MW-31-110220	11/02/2020 5:10 PM	11/04/2020 7:40 AM
2011059-004	MW-35-110220	11/02/2020 5:10 PM	11/04/2020 7:40 AM
2011059-005	MW-14-110220	11/02/2020 4:50 PM	11/04/2020 7:40 AM
2011059-006	MW-12-110320	11/03/2020 10:00 AM	11/04/2020 7:40 AM
2011059-007	MW-17-110320	11/03/2020 10:17 AM	11/04/2020 7:40 AM
2011059-008	MW-18-110320	11/03/2020 9:18 AM	11/04/2020 7:40 AM
2011059-009	MW-22-110320	11/03/2020 8:31 AM	11/04/2020 7:40 AM
2011059-010	MW-23-110320	11/03/2020 8:40 AM	11/04/2020 7:40 AM
2011059-011	MW-123-110320	11/03/2020 9:00 AM	11/04/2020 7:40 AM
2011059-012	MW-24-110320	11/03/2020 9:35 AM	11/04/2020 7:40 AM
2011059-013	MW-25-110320	11/03/2020 11:45 AM	11/04/2020 7:40 AM
2011059-014	MW-29-110320	11/03/2020 9:33 AM	11/04/2020 7:40 AM
2011059-015	Trip Blank	10/26/2020 9:00 AM	11/04/2020 7:40 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2011059**
Date: **11/11/2020**

CLIENT: Floyd | Snider
Project: POL-TPH

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

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

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

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

Qualifiers:

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

Acronyms:

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

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Collection Date: 11/2/2020 4:41:00 PM
Project: POL-TPH
Lab ID: 2011059-001
Matrix: Groundwater
Client Sample ID: MW-30-110220

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	ND	0.00863		mg/L	1	11/5/2020 3:04:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	57.9	2.50	DH	mg/L	25	11/4/2020 7:25:00 PM
Nitrate (as N)	60.4	1.00	DEQ	mg/L	10	11/4/2020 11:04:00 AM
Sulfate	234	7.50	D	mg/L	25	11/4/2020 7:25:00 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
E - Estimated value. The amount exceeds the linear working range of the instrument.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	492	2.00		µg/L	1	11/5/2020 8:58:14 PM
Total Alkalinity by SM 2320B				Batch ID: R63316		Analyst: WF
Alkalinity, Total (As CaCO3)	152	2.50		mg/L	1	11/9/2020 4:25:33 PM

Client: Floyd | Snider
Collection Date: 11/2/2020 3:48:00 PM
Project: POL-TPH
Lab ID: 2011059-002
Matrix: Groundwater
Client Sample ID: MW-10-110220

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	4.43	0.432	D	mg/L	50	11/5/2020 4:03:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	0.200	DH	mg/L	2	11/4/2020 7:48:00 PM
Nitrate (as N)	ND	1.00	DQ	mg/L	10	11/4/2020 11:27:00 AM
Sulfate	ND	0.600	D	mg/L	2	11/4/2020 7:48:00 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
Diluted due to high levels of non-target analytes.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	2,340	20.0	D	µg/L	10	11/10/2020 1:24:18 PM
Total Alkalinity by SM 2320B				Batch ID: R63316		Analyst: WF
Alkalinity, Total (As CaCO3)	132	2.50		mg/L	1	11/9/2020 4:25:33 PM

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2011059-003
Client Sample ID: **MW-31-110220**

Collection Date: 11/2/2020 5:10:00 PM
Matrix: Groundwater

Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Methane	0.0221	0.00863		mg/L	1	11/5/2020 3:06:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Nitrate (as N)	1.51	0.200	DH	mg/L	2	11/4/2020 9:20:00 PM
Nitrate (as N)	1.33	1.00	DQ	mg/L	10	11/4/2020 11:50:00 AM
Sulfate	15.8	0.600	D	mg/L	2	11/4/2020 9:20:00 PM

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Manganese	2.14	2.00		µg/L	1	11/5/2020 9:09:21 PM

Total Alkalinity by SM 2320B

Batch ID: R63316 Analyst: WF

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Alkalinity, Total (As CaCO3)	206	2.50		mg/L	1	11/9/2020 4:25:33 PM

Client: Floyd | Snider

Project: POL-TPH

Lab ID: 2011059-004

Client Sample ID: **MW-35-110220**

Collection Date: 11/2/2020 5:10:00 PM

Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	0.0167	0.00863		mg/L	1	11/5/2020 3:08:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	5.33	0.500	DH	mg/L	5	11/5/2020 11:31:00 AM
Nitrate (as N)	4.74	1.00	DQ	mg/L	10	11/4/2020 12:13:00 PM
Sulfate	6.67	0.600	D	mg/L	2	11/4/2020 9:43:00 PM

NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	6.39	2.00		µg/L	1	11/5/2020 9:14:55 PM
Total Alkalinity by SM 2320B				Batch ID: R63316		Analyst: WF
Alkalinity, Total (As CaCO3)	88.2	2.50		mg/L	1	11/9/2020 4:25:33 PM

Client: Floyd | Snider

Collection Date: 11/2/2020 4:50:00 PM

Project: POL-TPH

Lab ID: 2011059-005

Matrix: Groundwater

Client Sample ID: MW-14-110220

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	ND	0.00863		mg/L	1	11/5/2020 3:11:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	3.56	0.200	DH	mg/L	2	11/5/2020 12:48:00 AM
Nitrate (as N)	2.87	1.00	DQ	mg/L	10	11/4/2020 12:36:00 PM
Sulfate	28.8	1.50	D	mg/L	5	11/5/2020 11:54:00 AM

NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	18.6	2.00		µg/L	1	11/5/2020 9:20:29 PM
Total Alkalinity by SM 2320B				Batch ID: R63316		Analyst: WF
Alkalinity, Total (As CaCO3)	216	2.50		mg/L	1	11/9/2020 4:25:33 PM

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Collection Date: 11/3/2020 10:00:00 AM
Project: POL-TPH
Lab ID: 2011059-006
Matrix: Groundwater
Client Sample ID: MW-12-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	10.7	0.863	D	mg/L	100	11/5/2020 4:05:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	11/5/2020 1:12:00 AM
Sulfate	0.358	0.300		mg/L	1	11/5/2020 1:12:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	19.8	2.00		µg/L	1	11/5/2020 9:26:02 PM
Total Alkalinity by SM 2320B				Batch ID: R63316		Analyst: WF
Alkalinity, Total (As CaCO3)	186	2.50		mg/L	1	11/9/2020 4:25:33 PM

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2011059-007
Client Sample ID: **MW-17-110320**

Collection Date: 11/3/2020 10:17:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	ND	0.00863		mg/L	1	11/5/2020 3:17:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	1.98	0.100		mg/L	1	11/5/2020 1:35:00 AM
Sulfate	9.36	0.300		mg/L	1	11/5/2020 1:35:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	2.48	2.00		µg/L	1	11/5/2020 9:42:46 PM
Total Alkalinity by SM 2320B				Batch ID: R63316		Analyst: WF
Alkalinity, Total (As CaCO3)	93.1	2.50		mg/L	1	11/9/2020 4:25:33 PM

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Collection Date: 11/3/2020 9:18:00 AM
Project: POL-TPH
Lab ID: 2011059-008
Matrix: Groundwater
Client Sample ID: MW-18-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	0.0185	0.00863		mg/L	1	11/5/2020 3:25:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	1.60	1.00	D	mg/L	10	11/5/2020 2:44:00 AM
Sulfate	7.52	3.00	D	mg/L	10	11/5/2020 2:44:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	11.7	2.00		µg/L	1	11/5/2020 9:48:19 PM
Total Alkalinity by SM 2320B				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO3)	68.6	2.50		mg/L	1	11/11/2020 12:04:59 PM

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2011059-009
Client Sample ID: **MW-22-110320**
Collection Date: 11/3/2020 8:31:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	2.96	0.173	D	mg/L	20	11/5/2020 4:08:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	1.00	D	mg/L	10	11/5/2020 3:08:00 AM
Nitrate (as N)	ND	0.100	H	mg/L	1	11/5/2020 12:17:00 PM
Sulfate	0.326	0.300		mg/L	1	11/5/2020 12:17:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	1,090	2.00		µg/L	1	11/5/2020 9:53:53 PM
Total Alkalinity by SM 2320B				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO3)	157	2.50		mg/L	1	11/11/2020 12:04:59 PM

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Collection Date: 11/3/2020 8:40:00 AM
Project: POL-TPH
Lab ID: 2011059-010
Matrix: Groundwater
Client Sample ID: MW-23-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	0.458	0.0863	D	mg/L	10	11/5/2020 3:54:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	1.00	D	mg/L	10	11/5/2020 3:31:00 AM
Sulfate	13.9	3.00	D	mg/L	10	11/5/2020 3:31:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	3,690	20.0	D	µg/L	10	11/10/2020 1:29:52 PM
Total Alkalinity by SM 2320B				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO3)	88.2	2.50		mg/L	1	11/11/2020 12:04:59 PM

NOTES:
Diluted due to high levels of non-target analytes.

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Collection Date: 11/3/2020 9:00:00 AM
Project: POL-TPH
Lab ID: 2011059-011
Matrix: Groundwater
Client Sample ID: MW-123-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	0.354	0.0863	D	mg/L	10	11/5/2020 3:56:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	1.00	D	mg/L	10	11/5/2020 3:54:00 AM
Sulfate	13.6	3.00	D	mg/L	10	11/5/2020 3:54:00 AM

NOTES:
Diluted due to high levels of non-target analytes.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	3,960	20.0	D	µg/L	10	11/10/2020 1:35:26 PM
Total Alkalinity by SM 2320B				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO3)	103	2.50		mg/L	1	11/11/2020 12:04:59 PM

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2011059-012
Client Sample ID: **MW-24-110320**

Collection Date: 11/3/2020 9:35:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	ND	0.00863		mg/L	1	11/5/2020 3:35:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	2.29	1.00	D	mg/L	10	11/5/2020 4:17:00 AM
Sulfate	7.63	3.00	D	mg/L	10	11/5/2020 4:17:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	3.14	2.00		µg/L	1	11/5/2020 10:10:34 PM
Total Alkalinity by SM 2320B				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO3)	118	2.50		mg/L	1	11/11/2020 12:04:59 PM

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Collection Date: 11/3/2020 11:45:00 AM
Project: POL-TPH
Lab ID: 2011059-013
Matrix: Groundwater
Client Sample ID: MW-25-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	7.33	0.432	D	mg/L	50	11/5/2020 3:59:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	1.00	D	mg/L	10	11/5/2020 4:40:00 AM
Nitrate (as N)	ND	0.100	H	mg/L	1	11/5/2020 12:40:00 PM
Sulfate	0.349	0.300		mg/L	1	11/5/2020 12:40:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	1,950	2.00		µg/L	1	11/5/2020 10:16:08 PM
Total Alkalinity by SM 2320B				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO3)	191	2.50		mg/L	1	11/11/2020 12:04:59 PM

Analytical Report

Work Order: **2011059**
Date Reported: **11/11/2020**

Client: Floyd | Snider
Project: POL-TPH
Lab ID: 2011059-014
Client Sample ID: **MW-29-110320**
Collection Date: 11/3/2020 9:33:00 AM
Matrix: Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R63192		Analyst: MS
Methane	ND	0.00863		mg/L	1	11/5/2020 3:41:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 30290		Analyst: SS
Nitrate (as N)	2.06	1.00	D	mg/L	10	11/5/2020 5:03:00 AM
Sulfate	12.9	0.600	D	mg/L	2	11/5/2020 1:03:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 30296		Analyst: CO
Manganese	2.48	2.00		µg/L	1	11/5/2020 10:21:42 PM
Total Alkalinity by SM 2320B				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO3)	63.7	2.50		mg/L	1	11/11/2020 12:04:59 PM

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: **MB-R63316** SampType: **MBLK** Units: **mg/L** Prep Date: **11/9/2020** RunNo: **63316**
Client ID: **MBLKW** Batch ID: **R63316** Analysis Date: **11/9/2020** SeqNo: **1270833**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: **LCS-R63316** SampType: **LCS** Units: **mg/L** Prep Date: **11/9/2020** RunNo: **63316**
Client ID: **LCSW** Batch ID: **R63316** Analysis Date: **11/9/2020** SeqNo: **1270834**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	102	2.50	100.0	0	102	99.6	108				

Sample ID: **2011059-001CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **11/9/2020** RunNo: **63316**
Client ID: **MW-30-110220** Batch ID: **R63316** Analysis Date: **11/9/2020** SeqNo: **1270836**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	157	2.50						151.9	3.17	20	

Sample ID: **MB-R63317** SampType: **MBLK** Units: **mg/L** Prep Date: **11/11/2020** RunNo: **63317**
Client ID: **MBLKW** Batch ID: **R63317** Analysis Date: **11/11/2020** SeqNo: **1270844**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: **LCS-R63317** SampType: **LCS** Units: **mg/L** Prep Date: **11/11/2020** RunNo: **63317**
Client ID: **LCSW** Batch ID: **R63317** Analysis Date: **11/11/2020** SeqNo: **1270845**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	102	2.50	100.0	0	102	99.6	108				

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: **2011059-008CDUP**	SampType: **DUP**	Units: **mg/L**	Prep Date: **11/11/2020**	RunNo: **63317**	
Client ID: **MW-18-110320**	Batch ID: **R63317**		Analysis Date: **11/11/2020**	SeqNo: **1270847**	

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	73.5	2.50						68.60	6.90	20	

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-30289** SampType: **MBLK** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63239**
Client ID: **MBLKW** Batch ID: **30289** Analysis Date: **11/4/2020** SeqNo: **1269089**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.100									Q

NOTES:
Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Sample ID: **LCS-30289** SampType: **LCS** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63239**
Client ID: **LCSW** Batch ID: **30289** Analysis Date: **11/4/2020** SeqNo: **1269090**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.677	0.100	0.7500	0	90.3	90	110				

Sample ID: **LCS-30290** SampType: **LCS** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **LCSW** Batch ID: **30290** Analysis Date: **11/4/2020** SeqNo: **1269137**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.708	0.100	0.7500	0	94.4	90	110				
Sulfate	3.58	0.300	3.750	0	95.4	90	110				

Sample ID: **MB-30290** SampType: **MBLK** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **MBLKW** Batch ID: **30290** Analysis Date: **11/4/2020** SeqNo: **1269139**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.100									
Sulfate	ND	0.300									

Sample ID: **2011059-002CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **MW-10-110220** Batch ID: **30290** Analysis Date: **11/4/2020** SeqNo: **1269142**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.200						0		20	DH

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2011059-002CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **MW-10-110220** Batch ID: **30290** Analysis Date: **11/4/2020** SeqNo: **1269142**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	0.600						0		20	D

Sample ID: **2011059-002CMS** SampType: **MS** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **MW-10-110220** Batch ID: **30290** Analysis Date: **11/4/2020** SeqNo: **1269143**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	1.45	0.200	1.500	0	96.4	80	120				DH
Sulfate	7.15	0.600	7.500	0.5860	87.5	80	120				D

Sample ID: **2011059-002CMSD** SampType: **MSD** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **MW-10-110220** Batch ID: **30290** Analysis Date: **11/4/2020** SeqNo: **1269144**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	1.43	0.200	1.500	0	95.6	80	120	1.446	0.833	20	DH
Sulfate	7.10	0.600	7.500	0.5860	86.9	80	120	7.150	0.645	20	D

Sample ID: **2011061-002ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **BATCH** Batch ID: **30290** Analysis Date: **11/4/2020** SeqNo: **1269151**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.224	0.100						0.2270	1.33	20	
Sulfate	2.56	0.300						2.555	0.235	20	

Sample ID: **2011061-002AMS** SampType: **MS** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **BATCH** Batch ID: **30290** Analysis Date: **11/5/2020** SeqNo: **1269152**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.962	0.100	0.7500	0.2270	98.0	80	120				

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2011061-002AMS** SampType: **MS** Units: **mg/L** Prep Date: **11/4/2020** RunNo: **63240**
Client ID: **BATCH** Batch ID: **30290** Analysis Date: **11/5/2020** SeqNo: **1269152**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	6.64	0.300	3.750	2.555	109	80	120				

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-30296** SampType: **MBLK** Units: **µg/L** Prep Date: **11/5/2020** RunNo: **63216**
Client ID: **MBLKW** Batch ID: **30296** Analysis Date: **11/5/2020** SeqNo: **1268588**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	2.00									

Sample ID: **MB-30280FB** SampType: **MBLK** Units: **µg/L** Prep Date: **11/5/2020** RunNo: **63216**
Client ID: **MBLKW** Batch ID: **30296** Analysis Date: **11/5/2020** SeqNo: **1268590**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	2.00									

NOTES:
Filter Blank

Sample ID: **2011057-001BDUP** SampType: **DUP** Units: **µg/L** Prep Date: **11/5/2020** RunNo: **63216**
Client ID: **BATCH** Batch ID: **30296** Analysis Date: **11/5/2020** SeqNo: **1268592**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	9.34	2.00						9.420	0.805	30	

Sample ID: **2011057-001BMS** SampType: **MS** Units: **µg/L** Prep Date: **11/5/2020** RunNo: **63216**
Client ID: **BATCH** Batch ID: **30296** Analysis Date: **11/5/2020** SeqNo: **1268593**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	567	2.00	500.0	9.420	112	70	130				

Sample ID: **2011057-001BMSD** SampType: **MSD** Units: **µg/L** Prep Date: **11/5/2020** RunNo: **63216**
Client ID: **BATCH** Batch ID: **30296** Analysis Date: **11/5/2020** SeqNo: **1268594**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	560	2.00	500.0	9.420	110	70	130	567.0	1.26	30	

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **LCS-30296**	SampType: **LCS**			Units: **µg/L**		Prep Date: **11/5/2020**			RunNo: **63216**		
Client ID: **LCSW**	Batch ID: **30296**					Analysis Date: **11/10/2020**			SeqNo: **1269833**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	103	2.00	100.0	0	103	85	115				

Date: *11/11/2020*

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **LCS-R63192**	SampType: **LCS**			Units: **mg/L**		Prep Date: **11/5/2020**		RunNo: **63192**			
Client ID: **LCSW**	Batch ID: **R63192**					Analysis Date: **11/5/2020**		SeqNo: **1268280**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	1,060	0.00863	1,000	0	106	70	130				

Sample ID: **MB-R63192**	SampType: **MBLK**			Units: **mg/L**		Prep Date: **11/5/2020**		RunNo: **63192**			
Client ID: **MBLKW**	Batch ID: **R63192**					Analysis Date: **11/5/2020**		SeqNo: **1268281**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00863									

Sample ID: **2011059-002AREP**	SampType: **REP**			Units: **mg/L**		Prep Date: **11/5/2020**		RunNo: **63192**			
Client ID: **MW-10-110220**	Batch ID: **R63192**					Analysis Date: **11/5/2020**		SeqNo: **1268257**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	6.23	0.00863						6.779	8.47	30	E

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Fremont *Analytical*

Sample Log-In Check List

Client Name: **FS** Work Order Number: **2011059**

Logged by: **Clare Griggs** Date Received: **11/4/2020 7:40:00 AM**

Chain of Custody

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

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Present ☑
6. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
7. Were all items received at a temperature of >2°C to 6°C * Yes ☑ No ☐ NA ☐
8. Sample(s) in proper container(s)? Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
10. Are samples properly preserved? Yes ☑ No ☐
11. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
12. Is there headspace in the VOA vials? Yes ☐ No ☑ NA ☐
13. Did all samples containers arrive in good condition(unbroken)? Yes ☑ No ☐
14. Does paperwork match bottle labels? Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
16. Is it clear what analyses were requested? Yes ☑ No ☐
17. Were all holding times able to be met? Yes ☑ No ☐

Special Handling (if applicable)

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

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	5.2
Sample 2	2.6

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

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Date: 11/2/20 **Page:** 1 **of:** 2

Laboratory Project No (internal): 2011059

Special Remarks: Lab Filter dissolved metals
Methane by RSK-175
Alkalinity by SM 2320B

Sample Disposal: ☐ Return to client ☒ Disposal by lab (after 30 days)

Client: Floyd Snider
Address: 601 Union St Ste 600
City, State, Zip: Seattle, WA 98101
Telephone: 206-292-2078
Fax:

Project Name: POL-TPH
Project No:
Collected by: P.O., N.S., T.S and G.C.
Location: Longview, WA
Report To (PM): Gabe Cisneros
PM Email: gabe.cisneros@floydsnider.com

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	~~BTEX~~ Methane	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8) Mn	Total (T) / Dissolved (D)	Anions (IC)*** 300.0	EDB (8011)	Alk, ~~nitrate/sulfate~~			# of Bottles	Comments
1 MW-30-110220	11/2	1641	GW			X							X	D	X		X			4	
2 MW-10-110220	↓	1548	↓			X							X	D	X		X			4	
3 MW-31-110220	↓	1710	↓			X							X	D	X		X			4	
4 MW-35-110220	↓	1710	↓			X							X	D	X		X			4	
5 MW-14-110220	↓	1650	↓			X							X	D	X		X			4	
6 MW-12-110320	11/3/20	1000	GW			X							X	D	X		X			4	
7 MW-17-110320	↓	1017	↓			X							X	D	X		X			4	
8 MW-18-110320	↓	0918	↓			X							X	D	X		X			4	
9 MW-22-110320	↓	0831	↓			X							X	D	X		X			4	
10 MW-23-110320	↓	0840	↓			X							X	D	X		X			4	

*Matrix: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, [✓ GW = Ground Water], SW = Storm Water, WW = Waste Water

**Metals (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg [✓ Mn] Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

***Anions (Circle): [✓ Nitrate] Nitrite Chloride [✓ Sulfate] Bromide O-Phosphate Fluoride Nitrate+Nitrite

Turn-around Time:
☒ Standard
☐ 3 Day
☐ 2 Day
☐ Next Day
Same Day ______ (specify)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x Tyler Scott TS	11/3/20 1841	x Clair Anderson	11/4/20 0740
x		x	

Fremont Analytical
3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Date: 11/3/20
Page: 2 of: 2
Laboratory Project No (internal): 2011059

Client: Floyd Snider
Address: See Page 1
City, State, Zip:
Telephone:
Fax:

Project Name: POL-TPH
Project No:
Collected by:
Location:
Report To (PM): see page 1
PM Email:

Special Remarks:
Lab Filter dissolved metals
Methane by RSK-175
Alkalinity by SM 2320B

Sample Disposal: ☐ Return to client ☒ Disposal by lab (after 30 days)

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	~~BTEX~~ Methane	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8) MN	Total (T) | Dissolved (D)	Anions (IC)*** 300.0	EDB (8011)	Alkalinity			# of Bottles	Comments
1	MW-123-110320	11/3	0900	GW			X							X	D	X		X			4	
2	MW-24-110320	↓	0935	↓			X							X	D	X		X			4	
3	MW-25-110320		1145				X							X	D	X		X			4	
4	MW-29-110320		0933				X							X	D	X		X			4	
5																						
6																						
7																						
8																						
9																						
10																						

*Matrix: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, [✓ GW = Ground Water], SW = Storm Water, WW = Waste Water

**Metals (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg [✓ Mn] Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

***Anions (Circle): [✓ Nitrate] Nitrite Chloride [✓ Sulfate] Bromide O-Phosphate Fluoride Nitrate+Nitrite

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x Tyler Scott FS	11/3/20 18:41	x Claire Audron	11/4/20 0740
x		x	

Turn-around Time:
☒ Standard
☐ 3 Day
☐ 2 Day
☐ Next Day
Same Day ______ *(specify)*

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

March 4, 2021

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

Dear Ms King:

Included are the results from the testing of material submitted on February 24, 2021 from the POL-TPH, F&BI 102393 project. There are 57 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Gabriel Cisneros
FDS0304R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on February 24, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 102393 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
102393 -01	MW-37-022321
102393 -02	MW-38-022321
102393 -03	MW-36-022321
102393 -04	UST-04-022321
102393 -05	MW-26-022321
102393 -06	MW-24-022321
102393 -07	MW-06-022321
102393 -08	MW-39-022321
102393 -09	MW-25-022321
102393 -10	MW-20-022321
102393 -11	MW-10-022321
102393 -12	MW-03-022321
102393 -13	MW-103-022321
102393 -14	T-2-022321
102393 -15	MW-31-022321
102393 -16	MW-15-022321
102393 -17	MW-02-022321
102393 -18	MW-08-022321
102393 -19	MW-12-022321
102393 -20	MW-04-022421
102393 -21	MW-35-022421
102393 -22	MW-28-022421
102393 -23	MW-07-022421
102393 -24	MW-135-022421
102393 -25	MW-30-022421
102393 -26	MW-18-022421
102393 -27	MW-40-022421
102393 -28	MW-23-022421
102393 -29	MW-22-022421
102393 -30	MW-17-022421
102393 -31	MW-29-022421
102393 -32	MW-34-022421
102393 -33	MW-14-022421
102393 -34	MW-33-022421
102393 -35	MW-05-022421

All quality control requirements were acceptable.

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21
Date Analyzed: 02/26/21 and 03/01/21

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-37-022321 102393-01	260	97
MW-38-022321 102393-02	<100	95
MW-36-022321 102393-03	<100	89
UST-04-022321 102393-04	<100	91
MW-26-022321 102393-05	<100	90
MW-24-022321 102393-06	<100	89
MW-06-022321 102393-07	<100	88
MW-39-022321 102393-08	500	100
MW-25-022321 102393-09	<100	92
MW-20-022321 102393-10	2,600	125

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21
Date Analyzed: 02/26/21 and 03/01/21

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-10-022321 102393-11	5,800	100
MW-03-022321 102393-12	950	95
MW-103-022321 102393-13	870	93
T-2-022321 102393-14	<100	90
MW-31-022321 102393-15	<100	90
MW-15-022321 102393-16	<100	89
MW-02-022321 102393-17	<100	92
MW-08-022321 102393-18	2,900	87
MW-12-022321 102393-19	4,900	89
MW-04-022421 102393-20	<100	90

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21
Date Analyzed: 02/26/21 and 03/01/21

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-35-022421 102393-21	<100	91
MW-28-022421 102393-22	<100	88
MW-07-022421 102393-23	490	100
MW-135-022421 102393-24	<100	91
MW-30-022421 102393-25	<100	90
MW-18-022421 102393-26	<100	90
MW-40-022421 102393-27	2,300	85
MW-23-022421 102393-28	<100	91
MW-22-022421 102393-29	<100	91
MW-17-022421 102393-30	<100	91

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21
Date Analyzed: 02/26/21 and 03/01/21

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-29-022421 102393-31	<100	90
MW-34-022421 102393-32	<100	94
MW-14-022421 102393-33	<100	90
MW-33-022421 102393-34	190	91
MW-05-022421 102393-35	<100	91
Method Blank 01-350 MB	<100	89
Method Blank 01-351 MB	<100	89

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21 and 03/01/21
Date Analyzed: 02/25/21 and 03/01/21

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-37-022321 102393-01	63 x	<250	55
MW-38-022321 102393-02	<50	<250	110
MW-36-022321 102393-03	<50	<250	101
UST-04-022321 102393-04	87 x	290 x	100
MW-26-022321 102393-05	<50	<250	108
MW-24-022321 102393-06	<50	<250	100
MW-06-022321 102393-07	630 x	<250	110
MW-39-022321 102393-08	4,800 x	800 x	97
MW-25-022321 102393-09	<50	<250	98
MW-20-022321 102393-10	1,000 x	490 x	98

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21 and 03/01/21
Date Analyzed: 02/25/21 and 03/01/21

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-10-022321 102393-11	1,600 x	<250	92
MW-03-022321 102393-12	1,200 x	550 x	92
MW-103-022321 102393-13	1,200 x	550 x	99
T-2-022321 102393-14	54 x	<250	104
MW-31-022321 102393-15	<50	<250	102
MW-15-022321 102393-16	54 x	<250	82
MW-02-022321 102393-17	110 x	<250	102
MW-08-022321 102393-18	2,200 x	480 x	105
MW-12-022321 102393-19	1,100 x	<250	111
MW-04-022421 102393-20	520 x	440 x	112

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21 and 03/01/21
Date Analyzed: 02/25/21 and 03/01/21

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-35-022421 102393-21	470 x	<250	92
MW-28-022421 102393-22	1,200 x	680 x	94
MW-07-022421 102393-23	590	<250	96
MW-135-022421 102393-24	520 x	270 x	103
MW-30-022421 102393-25	940 x	550 x	110
MW-18-022421 102393-26	<50	<250	104
MW-40-022421 102393-27	2,500	290 x	108
MW-23-022421 102393-28	<50	<250	104
MW-22-022421 102393-29	<50	<250	104
MW-17-022421 102393-30	53 x	<250	106

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21 and 03/01/21
Date Analyzed: 02/25/21 and 03/01/21

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-29-022421 102393-31	<50	<250	111
MW-34-022421 102393-32	1,500 x	310 x	109
MW-14-022421 102393-33	<50	<250	84
MW-33-022421 102393-34	830 x	<220	92
MW-05-022421 102393-35	790 x	520 x	94
Method Blank 01-498 MB	<50	<250	96
Method Blank 01-499 MB	<50	<250	103
Method Blank 01-512 MB	<50	<250	106

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-37-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-01
Date Analyzed:	02/25/21	Data File:	022510.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	3.7
m,p-Xylene	2.7
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-38-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-02
Date Analyzed:	02/25/21	Data File:	022511.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	99	88	114
4-Bromofluorobenzene	96	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-36-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-03
Date Analyzed:	02/25/21	Data File:	022512.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	UST-04-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-04
Date Analyzed:	02/25/21	Data File:	022513.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	99	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-26-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-05
Date Analyzed:	02/25/21	Data File:	022515.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	94	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-24-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-06
Date Analyzed:	02/25/21	Data File:	022516.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-06-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-07
Date Analyzed:	02/25/21	Data File:	022517.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-39-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-08
Date Analyzed:	02/25/21	Data File:	022518.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	103	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-25-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-09
Date Analyzed:	02/25/21	Data File:	022519.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-20-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-10
Date Analyzed:	02/25/21	Data File:	022520.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	109	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	0.86
Toluene	1.8
Ethylbenzene	4.3
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/26/21	Lab ID:	102393-11
Date Analyzed:	02/26/21	Data File:	022611.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	106	88	114
4-Bromofluorobenzene	107	88	112

Compounds:	Concentration ug/L (ppb)
Toluene	31
Ethylbenzene	68
m,p-Xylene	45
o-Xylene	1.1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-11 1/10
Date Analyzed:	02/25/21	Data File:	022521.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	180

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-03-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-12
Date Analyzed:	02/25/21	Data File:	022522.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	0.88
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-103-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-13
Date Analyzed:	02/25/21	Data File:	022523.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	103	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	0.89
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	T-2-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-14
Date Analyzed:	02/25/21	Data File:	022524.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-31-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-15
Date Analyzed:	02/25/21	Data File:	022525.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-15-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-16
Date Analyzed:	02/25/21	Data File:	022540.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-02-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-17
Date Analyzed:	02/25/21	Data File:	022541.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-08-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-18
Date Analyzed:	02/25/21	Data File:	022542.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	109	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	1.1
Toluene	1.9
Ethylbenzene	<1
m,p-Xylene	2.3
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/26/21	Lab ID:	102393-19
Date Analyzed:	02/26/21	Data File:	022612.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	104	88	114
4-Bromofluorobenzene	103	88	112

Compounds:	Concentration ug/L (ppb)
Toluene	23
Ethylbenzene	36
m,p-Xylene	38
o-Xylene	1.0

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-19 1/10
Date Analyzed:	02/25/21	Data File:	022543.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	180

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-04-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-20
Date Analyzed:	02/25/21	Data File:	022544.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	96	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-35-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-21
Date Analyzed:	02/25/21	Data File:	022545.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-28-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-22
Date Analyzed:	02/26/21	Data File:	022546.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-07-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-23
Date Analyzed:	02/26/21	Data File:	022547.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-135-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-24
Date Analyzed:	02/26/21	Data File:	022548.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-30-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-25
Date Analyzed:	02/26/21	Data File:	022549.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-18-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-26
Date Analyzed:	02/26/21	Data File:	022550.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/26/21	Lab ID:	102393-27
Date Analyzed:	02/26/21	Data File:	022613.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Toluene	9.7
Ethylbenzene	2.6
m,p-Xylene	4.5
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-27 1/10
Date Analyzed:	02/26/21	Data File:	022551.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	96	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	200

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-23-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/26/21	Lab ID:	102393-28
Date Analyzed:	02/26/21	Data File:	022614.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-22-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-29
Date Analyzed:	02/26/21	Data File:	022553.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-17-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-30
Date Analyzed:	02/26/21	Data File:	022554.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-29-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-31
Date Analyzed:	02/26/21	Data File:	022555.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-34-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-32
Date Analyzed:	02/26/21	Data File:	022556.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-14-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-33
Date Analyzed:	02/26/21	Data File:	022557.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-33-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-34
Date Analyzed:	02/26/21	Data File:	022558.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-05-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-35
Date Analyzed:	02/26/21	Data File:	022559.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	94	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	01-435 mb
Date Analyzed:	02/25/21	Data File:	022508.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	01-441 mb
Date Analyzed:	02/25/21	Data File:	022539.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393

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

Laboratory Code: 102393-17 (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	91	99	53-117	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	104	69-134

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393

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

Laboratory Code: 102393-04 (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	94	97	53-117	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	97	69-134

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393

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

Laboratory Code: 102393-04 (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	300	87	98	50-150	12

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	106	63-142

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393

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

Laboratory Code: 102393-17 (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	89	88	50-150	1

Laboratory Code: Laboratory Control Sample

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

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393

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	82	82	63-142	0

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393

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

Laboratory Code: 102393-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	102	99	57-135	3
Toluene	ug/L (ppb)	10	<1	98	97	50-137	1
Ethylbenzene	ug/L (ppb)	10	<1	99	97	60-133	2
m,p-Xylene	ug/L (ppb)	20	<2	101	99	69-135	2
o-Xylene	ug/L (ppb)	10	<1	101	97	60-140	4

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)	10	96	99	69-134	3
Toluene	ug/L (ppb)	10	93	97	72-122	4
Ethylbenzene	ug/L (ppb)	10	93	96	77-124	3
m,p-Xylene	ug/L (ppb)	20	95	98	81-112	3
o-Xylene	ug/L (ppb)	10	96	98	81-121	2

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393

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

Laboratory Code: 102393-17 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	100	99	57-135	1
Toluene	ug/L (ppb)	10	<1	96	95	50-137	1
Ethylbenzene	ug/L (ppb)	10	<1	95	95	60-133	0
m,p-Xylene	ug/L (ppb)	20	<2	97	98	69-135	1
o-Xylene	ug/L (ppb)	10	<1	97	98	60-140	1

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)	10	94	93	69-134	1
Toluene	ug/L (ppb)	10	93	93	72-122	0
Ethylbenzene	ug/L (ppb)	10	93	92	77-124	1
m,p-Xylene	ug/L (ppb)	20	94	94	81-112	0
o-Xylene	ug/L (ppb)	10	94	92	81-121	2

Data Qualifiers & Definitions

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

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 analyte 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 due to sample matrix effects.

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.

102393

SAMPLE CHAIN OF CUSTODY ME 02-24-21

VW5 /E04

Page # _____ of 4

Report To Megan King | Gabe Cisneros

Company Floyd|Snider

Address 601 Union St. Suite 600

City, State, ZIP Seattle

Phone 206 292-2078 Email

SAMPLERS (signature)

PROJECT NAME POL- TPH

PO #

REMARKS BTEX by 8260

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME

☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL

☐ Archive samples
☐ Other
[✓ Default]: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					Notes
MW-37-022321	01 A-G	2/23/21	1156	W	7	X	X	X									Tidally influence Hard to remove bubble
MW-38-022321	02		1247		7	X	X	X									
MW-36-022321	03		1335		7	X	X	X									
UST-04-022321	04 A-U		1439		21	X	X	X									MS/MSD
MW-26-022321	05 A-G		1527		7	X	X	X									
MW-24-022321	06		1610		7	X	X	X									
MW-06-022321	07		1231		7	X	X	X									
MW-39-022321	08		1316		7	X	X	X									
MW-25-022321	09 A-F		1551		6	X	X	X									
MW-20-022321	10 A-G		1446		7	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:	Nathan Schachtman	Floyd|Snider	2/24/21	1542
Received by:	Khoi Hoang	FBF	2/24/21	1542
Relinquished by:				
Received by:		Samples received at 3 °C		

102393

SAMPLE CHAIN OF CUSTODY

ME 02-24-21 [redacted]

VW5/ E04

Page # 2 of 4

Report To Megan King/Gabe Cisneros
Company 601 Union St. Suite 600
Address Floyd/Snider
City, State, ZIP Seattle, WA
Phone 206-292-2078 Email

SAMPLERS (*signature*)

PROJECT NAME	PO #
POL-TPH	

REMARKS	INVOICE TO
Project specific RLs? - Yes / No	

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
[✓ Default]: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					Notes
MW-10-022321	11 A-G	2/23	1535	W	7	X	X	X									
MW-03-022321	12		1430	W	7	X	X	X									
MW-103-022321	13		1440	W	7	X	X	X									
T-2-022321	14		1300	W	7	X	X	X									
MW-31-022321	15		1510	W	7	X	X	X									
MW-15-022321	16		1650	W	7	X	X	X									
MW-02-022321	17 A-U		1300	W	21 ~~7~~	X	X	X									21 Jars for MS/MSD
MW-08-022321	18 A-G		1630	W	7	X	X	X									
MW-12-022321	19	2/23/21	1659	W	7	X	X	X									
MW-04-022421	20	2/24/21	0817	W	7	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:	Nathan Shochtman	Floyd/Snider	2/24/21	1542
Received by: VH	Khoi Hoang	FBI	2/24/21	1542
Relinquished by:				
Received by:		Samples received at 3 °C		

102393

SAMPLE CHAIN OF CUSTODY 1400 ME 02-24-21 VW5/E04

Page # 3 of 4

Report To Megan King/Gabe Cisneros

Company 601 Union St. Suite 600

Address Floyd/Snider

City, State, ZIP Seattle WA

Phone 206-292-2078 Email

SAMPLERS (*signature*)

PROJECT NAME POL-TPH	PO #
REMARKS	INVOICE TO /
Project specific RLs? - Yes / No	

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
[✓ Default]: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					Notes
MW-35-022421	21 A-G	2/24/21	0825	Water	7	X	X	X									
MW-28-022421	22	2/24/21	0830		7	X	X	X									
MW-07-022421	23	2/24/21	0835		7	X	X	X									
MW-135-022421	24	2/24/21	0835		7	X	X	X									
MW-30-022421	25	2/24/21	0857		7	X	X	X									
MW-18-022421	26	2/24/21	0931		7	X	X	X									
MW-40-022421	27	2/24/21	0935		7	X	X	X									
MW-23-022421	28	2/24/21	0950		7	X	X	X									
MW-22-022421	29	2/24/21	0955		7	X	X	X									
MW-17-022421	30 ↓	2/24/21	1043		7	X	X	X									

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3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Nathan Schachtman	Floyd/Snider	2/24/21	1542
Received by:	Khoi Hoang	FBI	2/24/21	1542
Relinquished by:				
Received by:		Samples received at 3 °C		

102393

SAMPLE CHAIN OF CUSTODY

02-24-21 VW5/E04

Page # 4 of 4

Report To Megan King / Gabe Cisneros

Company Floyd|Snider

Address 601 Union St. Suite 600

City, State, ZIP Seattle, WA

Phone 206-292-2078 Email

SAMPLERS (*signature*)

PROJECT NAME Pol-TPH

PO #

REMARKS

INVOICE TO

Project specific RLs? - Yes / No

TURNAROUND TIME

☒ Standard turnaround

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☐ Archive samples

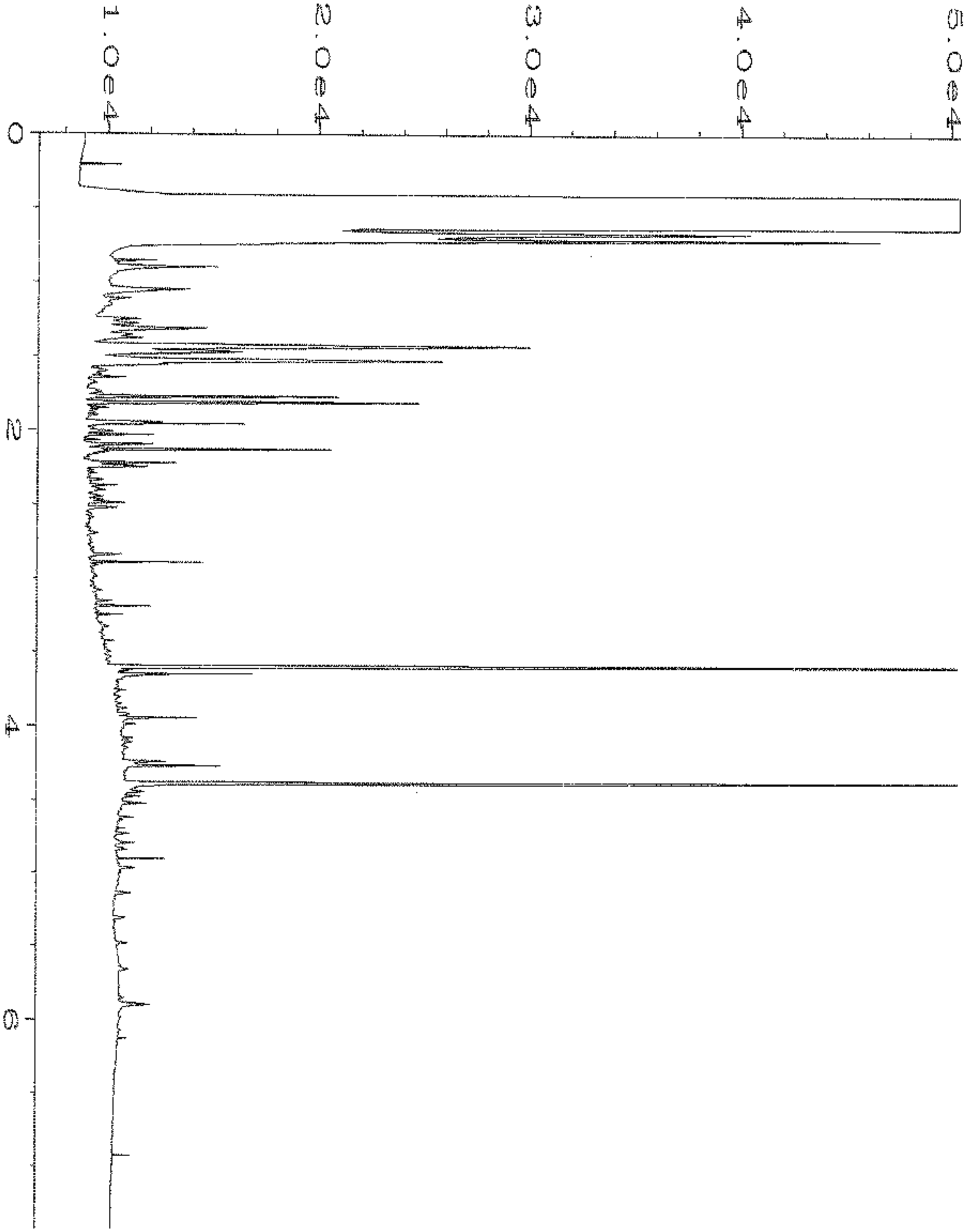
☐ Other

[✓ Default:] Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA ~~8021~~ 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					Notes
MW-29-022421	31 A-6	2/24/21	1051	Water	7	X	X	X									
MW-34-022421	32	2/24/21	1100		7	X	X	X									
MW-14-022421	33	2/24/21	1140		7	X	X	X									
MW-33-022421	34	2/24/21	1142		7	X	X	X									
MW-05-022421	35	2/24/21	1155		7	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:	Nathan Schachtman	FloydSnider	2/24/21	1542
Received by: KH	Khoi Hoang	FBI	2/24/21	1542
Relinquished by:				
Received by:		Samples received at	3 °C	



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Data File Name    : C:\HPCHEM\1\DATA\02-25-21\015F1101.D
Operator          : TL                               Page Number      : 1
Instrument        : GC1                              Vial Number      : 15
Sample Name       : 102393-01                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 11
Acquired on       : 25 Feb 21   02:49 PM             Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:00 AM              Analysis Method  : COND.MTH
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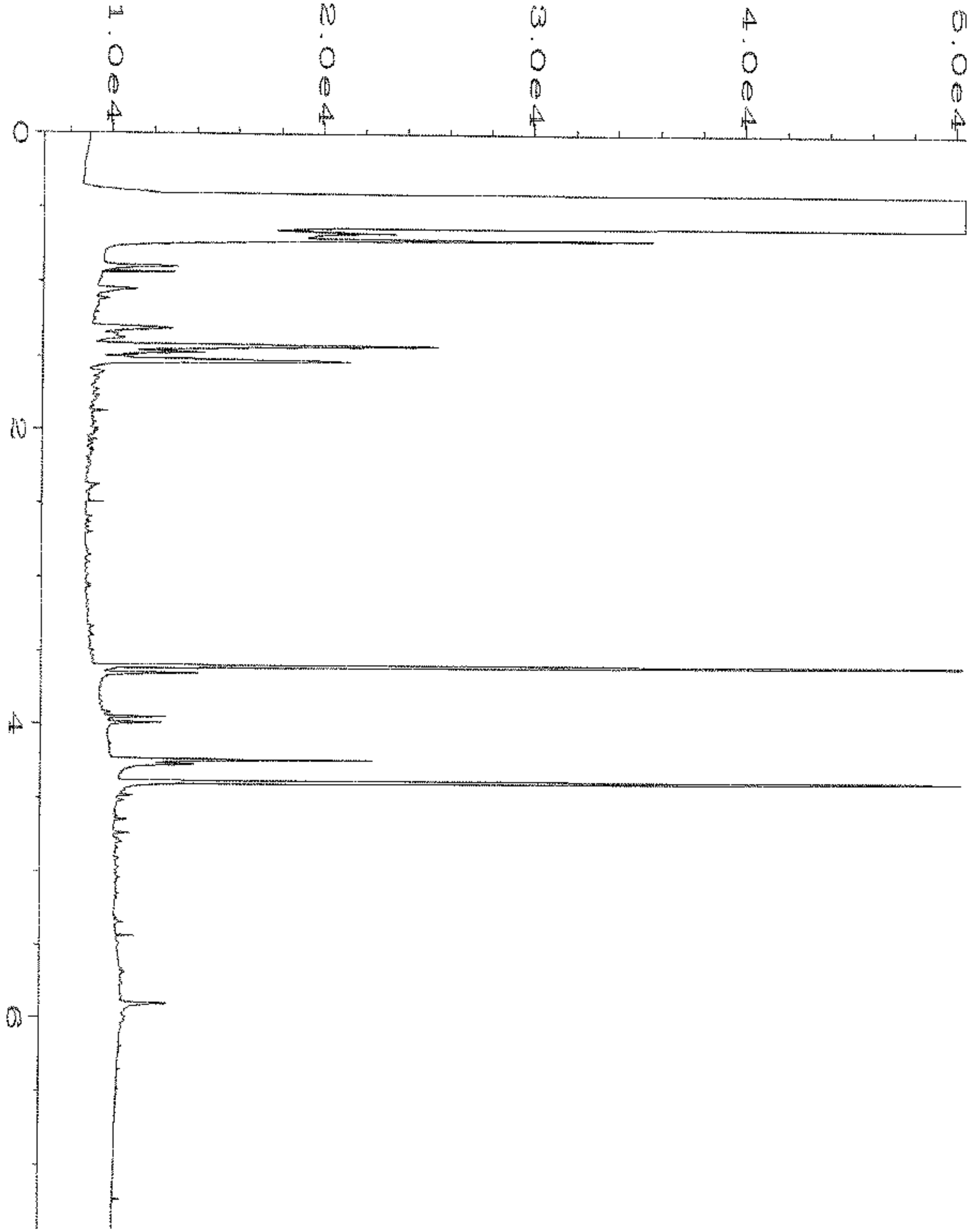

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Data File Name    : C:\HPCHEM\1\DATA\02-25-21\016F1101.D
Operator          : TL                          Page Number       : 1
Instrument        : GC1                         Vial Number       : 16
Sample Name       : 102393-02                   Injection Number  : 1
Run Time Bar Code:                              Sequence Line     : 11
Acquired on       : 25 Feb 21   03:00 PM        Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:02 AM         Analysis Method   : COND.MTH
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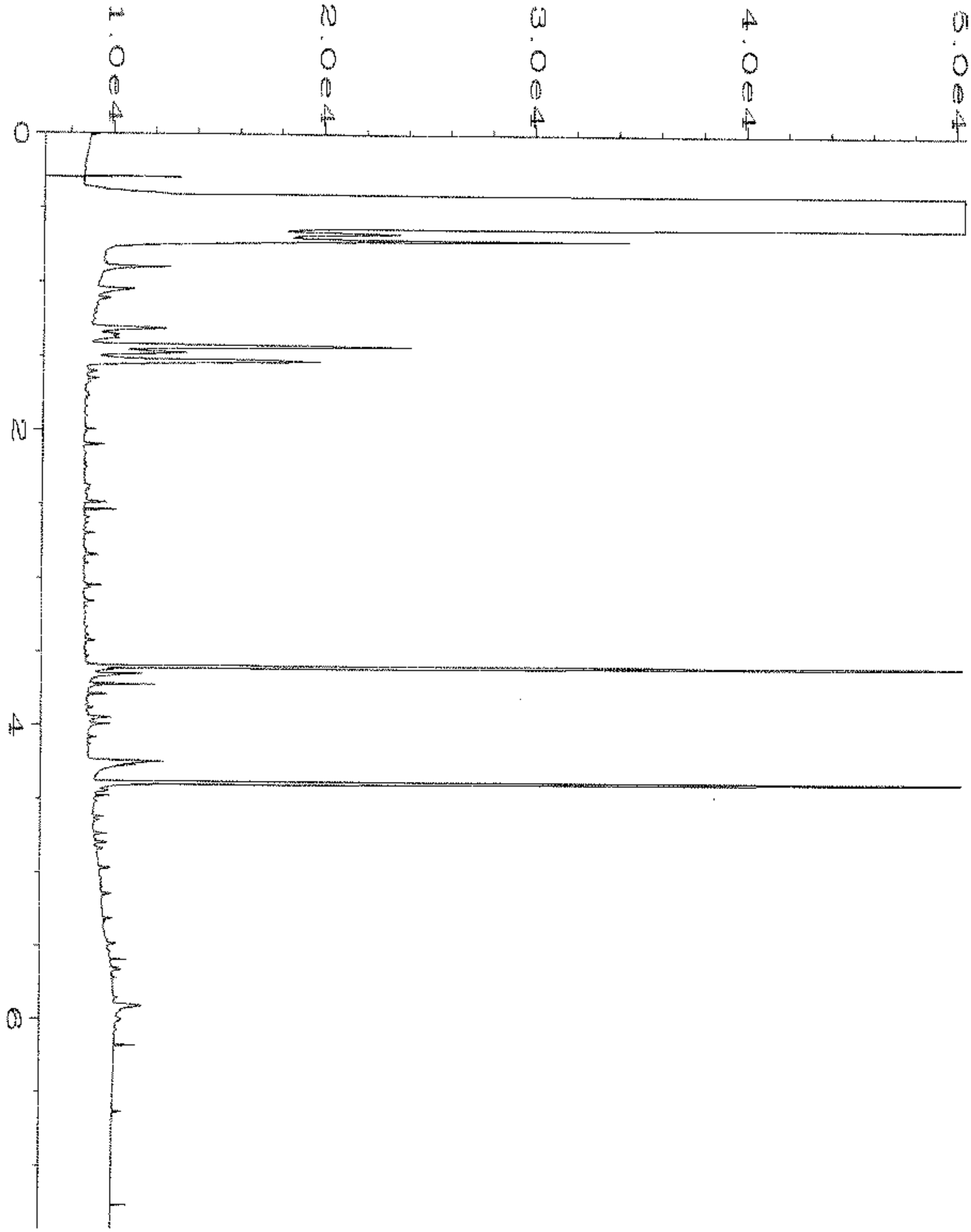
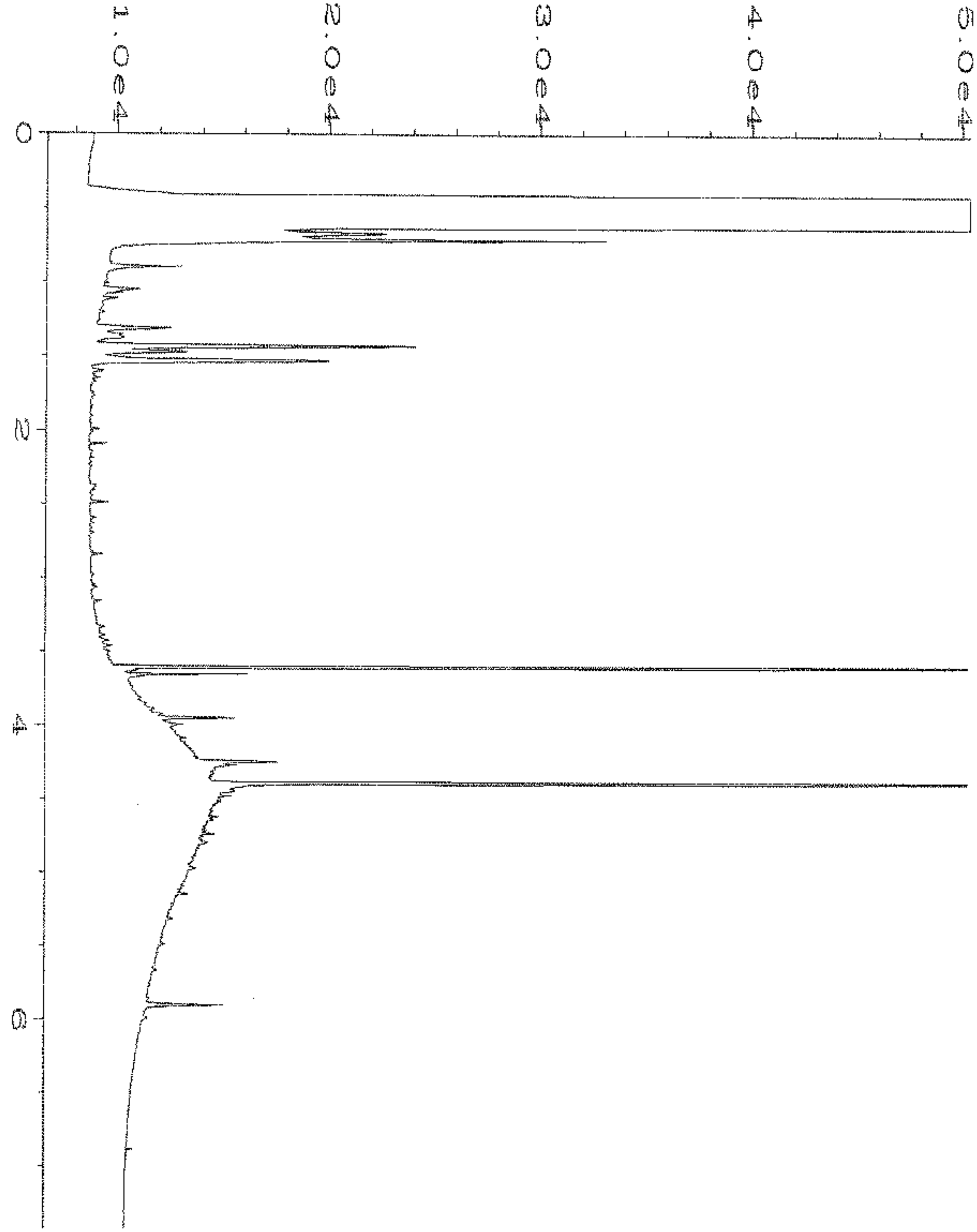


Data File Name : C:\HPCHEM\1\DATA\02-25-21\017F1101.D
Operator : TL
Instrument : GC1
Sample Name : 102393-03
Run Time Bar Code:
Acquired on : 25 Feb 21 03:11 PM
Report Created on: 26 Feb 21 10:02 AM

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 11
Instrument Method: DX.MTH
Analysis Method : COND.MTH



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Data File Name    : C:\HPCHEM\1\DATA\02-25-21\018F1101.D
Operator          : TL                                Page Number       : 1
Instrument        : GC1                               Vial Number       : 18
Sample Name       : 102393-04                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line     : 11
Acquired on       : 25 Feb 21  03:22 PM               Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:02 AM               Analysis Method  : COND.MTH
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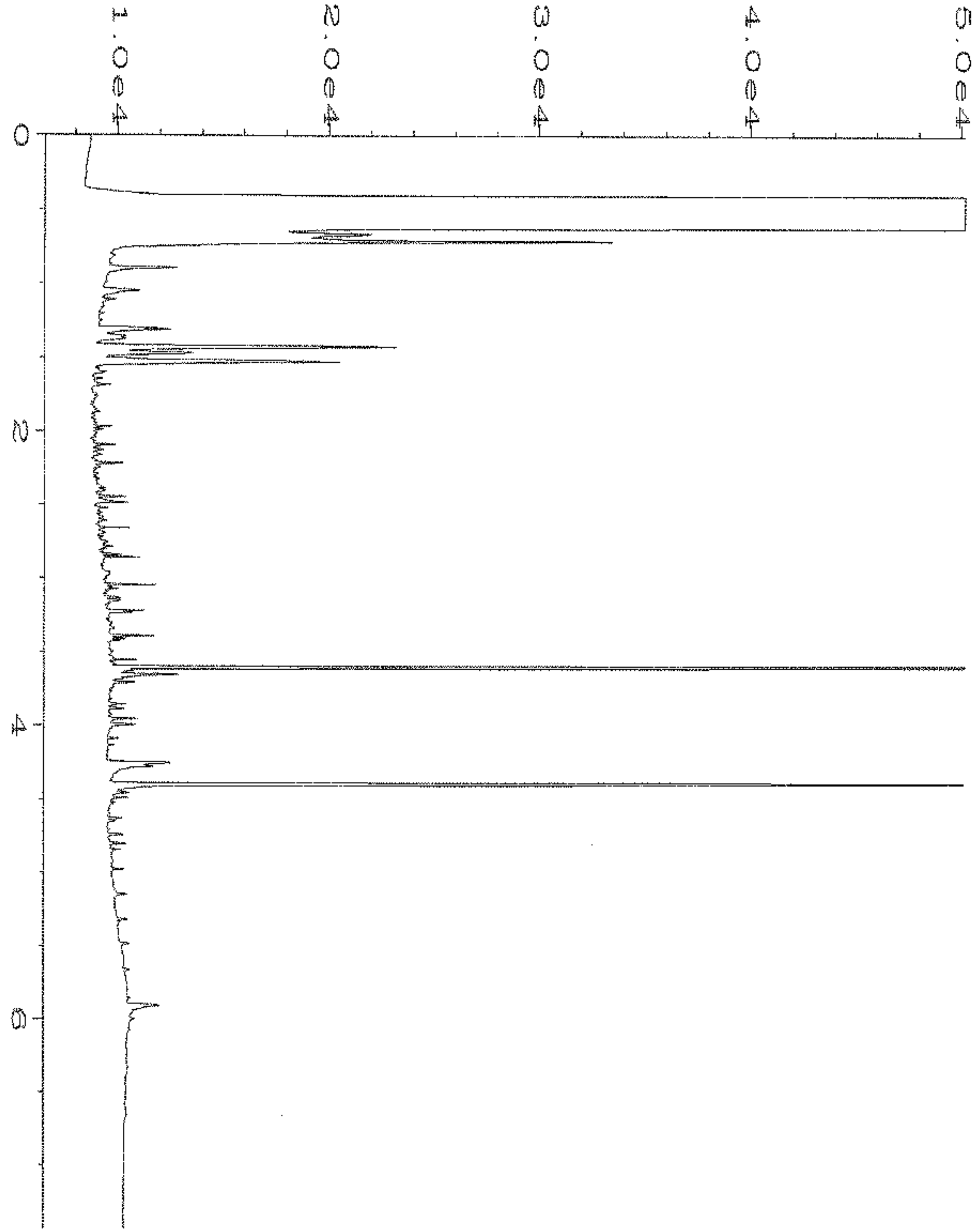

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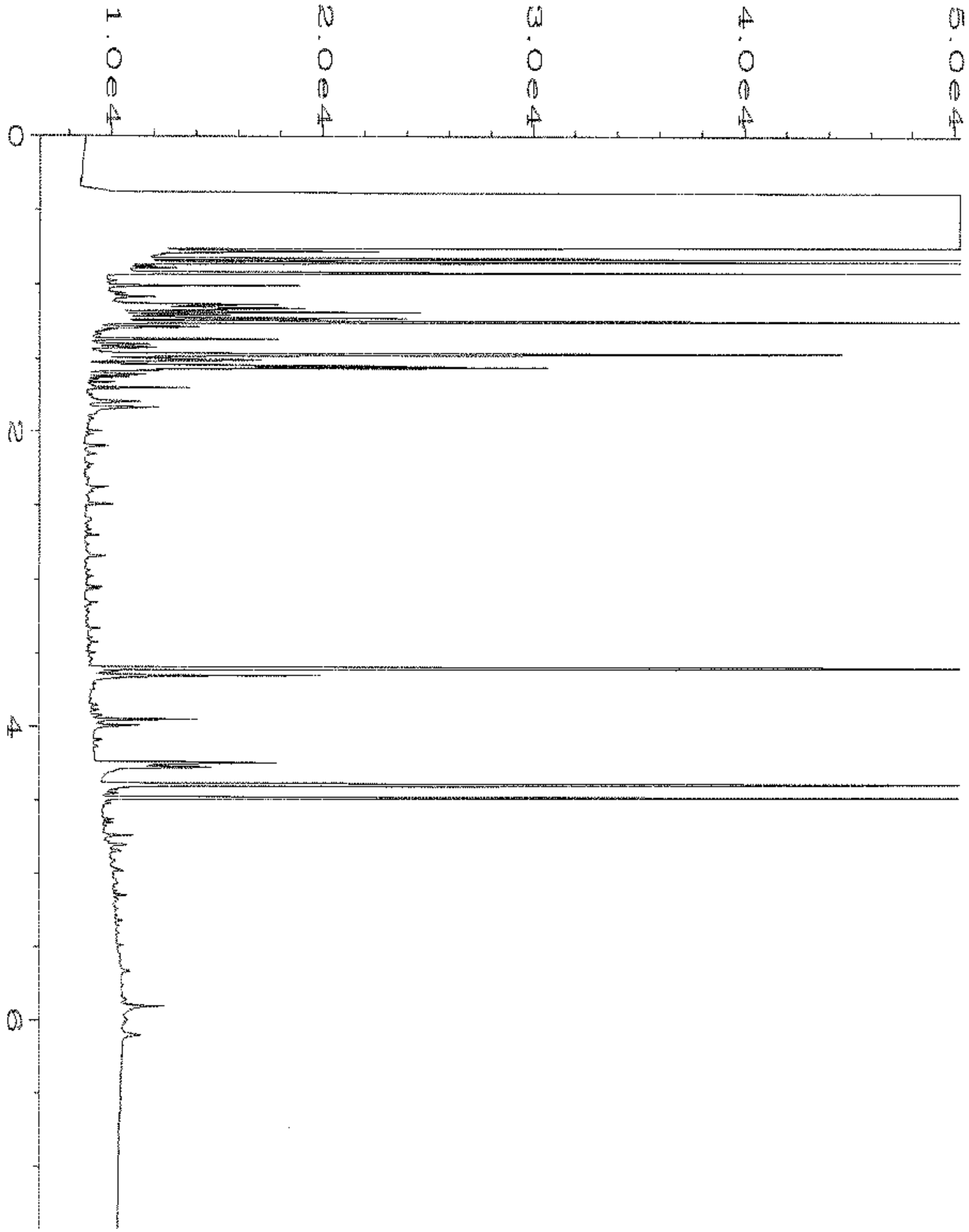
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\021F1301.D
Operator          : TL                                Page Number       : 1
Instrument        : GC1                               Vial Number       : 21
Sample Name       : 102393-05                         Injection Number  : 1
Run Time Bar Code:                                    Sequence Line     : 13
Acquired on       : 25 Feb 21   04:24 PM              Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:03 AM               Analysis Method   : COND.MTH
```



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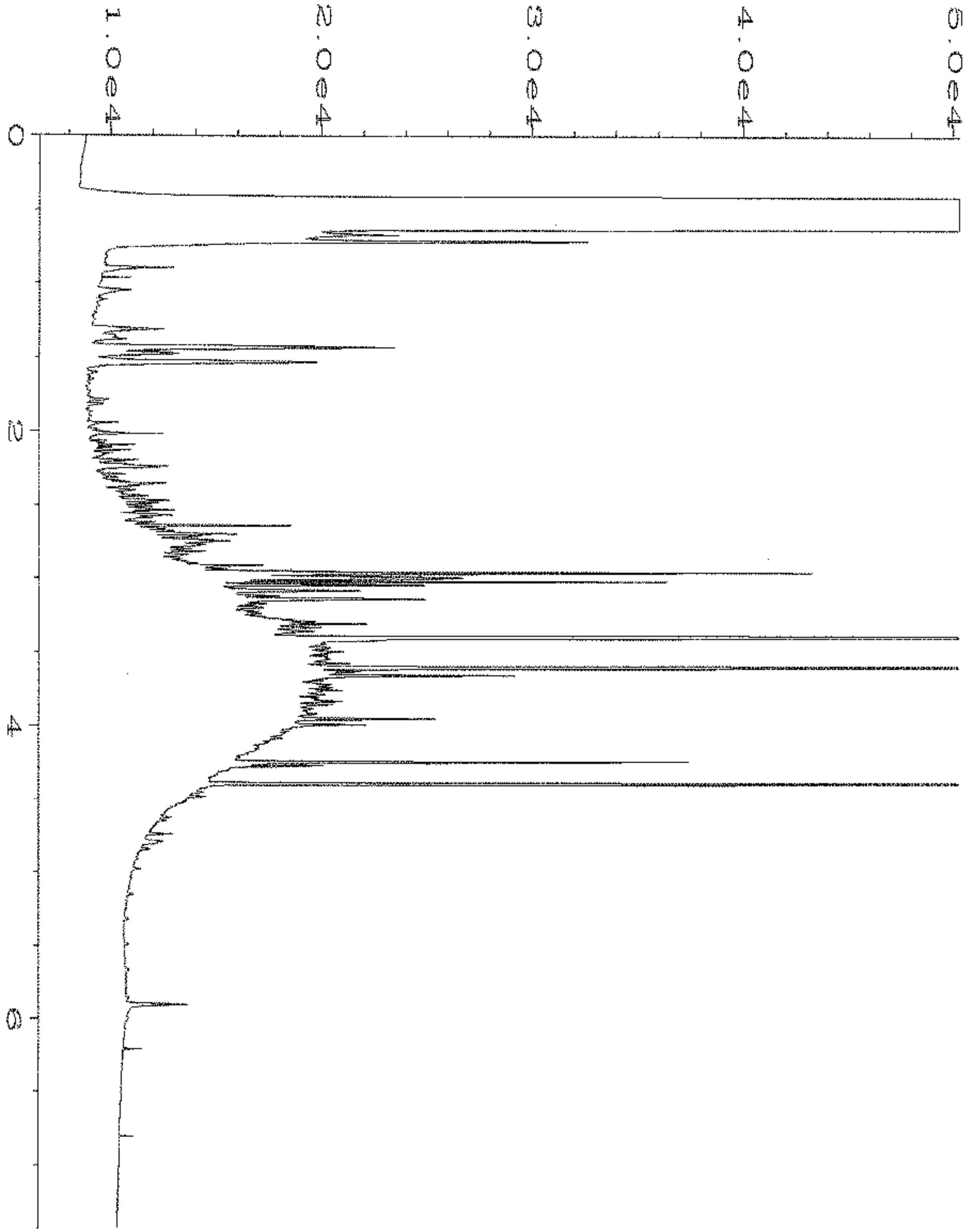
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\022F1301.D
Operator          : TL                                   Page Number       : 1
Instrument        : GC1                                  Vial Number       : 22
Sample Name       : 102393-06                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line     : 13
Acquired on       : 25 Feb 21  04:33 PM                  Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:03 AM                   Analysis Method   : COND.MTH
```



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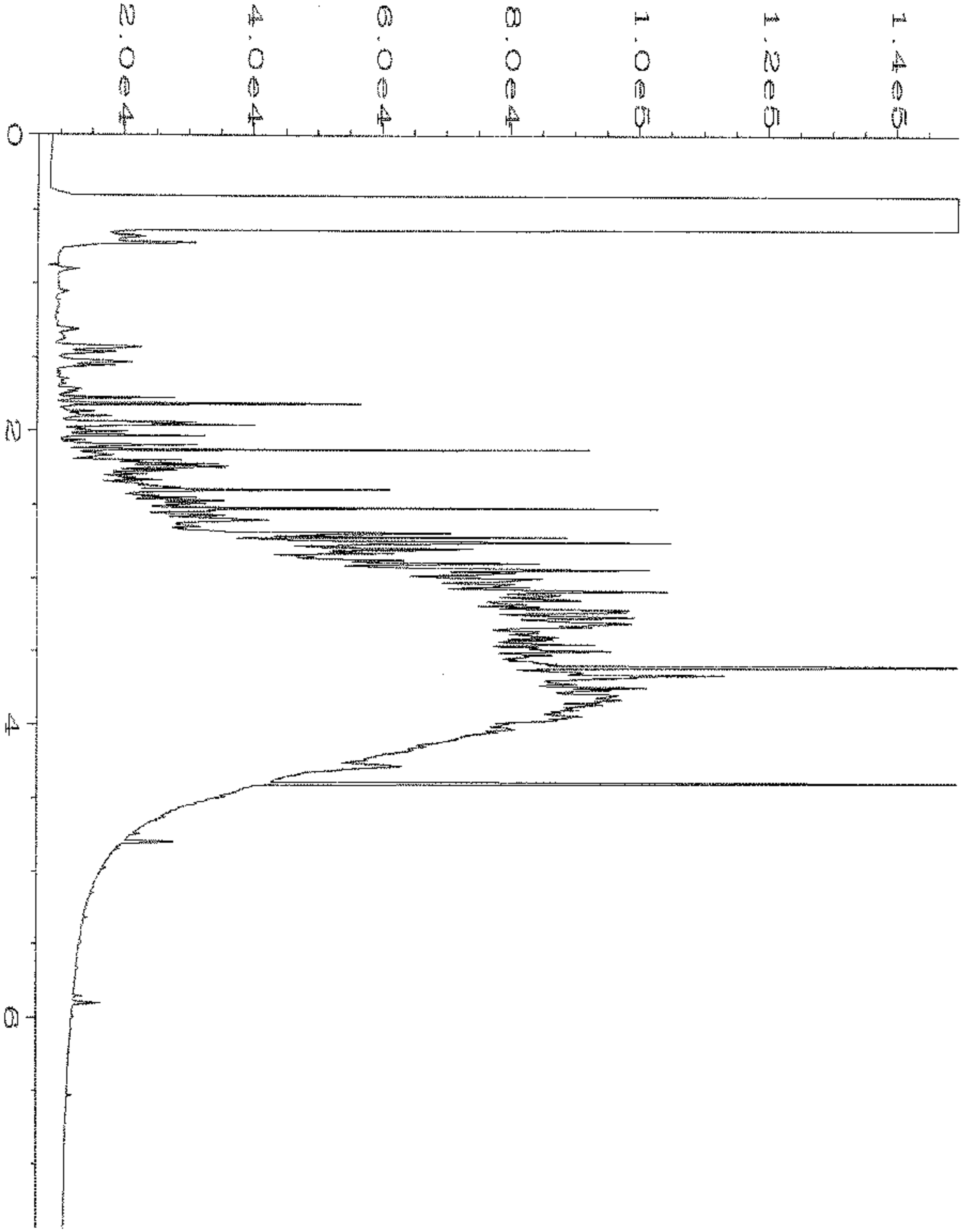
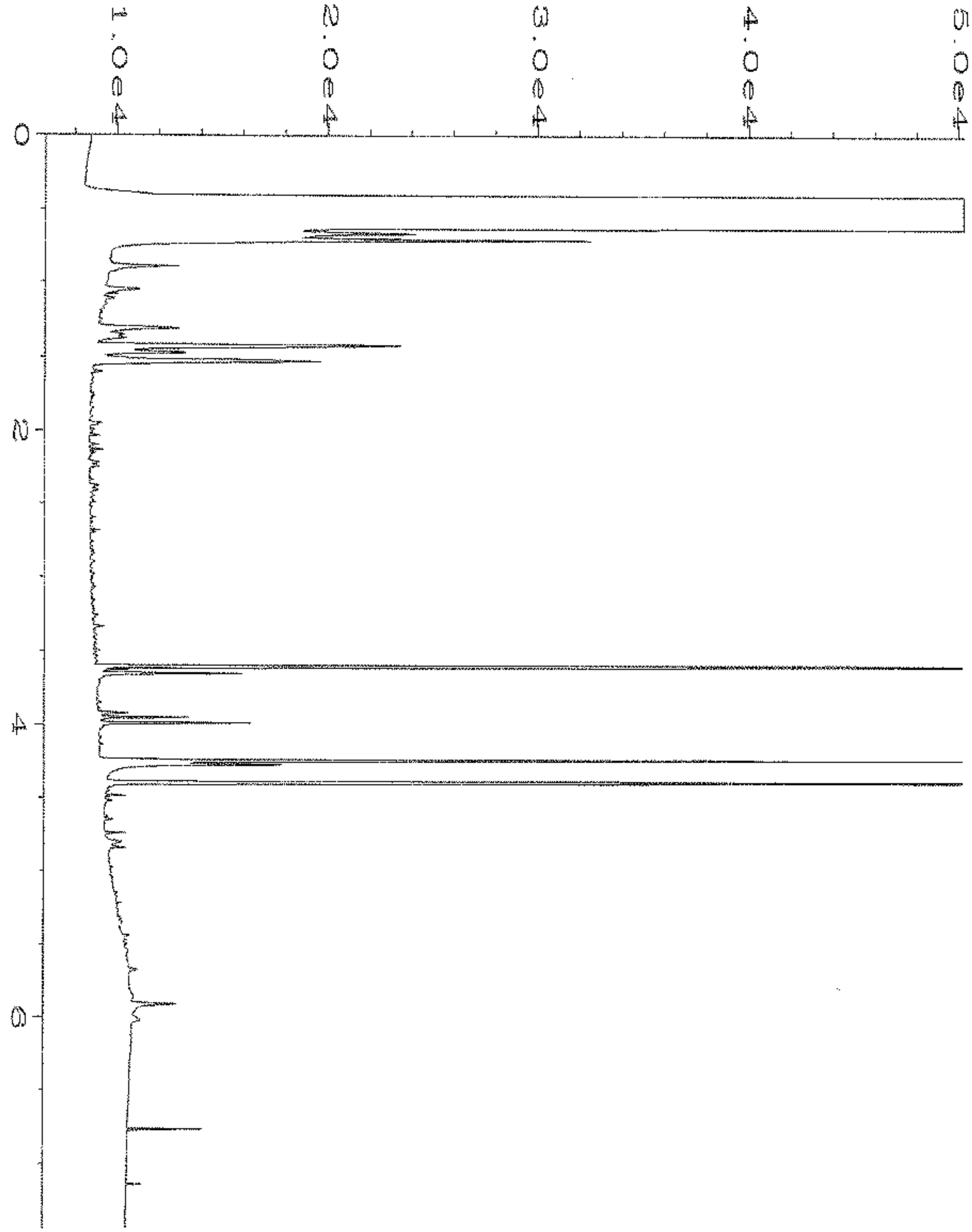
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\023F1301.D
Operator          : TL                                 Page Number      : 1
Instrument        : GC1                                Vial Number      : 23
Sample Name       : 102393-07                          Injection Number : 1
Run Time Bar Code:                                     Sequence Line    : 13
Acquired on       : 25 Feb 21  04:45 PM                Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:04 AM                 Analysis Method  : COND.MTH
```



Data File Name : C:\HPCHEM\1\DATA\02-25-21\024F1301.D
Operator : TL
Instrument : GC1
Sample Name : 102393-08
Run Time Bar Code:
Acquired on : 25 Feb 21 04:56 PM
Report Created on: 26 Feb 21 10:05 AM

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 13
Instrument Method: DX.MTH
Analysis Method : COND.MTH



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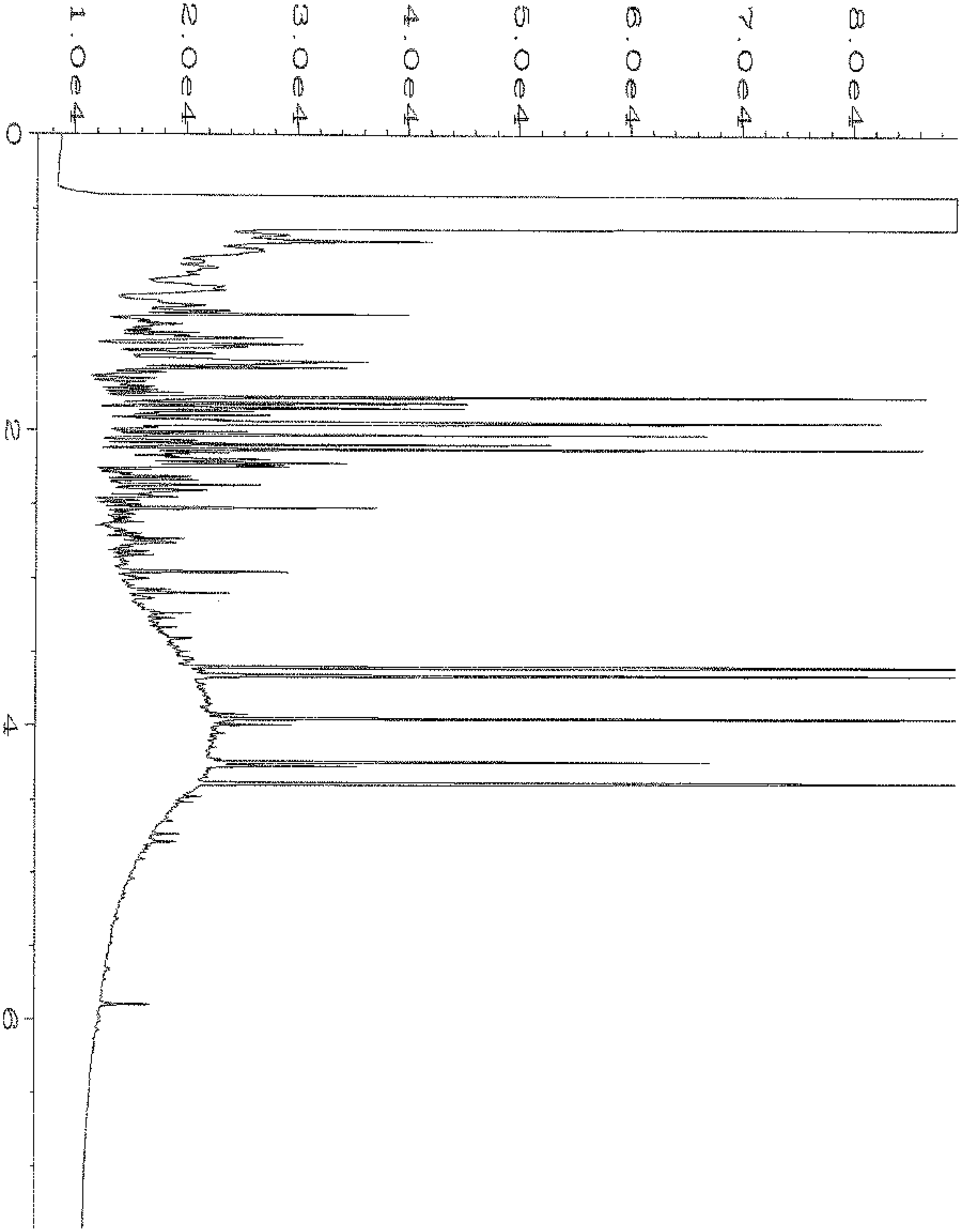
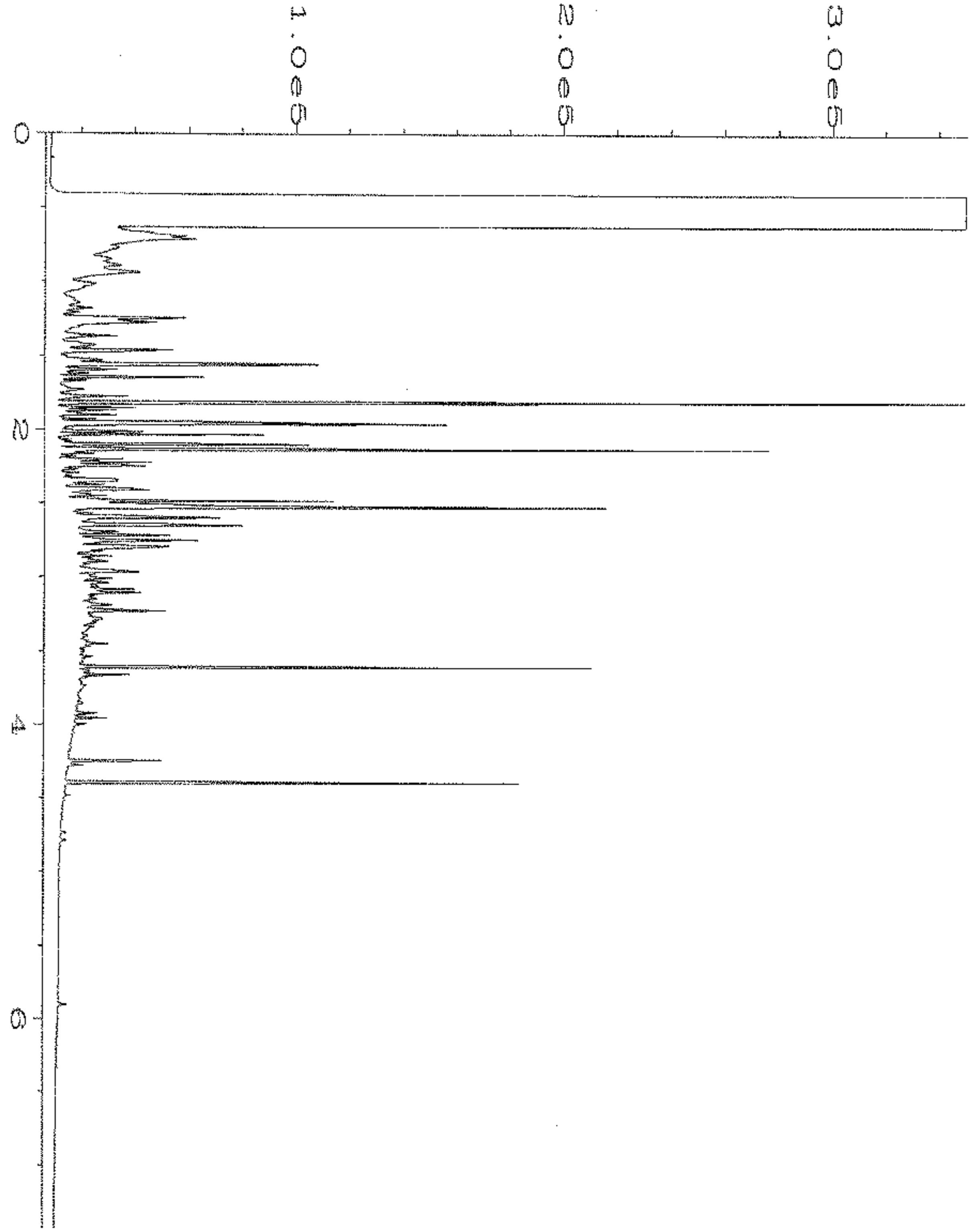
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\025F1301.D
Operator          : TL                               Page Number      : 1
Instrument        : GC1                              Vial Number      : 25
Sample Name       : 102393-09                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 13
Acquired on       : 25 Feb 21  05:07 PM              Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:05 AM               Analysis Method  : COND.MTH
```

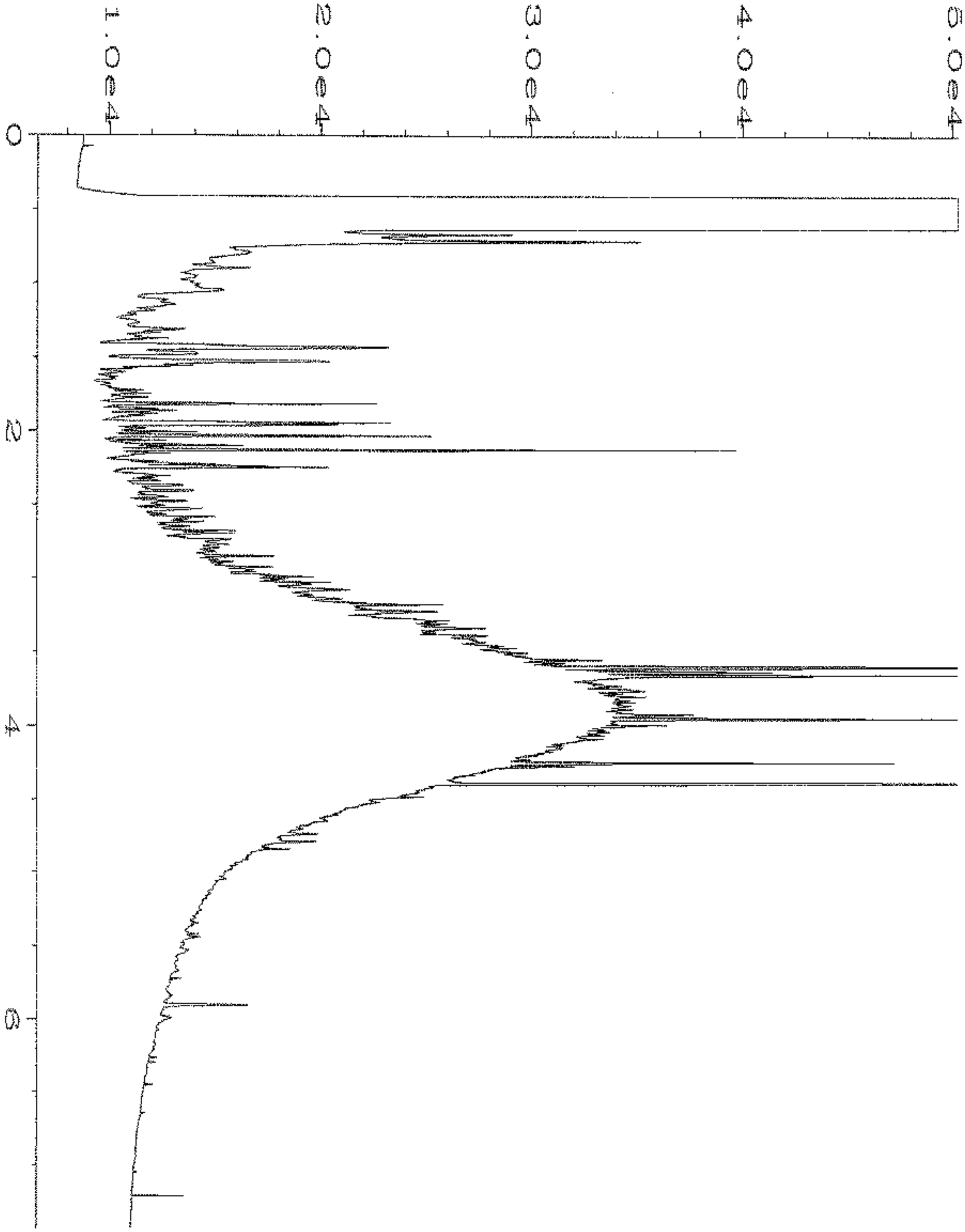


```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\026F1301.D
Operator          : TL                                   Page Number       : 1
Instrument        : GC1                                  Vial Number       : 26
Sample Name       : 102393-10                            Injection Number  : 1
Run Time Bar Code:                                       Sequence Line     : 13
Acquired on       : 25 Feb 21  05:19 PM                  Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:06 AM                   Analysis Method   : COND.MTH
```

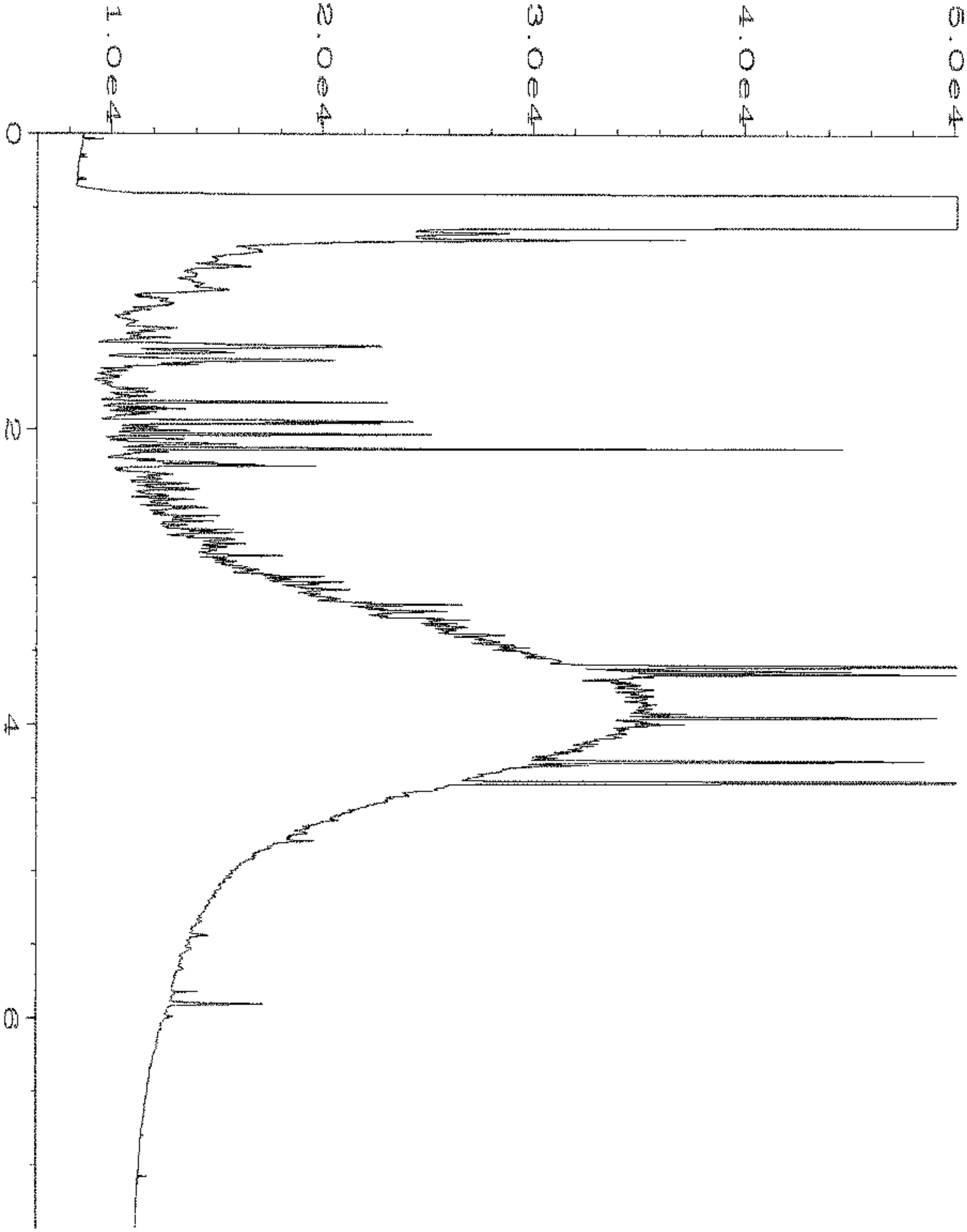


Data File Name   : C:\HPCHEM\1\DATA\02-25-21\027F1301.D
Operator   : TL
Instrument   : GC1
Sample Name   : 102393-11
Run Time Bar Code:
Acquired on   : 25 Feb 21 05:30 PM
Report Created on: 26 Feb 21 10:07 AM

Page Number   : 1
Vial Number   : 27
Injection Number : 1
Sequence Line   : 13
Instrument Method: DX.MTH
Analysis Method   : COND.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\028F1301.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 28
Sample Name       : 102393-12                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 13
Acquired on       : 25 Feb 21   05:41 PM            Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:07 AM            Analysis Method   : COND.MTH
```



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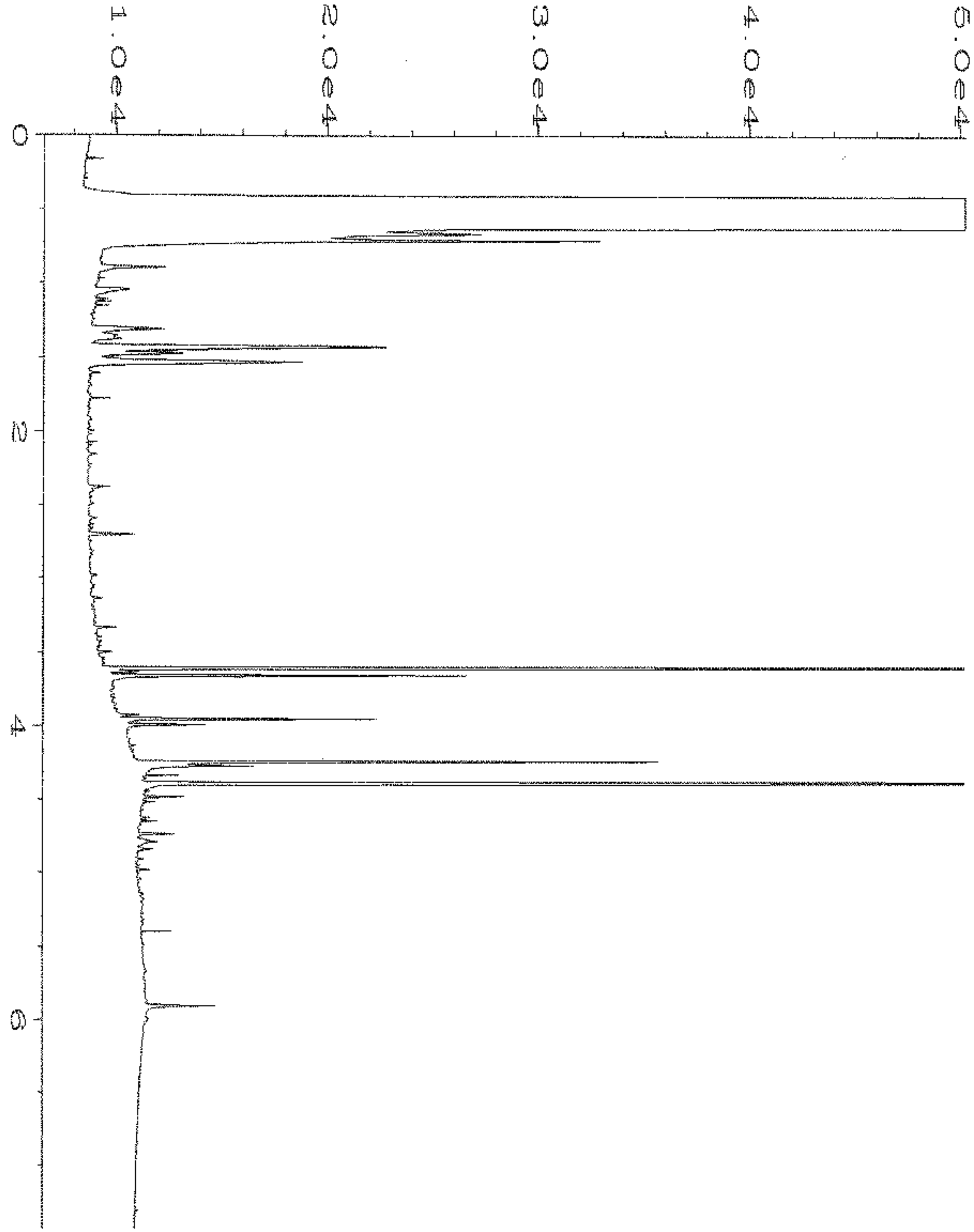
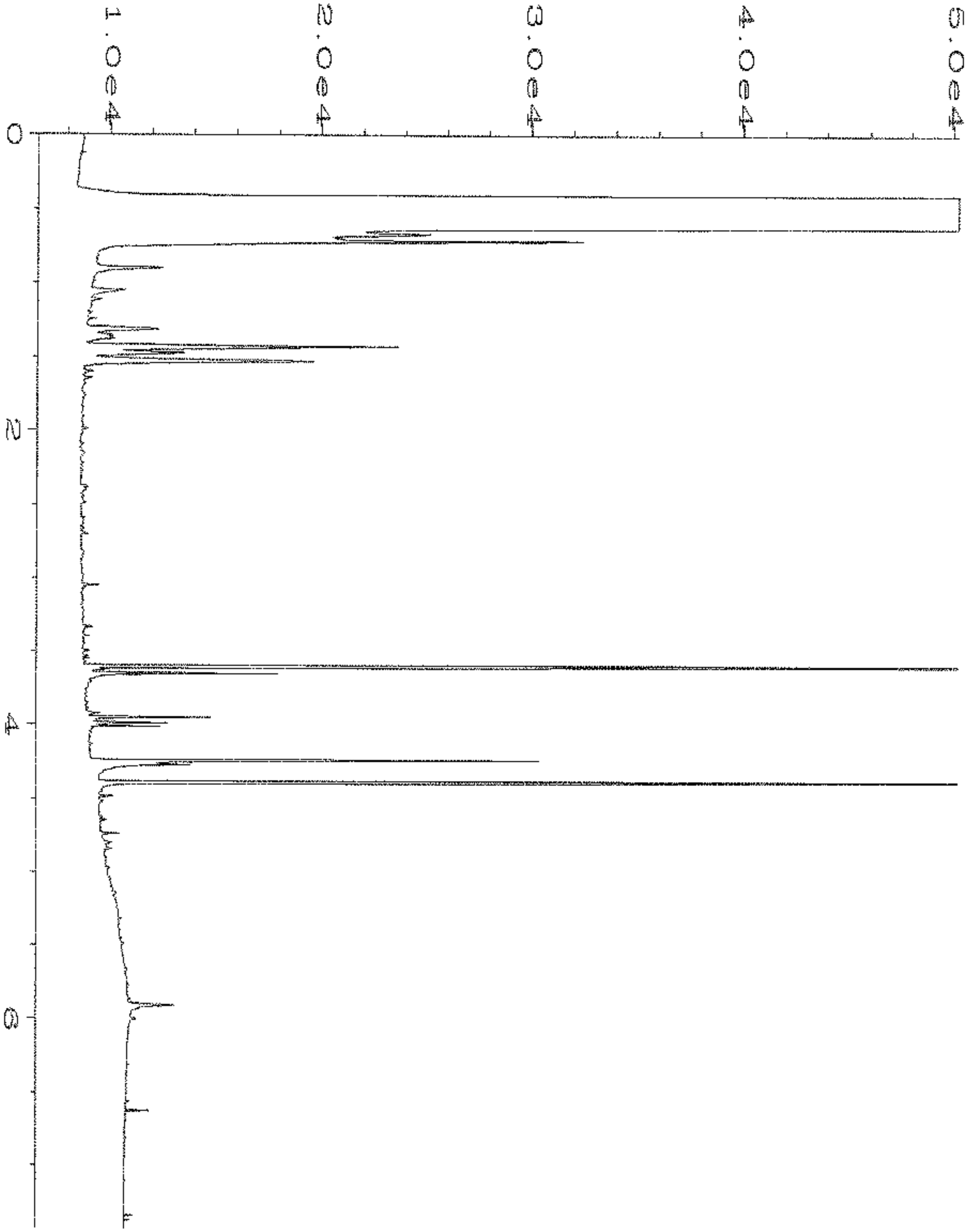
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\029F1301.D
Operator          : TL                                  Page Number      : 1
Instrument        : GC1                                 Vial Number      : 29
Sample Name       : 102393-13                           Injection Number : 1
Run Time Bar Code:                                      Sequence Line    : 13
Acquired on       : 25 Feb 21   05:53 PM                Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:08 AM                 Analysis Method  : COND.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\030F1301.D
Operator          : TL                                Page Number      : 1
Instrument        : GC1                               Vial Number      : 30
Sample Name       : 102393-14                         Injection Number : 1
Run Time Bar Code:                                    Sequence Line    : 13
Acquired on       : 25 Feb 21   06:04 PM              Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:09 AM               Analysis Method  : COND.MTH
```



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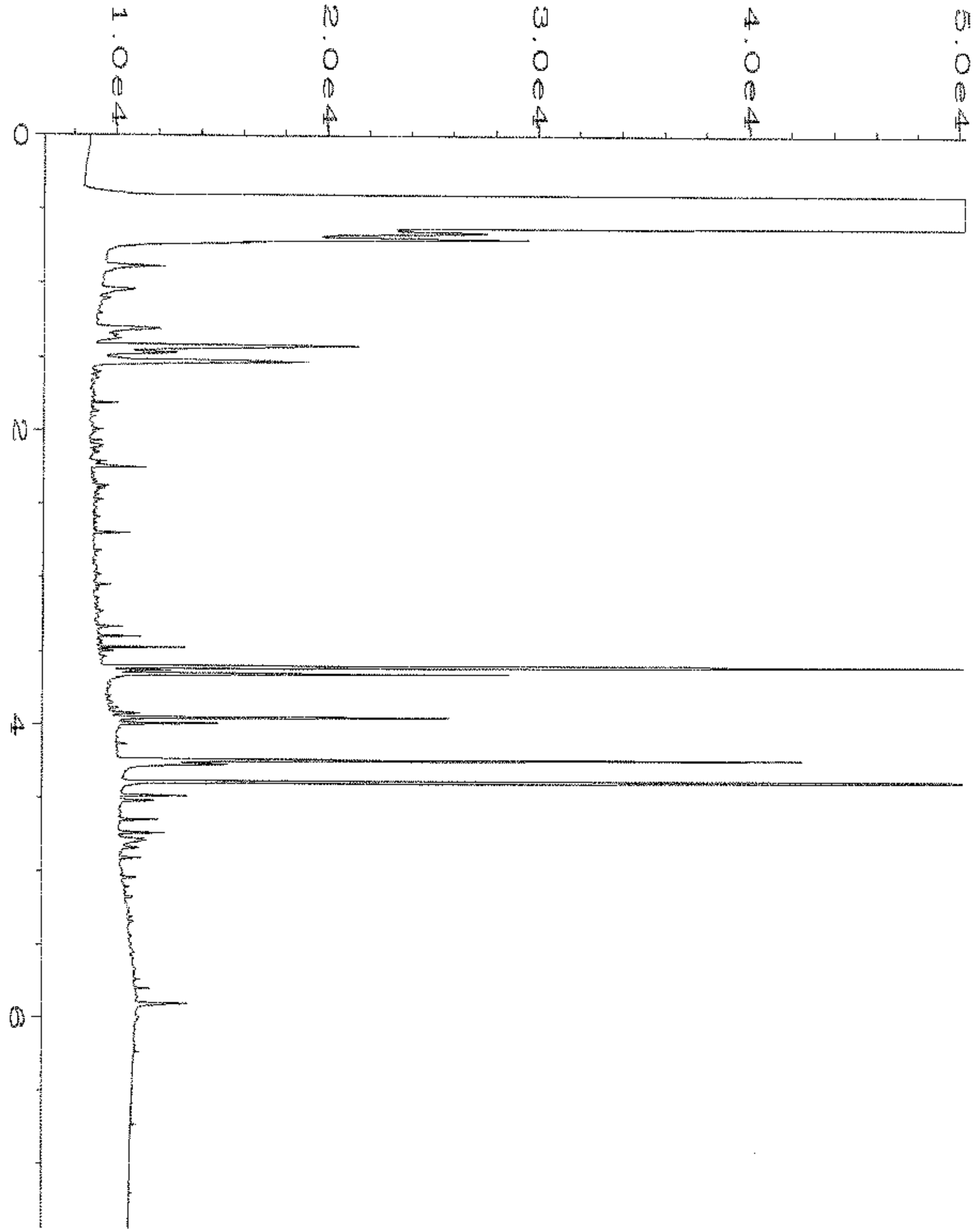
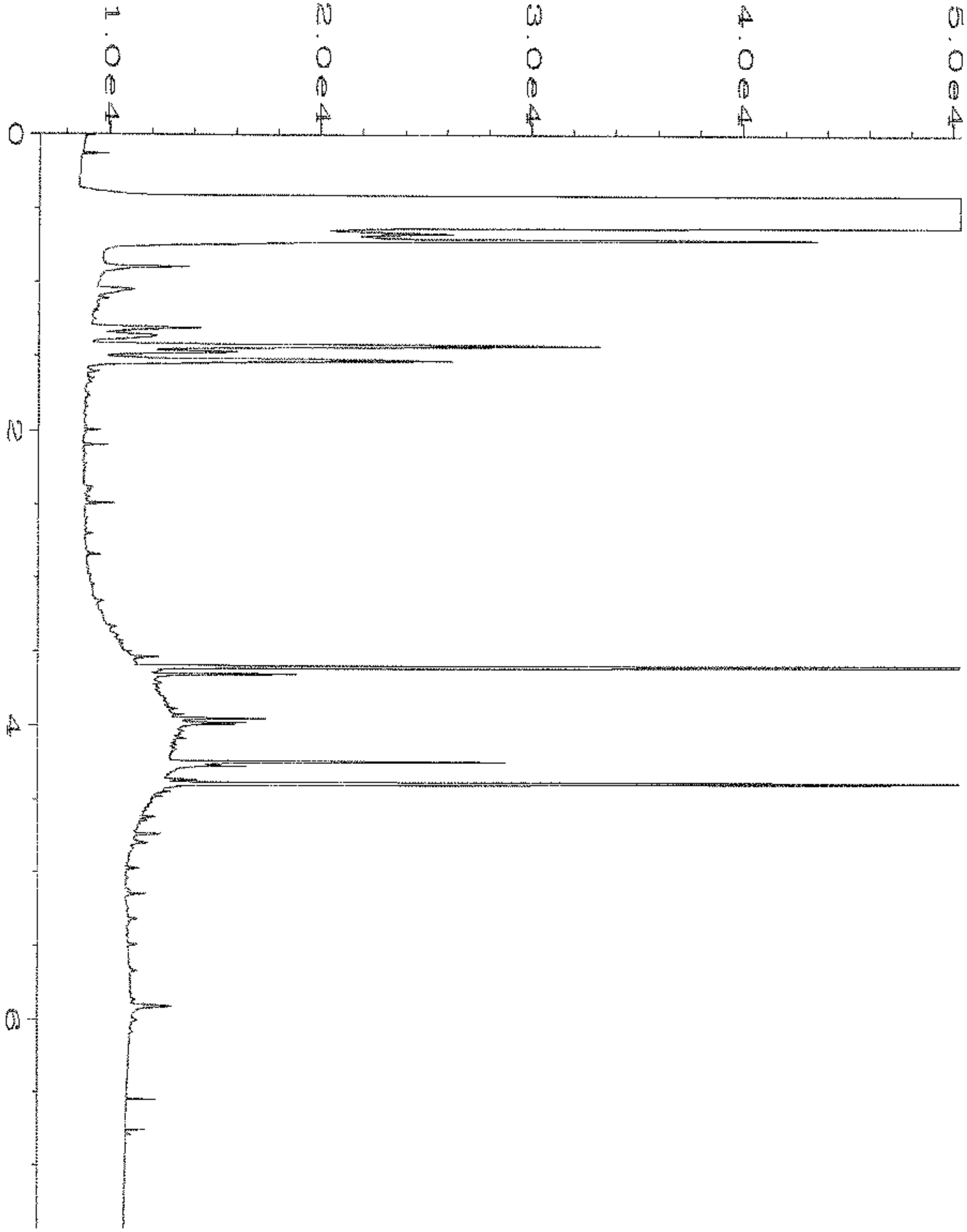
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\031F1301.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 31
Sample Name       : 102393-15                       Injection Number  : 1
Run Time Bar Code:                                  Sequence Line     : 13
Acquired on       : 25 Feb 21  06:15 PM             Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:09 AM              Analysis Method   : COND.MTH
```

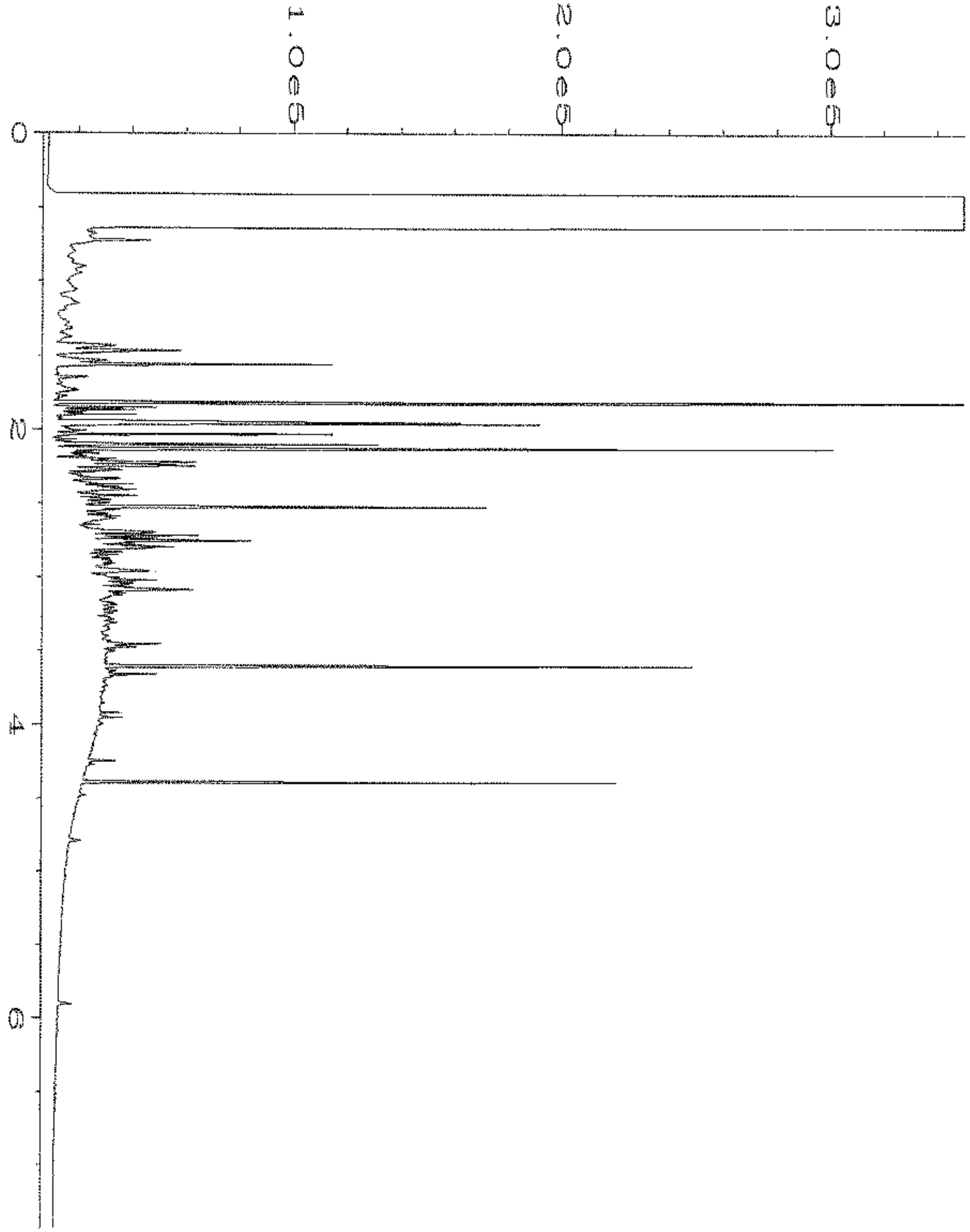


Data File Name	: C:\HPCHEM\1\DATA\02-25-21\032F1301.D		
Operator	: TL	Page Number	: 1
Instrument	: GC1	Vial Number	: 32
Sample Name	: 102393-16	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 13
Acquired on	: 25 Feb 21 06:26 PM	Instrument Method:	DX.MTH
Report Created on:	26 Feb 21 10:09 AM	Analysis Method	: COND.MTH



Data File Name : C:\HPCHEM\1\DATA\02-25-21\038F1301.D
Operator : TL
Instrument : GC1
Sample Name : 102393-17
Run Time Bar Code:
Acquired on : 25 Feb 21 07:34 PM
Report Created on: 26 Feb 21 10:10 AM

Page Number : 1
Vial Number : 38
Injection Number : 1
Sequence Line : 13
Instrument Method: DX.MTH
Analysis Method : COND.MTH



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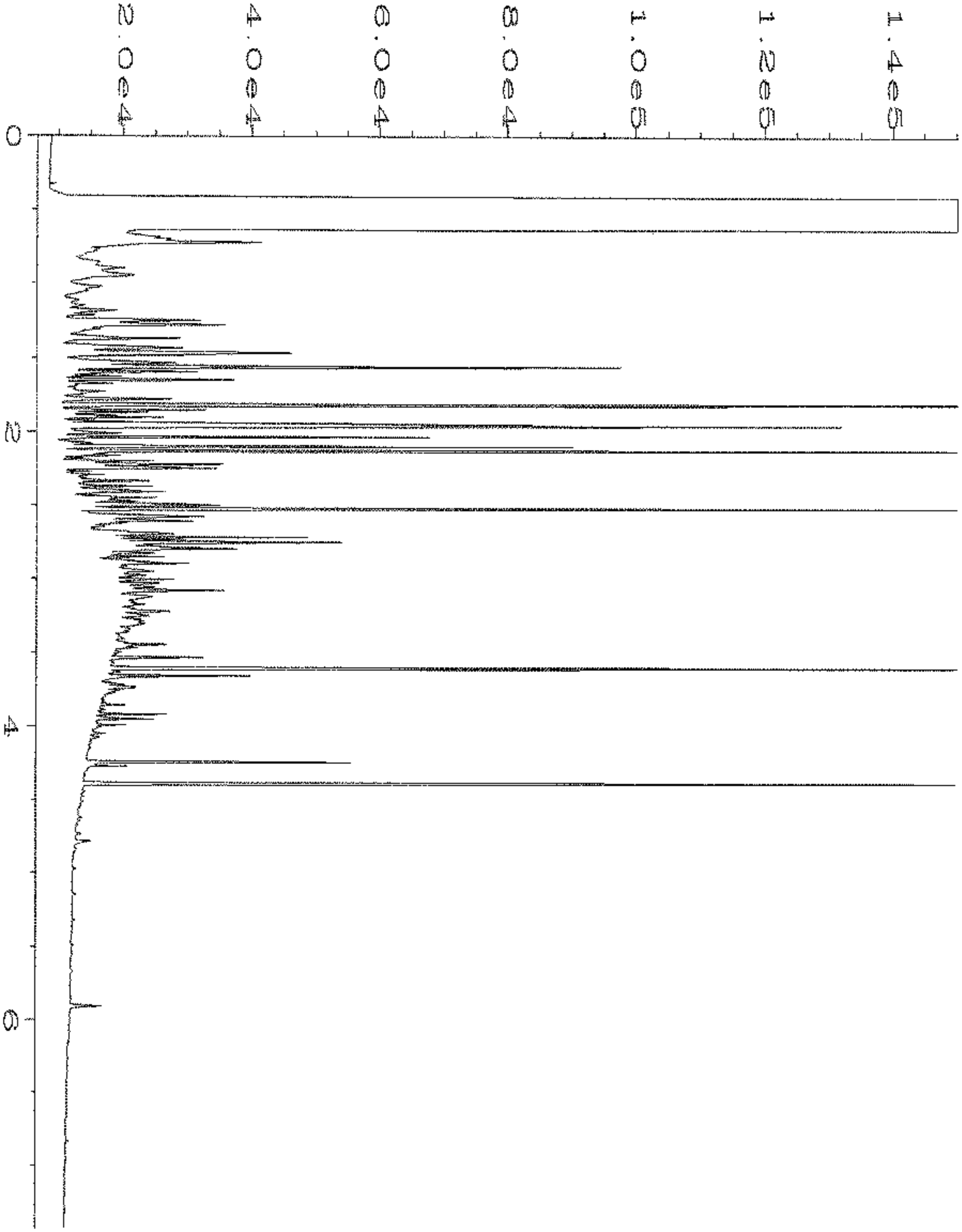
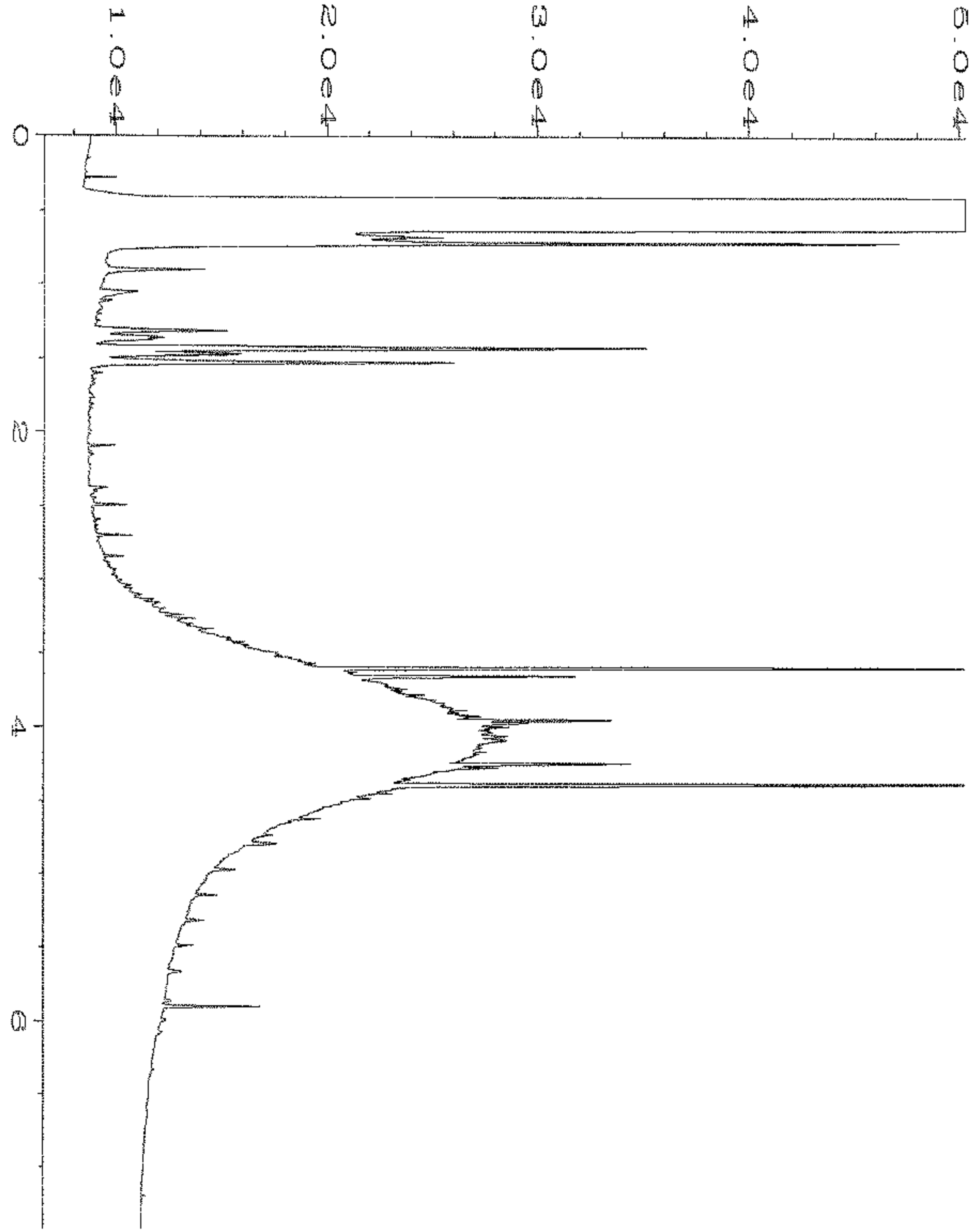
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\033F1301.D
Operator          : TL                            Page Number      : 1
Instrument        : GC1                           Vial Number      : 33
Sample Name       : 102393-18                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 13
Acquired on       : 25 Feb 21  06:38 PM           Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:09 AM            Analysis Method  : COND.MTH
```



Data File Name : C:\HPCHEM\1\DATA\02-25-21\034F1301.D
Operator : TL
Instrument : GC1
Sample Name : 102393-19
Run Time Bar Code:
Acquired on : 25 Feb 21 06:49 PM
Report Created on: 26 Feb 21 10:09 AM

Page Number : 1
Vial Number : 34
Injection Number : 1
Sequence Line : 13
Instrument Method: DX.MTH
Analysis Method : COND.MTH



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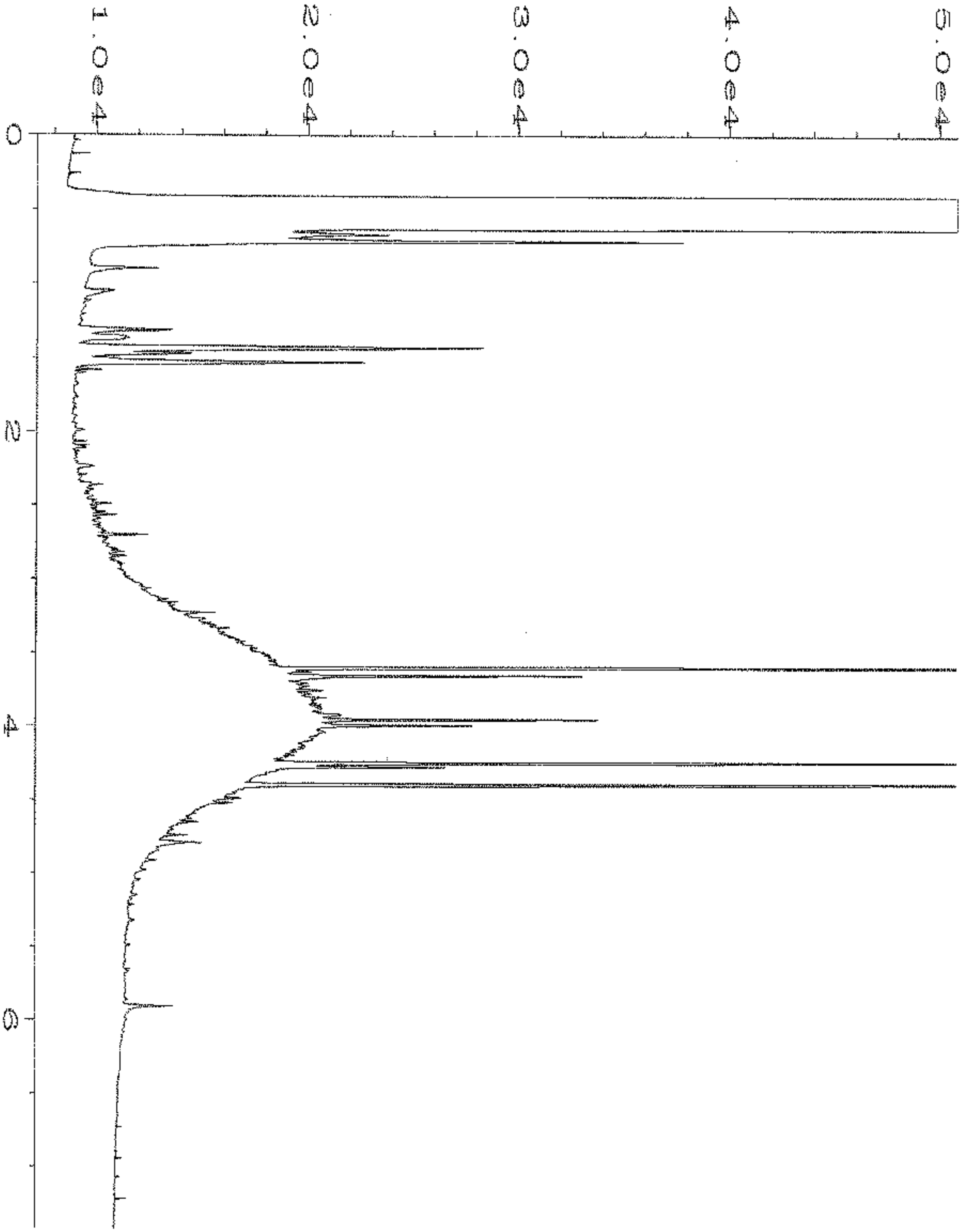
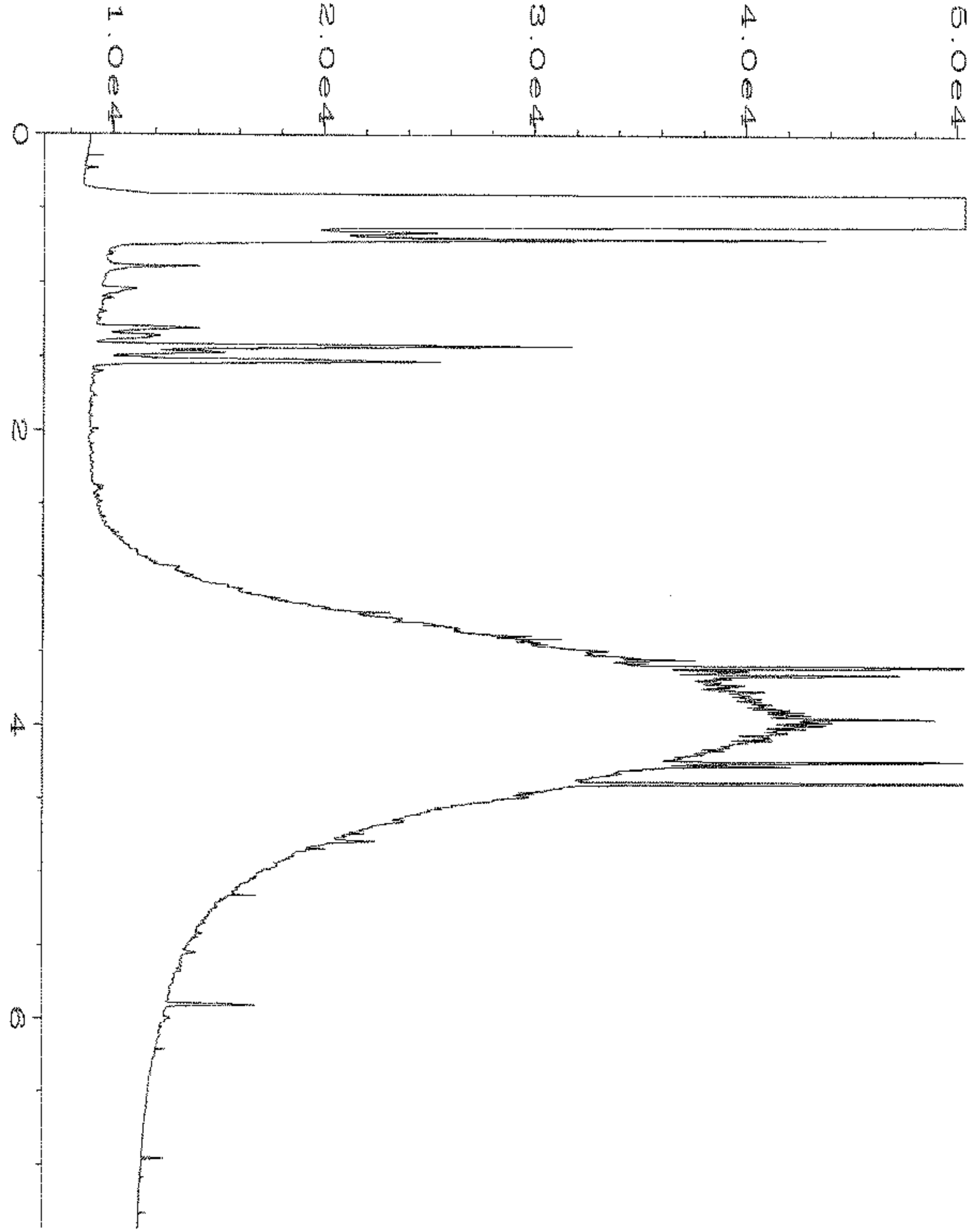
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\035F1301.D
Operator          : TL                                 Page Number       : 1
Instrument        : GC1                                Vial Number       : 35
Sample Name       : 102393-20                          Injection Number  : 1
Run Time Bar Code:                                     Sequence Line     : 13
Acquired on       : 25 Feb 21  07:00 PM                Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:10 AM                 Analysis Method   : COND.MTH
```



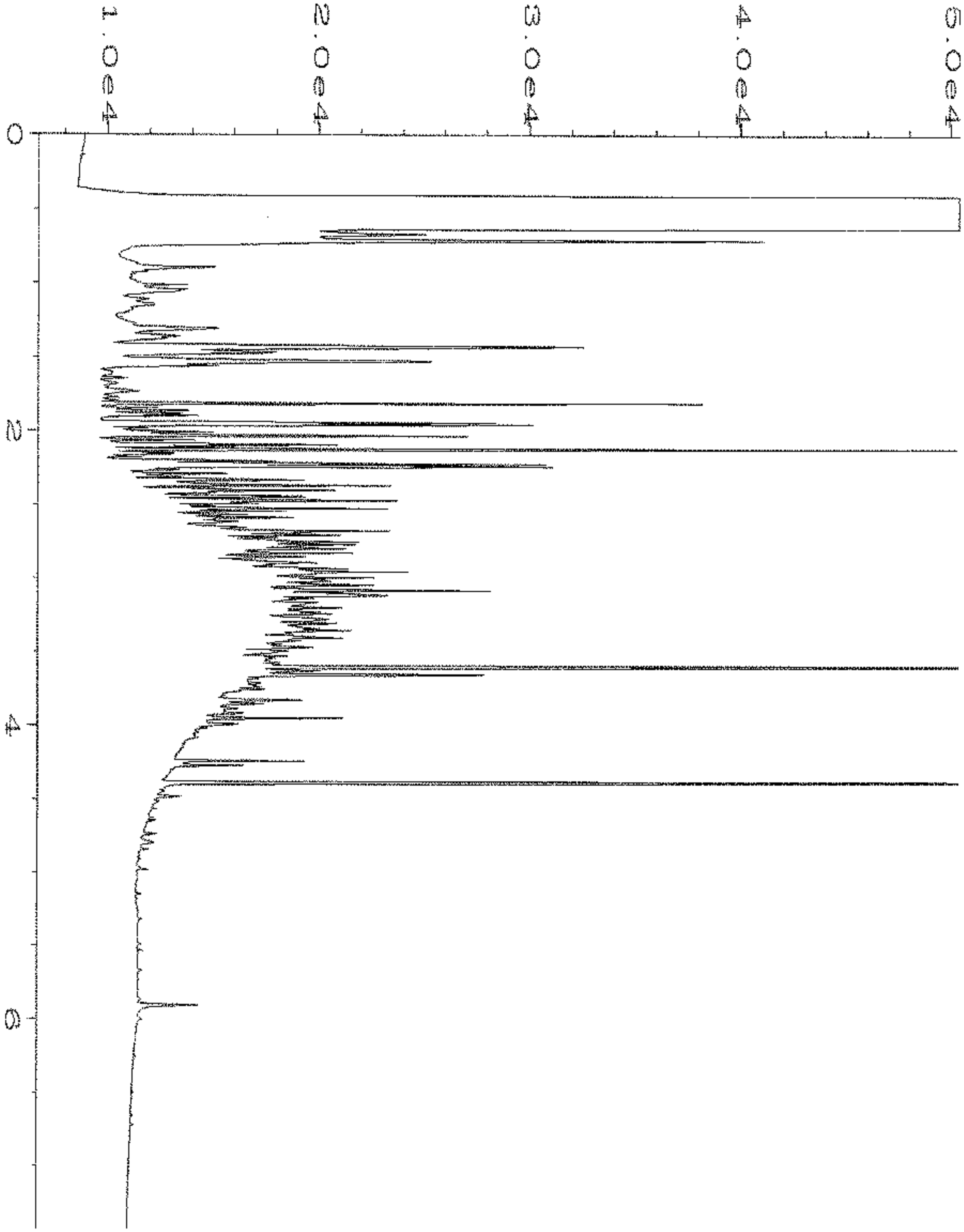
Data File Name : C:\HPCHEM\1\DATA\02-25-21\041F1501.D
Operator : TL
Instrument : GC1
Sample Name : 102393-21
Run Time Bar Code:
Acquired on : 25 Feb 21 08:31 PM
Report Created on: 26 Feb 21 10:11 AM

Page Number : 1
Vial Number : 41
Injection Number : 1
Sequence Line : 15
Instrument Method: DX.MTH
Analysis Method : COND.MTH



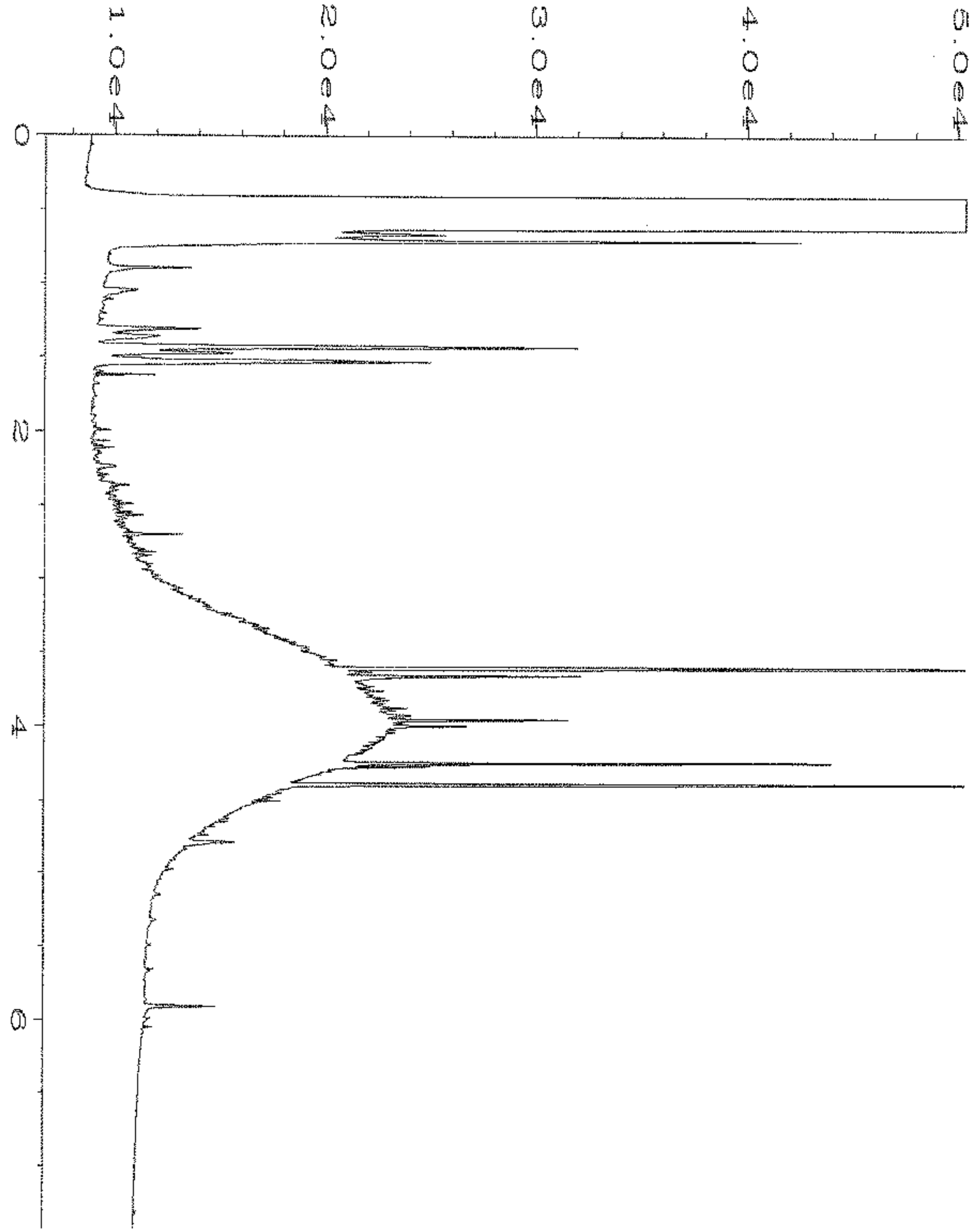
Data File Name : C:\HPCHEM\1\DATA\02-25-21\042F1501.D
Operator : TL
Instrument : GC1
Sample Name : 102393-22
Run Time Bar Code:
Acquired on : 25 Feb 21 08:42 PM
Report Created on: 26 Feb 21 10:11 AM

Page Number : 1
Vial Number : 42
Injection Number : 1
Sequence Line : 15
Instrument Method: DX.MTH
Analysis Method : COND.MTH



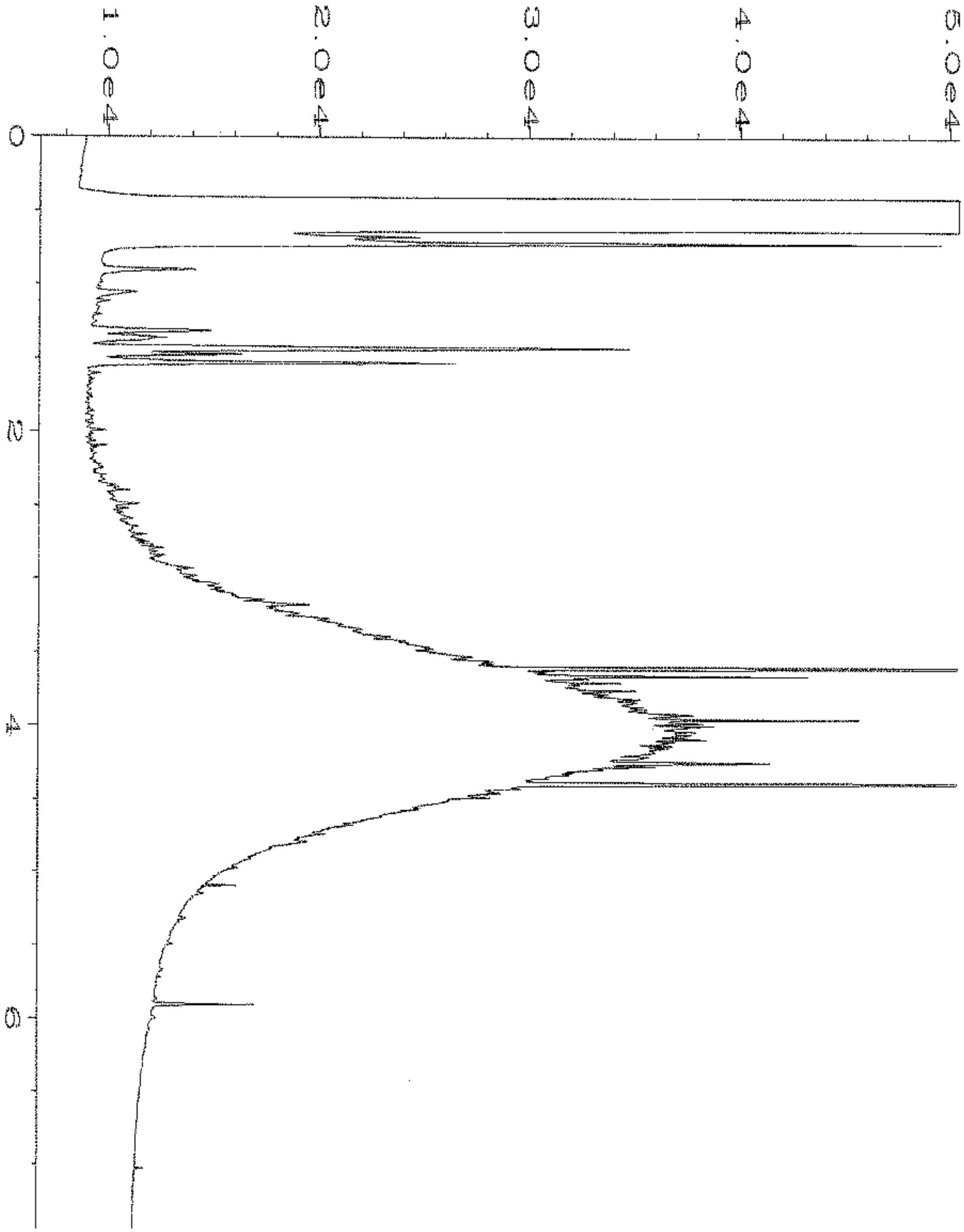
Data File Name : C:\HPCHEM\1\DATA\02-25-21\043F1501.D
Operator : TL
Instrument : GC1
Sample Name : 102393-23
Run Time Bar Code:
Acquired on : 25 Feb 21 08:53 PM
Report Created on: 26 Feb 21 10:11 AM

Page Number : 1
Vial Number : 43
Injection Number : 1
Sequence Line : 15
Instrument Method: DX.MTH
Analysis Method : COND.MTH



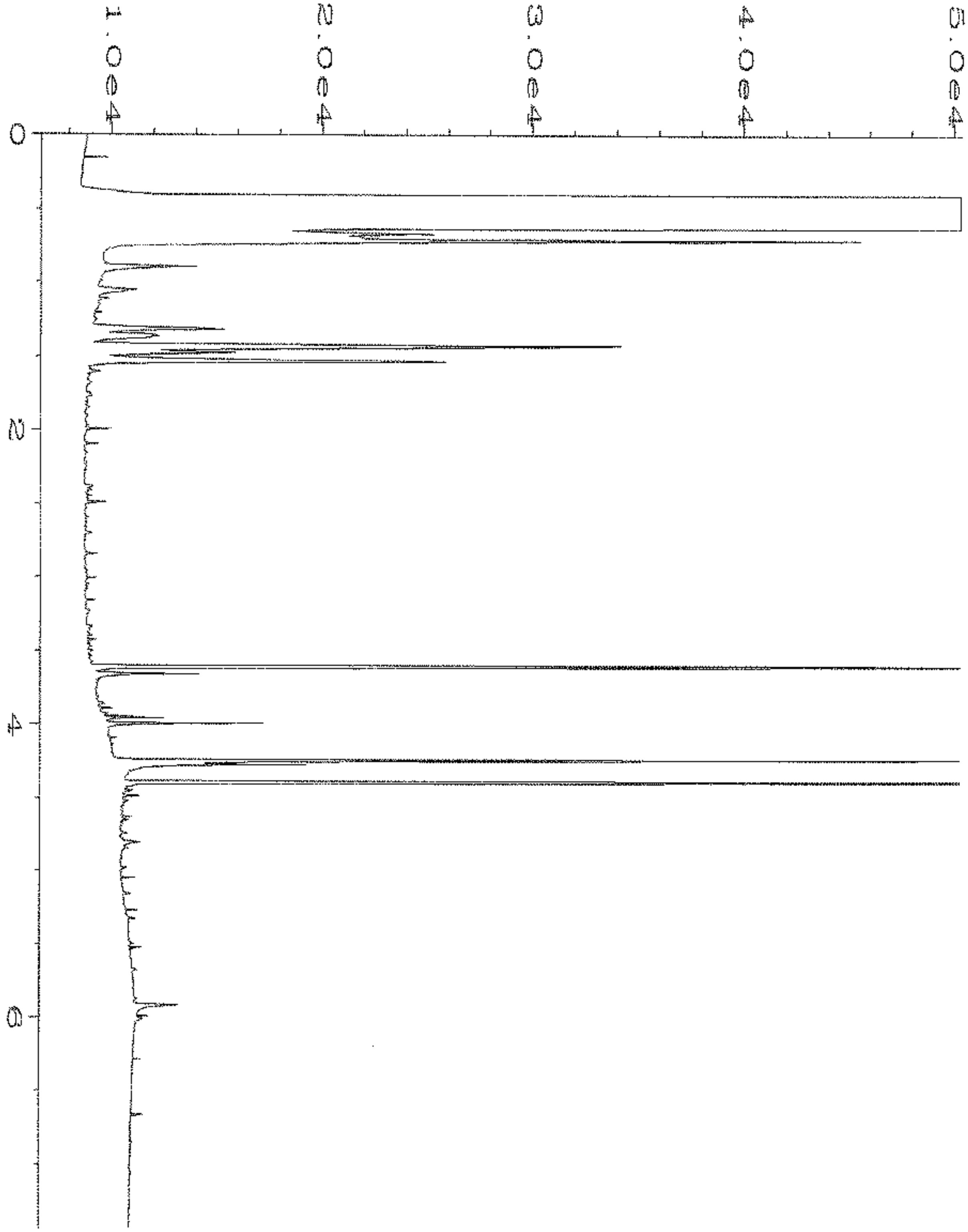
Data File Name : C:\HPCHEM\1\DATA\02-25-21\044F1501.D
Operator : TL
Instrument : GC1
Sample Name : 102393-24
Run Time Bar Code:
Acquired on : 25 Feb 21 09:04 PM
Report Created on: 26 Feb 21 10:11 AM

Page Number : 1
Vial Number : 44
Injection Number : 1
Sequence Line : 15
Instrument Method: DX.MTH
Analysis Method : COND.MTH



Data File Name   : C:\HPCHEM\1\DATA\02-25-21\045F1501.D
Operator   : TL
Instrument   : GC1
Sample Name   : 102393-25
Run Time Bar Code:
Acquired on   : 25 Feb 21 09:16 PM
Report Created on: 26 Feb 21 10:11 AM

Page Number   : 1
Vial Number   : 45
Injection Number : 1
Sequence Line   : 15
Instrument Method: DX.MTH
Analysis Method   : COND.MTH



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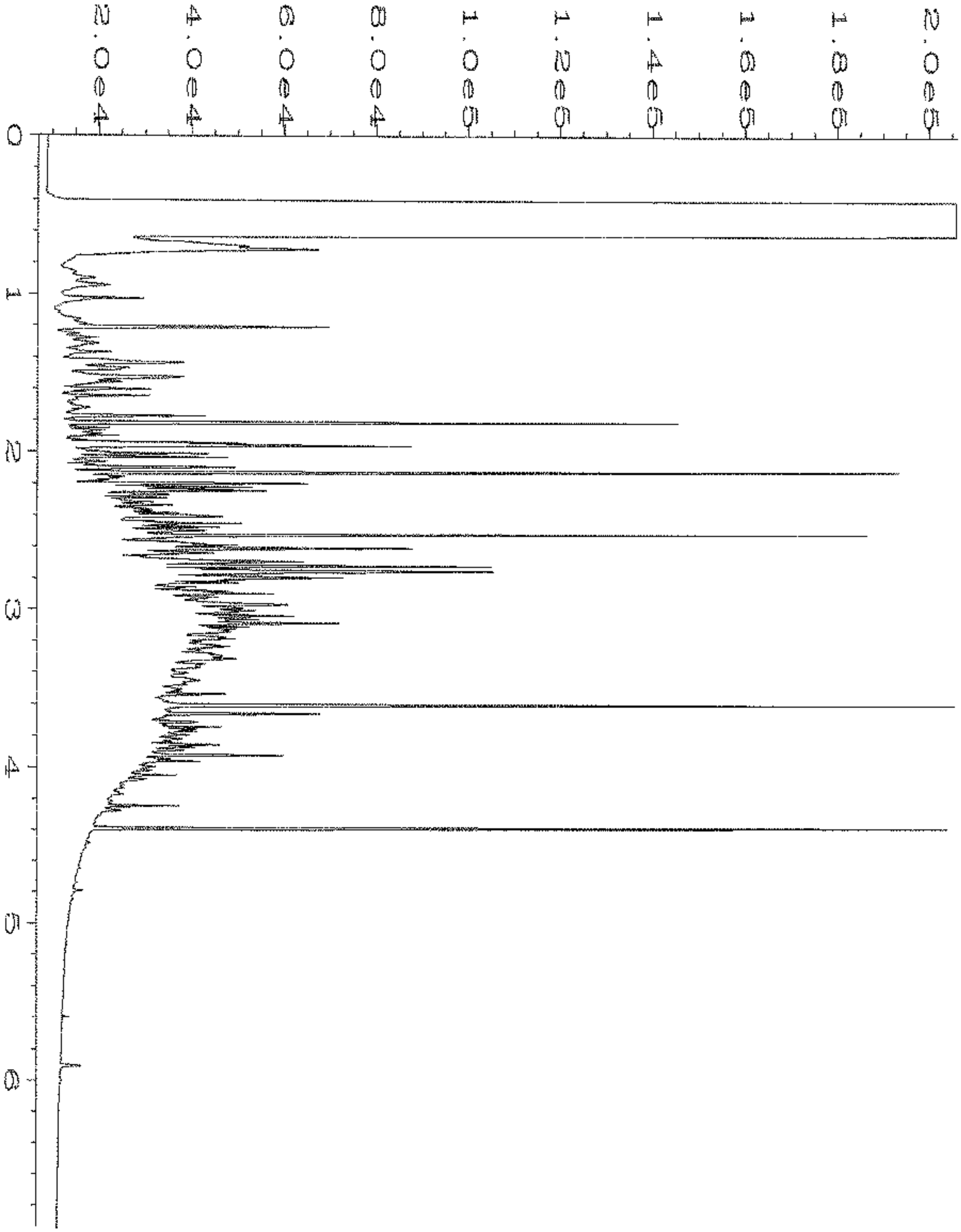
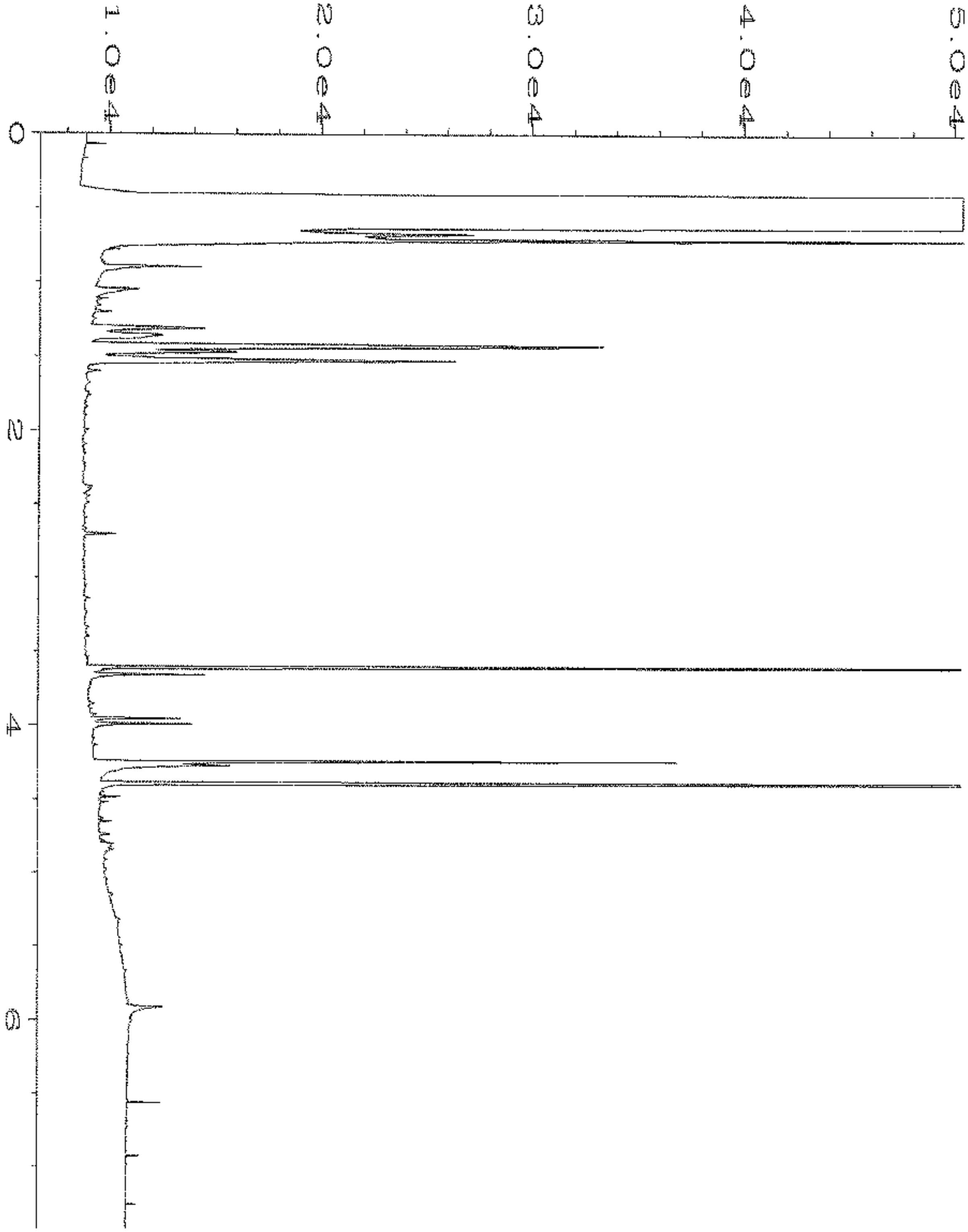
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\046F1501.D
Operator          : TL                                     Page Number      : 1
Instrument        : GC1                                    Vial Number      : 46
Sample Name       : 102393-26                              Injection Number : 1
Run Time Bar Code:                                         Sequence Line    : 15
Acquired on       : 25 Feb 21  09:27 PM                    Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:11 AM                     Analysis Method  : COND.MTH
```

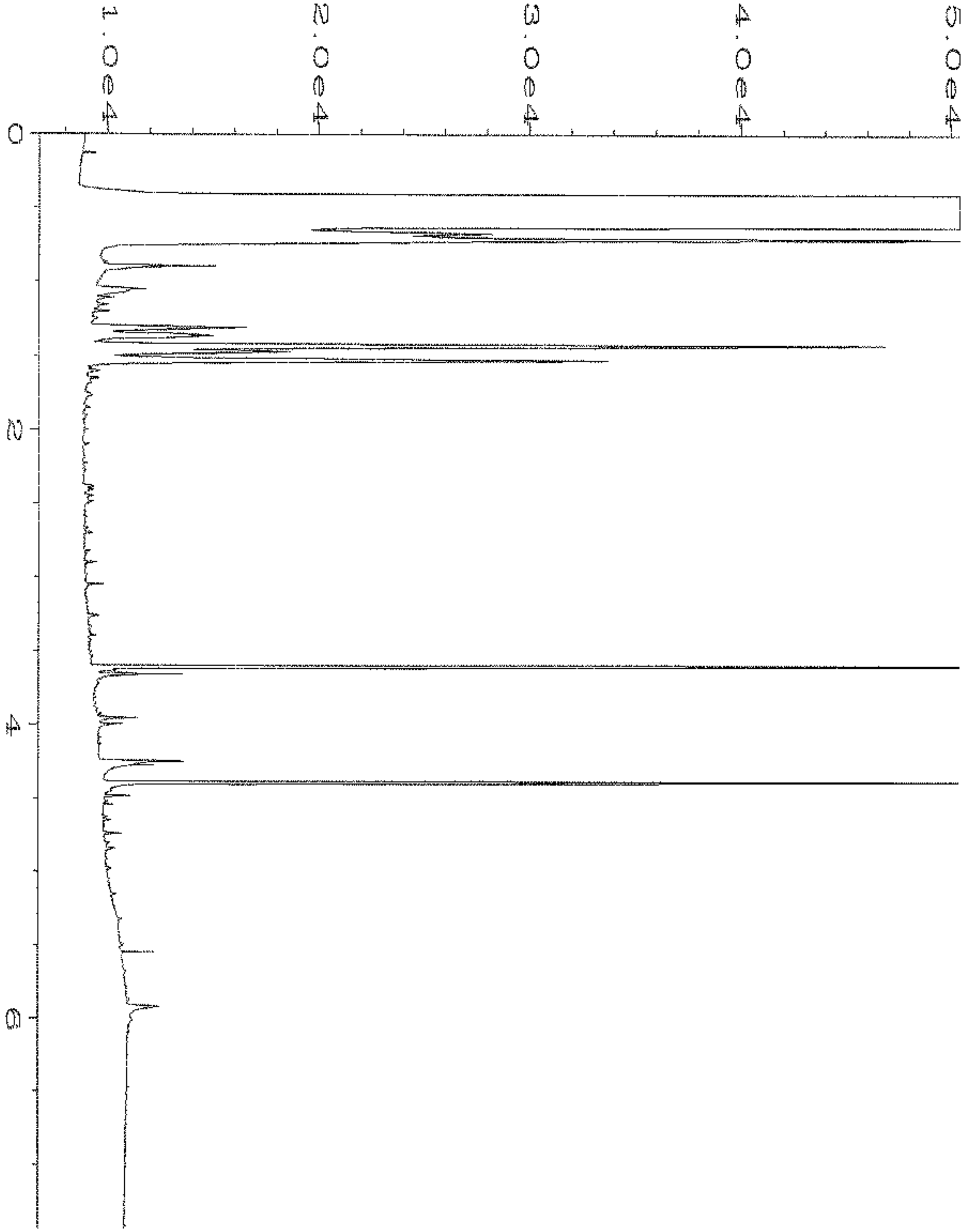


Data File Name : C:\HPCHEM\1\DATA\02-25-21\047F1501.D
Operator : TL
Instrument : GC1
Sample Name : 102393-27
Run Time Bar Code:
Acquired on : 25 Feb 21 09:38 PM
Report Created on: 26 Feb 21 10:12 AM

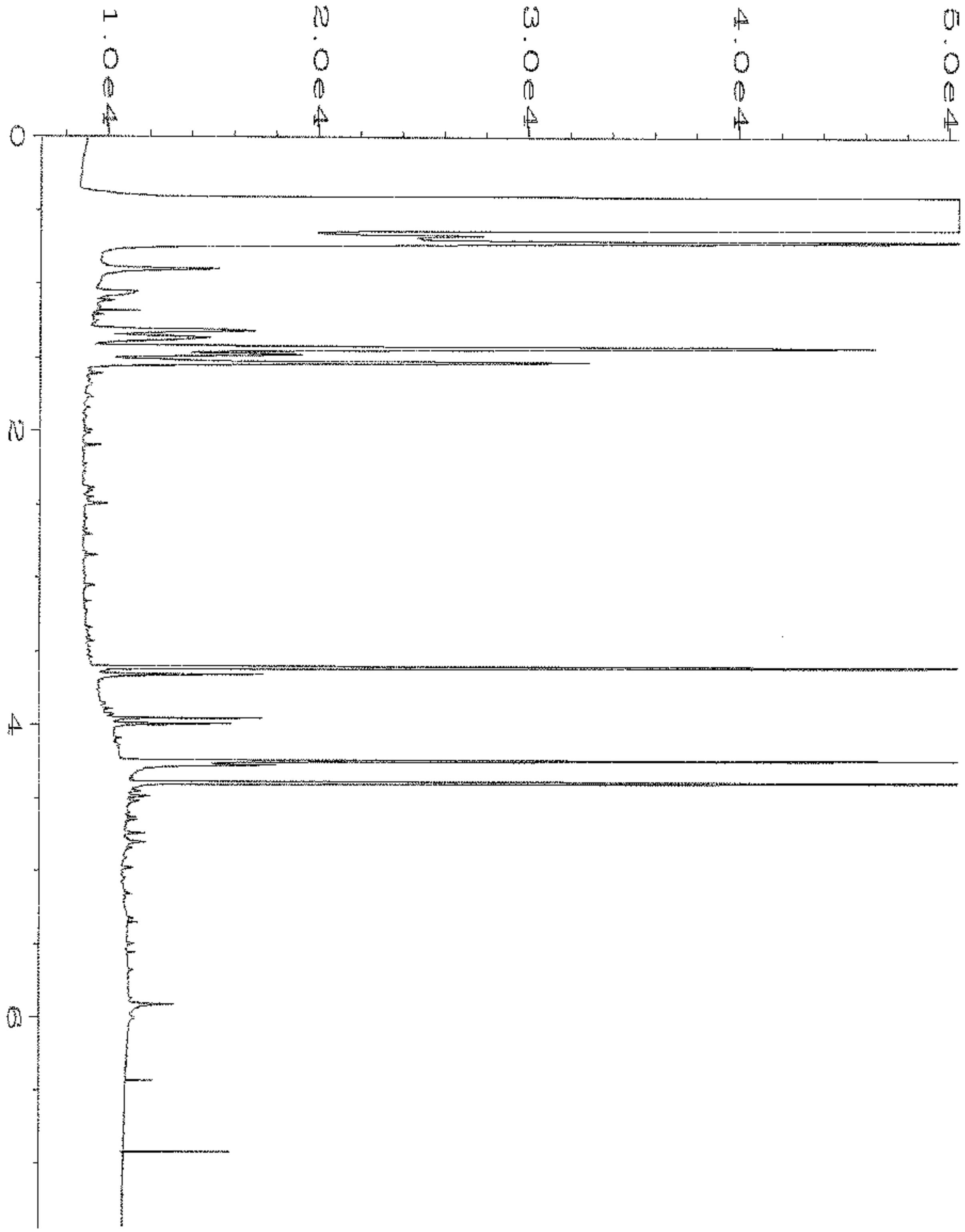
Page Number : 1
Vial Number : 47
Injection Number : 1
Sequence Line : 15
Instrument Method: DX.MTH
Analysis Method : COND.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\048F1501.D
Operator          : TL                                   Page Number      : 1
Instrument        : GC1                                  Vial Number      : 48
Sample Name       : 102393-28                            Injection Number : 1
Run Time Bar Code:                                       Sequence Line    : 15
Acquired on       : 25 Feb 21  09:49 PM                  Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:12 AM                   Analysis Method  : COND.MTH
```

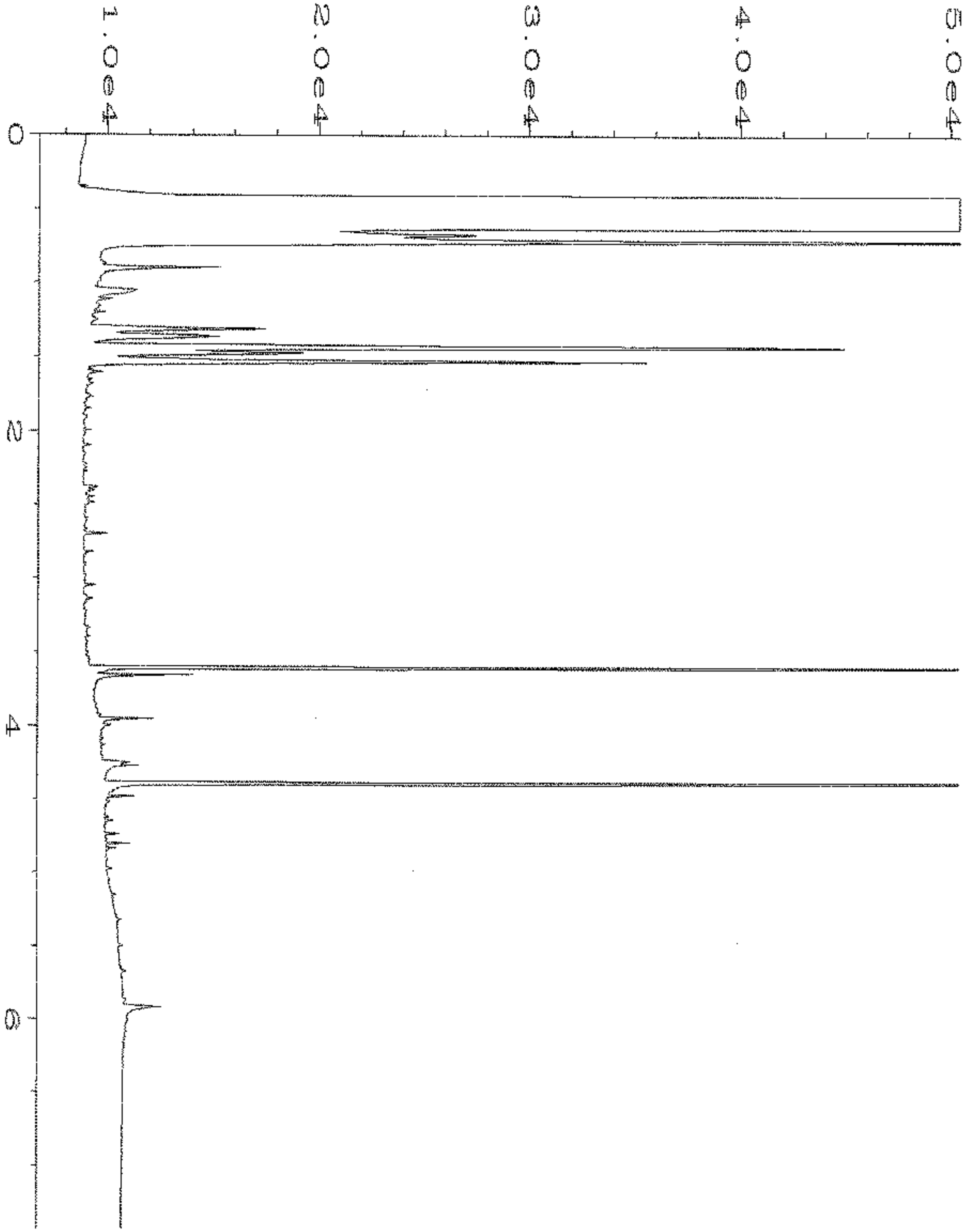


```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\049F1501.D
Operator          : TL                               Page Number       : 1
Instrument        : GC1                              Vial Number       : 49
Sample Name       : 102393-29                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 15
Acquired on       : 25 Feb 21  10:01 PM              Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:12 AM               Analysis Method   : COND.MTH
```

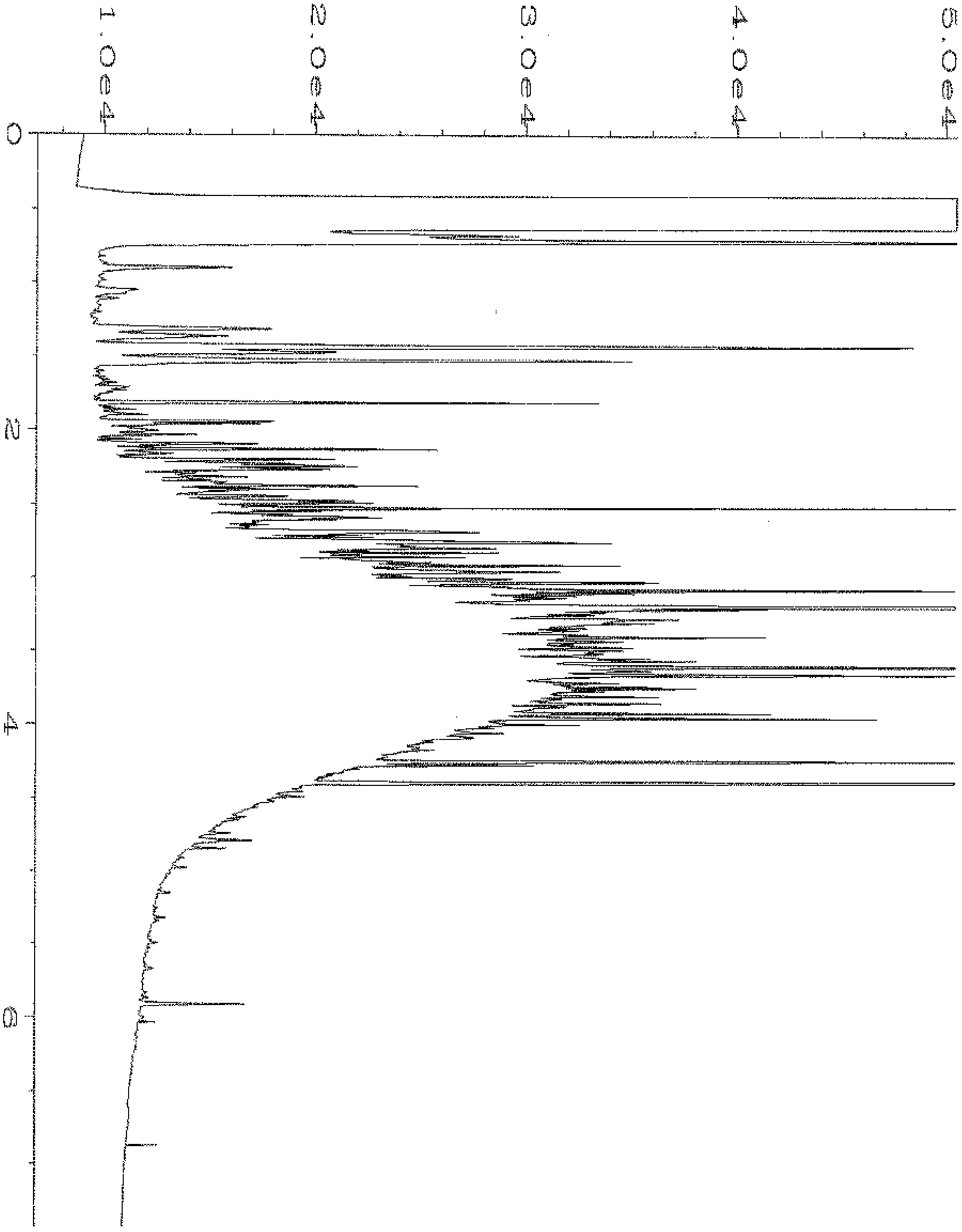


Data File Name : C:\HPCHEM\1\DATA\02-25-21\050F1501.D
Operator : TL
Instrument : GC1
Sample Name : 102393-30
Run Time Bar Code:
Acquired on : 25 Feb 21 10:12 PM
Report Created on: 26 Feb 21 10:12 AM

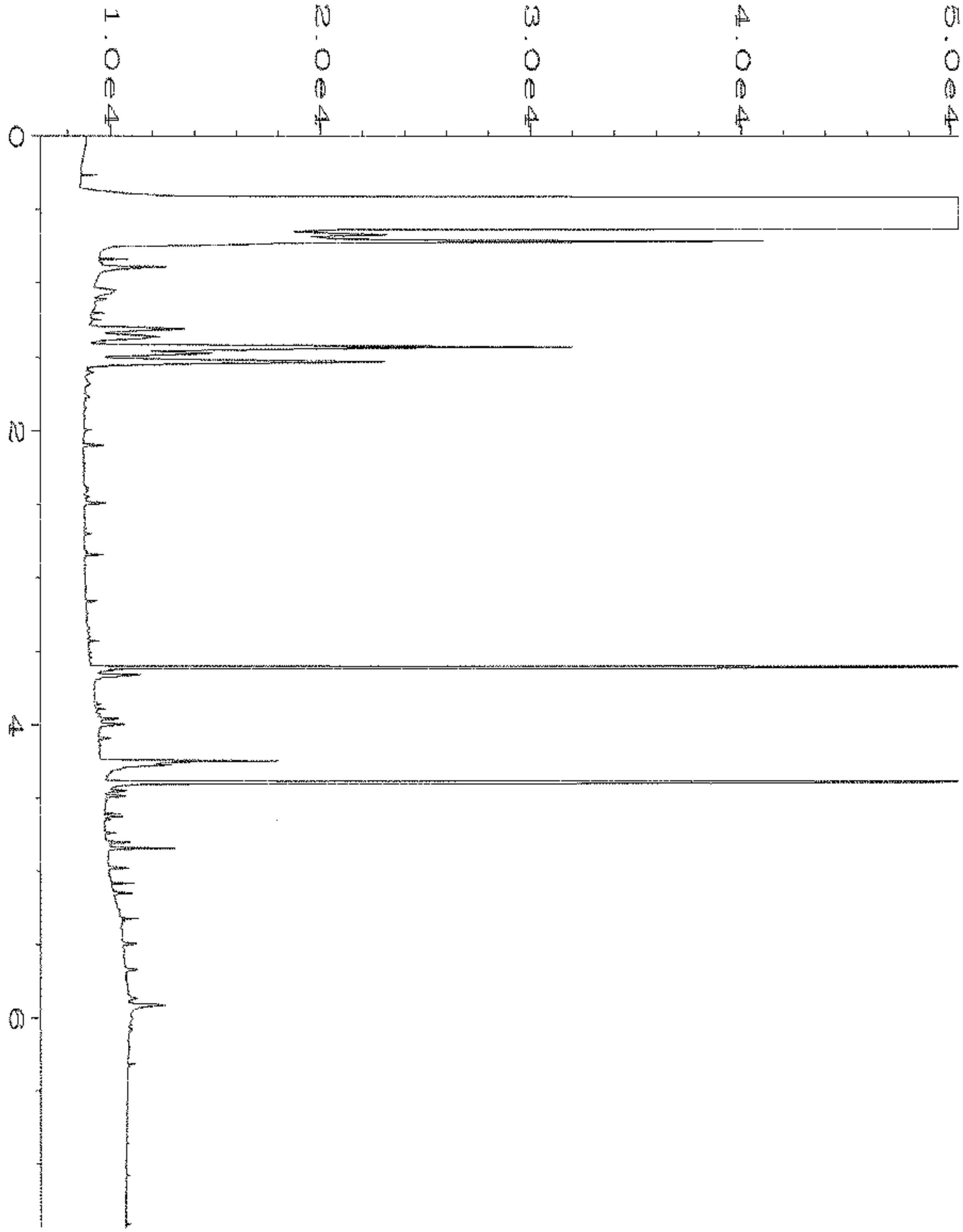
Page Number : 1
Vial Number : 50
Injection Number : 1
Sequence Line : 15
Instrument Method: DX.MTH
Analysis Method : COND.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\051F1501.D
Operator          : TL                                  Page Number       : 1
Instrument        : GC1                                 Vial Number       : 51
Sample Name       : 102393-31                           Injection Number  : 1
Run Time Bar Code:                                      Sequence Line     : 15
Acquired on       : 25 Feb 21   10:23 PM                Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:13 AM                 Analysis Method  : COND.MTH
```

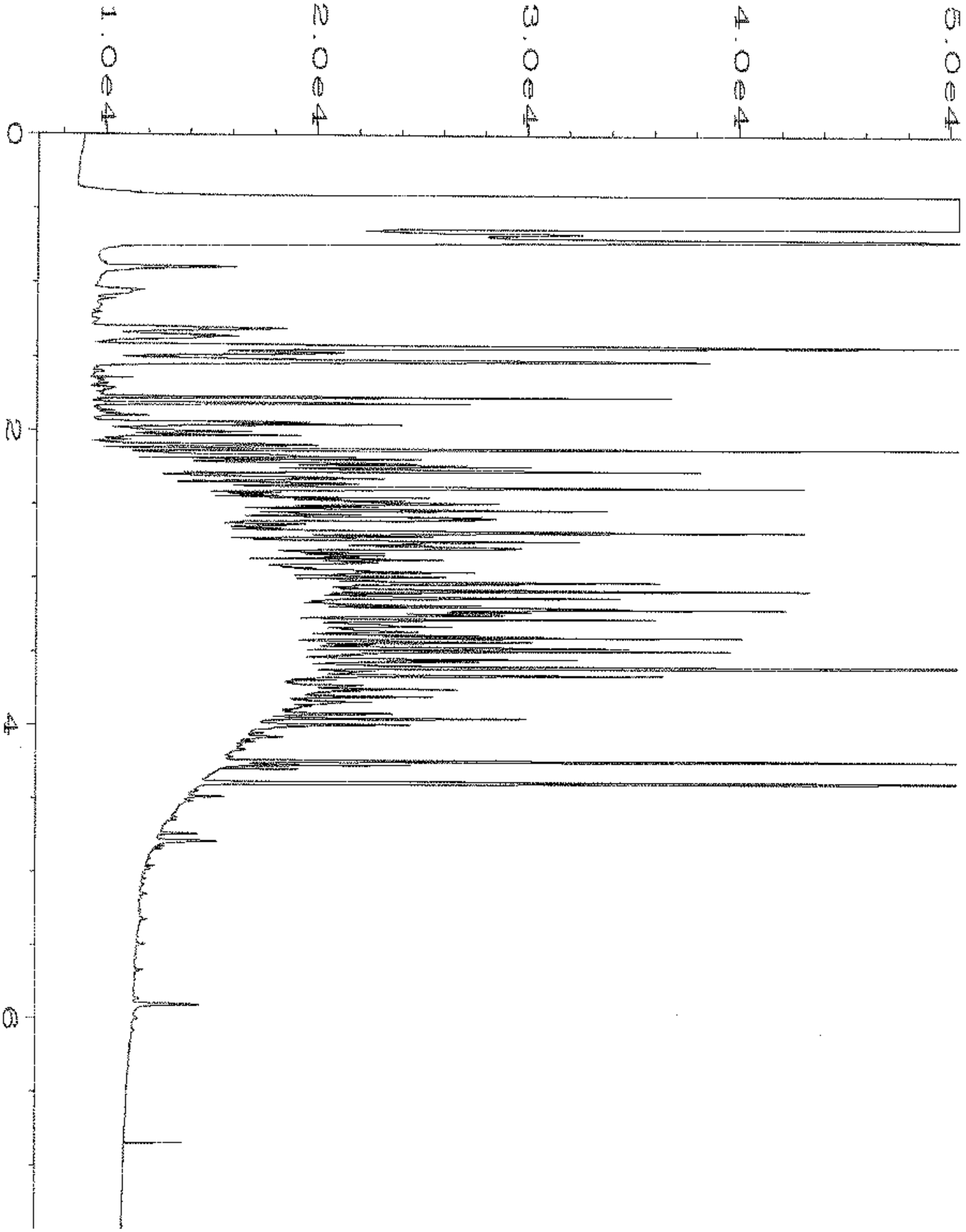


```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\052F1501.D
Operator          : TL                               Page Number      : 1
Instrument        : GC1                              Vial Number      : 52
Sample Name       : 102393-32                        Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 15
Acquired on       : 25 Feb 21  10:34 PM              Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:13 AM               Analysis Method  : COND.MTH
```



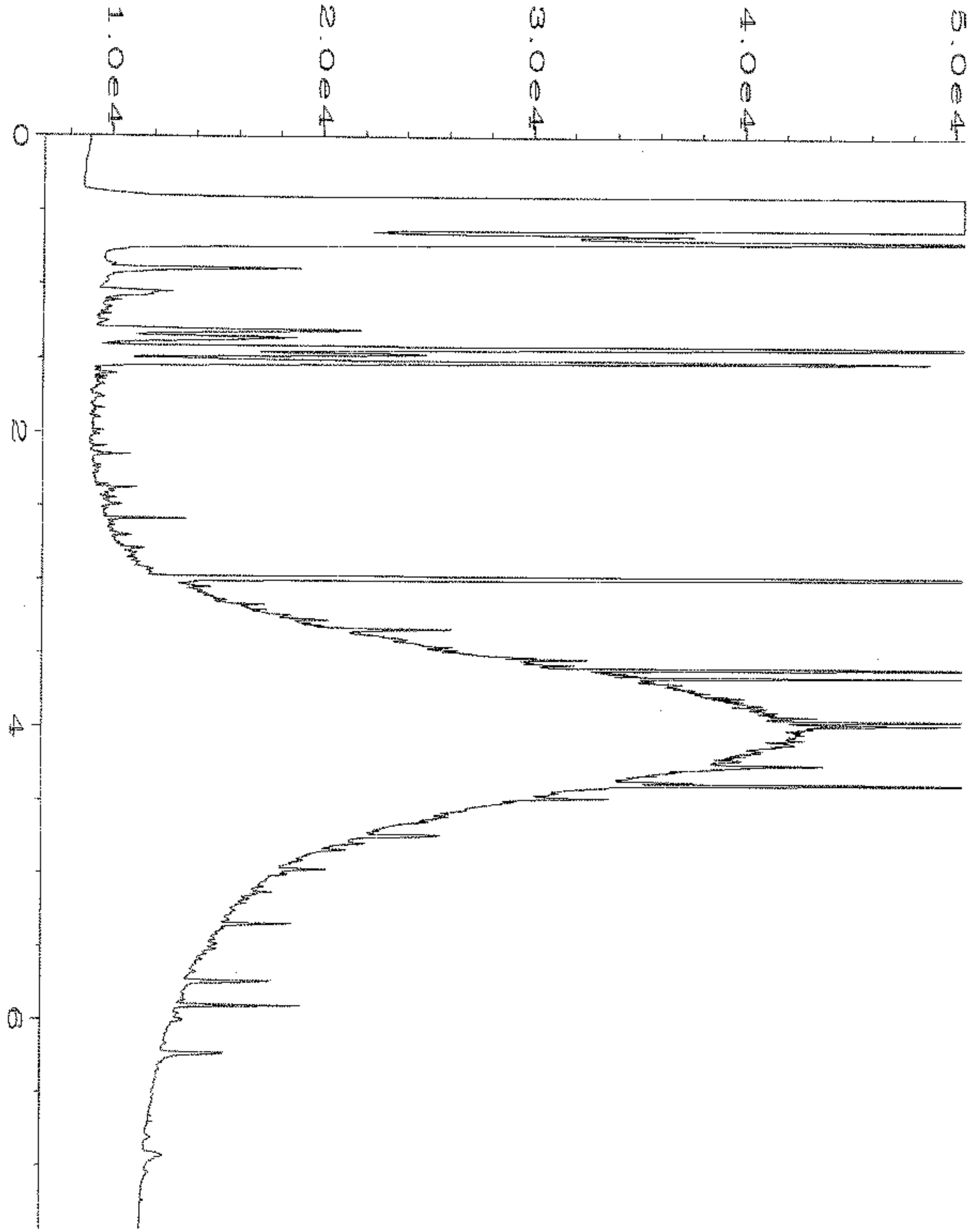
Data File Name   : C:\HPCHEM\1\DATA\02-25-21\053F1501.D
Operator   : TL
Instrument   : GC1
Sample Name   : 102393-33
Run Time Bar Code:
Acquired on   : 25 Feb 21   10:46 PM
Report Created on: 26 Feb 21   10:13 AM

Page Number   : 1
Vial Number   : 53
Injection Number : 1
Sequence Line   : 15
Instrument Method: DX.MTH
Analysis Method   : COND.MTH

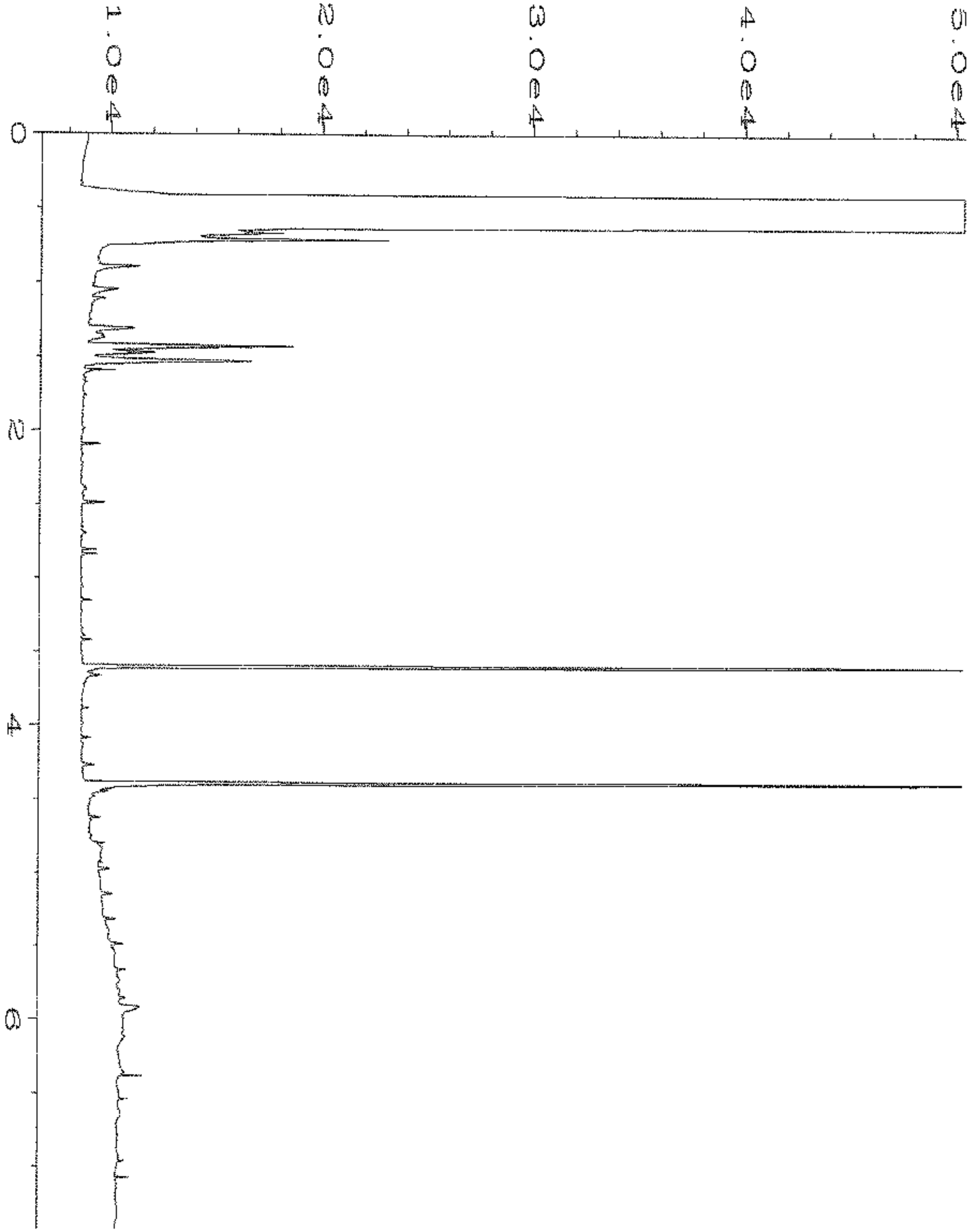


Data File Name : C:\HPCHEM\1\DATA\02-25-21\054F1501.D
Operator : TL
Instrument : GC1
Sample Name : 102393-34
Run Time Bar Code:
Acquired on : 25 Feb 21 10:57 PM
Report Created on: 26 Feb 21 10:13 AM

Page Number : 1
Vial Number : 54
Injection Number : 1
Sequence Line : 15
Instrument Method: DX.MTH
Analysis Method : COND.MTH

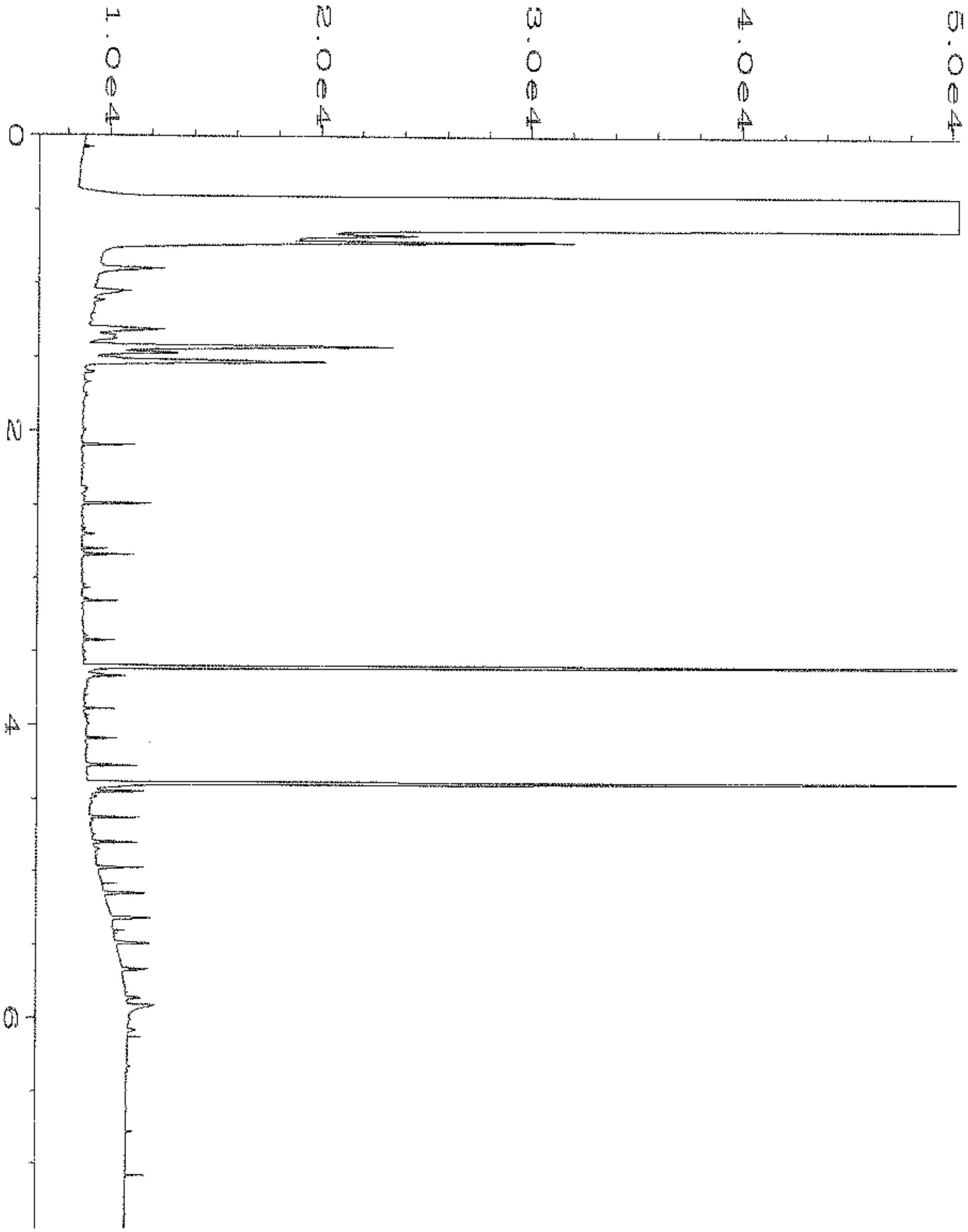


```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\055F1501.D
Operator          : TL                              Page Number       : 1
Instrument        : GC1                             Vial Number       : 55
Sample Name       : 102393-35                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line     : 15
Acquired on       : 25 Feb 21   11:08 PM            Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:13 AM             Analysis Method   : COND.MTH
```

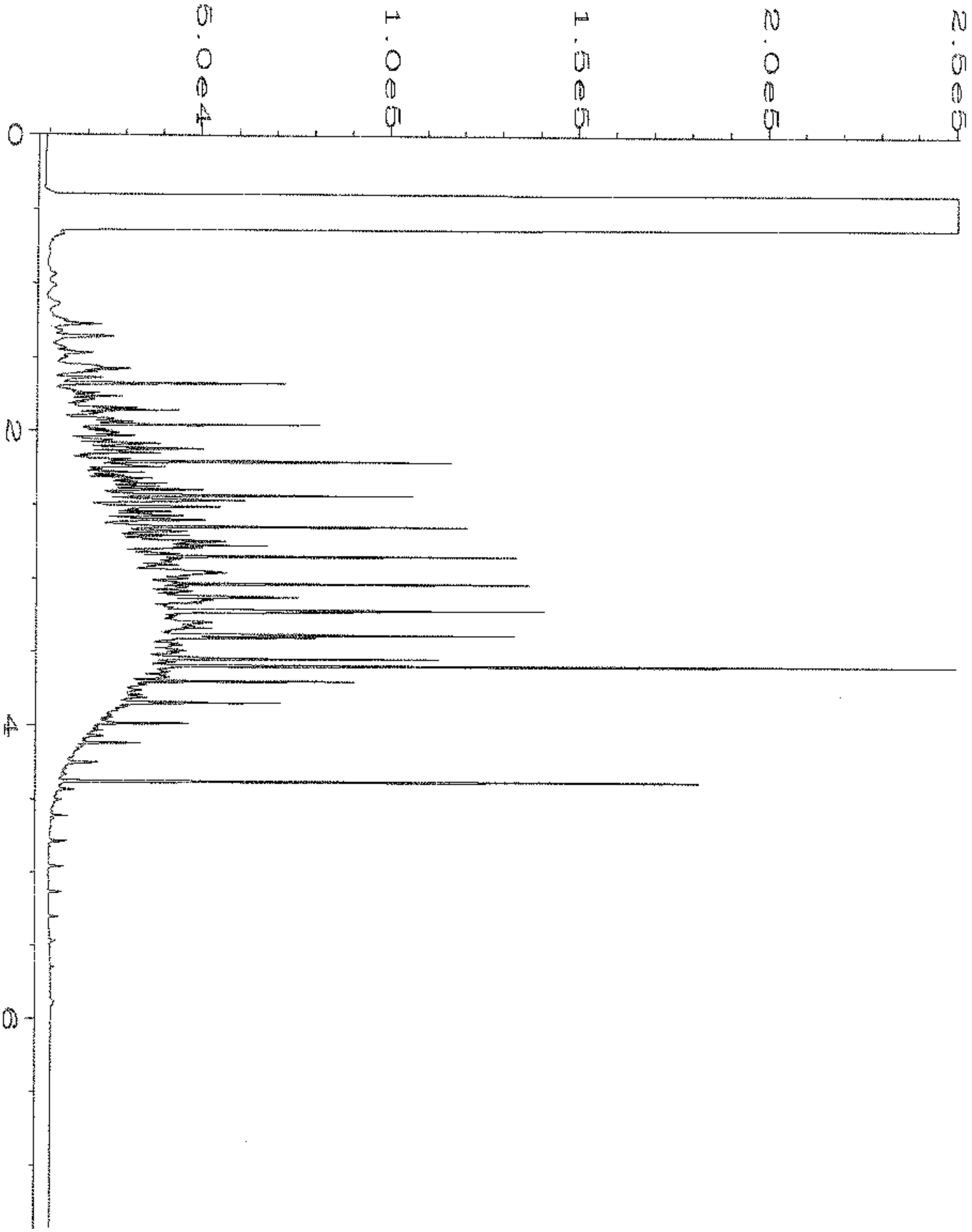


Data File Name : C:\HPCHEM\1\DATA\02-25-21\013F1101.D
Operator : TL
Instrument : GC1
Sample Name : 01-498 mb
Run Time Bar Code:
Acquired on : 25 Feb 21 02:26 PM
Report Created on: 26 Feb 21 10:16 AM

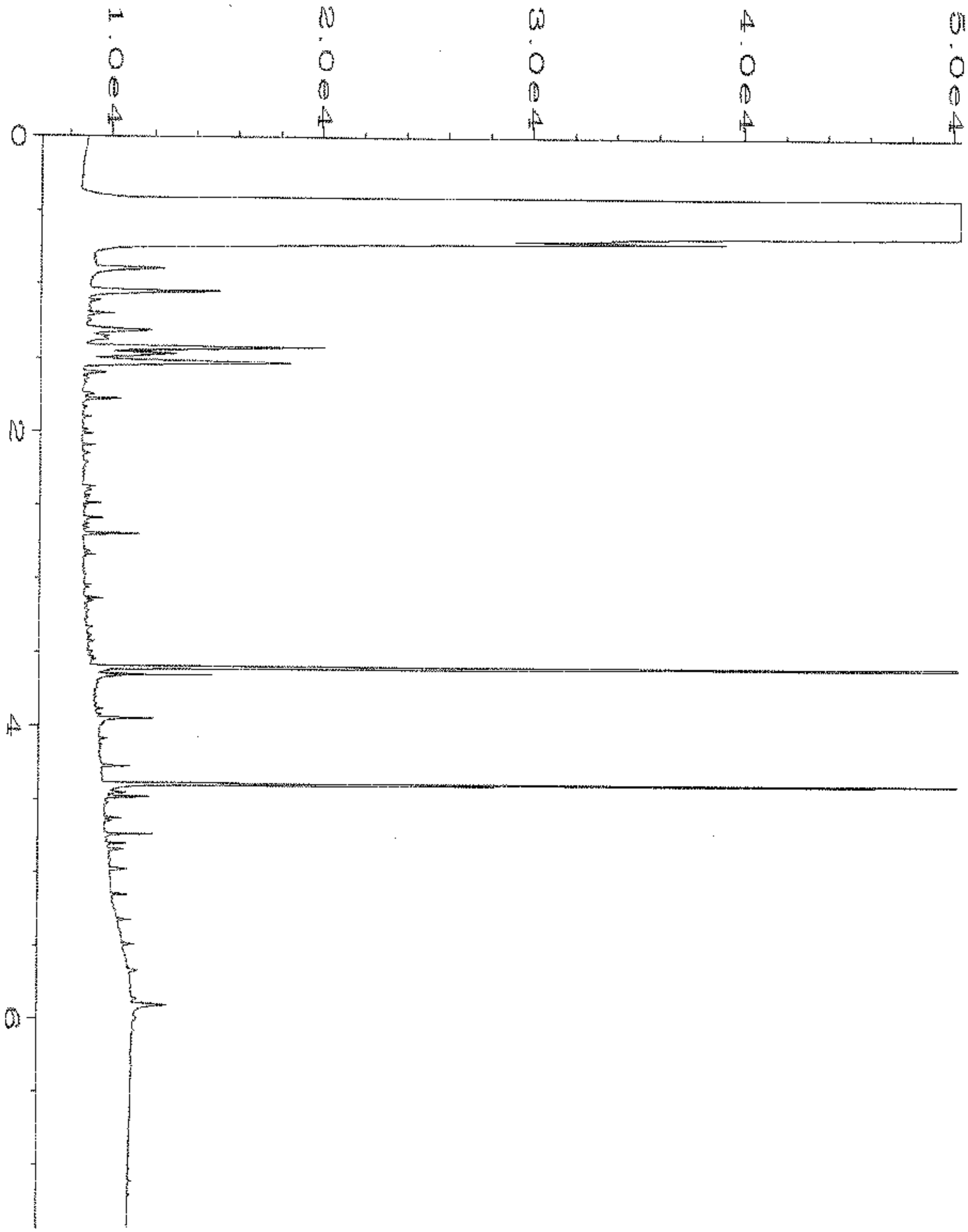
Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 11
Instrument Method: DX.MTH
Analysis Method : COND.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\036F1301.D
Operator          : TL                          Page Number       : 1
Instrument        : GC1                         Vial Number       : 36
Sample Name       : 01-499 mb                   Injection Number : 1
Run Time Bar Code:                              Sequence Line     : 13
Acquired on       : 25 Feb 21   07:12 PM        Instrument Method: DX.MTH
Report Created on: 26 Feb 21   10:16 AM         Analysis Method   : COND.MTH
```

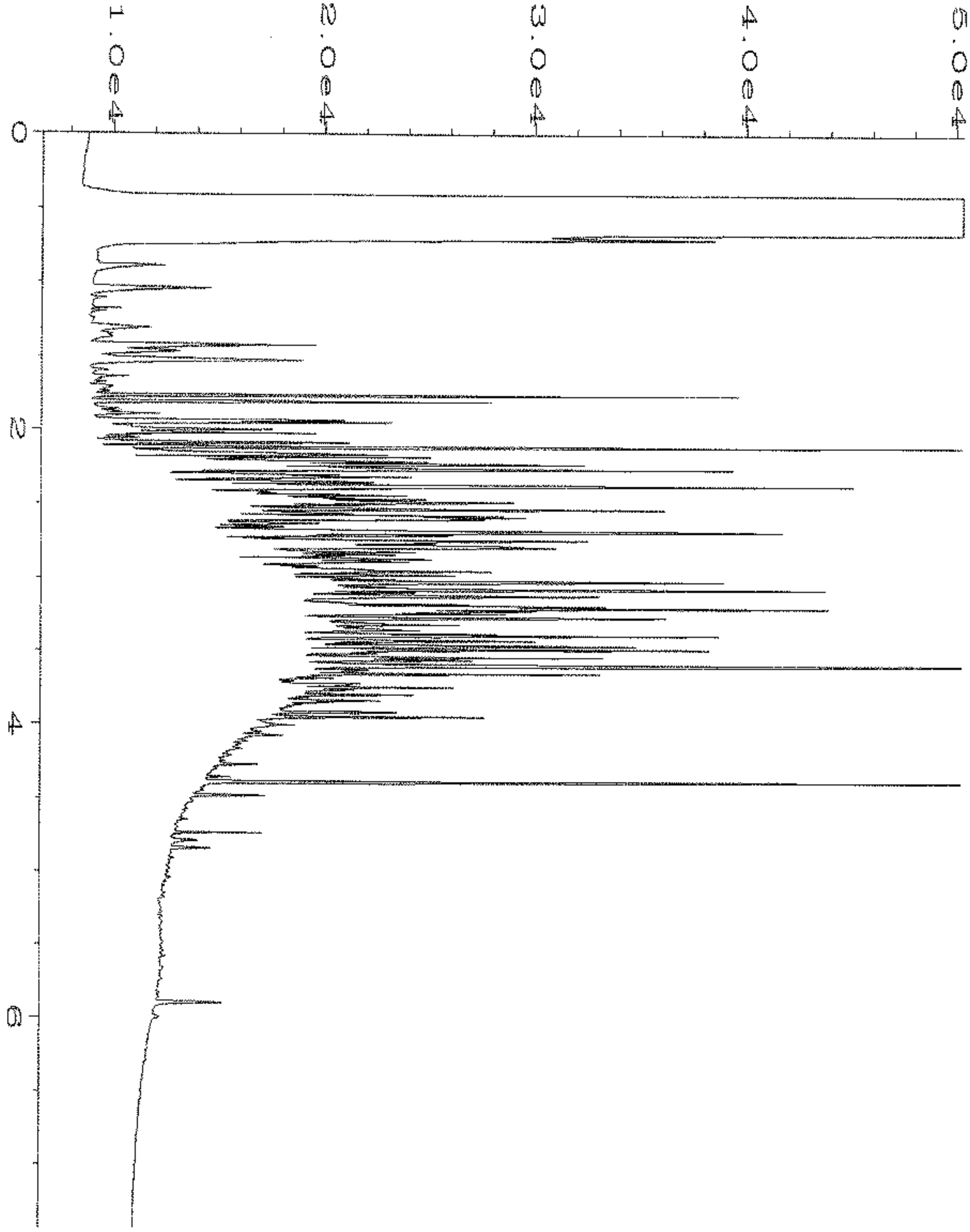


```
Data File Name    : C:\HPCHEM\1\DATA\02-25-21\003F0201.D
Operator          : TL                                   Page Number       : 1
Instrument        : GC1                                  Vial Number       : 3
Sample Name       : 500 Dx 61-146D                       Injection Number  : 1
Run Time Bar Code:                                       Sequence Line     : 2
Acquired on       : 25 Feb 21  05:47 AM                  Instrument Method: DX.MTH
Report Created on: 26 Feb 21  10:16 AM                   Analysis Method   : COND.MTH
```

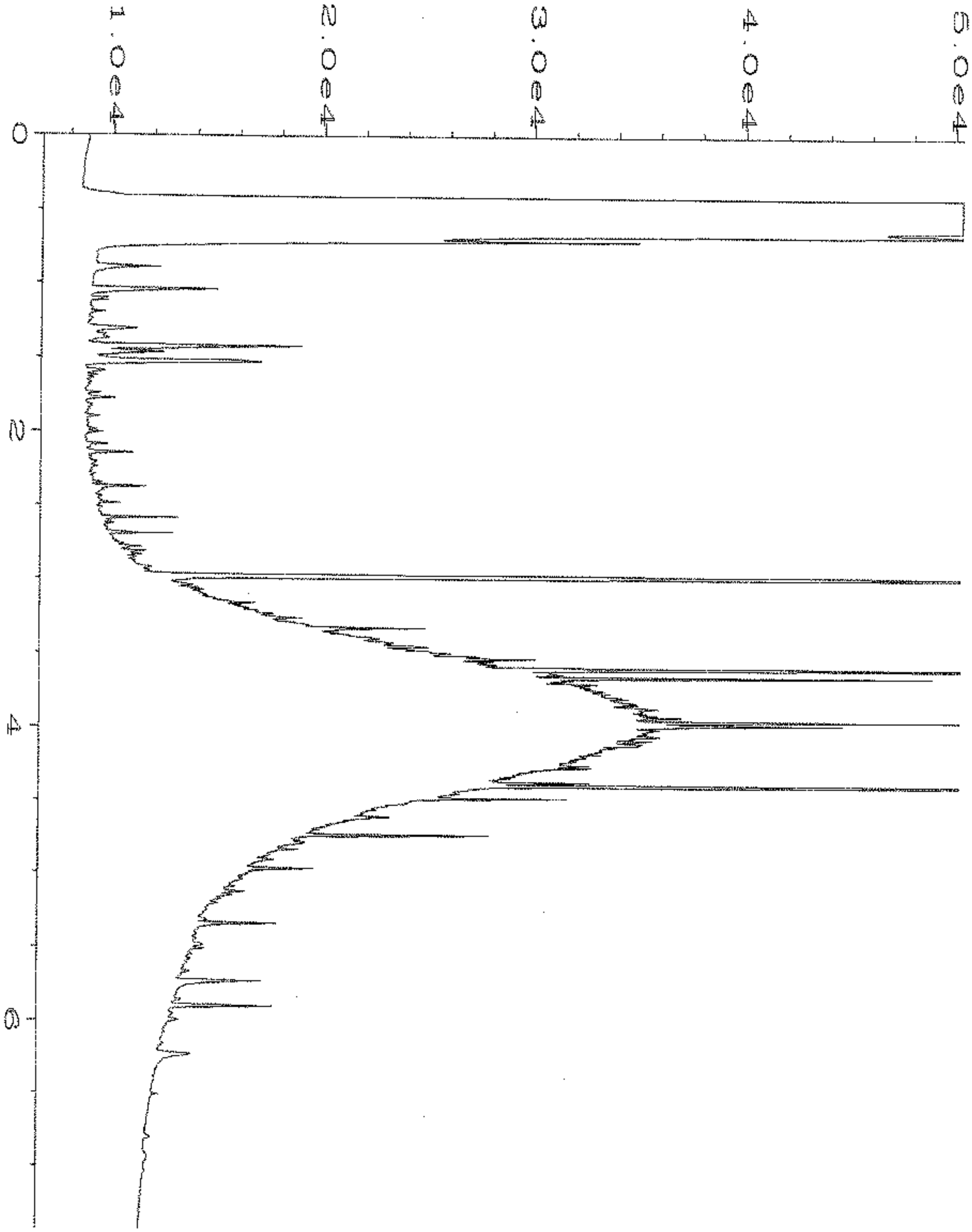


Data File Name : C:\HPCHEM\1\DATA\03-01-21\024F0601.D
Operator : TL
Instrument : GC1
Sample Name : 102393-33 rx
Run Time Bar Code:
Acquired on : 01 Mar 21 06:06 PM
Report Created on: 02 Mar 21 10:44 AM

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

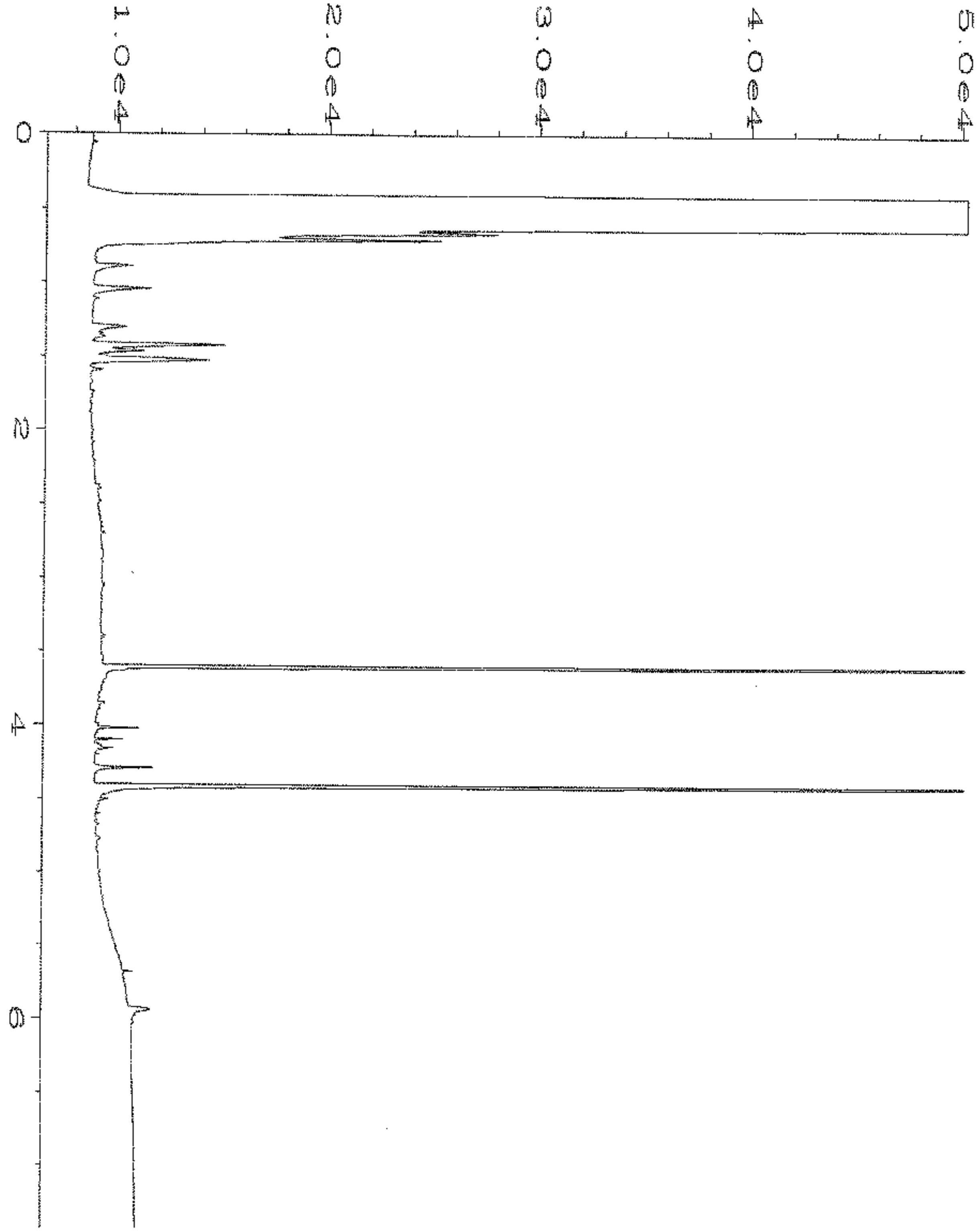


```
Data File Name    : C:\HPCHEM\1\DATA\03-01-21\025F0601.D
Operator          : TL                               Page Number      : 1
Instrument        : GC1                              Vial Number      : 25
Sample Name       : 102393-34 rx                     Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 6
Acquired on       : 01 Mar 21  06:17 PM              Instrument Method: DX.MTH
Report Created on: 02 Mar 21  10:44 AM               Analysis Method  : DEFAULT.MTH
```



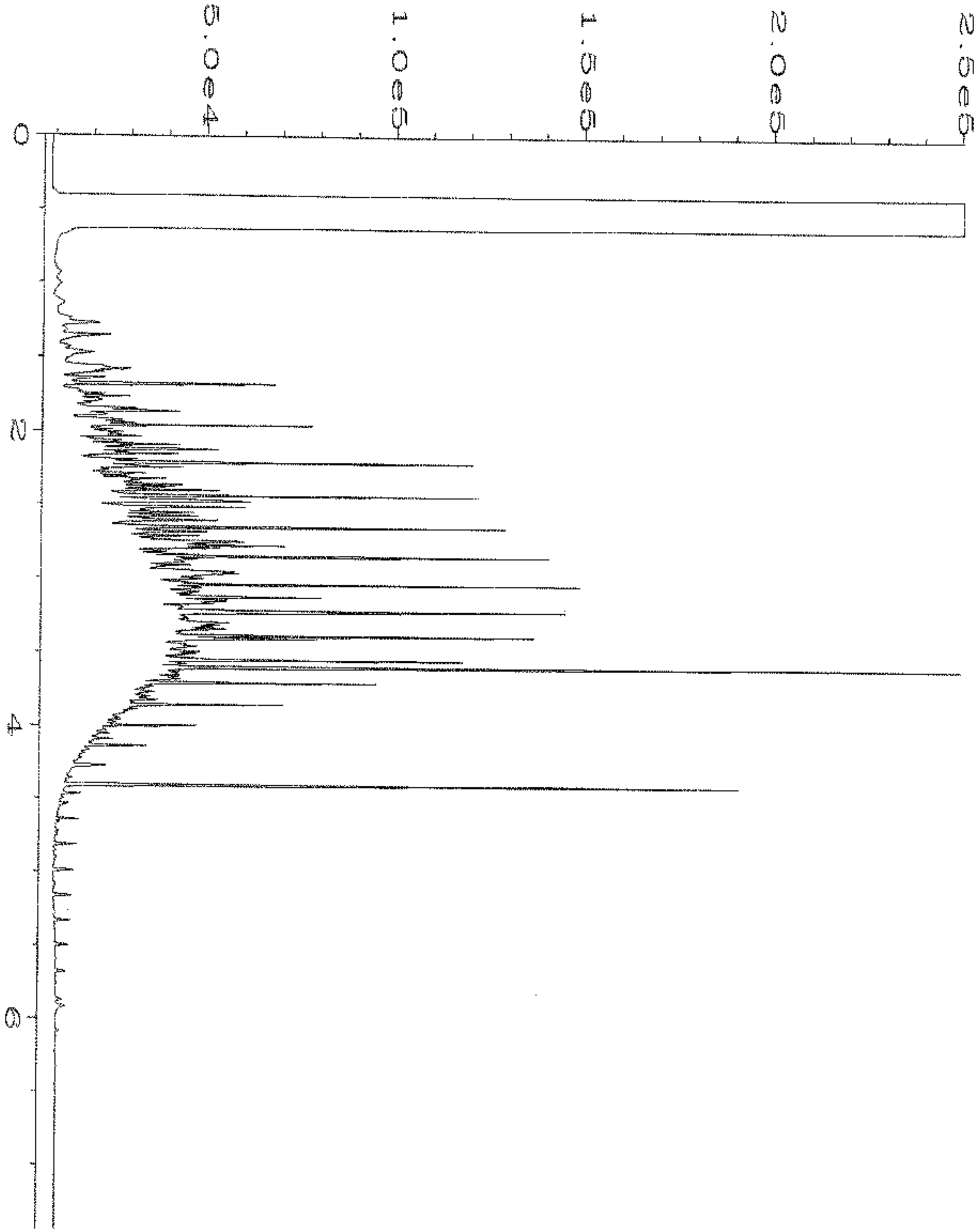
Data File Name : C:\HPCHEM\1\DATA\03-01-21\026F0601.D
Operator : TL
Instrument : GC1
Sample Name : 102393-35 rx
Run Time Bar Code:
Acquired on : 01 Mar 21 06:29 PM
Report Created on: 02 Mar 21 10:44 AM

Page Number : 1
Vial Number : 26
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\03-01-21\007F0401.D
Operator : TL
Instrument : GC1
Sample Name : 01-512 mb
Run Time Bar Code:
Acquired on : 01 Mar 21 02:26 PM
Report Created on: 02 Mar 21 10:43 AM

Page Number : 1
Vial Number : 7
Injection Number : 1
Sequence Line : 4
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



```
Data File Name    : C:\HPCHEM\1\DATA\03-01-21\003F0201.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 3
Sample Name       : 500 Dx 61-146D                  Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 2
Acquired on       : 01 Mar 21   05:45 AM            Instrument Method: DX.MTH
Report Created on: 02 Mar 21   10:44 AM             Analysis Method  : DEFAULT.MTH
```

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Floyd | Snider
Megan King
601 Union St., Suite 600
Seattle, WA 98101

RE: POL - TPH
Work Order Number: 2102384

March 03, 2021

Attention Megan King:

Fremont Analytical, Inc. received 17 sample(s) on 2/24/2021 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Dissolved Metals by EPA Method 200.8
Ion Chromatography by EPA Method 300.0
Total Alkalinity by SM 2320B

This report consists of the following:

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

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

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

CC:
Adia Jumper
Gabe Cisneros

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Date: *03/03/2021*

CLIENT: Floyd | Snider
Project: POL - TPH
Work Order: 2102384

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2102384-001	MW-24-022321	02/23/2021 4:10 PM	02/24/2021 3:56 PM
2102384-002	MW-25-022321	02/23/2021 3:51 PM	02/24/2021 3:56 PM
2102384-003	MW-20-022321	02/23/2021 2:46 PM	02/24/2021 3:56 PM
2102384-004	MW-10-022321	02/23/2021 3:35 PM	02/24/2021 3:56 PM
2102384-005	MW-31-022321	02/23/2021 3:10 PM	02/24/2021 3:56 PM
2102384-006	MW-12-022321	02/23/2021 4:59 PM	02/24/2021 3:56 PM
2102384-007	MW-28-022421	02/24/2021 8:30 AM	02/24/2021 3:56 PM
2102384-008	MW-35-022421	02/24/2021 8:25 AM	02/24/2021 3:56 PM
2102384-009	MW-135-022421	02/24/2021 8:35 AM	02/24/2021 3:56 PM
2102384-010	MW-30-022421	02/24/2021 8:57 AM	02/24/2021 3:56 PM
2102384-011	MW-18-022421	02/24/2021 9:31 AM	02/24/2021 3:56 PM
2102384-012	MW-23-022421	02/24/2021 9:50 AM	02/24/2021 3:56 PM
2102384-013	MW-22-022421	02/24/2021 9:55 AM	02/24/2021 3:56 PM
2102384-014	MW-17-022421	02/24/2021 10:43 AM	02/24/2021 3:56 PM
2102384-015	MW-29-022421	02/24/2021 10:51 AM	02/24/2021 3:56 PM
2102384-016	MW-14-022421	02/24/2021 11:40 AM	02/24/2021 3:56 PM
2102384-017	Trip Blank	02/10/2021 3:31 PM	02/24/2021 3:56 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2102384**
Date: **3/3/2021**

CLIENT: Floyd | Snider
Project: POL - TPH

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

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

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

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

Qualifiers & Acronyms

WO#: **2102384**
Date Reported: **3/3/2021**

Qualifiers:

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

Acronyms:

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

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Collection Date: 2/23/2021 4:10:00 PM
Project: POL - TPH
Lab ID: 2102384-001
Matrix: Water
Client Sample ID: MW-24-022321

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 10:26:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	1.34	0.200	D	mg/L	2	2/24/2021 6:02:00 PM
Sulfate	5.94	1.20	D	mg/L	2	2/24/2021 6:02:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	2.86	1.80		µg/L	1	2/26/2021 10:20:31 PM
Total Alkalinity by SM 2320B				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO3)	89.1	2.50		mg/L	1	3/1/2021 11:15:00 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-002
Client Sample ID: MW-25-022321

Collection Date: 2/23/2021 3:51:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	5.09	0.135	D	mg/L	20	2/26/2021 1:01:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	2/24/2021 6:25:00 PM
Sulfate	4.50	0.600		mg/L	1	2/24/2021 6:25:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	1,020	1.80		µg/L	1	2/26/2021 10:26:04 PM
Total Alkalinity by SM 2320B				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO3)	282	2.50		mg/L	1	3/1/2021 11:15:00 AM

Analytical Report

Client: Floyd | Snider
Collection Date: 2/23/2021 2:46:00 PM
Project: POL - TPH
Lab ID: 2102384-003
Matrix: Water
Client Sample ID: MW-20-022321

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	9.15	0.270	D	mg/L	40	2/26/2021 12:50:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	2/25/2021 9:56:00 AM
Sulfate	ND	0.600		mg/L	1	2/25/2021 9:56:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	2,790	18.0	D	µg/L	10	3/2/2021 1:24:28 PM
Total Alkalinity by SM 2320B				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO3)	425	2.50		mg/L	1	3/1/2021 11:15:00 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-004
Client Sample ID: **MW-10-022321**

Collection Date: 2/23/2021 3:35:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	3.33	0.270	D	mg/L	40	2/26/2021 12:53:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	0.200	D	mg/L	2	2/24/2021 8:20:00 PM
Sulfate	ND	1.20	D	mg/L	2	2/24/2021 8:20:00 PM
NOTES: Diluted due to high levels of non-target analytes.						
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	2,520	18.0	D	µg/L	10	3/2/2021 1:30:01 PM
Total Alkalinity by SM 2320B				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO3)	153	2.50		mg/L	1	3/1/2021 11:15:00 AM

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-005
Client Sample ID: MW-31-022321

Collection Date: 2/23/2021 3:10:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	0.0432	0.00675		mg/L	1	2/26/2021 11:38:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	5.14	0.400	D	mg/L	4	2/25/2021 10:19:00 AM
Sulfate	13.0	1.20	D	mg/L	2	2/24/2021 9:30:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	9.22	1.80		µg/L	1	2/26/2021 10:42:47 PM
Total Alkalinity by SM 2320B				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO3)	194	2.50		mg/L	1	3/1/2021 11:15:00 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-006
Client Sample ID: **MW-12-022321**

Collection Date: 2/23/2021 4:59:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	7.10	0.270	D	mg/L	40	2/26/2021 12:55:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	2/24/2021 9:53:00 PM
Sulfate	ND	0.600		mg/L	1	2/24/2021 9:53:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	1,940	1.80		µg/L	1	2/26/2021 10:48:21 PM
Total Alkalinity by SM 2320B				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO3)	186	2.50		mg/L	1	3/1/2021 11:15:00 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Collection Date: 2/24/2021 8:30:00 AM
Project: POL - TPH
Lab ID: 2102384-007
Matrix: Water
Client Sample ID: **MW-28-022421**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	0.0516	0.00675		mg/L	1	2/26/2021 11:43:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	1.36	0.200	D	mg/L	2	2/24/2021 10:16:00 PM
Sulfate	4.24	1.20	D	mg/L	2	2/24/2021 10:16:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	9.98	1.80		µg/L	1	2/26/2021 10:53:55 PM
Total Alkalinity by SM 2320B				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO3)	41.4	2.50		mg/L	1	3/1/2021 11:15:00 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-008
Client Sample ID: **MW-35-022421**

Collection Date: 2/24/2021 8:25:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 11:49:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	9.28	0.400	D	mg/L	4	2/24/2021 10:39:00 PM
Sulfate	15.2	2.40	D	mg/L	4	2/24/2021 10:39:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	9.09	1.80		µg/L	1	2/26/2021 11:10:39 PM
Total Alkalinity by SM 2320B				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO3)	86.0	2.50		mg/L	1	3/1/2021 11:15:00 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Collection Date: 2/24/2021 8:35:00 AM
Project: POL - TPH
Lab ID: 2102384-009
Matrix: Water
Client Sample ID: **MW-135-022421**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 11:51:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	9.33	1.00	D	mg/L	10	2/24/2021 11:02:00 PM
Sulfate	16.4	6.00	D	mg/L	10	2/24/2021 11:02:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	9.06	1.80		µg/L	1	2/26/2021 11:16:13 PM
Total Alkalinity by SM 2320B				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO3)	89.1	2.50		mg/L	1	3/2/2021 10:50:03 AM

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-010
Client Sample ID: MW-30-022421
Collection Date: 2/24/2021 8:57:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 11:54:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	23.8	2.00	D	mg/L	20	2/24/2021 11:25:00 PM
Sulfate	96.5	12.0	D	mg/L	20	2/24/2021 11:25:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	179	1.80		µg/L	1	2/26/2021 11:21:47 PM
Total Alkalinity by SM 2320B				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO3)	143	2.50		mg/L	1	3/2/2021 10:50:03 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-011
Client Sample ID: **MW-18-022421**

Collection Date: 2/24/2021 9:31:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 11:58:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	2.77	0.200	D	mg/L	2	2/25/2021 10:42:00 AM
Sulfate	6.76	0.600		mg/L	1	2/24/2021 11:48:00 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	ND	1.80		µg/L	1	2/26/2021 11:27:21 PM
Total Alkalinity by SM 2320B				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO3)	62.1	2.50		mg/L	1	3/2/2021 10:50:03 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Collection Date: 2/24/2021 9:50:00 AM
Project: POL - TPH
Lab ID: 2102384-012
Matrix: Water
Client Sample ID: MW-23-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	0.938	0.0675	D	mg/L	10	2/26/2021 12:57:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	1.00	D	mg/L	10	2/25/2021 11:05:00 AM
Sulfate	13.6	6.00	D	mg/L	10	2/25/2021 11:05:00 AM
NOTES: Diluted due to high levels of non-target analytes.						
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	1,600	1.80		µg/L	1	2/26/2021 11:32:55 PM
Total Alkalinity by SM 2320B				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO3)	82.8	2.50		mg/L	1	3/2/2021 10:50:03 AM

Analytical Report

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-013
Client Sample ID: **MW-22-022421**

Collection Date: 2/24/2021 9:55:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	2.63	0.135	D	mg/L	20	2/26/2021 12:59:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	2/25/2021 1:21:00 AM
Sulfate	2.30	0.600		mg/L	1	2/25/2021 1:21:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	871	1.80		µg/L	1	2/26/2021 11:38:29 PM
Total Alkalinity by SM 2320B				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO3)	134	2.50		mg/L	1	3/2/2021 10:50:03 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-014
Client Sample ID: **MW-17-022421**
Collection Date: 2/24/2021 10:43:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	0.00810	0.00675		mg/L	1	2/26/2021 12:12:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	2.01	0.100		mg/L	1	2/25/2021 1:44:00 AM
Sulfate	5.92	0.600		mg/L	1	2/25/2021 1:44:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	2.51	1.80		µg/L	1	2/26/2021 11:44:03 PM
Total Alkalinity by SM 2320B				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO3)	167	2.50		mg/L	1	3/2/2021 10:50:03 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Collection Date: 2/24/2021 10:51:00 AM
Project: POL - TPH
Lab ID: 2102384-015
Matrix: Water
Client Sample ID: MW-29-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 12:14:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	0.868	0.100		mg/L	1	2/25/2021 2:53:00 AM
Sulfate	1.30	0.600		mg/L	1	2/25/2021 2:53:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	ND	1.80		µg/L	1	2/26/2021 11:49:37 PM
Total Alkalinity by SM 2320B				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO3)	44.6	2.50		mg/L	1	3/2/2021 10:50:03 AM

Analytical Report

Work Order: **2102384**
Date Reported: **3/3/2021**

Client: Floyd | Snider
Project: POL - TPH
Lab ID: 2102384-016
Client Sample ID: MW-14-022421

Collection Date: 2/24/2021 11:40:00 AM
Matrix: Water

Analyses	**Result**	**RL**	**Qual**	**Units**	**DF**	**Date Analyzed**
Dissolved Gases by RSK-175				Batch ID: R65593		Analyst: MS
Methane	0.00701	0.00675		mg/L	1	2/26/2021 12:16:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 31485		Analyst: SS
Nitrate (as N)	2.81	0.200	D	mg/L	2	2/25/2021 3:16:00 AM
Sulfate	1.64	1.20	D	mg/L	2	2/25/2021 3:16:00 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 31499		Analyst: CO
Manganese	1.90	1.80		µg/L	1	2/26/2021 11:55:11 PM
Total Alkalinity by SM 2320B				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO3)	181	2.50		mg/L	1	3/2/2021 10:50:03 AM

Date: *3/3/2021*

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: **MB-R65584** SampType: **MBLK** Units: **mg/L** Prep Date: **3/1/2021** RunNo: **65584**
Client ID: **MBLKW** Batch ID: **R65584** Analysis Date: **3/1/2021** SeqNo: **1319245**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: **LCS-R65584** SampType: **LCS** Units: **mg/L** Prep Date: **3/1/2021** RunNo: **65584**
Client ID: **LCSW** Batch ID: **R65584** Analysis Date: **3/1/2021** SeqNo: **1319246**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	100	2.50	100.0	0	100	99.6	108				

Sample ID: **2102384-005CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **3/1/2021** RunNo: **65584**
Client ID: **MW-31-022321** Batch ID: **R65584** Analysis Date: **3/1/2021** SeqNo: **1319248**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	191	2.50						194.2	1.65	20	

Sample ID: **MB-R65587** SampType: **MBLK** Units: **mg/L** Prep Date: **3/2/2021** RunNo: **65587**
Client ID: **MBLKW** Batch ID: **R65587** Analysis Date: **3/2/2021** SeqNo: **1319287**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: **LCS-R65587** SampType: **LCS** Units: **mg/L** Prep Date: **3/2/2021** RunNo: **65587**
Client ID: **LCSW** Batch ID: **R65587** Analysis Date: **3/2/2021** SeqNo: **1319288**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	101	2.50	100.0	0	101	99.6	108				

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: **2102384-009CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **3/2/2021** RunNo: **65587**
Client ID: **MW-135-022421** Batch ID: **R65587** Analysis Date: **3/2/2021** SeqNo: **1319290**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	86.0	2.50						89.13	3.64	20	

Date: *3/3/2021*

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-31485** SampType: **MBLK** Units: **mg/L** Prep Date: **2/24/2021** RunNo: **65527**
Client ID: **MBLKW** Batch ID: **31485** Analysis Date: **2/24/2021** SeqNo: **1317986**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.100									
Sulfate	ND	0.600									

Sample ID: **LCS-31485** SampType: **LCS** Units: **mg/L** Prep Date: **2/24/2021** RunNo: **65527**
Client ID: **LCSW** Batch ID: **31485** Analysis Date: **2/24/2021** SeqNo: **1317987**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.704	0.100	0.7500	0	93.9	90	110				
Sulfate	3.60	0.600	3.750	0	95.9	90	110				

Sample ID: **2102384-002CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **2/24/2021** RunNo: **65527**
Client ID: **MW-25-022321** Batch ID: **31485** Analysis Date: **2/24/2021** SeqNo: **1317990**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	ND	0.100						0		20	
Sulfate	4.49	0.600						4.501	0.200	20	

Sample ID: **2102384-002CMS** SampType: **MS** Units: **mg/L** Prep Date: **2/24/2021** RunNo: **65527**
Client ID: **MW-25-022321** Batch ID: **31485** Analysis Date: **2/24/2021** SeqNo: **1317991**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.734	0.100	0.7500	0	97.9	80	120				
Sulfate	8.40	0.600	3.750	4.501	104	80	120				

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2102384-002CMSD** SampType: **MSD** Units: **mg/L** Prep Date: **2/24/2021** RunNo: **65527**
Client ID: **MW-25-022321** Batch ID: **31485** Analysis Date: **2/24/2021** SeqNo: **1317992**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	0.743	0.100	0.7500	0	99.1	80	120	0.7340	1.22	20	
Sulfate	8.46	0.600	3.750	4.501	105	80	120	8.396	0.712	20	

Sample ID: **2102384-014CDUP** SampType: **DUP** Units: **mg/L** Prep Date: **2/24/2021** RunNo: **65527**
Client ID: **MW-17-022421** Batch ID: **31485** Analysis Date: **2/25/2021** SeqNo: **1318014**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	2.00	0.100						2.006	0.200	20	
Sulfate	5.92	0.600						5.921	0.0676	20	

Sample ID: **2102384-014CMS** SampType: **MS** Units: **mg/L** Prep Date: **2/24/2021** RunNo: **65527**
Client ID: **MW-17-022421** Batch ID: **31485** Analysis Date: **2/25/2021** SeqNo: **1318015**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)	2.83	0.100	0.7500	2.006	110	80	120				E
Sulfate	10.1	0.600	3.750	5.921	113	80	120				

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-31499** SampType: **MBLK** Units: **µg/L** Prep Date: **2/26/2021** RunNo: **65561**
Client ID: **MBLKW** Batch ID: **31499** Analysis Date: **2/26/2021** SeqNo: **1318673**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	1.80									

Sample ID: **LCS-31499** SampType: **LCS** Units: **µg/L** Prep Date: **2/26/2021** RunNo: **65561**
Client ID: **LCSW** Batch ID: **31499** Analysis Date: **2/26/2021** SeqNo: **1318674**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	110	1.80	100.0	0	110	85	115				

Sample ID: **2102341-001ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **2/26/2021** RunNo: **65561**
Client ID: **BATCH** Batch ID: **31499** Analysis Date: **2/26/2021** SeqNo: **1318676**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	ND	1.80						3.509	73.8	30	R

NOTES:
R - High RPD observed due to analyte concentration near the reporting limit.

Sample ID: **2102341-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **2/26/2021** RunNo: **65561**
Client ID: **BATCH** Batch ID: **31499** Analysis Date: **2/26/2021** SeqNo: **1318677**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	546	1.80	500.0	3.509	108	70	130				

Sample ID: **2102341-001AMSD** SampType: **MSD** Units: **µg/L** Prep Date: **2/26/2021** RunNo: **65561**
Client ID: **BATCH** Batch ID: **31499** Analysis Date: **2/26/2021** SeqNo: **1318678**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	551	1.80	500.0	3.509	110	70	130	545.8	0.978	30	

Date: *3/3/2021*

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-31499FB**	SampType: **MBLK**			Units: **µg/L**		Prep Date: **2/26/2021**			RunNo: **65561**			
Client ID: **MBLKW**	Batch ID: **31499**					Analysis Date: **3/1/2021**			SeqNo: **1319065**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Manganese	ND	1.80										

NOTES:
Filter Blank

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **LCS-R65593**	SampType: **LCS**	Units: **mg/L**	Prep Date: **2/26/2021**	RunNo: **65593**
Client ID: **LCSW**	Batch ID: **R65593**		Analysis Date: **2/26/2021**	SeqNo: **1319442**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	992	0.00675	1,000	0	99.2	70	130				

Sample ID: **MB-R65593**	SampType: **MBLK**	Units: **mg/L**	Prep Date: **2/26/2021**	RunNo: **65593**
Client ID: **MBLKW**	Batch ID: **R65593**		Analysis Date: **2/26/2021**	SeqNo: **1319443**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675									

Sample ID: **2102384-001AREP**	SampType: **REP**	Units: **mg/L**	Prep Date: **2/26/2021**	RunNo: **65593**
Client ID: **MW-24-022321**	Batch ID: **R65593**		Analysis Date: **2/26/2021**	SeqNo: **1319410**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675						0		30	

Sample Log-In Check List

Client Name: **FS**
Work Order Number: **2102384**
Logged by: **Clare Griggs**
Date Received: **2/24/2021 3:56:00 PM**

Chain of Custody

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

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Present ☑
6. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
7. Were all items received at a temperature of >2°C to 6°C * Yes ☑ No ☐ NA ☐
8. Sample(s) in proper container(s)? Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
10. Are samples properly preserved? Yes ☑ No ☐
11. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
12. Is there headspace in the VOA vials? Yes ☐ No ☐ NA ☑
13. Did all samples containers arrive in good condition(unbroken)? Yes ☑ No ☐
14. Does paperwork match bottle labels? Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
16. Is it clear what analyses were requested? Yes ☑ No ☐
17. Were all holding times able to be met? Yes ☑ No ☐

Special Handling (if applicable)

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

Person Notified:
Date:
By Whom:
Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	4.6

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

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Client:	Floyd/Snider
Address:	601 Union St. Ste. 600
City, State, Zip:	Seattle 98101
Telephone:	206-292-2078
Fax:	
Date:	2/23/21 **Page:** 1 **of:** 2
Project Name:	POL-TPH
Project No:	
Collected by:	G. Cisneros, P. Ostuhat;
Location:	Longview, WA
Report To (PM):	Megan King/Gabe Cisneros
PM Email:	
Laboratory Project No (internal):	2102384
Special Remarks:	Please Lab Filter Mn to get Dissolved

Sample Disposal: ☐ Return to client ☑ Disposal by lab (after 30 days)

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	# of Cont.	VOCs (EPA 8260 / 624)	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8) Mn	Total (T) / [✓ Dissolved (D)]	Anions (IC)***	EDB (8011)	Dissolved Mn	Methane	Alkalinity	Nitrate/Sulfate	Comments
1 MW-24-022321	2/23/21	1610	W	4										D			X	X	X	X	
2 MW-25-022321	↓	1551	W	4										D			X	X	X	X	
3 MW-20-022321		1446	W	4										D			X	X	X	X	
4 MW-10-022321		1535	W	4										D			X	X	X	X	
5 MW-31-022321		1510	W	4										D			X	X	X	X	
6 MW-12-022321		1659	W	4										D			X	X	X	X	
7 MW-28-022421	2/24/21	0830	W	4										D			X	X	X	X	
8 MW-35-022421	↓	0825	W	4										D			X	X	X	X	
9 MW-135-022421		0835	W	4										D			X	X	X	X	
10 MW-30-022421		0857	W	4										D			X	X	X	X	

***Matrix:** A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

****Metals (Circle):** MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg [✓ Mn] Mo Na Ni Pb Sb Se Sr Sn Ti Tl V Zn

*****Anions (Circle):** [✓ Nitrate] Nitrite Chloride [✓ Sulfate] Bromide O-Phosphate Fluoride Nitrate+Nitrite

Turn-around Time:
☑ Standard ☐ Next Day
☐ 3 Day ☐ Same Day
☐ 2 Day ______ (specify)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished (Signature)	Print Name	Date/Time	Received (Signature)	Print Name	Date/Time
x Tyler Scott	Tyler Scott	2/24/21 10:26	x Claire Anderson	Claire Anderson	2/24/21 155
x			x		

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Date:
Page: 2 of: 2
Laboratory Project No (internal): 2102384

Special Remarks: please lab filter Mn to get dissolved

Client: Floyd | Snider
Address: 601 Union St. Ste. 600
City, State, Zip: Seattle, WA 98101
Telephone: 206-292-2078
Fax:

Project Name: POL-TPH
Project No:
Collected by: G. Cisneros, P. Osterhout
Location: Longview, WA
Report To (PM): Megan King / Gabe Cisneros
PM Email:

Sample Disposal: ☐ Return to client ☑ Disposal by lab (after 30 days)

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8) Total (T)	Dissolved (D)	Anions (IC)***	EDB (8011)	Dissolved MN	Methane	Alkalinity	Nitrate/Sulfate	Comments
1	MW-18-022421	2/24/21	0931	W	/										D			X	+	+	X	
2	MW-23-022421	↓	0950	W											D			X	X	X	X	
3	MW-22-022421		0955	W											D			X	X	X	X	
4	MW-17-022421		1043	W											D			X	X	X	X	
5	MW-29-022421		1051	W											D			X	X	X	X	
6	MW-14-022421	↓	1140	W											D			X	X	X	X	
7																						
8																						
9																						
10																						

***Matrix:** A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

****Metals (Circle):** MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg [✓ Mn] Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

*****Anions (Circle):** Nitrate [✓ Nitrite] Chloride [✓ Sulfate] Bromide O-Phosphate Fluoride Nitrate+Nitrite

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x Tyler Bott	2/24/21 15:26	x Clair Anderson	2/24/21 1550
x		x	

Turn-around Time:

☑ Standard
☐ 3 Day
☐ 2 Day
☐ Next Day
Same Day ______ *(specify)*

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix F
Aquifer Testing Report

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Two Union Square
601 Union Street, Suite 600
Seattle, WA 98101
tel: 206.292.2078 fax: 206.682.7867

Memorandum

To: POL-TPH Site PLP Group
From: Brett Beaulieu, LHG, and Nathan Schachtman, Floyd|Snider
Date: June 1, 2021
Project No: POL-TPH
Re: **Aquifer Testing Results**

INTRODUCTION

Previous environmental and hydrogeologic investigations at the Port of Longview (Port) Total Petroleum Hydrocarbons (TPH) Site (Site) is in Longview, Washington, have characterized two water-bearing zones at the Site: a discontinuous zone of perched groundwater (perched zone), which occurs primarily in shallow fill deposits, and a deeper alluvial aquifer, which sits in native sand deposits. The two water-bearing zones have been described as hydraulically isolated, separated by low permeability silt lenses (Golder 2000).

In accordance with the Remedial Investigation Work Plan (RIWP; Floyd|Snider 2019) and ASTM Method D4050, Floyd|Snider conducted aquifer testing at the Site on November 4, 2020. Constant-rate aquifer tests were conducted at two locations, MW-17 and MW-33, screened in the perched zone and alluvial aquifer, respectively. Constant-rate aquifer tests consist of drawdown and recovery periods, which are proceeded by an initial preliminary test to determine optimal pumping rate. During drawdown, water is evacuated from the well using a pump while the amount of drawdown is recorded over time. The recovery period follows the cessation of pumping, in which the increase or recovery of water levels in the well is recorded over time. The objectives of the constant-rate aquifer tests at the Site were to: (1) determine if the perched zone is a substantial water-bearing unit; (2) determine if the perched zone and alluvial aquifer are hydraulically isolated; and (3) to collect sufficient data to estimate aquifer parameters.

This report provides a description of the testing methodologies as well as a summary and interpretation of results derived from the two aquifer tests.

TESTING METHODOLOGY

The aquifer tests were implemented in general accordance with the RIWP and ASTM Method D4050, as summarized in this section, except when noted. Floyd|Snider conducted constant-rate aquifer tests on pumping wells MW-33, screened in the alluvial aquifer (18 to 28 feet below ground surface [bgs]), and MW-17, screened in the perched zone (7.5 to 17.5 feet bgs). MW-33 was pumped with a submersible Grundfos Redi-Flo 2 powered by a Honda EU2000 generator. A peristaltic pump was used to pump MW-17 because the well yield was deemed too low for the Redi-Flo 2 pump operating range. Pumping rates were measured using an in-line flow gauge (calibrated by hand measurements using a graduated bucket). Water levels were measured in the pumping well and three nearby observation wells using Solinst Levelogger transducers and manual water level meter. Water was pumped into 55-gallon drums and transferred throughout the test to a vacuum truck present on site.

Data from a preliminary yield test was used to the select the pumping rate at MW-33. A pumping rate of approximately 4.7 gallons per minute (gpm) was selected. This rate was the maximum flow rate able to be produced from the Redi-Flo 2 at this location. Due to expected slow recharge rates in the perched aquifer zone, a pumping rate of 250 milliliters per minute (mL/min) was selected for MW-17 using drawdown observations from prior low-flow groundwater sampling. After 14 minutes of pumping, the flow rate was increased to 360 mL/min for the duration of the test.

The constant-rate aquifer tests at MW-33 and MW-17 were conducted for a total of 126 and 116 minutes, respectively. MW-33 was pumped for a total of 102 minutes, and pumping at MW-17 was discontinued after 78 minutes due to a stabilization in the drawdown rate. Following the cessation of pumping, water levels at MW-33 recovered to pre-test levels in 24 minutes. Water levels at MW-17 recovered only approximately 3% of the total drawdown observed during the test after 38 minutes of recovery. Field forms with field observations and measurements are provided as Attachment 1.

AQUIFER TESTING RESULTS

After the two aquifer tests were complete, transducers were pulled from the pumping and observation wells, and all data were downloaded. All data were compensated for atmospheric pressure with data collected from a Solinst Barologger located on-site. The results of both aquifer tests are summarized as follows.

Perched Water-Bearing Zone

Figure 1 shows water levels in MW-17 and observation wells MW-11, MW-13, and MW-33 through the duration of the perched zone test. None of the three observation wells had observed drawdown in response to pumping and therefore were not included in the analysis.

MW-17 water levels showed a linear response of approximately 0.09 feet of drawdown per minute at a rate of 360 mL/min (Figure 1). The recovery response to the cessation of pumping was also linear at approximately 0.01 feet of recovery per minute. Drawdown and recovery data from MW-17 were not suitable for analysis using curve-fitting techniques due to the linear response curve, which did not suggest a typical cone of depression, a key assumption of aquifer test solutions, at a scale suitable for analysis. The observed linear drawdown and recovery responses to pumping at MW-17 as well as low sustainable yield indicates low-permeability of the surrounding geology and/or limited hydraulic connection between the well and the surrounding water-bearing zone.

Alluvial Aquifer

Figure 2 shows water levels in MW-33 and observation wells MW-11, MW-13, and MW-17 through the duration of the alluvial aquifer test. Throughout the 102-minute duration of the aquifer test, the three observation wells showed no significant influence from the pumping at MW-33, and therefore were not included in the analysis of pumping test results.

Drawdown and recovery data from MW-33 were loaded into *Aqtesolv* and analyzed using six different curve-matching techniques suitable for unconfined, leaky-confined, and/or confined aquifer types. The conceptual site model of the Site is most consistent with leaky-confined analysis, in which the perched zone acts as an overlying aquifer that transmits water through a low permeability aquitard unit at a relatively low rate compared to the horizontal flow in both the perched zone and alluvial aquifer. A range of solutions was applied to add robustness to the analysis, and account for variability in the aquitard and the potential for the aquitard to be so low in hydraulic conductivity as to act as a confining layer, or so high in hydraulic conductivity as to not impede flow. Table 1 summarizes the results the of the analysis, and Figures 3 through 8 summarize the *Aqtesolv* outputs. Each solution accounted for the effects of partial penetration of the well screen and assumed a saturated thickness of 85 feet, based on a deep well log at the Port (KJC 2010). Each solution also assumed an anisotropy ratio of 0.1. The hydraulic conductivity result of the leaky-confined aquifer solution (Hantush-Jacob) was approximately 49 feet per day (ft/day) or 1.7 X 10^{-2} centimeters per second (cm/s; Figure 6). Calculated hydraulic conductivities for the alluvial aquifer ranged from approximately 12 to 107 feet per day (ft/day) or 4.2 X 10^{-3} to 3.8 X 10^{-2} cm/s which are within the range of expected values for sandy aquifers (Table 1).

Notably, no indications of induced flux between the alluvial aquifer and the perched zone were observed during the pumping test. Water levels in perched zone well MW-17, which is located approximately 5 feet away from MW-33 so that the two wells constitute a pair, and other nearby perched zone observation wells MW-11 and MW-13, remained essentially constant throughout the duration of the alluvial test. This indicates no measurable induced leakage through the aquitard by the reduction in head in the alluvial aquifer and the associated increased vertical gradients under test conditions. Although transmission of small quantities of water through aquitards may be imperceptible during relatively low stress or short duration tests, the lack of a measurable response in the observation wells is consistent with the conceptual site model of negligible transmissivity across the aquitard under normal conditions.

REFERENCES

Floyd|Snider. 2019. *Port of Longview TPH Site Remedial Investigation Work Plan.* October.

Golder Associates, Inc. (Golder). 2000. *Port of Longview Historic Site Investigation and Remediation Summary Report.* October.

Kennedy/Jenks Consultants (KJC). 2010. *City of Longview Mint Farm Regional Water Treatment Plant Preliminary Design Report Part 2A: Hydrogeologic Characterization.* March.

LIST OF ATTACHMENTS

Table 1 Aquifer Test Solution Summary

Figure 1 Pumping and Observation Well Water Levels (Perched Test)

Figure 2 Pumping and Observation Well Water Levels (Alluvial Test)

Figure 3 MW-33 Theis Solution (unconfined)

Figure 4 MW-33 Neuman Solution (unconfined)

Figure 5 MW-33 Moench Solution (unconfined)

Figure 6 MW-33 Hantush-Jacob Solution (leaky-confined)

Figure 7 MW-33 Theis Solution (confined)

Figure 8 MW-33 Dougherty Badu Solution (confined)

Attachment 1 Field Forms

State of Washington
Licensed Geologist
Hydrogeologist
2624
BRETT BEAULIEU

Brett Beaulieu

Brett Beaulieu, LHG June 1, 2021
Senior Hydrogeologist
Floyd|Snider

Table

Table 1
Aquifer Test Solution Summary

Pumping Test Parameters								Curve Fitting Analyses				
Pumping Well	Screen Interval (ft bgs)	Site Water-Bearing Zone	Pumping Rate	Pumping Duration (min)	Recovery Duration (min)	Maxmium Drawdown (ft)	Observation Wells	Saturated Aquifer Thickness (ft)	Transmissivity (ft^2/day)	Storativity	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/s)
MW-17	7.5-17.5	Perched	250-360 mL/min	78	38 (1)	5.61	MW-11, MW-13, and MW-33	--(2)	--(2)	--(2)	--(2)	--(2)
MW-33	18-28	Alluival Aquifer	4.7 gpm	102	24	0.85	MW-11, MW-13, and MW-17	85	1051.7 to 9123.4	1.8 X 10^{-5} to 1.5 X 10^{-4}	12.4 to 107.3	4.2 X 10^{-3} to 3.8 x 10^{-2}

Notes:

Pumping tests were conducted on November 4, 2020.

Curve fitting results are shown as a range of solutions calculated using Theis (1935 and Hantush modification), Neuman (1974), Moench (1997), Hantush-Jacob (1955), and Dougherty-Babu (1984) methods.

-- Not applicable/not analyzed.

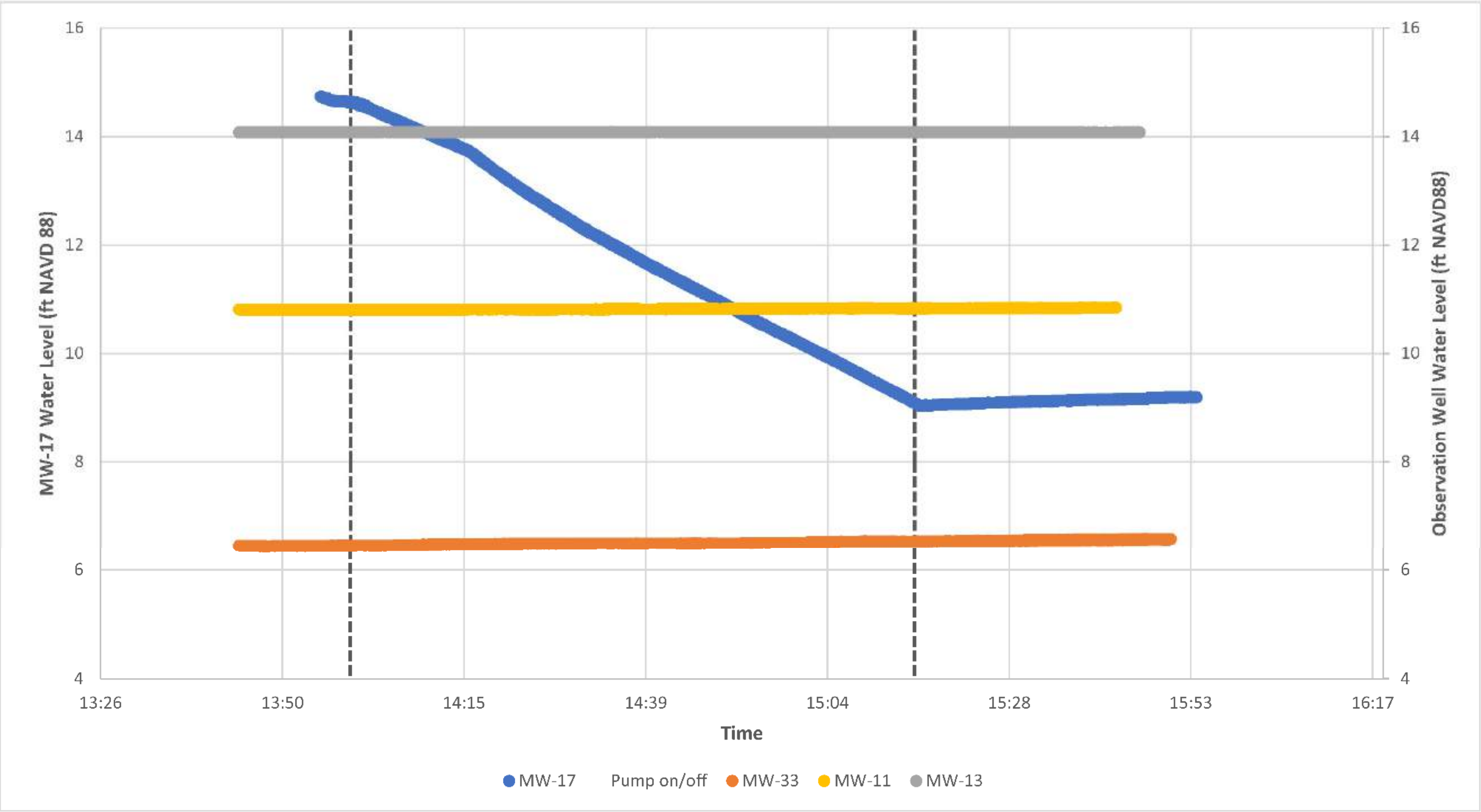
1 Recovery observations were stopped after 38 minutes at MW-17 due to a slow recharge rate.

2 Data from the MW-17 test were not suitable for analysis.

Abbreviations:

bgs	Below ground surface
cm/s	Centimeters per second
ft	Feet
ft/day	Feet per day
gpm	Gallons per minute
min	Minutes
mL/min	Milliliters per minute

Figures



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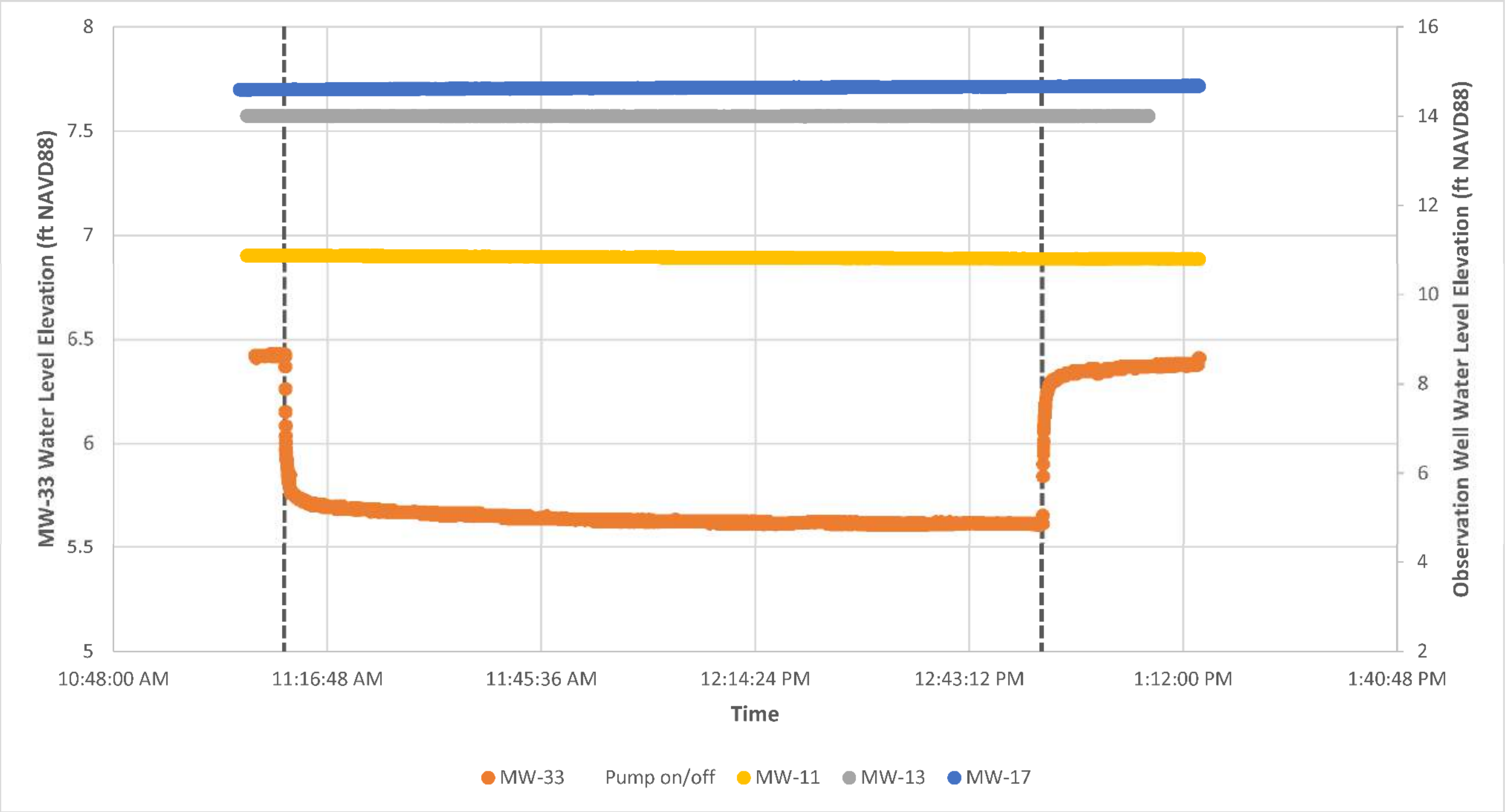
Aquifer Testing Results
Port of Longview TPH Site
Longview, Washington

Figure 1
Pumping and Observation Well Water Levels (Perched Test)

5/31/2021



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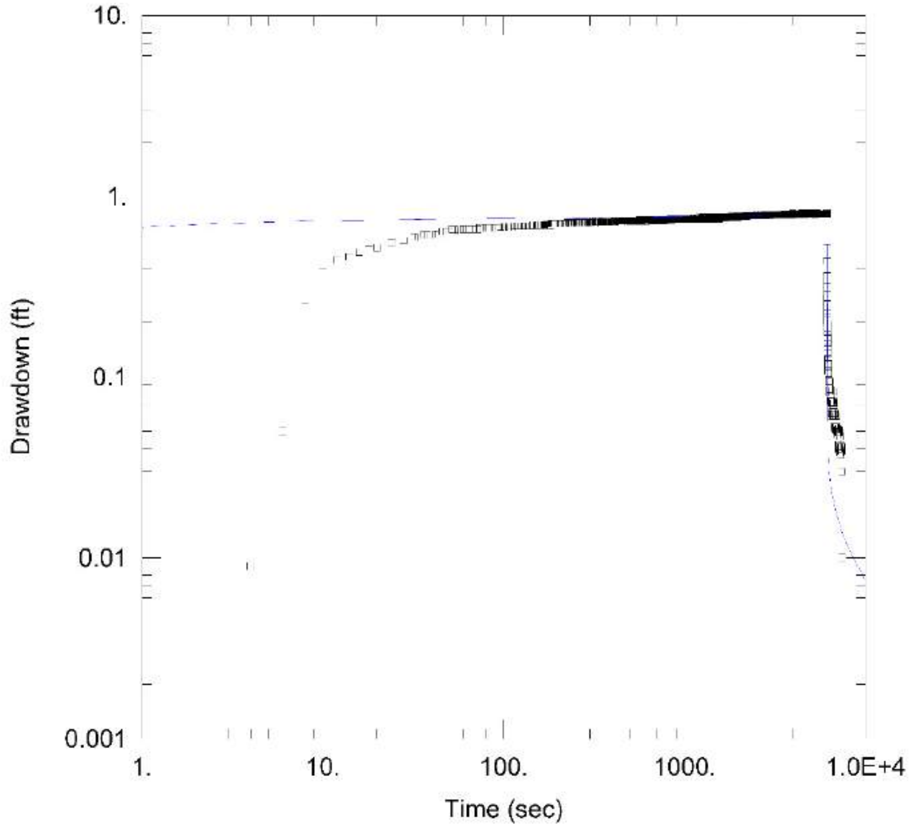
Aquifer Testing Results
Port of Longview TPH Site
Longview, Washington

Figure 2
Pumping and Observation Well Water Levels (Alluvial Test)

5/31/2021



WELL TEST ANALYSIS

Data Set: C:\Users\NathanS\OneDrive - Floyd Snider\Desktop\POL-TPH\Alluvial Test\MW33.aqt
Date: 02/05/21 Time: 09:23:42

PROJECT INFORMATION

Project: POL-TPH
Location: Longview, WA
Test Well: MW-33
Test Date: 11/4/2020

WELL DATA

Pumping Wells		
Well Name	X (ft)	Y (ft)
MW-33	0	0

Observation Wells		
Well Name	X (ft)	Y (ft)
⌜ MW-33	0	0

SOLUTION

Aquifer Model: Unconfined

Solution Method: Theis

T = 9123.4 ft^2/day
Kz/Kr = 0.1

S = 0.0001467
b = 85. ft

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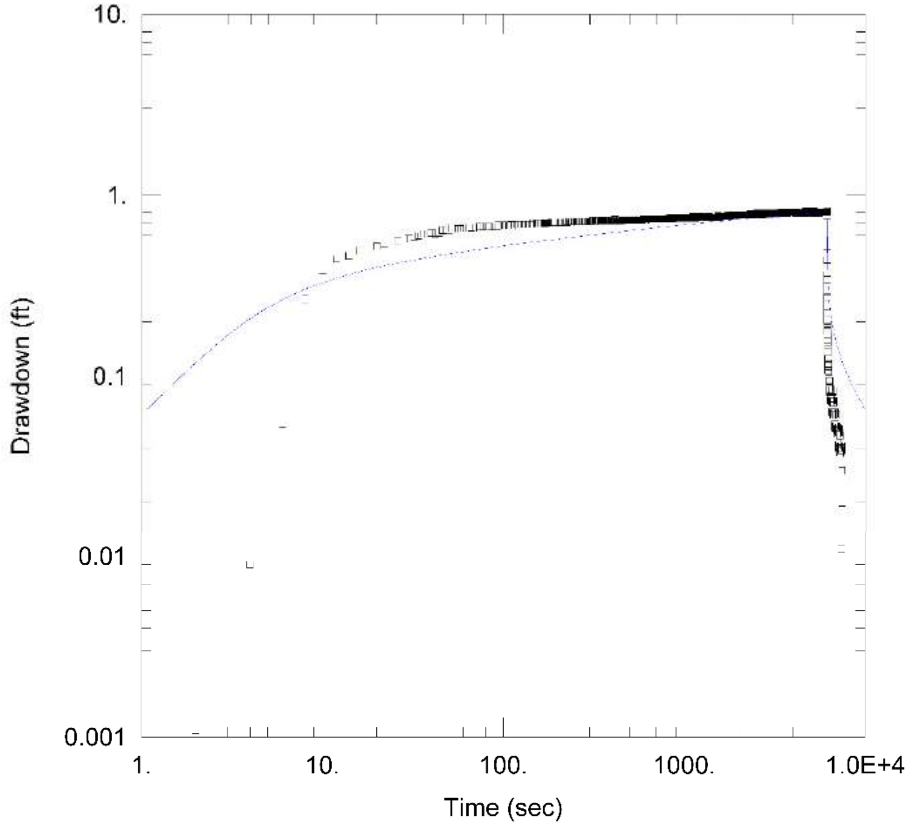
Aquifer Testing Results
Port of Longview TPH Site
Longview, Washington

Figure 3
MW-33 Theis Solution
(unconfined)



WELL TEST ANALYSIS

Data Set: C:\Users\NathanS\OneDrive - Floyd Snider\Desktop\POL-TPH\Alluvial Test\MW33.aqt
Date: 02/05/21 Time: 09:26:19

PROJECT INFORMATION

Project: POL-TPH
Location: Longview, WA
Test Well: MW-33
Test Date: 11/4/2020

AQUIFER DATA

Saturated Thickness: 85. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-33	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
⌞ MW-33	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 1051.7 ft^2/day
S = 1.816E-5
Sy = 0.1
ß = 0.1

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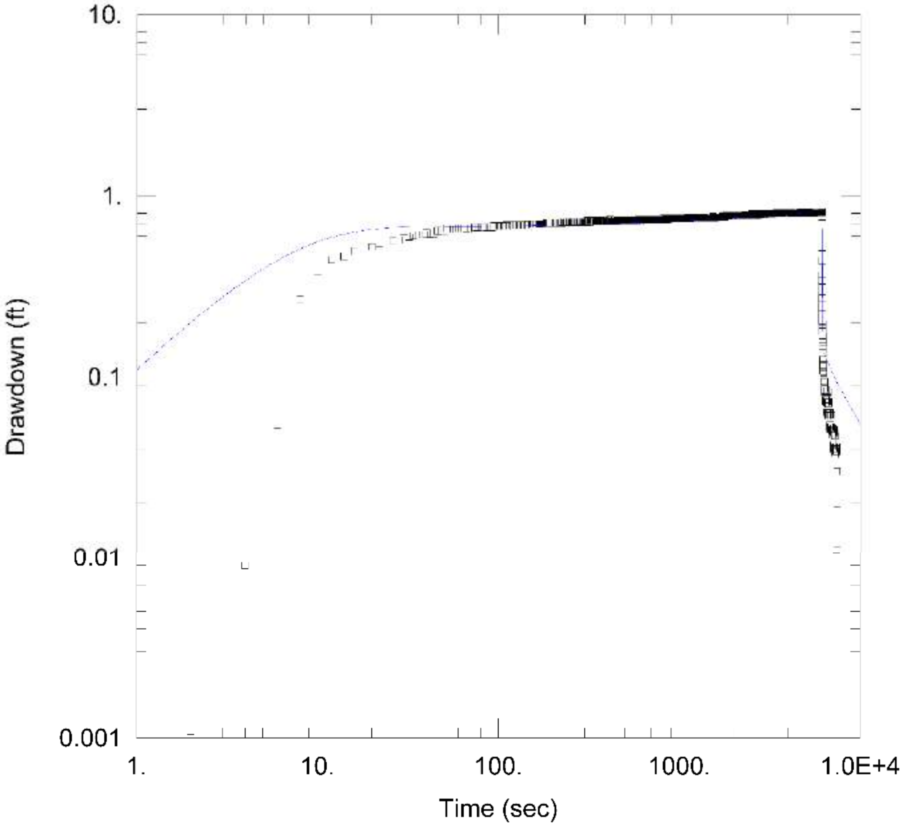
Aquifer Testing Results
Port of Longview TPH Site
Longview, Washington

Figure 4
MW-33 Neuman Solution
(unconfined)

5/31/2021



WELL TEST ANALYSIS

Data Set: C:\Users\NathanS\OneDrive - Floyd Snider\Desktop\POL-TPH\Alluvial Test\MW33.aqt
Date: 02/05/21 Time: 09:29:05

PROJECT INFORMATION

Project: POL-TPH
Location: Longview, WA
Test Well: MW-33
Test Date: 11/4/2020

AQUIFER DATA

Saturated Thickness: 85. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-33	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
⌞ MW-33	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Moench

T = 7371.6 ft^2/day
Sy = 0.1
Sw = 0.
r(c) = 0.167 ft
S = 0.0001291
ß = 1.507E-6
r(w) = 0.33 ft
alpha = 1.0E+30 sec^{-1}

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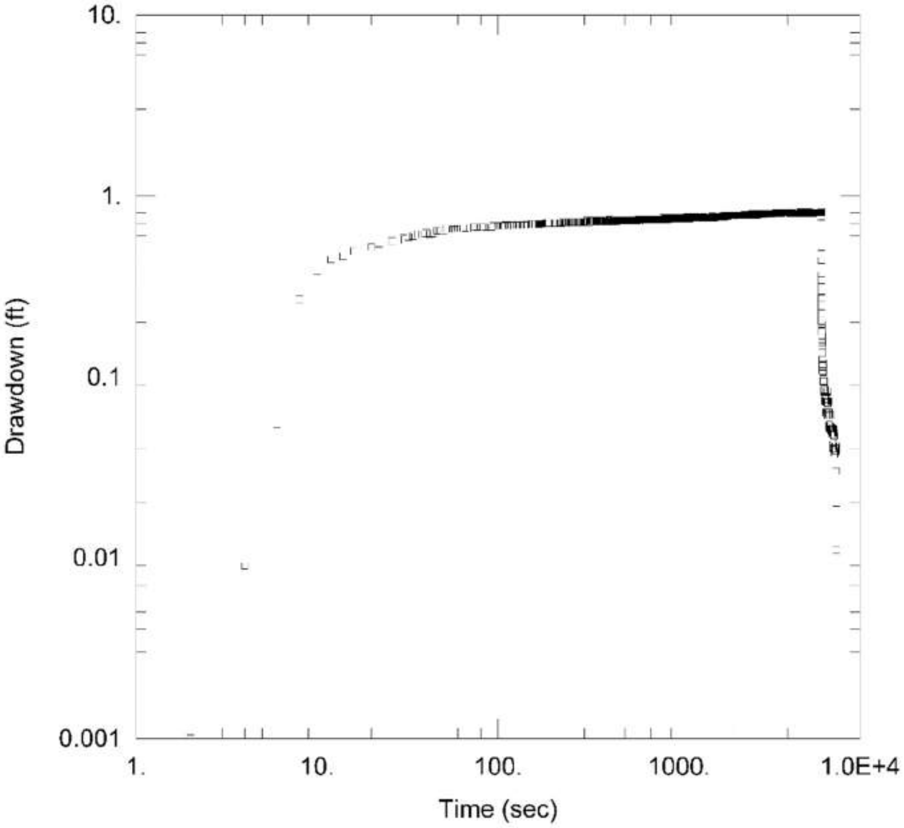
Aquifer Testing Results
Port of Longview TPH Site
Longview, Washington

Figure 5
MW-33 Moench Solution
(unconfined)



WELL TEST ANALYSIS

Data Set: C:\...\MW33 (confined).aqt
Date: 02/05/21 Time: 09:37:59

PROJECT INFORMATION

Project: POL-TPH
Location: Longview, WA
Test Well: MW-33
Test Date: 11/4/2020

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-33	0	0	MW-33	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 4174.2 ft^2/day
S = 9.191E-5
r/B = 0.1138
Kz/Kr = 0.1
b = 85. ft

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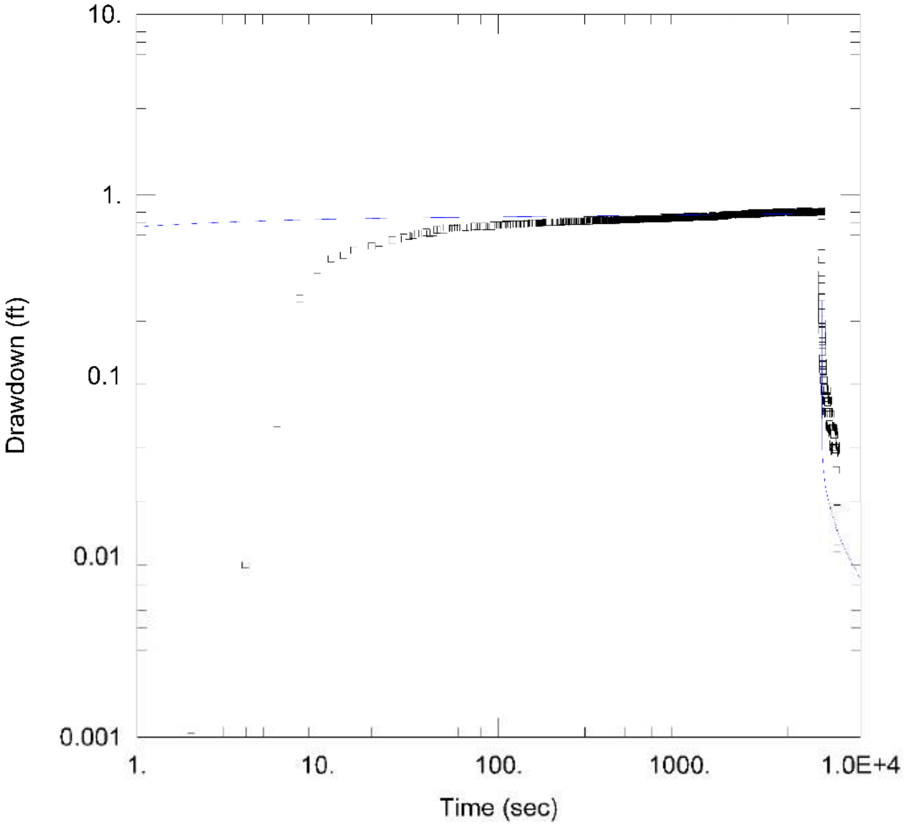
Aquifer Testing Results
Port of Longview TPH Site
Longview, Washington

Figure 6
MW-33 Hantush-Jacob
Solution (leaky-confined)



WELL TEST ANALYSIS

Data Set: C:\...\MW33 (confined).aqt
Date: 02/05/21 Time: 09:37:07

PROJECT INFORMATION

Project: POL-TPH
Location: Longview, WA
Test Well: MW-33
Test Date: 11/4/2020

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-33	0	0	⌞ MW-33	0	0

SOLUTION

Aquifer Model: Confined

Solution Method: Theis

T = 9044. ft^2/day

Kz/Kr = 0.1

S = 0.0002037

b = 85. ft

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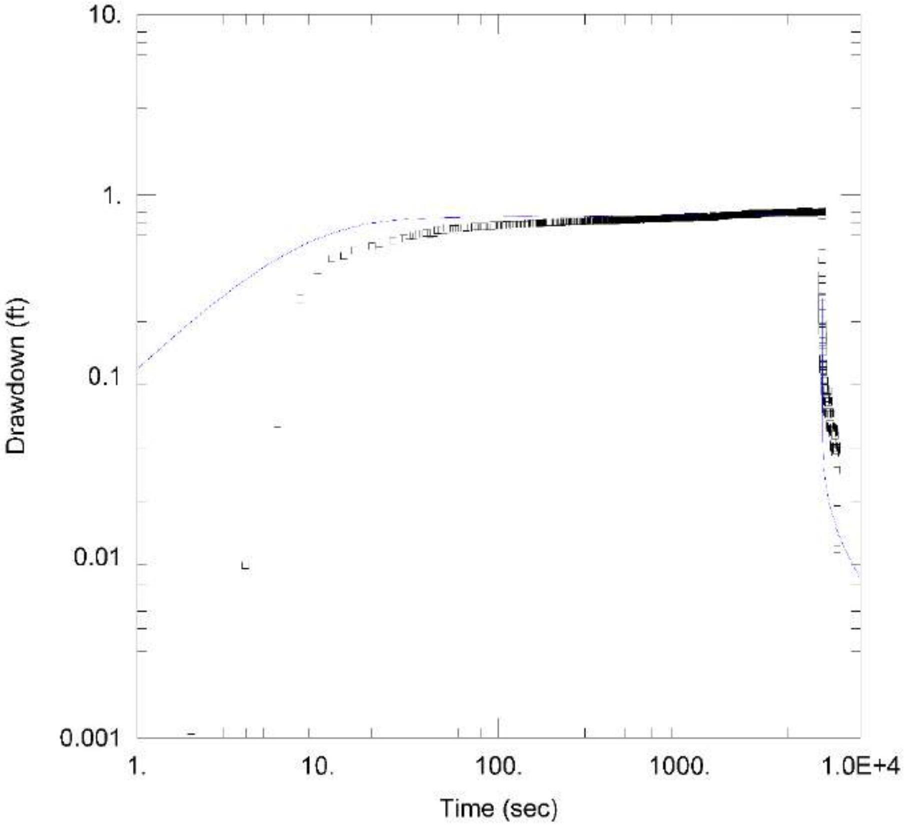
Aquifer Testing Results
Port of Longview TPH Site
Longview, Washington

Figure 7
MW-33 Theis Solution
(confined)



WELL TEST ANALYSIS

Data Set: C:\...\MW33 (confined).aqt
Date: 02/05/21 Time: 09:47:27

PROJECT INFORMATION

Project: POL-TPH
Location: Longview, WA
Test Well: MW-33
Test Date: 11/4/2020

AQUIFER DATA

Saturated Thickness: 85. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-33	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
∟ MW-33	0	0

SOLUTION

Aquifer Model: Confined
Solution Method: Dougherty-Babu

T = 9045.6 ft^2/day
Kz/Kr = 0.1
r(w) = 0.33 ft

S = 0.0002037
Sw = 0.
r(c) = 0.167 ft

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Aquifer Testing Results
Port of Longview TPH Site
Longview, Washington

Figure 8
MW-33 Dougherty Badu
Solution (confined)

Attachment 1
Field Forms

Page 1 MW 33 Test

AQUIFER TESTING FIELD FORM

Date: 11/4/2020 Field Personnel: B. Beaulieu, N-Schaetman, P. Osterhout

Test Data

Pumping Well ID: **MW-33 (alluvial)**

Well Diameter/Screened Interval: **2"/ 18.2-28.2 ft**

Observation Well IDs: **MW-17 (perched), MW-11 (perched), and MW-13 (alluvial)**

Well Diameter/Screened Interval: **2"/ MW-17 (7.5-17.5 ft); MW-11 (6.7-16.7 ft); and MW-13 (13-18 ft)**

Pump and depth: **Grundfos Redi-Flo 2** at well bottom (28.2 ft)

Transducer(s):

Purge water discharge location: **Water Truck (Bravo Environmental)** to drum, then vactored

Test setup comments and conditions: Light rain on and off. 1/2 OD tubing to Flowmec in-line flow meter, then valve, to drum. Use step test to calibrate meter to bucket, appears to be appropriately accurate (<5%)

Start pumping (time **to nearest second**): 11:11:00 AM

Stop pumping (time **to nearest second**):

Time	Control Well (MW-33) Depth to Water (feet)	Discharge Rate (gpm)	MW-33 DTW (feet)	MW-17 DTW (feet)	MW-11 DTW (feet)	MW-13 DTW (feet	Comments
		--	--	--	--	--	
Baseline							
9:28			19.42				
9:29				10.72			
9 30					14.11		
9:30					~~11.12~~	11.12	
~~Preliminary Yield/Step Testing~~		Baseline	2				
950				10.71	14.17		
951						11.11	
952			19.42				
1032			19.6				
1035			19.55				
Drawdown – Initial step test –			~ 1.15	gpm	@	135.5	Hz
1042			19.55				
1043			19.61				
	Increase rate to ~		1.5	gpm		153.0 Hz	
1045			19.69			~~153~~	
1046			19.69				
1047	Increase rate to ~		3.0 gpm			250	Hz (12-18 sec
1048			19.9	~~gpm~~			per good
1049			19.92				bucket test
1050			19.93				
1054	increase rate to		4	gpm.		@ 350	Hz
1056			20.17				
1057	increase rate to		4.6 gpm			400	Hz (Max
1058			20.17				
1059			20.14	STOP	PUMP		
1112			19.50				

Page 2 MW-33 Test

AQUIFER TESTING FIELD FORM

Time	Control Well Depth to Water (feet)	Meter Discharge rate (gpm)	Bucket Rate (gpm)	MW-33 DTW (feet) (control well)	MW-17 DTW (feet)	MW-11 DTW (feet)	MW-13 DTW (feet	Comments
Baseline cont'd								
11:05					10.64			
11:06						14.19	11.08	
11:07				19.49				
TEST								
11:11	Start pump =			4.70 gpm			1400 HZ	
11:12		4.70		20.12				
11:13					10.64	14.20	11.09	
11:14		4.68		20.16				
11:15					10.64	~~14.21~~		
11:16						14.21	11.08	
11:17				20.19			[illegible]	
11:18					10.64	14.21		
11:19							11.09	
11:20		4.70		20.20				
11:21					10.64			
11:22						14.21	11.08	
11:23		4.68		20.21				
11:36		4.66		20.22				
11:37					10.62	14.21		
11:38							11.08	
12:03		4.66		20.25				
12:04					10.59			
12:05						~~14.28~~		
1209						14.19*	11.09	*MW-11 probe is fluctuating by ~.08 ft
~~Recovery~~ Test, cont'd								
1222		4.67		20.26				
12.24					10.58			
12.25						14.25		
12.27				20.26			11.08	
12.45		466		20.26				
12.46					10.56	14.26	11.09	
12.52		4.66		20.27				
Recovery 1253	STOP PUMP			19.8				
				19.75				
				19.70				
				19.67				
				19.65				
				19.63				
~~1554~~				19.62				
				19.61				
				19.60				
				19.59				
				19.56				
1254				19.58	10.55			
1255				19.58		14.26		
1256				19.56				
1257				19.55				
1258				19.55				
12 59				19.54	10.54			
1300				19.54			11.08	

Page 3 MW-33 Test

Con't Test 1 - MW-33 control well

AQUIFER TESTING FIELD FORM

Time	Control Well Depth to Water (feet)	Meter Discharge rate (gpm)	Bucket Rate (gpm)	MW-33 DTW (feet) (control well	MW-17 DTW (feet)	MW-11 DTW (feet)	MW13 DTW (feet	Comments
Recovery, cont'd								
1301		0				14.26		
1303				19.53				
1306				19.53				
1307.							11.07	pull MW-13 transducer
1308				19.52				
1309					10.55			
1314				19.49				=Full recovery
1317				19.50				Pull MW-33 transducer

Leave in transducers in MW-17, MW-11
Red

Recovery

Page 1 MW-17 Test

AQUIFER TESTING FIELD FORM

Date: 11/4/2020

Field Personnel: B. Beaulieu, N. Schactman, P. Ostertag

Test Data

Pumping Well ID: **MW-17 (perched)**

Well Diameter/Screened Interval: 4" **7.5-17.5 ft**

Observation Well IDs: **MW-33 (alluvial), MW-11 (perched), and MW-13 (alluvial)**

Well Diameter/Screened Interval: **2"/ MW-17 (18.2-28.2 ft); MW-11 (6.7-16.7 ft); and MW-13 (13-18 ft)**

Pump and depth: ~~**Grundfos Redi-Flo 2**~~ Peristaltic

Transducer(s):

Purge water discharge location: ~~**Water Truck (Bravo Environmental)**~~ buckets to drums

Test setup comments and conditions: Use peristaltic pump based on known low yield/recovery. set transducer in MW-17 at 17 feet below TOC to allow for total drawdown

Start pumping (time **to nearest second**): 14:00 step test 14:02 - 250 mL/min

14:16 ↑ 360 mL/min

Stop pumping (time **to nearest second**): 15:16

Time	Control Well Depth to Water (feet)	Discharge Rate (gpm)	MW-33 DTW (feet)	MW-17 (control well) DTW (feet)	MW-11 DTW (feet)	MW-13 DTW (feet	Comments
		--	--	—	—	--	
Baseline							
13:43			19.46				
13:43					14.26	11.01	
13:44				10.51			
13:56				10.50			
Preliminary Yield/Step Testing							
14:00				10.50			
				10.51			
				10.52			
14:01				10.53			
				10.54			
Drawdown							
1402				10.59			
1403				10.60			
14:04				10.63			increase rate to 250mL/m
1405				10.70			
1405				10.79			
1407				10.93			
1410				11.04			
1411				11.16			
14:14				11.29			
14:16				11.43			increase rate to 360mL/m
14:17				11.51			
14:18				11.61			
1419				11.75			
1420				11.82			
1421				11.92			
1422			19.43	12.02	14.26	11.01	
1423				12.11		11.0	

Page 2 MW-17 Test

AQUIFER TESTING FIELD FORM

Time	Control Well Depth to Water (feet)	Meter Discharge rate (gpm)	Bucket Rate (gpm)	MW-33 DTW (feet)	MW-17 DTW (feet)	MW-U DTW (feet)	MW-13 DTW (feet	Comments
14.24					12.21			
14.25					12.30			
14.26					12.39			
14.27					12.48			
14.28					12.55			
14 29					12.63			
14 30					12.72			
14.31					12.81			
14.32		360mL/min			12.86			
14 33					12.91			
14.34					12.98	14.27		
14.35					13.12		11.00	
14.36				19.42	13.20			
14.37					13.26			
14.38					13.33			
14:39					13.41			
14 40					13.46			
1454					14.45			
14.55				19.41		14.21	11.01	
15:01					14.99			
1507					15.39			
1509				19.41		14.21		
1510							11.02	
1516	Stop pumping.				16.12			
Recovery								
1516					16.12			
1517					16.11			
1519				19.41	16.10			
1521				~~19.4~~	16.09			
1523					16.08			
1529					16.04			
1534					16.02			
1538					16.01			
1542						14.20		pull MW-U trans.
15:45							11.02	pull MW-13 "
15:49				19.35				pull MW-33 "
15:54					15.96			pull MW-17 "

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix G
Historical Groundwater Data

Table G.1
Pre-2019 Groundwater Analytical Data

	Analyte	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
	Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	**Sample Date**								
MW-01	5/30/1991	--	--	--	5.8	5.8	1 U	5.2	--
	1/7/1993	ND	--	ND	ND	ND	ND	ND	--
	5/1/1993	280	--	ND	--	--	--	--	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
	8/3/2000	630 U	630 U	250 U	--	--	--	--	--
	8/7/2001	630 U	630 U	250 U	--	--	--	--	--
	8/19/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/5/2004	630 U	630 U	250 U	--	--	--	--	--
	8/10/2005	630 U	630 U	250 U	--	--	--	--	--
	8/18/2006	600 U	600 U	240 U	--	--	--	--	--
	8/9/2007	670 U	670 U	270 U	--	--	--	--	--
	7/22/2008	630 U	630 U	250 U	--	--	--	--	--
	9/24/2009	640 U	640 U	260 U	--	--	--	--	--
	8/18/2010	609 U	609 U	242 U	--	--	--	--	--
	8/26/2011	630 U	630 U	250 U	--	--	--	--	--
	9/27/2012	650 U	650 U	260 U	--	--	--	--	--
	9/27/2013	660 U	660 U	270 U	--	--	--	--	--
MW-02	5/30/1991	--	--	--	0.5 U	1 U	1 U	1 U	--
	3/8/1994		--	--	ND	ND	ND	ND	--
	8/4/2000	420	500 U	250 U	--	--	--	--	--
	8/7/2001	630 U	630 U	250 U	--	--	--	--	--
	8/19/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/5/2004	250 U	500 U	250 U	--	--	--	--	--
	8/10/2005	250 U	500 U	250 U	--	--	--	--	--
	8/21/2006	240 U	480 U	250 U	--	--	--	--	--
	8/10/2007	1,900 Y	530 U	270 U	--	--	--	--	--
	10/5/2007	630 U	630 U	250 U	0.5 U	1 U	1 U	1 U	0.0151 U
	10/5/2007 (Dup)	630 U	630 U	250 U	0.5 U	1 U	1 U	1 U	0.0151 U
	7/22/2008	630 U	630 U	250 U	--	--	--	--	--
	9/24/2009	670 U	670 U	270 U	--	--	--	--	--
	8/18/2010	ND	ND	ND	--	--	--	--	--
	8/26/2011	270 U	540 U	250 U	--	--	--	--	--
	9/28/2012	660 U	660 U	270 U	--	--	--	--	--
	9/26/2013	680 U	680 U	270 U	--	--	--	--	--
MW-03	5/30/1991	500 U	500 U	8,200	9,000	8,600	570	380	--
	1/7/1993	1,080	ND	1,800	290	160	5 J	21	--
	5/1/1993	1,320	ND	2,500	310	160	34	35	--
	3/8/1994	--	--	--	38	32	7.7	8.6	--
	9/13/1995	1,000 A5	--	1,000	73	19	2.3	5.2	0.0755 U
	9/21/2009	710 Y	500 U	670 Y	6.6	4.9	14	4.83	0.0151 U
MW-04	5/30/1991	--	--	--	0.5 U	1 U	1 U	1 U	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
MW-05	5/30/1991	--	--	--	0.5 U	1 U	1 U	1 U	--
	3/8/1994	--	--	--	ND	ND	ND	ND	--
	7/15/1998	450	--	--	--	--	--	--	--
MW-06	1/6/1993	930	ND	ND	ND	ND	ND	ND	--
	5/1/1993	1,140	ND	ND	--	--	--	--	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	1,300	--	120	0.5 U	0.5 U	0.5 U	0.5	0.0755 U
	7/15/1998	680	--	310	ND	ND	ND	3,000	--
	9/23/2009	370 Y	520 U	250 U	--	--	--	--	0.0151 U
MW-07	1/6/1993	1,240	423	2,300	110	12	42	150	--
	5/24/1993	1,440	ND	4,900	1400	54	140	410	--
	3/15/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	1,400		7,200	640	55	530	540	0.0755 U
	9/22/2009	630 U	630 U	1,300 Y	2.2	1.3	0.5 U	1.78	--
MW-08	1/6/1993	1,130	244	3,800	3,700	27	39	38	--
	5/27/1993	1,610	ND	5,800	4,700	96	84	230	--
	3/15/1994	--	--	--	2,500	ND	ND	ND	--
	9/13/1995	1,400	--	3,200	610	19	5 U	100	0.0755 U
	7/15/1998	--	--	2,300	ND	ND	ND	4,000	--
	9/21/2009	250 U	500 U	2,900 Y	9	3.9	1.6	8.19	0.03
MW-09	1/1/1993	4,800 x	ND	89	ND	ND	ND	ND	--
	5/24/1993	210,000	--	ND	--	--	--	--	--
	3/15/1994	340,000	6400	60,000	160	100	540 Jx	410	--

Table G.1
Pre-2019 Groundwater Analytical Data

	Analyte	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
	Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	Sample Date								
MW-10	1/7/1993	1,740	281	3,500	320	37	5 J	82	--
	5/25/1993	2,160	ND	4,300	140	31	130	63	--
	3/8/1994	--	--	--	240	35	330	40	--
	9/13/1995	1,300	--	4,900	390	57	230	88	0.0755 U
	7/15/1998	--	--	6,400	510	70	440	100	--
	7/16/1999	2,170	500 U	5,300	300	58	360	83	0.0151 U
	8/3/2000	3,200	500 U	5,000	140	50	210	99	0.0151 U
	08/3/2000 (Dup)	3,100	500 U	4,800	130	48	200	95	0.0151 U
	8/7/2001	280 L	500 U	4,300 Y	190 C	40 C	190 C	62	0.0151 U
	08/7/2001 (Dup)	290 L	500 U	4,200 Y	190 C	41 C	200 C	64.1	0.0151 U
	8/19/2002	450 L	500 U	5,800 DY	250 D	46 D	260 D	75	0.0143 U
	8/21/2003	320 Y	480 U	4,700 Y	130	44	180	75 P	0.0151 U
	8/5/2004	340 Z	500 U	4,000 Y	110	21	140	42	0.0151 U
	08/5/2004 (Dup)	320 Z	500 U	4,000 Y	130	32	140	43	0.0143 U
	8/26/2005	1,700 Y	500 U	4,400 Y	310 D	51 D	290 D	77.4 D	0.0151 U
	8/21/2006	500 L	480 U	4,400 Y	430 D	65 D	280 D	90 D	0.0151 U
	08/21/2006 (Dup)	500 L	480 U	4,600 Y	470 D	70 D	3,310 D	96 D	0.0151 U
	8/9/2007	660 L	500 U	5,100 Y	360 D	54	230 D	90.6	0.0143 U
	7/23/2008	440 L	500 U	4,700 DY	340 D	51	260 D	65.6	0.0143 U
	07/23/2008 (Dup)	330 L	500 U	4,800 DY	340 D	51	270 D	73.7	0.0143 U
	9/24/2009	490 L	530 U	4,100 Y	160 D	37	130 D	54.3	0.0143 U
	09/24/2009 (Dup)	500 L	520 U	4,200 Y	140 D	33	110 D	47.2	0.0143 U
	8/19/2010	380 L	550 U	3,200 Y	70 D	16 D	99 D	22 D	0.0159 U
	08/19/2010 (Dup)	340 L	540 U	3,200 Y	74 D	17 D	100 D	23 D	0.0159 U
	8/26/2011	270 U	530 U	2,900 Y	110 D	24 D	130 D	28 D	0.0525
	08/26/2011 (Dup)	270 U	530 U	3,000 Y	110 D	21 D	110 D	23 D	0.0377
	9/28/2012	280 L	520 U	2,300 Y	--	--	--	--	0.0151 U
	09/28/2012 (Dup)	270 U	530 U	2,300 Y	--	--	--	--	0.0151 U
	9/26/2013	270 U	530 U	1,900 Y	64	13	55	25	0.0159 U
	09/26/2013 (Dup)	270 U	530 U	1,800 Y	63	13	54	25	0.0151 U
MW-11	1/7/1993	ND	ND	ND	ND	ND	ND	ND	--
	5/1/1993	608	ND	ND	--	--	--	--	--
	3/10/1994	--	--	--	ND	ND	ND	ND	--
	7/15/1998	ND	ND	ND	--	--	--	--	--
MW-12	1/7/1993	1,650	617	3,100	770	47	71	83	--
	5/27/1993	1,750	ND	3,800	900	67	74	120	--
	3/10/1994	--	--	--	680	39	54	76	--
	9/13/1995	1,700	--	3,600	600	56	84	110	0.0755 U
	7/15/1998	--	--	4,600	320	30	40	120	--
	7/16/1999	1,740	500 U	3,400	210	24	34	56	0.0151 U
	07/16/1999 (Dup)	1,690	500 U	3,600	220	26	37	60	0.0151 U
	8/3/2000	2,800	500 U	4,500	220	54	62	138	0.0151 U
	8/8/2001	270 L	500 U	4,500 Y	710 DC	48 C	42 C	89.9	0.0151 U
	8/19/2002	410 L	500 U	5,400 DY	420 D	41 D	53 D	77	0.0151 U
	08/19/2002 (Dup)	400 L	500 U	5,300 DY	450 D	43 D	57 D	83	0.0151 U
	8/21/2003	290 Y	480 U	3,900 Y	560 D	40	54	74.7 P	0.0143 U
	08/21/2003 (Dup)	250 Y	480 U	4,000 Y	560 D	40	55	75.7 P	0.0143 U
	8/5/2004	250 U	500 U	280 Z	17	1.6	1.9	2.3	0.0151 U
	8/11/2005	760 L	500 U	3,400 DZ	880 D	52 D	63 D	84 D	0.0151 U
	08/11/2005 (Dup)	410 L	500 U	3,300 DZ	890 D	48 D	63 D	77 D	0.0151 U
	8/18/2006	240 U	480 U	970 Y	350 D	21	15	12	0.0151 U
	8/9/2007	400 L	500 U	3,300 Y	730 D	42	48	72.2	0.0151 U
	08/9/2007 (Dup)	470 L	500 U	3,200 Y	680 D	39	47	75.8	0.0143 U
	7/23/2008	300 L	500 U	3,300 DY	660 D	45	34 D	94.6	0.0143 U
	9/23/2009	550 L	500 U	3,100 Y	840 D	48 D	44 D	67 D	0.0143 U
	8/19/2010	623 A1,L	199 U	2,410	133	29.6	46.1	52	0.0374 U
	8/25/2011	290 L	520 U	2,500 Y	420 D	25 D	24 D	38 D	0.0151 U
	9/27/2012	350 L	520 U	2,100 Y	--	--	--	--	0.0151 U
	9/26/2013	350 L	530 U	640 Y	74	6	13	11	0.0159 U
MW-13	5/26/1993	ND	ND	ND	--	--	--	--	--
	3/11/1994	--	--	--	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1998	ND	ND	ND	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--
MW-14	5/26/1993	4,060	ND	ND	--	--	--	--	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	--	--	--	0.77	0.78	1.5	2.6	--
	7/15/1998	550	--	--	--	--	--	--	--
	9/22/2009	160,000 D	50,000 U	--	--	--	--	--	--
	8/19/2010	1,600	536 M	--	--	--	--	--	0.14

Table G.1
Pre-2019 Groundwater Analytical Data

	Analyte	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
	Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	Sample Date								
MW-15	5/27/1993	212	ND	455	34.3	1	ND	2	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	7/15/1998	650	--	290	ND	ND	ND	ND	--
	9/23/2009	260 U	520 U	250 U	--	--	--	--	0.0151 U
MW-16	5/1/1993	250,000	--	ND	--	--	--	--	--
	3/15/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	4,000	--	300	1.3	2.2	1.3	0.91	0.0755 U
	8/19/2010	624 U	624 U	248 U	--	--	--	--	--
	9/23/2009	82,000 D	32,000 U	--	--	--	--	--	--
MW-17	5/26/1993	4,810	ND	ND					
	3/10/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	320 A3		80 U	0.5 U	0.5 U	0.5 U	0.5 U	--
	7/15/1998	ND	ND	ND	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--
MW-18	5/26/1993	ND	ND	ND	--	--	--	--	--
	3/11/1994	--	--	--	ND	ND	ND	ND	--
	7/15/1998	ND	ND	ND	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--
MW-19	5/24/1993	2,330	2,500	ND	--	--	--	--	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	380 A3	--	80 U	0.5 U	0.5 U	0.5 U	0.5 U	--
	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	9/23/2009	630 U	630 U	250 U					--
MW-20	5/1/1993	2,840	--	5,600	9	22	95	160	--
	3/15/1994	--	--	--	1.5	5.2	7 J	26	--
MW-21	5/27/1993	ND	ND	171	ND	ND	ND	1	--
	3/10/1994	--	--	--	ND	ND	ND	ND	--
MW-22	3/10/1994	ND	ND	ND	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	8/4/2000	630 U	630 U	250 U	--	--	--	--	--
	8/24/2001	630 U	630 U	250 U	--	--	--	--	--
	8/20/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/6/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/21/2006	630 U	630 U	250 U	--	--	--	--	--
	8/10/2007	650 U	650 U	260 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--
	8/19/2010	ND	ND	ND	--	--	--	--	--
	8/26/2011	630 U	630 U	250 U	--	--	--	--	--
	9/28/2012	650 U	650 U	260 U	--	--	--	--	--
	9/27/2013	660 U	660 U	270 U	--	--	--	--	--
MW-23	3/11/1994	ND	ND	ND	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
	8/3/2000	630 U	630 U	250 U	--	--	--	--	--
	8/8/2001	630 U	630 U	250 U	--	--	--	--	--
	8/20/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/6/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/21/2006	630 U	630 U	250 U	--	--	--	--	--
	8/10/2007	650 U	650 U	260 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/25/2009	250 U	500 U	250 U	--	--	--	--	--
	8/20/2010	642 U	642 U	255 U	--	--	--	--	--
	8/25/2011	630 U	630 U	250 U	--	--	--	--	--
	9/28/2012	660 U	660 U	270 U	--	--	--	--	--
	9/27/2013	660 U	660 U	270 U	--	--	--	--	--
MW-24	3/11/1994	ND	ND	570	ND	ND	ND	ND	--
	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	9/21/2009	630 U	630 U	250 U	--	--	--	--	--
MW-25	3/10/1994	ND	ND	ND	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--

Table G.1
Pre-2019 Groundwater Analytical Data

	Analyte	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
	Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	Sample Date								
MW-26	3/11/1994	130,000	ND	2100	ND	ND	ND	ND	--
	7/15/1998	4,900	--	--	ND	ND	ND	ND	--
	8/20/2010	618 U	618 U	245 U	--	--	--	--	--
MW-27	3/11/1994	ND	ND	ND	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
	8/4/2000	630 U	630 U	250 U	--	--	--	--	--
	8/8/2001	630 U	630 U	250 U	--	--	--	--	--
	8/20/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/6/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/18/2006	600 U	600 U	240 U	--	--	--	--	--
	8/9/2007	630 U	630 U	250 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/21/2009	630 U	630 U	250 U	--	--	--	--	--
	8/20/2010	645 U	645 U	256 U	--	--	--	--	--
	8/25/2011	630 U	630 U	250 U	--	--	--	--	--
	9/27/2012	660 U	660 U	270 U	--	--	--	--	--
	9/27/2013	660 U	660 U	270 U	--	--	--	--	--
MW-28	3/31/1994	28,000	ND	450	ND	ND	ND	ND	--
	7/15/1998	1,600	--		--	--	--	--	--
	8/20/2010	878 A4	301 A2,	262 U	--	--	--	--	2.76
MW-29	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	9/21/2009	630 U	630 U	250 U	--	--	--	--	--
MW-30	7/13/1998	1,320	--	ND	ND	ND	ND	ND	--
	8/24/1998	1,680	--	--	--	--	--	--	--
	4/28/1999	943	500 U	--	--	--	--	--	--
	7/15/1999	1,230	500 U	--	--	--	--	--	--
	07/15/1999 (Dup)	1,200	500 U	--	--	--	--	--	--
	11/18/1999	1,660	500 U	--	--	--	--	--	--
	2/3/2000	2,200	500 U	--	--	--	--	--	--
	5/31/2000	1,400	500 U	--	--	--	--	--	--
	8/3/2000	2,000	500 U	--	--	--	--	--	--
	08/3/2000 (Dup)	320	500 U	--	--	--	--	--	--
	8/7/2001	250 U	500 U	250 U	--	--	--	--	--
	8/19/2002	250 U	500 U	250 U	--	--	--	--	--
	8/21/2003	240 U	480 U	250 U	--	--	--	--	--
	8/5/2004	250 U	500 U	250 U	--	--	--	--	--
	8/26/2005	3,800 Y	1,100 L	250 U	--	--	--	--	--
	10/28/2005	250 U	500 U	--	--	--	--	--	--
	8/21/2006	240 U	480 U	250 U	--	--	--	--	--
	8/9/2007	3,000 Y	680 L	270 U	--	--	--	--	--
	10/5/2007	670 U	670 U	270 U	0.5 U	1 U	1 U	1 U	0.0151 U
	7/23/2008	250 U	500 U	250 U	--	--	--	--	--
	9/25/2009	260 U	520 U	250 U	--	--	--	--	--
	8/20/2010	643 U	643 U	255 U	--	--	--	--	--
	8/26/2011	270 U	540 U	250 U	--	--	--	--	--
	9/28/2012	830 Y	1,600 O	250 U	--	--	--	--	--
	9/26/2013	270 U	530 U	270 U	--	--	--	--	--
MW-31	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
	8/3/2000	630 U	630 U	250 U	--	--	--	--	--
	8/7/2001	630 U	630 U	250 U	--	--	--	--	--
	8/19/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/5/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/21/2006	630 U	630 U	250 U	--	--	--	--	--
	8/9/2007	670 U	670 U	270 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/24/2009	630 U	630 U	250 U	--	--	--	--	--
	8/18/2010	ND	ND	ND	--	--	--	--	--
	8/25/2011	630 U	630 U	250 U	--	--	--	--	--
	9/28/2012	680 U	680 U	270 U	--	--	--	--	--
	9/27/2013	660 U	660 U	270 U	--	--	--	--	--

Table G.1
Pre-2019 Groundwater Analytical Data

Analyte		DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
Unit		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	**Sample Date**								
MW-32	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	7/16/1999	630 U	630 U	250 U	--	--	--	--	--
	8/3/2000	630 U	630 U	250 U	--	--	--	--	--
	8/7/2001	630 U	630 U	250 U	--	--	--	--	--
	8/20/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/5/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/18/2006	600 U	600 U	240 U	--	--	--	--	--
	8/9/2007	630 U	630 U	250 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/24/2009	650 U	650 U	260 U	--	--	--	--	--
	8/18/2010	616 U	616 U	244 U	--	--	--	--	--
	8/26/2011	630 U	630 U	250 U	--	--	--	--	--
	9/27/2012	670 U	670 U	270 U	--	--	--	--	--
	9/26/2013	660 U	660 U	270 U	--	--	--	--	--

Note:

-- Not analyzed.

Abbreviations:

CLP	Contract Laboratory Program
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
DRO	Diesel-range organics
GC	Gas chromatography
GRO	Gasoline-range organics
HPLC	High performance liquid vhromatography
µg/L	Micrograms per liter
MS	Mass spectrometry
ND	Non-detect value, reporting limit unknown
ORO	Oil-range organics
TEQ	Toxic equivalent

Qualifiers:

A1,L	This sample contains a DRO not identified as a specific hydrocarbon product. The result was quantified against diesel calibration standards. Diesel result is biased high due to amount of gasoline contained in the sample.
A2,M	This sample contains an ORO not identified as a specific hydrocarbon product. The result was quantified against a lube oil calibration standard. Oil result is biased high due to amount of diesel contained in the sample.
A3	Detected hydrocarbons in the diesel range appear to be due to overlap of heavy oil-range hydrocarbons.
A4	The product appears to be aged or degraded diesel.
A5	Detected hydrocarbons in the diesel range appear to be degraded diesel as well as some overlap of heavy oil-range hydrocarbons.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
DC	The reported result is from a dilution. The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
DY	The reported result is from a dilution. The chromatogram resembles a petroleum product but does not match the calibration standard.
DZ	The reported result is from a dilution. The chromatogram does not resemble a petroleum product.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
M	Oil result is biased high due to amount of diesel contained in the sample.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
P	The GC or HPLC confirmation criteria were exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was undetected at the reported concentration.
x	The chromatogram is a poor match to the standard
Y	The chromatogram resembles a petroleum product but does not match the calibration standard.
Z	The chromatogram does not resemble a petroleum product.

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-01	17.96	5/30/1991	8.77	--	--	9.19
	17.96	6/11/1991	9.21	--	--	8.75
	17.96	2/12/1993	10.08	--	--	7.88
	17.96	6/29/1993	9.85	--	--	8.11
	17.96	6/1/1994	10.65	--	--	7.31
	17.96	4/9/1998	9.56	--	--	8.40
	17.96	5/21/1998	8.85	--	--	9.11
	17.96	6/30/1998	9.33	--	--	8.63
	17.96	7/15/1998	9.84	--	--	8.12
	17.96	7/16/1999	12.27	--	--	5.69
	17.96	8/3/2000	11.59	--	--	6.37
	17.96	8/7/2001	12.65	--	--	5.31
	17.96	8/19/2002	11.98	--	--	5.98
	17.96	8/19/2002	10.78	--	--	7.18
	17.96	8/21/2003	12.29	--	--	5.67
	17.96	8/5/2004	12.05	--	--	5.91
	17.96	8/10/2005	11.99	--	--	5.97
	17.96	8/18/2006	12.04	--	--	5.92
	17.96	8/9/2007	11.98	--	--	5.98
	17.96	7/22/2008	11.22	--	--	6.74
	17.96	8/18/2010	12.45	--	--	5.51
	17.96	8/26/2011	11.57			6.39
	17.96	9/27/2012	12.31	--	--	5.65
	17.96	9/27/2013	11.93	--	--	6.03
	17.96	10/9/2017	12.3	--	--	5.66
	17.96	2/27/2019	10.68	--	--	7.28
	17.96	5/6/2020	11.17	--	--	6.79
	17.96	8/10/2020	11.7	--	--	6.26
MW-02	22.71	5/30/1991	9.4	--	--	13.31
	22.71	6/11/1991	9.56	--	--	13.15
	22.71	2/12/1993	9.69	--	--	13.02
	22.71	6/29/1993	9.6	--	--	13.11
	22.71	6/1/1994	10.65	--	--	12.06
	22.71	4/9/1998	9.2	--	--	13.51
	22.71	5/21/1998	9.74	--	--	12.97
	22.71	6/30/1998	9.8	--	--	12.91
	22.71	7/15/1998	10.05	--	--	12.66
	22.71	8/4/2000	10.4	--	--	12.31
	22.71	8/7/2001	11.21	--	--	11.50
	22.71	8/19/2002	10.79	--	--	11.92
	22.71	8/21/2003	10.7	--	--	12.01
	22.71	8/5/2004	10.23	--	--	12.48
	22.71	8/10/2005	10.48	--	--	12.23
	22.71	8/21/2006	10.53	--	--	12.18
	22.71	8/10/2007	10.68	--	--	12.03
	22.71	10/5/2007	11.34	--	--	11.37
	22.71	7/22/2008	10.26	--	--	12.45
	22.71	8/18/2010	10.31	--	--	12.40
	22.71	8/26/2011	10.24	--	--	12.47
	22.71	9/28/2012	10.91	--	--	11.80
	22.71	9/26/2013	10.75	--	--	11.96
	22.71	10/9/2017	10.92	--	--	11.79
	22.71	2/27/2019	9.92	--	--	12.79
	22.71	5/6/2020	9.76	--	--	12.95
	22.71	8/10/2020	10.17	--	--	12.54
MW-03	20.93	5/30/1991	12.31	--	--	8.62
	20.93	6/11/1991	12.67	--	--	8.26
	20.93	2/12/1993	13.68	--	--	7.25
	20.93	6/29/1993	13.4	--	--	7.53
	20.93	9/13/1995	14.9	--	--	6.03
	20.93	4/9/1998	12.94	--	--	7.99
	20.93	5/21/1998	12.01	--	--	8.92
	20.93	6/30/1998	12.68	--	--	8.25
	20.93	7/15/1998	13.34	--	--	7.59
	20.93	2/27/2019	13.14	--	--	7.79
	20.93	5/6/2020	13.39	--	--	7.54
	20.93	8/10/2020	14.18	--	--	6.75

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-04	not surveyed	5/30/1991	13.53	--	--	--
	not surveyed	6/11/1991	14.27	--	--	--
	not surveyed	2/12/1993	free product (1)	--	--	--
	not surveyed	6/29/1993	16.15	--	--	--
	not surveyed	4/9/1998	12.8	--	--	--
	not surveyed	5/21/1998	14.17	--	--	--
	not surveyed	6/30/1998	14.72	--	--	--
	not surveyed	7/15/1998	15.33	--	--	--
	not surveyed	7/16/1999	15.09	--	--	--
	not surveyed	8/3/2000	17.01	--	--	--
	not surveyed	8/7/2001	dry	--	--	--
	not surveyed	8/19/2002	dry	--	--	--
	not surveyed	8/21/2003	dry	--	--	--
	not surveyed	8/5/2004	dry	--	--	--
	not surveyed	8/10/2005	dry	--	--	--
	not surveyed	7/23/2008	dry	--	--	--
	not surveyed	9/24/2009	dry	--	--	--
	not surveyed	8/18/2010	dry	--	--	--
	not surveyed	9/27/2012	dry	--	--	--
	not surveyed	9/26/2013	dry	--	--	--
	not surveyed	10/9/2017	17.45	--	--	--
	not surveyed	2/27/2019	14.26	--	--	--
	not surveyed	8/10/2020	17.12	--	--	--
MW-05	22.69	5/30/1991	12.67	--	--	10.02
	22.69	6/11/1991	13.36	--	--	9.33
	22.69	2/12/1993	12.46	--	--	10.23
	22.69	6/29/1993	13.9	--	--	8.79
	22.69	6/1/1994	15.05	--	--	7.64
	22.69	4/9/1998	10.3	--	--	12.39
	22.69	5/21/1998	10.32	--	--	12.37
	22.69	6/30/1998	10.46	--	--	12.23
	22.69	7/15/1998	12.57	--	--	10.12
	22.69	9/25/2009	dry	--	--	--
	22.69	10/9/2017	dry	--	--	--
	22.69	2/27/2019	14.95	--	--	7.74
	22.69	5/6/2020	14.96	--	--	7.73
	22.69	8/10/2020	15.9	--	--	6.79
MW-06	17.48	2/12/1993	10.96	--	--	6.52
	17.48	6/29/1993	10.7	--	--	6.78
	17.48	6/1/1994	11.5	--	--	5.98
	17.48	9/13/1995	11.92	--	--	5.56
	17.48	4/9/1998	10.39	--	--	7.09
	17.48	5/21/1998	9.61	--	--	7.87
	17.48	6/30/1998	10.14	--	--	7.34
	17.48	7/15/1998	10.64	--	--	6.84
	17.48	10/9/2017	11.91	--	--	5.57
	17.48	2/27/2019	10.21	--	--	7.27
	17.48	5/6/2020	10.62	--	--	6.86
	17.48	8/10/2020	11.35	--	--	6.13
MW-07	22.21	2/12/1993	13.9	--	--	8.31
	22.21	6/29/1993	13.58	--	--	8.63
	22.21	9/13/1995	15	--	--	7.21
	22.21	4/9/1998	13.28	--	--	8.93
	22.21	5/21/1998	12.3	--	--	9.91
	22.21	6/30/1998	12.89	--	--	9.32
	22.21	7/15/1998	13.52	--	--	8.69
	22.21	10/9/2017	16.19	--	--	6.02
	22.21	2/27/2019	14.44	--	--	7.77
	22.21	5/6/2020	14.82	--	--	7.39
	22.21	8/10/2020	15.6	--	--	6.61

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-08	20.61	2/12/1993	12.94	--	--	7.67
	20.61	6/29/1993	12.59	--	--	8.02
	20.61	6/1/1994	13.44	--	--	7.17
	20.61	9/13/1995	14.02	--	--	6.59
	20.61	4/9/1998	12.27	--	--	8.34
	20.61	5/21/1998	11.31	--	--	9.30
	20.61	6/30/1998	11.8	--	--	8.81
	20.61	7/15/1998	12.55	--	--	8.06
	20.61	5/6/2020	13.19	--	--	7.42
	20.61	8/10/2020	13.93	--	--	6.68
MW-09	23.36	2/12/1993	free product (1)	--	--	--
	23.36	6/29/1993	free product (1)	--	--	--
	23.36	9/13/1995	free product (1)	--	--	--
	23.36	4/9/1998	free product (1)	--	--	--
	23.36	5/21/1998	free product (1)	--	--	--
	23.36	6/30/1998	free product (1)	--	--	--
	23.36	7/15/1998	free product (1)	--	--	--
	23.36	8/6/2004	dry	--	--	--
	23.36	9/22/2009	dry	--	--	--
	23.36	5/6/2020	16.19	16.05	0.14	7.283
	23.36	8/11/2020	16.96	16.85	0.11	6.489
MW-10	22.89	2/12/1993	15.68	--	--	7.21
	22.89	6/29/1993	15.34	--	--	7.55
	22.89	6/1/1994	16.14	--	--	6.75
	22.89	9/13/1995	16.79	--	--	6.10
	22.89	4/9/1998	15.01	--	--	7.88
	22.89	5/21/1998	14.04	--	--	8.85
	22.89	6/30/1998	14.68	--	--	8.21
	22.89	7/15/1998	15.29	--	--	7.60
	22.89	7/16/1999	12.34	--	--	10.55
	22.89	8/3/2000	16.11	--	--	6.78
	22.89	8/7/2001	17.25	--	--	5.64
	22.89	8/19/2002	16.53	--	--	6.36
	22.89	8/21/2003	16.83	--	--	6.06
	22.89	8/5/2004	16.44	--	--	6.45
	22.89	8/21/2006	16.68	--	--	6.21
	22.89	8/10/2007	16.55	--	--	6.34
	22.89	7/23/2008	15.9	--	--	6.99
	22.89	8/19/2010	16.91	--	--	5.98
	22.89	8/26/2011	16	--	--	6.89
	22.89	9/28/2012	16.92	--	--	5.97
	22.89	9/26/2013	16.56	--	--	6.33
	22.89	10/9/2017	16.88	--	--	6.01
	22.89	2/27/2019	15.11	--	--	7.78
	22.89	5/6/2020	15.38	--	--	7.51
	22.89	8/10/2020	16.21	--	--	6.68
MW-11	25.07	2/12/1993	9.45	--	--	15.62
	25.07	6/29/1993	9.09	--	--	15.98
	25.07	6/1/1994	11.99	--	--	13.08
	25.07	4/9/1998	8.3	--	--	16.77
	25.07	5/21/1998	9.57	--	--	15.50
	25.07	6/30/1998	10.1	--	--	14.97
	25.07	7/15/1998	11.11	--	--	13.96
	25.07	9/22/2009	dry	--	--	--
	25.07	10/9/2017	18.54	--	--	6.53
	25.07	2/28/2019	7.26	--	--	17.81
	25.07	5/7/2020	12.39	--	--	12.68
	25.07	8/10/2020	15.43	--	--	9.64

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-12	21.16	2/12/1993	14.02	--	--	7.14
	21.16	6/29/1993	13.81	--	--	7.35
	21.16	6/1/1994	14.61	--	--	6.55
	21.16	9/13/1995	15.11	--	--	6.05
	21.16	4/9/1998	13.56	--	--	7.60
	21.16	5/21/1998	12.51	--	--	8.65
	21.16	6/30/1998	13.13	--	--	8.03
	21.16	7/15/1998	13.72	--	--	7.44
	21.16	7/16/1999	12.85	--	--	8.31
	21.16	8/3/2000	14.38	--	--	6.78
	21.16	8/8/2001	15.51	--	--	5.65
	21.16	8/19/2002	14.74	--	--	6.42
	21.16	8/21/2003	15.1	--	--	6.06
	21.16	8/5/2004	14.9	--	--	6.26
	21.16	8/11/2005	14.85	--	--	6.31
	21.16	8/18/2006	14.95	--	--	6.21
	21.16	8/9/2007	14.88	--	--	6.28
	21.16	7/23/2008	14.25	--	--	6.91
	21.16	8/19/2010	15.24	--	--	5.92
	21.16	8/25/2011	14.27	--	--	6.89
	21.16	9/27/2012	12.31	--	--	8.85
	21.16	9/26/2013	14.97	--	--	6.19
	21.16	10/9/2017	15.18	--	--	5.98
	21.16	2/27/2019	13.34	--	--	7.82
	21.16	5/7/2020	13.6	--	--	7.56
	21.16	8/11/2020	14.6	--	--	6.56
MW-13	25.09	6/29/1993	9.95	--	--	15.14
	25.09	4/9/1998	9.21	--	--	15.88
	25.09	5/21/1998	10.04	--	--	15.05
	25.09	6/30/1998	10.19			14.90
	25.09	7/15/1998	10.62	--	--	14.47
	25.09	10/9/2017	12.06	--	--	13.03
	25.09	2/28/2019	10.85	--	--	14.24
	25.09	5/7/2020	11.03	--	--	14.06
	25.09	8/10/2020	11.46	--	--	13.63
MW-14	23.77	6/29/1993	7.43	--	--	16.34
	23.77	9/13/1995	10.49	--	--	13.28
	23.77	4/9/1998	7.03	--	--	16.74
	23.77	5/21/1998	6.97	--	--	16.80
	23.77	6/30/1998	7.59	--	--	16.18
	23.77	7/15/1998	9.12	--	--	14.65
	23.77	7/16/1999	8.58	--	--	15.19
	23.77	8/6/2004	9.83	--	--	13.94
	23.77	8/19/2010	8.58	--	--	15.19
	23.77	10/9/2017	9.96	--	--	13.81
	23.77	2/27/2019	5.78	--	--	17.99
	23.77	5/7/2020	6.43	--	--	17.34
	23.77	8/10/2020	8.51	--	--	15.26
MW-15	21.75	6/1/1994	14.64	--	--	7.11
	21.75	4/9/1998	12.74	--	--	9.01
	21.75	5/21/1998	12.28	--	--	9.47
	21.75	6/30/1998	13.11	--	--	8.64
	21.75	7/15/1998	13.82	--	--	7.93
	21.75	10/9/2017	15.75	--	--	6.00
	21.75	2/27/2019	13.82	--	--	7.93
	21.75	5/7/2020	14.11	--	--	7.64
	21.75	8/10/2020	15	--	--	6.75
MW-16	22.94	6/29/1993	free product (1)	--	--	--
	22.94	9/13/1995	9.58	--	--	13.36
	22.94	4/9/1998	6.74	--	--	16.20
	22.94	5/21/1998	6.88	--	--	16.06
	22.94	6/30/1998	8.64	--	--	14.30
	22.94	7/15/1998	9.16	--	--	13.78
	22.94	8/6/2004	9.71	--	--	13.23
	23.94	8/19/2010	11.1	--	--	12.84
	22.94	10/9/2017	14.3	--	--	8.64
	22.94	2/27/2019	6.67	--	--	16.27
	22.94	5/7/2020	9.92	--	--	13.02
	22.94	8/10/2020	12.41	--	--	10.53

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-17	25.24	6/1/1994	12.56	--	--	12.68
	25.24	9/13/1995	12.5	--	--	12.74
	25.24	4/9/1998	8.57	--	--	16.67
	25.24	5/21/1998	10.27	--	--	14.97
	25.24	6/30/1998	10.58	--	--	14.66
	25.24	7/15/1998	11.37	--	--	13.87
	25.24	10/9/2017	13.21	--	--	12.03
	25.24	2/28/2019	7.8	--	--	17.44
	25.24	5/7/2020	10.07	--	--	15.17
	25.24	8/10/2020	12.62	--	--	12.62
MW-18	26.56	6/29/1993	11.5	--	--	15.06
	26.56	4/9/1998	10.66	--	--	15.90
	26.56	5/21/1998	11.49	--	--	15.07
	26.56	6/30/1998	11.7	--	--	14.86
	26.56	7/15/1998	12.1	--	--	14.46
	26.56	10/9/2017	13.71	--	--	12.85
	26.56	2/28/2019	11.1	--	--	15.46
	26.56	5/7/2020	12.5	--	--	14.06
	26.56	8/10/2020	13.4	--	--	13.16
MW-19	20.20	6/29/1993	free product (1)	--	--	--
	20.20	6/1/1994	14.39	--	--	5.81
	20.20	9/13/1995	14.5	--	--	5.70
	20.20	4/9/1998	13.34	--	--	6.86
	20.20	5/21/1998	12.52	--	--	7.68
	20.20	6/30/1998	13.03	--	--	7.17
	20.20	7/15/1998	13.57	--	--	6.63
	20.20	10/9/2017	14.59	--	--	5.61
	20.20	2/27/2019	12.93	--	--	7.27
	20.20	5/7/2020	13.3	--	--	6.90
	20.20	8/10/2020	13.95	--	--	6.25
MW-20	23.34	6/29/1993	16.21	--	--	7.13
	23.34	9/13/1995	free product (1)	--	--	--
	23.34	4/9/1998	16.16	15.61	0.55	7.62
	23.34	5/21/1998	15.63	14.29	1.34	8.782
	23.34	6/30/1998	free product (1)	--	--	--
	23.34	7/15/1998	free product (1)	--	--	--
	23.34	9/22/2009	dry	--	--	--
	23.34	10/9/2017	17.15	--	--	6.19
	23.34	2/28/2019	15.27	--	--	8.07
	23.34	5/7/2020	15.55	--	--	7.79
	23.34	8/11/2020	16.78	--	--	6.56
MW-22	31.40	6/1/1994	23.97	--	--	7.43
	31.40	4/9/1998	23.24	--	--	8.16
	31.40	5/21/1998	20.83	--	--	10.57
	31.40	6/30/1998	22.38	--	--	9.02
	31.40	7/15/1998	22.58	--	--	8.82
	31.40	8/3/2000	23.52	--	--	7.88
	31.40	8/8/2001	25.23	--	--	6.17
	31.40	8/20/2002	24.97	--	--	6.43
	31.40	8/21/2003	25.18	--	--	6.22
	31.40	8/6/2004	24.36	--	--	7.04
	31.40	8/11/2005	24.85	--	--	6.55
	31.40	8/18/2006	25.46			5.94
	31.40	8/10/2007	24.9	--	--	6.50
	31.40	7/23/2008	24.6	--	--	6.80
	31.40	8/19/2010	24.94	--	--	6.46
	31.40	8/26/2011	24.8			6.60
	31.40	9/28/2012	25.82	--	--	5.58
	31.40	9/27/2013	24.91	--	--	6.49
	31.40	10/9/2017	25.36	--	--	6.04
	31.40	2/28/2019	23.97	--	--	7.43
	31.40	5/6/2020	23.04	--	--	8.36
	31.40	8/10/2020	24.76	--	--	6.64

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-23	31.43	6/1/1994	24.73	--	--	6.70
	31.43	4/9/1998	23.96	--	--	7.47
	31.43	5/21/1998	22.12	--	--	9.31
	31.43	6/30/1998	23.11	--	--	8.32
	31.43	7/15/1998	23.3	--	--	8.13
	31.43	7/16/1999	22.8	--	--	8.63
	31.43	8/3/2000	24.22	--	--	7.21
	31.43	8/8/2001	25.48	--	--	5.95
	31.43	8/20/2002	25.43	--	--	6.00
	31.43	8/21/2003	25.21	--	--	6.22
	31.43	8/6/2004	24.59	--	--	6.84
	31.43	8/11/2005	25.43	--	--	6.00
	31.43	8/21/2006	25.55	--	--	5.88
	31.43	8/10/2007	25.26	--	--	6.17
	31.43	7/23/2008	23.89	--	--	7.54
	31.43	8/20/2010	25.64	--	--	5.79
	31.43	8/25/2011	24.15	--	--	7.28
	31.43	9/28/2012	26	--	--	5.43
	31.43	9/27/2013	25.12	--	--	6.31
	31.43	10/9/2017	25.45	--	--	5.98
	31.43	2/28/2019	23.83	--	--	7.60
	31.43	5/6/2020	22.93	--	--	8.50
	31.43	8/10/2020	24.72	--	--	6.71
MW-24	27.89	6/1/1994	14.35	--	--	13.54
	27.89	4/9/1998	11.31	--	--	16.58
	27.89	5/21/1998	12.42	--	--	15.47
	27.89	6/30/1998	12.06	--	--	15.83
	27.89	7/15/1998	13.06	--	--	14.83
	27.89	10/9/2017	14.61	--	--	13.28
	27.89	2/28/2019	11.32	--	--	16.57
	27.89	5/6/2020	12.58	--	--	15.31
	27.89	8/10/2020	13.31	--	--	14.58
MW-25	21.45	6/1/1994	15.06	--	--	6.39
	21.45	4/9/1998	12.52	--	--	8.93
	21.45	5/21/1998	11.53	--	--	9.92
	21.45	6/30/1998	12.51	--	--	8.94
	21.45	7/15/1998	13.23	--	--	8.22
	21.45	10/9/2017	13.57	--	--	7.88
	21.45	2/28/2019	6.9	--	--	14.55
	21.45	5/7/2020	8.02	--	--	13.43
	21.45	8/11/2020	9.68	--	--	11.77
MW-26	27.14	4/9/1998	12.54	--	--	14.60
	27.14	5/21/1998	13.31	--	--	13.83
	27.14	6/30/1998	13.19	--	--	13.95
	27.14	7/15/1998	14.21	--	--	12.93
	27.14	9/22/2009	dry	--	--	--
	27.14	8/20/2010	14.32	--	--	12.82
	27.14	10/9/2017	16.31	--	--	10.83
	27.14	2/28/2019	11.69	--	--	15.45
	27.14	5/6/2020	12.89	--	--	14.25
	27.14	8/10/2020	13.08	--	--	14.06
MW-27	25.90	4/9/1998	18.71	--	--	7.19
	25.90	5/21/1998	17.05	--	--	8.85
	25.90	6/30/1998	18.02	--	--	7.88
	25.90	7/15/1998	18.22	--	--	7.68
	25.90	7/16/1999	17.18	--	--	8.72
	25.90	8/4/2000	18.59	--	--	7.31
	25.90	8/8/2001	20.03	--	--	5.87
	25.90	8/20/2002	20.09	--	--	5.81
	25.90	8/21/2003	20.03	--	--	5.87
	25.90	8/6/2004	19.23	--	--	6.67
	25.90	8/11/2005	19.84	--	--	6.06
	25.90	8/18/2006	19.95	--	--	5.95
	25.90	8/9/2007	20.03	--	--	5.87
	25.90	8/25/2011	19.03	--	--	6.87
	25.90	9/27/2012	19.44	--	--	6.46
	25.90	9/27/2013	19.61	--	--	6.29
	25.90	10/9/2017	20.11	--	--	5.79
	25.90	2/28/2019	18.25	--	--	7.65
	25.90	5/7/2020	18.1	--	--	7.80
	25.90	8/10/2020	18.5	--	--	7.40

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-28	27.36	6/1/1994	16.84	--	--	10.52
	27.36	4/9/1998	13.24	--	--	14.12
	27.36	5/21/1998	14.07	--	--	13.29
	27.36	6/30/1998	14.6	--	--	12.76
	27.36	7/15/1998	14.21		--	13.15
	27.36	9/22/2009	dry	--	--	--
	27.36	10/9/2017	dry	--	--	--
	27.36	2/28/2019	12.39	--	--	14.97
	27.36	5/7/2020	17.91	--	--	9.45
	27.36	8/10/2020	13.6	--	--	13.76
MW-29	29.77	4/9/1998	15.99	--	--	13.78
	29.77	5/21/1998	16.54	--	--	13.23
	29.77	6/30/1998	16.57	--	--	13.20
	29.77	7/15/1998	16.78	--	--	12.99
	29.77	10/9/2017	16.8	--	--	12.97
	29.77	2/28/2019	15.51	--	--	14.26
	29.77	5/6/2020	15.82	--	--	13.95
	29.77	8/10/2020	16.2	--	--	13.57
MW-30	26.360	7/15/1998	15.53	--	--	10.83
	26.360	8/24/1998	14.9	--	--	11.46
	26.360	4/28/1999	13.19	--	--	13.17
	26.360	7/16/1999	13.76	--	--	12.60
	26.360	11/18/1999	14.54	--	--	11.82
	26.360	2/3/2000	13.16	--	--	13.20
	26.360	5/31/2000	13.68	--	--	12.68
	26.360	8/3/2000	14.09	--	--	12.27
	26.360	8/7/2001	15.25	--	--	11.11
	26.360	8/19/2002	14.31	--	--	12.05
	26.360	8/21/2003	14.28	--	--	12.08
	26.360	8/5/2004	13.99	--	--	12.37
	26.360	8/10/2005	14.02	--	--	12.34
	26.360	10/28/2005	14.63	--	--	11.73
	26.360	8/10/2005	14.02	--	--	12.34
	26.360	8/21/2006	14.89	--	--	11.47
	26.360	8/9/2007	14.05	--	--	12.31
	26.360	10/5/2007	16.1	--	--	10.26
	26.360	7/23/2008	18.4	--	--	7.96
	26.360	8/20/2010	15.14	--	--	11.22
	26.360	8/26/2011	16.23	--	--	10.13
	26.360	9/28/2012	17.82	--	--	8.54
	26.360	9/27/2013	20	--	--	6.36
	26.360	10/9/2017	15.37	--	--	10.99
	26.360	8/10/2020	16.8	--	--	9.56
MW-31	19.89	7/15/1998	12.98	--	--	6.91
	19.89	7/16/1999	12.27	--	--	7.62
	19.89	8/3/2000	13.39	--	--	6.50
	19.89	8/7/2001	14.52	--	--	5.37
	19.89	8/19/2002	14.04	--	--	5.85
	19.89	8/21/2003	14.3	--	--	5.59
	19.89	8/5/2004	13.92	--	--	5.97
	19.89	8/11/2005	13.97	--	--	5.92
	19.89	8/21/2006	13.99	--	--	5.90
	19.89	8/9/2007	13.95	--	--	5.94
	19.89	7/23/2008	13.4	--	--	6.49
	19.89	8/18/2010	14.42	--	--	5.47
	19.89	8/25/2011	13.5	--	--	6.39
	19.89	9/28/2012	14.53	--	--	5.36
	19.89	9/27/2013	14.09	--	--	5.80
	19.89	10/9/2017	14.32	--	--	5.57
	19.89	2/27/2019	12.68	--	--	7.21
	19.89	5/6/2020	13.09	--	--	6.80
	19.89	8/10/2020	13.72	--	--	6.17

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-32	21.18	7/15/1998	13.25	--	--	7.93
	21.18	7/16/1999	12.34	--	--	8.84
	21.18	8/3/2000	14.37	--	--	6.81
	21.18	8/7/2001	15.51	--	--	5.67
	21.18	8/20/2002	14.88	--	--	6.30
	21.18	8/21/2003	15.16	--	--	6.02
	21.18	8/5/2004	14.8	--	--	6.38
	21.18	8/11/2005	14.86	--	--	6.32
	21.18	8/18/2006	14.89	--	--	6.29
	21.18	8/9/2007	14.81	--	--	6.37
	21.18	7/23/2008	14.15	--	--	7.03
	21.18	8/18/2010	15.44	--	--	5.74
	21.18	8/26/2011	14.31	--	--	6.87
	21.18	9/28/2012	15.97	--	--	5.21
	21.18	9/26/2013	14.75	--	--	6.43
	21.18	10/9/2017	15.75	--	--	5.43
	21.18	2/28/2019	16.75	--	--	4.43
	21.18	5/6/2020	13.38	--	--	7.80
	21.18	8/10/2020	14.31	--	--	6.87
MW-33	25.91	5/6/2020	18.32	--	--	7.59
	25.91	8/10/2020	19.25	--	--	6.66
MW-34	26.67	5/6/2020	18.74	--	--	7.93
	26.67	8/10/2020	20.27	--	--	6.40
MW-35	26.95	5/6/2020	14.2	--	--	12.75
	26.95	8/10/2020	15.08	--	--	11.87
MW-36	31.59	5/6/2020	23.5	--	--	8.09
	31.59	8/10/2020	25.05	--	--	6.54
MW-37	31.13	5/6/2020	22.54	--	--	8.59
	31.13	8/10/2020	23.91	--	--	7.22
MW-38	31.09	5/6/2020	22.32	--	--	8.77
	31.09	8/10/2020	24.09	--	--	7.00
MW-39	18.95	5/7/2020	12.08	--	--	6.87
	18.95	8/10/2020	12.8	--	--	6.15
MW-40	24.65	5/6/2020	17.05	--	--	7.60
	24.65	8/10/2020	18.07	--	--	6.58
UST-4	31.68	10/9/2017	18.3	--	--	13.38
	31.68	2/28/2019	17.09	--	--	14.59
	31.68	5/6/2020	17.34	--	--	14.34
	31.68	8/10/2020	17.67	--	--	14.01

Notes:

-- Not applicable

RED Depth to water derived from historically reported groundwater elevation in feet mean sea level datum at time of report; surveyed casing elevation was not reported and depth is considered an estimate.

1 LNAPL noted historically at unreported thickness.

Abbrevaitions:

LNAPL Light non-aqueous phase liquid

NAVD 88 North American Vertical Datum of 1988

Table G.3
LNAPL Recovery Notes

Date	Wells with Socks	Notes
4/1/1999	MW3, MW7, MW9, MW20	total 25 lb removed (35?)
7/1/1999	MW3, MW7, MW9, MW20	
11/1/1999	MW3, MW7, MW9, MW20	
2/1/2000	MW3, MW7, MW9, MW20	very little in MW3, MW7
5/1/2000	MW3, MW7, MW9, MW20	POL took over
8/1/2000	MW3, MW7, MW9, MW20	total 43.5 lb removed
8/1/2001	MW3, MW7, MW9, MW20	total 52 lb removed; only MW9 changed regularly and MW20 only fills during low water table
8/1/2002	MW3, MW7, MW9, MW20	total 101 lb removed
8/1/2003	MW3, MW7, MW9, MW20	total 105 lb removed
8/1/2004	MW3, MW7, MW9, MW20	total 116 lb removed
8/1/2005	MW3, MW7, MW9, MW20	total 123 lb removed
8/1/2006	MW3, MW7, MW9, MW20	total 125 lb removed
11/1/2007	MW3, MW7, MW9, MW20	total 125 lb removed
7/1/2008	MW3, MW7, MW9, MW20	total 125 lb removed
8/1/2010	MW3, MW7, MW9, MW20	product only at MW9

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix H
Terrestrial Ecological Evaluation

Simplified Terrestrial Ecological Evaluation

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).	
1) From the table below, find the number of points corresponding to the area and enter this number in the field to the right.	4
<u>Area (acres)</u> <u>Points</u> 0.25 or less 4 0.5 5 1.0 6 1.5 7 2.0 8 2.5 9 3.0 10 3.5 11 4.0 or more 12	
2) Is this an industrial or **commercial** property? If yes, enter a score of 3. If no, enter a score of 1.	3
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	3
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.	2
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.	4
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.	12

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix I
Detailed Cost Estimates

Table I.1
Summary of Remedial Alternative Costs

Alternative	Restoration Time Frame (years) (1)	Construction Capital Cost	Other Professional Services	Long-Term Monitoring and Closure (2)	Cost (3)
Alternative 1	30	$143,000	$151,000	$1,205,000	$1,600,000
Alternative 2	5-10	$727,000	$317,000	$2,690,000	$4,200,000
Alternative 3	5-10	$1,605,000	$553,000	$1,278,000	$4,200,000
Alternative 4	5-10	$5,899,000	$790,000	$1,190,000	$10,200,000
Alternative 5	5-10	$4,109,000	$1,466,000	$875,000	$8,300,000

Notes:

Total costs are rounded up to the nearest $100,000.

1 Restoration time frame is the estimated time to meet proposed groundwater CULs off-property and at the downgradient edge of the Port property. Time frame includes remedy implementation.

2 Long-term monitoring and closure costs are based on the assumption of 30 years of monitoring for Alternatives 1 through 4 and 15 years of monitoring for Alternative 5. Long-term monitoring costs for Alternative 2 include two maintenance injection events of the treatment barrier. Costs for Alternatives 3 and 5 also include one contingency injection event to address any residual groundwater impacts at the downgradient edge of the Port property. All long-term monitoring costs are adjusted for NPV using a discount rate of 5%. Costs are included for annual monitoring, reporting/agency periodic reviews, and institutional controls.

3 Includes total of construction costs, professional services (including long-term monitoring), sales tax, 25% contingency on direct construction costs, and a 20% contingency on indirect construction costs.

Abbreviations:

CUL	Cleanup level
NPV	Net present value
Port	Port of Longview

Table I.2
Detailed Costs for Remedial Alternative 1

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	$ 2,000.00	$ 2,000	
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes closure of travel lanes is not ncessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	$ 11,000.00	$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	$ 3,000.00	$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	$ 20.00	$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of two 2-inch monitoring wells	1	LS	$ 8,500.00	$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	1	LS	$ 1,925.00	$ 1,925	Assumes one day of utility locating services, including a GPR survey to locate adjacent pipelines.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	$ 20,000.00	$ 20,000	Assumes that hydrant costs are not included in Regenesis quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	$ 100.00	$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Utility Locate	0	LS	$ 1,300.00	$ -	Cost included above in surfactant injections and extractions.
Installation of four 4-inch injection wells	1	LS	$ 22,000.00	$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Three rounds of PetroCleanze injections in six locations	4160	lbs	$ 3.60	$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	$ 16,000.00	$ 48,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not required.
Soil/water drum disposal during injection well installation and development	1	LS	$ 2,600.00	$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	$ 7,500.00	$ 7,500	Assumes that a total of 6,100 gallons will be extracted and transported off site for disposal.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				**$ 143,000**	
CONSTRUCTION INDIRECT COSTS					
Project Management	5	%	DC	$ 7,150	PM Costs for remediation activities.
Engineering Design Report and Remedial Action Work Plan	1	LS	$ 65,000.00	$ 65,000	Includes draft and final based on Ecology comments.
Contractor Coordination and Preparation	1	LS	$ 20,000.00	$ 20,000	Assumes that Floyd|Snider will coordinate with all subcontractors.
Field management and oversight	190	hrs	$ 150.00	$ 28,500	Assumes 12-hr days and pre- and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 6 days for injection and well installation, development, and locate, 5 days for injection and extraction activities (PetroCleanze), and 1 day oversight for pipeline inspection. One field staff present during all field activities.
Mobilization, demob, food and lodging	1	LS	$ 5,000.00	$ 5,000	Includes food, lodging, field equipment costs.
Completion report	1	LA	$ 25,000.00	$ 25,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				**$ 151,000**	

Table I.2
Detailed Costs for Remedial Alternative 1

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
LONG-TERM MONITORING AND CLOSURE					
Project Management	30	Event	$ 7,600.00	$ -	Includes correspondence with PLP Group/Port and sampling coordination. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Per event cost is for year 1.
Groundwater monitoring	30	Event	$ 25,000.00	$ -	Assumes compliance with CULs is reached within approximately 30 years, and for evaluation purposes, annual groundwater monitoring at the Site for 30 years. COCs and select MNA parameters will be analyzed on select wells across the Site. Per event cost is for year 1.
Annual Reporting and Five-Year Reviews	28	Event	$ 19,500.00	$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	15	Event	$ 1,700.00	$ -	Disposal of purge water drums every 2 years. Per event cost is for the first disposal event in year 2.
SUBTOTAL NPV - LONG-TERM MONITORING				**$ 1,025,300**	For evaluation purposes, assumes 30 years of annual project management and groundwater monitoring; 28 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every 2 years. Net present value is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	$ 90,000.00	$ 90,000	Includes costs for developing, negotiating, and recording environmental covenants with all affected property owners and developing the Soil Management Plan.
Closure report and Ecology correspondence	1	LS	$ 40,000.00	$ 40,000	Draft and final completion report, including Ecology review.
Well abandonment activities	49	Wells	$ 1,000.00	$ 49,000	Assumes that most well boxes do not need to be removed, only chipped-in-place and filled with concrete; includes injection wells; includes inflation.
SUBTOTAL LONG -TERM MONITORING AND CLOSURE				**$1,205,000**	
Ecology Oversight	3	%	DC	$ 20,870	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to construction capital costs	25	%	DC	$ 35,750	25% contingency added to direct construction costs.
20% Contingency added to construction indirect costs	20	%	DC	$ 30,200	20% contingency added to indirect construction costs.
Taxes	10	%	DC	$ 14,300	Applicable to injection activities.
Total				**$ 1,600,000**	

Abbreviations:

COC	Contaminant of concern
CUL	Cleanup level
CY	Cubic yards
DC	Direct costs
GPR	Ground-penetrating radar
hr	Hour
IDW	Investigation-derived waste
LS	Lump sum
MNA	Monitored natural attenuation
UIC	underground injection control

Table I.3
Detailed Costs for Remedial Alternative 2

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	$ 2,000.00	$ 2,000	
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	$ 11,000.00	$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	$ 3,000.00	$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	$ 20.00	$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of two 2-inch monitoring wells	1	LS	$ 8,500.00	$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	0	LS	$ 1,925.00	$ -	Cost included below in surfactant injections and extractions.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	$ 20,000.00	$ 20,000	Assumes that hydrant costs are not included in Regenesis quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	$ 100.00	$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Utility Locate	1	LS	$ 1,925.00	$ 1,925	Assumes 1 day of utility locating services, including a GPR survey to locate off-property and on-property activities.
Installation of four 4-inch injection wells	1	LS	$ 22,000.00	$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Total Regenesis cost for three applications of PetroCleanze in six locations	4160	lbs	$ 3.60	$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	$ 15,000.00	$ 45,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal during injection well installation and development	1	LS	$ 2,600.00	$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	$ 7,500.00	$ 7,500	Assumes that a total of 6,100 gallons will be extracted and transported off site for disposal.
Off-Property PersulfOx Injections					
Permit for PersulfOx injections: UIC Permit	38	borings	$ 100.00	$ 3,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Utility Locate	0	LS	$ 1,925.00	$ -	Cost included above in surfactant injections and extractions.
Regenesis Total Cost for PersulfOx Off-Property Injections	1	LS	$ 55,000	$ 55,000	Unit costs for PersulfOx product; includes estimated shipping costs.
MW-04 Area (3,840 sq. ft); Installation of 24 injection points - geoprobe	1	LS	$ 54,000	$ 54,000	Assumes a 12- to 14-ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10 and 20 ft bgs (12 points per day with two rigs; 2 days).
MW-30 Area (2,210 sq. ft); Installation of 14 injection points - geoprobe	1	LS	$ 32,000	$ 32,000	Assumes a 12 to 14 foot spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10-20 ft bgs (12 points per day with two rigs; 1 day).
Airknife to clear locations	1.5	Day	$ 2,300	$ 3,450	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 1.5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	$ 2,000.00	$ 2,000	Assumes that no soil will be generated and very little water.
CAA-1 PetroFix Barrier Injections					
Permit for PetroFix injections: UIC Permit	218	borings	$ 100.00	$ 21,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Utility Locate	0	LS	$ 1,925.00	$ -	Cost included above in surfactant injections and extractions.
Regenesis Total Cost for PetroFix barrier injections in CAA-1	1	LS	$ 146,000	$ 146,000	Unit costs for PetroFix product; includes estimated shipping costs.
PetroFix barrier (650' by 12'); Installation of two rows with 218 total injection points - geoprobe	1	LS	$ 250,000	$ 250,000	Assumes two rows 650 ft in length with 6-ft spacing with injections that will be conducted using a geoprobe (12 points per day with two rigs; 19 days).
Airknife to clear locations	7	Day	$ 2,300	$ 16,100	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 7 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	$ 3,000.00	$ 3,000	Assumes that no soil will be generated and very little water.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				**$ 727,000**	

Table I.3
Detailed Costs for Remedial Alternative 2

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION INDIRECT COSTS					
Project Management	5	%	DC	$ 36,350	PM Costs for injection activities.
Engineering Design Report and Remedial Action Work Plan	1	LS	$ 80,000.00	$ 80,000	Includes draft and final based on Ecology comments.
Contractor Coordination and Preparation	1	LS	$ 20,000.00	$ 20,000	Assumes that Floyd|Snider will coordinate with all subcontractors.
Field management and oversight	784	Hrs	$ 150.00	$ 117,600	Assumes 12 hrs days and pre and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 5 days for injection and downgradient well installation and development, 5 days for injection and extraction activities (PetroCleanze), 1 day utility locate, and 1 day oversight for pipeline inspection with one field staff; 22 days injection activities with two field staff (PersulfOx and PetroFix).
Mobilization, demob, food and lodging	1	LS	$ 22,800.00	$ 22,800	Includes food, lodging, field equipment costs.
Completion report	1	LA	$ 40,000.00	$ 40,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				**$ 317,000**	
LONG-TERM MONITORING AND CLOSURE					
Project Management	30	Event	$ 7,600.00	$ -	Includes correspondence with PLP Group/Port and sampling coordination. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Per event cost is for year 1.
Groundwater monitoring	30	Event	$ 25,000.00	$ -	Assumes compliance with CULs is reached within approximately 30 years, and for evaluation purposes, annual groundwater monitoring for 30 years. COCs and select MNA parameters will be analyzed on select wells to be determined in a long term monitoring plan. Per event cost is for year 1.
Annual Reporting and Five Year Reviews	28	Event	$ 19,500.00	$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	15	Event	$ 1,700.00	$ -	Disposal of purge water drums every 2 years. Per event cost is for the first disposal event in year 2.
SUBTOTAL NPV - LONG-TERM MONITORING				**$ 1,025,300**	For evaluation purposes, assumes 30 years of annual project management and groundwater monitoring; 28 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every two years. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	$ 75,000.00	$ 75,000	Includes costs for developing, negotiating, and recording environmental covenants on Port property and developing the Soil Management Plan.
Well abandonment activities	49	wells	$ 1,000.00	$ 49,000	Assumes that most well boxes do not need to be removed, only chipped-in-place and filled with concrete; wells in sidewalks need to be removed and the sidewalk section needs to be replaced. Includes injection wells.
Closure report and Ecology correspondence	1	LS	$ 40,000.00	$ 40,000	Draft and final completion report including Ecology review.
Contingency PetroFix barrier injection events	1	LS	DC	$ 1,500,000	Two additional injection events to maintain the PetroFix barrier and prevent off-property migration of impacts. For evaluation, the PetroFix barrier is expected to last approximately 10 years per injection event, which is based on Regenesis' estimates and the assumption of a relatively low flux of groundwater across the barrier. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
SUBTOTAL LONG-TERM MONITORING AND CLOSURE				**$ 2,690,000**	
Ecology Oversight	3	%	DC	$ 58,220	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to remedial construction activities	25	%	DC	$ 181,750	25% contingency added to injection activities.
20% Contingency added to construction indirect costs	20	%	DC	$ 63,400	20% contingency added to indirect construction costs.
Taxes	10	%	DC	$ 72,700	Applicable to injection activities.
Total				**$ 4,110,000**	

Abbreviations:

bgs	below ground surface	DC	Direct cost	lbs	Pounds
CAP	Cleanup Action Plan	ft	feet	LS	Lump sum
CUL	Cleanup level	GPR	Ground-penetrating radar	NA	Not applicable
CY	Cubic yards	Hrs	Hours	NPV	Net present value

Table I.4
Detailed Costs for Remedial Alternative 3

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	$ 2,000.00	$ 2,000	
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	$ 11,000.00	$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	$ 3,000.00	$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	$ 20.00	$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of at least two 2-inch monitoring wells	1	LS	$ 8,500.00	$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	0	LS	$ 4,825.00	$ -	Cost included below in surfactant injections and extractions.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	$ 20,000.00	$ 20,000	Assumes that hydrant costs are not included in Regenesis quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	$ 100.00	$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring; Included above in surfactant wells.
Utility Locate	1	LS	$ 4,825.00	$ 4,825	Assumes three days of detailed utility locating services including a GPR survey (3 days).
Installation of four 4-inch injection wells	1	LS	$ 22,000.00	$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Total Regenesis cost for three applications of PetroCleanze in six locations	4160	lbs	$ 3.60	$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	$ 15,000.00	$ 45,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal during injection well installation and development	1	LS	$ 2,600.00	$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	$ 7,500.00	$ 7,500	Assumes that a total of 6,100 gallons will be extracted and transported off site for disposal.
Off-Property PersulfOx Injections					
Permit for PersulfOx injections: UIC Permit	38	borings	$ 100.00	$ 3,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Regenesis Total Cost for PersulfOx Off-Property Injections	1	LS	$ 55,000	$ 55,000	Costs for PersulfOx product; includes estimated shipping costs.
Utility Locate	0	LS	$ 4,825.00	$ -	Cost included above in surfactant injections and extractions.
MW-04 Area (3,840 sq. ft); Installation of 24 injection points - geoprobe	1	LS	$ 54,000	$ 54,000	Assumes a 12- to 14-ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10 and 20 ft bgs (12 points per day with two rigs; 2 days).
MW-30 Area (2,210 sq. ft); Installation of 14 injection points - geoprobe	1	LS	$ 32,000	$ 32,000	Assumes a 12- to 14-ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10 and 20 ft bgs (12 points per day with two rigs; 1 day).
Airknife to Clear locations	1.5	Day	$ 2,300	$ 3,450	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 1.5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	$ 2,000.00	$ 2,000	Assumes that no soil will be generated and very little decontamination water.

Table I.4
Detailed Costs for Remedial Alternative 3

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS (cont.)					
CAA-2 PersulfOx and RegenOx Injections					
Hydrant permit	0	LS	$ 20,000.00	$ -	Assumes that hydrant costs are included above with surfactant Injection costs.
Permit for injection of PersulfOx and RegenOx: UIC Permit	188	borings	$ 100.00	$ 18,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Utility Locate	0	LS	$ 4,825.00	$ -	Cost included above in surfactant injections and extractions.
Regenesis Total Cost for RegenOx Injections in CAA-2	1	LS	$ 134,000.00	$ 134,000	Costs for RegenOx product inside rail lines; includes estimated shipping costs.
Regenesis Total Cost for PersulfOx Injections in CAA-2	1	LS	$ 124,000.00	$ 124,000	Costs for PersulfOx product inside rail lines; includes estimated shipping costs.
Northern Plume Area (5,000 sq. ft); Installation of 18 RegenOx and 18 PersulfOx injection points - geoprobe	1	LS	$ 78,000.00	$ 78,000	RegenOx: Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 4 days). PersulfOx: Assumes no utilities in injection area; 12 to 14 ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 2 days).
Central Plume Area (16,000 sq. ft); Installation of 57 RegenOx and 48 PersulfOx injection points - geoprobe	1	LS	$ 236,450.70	$ 236,451	RegenOx: Assumes utilities in injection area; a 10 to 14 ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 10 days). PersulfOx: Assumes no utilities in injection area; 12 to 14 ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 4 days).
Southern Plume Area (10,000 sq. ft); Installation of 36 RegenOx and 30 PersulfOx injection points - geoprobe	1	LS	$ 147,500.00	$ 147,500	RegenOx: Assumes utilities in injection area; a 10 to 14 ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 6 days). PersulfOx: Assumes no utilities in injection area; 12 to 14 ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 3 days).
Airknife to clear locations	5	Day	$ 2,300.00	$ 11,500	Assumes that 40 percent of the locations (and nearby vicinity for subsequent injections) would be cleared once for utilities using an airknife (12 holes per day; 5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	$ 5,000.00	$ 5,000	Assumes that very little soil and water will be generated.
CAA-1 PersulfOx Injections					
Hydrant permit	0	LS	$ 20,000.00	$ -	Assumes that hydrant costs are included above with surfactant Injection costs.
Permit for injection of PersulfOx: UIC Permit	213	borings	$ 100.00	$ 21,300	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring; Included above in surfactant wells.
Utility Locate	0	LS	$ 4,825.00	$ -	Cost included above in surfactant injections and extractions.
Regenesis Total Cost for PersulfOx Injections in CAA-1	1	LS	$ 308,000.00	$ 308,000	Costs for PersulfOx product outside rail lines; includes estimated shipping costs.
Central Plume Area (30,000 sq. ft); Installation of 180 injection points - geoprobe	1	LS	$ 170,000.00	$ 170,000	Assumes a 12 to 14 ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are approximately between 8 to 20 ft bgs (12 points per day with two rigs, 15 days).
Southern Plume Area (5,650 sq. ft); Installation of 33 injection points - geoprobe	1	LS	$ 29,000.00	$ 29,000	Assumes a 12 to 14 foot spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are approximately between 8-20 ft bgs (12 points per day with two rigs, 3 days).
Airknife to clear locations	9	Day	$ 2,300.00	$ 20,700	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 9 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	$ 7,500.00	$ 7,500	Assumes that very little soil and water will be generated.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				**$ 1,605,000**	

Table I.4
Detailed Costs for Remedial Alternative 3

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION INDIRECT COSTS					
Project Management (Construction)	5	%	DC	$ 80,250	PM Costs for injection activities.
Engineering Design Report and Remedial Action Work Plan	1	LS	$ 110,000.00	$ 110,000	Includes draft and final based on Ecology comments.
Contained-In Waste Application and Determination	1	LS	$ 5,000.00	$ 5,000	Assumes that a contained-in-waste determination is needed. Time includes memo/letter preparations, ecology coordination.
Contractor Coordination and Preparation	1	LS	$ 20,000.00	$ 20,000	Assumes that Floyd|Snider will coordinate with all subcontractors.
Field management and oversight	1650	Hrs	$ 150.00	$ 247,500	Assumes 12-hr days and pre- and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 5 days for injection and well installation and development, 5 days for injection and extraction activities (PetroCleanze), 3 days utility locate, and 1 day oversight for pipeline inspection with one field staff; 29 days injection activities with two field staff (PersulfOx); 18 days injection activities with three field staff (RegenOx).
Mobilization, demob, food and lodging	1	LS	$ 45,000.00	$ 45,000	Includes food, lodging, field equipment costs
Completion report	1	LA	$ 45,000.00	$ 45,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				**$ 553,000**	
LONG-TERM MONITORING AND CLOSURE					
Project Management	30	Event	$ 7,600.00	$ -	Includes correspondence with PLP Group/Port and sampling coordination. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Per event cost is for year 1.
Groundwater monitoring	30	Event	$ 25,000.00	$ -	Assumes compliance with CULs is reached within approximately 30 years, and for evaluation purposes, annual groundwater monitoring for 30 years. COCs and select MNA parameters will be analyzed on select wells to be determined in a long term monitoring plan. Per event cost is for year 1.
Annual Reporting and Five-Year Reviews	28	Event	$ 19,500.00	$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	15	Event	$ 1,700.00	$ -	Disposal of purge water drums every 2 years. Per event cost is for the first disposal event in year 2.
SUBTOTAL NPV - LONG-TERM MONITORING				**$ 1,025,300**	For evaluation purposes, assumes 30 years of annual project management and groundwater monitoring; 28 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every two years. Net present value is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	$ 75,000.00	$ 75,000	Includes costs for developing, negotiating, and recording environmental covenants on Port property and developing the Soil Management Plan.
Well abandonment activities	49	wells	$ 1,000.00	$ 49,000	Assumes that most well boxes do not need to be removed, only chipped-in-place and filled with concrete; wells in sidewalks need to be removed and the sidewalk section needs to be replaced. Includes injection wells.
Closure report and Ecology correspondence	1	LS	$ 40,000.00	$ 40,000	Draft and final completion report including Ecology review.
Contingency PersulfOx injections	1	LS	DC	$ 88,000	Additional 5,000 sq. ft of injections to address residual groundwater impacts if off-property migration is ongoing. For evaluation, costs for a total of 30 PersulfOx injections (product, installation, and oversight) implemented 5 years after remedy implementations are included. Net present value is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
SUBTOTAL LONG-TERM MONITORING AND CLOSURE				**$ 1,278,000**	
Ecology Oversight	3	%	DC	$ 77,520	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to remedial construction activities	25	%	DC	$ 401,250	25% contingency added to injection activities.
20% Contingency added to construction indirect costs	20	%	DC	$ 110,600	20% contingency added to indirect construction costs.
Taxes	10	%	DC	$ 160,500	Applicable to injection activities.
Total				**$ 4,186,000**	

Abbreviations:

bgs	Below ground surface
CAP	Cleanup Action Plan
COC	Contaminant of concern
CUL	Cleanup level
CY	Cubic yards
DC	Direct cost
ft	Feet
gals	gallons
GPR	Ground-penetrating radar
hrs	Hours
lbs	Pounds
LS	Lump sum
NA	Not applicable
UIC	underground injection control

Table I.5
Detailed Costs for Remedial Alternative 4

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	$ 2,000.00	$ 2,000	
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	$ 11,000.00	$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	$ 3,000.00	$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	$ 20.00	$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of two 2-inch monitoring wells	1	LS	$ 8,500.00	$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	0	LS	$ 4,825.00	$ -	Cost included below in surfactant injections and extractions.
CAA-1 Limited Excavation					
Mob/Demob and Facilities Management	1	LS	$ 29,044.00	$ 29,044	Based on similar project experience.
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes closure of travel lanes is not necessary.
Utilities: relocation/cap/reconnect	1	LS	$ 15,000.00	$ 15,000	Assumes there are utilities that will need to be capped and reconnected.
Shoring - Installation of sheet pile wall to 50 feet	570	LF	$ 2,995.00	$ 1,707,150	Assumes approximately 570 linear ft of sheet piling will need to be installed to 50 ft bgs along the western edge of the rail lines.
Excavate and stockpile clean overburden soil and reuse as backfill	13,000	CY	$ 15.00	$ 195,000	Assumes that an average of 10 ft of clean overburden soil can be used as backfill material; this cost includes handling clean soil and placing as backfill material.
Excavate, load, haul and soil disposal	20,800	ton	$ 76.00	$ 1,580,800	Assumes excavation of an approximately 35,000 sq. ft area of soil to 22 ft bgs with an average thickness of impacted soil at 10 ft; hauling of soil land disposal at a Sub title D landfill (25 days).
Provide, install, and compact backfill material	20,800	ton	$ 39.00	$ 811,200	Does not include mixing and placement of ORC pellets in bottom of excavation (5 days).
Dewatering and groundwater handling services	750,000	gallons	$ 0.44	$ 330,000	Assume dewatering at approximately 15 ft bgs and on Site treatment to dispose to sanitary sewer.
Regenesis Total Cost for ORC Pellets	1	LS	$ 145,042.00	$ 145,042	Assumes that 18,018 lbs of ORC Advanced will be placed in 30,000 sq. ft of the excavation bottom. Includes estimated shipping costs.
ORC placement and mixing	1	LS	$ 18,000.00	$ 18,000	Assume 5 days of ORC pellet mixing and placement (5 days).
Site restoration	1	LS	$ 20,000.00	$ 20,000	Assumes that site will be restored or finished according to development plans; e.g., asphalt or concrete.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	$ 20,000.00	$ 20,000	Assumes that hydrant costs are not included in Regenesis quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	$ 100.00	$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Utility Locate	1	LS	$ 4,825.00	$ 4,825	Assumes three days of detailed utility locating services including a GPR survey (3 days)
Installation of four 4-inch injection wells	1	LS	$ 22,000.00	$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Total Regenesis cost for three applications of PetroCleanze in six locations	4,160	lbs	$ 3.60	$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	$ 15,000.00	$ 45,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days)
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary
Soil/water drum disposal during injection well installation and development	1	LS	$ 2,600.00	$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	$ 7,500.00	$ 7,500	Assumes that a total of 6,100 gallons will be extracted and transported off site for disposal.

Table I.5
Detailed Costs for Remedial Alternative 4

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS (cont.)					
Off-Property PersulfOx Injections					
Permit for PersulfOx injections: UIC Permit	38	borings	$ 100.00	$ 3,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Regenesis Total Cost for PersulfOx Off-Property Injections	1	LS	$ 55,000	$ 55,000	Costs for PersulfOx product; includes estimated shipping costs.
Utility Locate	0	LS	$ 4,825.00	$ -	Cost included above in surfactant injections and extractions.
MW-04 Area (3,840 sq. ft); Installation of 24 injection points - geoprobe	1	LS	$ 54,000	$ 54,000	Assumes a 12 to 14 foot spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10-20 ft bgs (12 points per day with two rigs; 2 days)
MW-30 Area (2,210 sq. ft); Installation of 14 injection points - geoprobe	1	LS	$ 32,000	$ 32,000	Assumes a 12 to 14 foot spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10-20 ft bgs (12 points per day with two rigs; 1 day)
Airknife to Clear locations	1.5	Day	$ 2,300	$ 3,450	Assumes that 40 percent of the locations would be cleared for utilities using an airknife (12 holes per day; 1.5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary
Soil/water drum disposal	1	LS	$ 2,000.00	$ 2,000	Assumes that no soil will be generated and very little decontamination water.
CAA-2 RegenOx and PersulfOx Injections					
Hydrant permit	0	LS	$ 20,000.00	$ -	Assumes that hydrant costs are included above with surfactant Injection costs.
Permit for injection of RegenOx: UIC Permit	188	borings	$ 100.00	$ 18,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring. Included above in surfactant wells.
Utility Locate	0	LS	$ 4,825.00	$ -	Cost included above in surfactant injections and extractions.
Regenesis Total Cost for RegenOx Injections in CAA-2	1	LS	$ 134,000.00	$ 134,000	Costs for RegenOx product inside rail lines; includes estimated shipping costs.
Regenesis Total Cost for PersulfOx Injections in CAA-2	1	LS	$ 124,000.00	$ 124,000	Costs for PersulfOx product inside rail lines; includes estimated shipping costs.
Northern Plume Area (5,000 sq. ft); Installation of 18 RegenOx and 18 PersulfOx injection points - geoprobe	1	LS	$ 78,000.00	$ 78,000	RegenOx: Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 4 days). PersulfOx: Assumes no utilities in injection area; 12- to 14-ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 2 days).
Central Plume Area (16,000 sq. ft); Installation of 57 RegenOx and 48 PersulfOx injection points - geoprobe	1	LS	$ 236,450.70	$ 236,451	RegenOx: Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 10 days). PersulfOx: Assumes no utilities in injection area; 12- to 14-ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 4 days).
Southern Plume Area (10,000 sq. ft); Installation of 36 RegenOx and 30 PersulfOx injection points - geoprobe	1	LS	$ 147,500.00	$ 147,500	RegenOx: Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 6 days). PersulfOx: Assumes no utilities in injection area; 12- to 14-ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 3 days).
Airknife to clear locations	5	Day	$ 2,300.00	$ 11,500	Assumes that 40% of the locations (and nearby vicinity for subsequent injections) would be cleared once for utilities using an airknife (12 holes per day; 5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	$ 5,000.00	$ 5,000	Assumes that very little soil and water will be generated.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				**$ 5,899,000**	

Table I.5
Detailed Costs for Remedial Alternative 4

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION INDIRECT COSTS					
Project Management	5	%	DC	$ 294,950	PM Costs for injection and excavation activities.
Engineering Design Report and Remedial Action Work Plan, Contract Documents for Excavation	1	LS	$ 130,000.00	$ 130,000	Includes draft and final based on Ecology comments. Assumes that an EDR and work plan are required.
Contractor Coordination and Preparation	1	LS	$ 20,000.00	$ 20,000	Assumes that Floyd|Snider will coordinate with all subcontractors.
Field management and oversight	1663	Hours	$ 150.00	$ 249,450	Assumes 12 hrs days and pre and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 5 days for injection and downgradient well installation and development, 5 days for injection and extraction activities (PetroCleanze), 3 days utility locate, and 1 day oversight for pipeline inspection with one field staff; 35 days excavation oversight with one field staff; 8 days PersulfOx injections with two field staff; and 18 days for injection activities with three field staff (RegenOx).
Mobilization, demob, food and lodging	1	LS	$ 50,000.00	$ 50,000	Includes food, lodging, field equipment costs.
Completion report	1	LS	$ 45,000.00	$ 45,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				**$ 790,000**	
LONG-TERM MONITORING AND CLOSURE					
Project Management	30	Event	$ 7,600.00	$ -	Includes correspondence with PLP Group/Port and sampling coordination. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Per event cost is for year 1.
Groundwater monitoring	30	Event	$ 25,000.00	$ -	Assumes compliance with CULs is reached within approximately 30 years, and for evaluation purposes, annual groundwater monitoring for 30 years. COCs and select MNA parameters will be analyzed on select wells to be determined in a long term monitoring plan. Per event cost is for year 1.
Annual Reporting and Five-Year Reviews	28	Event	$ 19,500.00	$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	15	Event	$ 1,700.00	$ -	Disposal of purge water drums every two years. Per event cost is for the first disposal event in year
SUBTOTAL NPV - LONG-TERM MONITORING				**$ 1,025,300**	For evaluation purposes, assumes 30 years of annual project management and groundwater monitoring; 28 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every two years. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	$ 75,000.00	$ 75,000	Includes costs for developing, negotiating, and recording environmental covenants on Port
Well abandonment activities	49	wells	$ 1,000.00	$ 49,000	Assumes that most well boxes do not need to be removed, only chipped-in-place and filled with concrete; wells in sidewalks need to be removed and the sidewalk section needs to be replaced. Includes injection wells.
Closure report and Ecology correspondence	1	LS	$ 40,000.00	$ 40,000	Draft and final completion report including Ecology review.
SUBTOTAL LONG -TERM MONITORING AND CLOSURE				**$ 1,190,000**	
Ecology Oversight	3	%	DC	$ 95,000	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to remedial construction activities	25	%	DC	$ 1,474,750	25% contingency added to excavation and injection activities.
20% Contingency added to construction indirect costs	20	%	DC	$ 158,000	20% contingency added to indirect construction costs.
Taxes	10	%	DC	$ 589,900	Applicable to excavation and injection activities.
Total				**$ 10,197,000**	

Abbreviations:

CAP	Cleanup Action Plan	ft	Feet	NA	Not applicable
CY	Cubic yards	lbs	Pounds	NPV	Net present value
DC	Direct cost	LS	Lump sum	UIC	Underground injection control

Table I.6
Detailed Costs for Remedial Alternative 5

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	$ 2,000.00	$ 2,000	
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	$ 11,000.00	$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	$ 3,000.00	$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	$ 20.00	$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of two 2-inch monitoring wells	1	LS	$ 8,500.00	$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	0	LS	$ 8,000.00	$ -	Cost included below in surfactant injections and extractions.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	$ 20,000.00	$ 20,000	Assumes that hydrant costs are not included in Regenesis quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	$ 100.00	$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
Utility Locate	1	LS	$ 8,000.00	$ 8,000	Assumes 5 days of detailed utility locating services including a GPR survey (5 days).
Installation of four 4-inch injection wells	1	LS	$ 22,000.00	$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Total Regenesis cost for three applications of PetroCleanze in six locations	4,160	lbs	$ 3.60	$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	$ 15,000.00	$ 45,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days).
Traffic Control	0	Day	$ 1,000.00	$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal during injection well installation and development	1	LS	$ 2,600.00	$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	$ 7,500.00	$ 7,500	Assumes that a total of 6,100 gals will be extracted and transported off site for disposal.
Plume Wide PersulfOx and RegenOx Injections (CAA-1, CAA-2, and Off-Property)					
Hydrant permit	0	LS	$ 20,000.00	$ -	Assumes that hydrant costs are included with the surfactant injection costs.
Permit for injection of PersulfOx: UIC Permit	1,370	borings	$ 100.00	$ 137,000	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges $100 per boring.
ROW Permit and Traffic Control Plan	1	LS	$ 5,000.00	$ 5,000	Permit to perform injection work in the City of Longview ROW and prepare required Traffic Control Plan.
Utility Locate	0	LS	$ 4,825.00	$ -	Cost included above in surfactant injections and extractions.
Regenesis total cost for PersulfOx Injections	1	LS	$ 659,000.00	$ 659,000	Quote from Regenesis; Includes estimated shipping.
Regenesis total cost for RegenOx Injections	1	LS	$ 983,923.00	$ 983,923	Quote from Regenesis; Includes estimated shipping.
Plume-wide PersulfOx injections (105,000 sq. ft); Installation of 625 injection points - geoprobe	1	LS	$ 460,000.00	$ 460,000	Assumes a 12- to 14-ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are approximately between 10 and 20 ft bgs (15 points per day with two rigs; 42 days).
Plume-wide RegenOx injections (105,000 sq. ft); Installation of 745 injection points - geoprobe	1	LS	$ 1,600,000.00	$ 1,600,000	Assumes utlities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 125 days).
Airknife to Clear locations	42	Day	$ 2,300	$ 96,600	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 42 days).
Traffic Control	10	Day	$ 1,000.00	$ 10,000	Assume lane closure and traffic control during ROW injections.
Soil/water drum disposal	1	LS	$ 12,000.00	$ 12,000	Assumes that some soil and decontamination water will be generated.
			SUBTOTAL CONSTRUCTION CAPITAL COSTS	**$ 4,109,000**	

Table I.6
Detailed Costs for Remedial Alternative 5

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION INDIRECT COSTS					
Project Management	5	%	DC	$ 205,450	PM Costs for injection activities.
Engineering Design Report and Remedial Action Work Plan, Contract Documents for Excavation	1	LS	$ 130,000.00	$ 130,000	Includes draft and final based on Ecology comments. Assumes that an EDR and work plan are required.
Contractor Coordination and Preparation	1	LS	$ 20,000.00	$ 20,000	Assumes that Floyd|Snider will coordinate with all subcontractors.
Field management and oversight	6000	Hrs	$ 150.00	$ 900,000	Assumes 12-hr days and pre- and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 5 days for injection and downgradient well installation and development, 5 days for injection and extraction activities (PetroCleanze), 5 days utility locate, and 1 day oversight for pipeline inspection with one field staff; 42 days injection activities with two field staff (PersulfOx); 125 days injection activities with three field staff (RegenOx).
Mobilization, demob, food and lodging	1	LS	$ 160,000.00	$ 160,000	Includes food, lodging, field equipment costs
Completion report	1	LA	$ 50,000.00	$ 50,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				**$ 1,466,000**	
LONG-TERM MONITORING AND CLOSURE					
Project Management	15	Event	$ 7,600.00	$ -	Includes correspondence with PLP Group/Port correspondence, and sampling coordination of up to 15 years of sampling events. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Assumes a 2% annual rate increase/inflation.
Groundwater monitoring	18	Event	$ 25,000.00	$ -	Assumes compliance with CULs is reached within approximately 5-10 years, and for evaluation purposes, annual groundwater monitoring for 14 years and quarterly monitoring during the 15th year. COCs and select MNA parameters will be analyzed on select wells; includes inflation.
Annual Reporting and Five-Year Reviews	13	Event	$ 19,500.00	$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	8	Event	$ 1,700.00	$ -	Disposal of purged water drums every 2 years.
SUBTOTAL NPV - LONG-TERM MONITORING				**$ 622,400**	For evaluation purposes, assumes 15 years of annual project management and groundwater monitoring; 13 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every 2 years. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	$ 75,000.00	$ 75,000	Includes costs for developing, negotiating, and recording environmental covenants on Port property and developing the Soil Management Plan.
Well abandonment activities	49	wells	$ 1,000.00	$ 49,000	Assumes that most well boxes do no need to be removed only chipped-in-place and fill with concrete; wells in sidewalks need to be removed and the sidewalk section needs to be replaced. Includes injection wells.
Closure report and Ecology correspondence	1	LS	$ 40,000.00	$ 40,000	Draft and final completion report including Ecology review.
Contingency PersulfOx injections	1	LS	DC	$ 88,000	Additional 5,000 sq. ft of injections to address residual groundwater impacts at the downgradient edge of the Port property. For evaluation, costs for a total of 30 PersulfOx injections deployed 5-years after remedy implementation are included. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
SUBTOTAL LONG -TERM MONITORING AND CLOSURE				**$ 875,000**	
Ecology Oversight	3	%	DC	$ 100,000	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to remedial construction activities	25	%	DC	$ 1,027,250	25% contingency added to injection activities.
20% Contingency added to construction indirect costs	20	%	DC	$ 293,200	20% contingency added to indirect construction costs.
Taxes	10	%	DC	$ 410,900	Applicable to injection activities.
Total				**$ 8,281,000**	

Abbreviations:

CAP	Cleanup Action Plan
CY	Cubic yards
DC	Direct cost
gals	Gallons
GPR	Ground-penetrating radar
Hrs	Hours
lbs	Pounds
LS	Lump sum
NA	Not applicable
NPV	Net Present Value
PM	Project Manager
UIC	underground injection control

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix J
Boring Logs

Petroleum Services Unlimited, Inc.
1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER 40612
WELL NUMBER MW-1
SHEET 1 OF 1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview
LOCATION 20 Port Way, Longview, Washington
ELEVATION
DRILLING CONTRACTOR Hokkaido Drilling and Developing
DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
START DATE 4-30-91
FINISH DATE 4-30-91
WATER LEVEL est. 8'6" depth
LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	WELL CONSTRUCTION
	INTERVAL	TYPE AND NUMBER	RECOVERY	6"-6"-6" (N)	NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
	1.0					Flush mount monument casing
	2.5		10"	3-4-7 (11)	Silt, light brown, dry, silt (ML)	Bentonite seal to 1' 3 ea 50# bags Wyoben enviro plug med. used 6'3" of 4" dia sch 40 PVC blank casing
5	5.0					
	6.5		18"	2-3-2 (5)	Sand, brown, loose, med. graines, wet, to 5'5" then is a silt, grey, wet, w/charcoal and wood chips to 6'3", then is a silty clay, grey green, dry, clay with organic odor	10-20 CSSI sand pack to 6' depth 4" dia 20 slot sch 40 PVC screen - top of screen at 6'5" depth
	7.5					
	9.0		18"	3-2-6 (8)	Clay as above except moist, w/wood chips to 8'6", then is a fine sand dark grey, wet loose, sand (SP)	∇ ATD
10	10.0					10' of 4" dia 20 slot sch 40 PVC screen used
	11.5		15"	2-2-2 (4)	Clay w/silt, grey, moist, soft, clay w/wood fibres (OH), to 11'2" then is a sand, saturated (SP)	6 ea 100# bags 10-20 CSSI silica sand used
	13.0		19"	6-4-3 (7)	Interbedded sands and clay, grey, wet, loose, interbeds (SC)	
15					End boring at 16'10"	Centralizing guides used 7" threaded bottom sump Bottom of screen @ 16'3"

Petroleum Services Unlimited, Inc.
1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER 40612	WELL NUMBER MW2	SHEET 1	OF 1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION ______ DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

START DATE 4-30-91 FINISH DATE 4-30-91 WATER LEVEL ______ LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	WELL CONSTRUCTION
	INTERVAL	TYPE AND NUMBER	RECOVERY	6"-6"-6" (N)	NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
	1.0 2.5		10"	6-8-7 (15)	Top 1' of surface is a crushed rock pavement. Poorly graded fine sand, brown, dry, sand (SP)	Flush mount monument with concrete seal locking compression cap Bentonite plug to 1' 3 ea 50" bags Wyoben envir plug med used, sand pack to 4'
5	4.5 6.0		18"	3-4-4 (8)	Poorly graded fine, sand w/silt brown to light grey, moist, sand with some silt (SP-SM)	6' of 4" dia sch 40 PVC blank casing 6'2" top of screen
	7.5 9.0		15"	3-3-5 (8)	Sand w/silt as above to 8'6" depth then grading to a silty fine sand saturated, loose, silty sand (SM)	4.5 ea 100# bags 10-20 SCCI silica sand used ▽ ATD 6'2" of 4" dia 20 slot sch 40 PVC screen
10						
	11.5 13		18"	2-2-4 (6)	Silty sand (SM) as above to 11'9" then is a clay, dark grey, dry, clay w/wood fibres throughout and some silt and charcoal lenses (OH)	Bottom of screen at 12'5" slip cap bottom sump
	14.5		18"	1-4-6 (10)	Clay (OH) as above to 14'2" then is a silt, dark grey, wet, loose silt (ML) End boring at 14'6" depth	Bentonite plug seal from 12'5" to 14'5"
15						

Petroleum Services Unlimited, Inc.
1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER	WELL NUMBER	SHEET	OF
40612	MW3	1	1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION ______ DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

START DATE 5-1-91 FINISH DATE 5-1-91 WATER LEVEL ______ LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	WELL CONSTRUCTION
	INTERVAL	TYPE AND NUMBER	RECOVERY	6"-6"-6" (N)	NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
						Flush mount monument with concrete seal, locking compression cap on casing Bentonite seal to 1' depth 4 ea 50# bags Wyoben envir plug medium used
4	2.5 4.0		17"	1-2-3 (5)	Poorly graded fine sand w/silt, brown to grey, dry, loose, sand w/silt (SP-SM) to 3'6", then is a silt, grey dry, silt w/some iron stain (ML) to 3'10", then is a well graded sand, dry, loose sand with gravel to 3/8" (SW)	8'3" of 4" dia sch 40 PVC blank casing used
8	6.0 7.5		18"	2-3-4 (7)	Interbedded fine sands and silts, grey to brown, moist, loose, sand (SP-SM)	
	9.0		18"	2-2-2 (4)	Sand and silt (SP-SM) as above except wet, to 8'10", then is a silt w/clay, dark grey, moist, plastic, silt (MH)	Top of sand pack @ 7'8" PID = 5ppm Top of screen @ 8'5"
	10.5		18"	4-3-4 (7)	Interbedded clay silt/silt clay, wet w/wood fibres throughout (OH)	PID = 757 ppm
12	11.5 13.0		15"	4-3-4 (7)	Poorly graded fine sand w/silt, blue grey, saturated, loose, sand with interbeds of clayey silt, (SP) with irridescent sheen	5 ea 100# bags 10-20 CSSI silica sand used 10' of 4" dia 20 slot sch 40 PVC screen used.
16						
	17.5 19.0		15"	3-4-9 (13)	Interbedded clayey silt and silt, dark grey, wet, med dense, silt (MH) to 18'3", then is a well graded sand, blue grey, wet, med dense, sand (SW)	Bottom of screen @ 18'5" 7" bottom sump
					End boring at 19'	

Pelroleum Services Unlimiled, Inc.
1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER 40612	WELL NUMBER MW4 SHEET 1 OF 1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

START DATE 5-2-91 FINISH DATE 5-2-91 WATER LEVEL LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	WELL CONSTRUCTION
	INTERVAL	TYPE AND NUMBER	RECOVERY	6"-6"-6" (N)	NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
					Crushed rock pavement to 1'	Flush mount monumnet with concrete seal, locking compression cap Bentonite seal to 1' 6 ea 50# bags Wyoben Enviro plug medium used 7'2" of 4" dia sch 40 PVC blank casing Sand pack to 5' 5 ea 100# bags 10-20 SCCI silica sand used
4						
8	7.5 9.0		12"	5-10-17 (27)	Poorly graded fine to med sand, grey, moist, med dense, sand (SP)	Top of screen at 7'5"
	10.5		13"	6-9-9 (18)	Sand (SP) as above, except w/some silt and pumice fragments	10' of 4" dia 20 slot sch 40 PVC screen used
12	12.0		13"	6-9-10 (19)	Poorly graded fine sand w/silt, grey brown, wet, med dense sand w/silt (SP-SM) to 11'3", then is a silt 2/sand, grey, wet, med dense, silt (SM)	5 ea 100# bags 10-20 CSSI silica sand used
16						
	17.5 19.0		15"	3-7-7 (14)	Interbedded silt and silty fine sand and clayey silt, grey, wet med dense, silts (SC-SM)	Bottom of screen @ 17'5" 7" bottom sump
20					End boring @ 19'	

Deepest well

Petroleum Services Unlimited, Inc.
1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER	WELL NUMBER	
40612	MW5	SHEET 1 OF 1

MONITORING WELL DRILLING & CONSTRUCTION LO

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
ELEVATION DRILLING CONTRACTOR Hokkaido Drilling and Developing
DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
START DATE 5-3-91 FINISH DATE 5-3-91 WATER LEVEL LOGGER C. Grant

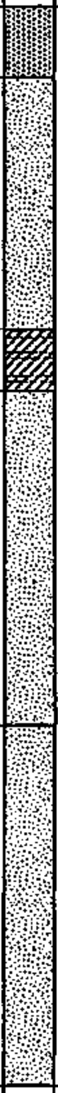
DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	WELL CONSTRUCTION
	INTERVAL	TYPE AND NUMBER	RECOVERY	6"-6"-6" (N)	NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PAC GRADATION & INTERVAL, GROUT INTERVAL, ETC.
						Flush mount monument w concrete seal, locking compression cap Bentonite seal to 1' 8 ea 50# bags Wyoben Enviro plug medium use
4						12'1" of 2" dia sch 40 Blank casing used
8						
	9.5 11.0		18"	6-4-4 (8)	Poorly graded fine sand w/silt, grey brown, wet, loose, sand w/ interbedded silt & silty clay layers to .25" (SP-SM)	
12	11.0 12.5		18"	3-4-6 (10)	Sand (SP-SM) as above, to 11'7" then is a clay w/silt, grey, moist plastic, clay (OH) to 12'3", then is a clayey silt, grey moist, loose silt w/organic fibres (OH)	Sand pack to 12'5" Top of screen @ 12'6"
	12.5 14.0		18"	3-4-3 (7)	Silty clay, grey, moist, firm, clay w/interbedded silt layers (OH	6 ea 100# bags 10-20 C silica sand used
	14.0 15.5		18"	3-3-4 (7)	Silty clay (OH), as above to 14'8" then is a poorly graded fine sand w/silt, grey, wet, loose sand w/ silty clay interbeds (SP-SM)	
16						10' of 2" dia 20 slot sch 40 PVC screen used
20						
	21.0 22.5		10"	3-4-5 (9)	Well graded fine to med sand with silt, grey, saturated, loose, sand w/silt (SP-SM)	
					End boring at 22'8"	Bottom of screen @ 22' 5" bottom sump
24						

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-6
RECORD OF MONITORING WELL INSTALLATION

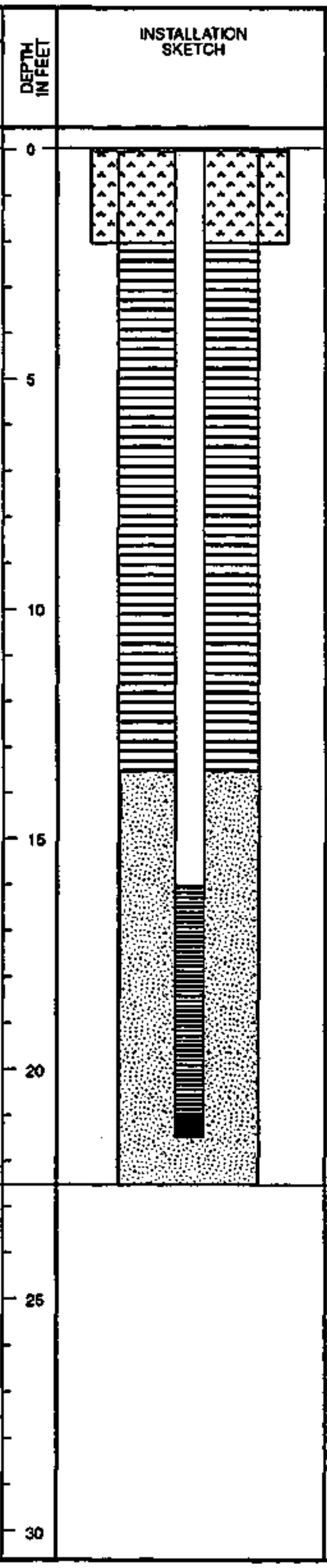
PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 **OF** 1
PROJECT: Port of Longview
BORING DATE: 12/9/92

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD
0.0	Railroad ballast			Hollow Stem Auger
1.5	Brown, fine to medium SAND, trace gravel Iron staining @5.5' Increasing silt			
6.9	Gray silty CLAY to clayey SILT			
8.0	Gray, fine SAND grading coarser with depth Coarse pumice at 11.8'			
15.0	Light gray to light brown, fine to medium SAND, trace coarse sand and silt Pumice layers			
22.5	Bottom of Hole - 22.5' Below Ground Surface			

DEPTH IN FEET / INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 22.5'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.0	Cement seal
2.0-13.5	Bentonite chips
13.5-22.5	10x20 Sand
16.0-21.0	4" Schedule 40 0.010 slotted screen
21.0-21.5	Sump

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-7
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

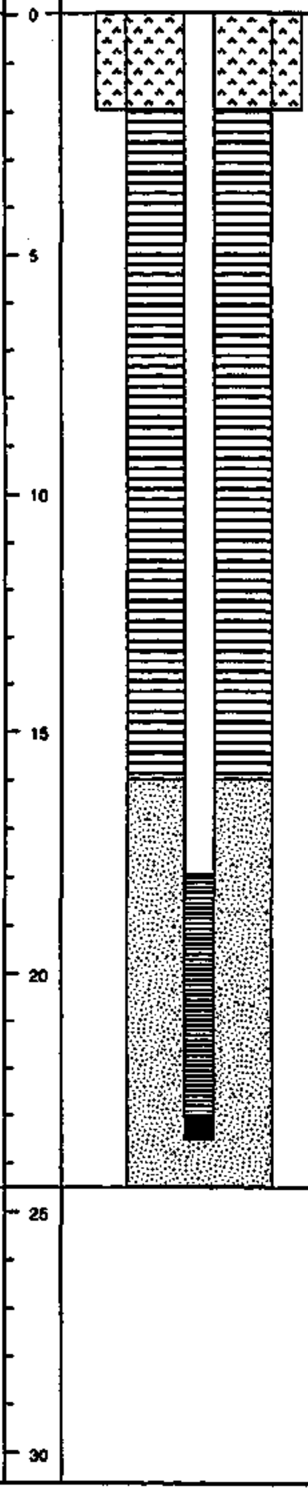
BORING DATE: 12/7/92

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD
0.0	Brown to black silt, sand and gravel FILL			Hollow Stem Auger
1.7	Brown, silty, fine to medium SAND iron staining			
5.3	Gray and orange, silty CLAY, iron stained			
7.3	Light gray SILT			
8.0	Light gray, fine to medium SAND, with silt layers wet at 8.3', sheen			
10.7	Light gray, clayey SILT to silty CLAY			
13.5	Gray, fine to medium SAND, some silt coarse pumice layers saturated Saturated @14' Some SILT layers			
24.5	Bottom of Hole - 24.5' Below Ground Surface			

DEPTH IN FEET

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 24.5'

OPEN TO:

DEPTH CASING AUGERS:

DEPTH TO W.L.: 8.8

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.0	Cement seal
2.0-16.0	Bentonite chips
16.0-24.5	10x20 Sand
18.0-23.0	4" Schedule 40 0.010 slotted screen
23.0-23.5	Sump

DRILL RIG:

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: A. Templeton

CHECKED: T. Belunes

DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-8
RECORD OF MONITORING WELL INSTALLATION

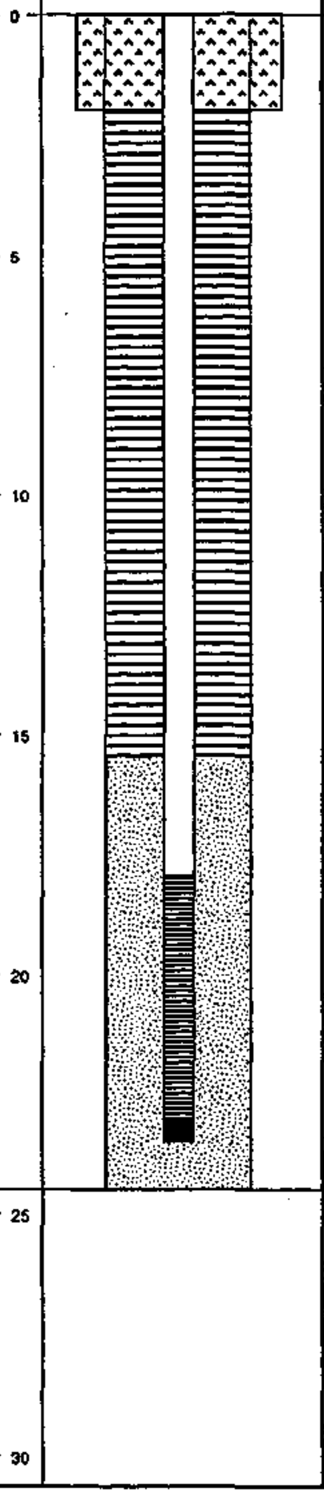
PROJECT NUMBER: 933-9725	**SHEET** 1 **OF** 1
BOREHOLE LOCATION:	**PROJECT:** Port of Longview
BOREHOLE CONDITION:	**BORING DATE:** 12/8/92

START OF INSTALLATION

HOLE DRILLED TO: 24.5'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	BORING METHOD
0.0	Brown SILT, SAND and gravel FILL	Hollow Stem Auger
1.6	Gray, silty fine to medium SAND Trace of roots	
7.8	Dark gray SILT and fine SAND	
8.2	Gray SILT Pink layer @ 9.2'	
9.6	Gray fine SAND	
12.0	Gray SILT	
13.9	Gray fine to medium SAND with SILT layers Saturated @16' Some SILT layers	
24.5	Bottom of Hole - 24.5' Below Ground Surface	



INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.0	Cement seal
2.0-15.35	Bentonite chips
15.35-24.5	10x20 Sand
18.0-23.5	4" Schedule 40 0.010 slotted screen
23.0-23.5	Sump

DRILL RIG: CME-55	**LOGGED:** A. Templeton
DRILLING CONTRACTOR: Geotech	**CHECKED:** T. Belunes
DRILLER:	**DATE:** 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-9
RECORD OF MONITORING WELL INSTALLATION

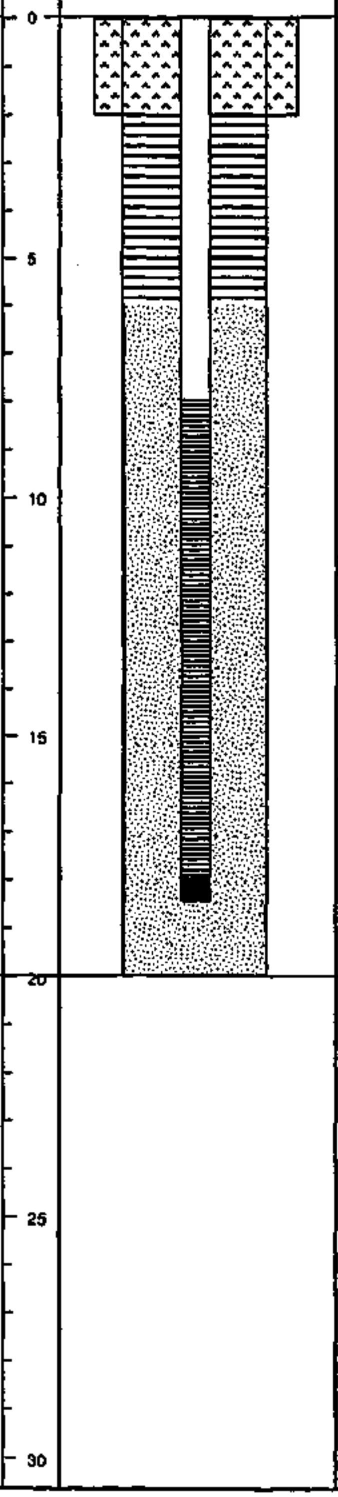
PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 12/2/92

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD
0.0	Brown, fine to coarse SAND and GRAVEL			Hollow Stem Auger
1.5	Olive gray, fine to medium SAND Iron staining			
7.5	Dark gray, fine to medium SAND, some SILT layers Odor, free product @10'			
14.6	Pink silty CLAY to clayey SILT			
15.0	Gray, fine to medium SAND, some silt			
17.3	Gray-pink SILT and CLAY			
18.5	Gray, fine to medium SAND			
20.0	Bottom of Hole - 20.0' Below Ground Surface			

DEPTH IN FEET / INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 20.0'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.0	Cement seal
2.0-6.0	Bentonite chips
6.0-20.0	10x20 Sand
8.0-18.0	4" Schedule 40 0.010 slotted screen
18.0-18.5	Sump

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-10
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

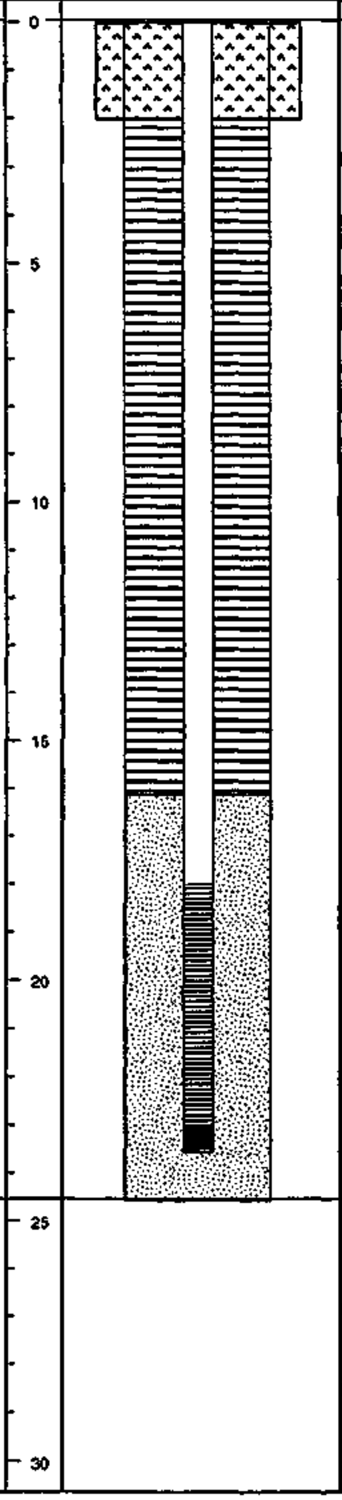
SHEET 1 **OF** 1
PROJECT: Port of Longview
BORING DATE: 12/7/92

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD
0.0	Brown SAND and GRAVEL FILL			Hollow Stem Auger
1.7	Brown, fine to medium SAND, trace gravel Iron staining			
7.1	Gray SILT grading to fine to medium SAND			
8.4	Gray fine to medium SAND, trace gravel			
11.3	Gray SILT and SAND layers			
17.3	Gray fine to medium SAND, some silt layers			
20.0	Gray fine to medium SAND, trace coarse sand			
24.5	Bottom of Hole - 24.5' Below Ground Surface			

DEPTH IN FEET

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 24.5'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.0	Cement seal
2.0-16.0	Bentonite chips
16.0-24.5	10x20 Sand
18.0-23.0	4" Schedule 40 0.010 slotted screen
23.0-23.5	Sump

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-11
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 12/3/92

START OF INSTALLATION

HOLE DRILLED TO: 20.0'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

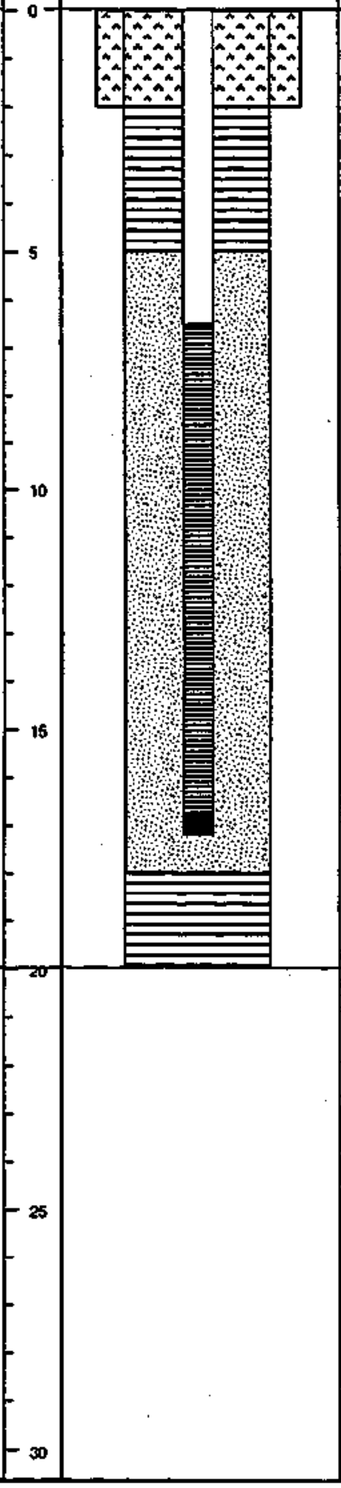
STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	WATER NOTES	BORING METHOD
0.0	Railroad ballast		Hollow Stem Auger
2.5	Gray, fine to medium SAND and GRAVEL		
3.4	Brown fine to medium SAND, trace gravel Iron staining		
9.8	Light gray SILT, micaceous, petroleum odor		
13.1	Gray and white, coarse SAND pumice layers		
17.8	Gray silty CLAY to clayey SILT		
19.0	Light gray, fine to medium SAND		
20.0	Bottom of Hole - 20.0' Below Ground Surface		

GRAPHIC LOG

DEPTH IN FEET

INSTALLATION SKETCH



INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.0	Cement seal
2.0-5.0	Bentonite chips
5.0-18.0	10x20 Sand
6.6-16.66	4" Schedule 40 0.010 slotted screen
16.66-17.16	Sump
18.0-20.0	Bentonite chips

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

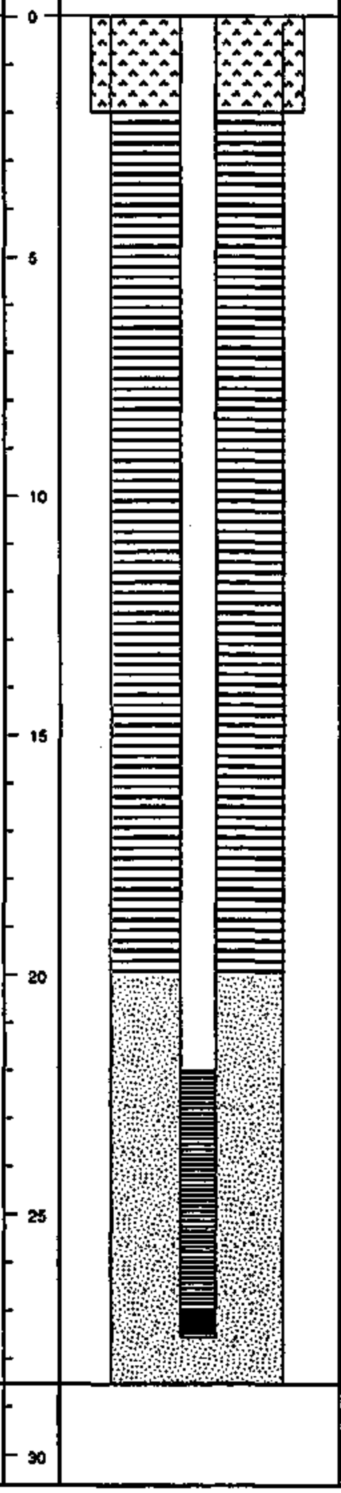
RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-12
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 12/4/92

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD
0.0	Railroad ballast			Hollow Stem Auger
2.0	Light to dark brown fine to medium SAND wet @4.5'			
5.4	Gray SILT and SAND layers			
7.8	Gray-blue SILT			
10.8	SILT and SAND layers			
11.8	Gray fine to medium SAND some silt layers Pink layer			
18.6	Gray silty CLAY to clayey SILT			
19.0	Gray, fine to medium SAND, some silt layers			
28.5	Bottom of Hole - 28.5' Below Ground Surface			



START OF INSTALLATION

HOLE DRILLED TO: 28.5'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.0	Cement seal
2.0-20.0	Bentonite chips
20.0-28.5	10x20 Sand
22.0-27.0	4" Schedule 40 0.010 slotted screen
27.0-27.5	Sump

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-13
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 5/26/93

START OF INSTALLATION

HOLE DRILLED TO: 19.9'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.: 12.0

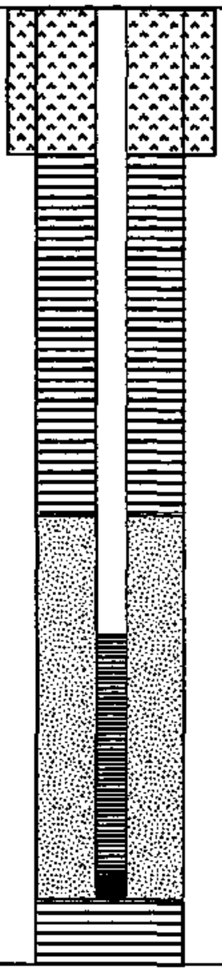
STRATIGRAPHY

Boring method: Hollow Stem Auger

Water notes: ▼ 11.5–12.0

ELEV. / DEPTH	DESCRIPTION
0.0	Railroad ballast
1.0	Moist, brown, medium SAND, some silt and gravel
3.8	Moist, brown, fine sandy SILT
4.3	Moist, brown, silty medium SAND
5.0	SILT
5.2	Moist, brown, medium SAND, some silt
8.5	Wet fine SAND
8.9	Wet brown SILT
10.0	Wet gray SILT
11.5	Wet, gray CLAY
12.0	Wet, gray medium SAND
16.5	Gray SILT
17.5	Gray CLAY
19.9	Bottom of Hole - 19.9' Below Ground Surface

INSTALLATION SKETCH



INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-3.0	Cement seal
3.0-10.5	Bentonite chips
10.5-18.5	10x20 Sand
13.0-18.0	4" Schedule 40 0.010 slotted screen
18.0-18.5	Sump
18.5-19.9	Bentonite chips

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30

DRILL RIG: CME-55
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: T. Belunes
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-14
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

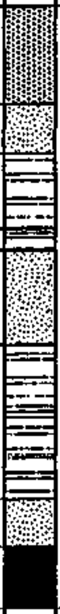
BOREHOLE CONDITION:

SHEET 1 **OF** 1

PROJECT: Port of Longview

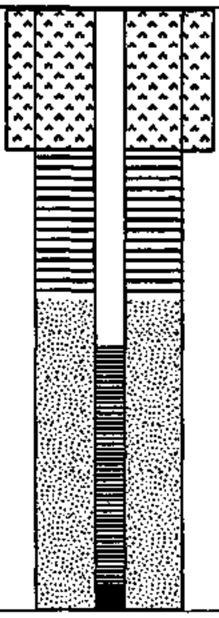
BORING DATE: 5/17/93

STRATIGRAPHY



ELEV. / DEPTH	DESCRIPTION	WATER NOTES	BORING METHOD	DEPTH IN FEET
0.0	Railroad ballast			0
2.0	Moist, brown, medium SAND			
3.0	Moist, brown, fine sandy SILT, with gravel, pieces of bunker?			
4.5	Moist, brown, clayey SILT			
5.0	Moist, brown, medium SAND Black staining, strong odor			5
7.0	Wet, gray, clayey SILT, some wood, petroleum odor	▼	Hollow Stem Auger	
10.2	Wet, gray, medium SAND, strong odor			10
11.2	Wood-free product			
12.5	Bottom of Hole - 12.5' Below Ground Surface			
				15
				20
				25
				30

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 12.5'

OPEN TO:

DEPTH CASING AUGERS:

DEPTH TO W.L.: 8.0

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.9	Cement seal
2.9-6.0	Bentonite chips
6.0-12.5	10x20 Sand
7.0-12.0	4" Schedule 40 0.010 slotted screen
12.0-12.5	Sump

DRILL RIG: CME-55

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: T. Belunes

CHECKED: T. Belunes

DATE: 7/23/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-15
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 **OF** 1

PROJECT: Port of Longview

BORING DATE: 5/18/93

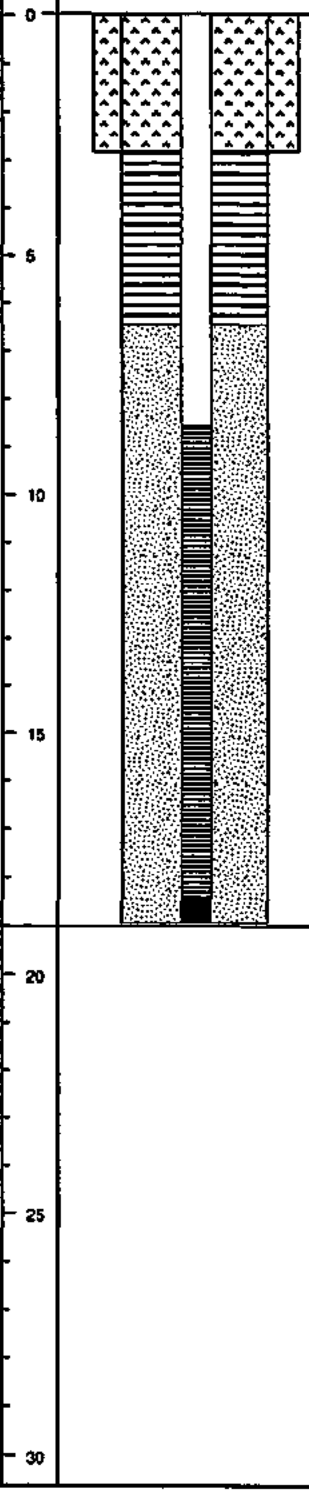
STRATIGRAPHY

ELEV. / DEPTH	DESCRIPTION	WATER NOTES	BORING METHOD
0.0	Railroad ballast		Hollow Stem Auger
2.2	FILL		
2.5	Moist, brown, clayey SILT		
3.5	Moist, brown, medium SAND		
5.6	Moist, brown, clayey SILT		
6.6	Wet, gray and brown, clayey SILT		
7.0	Wet, gray, silty fine SAND		
7.6	Moist, gray SILT petroleum odor @ 8.5'		
9.0	Moist, gray, clayey SILT slight odor		
11.5	Moist, gray, medium SAND petroleum odor @ 13.5	▼	
17.0	Wet, gray SILT		
19.0	Bottom of Hole - 19.0' Below Ground Surface		

GRAPHIC LOG

DEPTH IN FEET

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 19.0'

OPEN TO:

DEPTH CASING AUGERS:

DEPTH TO W.L.: 12.5

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.8	Cement seal
2.8-6.5	Bentonite chips
6.5-19.0	10x20 Sand
8.5-18.5	4" Schedule 40 0.010 slotted screen
18.5-19.0	Sump

DRILL RIG: CME-55

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: T. Belunes

CHECKED: T. Belunes

DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-16
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

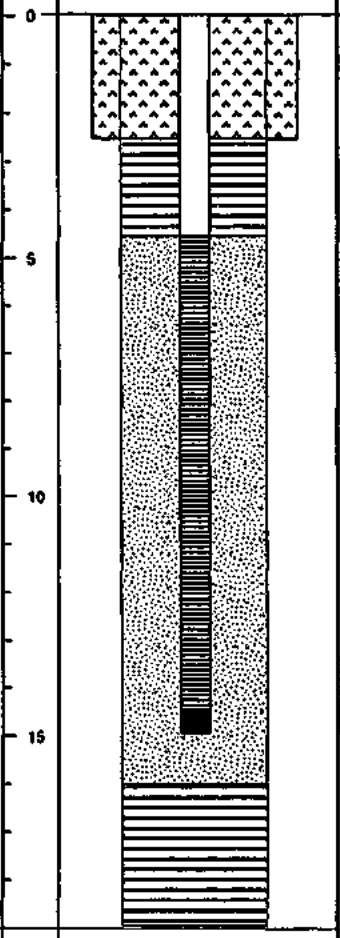
PROJECT: Port of Longview

BORING DATE: 5/18/93

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD
0.0	Railroad ballast			Hollow Stem Auger
2.0	Moist, brown, silty, medium SAND			
2.7	SILT			
3.0	Moist, brown, medium SAND			
7.0	Moist to wet, gray, clayey SILT			
9.0	Wet, gray, clayey SILT Free product			
10.0	Wet, gray, medium SAND Free product			
10.8	Wet, gray, clayey SILT Strong odor			
12.0	Wet, gray, silty CLAY Strong odor; some product			
14.0	CLAY free product			
15.0	Wet, gray SILT, slight odor			
17.0	Wet, gray medium SAND			
19.0	Bottom of Hole - 19.0' Below Ground Surface			

INSTALLATION SKETCH



DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30

START OF INSTALLATION

HOLE DRILLED TO: 19.0'

OPEN TO:

DEPTH CASING AUGERS:

DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-2.5	Cement seal
2.5-4.5	Bentonite chips
4.5-16.0	10x20 Sand
4.5-14.5	4" Schedule 40 0.010 slotted screen
14.5-15.0	Sump
16.0-19.0	Bentonite chips

DRILL RIG: CME-55

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: T. Belunes

CHECKED: T. Belunes

DATE: 7/23/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-17
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

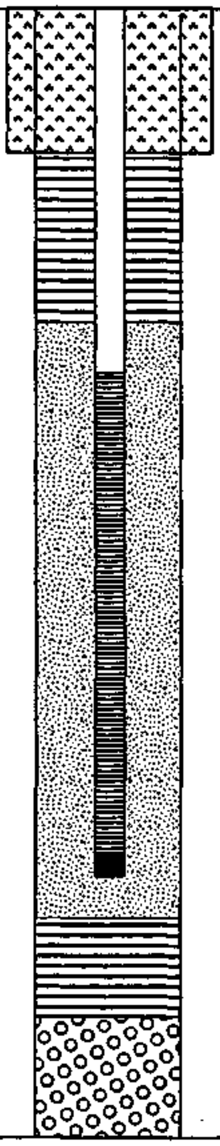
SHEET 1 **OF** 1
PROJECT: Port of Longview
BORING DATE: 5/19/93

STRATIGRAPHY

ELEV. / DEPTH	DESCRIPTION	BORING METHOD
0.0	Railroad ballast	Hollow Stem Auger
1.0	Moist brown medium SAND Bunker C	
2.0	Moist brown medium SAND Wet @ 8.0'	
10.2	Moist to wet gray clayey SILT slight odor	
12.2	Wet gray medium SAND strong odor	
13.5	Wet gray medium SAND Free product strong odor	
18.5	Wet gray medium SAND slight odor	
19.5	Moist gray clayey SILT	
20.0	Wet gray medium SAND	
23.5	Bottom of Hole - 23.5' Below Ground Surface	

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 23.5'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-3.0	Cement seal
3.0-6.5	Bentonite chips
6.5-19.0	10x20 Sand
7.5-17.5	4" Schedule 40 0.010 slotted screen
17.5-18.0	Sump
19.0-21.0	Bentonite chips
21.0-23.5	Heave

DRILL RIG: CME-55
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: T. Belunes
CHECKED: T. Belunes
DATE: 7/23/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-18
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 5/19/93

START OF INSTALLATION

HOLE DRILLED TO: 18.5'

OPEN TO:

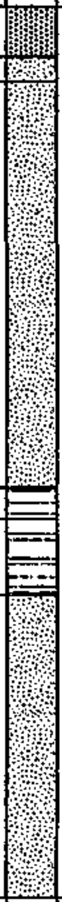
DEPTH CASING AUGERS:

DEPTH TO W.L.:

STRATIGRAPHY

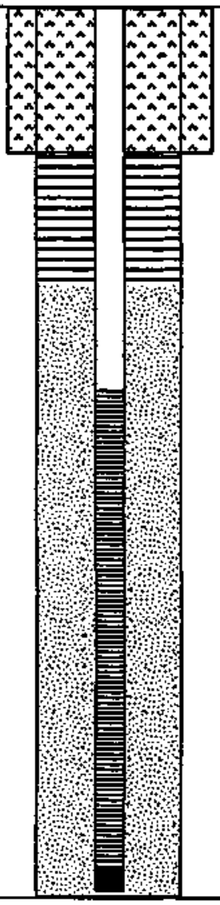
ELEV. DEPTH	DESCRIPTION	WATER NOTES	BORING METHOD
0.0	Railroad ballast		Hollow Stem Auger
1.0	SAND with crushed rock		
1.5	Moist, brown, medium SAND (massive)		
10.0	Moist, brown, clayey SILT		
10.6	Moist, gray, clayey SILT	▼	
12.25	Moist to wet, gray, medium SAND		
18.5	Bottom of Hole - 18.5' Below Ground Surface		

GRAPHIC LOG



DEPTH IN FEET

INSTALLATION SKETCH



INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-3.0	Cement seal
3.0-6.75	Bentonite chips
6.75-18.5	10x20 Sand
8.0-18.0	4" Schedule 40 0.010 slotted screen
18.0-18.5	Sump

DRILL RIG: CME-55

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: T. Belunes

CHECKED: T. Belunes

DATE: 7/26/93

Golder Associates

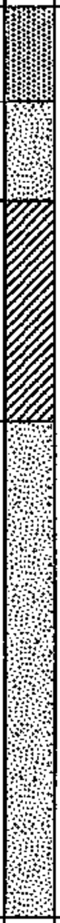
RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-19
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 **OF** 1
PROJECT: Port of Longview
BORING DATE: 5/20/93

START OF INSTALLATION
HOLE DRILLED TO: 19.0'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

STRATIGRAPHY



ELEV. / DEPTH	DESCRIPTION	WATER NOTES	BORING METHOD
0.0	Railroad ballast		Hollow Stem Auger
2.0	Moist, black SAND Free product, Bunker?		
4.0	Moist, gray, silty CLAY Free product @ 6.6		
8.5	Moist, brown, fine to medium SAND Slight odor @ 10.5 Wet @12.8'		
19.0	Bottom of Hole - 19.0' Below Ground Surface		

INSTALLATION SKETCH

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-3.0	Cement seal
3.0-13.0	Bentonite chips
13.0-19.0	10x20 Sand
13.5-18.5	4" Schedule 40 0.010 slotted screen
18.5-19.0	Sump

DRILL RIG: CME-55
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: J. Bach
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

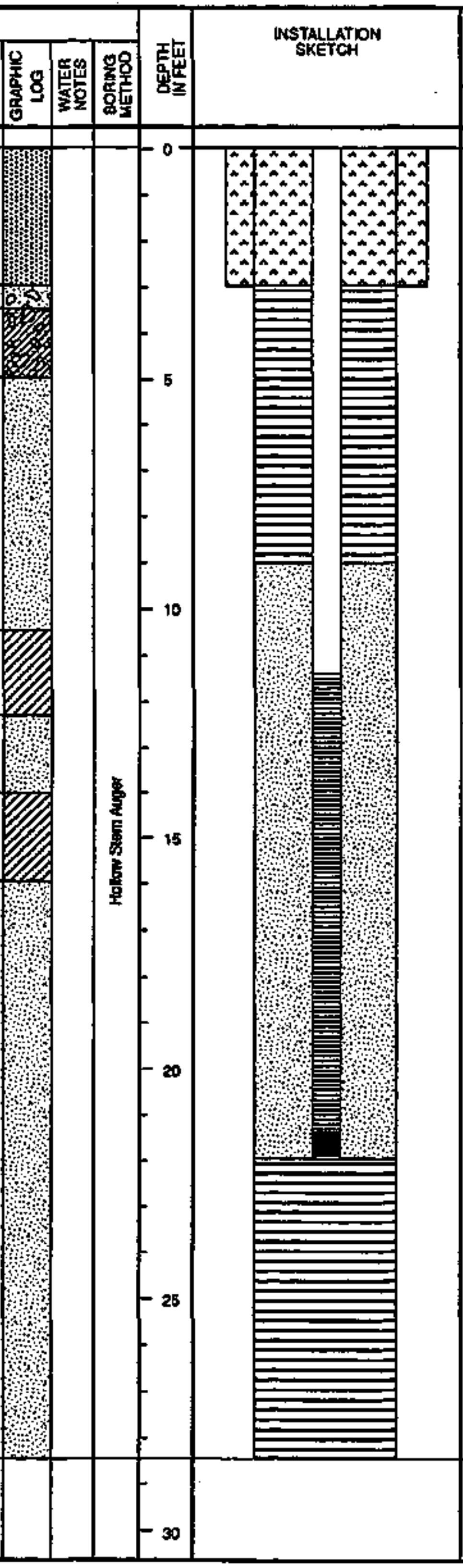
RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-20
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 5/20/93

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION
0.0	Railroad Ballast
3.0	Moist, hard, blackish brown to gray, sandy GRAVEL
3.5	Bunker C (?) Moist, gray CLAY and GRAVEL
5.0	Moist, gray, silty, fine SAND with gravel
10.5	Dark gray, sandy CLAY Wet @10.5
12.2	Moist to wet, gray fine SAND with gravel Free product at 13.0'
14.0	Wet, gray CLAY Sheen on water at 15.0'
16.0	Gray, fine to medium SAND with gravel
28.5	Bottom of Hole - 28.5' Below Ground Surface



START OF INSTALLATION

HOLE DRILLED TO: 28.5'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-3.0	Cement seal
3.0-9.0	Bentonite chips
9.0-22.0	10x20 Sand
11.5-21.5	4-inch schedule 40 0.010 slotted PVC screen
21.5-22.0	Sump
22.0-28.5	Bentonite chips

DRILL RIG: CME-55
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: J. Bach
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-21
RECORD OF MONITORING WELL INSTALLATION

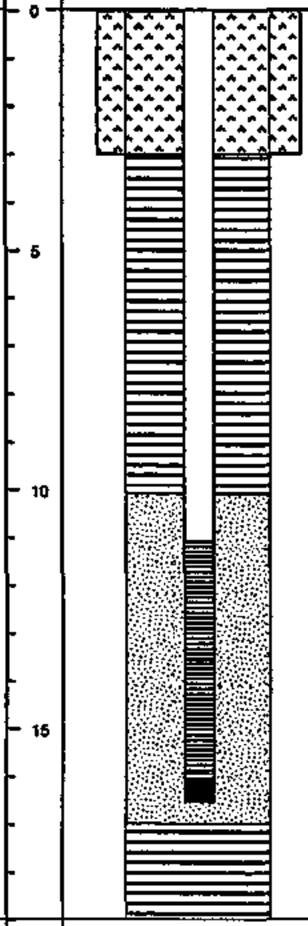
PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 **OF** 1
PROJECT: Port of Longview
BORING DATE: 5/21/93

STRATIGRAPHY

ELEV. / DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD
0.0	Gravel fill			Hollow Stem Auger
1.5	Moist, medium gray, silty CLAY			
2.5	Moist, gray, silty, fine SAND			
2.9	Moist, CLAY			
3.2	Moist, gray, silty, fine to medium SAND Wet @4.5 Increased clay content			
8.0	Wet, gray, sandy CLAY			
9.0	Wet, gray CLAY			
10.0	Wet, gray, silty, fine SAND			
17.0	Wet, gray SILT			
19.0	Bottom of Hole - 19.0' Below Ground Surface			

INSTALLATION SKETCH



START OF INSTALLATION
HOLE DRILLED TO: 19.0'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0	Flush mounted steel cap
0.0-3.0	Redi-Mix
3.0-11.0	Bentonite chips
10.0-17.0	10/20 Sand
11.0-16.0	10-slot screen
17.0-19.0	Bentonite chips

WELL DEVELOPMENT NOTES

Drillers surged the sand pack at the completion of well installation

DRILL RIG: CME-55
DRILLING CONTRACTOR: Geotech
DRILLER: Brad/Tim

LOGGED: J. Bach
CHECKED: T. Belunes
DATE: 7/26/93

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-22
RECORD OF MONITORING WELL INSTALLATION

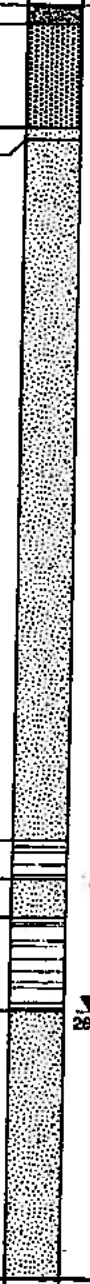
PROJECT NUMBER: 943-9735
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 **OF** 1
PROJECT: Port of Longview
BORING DATE: 3/1/94

STRATIGRAPHY

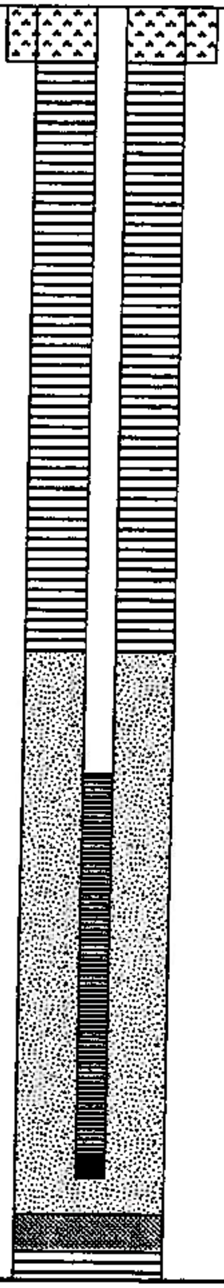
ELEV. DEPTH	DESCRIPTION	WATER NOTES
0.0	Asphalt	
0.5	Railroad Ballast PID = 0	
3.2	Brown medium SAND (FILL) PID = 0	
3.6	PID = 0 Brown medium SAND, trace gravel	
22.0	Brown SILT	
23.0	Brown medium SAND with gravel	
24.0	Gray clayey SILT, moist	
26.5	Gray fine to medium SAND with SILT layers,	▼ 26.5
33.4	Bottom of Hole - 33.4' Below ground surface	

GRAPHIC LOG



DEPTH IN FEET

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 33.4
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0-1.5	Cement Seal
1.5-17.0	3/8" Bentonite Chips
17.0-31.8	10-20 SAND
20.2-30.2	4" Schedule 40 PVC 0.010 Slotted Screen
30.2-30.7	Sump
31.8-32.8	Sluff
32.8-33.4	Bentonite Chips

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-23
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735
BOREHOLE LOCATION:
BOREHOLE CONDITION:

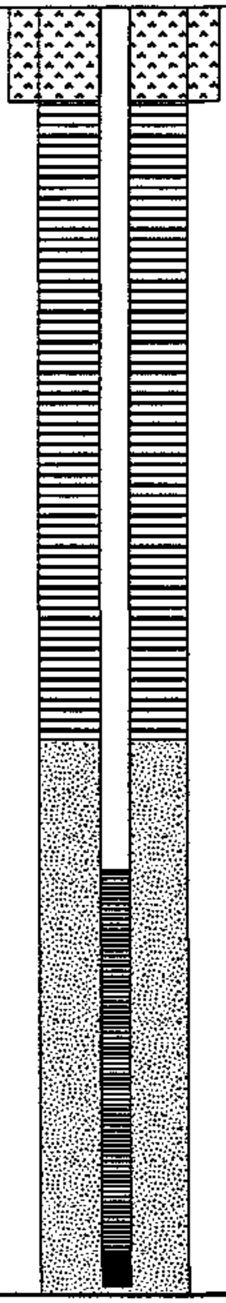
SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 3/2/94

START OF INSTALLATION
HOLE DRILLED TO: 33.4
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

STRATIGRAPHY

ELEV. / DEPTH	DESCRIPTION
0.0	Asphalt
0.5	Brown silty GRAVEL
2.2	IBrown medium SAND (damp)
11.8	IBrown SILT
12.3	IBrownish-gray fine SAND
14.5	Interbedded brown SILT and SAND
18.0	Brown medium SAND
20.0	Gray clayey SILT wet to moist at 24 '
25.5	Gray medium SAND, wet
33.6	Bottom of Hole - 33.6' Below ground surface

INSTALLATION SKETCH



INSTALLATION DETAILS

DEPTH	NOTES
0.0-2.5	Cement Seal
2..5-19.0	3/8" Bentonite Chips
19.0-33.6	10-20 SAND
22.4-32.4	4" Schedule 40 PVC 0.010 Slotted Screen
32.4-33.3	Sump

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-24
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735
BOREHOLE LOCATION:
BOREHOLE CONDITION:

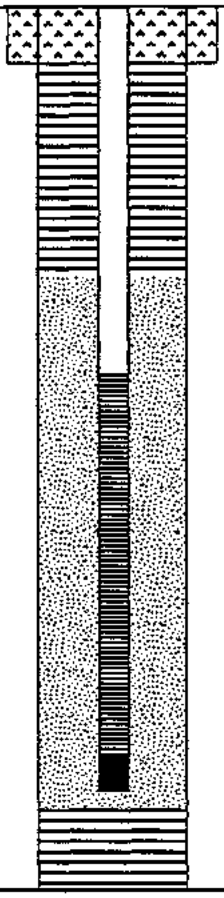
SHEET 1 **OF** 1
PROJECT: Port of Longview
BORING DATE: 3/3/94

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES
0.0	Railroad Ballast		
5.5	Brown medium SAND		
7.0	Brown SILT		
7.5	PID = 0 Brownish-gray fine to medium SAND		
12.4	Gray SILT		
15.2	Gray clayey SILT, moist, odor		
15.4	PID = 1.2 Gray medium SAND, trace gravel, wet, odor, sheen on water		
18.2	Gray fine SAND, wet		
20.4	Gray SILT, wet		
21.4	Gray clayey SILT		
22.6	Gray SAND (wet)		
23.0	Bottom of Hole - 23.0' Below ground surface		

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30, 35

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 23.0
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0-1.5	Cement Seal
1.5-7.0	3/8" Bentonite Chips
7.0-20.9	10-20 SAND
9.6-19.6	4" Schedule 40 PVC 0.010 Slotted Screen
19.6-20.5	Sump
20.9-23.0	Bentonite Chips

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-25
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735
BOREHOLE LOCATION:
BOREHOLE CONDITION:

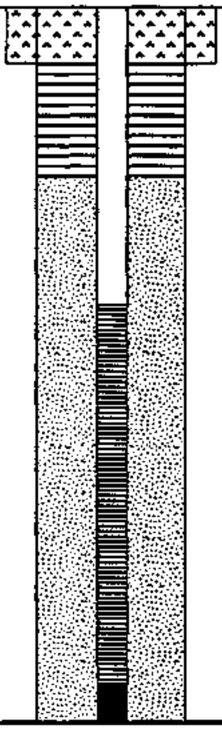
SHEET 1 **OF** 1
PROJECT: Port of Longview
BORING DATE: 3/2/94

STRATIGRAPHY

ELEV. / DEPTH	DESCRIPTION
0.0	Railroad Ballast
1.3	Brown SILT
3.6	Gray medium SAND
4.8	Gray SILT 7.4-7.7 Organic Layer
7.7	Gray SILT
8.0	Gray fine SAND wet at 9.5
10.5	silty clay zone Gray SILT and fine SAND, wet
12.5	Gray SILT
13.4	Gray SILT to SILTY CLAY, wet
16.0	Gray medium SAND, wet
18.7	Bottom of Hole - 18.7' Below ground surface

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30, 35

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 18.7
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0-1.5	Cement Seal
1.5-4.5	3/8" Bentonite Chips
4.5-18.7	10-20 SAND
7.8-17.8	4" Schedule 40 PVC 0.010 Slotted Screen
17.8-18.7	Sump

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-26
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 **OF** 2

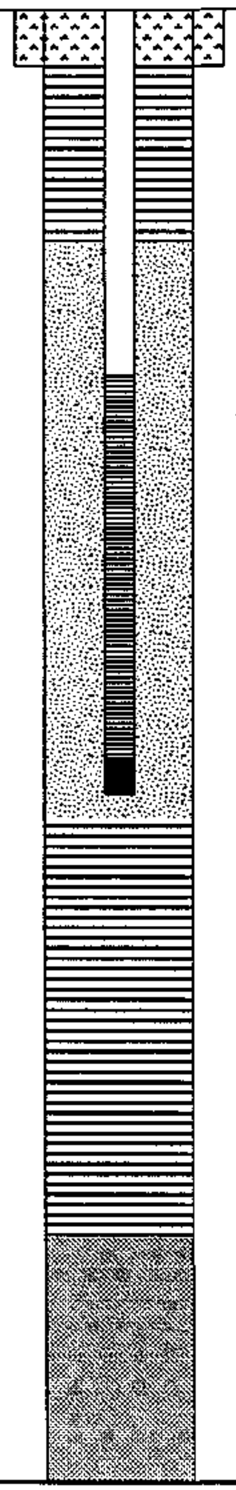
PROJECT: Port of Longview

BORING DATE: 3/3/94

STRATIGRAPHY

ELEV. / DEPTH	DESCRIPTION
0.0	Railroad Ballast
1.0	Brown medium SAND PID = 0
11.5	Gray clayey SILT
12.8	Slight petroleum odor Gray medium SAND, moist to wet, sheen on water
15.5	Gray SILT, wet
16.5	PID = 100 at 17 ' Gray fine SAND, wet, sheen on warter
20.8	Gray SILT, wet
21.8	Gray silty CLAY, odor
22.6	PID = 65 at 22' strong odor gray medium SAND, wet strong odor Silt at 28', sheen on water
29.0	Gray SILT, wet
30.4	Gray clayey SILT, wet
31.2	slight odor Gray medium SAND, wet PID = 0 at 37.5 ft. Continued

INSTALLATION SKETCH



START OF INSTALLATION

HOLE DRILLED TO: 43.5

OPEN TO:

DEPTH CASING AUGERS:

DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0-1.5	Cement Seal
1.5-6.0	3/8" Bentonite Chips
6.0-21.0	10-20 SAND
9.4-19.4	4" Schedule 40 PVC 0.010 Slotted Screen
19.4-20.3	Sump
21.0-32.0	3/8" Bentonite Chips
32.0-43.5	Sluff, collapsed hole

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:

DRILLING CONTRACTOR:

DRILLER:

LOGGED: T. Norton

CHECKED:

DATE:

Golder Associates

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-26
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 2 **OF** 2

PROJECT: Port of Longview

BORING DATE: 3/3/94

START OF INSTALLATION

HOLE DRILLED TO: 43.5

OPEN TO:

DEPTH CASING AUGERS:

DEPTH TO W.L.:

STRATIGRAPHY						INSTALLATION DETAILS	
ELEV. DEPTH	DESCRIPTION	GRAPHIC LOG	WATER NOTES	DEPTH IN FEET	INSTALLATION SKETCH	DEPTH	NOTES
35.0	Slight odor Gray medium SAND, wet PID = 0 at 37.5'	▨		35	▨	32.0-43.5	Sluff, collapsed hole
		▨		40	▨		
43.5	Bottom of hole - 43.5' Below ground surface						
				45			
				50			
				55			
				60			
				65			
				70			

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:

DRILLING CONTRACTOR:

DRILLER:

LOGGED: T. Norton

CHECKED:

DATE:

Golder Associates

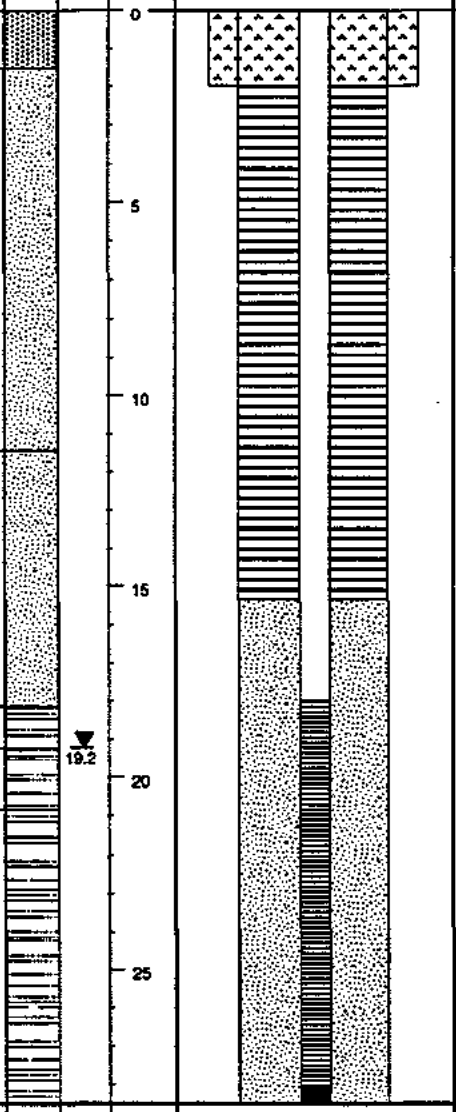
RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-27
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 3/21/94

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION
0.0	Railroad Ballast
1.5	Gray medium SAND, damp 7.0-8.8 Gravels
11.4	PID = 0 Gray fine SAND, damp
18.1	Gray sandy SILT PID = 0
19.2	Moist to moist Gray clayey SILT
20.9	Gray fine sandy SILT, wet PID = 0 Silt
28.6	Bottom of Hole - 28.6' Below ground surface



START OF INSTALLATION

HOLE DRILLED TO: 28.6
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0-2.0	Cement Seal
2.0-15.3	3/8" Bentonite Chips
4.5-18.7	10-20 SAND
18.0-28.0	2" Schedule 40 PVC 0.010 Slotted Screen
28.0-28.6	Sump

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:

Golder Associates

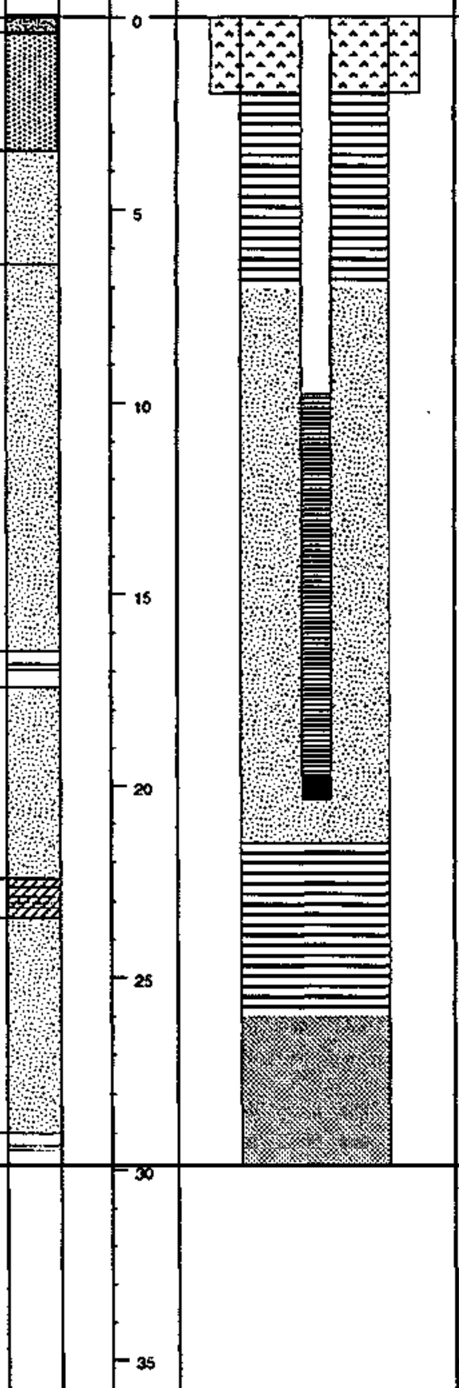
RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-28
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 3/22/94

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION
0.0	Asphalt
0.5	Railroad Ballast
3.3	Brown fine to medium SAND FILL
6.3	Gray fine to medium SAND, moist wood at 11' trace gravel at 12.8-13.3 PID = 58.7 at 14.6' wet at 15' odor, sheen on water PID = 60 at 15.5'
16.5	Gray clayey SILT
17.4	Gray silty fine SAND, wet PID = 20 at 20' sheen
22.3	Interbedded CLAY and SILT, petroleum odor
23.3	Gray medium SAND, wet PID = 20 at 26'
29.0	Gray SILT, wet PID = 0
29.9	Bottom of Hole - 29.9' Below ground surface



START OF INSTALLATION

HOLE DRILLED TO: 29.9
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.:

INSTALLATION DETAILS

DEPTH	NOTES
0.0-2.0	Cement Seal
2.0-7.0	3/8" Bentonite Chips
7.0-21.5	10-20 SAND
9.8-19.8	2" Schedule 40 PVC 0.010 Slotted Screen
19.8-20.4	Sump
21.5-26.0	Bentonite Chips
26.0-29.9	Sluff

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:

Golder Associates

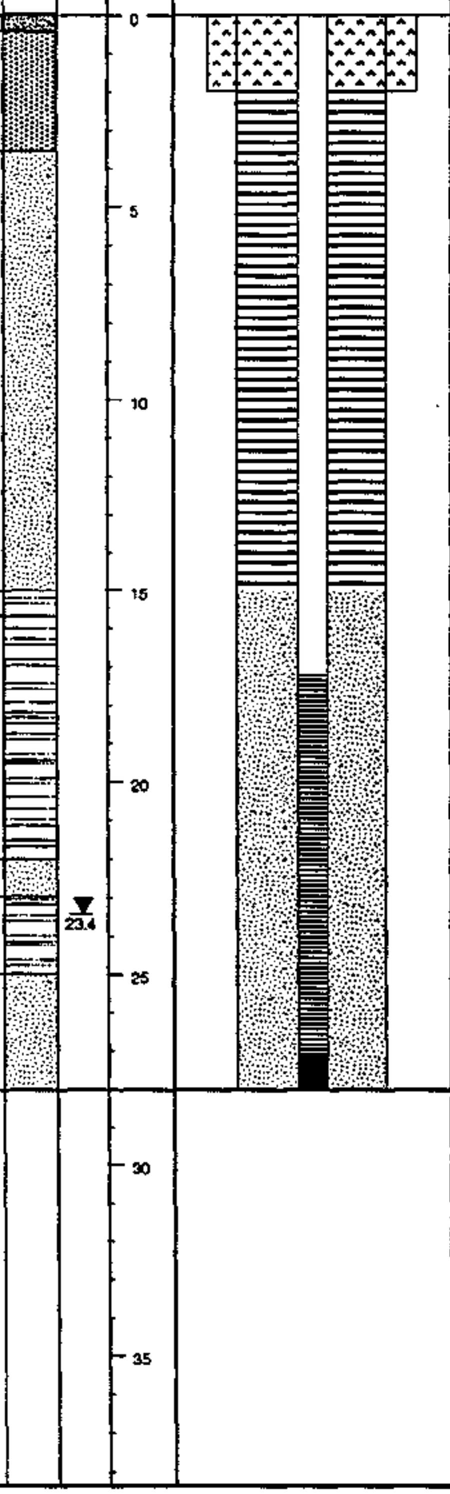
RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-29
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 6/3/94

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION
0.0	Asphalt
0.3	Railroad Ballast
3.5	Brown fine to medium SAND, trace silt and gravel
15.0	Brown clayey SILT
15.7	Brown fine to medium SAND, moist
22.0	Gray silty fine SAND, wet
23.0	Gray clayey SILT, wet
25.0	Gray silty fine to medium SAND, moist
28.0	Bottom of Hole - 28.0' Below ground surface



START OF INSTALLATION

HOLE DRILLED TO: 28.0
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.: 22.0

INSTALLATION DETAILS

DEPTH	NOTES
0.0-2.0	Flush mounted steel cap Cement Seal
2.0-15.0	3/8" Bentonite Chips
15.0-27.7	10-20 SAND
17.2-27.2	2" Schedule 40 PVC 0.010 Slotted Screen
27.2-27.7	Sump

WELL DEVELOPMENT NOTES

Well Development Notes

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:

Golder Associates

PROJECT: Port of Longview/CAP/WA

RECORD OF BOREHOLE MW-30

SHEET 1 OF 1

DATUM:

PROJECT NUMBER: 983 9710

BORING LOCATION:

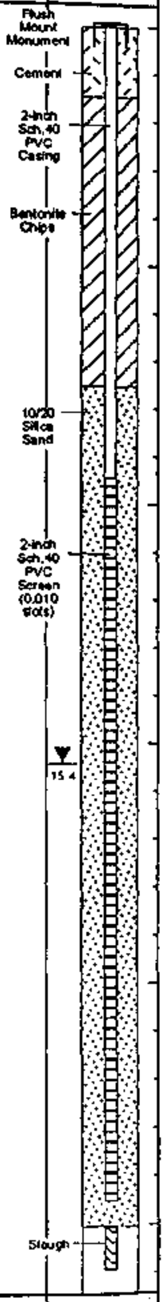
BORING DATE: 6/24/98

DEPTH FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	SAMPLES: NUMBER	TYPE	BLOWS / 6 IN. 140 lb. hammer 30 inch drop	N	REC/ATT	PID	WATER LEVEL
0	4 1/4-inch I.D. HSA	Loose to compact, olive gray (5Y 4/1), fine to medium SAND, little silt, moist	SP							
5				1	SS	5-8-10	18	14/18	0.0	
10		Loose, olive gray (5Y 4/1), fine to coarse SAND, little silt, trace fine to coarse rounded gravel, moist	SP	2	SS	6-5-5	10	15.5/18	0.0	
15		Loose, medium gray (N5), fine to medium SAND, wet	SP	3*	SS	5-3-2	5	18/18	0.0	15.4
		Olive gray (5Y 3/2), fine sandy SILT with thin laminations of clayey silt, roots, wet	SM							
20		Loose, dark gray (N3), silty fine to medium SAND, few silt lenses, wet	SP	4	SS	3-2-3	5	18/18	0.0	
25				5*	SS	3-4-6	10	18/18	0.0	
		Total depth 26.5 ft bgs * Samples submitted to a laboratory for analysis of total petroleum hydrocarbons								
30										

PENETRATION RESISTANCE BLOWS/FT. ■ 0 10 20 30 40 50

WATER CONTENT,PERCENT Wp W Wl

PIEZOMETER GRAPHIC



DRILL RIG: Mobile B-59

DRILLING CONTRACTOR: Geo-Tech Explorations

DRILLER: A. Pablo

LOGGED: R. Biegen

CHECKED:

DATE: 10/9/98

Golder Associates

PROJECT: Port of Longview/CAP/WA

RECORD OF BOREHOLE MW-31

SHEET 1 OF 1

DATUM:

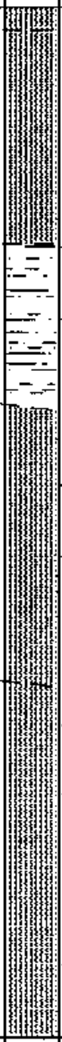
PROJECT NUMBER: 983 9710

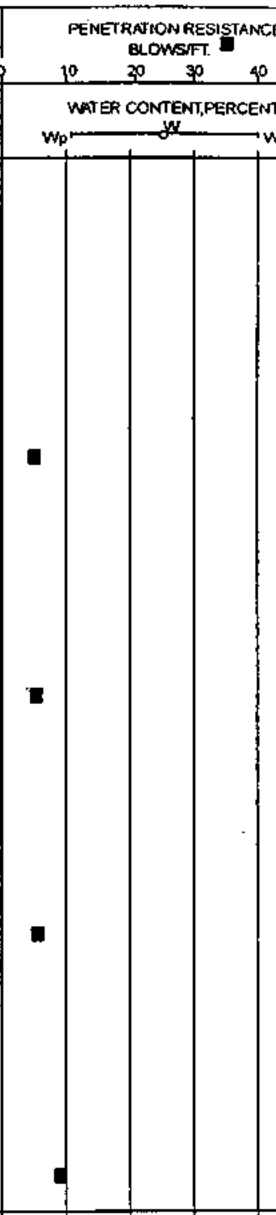
BORING LOCATION:

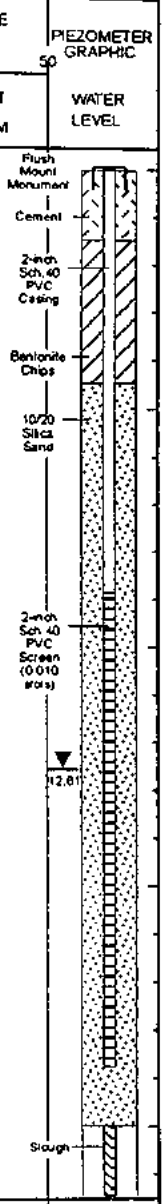
BORING DATE: 6/24/98

DEPTH FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	USCS	SAMPLES NUMBER	TYPE	BLOWS / 6 IN 140 lb. hammer 30 inch drop	N	REC/ATT	PID
0	4 1/4-inch I.D. HSA	Thin surface soil							
		Loose, dark yellowish brown (10YR 4/2), fine to medium SAND, slightly moist	SM						
5		Loose, moderate yellowish brown (10YR 5/4), fine sandy SILT with thin sand laminations	SM	1	SS	2-3-3	6	1.2/1.5	0.0
10		Loose, moderate yellowish brown (10YR 5/4), silty fine SAND, moist to wet, iron oxide staining from 10.0 to 10.5 ft	SM	2*	SS	3-3-3	6	1.3/1.5	0.0
15		Loose, medium gray (N5), medium to coarse SAND, trace fine sand, wet, pumice common from 20.0 to 21.5 ft, 1-inch silt lense at 20.4 ft	SP	3	SS	3-3-3	6	1.4/1.5	1.8
20				4*	SS	3-4-5	9		0.0
25		Total depth 21.5 ft bgs							
30									

* Samples submitted to a laboratory for analysis of total petroleum hydrocarbons







DRILL RIG: Mobile B-59

DRILLING CONTRACTOR: Geo-Tech Explorations

DRILLER: A. Pablo

LOGGED: R. Blegen

CHECKED:

DATE: 10/9/98

Golder Associates

PROJECT: Port of Longview/CAP/WA

RECORD OF BOREHOLE MW-32

SHEET 1 OF 1

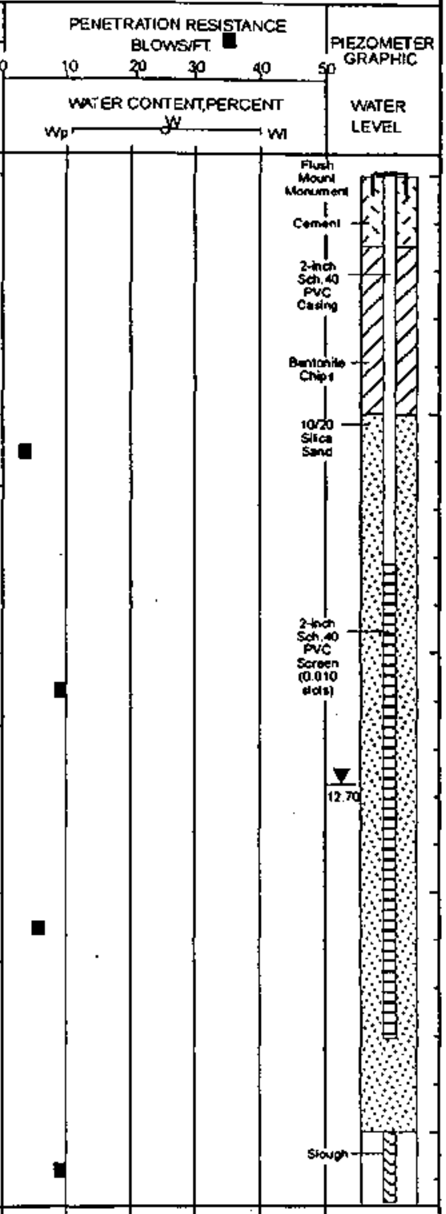
DATUM:

PROJECT NUMBER: 983 9710

BORING LOCATION:

BORING DATE: 6/24/98

DEPTH FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	SAMPLES: NUMBER	TYPE	BLOWS / 6 IN. 140 lb. hammer 30 inch drop	N	REC/ATT	PID
0	4 1/4-inch I.D. HSA	Gravel Roadbed (cuttings)							
		Moderate yellowish brown (10YR 5/4), silty SAND (cuttings)							
		Gray SILT (cuttings)							
5		Very loose, dark gray (N3), silty fine SAND (cuttings)	SM	1	SS	3-2-2	4	0/1.8	
10		Lose, interfingering layers of olive gray (5Y 3/2), silty fine SAND and SILT, roots and wood fragments common, wet	SM	2*	SS	3-4-5	9	1.5/1.5	0.0
15				3	SS	4-5-7	12	1.5/1.5	0.0
20		Compact, medium gray (N5), silty fine SAND, interfingering with SILT, trace coarse sand, wet	SM	4*	SS	4-5-5	10	1.5/1.5	0.0
		Total depth 21.5 ft bgs * Samples submitted to a laboratory for analysis of total petroleum hydrocarbons							
25									
30									



DRILL RIG: Mobile B-59

DRILLING CONTRACTOR: Geo-Tech Explorations

DRILLER: A. Pablo

LOGGED: R. Blegen

CHECKED:

DATE: 10/9/98

Golder Associates

PROJECT: Port of Longview/UST Characterization/WA

RECORD OF BOREHOLE UST-1

SHEET 1 **OF** 1

DATUM: MSL

PROJECT NUMBER: 933-9729

BORING LOCATION: Port of Longview Maintenance/Shop Facility

BORING DATE: 7/22/93

DEPTH FEET	BORING METHOD	SAMPLING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: GRAPHIC LOG	SOIL PROFILE: USCS	SOIL PROFILE: DEPTH (feet)	SAMPLES: REC/ATT	SAMPLES: NUMBER	ANALYTICAL RESULTS: BTEX (ppm)	ANALYTICAL RESULTS: TPH (ppm)	HEADSPACE ANALYSIS (ppm)	WELL CONSTRUCTION DIAGRAM	NOTES: PIEZOMETER STANDPIPE INSTALLATION
0	6.25" O.D. Hollow Stem Auger	3.5" O.D. Split Barrel Core Tube	3" Asphalt			0.0	5%						Borehole Abandoned 1207 Start drilling
			GRAVEL SUBGRADE										
			Dark yellowish brown (10YR 4/2), fine to medium SAND, little silt, dry, (FILL)		SM	1.0							
							25%						
5								1					1229 - Sample No. UST1-7/22-5
			Moderate reddish-brown (10YR 4/6), silty, fine to medium SAND, trace gravel (iron-oxide staining)										
			Interlaminated, dark yellowish brown (10 YR 4/2), fine to medium SAND and pale brown fine, sandy SILT, slightly moist		SM	9.2	50%						
10					SP/ML	10.0							
			Brownish-grey (5YR 4/1), clayey SILT, moist		CL-ML	10.4							
			Dark yellowish brown (10YR 4/2), fine to coarse SAND, trace gravel, trace silt		SW	11.0							
			Dark yellowish brown (10YR 4/2), fine to coarse SAND, little silt		SM	14.0	40%	2			0.0		1235 - Sample No. UST1-7/22-14
15													
							25%				0.0		
20													
											0.0	▼	
			Medium dark gray (10YR 4/2), fine to medium sandy SILT, little gravel, WET (First water)		ML	23.0							
			Olive gray (5YR 3/2) fine sandy SILT. Trace rootlets. Wet.		ML	24.0	100%	3					1258 - Sample No. UST1-7/22-24
25													
							100%						
			Dark gray (N3), fine to coarse SAND, little silt, wet		SM	27.0							1337 - End Drilling
			Bottom of Hole @29.0' Below Ground Surface			29.0							
30													
35													

DRILL RIG: CME-55

DRILLING SUBCONTRACTOR: Geo-Tech Explorations, Inc.

DRILLER: D. Abernathy

LOGGED: R. Blegen

CHECKED: MDL

DATE: 7/30/93

Golder Associates

PROJECT: Port of Longview/UST Characterization/WA

RECORD OF BOREHOLE UST-2

SHEET 1 **OF** 1

DATUM: MSL

PROJECT NUMBER: 933-9729

BORING LOCATION: Port of Longview Maintenance/Shop Facility

BORING DATE: 7/23/93

DEPTH FEET	BORING METHOD	SAMPLING METHOD	SOIL PROFILE: DESCRIPTION	USCS	DEPTH (feet)	SAMPLES: REC/ATT	SAMPLES: NUMBER	ANALYTICAL RESULTS: BTEX (ppm)	ANALYTICAL RESULTS: TPH (ppm)	HEADSPACE ANALYSIS (ppm)	WELL CONSTRUCTION DIAGRAM	NOTES PIEZOMETER STANDPIPE INSTALLATION
0	6.25" O.D. Hollow Stem Auger	3.5" O.D. Split Barrel Core Tube	Dark yellowish brown (10YR 4/2), silty, sandy GRAVEL (Railroad Ballast and Fill)		0.0	100%						0650-Start drilling Borehole Abandoned
			Dark yellowish brown (10YR 4/2), fine to medium SAND, little silt, (FILL)	SM								
												Tip reading 2.7 ppm
						100%						
5							1			0.0		0859 - Sample No. UST2-7/23-5
						100%						
						100%				0.0		
10							2					0910 - Sample No. UST2-7/23-10
			Olive gray (5Y 3/2), fine to medium SAND, some coarse sand, little silt			100%						
			Olive gray (5Y 3/2), fine to medium SAND, some coarse sand, little silt	SM	13.5							
			Dark yellowish brown (10 YR 4/2) silty fine SAND, some iron-oxide staining	SM	13.8	100%						
			Dark gray (N3), clayey SILT, little fine sand, moist	CL-ML	14.6							
15							3					1020 - Sample No. UST2-7/23-15
			Dark gray (N3), fine to medium SAND, little silt, moist	SM	15.2							
						60%						
			Moderate yellowish brown (10YR 5/4) gravelly, medium SAND, gravel consists of pumice fragments	SW	18.0							
			Dark gray (N3), fine to coarse SAND, wet, pumice fragments common	SW	18.5						▼	
						75%				0.0		
20							4					1031 - Sample No. UST2-7/23-20
										0.0		
						100%						
			Olive gray (5Y 4/1), clayey SILT, laminated with light brownish gray (5YR 6/1), clayey SILT	CL-ML	22.0							
			Olive gray (5Y 3/2) silty fine SAND, wet	SM	22.6							
			Bottom of Hole @24.0' Below Ground Surface		24.0							
25												
30												
35												

DRILL RIG: CME-55

DRILLING SUBCONTRACTOR: Geo-Tech Explorations, Inc.

DRILLER: D. Abernathy

LOGGED: R. Biegen

CHECKED: MDL

DATE: 7/30/93

Golder Associates

PROJECT: Port of Longview/UST Characterization/WA

RECORD OF BOREHOLE UST-3

SHEET 1 **OF** 1

DATUM: MSL

PROJECT NUMBER: 933-9729

BORING LOCATION: Port of Longview Maintenance/Shop Facility

BORING DATE: 7/23/93

DEPTH FEET	BORING METHOD	SAMPLING METHOD	SOIL PROFILE: DESCRIPTION	GRAPHIC LOG	USCS	DEPTH (feet)	SAMPLES: REC/ATT	SAMPLES: NUMBER	ANALYTICAL RESULTS: BTEX (ppm)	ANALYTICAL RESULTS: TPH (ppm)	HEADSPACE ANALYSIS (ppm)	WELL CONSTRUCTION DIAGRAM	NOTES PIEZOMETER STANDPIPE INSTALLATION
0	6.25" O.D. Hollow Stem Auger	3.5" O.D. Split Barrel Core Tube	Dark yellowish brown (10YR 4/2), gravelly SAND (FILL and BALLAST)			0.0	100%						1309-Start drilling Borehole Abandoned
			Dark yellowish brown (10YR 4/2), silty, fine to medium SAND (FILL)		SM	1.25							
							100%						
5								1					1319 - Sample No. UST3-7/23-5
							100%						
			Iron-oxide staining at 8 feet										
			Dark gray (N3), fine to medium SAND, little silt, slightly moist		SM	8.5	100%				0.0		
10			Dark yellowish brown (10YR 4/2), silty, fine to medium SAND, thin laminations of iron-oxide stained material		SM	9.3		2					1328 - Sample No. UST3-7/23-10
			Dark gray (N3), silty fine SAND		SM	12.7	100%						
			Dark gray (N3) fine to coarse SAND. Little fine gravel. Trace silt. Moist, slight petroleum odor.		SW	13.0							
							100%				16.4		
15								3					1409 - Sample No. UST3-7/23-14.5
							60%				0.0		
			Wet material at 18 feet					4				▼	1415 - Sample No. UST3-7/23-18
			Dark yellowish brown (10YR 4/2), silty, fine to medium SAND		SM	18.5	75%						
20			Interlaminated, olive gray (5Y 3/2), silty, fine SAND and clayey SILT		SM/ML	19.5							
			Olive gray (5Y 3/2) clayey SILT, plant roots common		CL-ML	20.5							1420 - End Drilling
			Bottom of Hole @21.5' Below Ground Surface			21.5	100%						
25													
30													
35													

DRILL RIG: CME-55

DRILLING SUBCONTRACTOR: Geo-Tech Explorations, Inc.

DRILLER: D. Abernathy

LOGGED: R. Blegen

CHECKED: MDL

DATE: 7/30/93

Golder Associates

PROJECT: Port of Longview/UST Characterization/WA

RECORD OF BOREHOLE UST-4

SHEET 1 **OF** 1

DATUM: MSL

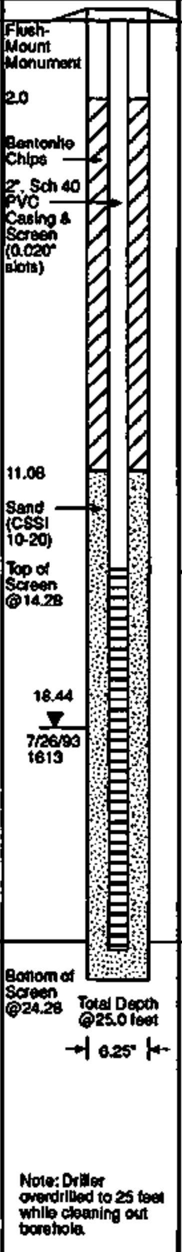
PROJECT NUMBER: 933-9729

BORING LOCATION: Port of Longview Maintenance/Shop Facility

BORING DATE: 7/26/93

DEPTH FEET	BORING METHOD	SAMPLING METHOD	SOIL PROFILE: DESCRIPTION	GRAPHIC LOG	USCS	DEPTH (feet)	SAMPLES: REC/ATT	SAMPLES: NUMBER	ANALYTICAL RESULTS: BTEX (ppm)	ANALYTICAL RESULTS: TPH (ppm)	HEADSPACE ANALYSIS (ppm)	NOTES PIEZOMETER STANDPIPE INSTALLATION
0	6.25" O.D. Hollow Stem Auger	3.5" O.D. Split Barrel Core Tube	4" Asphalt	▨		0.0	5%					0937-Start drilling
			Gravel subgrade									
			Dark yellowish brown (10YR 4/2) fine to medium SAND, little silt (FILL)		SM	1.0						
							100%					
5								1			5.8	1004 - Sample No. UST4-7/26-5
							100%					
							100%					
10								2			110	1021 - Sample No. UST4-7/26-10
			Olive gray (5Y 3/2), silty fine SAND iron-oxide staining, petroleum odor		SM	10.3						
			Light olive gray (5Y 5/2) to dark yellowish brown (10YR 4/2) fine to medium SAND, little silt		SM	11.0	100%				111	
			Light olive gray (5Y 5/2) to olive grey (5Y 3/2) silty fine to medium SAND		SM	14.0	100%					
15								3			41.7	1106 - Sample No. UST4-7/26-15
							100%					
			Dark gray (N3), medium SAND, little coarse sand, trace silt		SP	18.2						
			Dark gray (N3), silty, fine to medium SAND, little coarse sand, wet		SM	19.0	90%					
20								4				1127 - Sample No. UST4-7/26-20
			Dark gray (N3) gravelly, fine to coarse SAND		SW	22.5					101	
			Olive gray (5Y 3/2), silty fine SAND, few wood fragments, wet		SM	22.9						
			Bottom of Hole @24.0' Below Ground Surface			24.0						
25												
30												
35												

WELL CONSTRUCTION DIAGRAM



DRILL RIG: CME-55

DRILLING SUBCONTRACTOR: Geo-Tech Explorations, Inc.

DRILLER: D. Abernathy

LOGGED: R. Blegen

CHECKED: MDL

DATE: 7/30/93

Golder Associates

PROJECT: Port of Longview

PROJECT NUMBER: 943 9735

RECORD OF BOREHOLE
UST 5

BORING LOCATION:

SHEET 1 **OF** 1

DATUM: MSL

BORING DATE: 6/3/94

DEPTH FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 IN. 140 lb. hammer 30 inch drop	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ 0 10 20 30 40 50 / WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER GRAPHIC / WATER LEVEL
0	4-inch HSA	Brown SAND and coarse GRAVEL FILL			0.0							
5		Brown fine to medium SAND, some gravel, black staining at 8.0-10.0'			6.0							
10												
15		Gray fine to medium SAND, trace silt and gravel 15.0-19.0 staining			15.0							▼ 19.0
20		Brown medium to coarse SAND and fine to coarse GRAVEL			20.0							
		Gray to brown silty fine to coarse SAND, trace gravel, wet			21.0							
		Bottom of Hole at 24.0'			24.0							
25												
30												

DRILL RIG: CME-75

DRILLING CONTRACTOR:

DRILLER:

Golder Associates

LOGGED:

CHECKED:

DATE: 8/2/94

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. IB-2
RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 12/4/92

STRATIGRAPHY

ELEV. DEPTH	DESCRIPTION	WATER NOTES	BORING METHOD
0.0	Railroad ballast		Hollow Stem Auger
1.8	Gray, fine to medium SAND, trace gravel Iron Staining		
9.7	Gray SILT, iron stained		
12.0	Gray, fine to medium SAND, some silt layers	▼	
17.3	SILT		
17.8	Gray SILT to silty CLAY pink layer		
19.6	Gray, fine to medium SAND		
20.0	Bottom of Hole - 20.0' Below Ground Surface		

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30

INSTALLATION SKETCH

START OF INSTALLATION
HOLE DRILLED TO: 20.0'
OPEN TO:
DEPTH CASING AUGERS:
DEPTH TO W.L.: 13.0

INSTALLATION DETAILS

DEPTH	NOTES

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Balunes
DATE: 9/5/93

Golder Associates

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1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER 40612	BORING NUMBER SB1	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION ____ DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE ____ START 5/1/91 FINISH 5/1/91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	1.0				Top 1' - crushed rock pavement		
2.5	2.5		0	3-7-7 (14)	No recovery		
			0 8"	6-9-7 (16) 2-3-11 (14)	No recovery w/1.5" ID split spoon w/3" ID split spoon poorly graded sand, grey, dry, med dense, sand (SP)		Rock in sampler head Redrive 3" ID split spoon
5.0	5.5		17"	4-3-3 (6)	Poorly graded sand as above to 4'5" then in contact with a silt grey, moist, loose silt w/some iron stain and fine grained sand lenses throughout (ML)		
	7.0		10"	3-4-4 (8)	Silt (ML) as above to 6'8", then is a poorly graded sand, grey, wet, loose, fine to coarse sand w/an odor of petroleum (SP)		PID = 27 ppm Irridescent sheen on spoon
7.5	8.5		16"	3-2-2 (4)	Sand (SP) as above, except saturated to 8' - then is a silt, grey, wet, loose silt (ML)		GW at approx 7' depth PID = 167 ppm
					End boring at 8.5"		6 ea 50# bags Wyoben enviro plug medium used to abandon boring
10							

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PROJECT NUMBER 40612

BORING NUMBER SB2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE START 5-1-91 FINISH 5-1-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					3" asphalt pavement cover		
2.5	2.5 4.0		15"	3-3-6 (9)	Poorly graded fine sand w/silt brown, dry, sand w/occasional charcoal lenses to 3'2", then is a silt, grey, silt w/wood fibres to 3'6" then is a well graded sand, grey, moist, fine to coarse sand (SW)		PID = 7.1 ppm odor of petroleum
5.0							
	6.0 7.5		15"	4-3-3 (6)	At 6' is a well graded sand as above to 6'8", then is a poorly graded fine sand w/silt, dark grey, wet, loose, sand to 7'3", then is a clay w/ silt, dark grey, plastic clay (OH)		PID = 1000+ ppm
7.5	7.5 9.0		18"	2-2-2 (4)	Clay, as above, except wet with occasional fine grained sand lenses, to 8'8", then is a poorly graded fine sand w/silt, grey, wet, loose, fine sand (SP-SM)		PID = 2000 ppm odor of petroleum
10.0	9.0 10.5		17"	5-4-6 (10)	Sand as above to 9'3", then is a clay w/silt, grey blue, wet, plastic, clay w/wood fibres to 9'8", then is a poorly graded fine sand w/silt, grey blue, wet, loose, fine sand (SP-SM)		PID = 690 ppm odor of petroleum
12.5					End boring at 10.5'		

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PROJECT NUMBER 40612	BORING NUMBER SB3	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION DRILLING CONTRACTOR Hokkaido Drilling and developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE START 5-1-91 FINISH 5-1-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
2.5							
5	4.0 5.5		18"	2-2-3 (5)	Poorly graded fine sand w/silt, brown, dry, loose, sand (SP-SM), to 4'11", then is a silt, brown, loose, silt with iron stain throughout (ML), to 5'4", then is a clayey silt, grey blue, silt (OH) w/an odor of petroleum		PID = 32.5 ppm
7.5	7.0 8.5		16"	4-4-5 (9)	Silt w/sand, grey blue, wet, loose silt (ML), to 7'9" then is a well graded fine to coarse sand, blue, wet, loose sand (SW) to 8'3", then is a poorly graded fine sand w/silt, grey blue, wet, loose, sand w/wood chips (SP-SM)		PID - 177 ppm Odor of petroleum
10	10.0 11.5		18"	2-2-3 (5)	Poorly graded fine sand w/silt (SP-SM) as above, to 10'7", then is a silt, blue grey, moist, silt (OH), to 10'10", then is a silty clay, black, moist, clay with organic fibres throughout (OH) to 11'2", then is a clay, grey, dry, plastic, clay (OH)		PID = 30 ppm Odor of petroleum
12.5					End boring at 11'6"		9 ea 50# bags Wyoben Enviro plug medium used to abandon boring

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PROJECT NUMBER 40612

BORING NUMBER SB4 **SHEET** 1 **OF** 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE _____ START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Top 8" is a crushed rock pavement		
2.5							
5	4.0 5.5		18"	7-7-6 (13)	Poorly graded fine sand, grey, dry, med dense, sand (SP), to 5' then is a silt, brown, soft, silt w/iron stain througout (ML) to 5'4" then is a clayey silt, grey blue, dry silt (CL-ML)		
7.5	7.0 8.5		14"	4-5-4 (9)	Well graded sand, blue grey, wet loose, sand w/occasional pebbles (SW), to 8'2", then is a poorly graded fine sand, blue grey, saturated, sand (SP)		PID = 147 ppm Odor of petroleum
10	10.0 11.5		18"	5-5-4 (9)	Poorly graded sandy silt, blue grey, wet, loose, silt (ML) to 10'7", then is an interbedded silt and clay, blue grey, wet (ML)		PID = 32 ppm Odor of petroleum
12.5					End boring at 11'6"		10 ea 50# bags Wyoben enviro plug medium used to abandon boring

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PROJECT NUMBER	BORING NUMBER	
40612	SB5	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION ____ DRILLING CONTRACTOR Hokkaido Drilling and eveloping

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE ____ START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Top 8" is a crushed rock pavement		
2.5							
5	4.0 5.5		13.5'	3-4-7 (11)	Poorly graded fine to med sand, brown, dry, med dense, sand (SP)		
7.5	7.0 8.5		17"	4-4-4 (3)	Poorly graded fine sand w/silt brown grey, moist, loose, washed sand w/occasional silt lenses and piesces of charcoal (SP-SM)		
10	10.0 11.5		18"	4-4-6 (10)	Silt, grey blue, wet, stiff, silt (OL) to 10'8", then is a clayey silt, grey blue, moist, silt with woodchips throughout (OH)		PID = 12.7ppm Odor of petroleum
12.5	11.5 13.0		18"	2-3-4 (7)	Silt w/sand grey, wet, firm, silt with organic fibres (OL) to 12'2", then is a clayey silt, grey blue, moist, firm, silt with woodchips and charcoal throughout (OH)		PID = 15.8 Odor of petroleum
					End boring at 13'		11 ea 50# bags Wyoben Enviro plug medium used to abandon boring

Petroleum Services Unlimited, Inc.
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PROJECT NUMBER	BORING NUMBER	
40612	SB6	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way Longview Washington

ELEVATION ______ DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE ______ START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Top 6-8" is a crushed rock pavement Soil cuttings are a fine to med. grain sand, brown, dry		
2.5							
5							
7.5							
	8.5 10.0		18"	5-4-4 (8)	Interbedded brown and grey silt layers, moist, soft, silt (OL) to 9' then is a clay w/silt, grey blue, dry, soft, clay with interbedded silt (OH)		PID = 0.0 ppm Odor of petroleum
10	10.0 11.5		13"	3-4-4 (8)	Clay (OH) as above, to 11', then is a silt, grey, moist, soft, silt (OL)		
12.5	11.5 13.0		15"	5-3-3 (6)	Clay, grey, plastic, soft, clay (OH), to 11'10" then is a silt w/sand, grey blue, wet, loose, silt (OL)		PID = 3.7 ppm
					End boring at 13'		9 ea 50# bags Wyoben Enviro plug medium used to abandon boring

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PROJECT NUMBER 40612

BORING NUMBER SB7 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Top 24" is a crushed rock pavement		
2.5							
	4.0				Poorly graded fine sand, dry, med dense, sand (SP)		
5			15"	5-7-11 (18)			
	5.5						
7.5	7.5				Clayey silt, grey blue, wet, silt w/irridescent sheen and organic fibres, charcoal pieces (OL) to 8'3", then is a clay w/silt, dark grey, slightly plastic, dry to moist, soft, clay with some wood fibres (CL-ML)		PID = 133 ppm
			18"	2-1-1 (2)			
	9.0						
10					End boring at 9'		7 ea 50# bags Wyoben Enviro plug med used to abandon boring

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PROJECT NUMBER 40612

BORING NUMBER SB8

SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview

LOCATION 20 Port Way; Longview, Washingto

ELEVATION

DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE

START 5-2-91

FINISH 5-2-91

LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)		SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Top 3" is an asphalt pavement		
					Drill cuttings are a dark brown sand and gravel.		
2.5							
5.0							
7.5	7.5		16"	2-3-3 (6)	Poorly graded fine sand w/silt brown, loose, sand (SP) to 8'1", then is a clay w/silt, dark grey dry, plastic, firm clay (OH)		PID = 7.0 ppm Odor of petroleum
	9.0		16"	3-5-5 (10)	Clay (OH), as above, to 9'7" then is a silt, grey, moist, loose silt w/interbeds of fine sand and clay lenses		PID = 4.8 ppm Odor of petroleum
10	10.5				End of boring at 10'6"		10 ea 50# bags Wyoben Enviro plug med used to abandon boring
12.5							

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PROJECT NUMBER 40612	BORING NUMBER SB9 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION ____ DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE ____ START 5-3-91 FINISH 5-3-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Top 8-12" is a crushed rock pavement Drill cuttings and a brown sand		
2.5							
5							
7.5	9.0		18"	2-2-3 (5)	Silty clay, grey, dry, firm, slightly plastic, clay w/organic fibres throughout (OH), to 8'8", then is a silt, grey, moist, firm silt (OL)		PID = 11.7 ppm Odor of petroleum
10	10.5		16.5"	4-6-4 (10)	Silt (OL), as above, to 9'6" then is a poorly graded fine sand with silt, dark grey, moist to wet, loose, sand (SP-SM)		PID = 10.3 ppm Odor of petroleum
					End boring at 10'6"		10 ea 50# bags Wyoben Enviro plug med used to abandon boring
12.5							

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PROJECT NUMBER	BORING NUMBER	
40612	SB10	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington

ELEVATION DRILLING CONTRACTOR Hokkaido Drilling and Developing

DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig

WATER LEVEL AND DATE START 5-3-91 FINISH 5-3-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Top 8-12" is a crushed rock pavement		
2.5							
5							
7.5	7.5 9.0		17"	4-2-2 (4)	Clay w/silt, grey, moist, soft, silt (OL), to 8', then is a poorly graded sand w/silt, grey, moist, very loose, sand w/organic fibres (SP-SM)		PID = 6.7 ppm
10	9.0 10.5		18"	3-2-1 (3)	Silt, grey, moist, soft, silt (OL) to 9'7", then is a clay w/silt, light grey, wet, soft, clay (OH) to 9'10", then is a silt w/sand wet, loose, silt w/clay lenses		PID = 3.1 ppm
					End boring at 10'6"		9 ea 50# bags Wyoben Enviro plug medium used to abandon boring
12.5							

Test Pit Logs

Test Pit 1
11/23/92
South side of Bunker C Tank

Depth ft.	Description
0-2	Moist brown sand, some silt and clay fill. Hard dark grey bunker layer at 1.5 ft. Tile pipeline at 1.5 ft. , oily sheen on water in pipeline.
2-6.5	Grey clayey silt, decaying organic odor. Wood at 6.5 ft. PID 3.2 ppm at 4.0 ft.

Test Pit 2
11/23/92
West side of Bunker C Tank

0-2	Brown to yellow sand and cobble Fill, some pieces of bunker
2-2.5	Gray clayey silt
2.5-4	Light brown clayey silt
4-7	Light brown silty fine to medium sand
7-11	Grey clayey silt, with fine sands and wood fragments, strong petroleum odor.

Water entering pit from 3.5 and 5 ft., sheen on water from 3.5 ft.
PID readings of 9.7 ppm and 8.0 ppm from 7 and 11 ft., rspectively.

Test Pit 3
11/23/92
South side of Bunker C Tank.

0-1.5	Brown silty sand.
1.5-5	Grey silty sand to sandy silt, strong petroleum odor. PID at 2 ft 33.4 ppm, sample TP-3-2(d).
5-8	Grey clayey silt with wood fragments. PID at 8 ft 365 ppm, sample TP-3-8.
8-10	Grey fine sand, some silt, strong petroleum odor.

PID reading from soil pile vary from 55 to 365 ppm

Test Pit 4
11/23/92
Northwest side of Bunker C Tank.

Depth Ft.	Description
0-2.5	Moist, brown sandy silt.
2.5-3	Brown-grey medium sand, some silt.
3-6	Moist, mottled brown silty fine sand, some clay.
6-8	Moist, brown clayey silt.
8-12	Grey fine to medium sand, some silt.
12-15	Wet, mottled gray silt.

Test Pit 5
11/23/92
East side of Bunker C Tank

0-1.5	Brown clayey silt, some sand. Water entering pit at 1.5 feet.
1.5-2.0	Grey to black hard materail, possible Bunker C spill.
2-3	Moist, grey sand to sandy silt.
3-5	Moist, grey silty fine to medium sand.
5-6	Moist to wet, grey silty clay to clayey silt, water at 5 feet.
6-13	Wet, grey clayey silt

Test Pit 6
11/23/92
South of
Bunker C Tank by Army Reserve Property

0-15.	Crushed rosk fill.
1.5-2	Hard grey Bunker C (?)
2-6	Brown clayey fine sandy silt.
6-7	Wet, mottled brown clayey silt.

7-10	Wet, grey clayey silt
10-11	Grey medium sand, strong odor

Test Pit 7
11/23/92
West side of tank.

Depth ft.	Description
0-1.5	Brown clayey silt.
1.5-2	Black chunks of tar like material.

Test Pit 8
11/23/92
East side of Tank

0-4	Moist, brown clayey sandy silt
4-7	Grey medium sand.
7	Wet grey silt

Excavation appears "Clean".

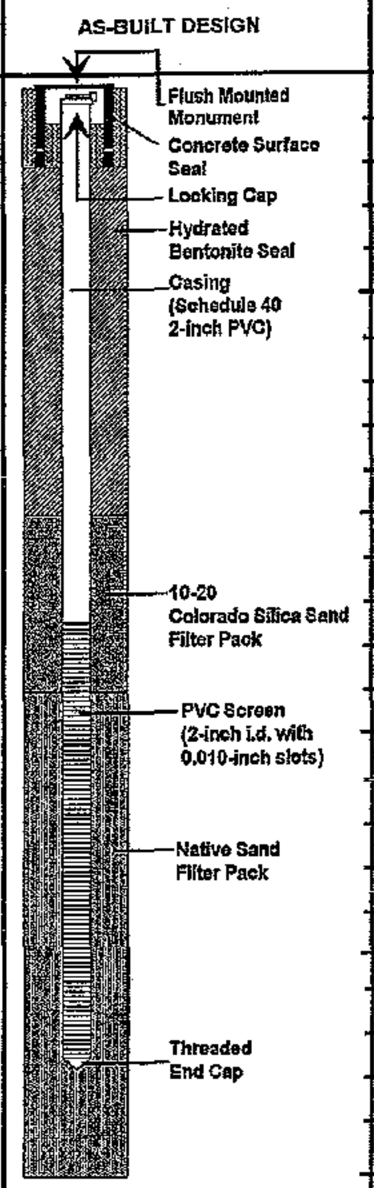
Test Pit 9
11/23/92
South of Tank by Army Reserve property.

0-1.5	Crushed rock and clay, silt, sand fill.
1.5-3	Moist, mottled, brown sandy clayey silt.
3-6.5	Grey brown silty sand.
6.5-10	Moist to wet, grey sandy silt, some wood fragment.
10-16	Dry to moist, grey clay, some silt
16	Wet grey sand, strong petroleum odor.

PROJECT: Chevron - Longview **START CARD No.: R04372** **BORING No.: AMW1**

Elevation Reference: MSL	Well Completed: 9/11/95	Boring Method: H S A
Relative Ground Surface Elevation: NA	Relative Casing Elevation: 13.33	Borehole Diameter: 8.25" O. D.

Depth (feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatile Readings	Ground Water	ANALYSES
0	3/4"-minus gravel FILL.	FILL			ppm		
	Medium stiff, moist, red-brown, medium SAND.	SP	S1/2.5	5			
5	Medium dense, moist, gray SILT. Mild organic odor.	ML	S2/5	5	345		WTPH-G WTPH-D BTEX
	Very soft, wet, dark gray, silty, fine and medium SAND, interbedded with thin silt lenses. Strong hydrocarbon-like odor.	SW with ML	S3/7.5	2	1510		WTPH-G WTPH-D BTEX
10			S4/10	4	15	SW	Pb TPH-G TPH-D BTEX WTPH-G WTPH-D BTEX
15	Medium dense, saturated, gray, coarse, andesitic SAND. Mild organic odor.	SP	S5/15	9	23		
20			S6/20	8	9		
25	Medium stiff, saturated, dark gray, fine SAND, becoming coarser with depth. Mild organic odor.	SP	S7/25	5	11		
30	Boring completed at 27 feet below ground surface. Monitoring well AMW1 installed to 22.5 feet below ground surface. Note - significant volume of heaving native sand flowed into auger during well installation and prevented placement of engineered filter-pack sand in the interval 14-25' below ground surface.						



LEGEND

- ▨ 2-inch O.D. split-spoon sample with % recovered
- △ Groundwater Analysis (Test Method Shown)
- 8015 / 8240 Soil Analysis (Test Method Shown)
- ▽ WD Encountered groundwater level while drilling
- ▽ SW Measured static groundwater level

AEE PROJECT NUMBER: 12-1272-01
Chevron - Longview
Port of Longview Maintenance Yard
Terminal Way
Longview, Washington

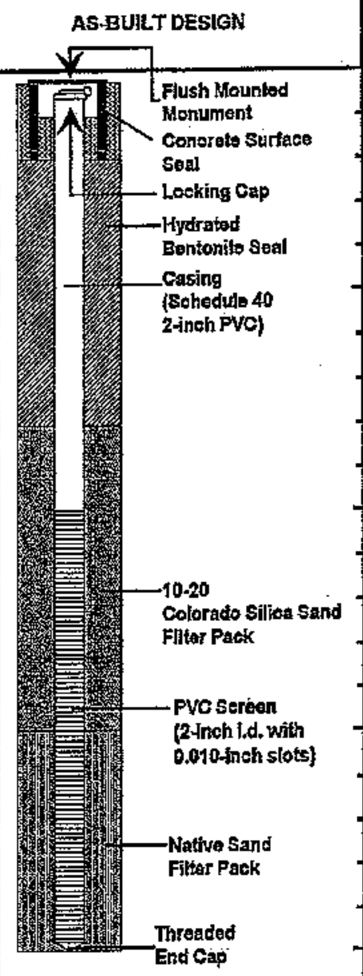
AGRA EARTH AND ENVIRONMENTAL
ENGINEERING & ENVIRONMENTAL SERVICES
7477 SW Tech Center Drive
Portland, Oregon 97223-8024
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 9/11/95 Drilling Completed: 9/11/95 Logged By: PDE a:\CHEVRONLONGVIEW\1272MW1.DRW

PROJECT: Chevron - Longview **START CARD No.: R04372** **BORING No.: AMW2**

Elevation Reference: MSL
Relative Ground Surface Elevation: NA
Well Completed: 9/11/95
Relative Casing Elevation: 13.27
Boring Method: H S A
Borehole Diameter: 8.25" O. D.

Depth (feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatile Readings ppm	Ground Water	ANALYSES
0	3/4"-minus gravel FILL.	FILL					
	Soft, moist, gray, silty, fine SAND. Strong hydrocarbon-like odor. Poor sample recovery.	SM	S8/2.5	4	800		
5	Mild organic odor.		S9/5	3	27		
	Medium dense, moist, brown-gray, micaceous SILT. Mild organic odor.	ML	S10/7.5	7	63		WTPH-G WTPH-D BTEX
10	Medium soft, wet to saturated, dark gray, medium SAND. Mild organic odor.		S11/10	n/a	16	▼ SW	Pb TPH-G TPH-D BTEX WTPH-G WTPH-D BTEX
	Medium dense, wet, gray SILT.	ML					
15	Medium stiff, saturated, dark gray, coarse, andesitic SAND.	SP	S12/15	n/a	21		
	Medium stiff, wet, gray SILT.	ML					
20	Medium stiff, saturated, dark gray, coarse, andesitic SAND.	SP	S13/20	8	23		
	Boring completed at 22 feet below ground surface. Monitoring well AMW2 installed to 20 feet below ground surface.						
25							
30							



LEGEND

▨ 2-inch O.D. split-spoon sample with % recovered

▼ WD Encountered groundwater level while drilling

▼ SW Measured static groundwater level

△ Groundwater Analysis (Test Method Shown)

8015 8240 Soil Analysis (Test Method Shown)

AEE PROJECT NUMBER: 12-1272-01
Chevron - Longview
Port of Longview Maintenance Yard
Terminal Way
Longview, Washington

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Portland, Oregon 97223-8024
Phone (503) 639-3400 FAX (503) 620-7892

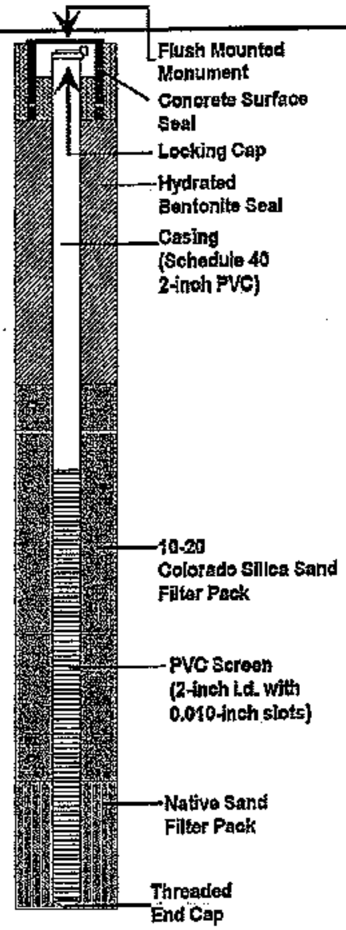
Drilling Started: 9/11/95 Drilling Completed: 9/11/95 Logged By: PDE a:\CHEVRON\LONGVIEW\1272MW2.DRW

PROJECT: Chevron - Longview **START CARD No.: R04372** **BORING No.: AMW3**

Elevation Reference: MSL	Well Completed: 9/11/95	Boring Method: H S A
Relative Ground Surface Elevation: NA	Relative Casing Elevation: 13.00	Borehole Diameter: 8.25" O. D.

Depth (Feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatile Readings ppm	Ground Water	ANALYSES
0	3/4"-minus gravel FILL.	FILL					
	Soft, moist, brown, micaceous, silty, fine SAND. Poor sample recovery.	SM	S14/2.5	3	11		
5			S15/5	3	16		
	Brown, clean, medium SAND lens.	SP					
	Silty, fine SAND.	SM	S16/7.5	5	21		△ Pb TPH-G TPH-D BTEX
10	Medium soft, moist, brown, medium SAND. Sand coarsening with depth, becoming saturated.	SP	S17/10	4	21	SW	WTPH-G WTPH-D BTEX
	Medium soft, saturated, gray, micaceous, fine SAND.	SP	S18/12.5	4	21		WTPH-G WTPH-D BTEX
15	Medium dense, saturated, gray, coarse, andesitic SAND.	SP	S19/15	8	24		WTPH-G WTPH-D BTEX
20			S20/20	5	24		
	Boring completed at 22 feet below ground surface. Monitoring well AMW3 installed to 20 feet below ground surface.						
25							
30							

AS-BUILT DESIGN



AEE PROJECT NUMBER: 12-1272-01
Chevron - Longview
Port of Longview Maintenance Yard
Terminal Way
Longview, Washington

LEGEND

- ▨ 2-inch O.D. split-spoon sample with % recovered
- △ Groundwater Analysis (Test Method Shown)
- WD Encountered groundwater level while drilling
- 8015 8240 Soil Analysis (Test Method Shown)
- SW Measured static groundwater level

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ENGINEERING & ENVIRONMENTAL SERVICES
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Portland, Oregon 97223-8024
Phone (503) 639-3400 FAX (503) 620-7892

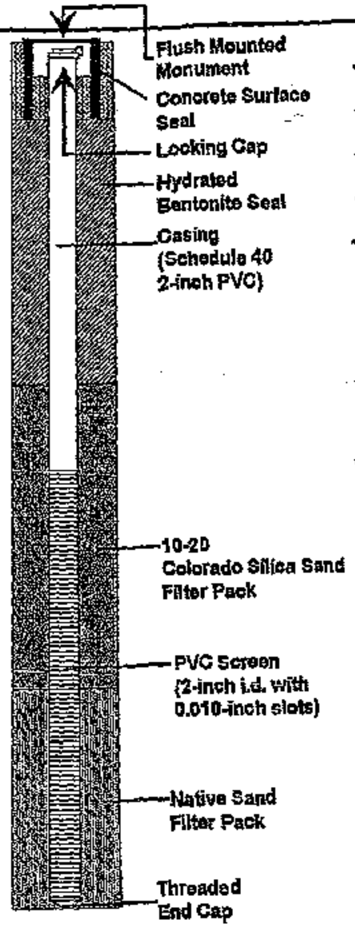
Drilling Started: 9/11/95 Drilling Completed: 9/11/95 Logged By: PDE a:\CHEVRON\LONGVIEW\1272MW3.DRW

PROJECT: Chevron - Longview
START CARD No.: R04372
BORING No.: AMW4

Elevation Reference: MSL
Relative Ground Surface Elevation: NA
Well Completed: 9/12/95
Relative Casing Elevation: 13.71
Boring Method: H S A
Borehole Diameter: 8.25" O. D.

Depth (feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatile Readings	Ground Water	ANALYSES
0	3/4"-minus gravel FILL.	FILL			ppm		
	Medium dense, moist, brown, fine SAND	SP					
	Medium dense, moist, gray, slightly organic SILT.	OL					
	Medium stiff, moist, gray, silty, fine SAND. Strong hydrocarbon-like odor. Poor sample recovery.	SM	S21/2.5	6	1520		
5	Thin lenses of clean, medium SAND below 5 feet. Strong hydrocarbon-like odor.		S22/5	3	1913		WTPH-G WTPH-D BTEX
	Poor sample recovery.		S23/7.5	4	1939		WTPH-G WTPH-D BTEX Pb TPH-G TPH-D BTEX
10	Soils becoming saturated.		S24/10	4	661	SW	WTPH-G WTPH-D BTEX
	Medium soft, saturated, gray, micaceous, fine SAND.						
	Medium stiff, saturated, gray, fine and medium SAND. Moderate hydrocarbon-like odor.	SW					
15			S25/15	6	123		
	Grading into coarse, andesitic SAND.	SP					
20			S26/20	11	109		
	Medium-grained, mafic, SAND below 21 feet below ground surface.						
	Boring completed at 22 feet below ground surface. Monitoring well AMW4 installed to 20 feet below ground surface.						
25							
30							

AS-BUILT DESIGN



LEGEND

2-inch O.D. split-spoon sample with % recovered

WD Encountered groundwater level while drilling

SW Measured static groundwater level

△ Groundwater Analysis (Test Method Shown)

8015 8240 Soil Analysis (Test Method Shown)

AEE PROJECT NUMBER: 12-1272-01
Chevron - Longview
Port of Longview Maintenance Yard
Terminal Way
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Portland, Oregon 97223-8024
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 9/12/95
Drilling Completed: 9/12/95
Logged By: PDE
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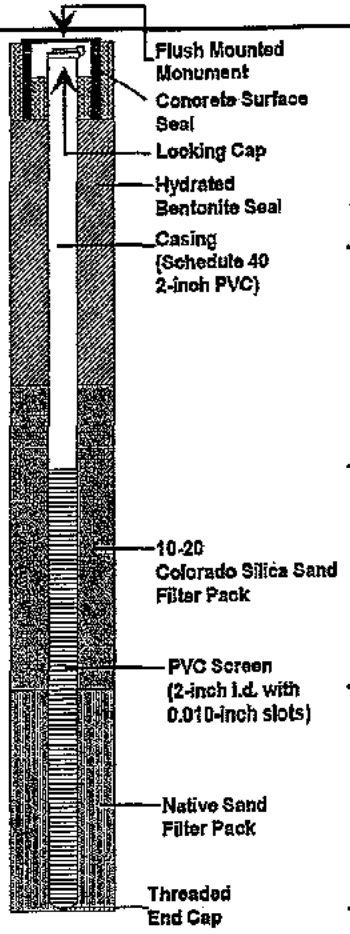
PROJECT: Chevron - Longview **START CARD No.: R04372** **BORING No.: AMW5**

Elevation Reference: MSL
Relative Ground Surface Elevation: NA
Well Completed: 9/12/95
Relative Casing Elevation: 13.55
Boring Method: H S A
Borehole Diameter: 8.25" O. D.

Depth (feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatile Readings ppm	Ground Water	ANALYSES
0	3/4"-minus gravel FILL.	FILL					
	Soft, moist, brown, slightly gravelly, medium and coarse SAND. Poor recovery.	SW	S27/2.5	4	7		
5	Very soft, moist, brown-gray, silty, fine SAND.	SM	S28/5	2	8		
	Soft, moist, brown, medium SAND.	SP					
	Medium dense, moist to saturated, brown-light gray, silty, very fine SAND, interbedded with gray fine and medium, clean SAND.	SM with SW	S29/7.5	7	12		WTPH-G WTPH-D BTEX
10			S30/10	9	7	SW	Pb TPH-G TPH-D BTEX WTPH-G WTPR-D BTEX
	Dense, saturated, brown-gray, coarse, andesitic SAND.	SP					
15			S31/15	6	6		
20			S32/20	4	5		
	Boring completed at 22 feet below ground surface. Monitoring well AMW5 installed to 20 feet below ground surface.						
25							
30							

AS-BUILT DESIGN



LEGEND

▨ 2-inch O.D. split-spoon sample with % recovered

△ Groundwater Analysis (Test Method Shown)

▼ WD Encountered groundwater level while drilling

8015 8240 Soil Analysis (Test Method Shown)

▼ SW Measured static groundwater level

AEE PROJECT NUMBER: 12-1272-01
Chevron - Longview
Port of Longview Maintenance Yard
Terminal Way
Longview, Washington

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Portland, Oregon 97223-8024
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Drilling Started: 9/12/95 Drilling Completed: 9/12/95 Logged By: PDE a:\CHEVRON\LONGVIEW\1272MW5.DRW

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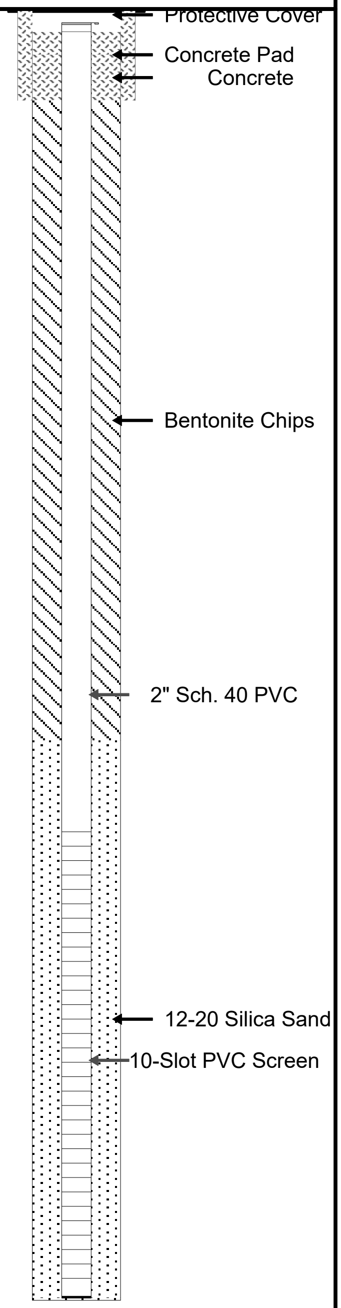
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-33**
	DRILL DATE: **3/9/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 942**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292780.64**	EASTING: **1017605.9**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **26.1**	TOC ELEVATION: **25.91**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **28.2**	DEPTH TO WATER (ft bgs): **18.18**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **18-28**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0	SP	Airknifed to 7 ft. bgs; clean **SAND** observed.				
2						
4						
6						
		Brown, fine to medium **SAND**; moist; no odor; no sheen.				
8				3 7 5	0.9	
					1.3	
10	ML	Olive-gray, sandy **SILT** with moderate plasticity; no odor; no sheen.		3 2 1	0.6	
					0.7	
12	SP	Gray, fine to medium **SAND**; wet; strong odor; heavy sheen,		3 6 9	194.0	MW-33-12-12.5
					102.0	
14				1 6 9	116.0	
					39.0	
16						
		At 17 ft., moderate odor and moderate sheen.			52.0	
18	ML	Olive-gray **SILT** with low plasticity; slight odor; no sheen.		2 4 5	20.0	
				3 2 1	22.8	
20					11.5	MW-33-19.5-20
	SP	Gray to brown, fine to medium **SAND**; wet; slight odor; no sheen.		3 8 10	11.9	
22					8.6	
				1 8 10	3.3	MW-33-22.5-23
24					3.1	
26						
28		Depth to bottom of well = 28.20 ft. bgs.				

Well Construction



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

NOTES:

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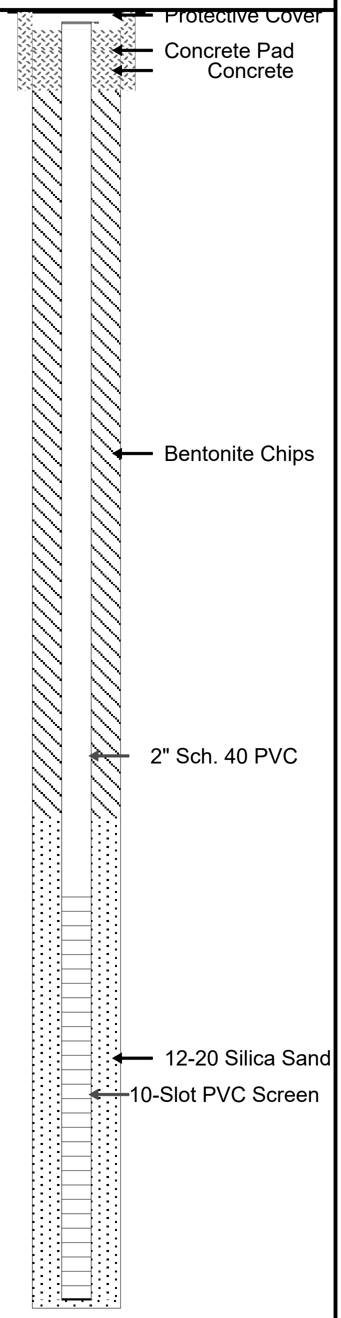
PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-34**	
DRILL DATE: **3/10/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 944**	
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292630.78**	EASTING: **1017483.21**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **26.96**	TOC ELEVATION: **26.67**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **32**	DEPTH TO WATER (ft bgs): **18.92**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **22-32**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0 2 4 6 8		Airknifed to 10 ft. bgs; asphalt ground surface; road base fill to 0.5 ft.				
10 12	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.		9 15 15 9 5 6	0.1 0.3	
14	ML	Olive, sandy **SILT** with low plasticity; moist; slight odor; no sheen.			63.0	
16	SM	Gray, silty, fine **SAND**; moderate odor; slight sheen.		3 7 7	377.0 372.0	MW-34-15-15.5
	SP-SM	Gray, fine to medium **SAND** with 10% silt.		4 5 6	95.0 96.0	
18 ▼ 20	SM/ML	From 18 to 20.5 ft., interbedded silty **SAND** and sandy **SILT**.		4 4 4 2	116.0 73.0 315.0	MW-34-20-20.5
	ML	Olive-gray **SILT** with medium plasticity; moist; slight odor; no sheen.		2 2	23.0	
22	SM	Gray, silty, fine **SAND**; wet; slight odor; no sheen.				
24 26	SP	Brown, fine to medium **SAND**; wet; slight odor; no sheen.		3 5 7 4 4 3	29.6 14.8 42.0 8.2	MW-34-24-24.5
	SM	Gray, silty, fine **SAND**; moist; slight odor; no sheen.		1	58.0	
28 30	SP	Gray, fine to medium **SAND**; wet; very slight odor; no sheen.		3 5	9.4	MW-34-28-28.5
32		Depth to bottom of well = 32 ft. bgs.				

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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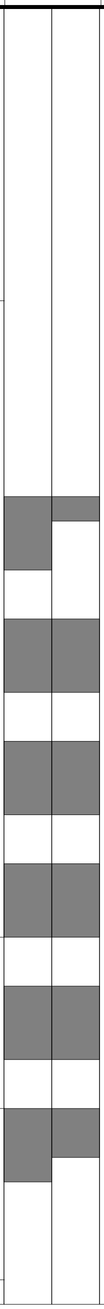
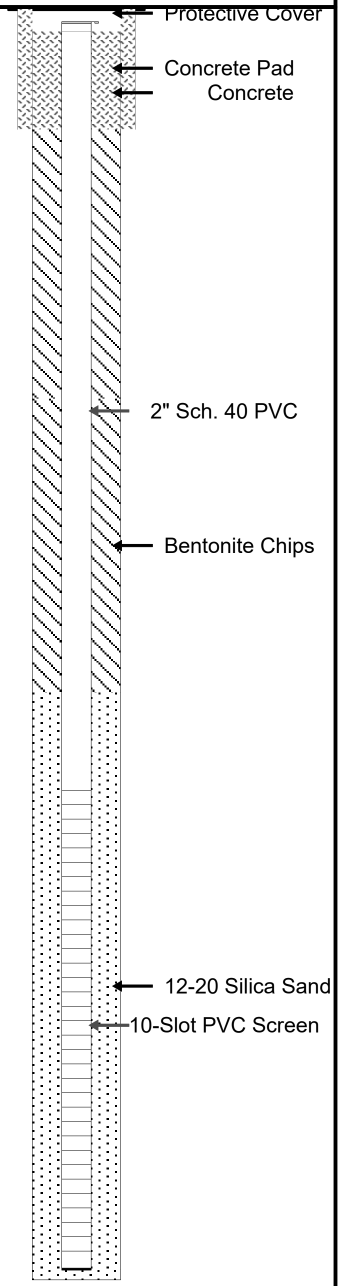
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-35**
	DRILL DATE: **3/10/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 943**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292571.93**	EASTING: **1017321.65**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **27.4**	TOC ELEVATION: **26.95**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **25.8**	DEPTH TO WATER (ft bgs): **13.71**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **16-26**

Depth (feet)	USCS Symbol	Description	# of Blows	PID (ppm)	Sample ID
0		Airknifed to 6 ft. bgs; asphalt ground surface.			
6	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.			
10			4 12 12	1.2 1.0	
12			3 10 10	2.1 1.3	
14					
15		At 19 ft., becomes wet.	2 7 8	0.3 0.2	MW-35-15.5-16
18			1 2 3	0.2 0.2	
19	ML	Olive-gray **SILT** with moderate plasticity; moist; no odor; no sheen.			
20			2 3 4	0.2 0.2	
22.5	SP	Brown to gray, fine to medium **SAND** with shell fragments; wet; no odor; no sheen.	2 5 9	0.3	
26		Depth to bottom of well = 25.80 ft. bgs.			

Drive/ Recovery



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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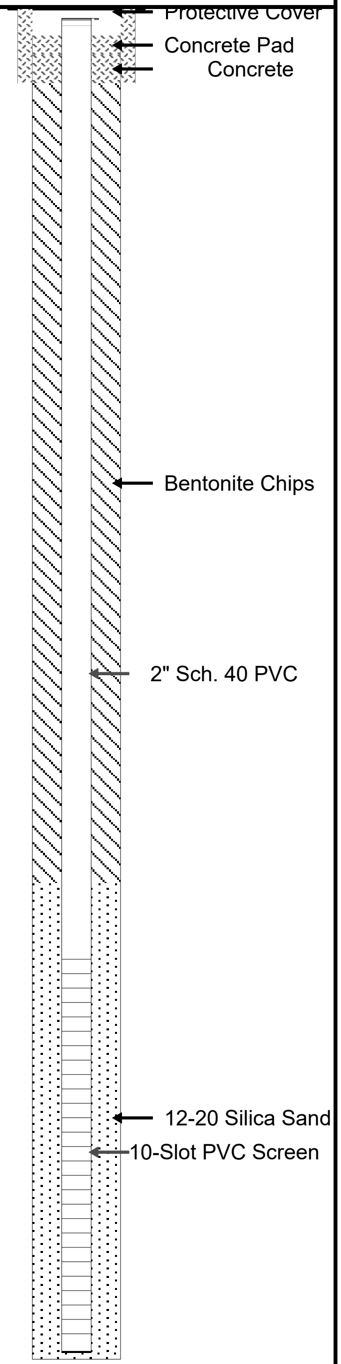
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-36**
	DRILL DATE: **3/11/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 945**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292270.4**	EASTING: **1017406**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **31.88**	TOC ELEVATION: **31.59**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **35.33**	DEPTH TO WATER (ft bgs): **24.45**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **25-35**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0		Airknifed to 8 ft. bgs.				
2						
4						
6						
8	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.				
10				7 4 5	0.0	
12						
	ML	Reddish-brown, stiff **SILT** with moderate plasticity; moist; no odor; no sheen.				
14	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.				
				2 4 4	0.0	
16						
				3 5 5	0.0	
18					0.0	
20				3 3 3	0.0	
	ML	Brown to olive, stiff **SILT** with moderate to high plasticity; moist; no odor; no sheen.			0.0	
22				0 0 0	0.1	
24 ▼					0.1	
				1 2 1	0.2	
26	SP-SM	Gray, fine to medium **SAND** with 10% silt; wet; no odor; no sheen.			0.3	
	SP	Brown, fine to medium **SAND** with 10% fine red grains; saturated; no odor; no sheen.		1 2 2		MW-36-27.5-28
28						
30						
32						
34						
		Depth to bottom of well = 35.33 ft. bgs.				

Well Construction



ABBREVIATIONS:
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NOTES:

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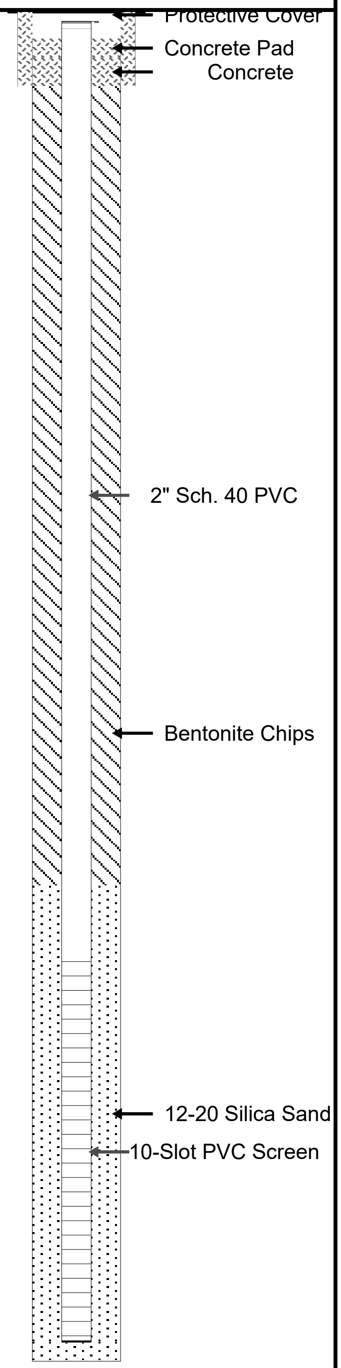
PROJECT: **POL-TPH**		LOCATION: **Longview, WA**	WELL ID: **MW-37**
DRILL DATE: **3/12/2020**		COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 947**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **292043.9**	EASTING: **1017170.7**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **31.67**	TOC ELEVATION: **31.13**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **35**	DEPTH TO WATER (ft bgs): **27.5**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **25-35**

Depth (feet)	USCS Symbol	Description	# of Blows	PID (ppm)	Sample ID
0		Airknifed to 8 ft. bgs; asphalt ground surface with sand and cobbles below.			
8	SP	Brownish-gray, fine to medium **SAND**; moist; no odor; no sheen.			
10			0 0 1	0.0	
			0 0 0	0.0	
18			0 0 0	0.0	
20		Brown, very loose, fine to medium **SAND** with 10% red grains; moist; no odor; no sheen.	0 0 0	0.0	
			0 0 0	0.0	
			1 2 3	0.0	
26		At 26 ft., becomes moist to wet; no odor; no sheen.			
28		Gray, poorly-graded **SAND** with 10% red grains; moist; no odor; no sheen.	3 3 3	0.2	MW-37-27.5-28 and MW-37D-27.5-28
		Depth to bottom of well = 35 ft. bgs.			

Well Construction



ABBREVIATIONS:
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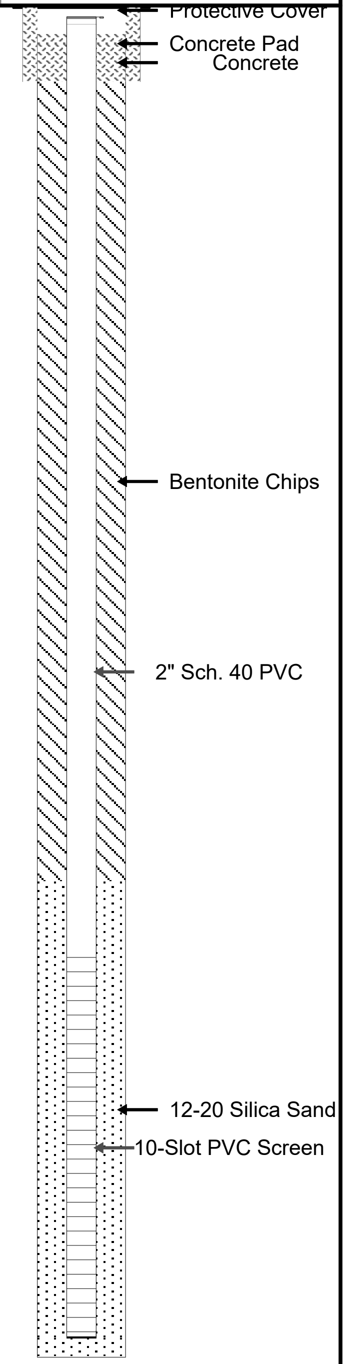
PROJECT: **POL-TPH**		LOCATION: **Longview, WA**	WELL ID: **MW-38**
DRILL DATE: **3/11/2020**		COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 946**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **G. Cisneros**	NORTHING: **291808.13**	EASTING: **1017497.79**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **31.46**	TOC ELEVATION: **31.09**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **35**	DEPTH TO WATER (ft bgs): **24**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **8 inch**	SCREENED INTERVAL: **25-35**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.				
2	SW	**SAND** and cobbles.				
4		Brown-gray, loose **SAND**; no odor; no sheen.				
6						
8						
10		Brown to gray, fine to medium **SAND**; moist; no odor; no sheen.		8 9 9	0.0 0.0	
12						
14				4 4 4	0.0 0.0	
16		Brown, fine to medium **SAND**; moist; no odor; no sheen.		3 2 2		
18		At 18 ft., rock in sampler; no recovery.				
20	SP	Brown, fine to medium **SAND** with 10% fine red grains; moist; no odor; no sheen.		2 2 2	0.0 0.0	
22		At 23 ft., becomes moist to wet.		4 7 7	0.0 0.0	MW-38-23.5-24
24 ▼		At 25 ft., becomes saturated; no odor; no sheen.		4 4 4	0.0 0.0	
26						
28				2 2 4	0.0	
30		Same as above.				
32						
34		Depth to bottom of well = 35 ft. bgs.				

Well Construction



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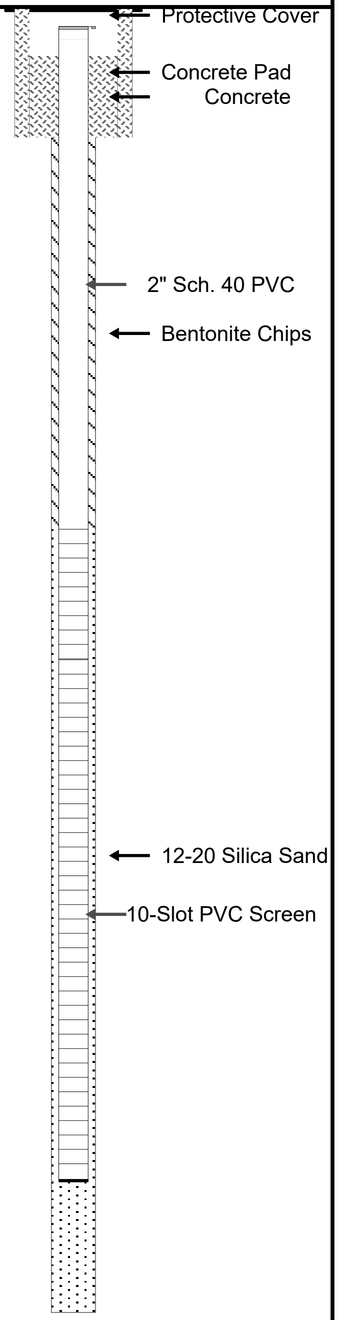
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-39**
	DRILL DATE: **3/12/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 948**
DRILLED BY: **Holt: Mike Running**	LOGGED BY: **P. Osterhout**	NORTHING: **293200.28**	EASTING: **1017952.25**
DRILLING EQUIPMENT: **LAR Geoprobe**		GROUND SURFACE ELEV.: **19.23**	TOC ELEVATION: **18.95**
DRILLING METHOD: **Direct Push**		TOTAL DEPTH (ft bgs): **20**	DEPTH TO WATER (ft bgs): **14.5**
SAMPLING METHOD: **5' x 2" Liner**		BORING DIAMETER: **3 inch**	SCREENED INTERVAL: **8-18**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0		Railroad spall, gravelly **FILL** ground surface.				
1	FILL					
2	GM	Brown, silty, sandy **GRAVEL**; moist; no odor.				
3	SP	Brown, loose, clean **SAND**; dry; no odor.			2.8	MW-39-2-4
4		Interbedded brown, silty **SAND** and mottled brown/coppery, sandy **SILT**; moist to wet; no odor; no sheen.				
5	SM/ML				2.1	
6					1.8	
7		Gray **SILT** and clayey **SILT** with < 10% organics (wood); dry to moist.				
8		At 8 ft., moderate odor; rainbow sheen.			4.8	MW-39-8-9
9	ML					
10					17.4	
11		Gray, loose, fine to coarse, clean **SAND** with trace silt.; moist to wet; moderate odor; rainbow sheen.				
12					69.6	
13						MW-39-13-14
14					67.6	
▼ 15	SP	At 14.5 ft., becomes saturated.				
16					2.4	
17						
18	SM/SP	Interbedded silty **SAND** and clean **SAND**.			1.2	
19	SP	Gray, clean **SAND**; moderate odor; rainbow sheen.				MW-39-18.5-20
20		Depth to bottom of well = 20 ft. bgs.			1.0	

Well Construction



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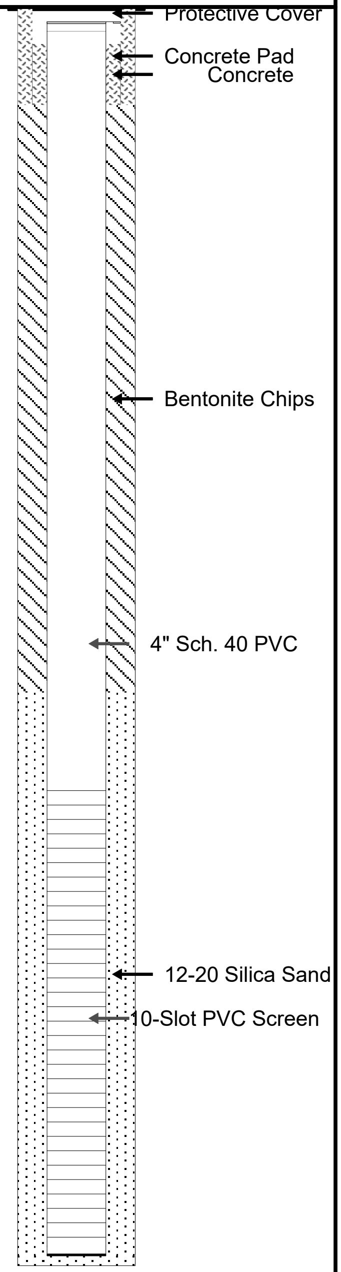
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **MW-40**
	DRILL DATE: **3/9/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 941**
DRILLED BY: **Holt: John Bennett**	LOGGED BY: **P. Osterhout**	NORTHING: **292857.32**	EASTING: **1017668.47**
DRILLING EQUIPMENT: **Truck Mounted Auger**		GROUND SURFACE ELEV.: **24.77**	TOC ELEVATION: **24.65**
DRILLING METHOD: **Hollow Stem Auger**		TOTAL DEPTH (ft bgs): **26**	DEPTH TO WATER (ft bgs): **14.95**
SAMPLING METHOD: **1.5 ft. Interval Split Spoon**		BORING DIAMETER: **10 inch**	SCREENED INTERVAL: **16-26**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	# of Blows	PID (ppm)	Sample ID
0		Hand Augered to 2 ft. bgs.				
2		Airknifed to 5 ft. bgs.				
5	SP	Fine **SAND** with angular, coarse gravel.				
9	GM	Silty **GRAVEL**.				
10.5	SP	Fine **SAND**; moist; strong odor; brown droplets.		0 3 6	351.0	MW-40-10.5-11
12		At 12 ft., trace gravel present and wood at the bottom of sampler.		2	460.0 172.0	MW-40-11-13
12.5	SM	At 12.5 ft., grades to silty **SAND**.		3 3	36.0	
13.5	ML	At 13.5 ft., grades to dark brown **SILT** with 5 -10% sand and organics; slight odor.		0 0	47.0	
15 ▼		At 15 ft., becomes gray; slight to moderate odor; no sheen.		1	86.0	
17	SP-SM	Brown, fine **SAND** with 10% silt; wet; moderate odor; slight sheen.		5 6	650.0	MW-40-17 and MW-40D-17
19	SP	Gray, fine to medium **SAND**; slight odor; wet; slight sheen.		11 3 4 8	391.0 414.0 391.0 157.0 170.0	
23.5		At 23.5 ft., odor dissipates.		2 4 7	10.7	MW-40-24-24.5
26		Depth to bottom of well = 25.70 ft. bgs.				

Well Construction



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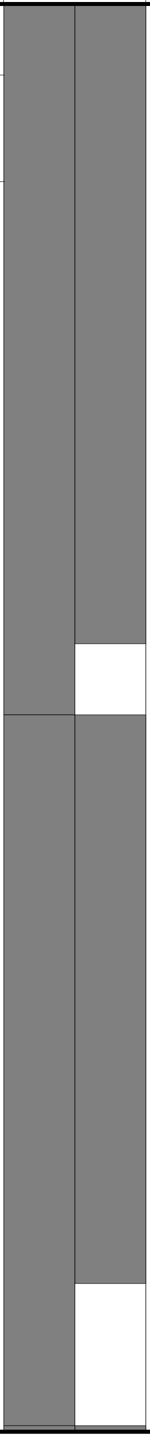
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-1**
LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN	**NORTHING:** 292952.598299	**EASTING:** 1017608.66501
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 17.5 and 21.75
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1					
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		5.1	
2					
				5.8	
3		Same as above; no odor; no sheen; moist.			
				5.6	
4					
5		Same as above; no odor; no sheen; moist.			
6				9.4	
7		Brown, medium dense, fine to coarse **SAND** with 10% fine red grains; no odor; no sheen.			
8				7.6	
9					
10					



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NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-1**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292952.598299	**EASTING:** 1017608.66501
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 17.5 and 21.75
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; moist.			
11				7.6	
12		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
				6.3	
13					
14		Same as above; no odor; no sheen; moist.		5.6	
15					
16		Same as above; no odor; no sheen; moist.		6.0	
				7.0	
17		Same as above; wet perched zone.			
▼					
18	ML	Olive gray, stiff **SILT** with moderate plasticity and organic debris; no odor; no sheen; moist.		117.4	
19		Olive gray, medium dense, fine **SAND** with 5% silt; moderate odor; no sheen; moist.		360.4	
					GP-1-19.5-20@1500
20					

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NOTES:

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PROJECT: POL-TPH		**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-1
LOGGED BY: G. Cisneros		**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292952.598299	**EASTING:** 1017608.66501
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 17.5 and 21.75
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		10.3	
21					GP-1-21-21.5@1505
▼	ML	Olive gray, stiff, sandy **SILT**; slight odor; no sheen; wet.		27.0	
22					
	SP	Gray, medium dense, fine to coarse **SAND** with 10% fine red clasts; no odor; no sheen; saturated.		23.1	
23					
24	SP	Same as above; no odor; no sheen; saturated.		10.5	
					GP-1-GW@1516
25					

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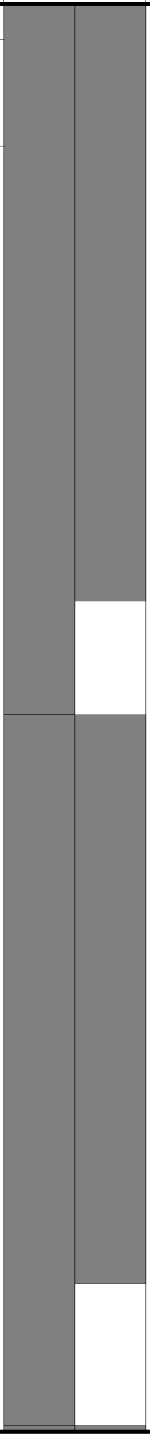
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** **GP-2**
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292848.310601	**EASTING:** 1017538.62636	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 16.5 and 21	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base **FILL**.			
1		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		1.8	
2					
3		Same as above; no odor; no sheen; moist.		5.3	
4					
5		Brown, medium dense, fine to medium **SAND** with small 2-inch layers of crushed gray rock and a 2-inch layer of black coal at 6 feet bgs; no odor; no sheen; moist.		8.9	
6				4.3	
7					
8		Light brown, medium dense, fine to coarse **SAND**; no odor; no sheen.		5.6	
9					
10	SP				

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PROJECT: POL-TPH		**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-2
LOGGED BY: G. Cisneros		**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292848.310601	**EASTING:** 1017538.62636
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 16.5 and 21
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Light brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
11				8.3	
12		Same as above; no odor; no sheen; moist.		7.1	
13				6.1	
14		Gray staining from 14.5 to 15.5 feet bgs; slight odor at 14.5 feet; no sheen; moist.		6.3	
15		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		5.6	
16					GP-2-16-16.5@1353
▼		Gray, medium dense, fine to medium **SAND**; slight odor; no sheen; wet to saturated.		7.6	
17		Gray medium dense, fine to medium **SAND**; no odor; no sheen; saturated.		7.4	
18				6.6	
	ML	Olive, stiff, sandy **SILT**; no odor; no sheen; moist.			
19					
20					

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NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-2**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292848.310601	**EASTING:** 1017538.62636
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 16.5 and 21
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Gray, medium dense, fine to medium **SAND** with 10% fine red clasts; no odor; no sheen; saturated.		7.3	
21 ▼					
22					
	SP	Same as above; no odor; no sheen; saturated.			
23					
				5.2	
24					
					GP-2-GW@1411
25					

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-3
LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN	**NORTHING:** 292780.862706	**EASTING:** 1017486.36455
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 16.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base **FILL**.			
1	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
2				51.7	GP-3-2-3@1240
3		Wood at 3.5 feet bgs.			
		Same as above with 10% fine gravel; no odor; no sheen.		3.4	
4					
5		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		7.7	
6	SW	Brown, medium dense, fine to coarse **SAND** with 10% rounded gravel and 5% silt; no odor; no sheen; moist.			
7	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		6.2	
8				6.2	
9					
10					

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-3
LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN	**NORTHING:** 292780.862706	**EASTING:** 1017486.36455
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 16.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; moist.			
				6.2	
11					
12					
13					
		Same as above; no odor; no sheen; moist.			
				5.3	
14					
15	SP	Same as above; no odor; no sheen; wet.			
				5.2	
16					
					GP-3-16-16.5@1246
▼				5.8	
		Brown to gray, fine to medium **SAND**; no odor; no sheen; saturated.			
17					
18				4.6	
		Same as above; no odor; no sheen; saturated.			
19					
20					

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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-3**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292780.862706	**EASTING:** 1017486.36455	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 16.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown to gray, fine to medium **SAND**; no odor; no sheen; saturated.			
21				3.4	
		Same as above; no odor; no sheen; saturated.			
22					
				3.2	
23	ML	Olive brown, stiff **SILT** with low plasticity; no odor; no sheen; moist.			
24	SP	Gray, medium dense, fine to medium **SAND** with 10% fine red grains; no odor; no sheen; saturated.		2.1	
25					

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

NOTES:

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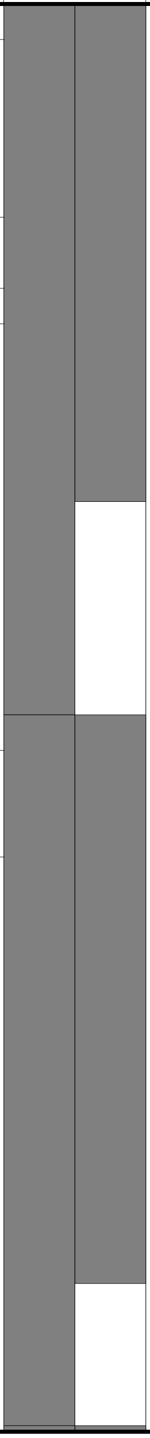
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-4	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN		**NORTHING:** 292694.507727	**EASTING:** 1017433.34722
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 21.5 and 24
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
1	FILL	Road Base **FILL**.			
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist to wet.		4.6	
2	ML	Sandy **SILT** lens at 2 feet bgs.			
3 4 5	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist. Same as above; no odor; no sheen; moist.		5.8	
	SW	Brown, medium dense, fine to coarse **SAND** with 5% silt and 5% gravel; no odor; no sheen.		7.7	
6 7 8 9 10	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist. Same as above; no odor; no sheen; moist.		6.1	



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

NOTES:

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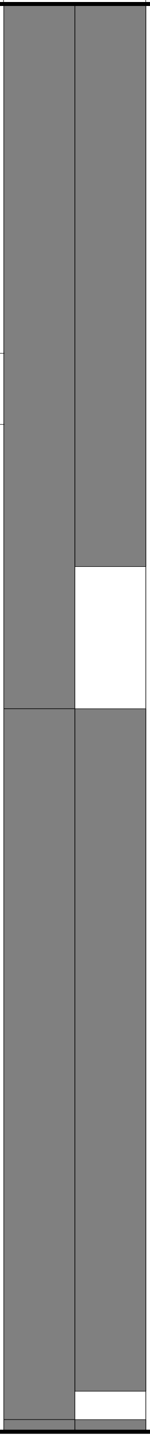
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-4
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292694.507727	**EASTING:** 1017433.34722	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 21.5 and 24	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; moist.		
11				
			4.7	
12				
	ML	Brown, stiff **SILT** with low plasticity.	4.5	
13		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		
14				
15		Same as above; no odor; no sheen; moist.		
16			5.7	
17				
	SP			
18				
		Same as above; no odor; no sheen; moist to wet.	3.0	
19				
20				

Drive/
Recovery



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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** **GP-4**
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292694.507727	**EASTING:** 1017433.34722	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 21.5 and 24	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; wet.		6.0	
21					GP-4-21-21.5@1204
▼		Same as above; no odor; no sheen; saturated.		4.0	
22	SM	Brown, medium dense, silty, fine **SAND**; no odor; no sheen; saturated.			
	ML	Brown, stiff, sandy **SILT**; no odor; no sheen; moist.		4.7	
23					
	SP	Brown to gray, medium dense, fine to medium **SAND** with 10% fine red grains; no odor; no sheen; saturated.		2.4	
24 ▼					
					GP-4-GW@
25					

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: POL-TPH

LOCATION: 10 Port Way, Longview, WA

BORING ID: **GP-5**

LOGGED BY: G. Cisneros

BORING LOCATION:

DRILLED BY: Brian, ESN

NORTHING: 292576.577732

EASTING: 1017216.47276

DRILLING EQUIPMENT: Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM: SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs): 25

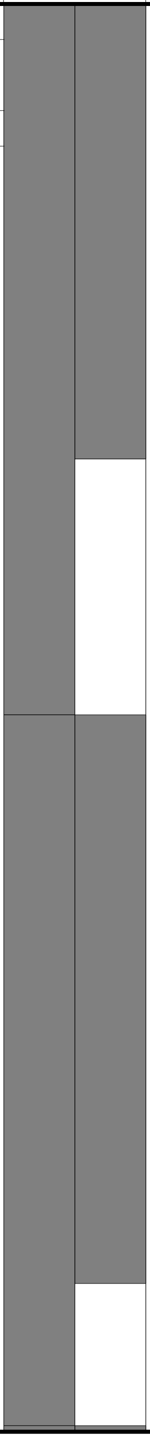
DEPTH TO WATER (ft bgs): 20

SAMPLING METHOD/SAMPLER LENGTH: Continuous

BORING DIAMETER: 2"

DRILL DATE: 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	Conc.	Concrete.			
	FILL	Road Base **FILL**.			
1		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
2				1.1	
3					
4					
5		Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
6				1.3	
7					
8		Same as above; no odor; no sheen; moist.		2.5	
9					
10					



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: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-5**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292576.577732	**EASTING:** 1017216.47276	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 20	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
11				3.2	
12					
		Same as above; no odor; no sheen; moist.		3.5	
13					
14					
15		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
16				1.2	
17					
18		Gray, fine to medium **SAND**; no odor; no sheen; wet.		4.0	
19					GP-5-19-19.5@0820
	ML	Olive gray, stiff **SILT** with low plasticity; no odor; no sheen; wet.		2.9	
20 ▼					

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: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:**	**GP-5**
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292576.577732	**EASTING:** 1017216.47276	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 20	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SP	Brown to gray, medium dense, fine to coarse **SAND** with 5% fine red grains; no odor; no sheen; saturated.	▨	2.8	
22 23	ML	Olive gray, stiff, sandy **SILT** with low to moderate plasticity; no odor; no sheen; saturated.	▨	3.4	
24	SP	Olive gray, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.	▨	3.1	
25					

ABBREVIATIONS:
ft bgs = feet below ground surface
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ppm = parts per million
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NOTES:

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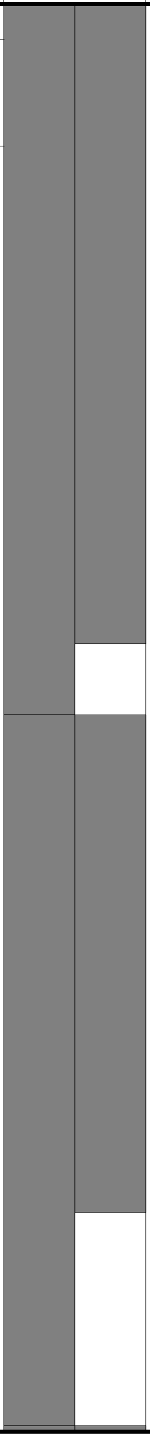
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-6	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292563.555458	**EASTING:** 1017346.54222	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 20	**DEPTH TO WATER (ft bgs):** 16.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	



Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base **FILL**.			
1	SP	Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
				2.1	
2					
3				3.6	
4		Same as above; no sheen; no odor; moist.			
				4.2	
5					
		Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel and crushed rock; no odor; no sheen; moist.			
6				1.8	
7					
				1.7	
8		Same as above; no sheen; no odor; moist.			
9	SP				
10					

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

NOTES:
Collected groundwater at 1324

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-6	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292563.555458	**EASTING:** 1017346.54222	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 20	**DEPTH TO WATER (ft bgs):** 16.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND** with 5% angular gravel clasts; no odor; no sheen; moist.		3.0	
11					
12				3.7	
13		Same as above; moist to wet at 13.75 feet bgs; no odor; no sheen.			
14					
15		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; wet to saturated at 16.5 feet bgs.		3.7	
16 ▼				2.0	GP-6-16-17@1117
17	SW	Brown, medium dense, fine to coarse **SAND** with 10% white grains; no odor; no sheen; saturated.		3.1	
18					
19	ML	Olive gray, stiff, fine, sandy **SILT**; no odor; no sheen; wet.		2.4	GP-6-GW@1324
20					

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

NOTES:
Collected groundwater at 1324

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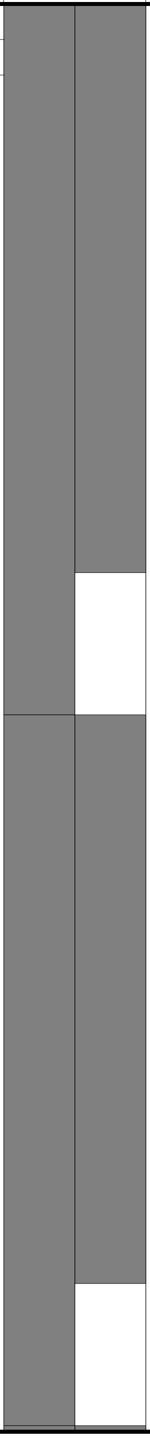
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-7	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292390.444892	**EASTING:** 1017269.96574	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base **FILL**.			
		Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
1				3.0	
2					
				1.0	
3		Same as above; no odor; no sheen; moist.			
4					
5		Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
6				2.4	
7					
8		Same as above; no odor; no sheen; moist.		2.0	
9					
	SP				
10					



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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-7**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292390.444892	**EASTING:** 1017269.96574
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND** with 5% gravel and 5% silt; no odor; no sheen; moist.			
11				3.5	
12					
13		Same as above; no odor; no sheen; moist.		2.9	
14					
15		Same as above; no odor; no sheen; moist.			
16				2.2	
17					
18				4.0	
19	SM	Brown, medium dense, silty, fine **SAND** with 15% silt.			
		Brown, medium dense, fine to medium **SAND** with 5% gravel and 5% silt; no odor; no sheen; moist.			
20					

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-7
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292390.444892	**EASTING:** 1017269.96574
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Same as above; no odor; no sheen; moist.			
21				3.3	
22				3.5	
	ML	Olive gray, stiff **SILT** with low plasticity; no odor; no sheen; moist.			
23				3.4	
24					
	SP	Brown, medium dense, fine to medium **SAND** with 5% silt; no odor; no sheen; moist.			
25				1.3	
					GP-7-25.5-26@0851
26 ▼		Same as above; no odor; no sheen; wet.		2.8	
27				3.5	
28		Same as above with shells at 28 feet bgs; no odor; no sheen; saturated.			
29				3.4	
30					

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

NOTES:

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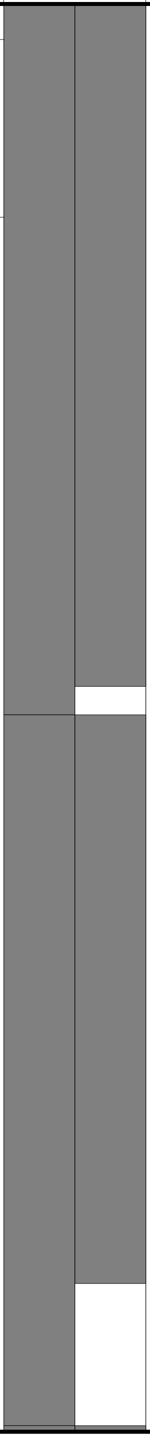
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-8	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292344.944418	**EASTING:** 1017283.86709	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base **FILL**.			
1					
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
2					
3		Same as above; no odor; no sheen; moist.		3.3	
4					
5		Same as above; no odor; no sheen; moist.			
6				3.0	
7					
8		Same as above; no odor; no sheen; moist.		2.8	
9					
10					



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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-8	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292344.944418	**EASTING:** 1017283.86709	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015	

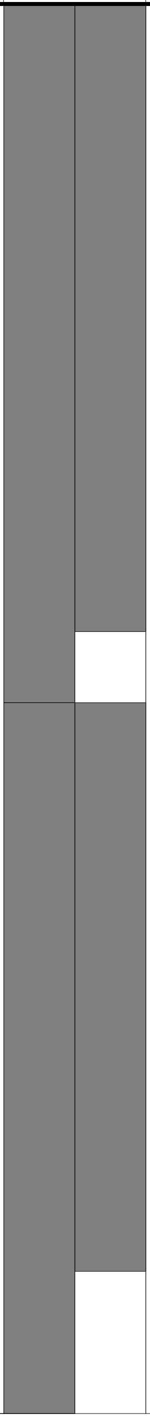
Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
11				3.9	
12		Same as above; no odor; no sheen; moist.			
13					
14				3.9	
15					
16		Brown, medium dense, fine to medium **SAND** with 5% medium red grains (Dredge **FILL**); no odor; no sheen; moist.		4.6	
17					
18				4.6	
19					
20					

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-8**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292344.944418	**EASTING:** 1017283.86709
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; moist.			
21				4.3	
22					
23		Same as above; no odor; no sheen; moist.		3.9	
24		Same as above; no odor; no sheen; wet.			
25				3.6	GP-8-25.5-26@1011
26 ▼		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.			
27				3.3	
28				2.0	
29					GP-8-GW@
30					



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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-9	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292269.877327	**EASTING:** 1017286.47024	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**; slight odor; no sheen.			
1					
				3.4	
2	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
3					
				1.4	
4					
5					
	SW	Gray to dark brown, medium dense, sandy **GRAVEL** and crushed rock; no odor; no sheen.			
6	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		1.0	
7					
8				1.1	
9					
10					

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: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-9**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292269.877327	**EASTING:** 1017286.47024	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
				1.3	
11	GW	Dark brown to gray, medium dense, sandy crushed rock **FILL**; no odor; no sheen; moist.			
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		1.5	
12					
13				0.9	
	SP				
14					
15					
	SW	Brown, medium dense, gravelly, fine to coarse **SAND** with 5% silt; no odor; no sheen; moist.		2.2	
16					
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
17					
				1.7	
18					
	SP	Same as above; gray, fine **SAND**; no odor; no sheen; moist.			
19					
				2.1	
20					

ABBREVIATIONS:
ft bgs = feet below ground surface
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NOTES:

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PROJECT: POL-TPH		**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-9
LOGGED BY: G. Cisneros		**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292269.877327	**EASTING:** 1017286.47024
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SW	Brown, medium dense, gravelly, fine to coarse **SAND** with 5% silt; no odor; no sheen; moist.		2.6	
22		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
23				2.2	
24					
25	SP	Gray, medium dense, fine to medium **SAND**; no odor; no sheen; wet.		3.6	
26					
27		Same as above; no odor; no sheen; saturated.		4.8	GP-9-27.5-28@0945
28 ▼				2.5	
29				2.3	
30					

ABBREVIATIONS:
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NOTES:

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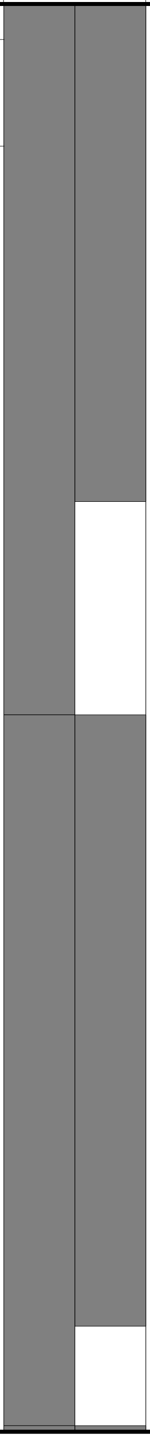
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-10**
LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN	**NORTHING:** 292333.466198	**EASTING:** 1017369.43114
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 21.5 and 28.25
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base **FILL**.			
1	SP	Brown, medium dense, fine to medium **SAND** with 5% gravel; no odor; no sheen; moist.			
2					
3				3.5	
4					
5		Same as above; no odor; no sheen; moist.			
6				3.2	
7					
8				3.4	
9					
10					



ABBREVIATIONS:
ft bgs = feet below ground surface
USCS = Unified Soil Classification System
ppm = parts per million
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-10**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292333.466198	**EASTING:** 1017369.43114	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 21.5 and 28.25	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND** with 10% angular gravel; no odor; no sheen; moist.			
11				1.8	
12					
				2.8	
13					
		Brown, stiff **SILT** with low plasticity; no odor; no sheen; moist.			
14	ML			0.9	
	SM	Brown, medium dense, silty **SAND**; no odor; no sheen; moist.			
15		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
16				3.3	
	SP				
17					
				2.0	
18					
		Brown, stiff, sandy **SILT** with low plasticity; no odor; no sheen; moist.			
19	ML				
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		3.2	
20					

ABBREVIATIONS:
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NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-10
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292333.466198	**EASTING:** 1017369.43114
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 21.5 and 28.25
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SP			2.2	
▼		Perched zone at 21.5 feet bgs.			
22	ML	Olive gray, stiff **SILT** with high plasticity; no odor; no sheen; moist.			
23				3.0	
24		Wood at 24.25 feet bgs.			
25	SP	Brown, medium dense, fine to medium **SAND** with 5% gravel; no odor; no sheen; moist.		2.1	
26	ML	Olive, stiff **SILT** with high plasticity; no odor; no sheen; moist.			
27				3.1	
28 ▼	SP	Gray, medium dense, fine to medium **SAND** with 5% fine red grains; no odor; no sheen; saturated.		2.9	GP-10-28-28.5@0820
29				1.2	
30					

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-11	
LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' East of pipeline		
DRILLED BY: Brian, ESN	**NORTHING:** 292192.993596	**EASTING:** 1017258.79383	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base **FILL**.			
2	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		1.1	
3					
4				0.9	
5					
	GW	Dark brown, medium dense, sandy, crushed rock **FILL**; no odor; no sheen; moist.			
6	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		0.7	
7					
8				0.8	
9					
10					

ABBREVIATIONS:
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ppm = parts per million ▼ = denotes groundwater table

NOTES:

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	PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-11
	LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' East of pipeline	
DRILLED BY: Brian, ESN		**NORTHING:** 292192.993596	**EASTING:** 1017258.79383
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
11	GW	Dark brown to gray, medium dense, sandy crushed rock **FILL**; no odor; no sheen; moist.		1.4	
12 13	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		0.9	
14	SM	Brown, medium dense, silty, fine **SAND** with 20% silt; no odor; no sheen; moist.		1.0	
15	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
16	SW	Brown, medium dense, gravelly, fine to coarse **SAND** with 20% subrounded gravel and 5% silt; no odor; no sheen.		1.4	
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
17 18	SM/ML	Brown to olive gray, silty **SAND** /sandy **SILT**; no odor; no sheen; moist.		1.2	
19 20		Gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-11	
LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' East of pipeline		
DRILLED BY: Brian, ESN	**NORTHING:** 292192.993596	**EASTING:** 1017258.79383	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Brown to olive gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
				1.0	
21					
22					
				1.1	
23					
24				1.2	
25					
				0.8	
26	SM	Olive gray, medium dense, silty, fine to medium **SAND** with 20% silt and some wood debris; no odor; no sheen; moist to wet.			
27				3.8	GP-11-27-27.5@0908
▼		Same as above; no odor; no sheen; wet to saturated.			
28					
				0.8	
29	ML	Olive, stiff, sandy **SILT** with low plasticity; no odor; no sheen; wet.			
30					

ABBREVIATIONS:
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NOTES:

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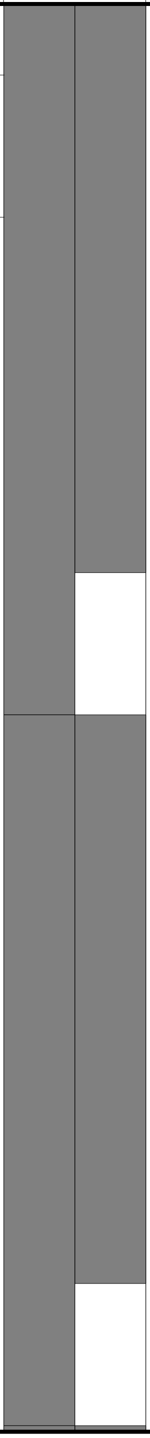
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-12
LOGGED BY: G. Cisneros	**BORING LOCATION:** 8' East of pipeline		
DRILLED BY: Brian, ESN	**NORTHING:** 292127.372664	**EASTING:** 1017213.48767	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1				3.8	
	SP	Brown, medium dense, fine to medium **SAND** with 10% gravel; no odor; no sheen; moist.			
2					
3				4.2	
4					
5		Light brown, medium dense, fine to medium **SAND** with 5% fine red grains; no odor; no sheen; moist.			
				4.2	
6					
7					
8				5.1	
9					
10					

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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-12	
LOGGED BY: G. Cisneros	**BORING LOCATION:** 8' East of pipeline		
DRILLED BY: Brian, ESN	**NORTHING:** 292127.372664	**EASTING:** 1017213.48767	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
				6.3	
11	SW	Gray, gravelly, **SAND** with crushed rock; no odor; no sheen; moist.			
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
12					
13					
				6.6	
14					
15					
		Brown, medium dense, fine to medium **SAND** with 10% fine red grains; no odor; no sheen; moist.			
16				6.7	
17					
18				6.3	
19					
	SP				
20					

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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-12
LOGGED BY: G. Cisneros	**BORING LOCATION:** 8' East of pipeline		
DRILLED BY: Brian, ESN	**NORTHING:** 292127.372664	**EASTING:** 1017213.48767	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21				2.8	
22		Wood encountered between 22 and 23 feet bgs.			
				2.9	
23		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
24				5.1	
		Gray, fine to medium **SAND**; no odor; no sheen; wet.			
25				4.5	
				2.9	
26					GP-12-26-26.5@1017
▼				5.3	
27					
		Same as above; saturated and wood at 27.75 feet bgs.			
28	ML	Olive, stiff **SILT** with high plasticity; no odor; no sheen; wet.		5.1	
	SM	Gray, medium dense, silty **SAND** with 30% silt; no odor; no sheen; saturated.			
29				4.2	
30					

ABBREVIATIONS:
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ppm = parts per million
USCS = Unified Soil Classification System
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-13
LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' East of pipeline	
DRILLED BY: Brian, ESN	**NORTHING:** 292049.434655	**EASTING:** 1017159.27063
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS FILL	Asphalt Top 6 inches. Road Base **FILL**.			
1	FILL				
2	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
3	SP			4.6	
4	SP				
5	SP	Brown, medium dense, fine to medium **SAND** with 10% gravel; no odor; no sheen; moist.			
6	SP			6.4	
7	SW	Brown, medium dense, fine to coarse **SAND** with 10% gravel; no odor; no sheen; moist.			
8	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		6.5	
9	SP				
10					

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-13
	LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' East of pipeline	
DRILLED BY: Brian, ESN		**NORTHING:** 292049.434655	**EASTING:** 1017159.27063
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
11	SW	Brown, medium dense, gravelly, fine to coarse **SAND** with 5% silt; no odor; no sheen; moist.		5.7	
12		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
13				5.8	
14					
15		Same as above with 10% gravel; no odor; no sheen.			
				4.0	
16					
17					
		Same as above with 5% gravel; no odor; no sheen.			
18				4.2	
19					
20					

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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-13**
LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' East of pipeline	
DRILLED BY: Brian, ESN	**NORTHING:** 292049.434655	**EASTING:** 1017159.27063
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
21				5.3	
22					
23		Same as above with 5% fine red grains; no odor; no sheen.		6.1	
24					
25				5.5	
26		Gray, medium dense, fine to medium **SAND** with 5% fine red grains; no odor; no sheen; wet.			GP-13-26.5-27@1119
27 ▼				4.9	
28		Same as above; no odor; no sheen; saturated.		4.8	
29					GP-13-GW@1130
30					

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: POL-TPH

LOCATION: 10 Port Way, Longview, WA

BORING ID: **GP-14**

LOGGED BY: G. Cisneros

BORING LOCATION:

DRILLED BY: Brian, ESN

NORTHING: 292147.66449

EASTING: 1016991.25362

DRILLING EQUIPMENT: Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM: SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs): 30

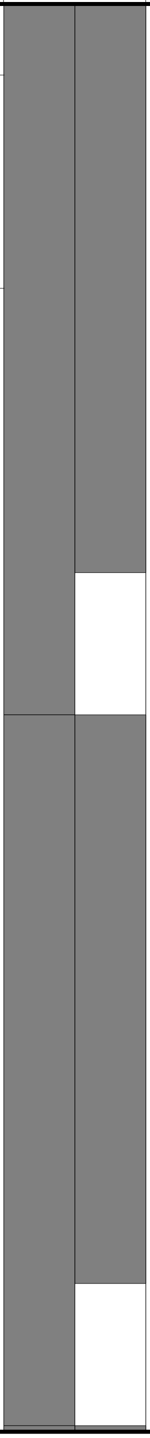
DEPTH TO WATER (ft bgs): 26.5

SAMPLING METHOD/SAMPLER LENGTH: Continuous

BORING DIAMETER: 2"

DRILL DATE: 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1					
2	SP	Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.		3.0	
3					
4					
5				4.2	
6					
7					
8				5.3	
9					
10					



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: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-14	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292147.66449	**EASTING:** 1016991.25362	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
11				5.7	
12					
				3.7	
13					
	SM	Brown, medium dense, silty, fine **SAND**; no odor; no sheen; moist.			
14					
15					
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		5.6	
16					
17					
18	ML	Brown, stiff, sandy **SILT** with low plasticity; no odor; no sheen; moist.		5.1	
	SM	Gray, medium dense, silty, fine **SAND**; no odor; no sheen; moist to wet.		5.7	
19					
20					

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

NOTES:

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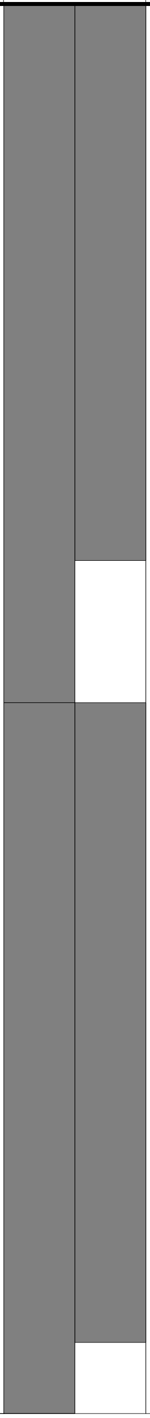
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-14	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292147.66449	**EASTING:** 1016991.25362	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	



Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	PID (ppm)	Sample ID
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.	4.6	
21				
22			2.8	
23				
24				
25	SP		2.4	
26		Gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist.	5.4	GP-14-26-26.5@1219
▼				
27		Same as above; no odor; no sheen; saturated.		
28			2.4	
29				
30				

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

NOTES:

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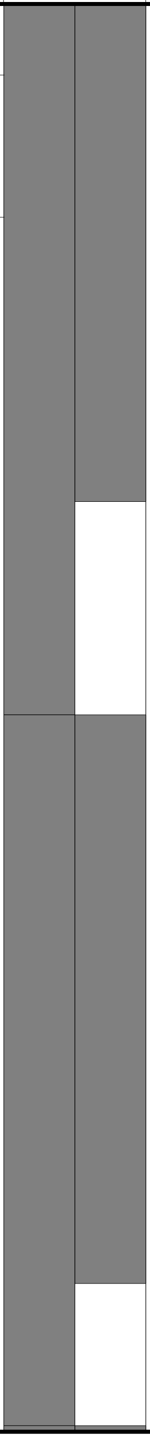
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-15
LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN	**NORTHING:** 291962.269443	**EASTING:** 1017282.09882
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

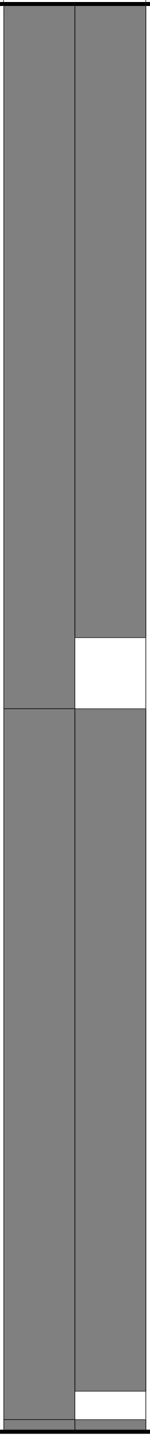
Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1					
		Light brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		1.1	
2					
				1.3	
3					
4					
5		Brown to light brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
				1.6	
6					
7					
8		Same as above; no odor; no sheen; moist.		1.5	
9					
10					



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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-15**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 291962.269443	**EASTING:** 1017282.09882
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015



Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Light brown, medium dense, fine to medium **SAND** with 5% gravel; no odor; no sheen; moist.			
11				1.4	
12					
13		Same as above; no odor; no sheen; moist.		1.3	
14					
15	SP	Same as above; no odor; no sheen; moist.			
16				1.4	
17					
18		Same as above; no odor; no sheen; moist.			
19				1.1	
20					

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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-15**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 291962.269443	**EASTING:** 1017282.09882	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
21					
				1.5	
22					
23		Same as above; no odor; no sheen; moist.			
				1.8	
24					
25		Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
				2.6	
26					
27		Gray, medium dense, fine to medium **SAND** with 5% fine red grains; no odor; no sheen; wet to saturated.		1.8	GP-15-27-27.5@1320
▼					
28					
29	ML/SM	Olive gray, medium dense/stiff, fine sandy **SILT** / silty **SAND**; no odor; no sheen; saturated to wet.		2.8	
					GP-15-GW@1335
30					

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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-16
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN		**NORTHING:** 291811.257642	**EASTING:** 1017464.66298
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1					
		Light brown, medium dense, medium to coarse **SAND** with 5% fine gravel; no odor; no sheen; moist.			
2					
3				2.1	
4					
5		Brown, medium dense, medium to coarse **SAND** with 10% fine subrounded gravel; no odor; no sheen; moist.			
6				2.4	
7					
8		Same as above; no odor; no sheen; moist.			
9				2.1	
10					

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

NOTES:

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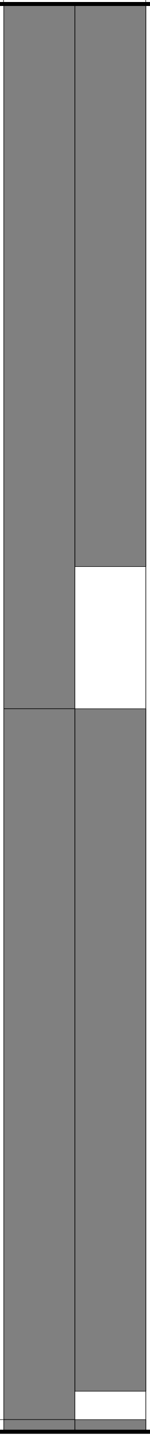
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-16	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 291811.257642	**EASTING:** 1017464.66298	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	



Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Light brown, medium dense, medium to coarse **SAND** with 5% fine gravel; no odor; no sheen; moist.			
11					
				2.6	
12					
13		Same as above; no odor; no sheen; moist.			
				1.8	
14					
15		Brown, medium dense, fine to medium **SAND** with 10% subrounded gravel; no odor; no sheen; moist.			
16					
				2.2	
17					
18		Same as above; no odor; no sheen; moist.			
				1.6	
19					
20					

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: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-16	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 291811.257642	**EASTING:** 1017464.66298	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to coarse **SAND** with 10% subrounded gravel and 5% angular gravel; no odor; no sheen; moist.			
21					
	SW			2.1	
22					
23		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
				3.4	
24					
25					
26				2.1	
	SP				
27		Gray, medium dense, fine to medium **SAND** with 10% fine red grains; no odor; no sheen; wet to saturated.			
				3.1	GP-16-27.5-28@1424
28 ▼					
29				2.7	
					GP-16-GW@1439
30					

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

NOTES:

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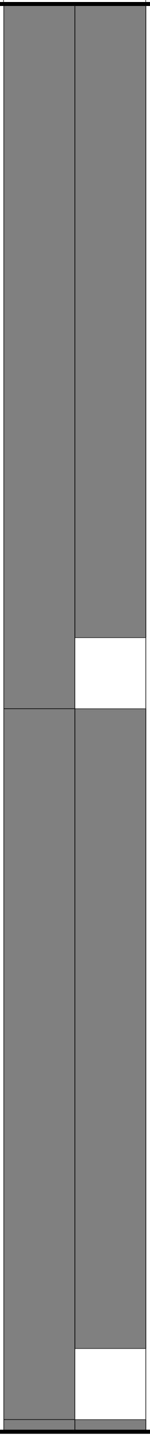
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-17	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 291757.351966	**EASTING:** 1017548.36186	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1				1.3	
		Reddish brown, medium dense, fine **SAND**; no odor; no sheen; moist.			
2					
				2.8	
3					
4					
5		Same as above; no odor; no sheen; moist.			
				5.3	
6		Light brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
7					
8		Same as above; no odor; no sheen; moist.		3.7	
9					
10					

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-17
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 291757.351966	**EASTING:** 1017548.36186
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015



Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; moist.		
			1.8	
11				
12				
13		Same as above; no odor; no sheen; moist.	0.7	
14				
15		Same as above; no odor; no sheen; moist.		
	SP			
16			1.8	
17				
18		Brown to gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		
			1.9	
19				
20				

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-17**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 291757.351966	**EASTING:** 1017548.36186
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 26.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

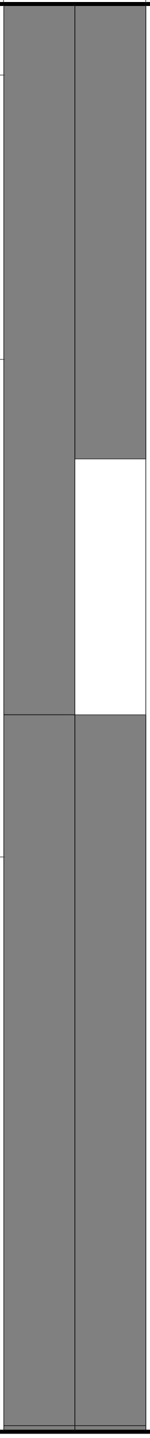
Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; moist.			
21				2.5	
22					
		Brownish gray, medium dense, fine to medium **SAND** with 5% fine red grains and 1/2-inch volcanic ash layer; no odor; no sheen; moist.			
23				2.1	
24					
25		Same as above; no odor; no sheen; moist to wet.			
				2.2	
26		Gray, medium dense, fine to coarse **SAND** with 10% fine red grains; no odor; no sheen; saturated.			GP-17-26-26.5@0924
▼				2.3	
27					
28				2.1	
		Same as above; no odor; no sheen; saturated.			
29					
					GP-17-GW@0934
30					

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-18**
	LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' West of pipeline	
DRILLED BY: Brian, ESN		**NORTHING:** 291961.594646	**EASTING:** 1017513.07725
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1					
				3.2	
2					
	SW	Brown, medium dense, fine to coarse **SAND** with 10% silt and 10% gravel; no odor; no sheen; moist.			
3				4.8	
4					
5		Same as above; no odor; no sheen; moist.			
6		Light brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.		2.0	
7					
8					
		Same as above; no odor; no sheen; moist.			
9				5.7	
10					



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

NOTES:

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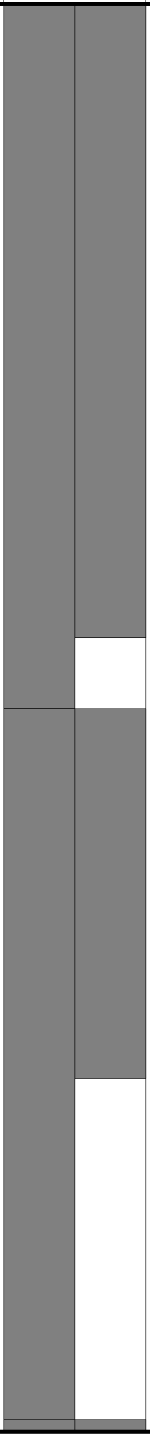
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-18
LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' West of pipeline		
DRILLED BY: Brian, ESN		**NORTHING:** 291961.594646	**EASTING:** 1017513.07725
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND** with 15% subrounded gravel; no odor; no sheen; moist.			
11				4.9	
12					
13	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		5.9	
14					
15		Same as above; no odor; no sheen; moist.			
16					
				3.7	
17		Same as above; no odor; no sheen; moist.			
18					
19					
20					



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

NOTES:

FLOYD | SNIDER strategy • science • engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-18
	LOGGED BY: G. Cisneros	**BORING LOCATION:** 5' West of pipeline	
DRILLED BY: Brian, ESN		**NORTHING:** 291961.594646	**EASTING:** 1017513.07725
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SW	Brown, medium dense, fine to coarse **SAND** with 10% gravel and 5% silt; no odor; no sheen; moist.		3.7	
22				2.9	
23	SP	Brown, medium dense, fine to medium **SAND** with 5% gravel; no odor; no sheen; moist.		6.7	
24				14.0	
	SM	Olive gray, medium dense, silty **SAND**; moderate odor; moderate sheen; moist.			
25					
	SP	Dark brown, medium dense, fine to medium **SAND** with 5% gravel; no odor; no sheen.		6.7	
26					
27	SM/ML	Olive gray, medium dense, silty **SAND** /sandy **SILT**; moderate odor; moderate sheen; wet.		46.7	GP-18-27-28@1531
	SP	Dark gray, medium dense, fine to medium **SAND**; slight odor; slight sheen; saturated.			
28 ▼				7.5	
29		Same as above; no odor; no sheen; saturated.		6.6	GP-18-29-30@1536
30					

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-19**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN		**NORTHING:** 292031.916154	**EASTING:** 1017556.63986
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 24
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1				0.3	
2		Light brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
3				4.6	
4		Same as above; no odor; no sheen; moist.			
5				7.1	
6		Same as above; no odor; no sheen; moist.			
7				5.3	
8		Same as above; no odor; no sheen; moist.			
9				4.0	
10					

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

NOTES:

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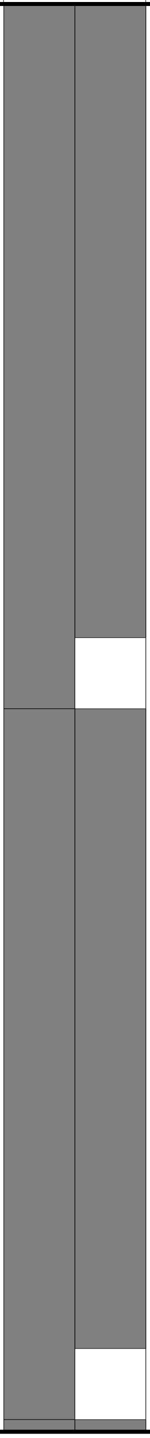
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-19**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292031.916154	**EASTING:** 1017556.63986	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 24	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Light brown, fine to coarse **SAND** with 5% gravel; no odor; no sheen; moist.			
11					
				4.4	
12		Same as above; no odor; no sheen; moist.			
13					
				3.5	
14					
15		Same as above; no odor; no sheen; moist.			
16				4.8	
17					
18		Same as above; no odor; no sheen; moist.		3.2	
19					
20					



ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
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NOTES:

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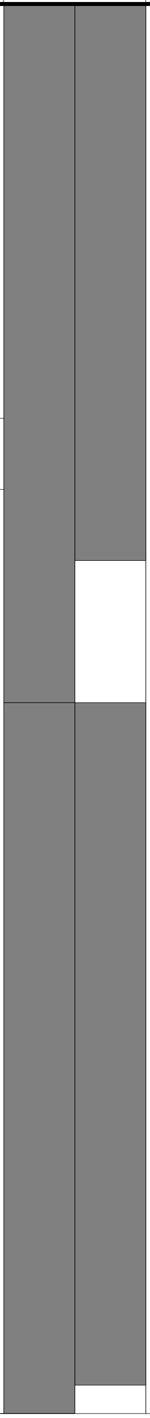
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-19**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292031.916154	**EASTING:** 1017556.63986	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 24	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to coarse **SAND**; no odor; no sheen; moist.			
21					
				1.6	
22					
23	ML	Olive, stiff **SILT** with high plasticity; no odor; no sheen; moist to wet.		2.2	
		Gray, medium dense, fine to medium **SAND**; no odor; no sheen; wet to saturated.			GP-19-23.5-24@1435
24 ▼					
25		Same as above; no odor; no sheen; saturated.			
26				1.9	
	SP				
27		Same as above; no odor; no sheen; saturated.			
				2.6	
28					
		Same as above; no odor; no sheen; saturated.			
29				2.3	
30					



ABBREVIATIONS:
ft bgs = feet below ground surface
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NOTES:

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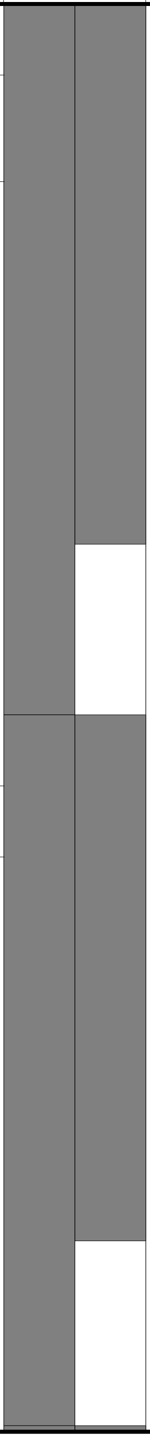
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-20**	
LOGGED BY: T. Gardner-Brown	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292143.288955	**EASTING:** 1017584.18033	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 25	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1	SP	Light brown, medium dense, fine to medium **SAND** with 5% angular to subrounded gravel; no odor; no sheen; moist.			
3				4.3	
		Same as above; no odor; no sheen; moist.			
		Same as above; no odor; no sheen; moist.			
	SW	Fine to coarse, gravelly **SAND**; likely historical road base **FILL**; no odor; no sheen; moist.			
6		Light brown to gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		5.2	
8				5.7	
10					

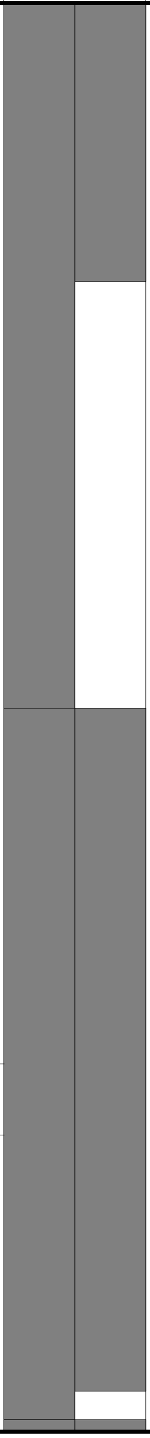


ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:
Groundwater collected at 1350

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-20
	LOGGED BY: T. Gardner-Brown	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292143.288955	**EASTING:** 1017584.18033
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 25
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Light brown, medium dense, fine to medium **SAND** with 15% angular gravel; no odor; no sheen; moist.		4.9	
11					
				1.7	
	SP				
12		Refusal at 12 feet bgs; rusty metal encountered; likely former pipeline. Moved boring location approximately 15 to the northwest.			
13		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
14					
				4.1	
15					
		Same as above; no odor; no sheen; moist.			
16				5.5	
17					
	ML	Brown, stiff **SILT** with low plasticity; no odor; no sheen; moist.			
18		Brown to gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		5.6	
19				6.2	
20					



ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
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NOTES:
Groundwater collected at 1350

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-20	
LOGGED BY: T. Gardner-Brown	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292143.288955	**EASTING:** 1017584.18033	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 25	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Brown, medium dense, fine to medium **SAND** with 10% subangular gravel; no odor; no sheen; moist.			
21				5.9	
22		Gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
23	ML	Olive, stiff **SILT** with high plasticity; no odor; no sheen; moist.		6.4	
24	SP	Gray, medium dense, fine to medium **SAND** with 5% gravel; saturated.		4.9	GP-20-24-25@1340
25 ▼					
26	SM	Reddish brown to gray, silty, fine **SAND**; no odor; no sheen; saturated.		5.1	
27					
28	SP	Gray, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.		5.2	
29				6.5	
30					

ABBREVIATIONS:
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▼ = denotes groundwater table

NOTES:
Groundwater collected at 1350

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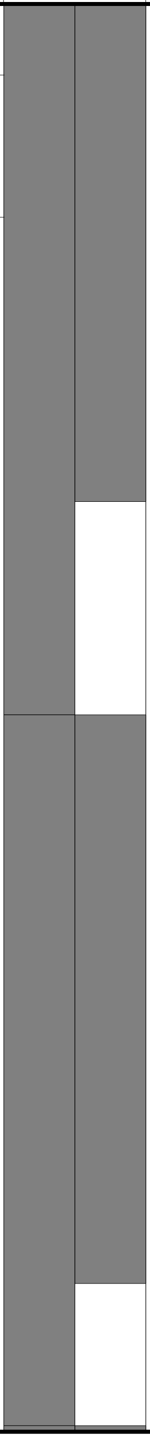
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-21	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292295.653404	**EASTING:** 1017421.7143	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 21.5 and 26	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1				0.7	
	SP	Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
2					
				1.7	
3					
		Same as above; no odor; no sheen; moist.			
4					
5		Same as above; no odor; no sheen; moist.			
6				2.6	
7					
8				5.2	
		Reddish brown, medium dense, fine to medium **SAND** with a 1-inch silt layer at 8.5 feet bgs; no odor; no sheen; moist.			
9					
10					



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

NOTES:
Groundwater collected at 1128

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-21**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292295.653404	**EASTING:** 1017421.7143
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 21.5 and 26
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to coarse **SAND** with 5% gravel; no odor; no sheen; moist.			
11				4.6	
		Same as above; no odor; no sheen; moist.			
12					
	ML	Reddish brown, stiff **SILT** with moderate plasticity; no odor; no sheen; moist.			
13				4.5	
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
14					
15					
		Same as above; no odor; no sheen; moist.		3.6	
16					
17					
18	SP	Same as above with 1-inch silt layers at 17.5 and 18 feet bgs; no odor; no sheen; moist.		2.5	
19					
20					

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

NOTES:
Groundwater collected at 1128

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-21
LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN	**NORTHING:** 292295.653404	**EASTING:** 1017421.7143
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 21.5 and 26
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		4.0	
21					GP-21-21-21.5@1101
▼		Same as above; saturated.		7.5	
22					
		Olive, stiff **SILT** with moderate to high plasticity; no odor; no sheen; moist to wet.		6.1	
23					
24	ML	Same as above; no odor; no sheen; moist.			
25					
		Gray, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.		1.9	GP-21-25.5-26@1158
26 ▼					
27				5.5	
28	SP	Same as above; no odor; no sheen; saturated.			
29				6.1	
30					

ABBREVIATIONS:
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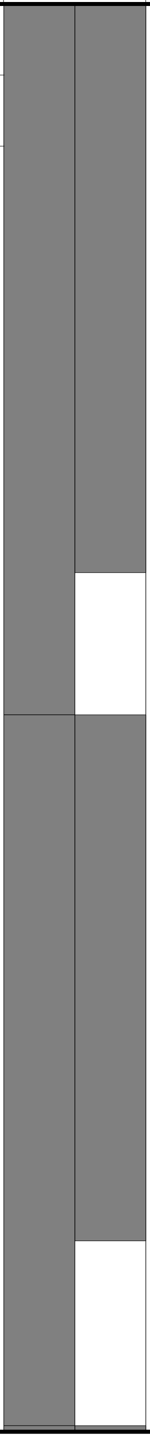
ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:
Groundwater collected at 1128

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-22
	LOGGED BY: G. Cisneros	**BORING LOCATION:** South of pipeline in Transect Shed 1	
DRILLED BY: Brian, ESN		**NORTHING:** 292244.571626	**EASTING:** 1017476.03572
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 29.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
				1.1	
2					
3				1.6	
		Same as above; no odor; no sheen; moist.			
4					
5		Light brown, medium dense, fine to medium **SAND** no odor; no sheen; moist.			
6				2.0	
7		Same as above; no odor; no sheen; moist.			
				1.6	
8					
9					
10					



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

NOTES:
Flooring is elevated from surrounding ground surface ~2'

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-22
LOGGED BY: G. Cisneros	**BORING LOCATION:** South of pipeline in Transect Shed 1		
DRILLED BY: Brian, ESN	**NORTHING:** 292244.571626	**EASTING:** 1017476.03572	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 29.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
11				1.9	
12	SP	Same as above; no odor; no sheen; moist.			
13				1.4	
14					
15		Same as above; no odor; no sheen; moist.			
				1.9	
16					
17		Brown, medium dense, fine to medium **SAND** interbedded with 1-inch silt layers; no odor; no sheen; moist.			
18				2.7	
19					
20					

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

NOTES:
Flooring is elevated from surrounding ground surface ~2'

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-22**	
LOGGED BY: G. Cisneros	**BORING LOCATION:** South of pipeline in Transect Shed 1		
DRILLED BY: Brian, ESN		**NORTHING:** 292244.571626	**EASTING:** 1017476.03572
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 29.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to coarse **SAND**; no odor; no sheen; moist.			
21				1.9	
22					
				2.3	
23	ML	Olive, stiff **SILT** with low plasticity; no odor; no sheen; moist.			
	SP	Olive gray, medium dense, fine to medium **SAND**; no odor; no sheen; wet.			
24	ML	Olive, stiff **SILT** with high plasticity; no odor; no sheen; moist.		3.2	
25					
	SP	Brownish gray, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.		1.8	
26					
27		Same as above; no odor; no sheen; moist.			
				1.9	
28					
	ML	Olive, stiff, sandy **SILT**; no odor; no sheen; wet.			
29	SP	Gray, medium dense, fine to medium **SAND** with 5% fine red grains; no odor; no sheen; saturated.			GP-22-29-29.5@1021
▼				3.0	
30					

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

NOTES:
Flooring is elevated from surrounding ground surface ~2'

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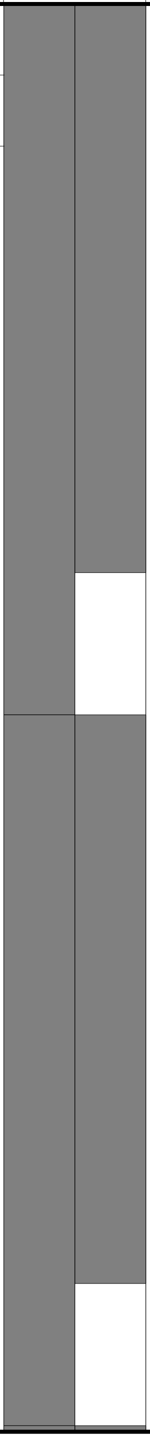
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-23**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292158.666646	**EASTING:** 1017542.18923	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	



Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1	SP	Light brown, medium dense, fine to medium **SAND** with 10% angular to subrounded gravel; no odor; no sheen; moist.			
2					
3				6.5	
		Same as above; no odor; no sheen; moist.			
4					
5		Same as above; no odor; no sheen; moist.			
6				4.2	
7		Rusty/reddish brown, medium dense, fine to medium **SAND**; no odor; no sheen.			
8				4.5	
9		Refusal at 9 feet bgs. Encountered rusty metal; likely the abandoned pipeline. Moved boring location approximately 10 feet to the south.			
10					

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

NOTES:

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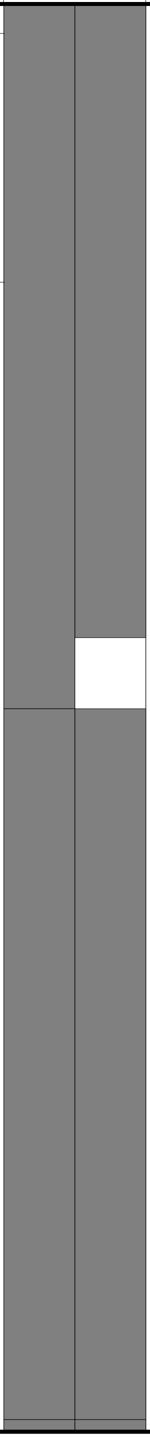
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-23	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292158.666646	**EASTING:** 1017542.18923	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	PID (ppm)	Sample ID
	SW	Gray, fine to coarse **SAND** with 15% angular gravel; no odor; no sheen; moist.	4.5	GP-23-10.5-11@1222
11			1.9	
12	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		
			1.3	
13				
14				
15		Same as above; no odor; no sheen; moist.		
16			3.1	
17				
		Same as above; no odor; no sheen; moist.		
18				
			1.7	
19				
20				

Drive/Recovery



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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-23**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292158.666646	**EASTING:** 1017542.18923
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SW	Brown to gray, fine to coarse **SAND** with angular gravel and 5% silt; no odor; no sheen; moist.		2.1	
22	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
23				2.0	
24	ML	Olive, stiff **SILT** with high plasticity; no odor; no sheen; moist.		3.1	
25		Gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist to wet.		4.8	
26					
27				1.9	GP-23-27-27.5@1241
▼	SP	Same as above; no odor; no sheen; saturated.			
28		Same as above; no odor; no sheen; saturated.			
29				4.6	
30					

ABBREVIATIONS:
ft bgs = feet below ground surface
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-24
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292177.904933	**EASTING:** 1017655.17749	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 21	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Rail Line Base **FILL**. Crushed angular gravel.			
		Light brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
1				3.2	
2					
		Same as above; no odor; no sheen; moist.			
3					
4					
5		Brown to light brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
				4.0	
6					
7					
		Same as above; no odor; no sheen; moist.		3.4	
8					
9				1.4	
10					

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
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NOTES:

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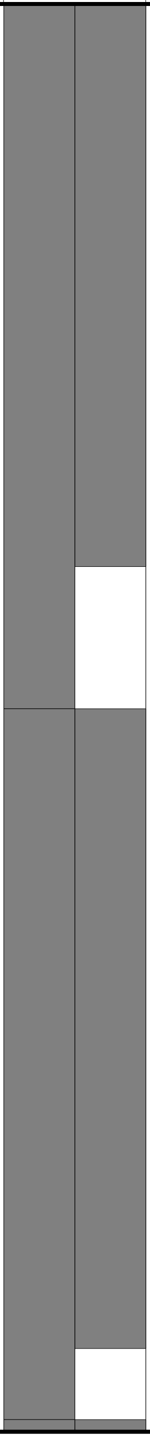
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-24
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN		**NORTHING:** 292177.904933	**EASTING:** 1017655.17749
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 21
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; moist.			
				2.3	
11	SP				
12					
				2.4	
13		Same as above; no odor; no sheen; moist.			
14				1.6	
15		Same as above; no odor; no sheen; moist.			
16				2.1	
17					
18		Same as above; no odor; no sheen; moist.			
				3.2	
19					
20					



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

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:**	**GP-24**
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292177.904933	**EASTING:** 1017655.17749	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 21	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21 ▼		Brown, medium dense, fine to medium **SAND** with 5% fine red grains; no odor; no sheen; wet to saturated.		0.6	GP-24-20-20.5@1519
22 23	ML	Olive, stiff **SILT** with high plasticity; no odor; no sheen; wet.		2.5	
24 25	SP	Olive gray, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.		2.0	

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
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NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-25
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292282.681266	**EASTING:** 1017572.25179
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 20.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Rail Line Base **FILL**. Crushed angular gravel.			
1	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
2				3.4	
3		Same as above; no odor; no sheen; moist.			
4					
5	GW	Crushed rock and sandy **GRAVEL**; no odor; no sheen; saturated.		3.1	
6	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
7				2.8	
8		Same as above; no odor; no sheen; moist.			
9				4.0	
10					

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** **GP-25**
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292282.681266	**EASTING:** 1017572.25179	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 20.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Same as above; no odor; no sheen; moist.		4.1	
11					
12		Same as above; no odor; no sheen; moist.			
13				3.8	
14	SM-SP	Brown, medium dense, fine to medium **SAND** with 10% silt; no odor; no sheen; moist to wet.			
15	GM	Brown, medium dense, silty, sandy, angular **GRAVEL**; no odor; no sheen; moist.		3.1	
16					
17		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		2.4	
18					
19		Same as above; no odor; no sheen; moist to wet.		1.4	
20					

ABBREVIATIONS:
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ppm = parts per million
USCS = Unified Soil Classification System
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NOTES:

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PROJECT: POL-TPH		**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-25
LOGGED BY: G. Cisneros		**BORING LOCATION:**	
DRILLED BY: Brian, ESN		**NORTHING:** 292282.681266	**EASTING:** 1017572.25179
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 20.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
▼	SP	Same as above; no odor; no sheen; saturated.		2.8	GP-25-20-20.5@1550
21					
22				3.4	
		Gray to brown, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.			
23					
24	ML	Olive gray, stiff **SILT**.		1.8	
	SP	Gray, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.			
25					

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA		**BORING ID:** GP-26
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN		**NORTHING:** 292349.864424	**EASTING:** 1017564.72411
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 19.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Rail Line Base **FILL**. Crushed angular gravel.			
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
1				1.3	
2				2.6	
3	SP				
		Same as above; no odor; no sheen; moist.		2.4	
4					
5					
	SW	Dark brown, gravelly, fine to coarse **SAND** with 15% angular gravel and 5% silt (**FILL**?); no odor; no sheen; moist.		2.6	
6	SP	Brown, fine to medium **SAND**; no odor; no sheen.			
7					
8	ML	Reddish brown, stiff **SILT** with 10% fine sand; no odor; no sheen; moist.			
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		2.9	
9					
10					

ABBREVIATIONS:
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ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-26**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292349.864424	**EASTING:** 1017564.72411	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 19.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Same as above; no odor; no sheen; moist.			
11				2.6	
12	SP	Same as above; no odor; no sheen; moist.			
13				2.2	
14					GP-26-14-14.5@0915
		Same as above; no odor; no sheen; moist.		2.2	
15					
16	SW	Dark brown, medium dense, gravelly, fine to coarse **SAND** with 20% angular gravel and 5% silt; no odor; no sheen; moist.			
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
17				1.4	
18					
		Gray, fine to medium **SAND**; no odor; no sheen; wet.		3.3	
19					GP-26-19-19.5@0920
▼		Same as above; no odor; no sheen; saturated.			
20	SP				

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-26	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Brian, ESN	**NORTHING:** 292349.864424	**EASTING:** 1017564.72411	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 19.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
				7.5	
21					
		Same as above; no odor; no sheen; saturated.			
22					
23					
	ML	Olive, stiff **SILT** with high plasticity; no odor; no sheen; wet.		2.8	
24					
25	SP	Gray, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.			
26				2.9	
27		Same as above; no odor; no sheen; saturated.			
28					
29				2.3	
30					

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-27	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Trevor, ESN	**NORTHING:** 292434.344428	**EASTING:** 1017567.29016	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 14.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Rail Line Base **FILL**. Crushed angular gravel.			
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
1					
2				1.4	
3					
		Same as above; no odor; no sheen; moist.			
4					
				1.4	
5	SP				
		Same as above; no odor; no sheen; moist.			
6					
7				1.7	
8		Same as above; no odor; no sheen; moist.			
9				2.1	
	ML	Olive gray, stiff **SILT** with low plasticity; no odor; no sheen; moist.			
10					

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-27
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Trevor, ESN		**NORTHING:** 292434.344428	**EASTING:** 1017567.29016
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 14.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
	SP	Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
11				2.2	
12	SP	Gray **SAND**; no odor; no sheen; moist.			
		Same as above; slight odor at 13 feet bgs; no sheen; moist.		2.9	
13					
	SM	Olive, silty **SAND**; moderate odor; moderate sheen; wet.			
14				106.0	
	ML	Olive **SILT** with low plasticity; moderate odor; moderate sheen; wet.			GP-27-14-14.5@0832
▼		Gray to brown, medium dense, fine to medium **SAND**; slight odor; slight sheen; saturated.			
15					
				26.0	
16					
				8.2	
17		Same as above; no odor; no sheen; saturated.			
				4.8	GP-27-17-18@0853
18		Coarse white grains at 18 to 18.25 feet bgs.			
				3.4	
19	SP	Same as above; no odor; no sheen; saturated.			
20					

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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-27**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Trevor, ESN		**NORTHING:** 292434.344428	**EASTING:** 1017567.29016
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 25	**DEPTH TO WATER (ft bgs):** 14.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
				2.7	
21					
		Coarse white grains at 21.5 to 22 feet bgs.		3.1	
22		Gray, medium dense, fine to coarse **SAND** with 10% fine white grains; no odor; no sheen; saturated.			
				3.3	
23					
		Olive brown, stiff **SILT** with 10% fine sand; no odor; no sheen; saturated.			
24	SM			1.7	
25					

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: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-28**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Trevor, ESN		**NORTHING:** 291996.858807	**EASTING:** 1017494.02952
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base **FILL**.			
1				1.3	
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
2					
				0.8	
3					
		Same as above; no odor; no sheen; moist.			
4					
5				4.2	
		Light brown, medium dense, fine to coarse **SAND**; no odor; no sheen; moist.			
6					
7				2.5	
		Same as above with 5% rounded gravel; no odor; no sheen; moist.			
8					
9				2.3	
10					

ABBREVIATIONS:
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NOTES:
Groundwater collected at 1200

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-28	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Trevor, ESN	**NORTHING:** 291996.858807	**EASTING:** 1017494.02952	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		No recovery between 10 feet bgs and 30 feet bgs. Lost sampler in hole.			
11					
12					
13		Collected groundwater sample at 30 feet bgs.			
14					
15					
16	SP				
17					
18					
19					
20					

ABBREVIATIONS:
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NOTES:
Groundwater collected at 1200

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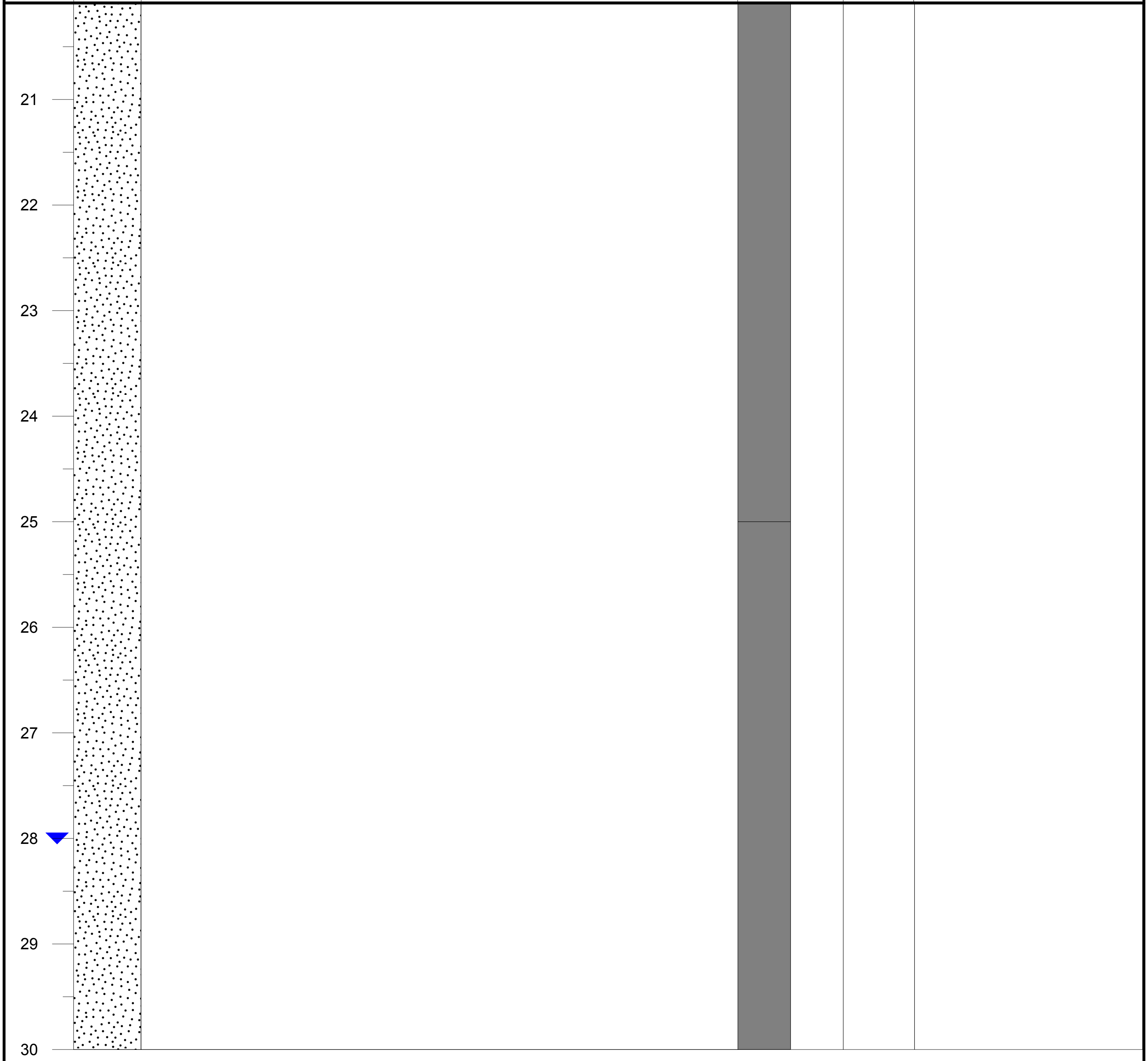
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-28	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Trevor, ESN	**NORTHING:** 291996.858807	**EASTING:** 1017494.02952	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 28	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID



ABBREVIATIONS:
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NOTES:
Groundwater collected at 1200

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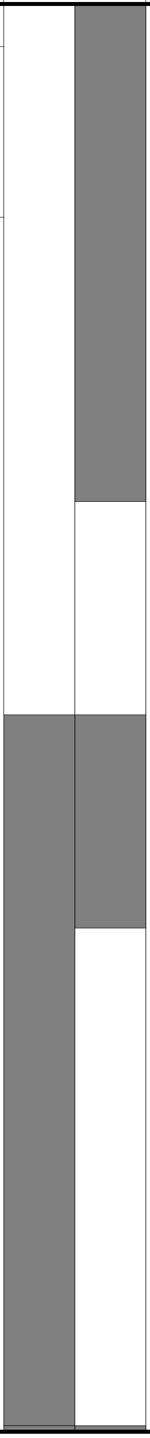
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-29**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Trevor, ESN	**NORTHING:** 291923.179687	**EASTING:** 1017537.41072	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 4 inches.			
	FILL	Road Base **FILL**.			
1				5.8	
		Brown, medium dense, fine to medium **SAND** with 10% angular gravel; no odor; no sheen; moist.			
2					
				1.4	
3					
4					
5		Same as above; no odor; no sheen; moist.			
				2.1	
6					
7					
8					
9					
10					



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

NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-29**
	LOGGED BY: G. Cisneros	**BORING LOCATION:**	
DRILLED BY: Trevor, ESN		**NORTHING:** 291923.179687	**EASTING:** 1017537.41072
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Light brown, medium dense, fine to medium **SAND** with 5% subrounded gravel; no odor; no sheen; moist.			
				1.6	
11					
12					
	SP	Same as above; no odor; no sheen; moist.			
13					
				1.5	
14					
15		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
				1.2	
16					
17				2.8	
18		Same as above; no odor; no sheen; moist.			
19				1.4	
20					

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-29	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY: Trevor, ESN	**NORTHING:** 291923.179687	**EASTING:** 1017537.41072	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 30	**DEPTH TO WATER (ft bgs):** 27.5	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.			
21				1.2	
22					
		Same as above; no odor; no sheen; moist.		1.7	
23					
24	SM	Olive gray, silty **SAND** with 20% silt and 1/4-inch wood debris at 24.25 feet bgs; no odor; no sheen; moist.		1.2	
	ML	Olive, stiff **SILT**; no odor; no sheen; moist.			
25				2.8	GP-29-25-25.5@1015
		Brown to gray, medium dense, fine to medium **SAND**; no odor; no sheen; wet.			
26				2.9	
27				3.1	GP-29-27-27.5@1020
▼	SP				
28		Gray, fine to medium **SAND**; no odor; no sheen; saturated.			
29		Same as above; no odor; no sheen; saturated.		2.3	
30					

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NOTES:

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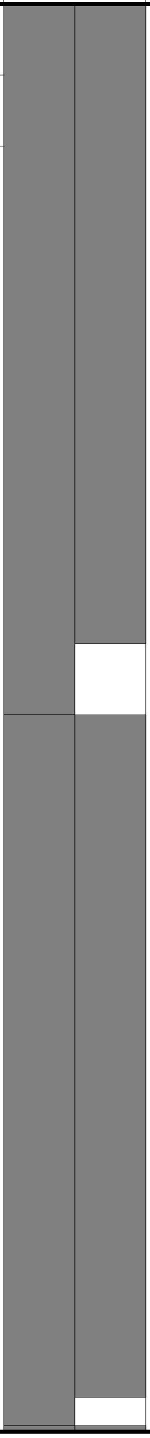
PROJECT: POL-TPH	**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** **GP-30**	
LOGGED BY: G. Cisneros	**BORING LOCATION:**		
DRILLED BY:	**NORTHING:** 292962.155627	**EASTING:** 1017572.12614	
DRILLING EQUIPMENT: Geoprobe	**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT	
DRILLING METHOD:	**TOTAL DEPTH (ft bgs):** 20	**DEPTH TO WATER (ft bgs):** 16.5 and 19.75	
SAMPLING METHOD/SAMPLER LENGTH: Continuous	**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.		
	FILL	Road Base **FILL**.		
1		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.	1.3	
2			1.4	
3		Same as above; no odor; no sheen; moist.		
4			1.6	
		Same as above; no odor; no sheen; moist.		
5			3.7	
6		Crushed rock **FILL**.		
		Brown, medium dense, fine to medium **SAND**; no odor; no sheen; moist.		
7	SP			
8			2.3	
9		Same as above; no odor; no sheen; moist.		
			2.1	
10				

Drive/ Recovery



ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

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PROJECT: POL-TPH		**LOCATION:** 10 Port Way, Longview, WA	**BORING ID:** GP-30
LOGGED BY: G. Cisneros		**BORING LOCATION:**	
DRILLED BY:		**NORTHING:** 292962.155627	**EASTING:** 1017572.12614
DRILLING EQUIPMENT: Geoprobe		**SURFACE ELEVATION:**	**COORDINATE SYSTEM:** SPCS WA S NAD83 FT
DRILLING METHOD:		**TOTAL DEPTH (ft bgs):** 20	**DEPTH TO WATER (ft bgs):** 16.5 and 19.75
SAMPLING METHOD/SAMPLER LENGTH: Continuous		**BORING DIAMETER:** 2"	**DRILL DATE:** 9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
11					
				1.2	
12					
13		Same as above; no odor; no sheen; moist.			
				1.5	
14					
	ML	Reddish brown, stiff **SILT** with low plasticity; no odor; no sheen; moist.			
15		Brown to gray, medium dense, fine to medium **SAND**; no odor; no sheen; moist to wet.			
				1.2	
16					GP-30-16-16.5@1112
▼	SP	Gray, medium dense, fine to medium **SAND**; no odor; no sheen; saturated.			
17				2.1	
18		Olive gray, stiff **SILT** with high plasticity; no odor; no sheen; saturated.			
	ML			1.9	
19					
▼	SML	Olive gray, silty, fine to medium **SAND**; no odor; no sheen; saturated.			GP-30-19.5-20@1120
20					

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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** GP-31	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-9	**DRILL DATE:** 3/11/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292765.1886	**EASTING:** 1017985.424	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 14	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 13.5-18.5	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	SP	Airknifed to 6.5 ft bgs; brown, loose **SAND** observed during clearing.			
6				0.8	
7	SM/ML	Brown, silty **SAND**; moist, loose, no odor. Grades to brown **SILT** interbedded with silty, fine, medium **SAND** with 5-20% organics (wood).			
8		At 8 ft., becomes wet (perched).		1.1	
10		At 10 ft., becomes saturated.		1.3	
12				1.4	
13	CH	At 13 ft., 2 inch chunk of wood over gray, firm, silty **CLAY**; moist; no odor.			
14 ▼	SM/ML	At 14 ft., grades to silty **SAND** with interbedded sandy **SILT**; soft and loose; saturated; no odor; no sheen.		1.4	
16				1.1	GP-31-14-15 GP-31-GW-13.5-18.5
16.5	SM	At 16.5 ft., fines decrease; wet; no odor.			
19	SP	At 19 ft., grades to loose, clean **SAND**; wet; no odor.		0.9	
20		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:
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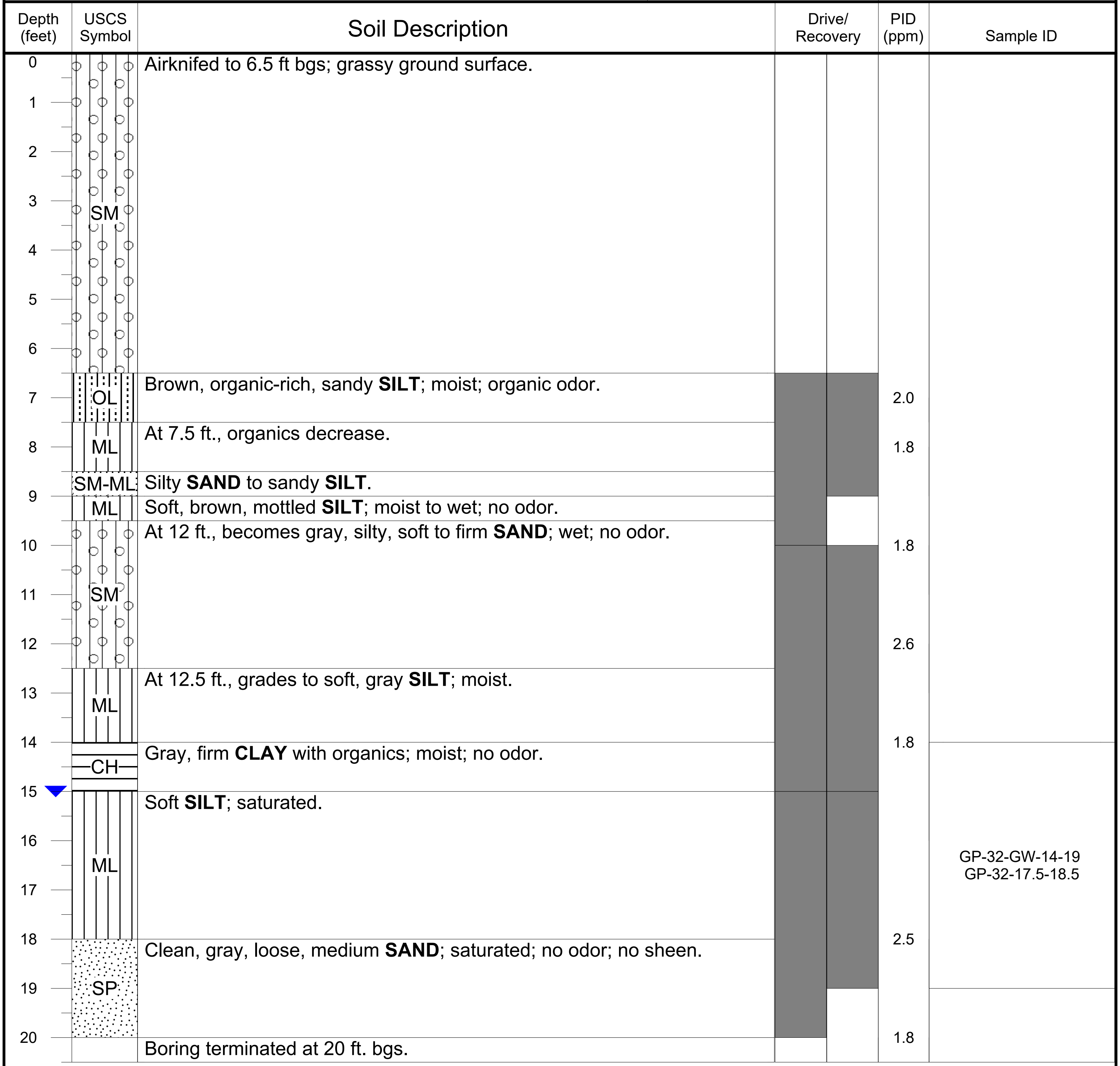
NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **GP-32**
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-9	**DRILL DATE:** 3/11/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292735.4444	**EASTING:** 1018027.903
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 14-19



Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0 1 2 3 4 5 6	SM	Airknifed to 6.5 ft bgs; grassy ground surface.			
7	OL	Brown, organic-rich, sandy **SILT**; moist; organic odor.		2.0	
8	ML	At 7.5 ft., organics decrease.		1.8	
	SM-ML	Silty **SAND** to sandy **SILT**.			
9	ML	Soft, brown, mottled **SILT**; moist to wet; no odor.			
10 11 12	SM	At 12 ft., becomes gray, silty, soft to firm **SAND**; wet; no odor.		1.8 2.6	
13	ML	At 12.5 ft., grades to soft, gray **SILT**; moist.			
14	CH	Gray, firm **CLAY** with organics; moist; no odor.		1.8	
15 16 17	ML	Soft **SILT**; saturated.			GP-32-GW-14-19 GP-32-17.5-18.5
18 19	SP	Clean, gray, loose, medium **SAND**; saturated; no odor; no sheen.		2.5	
20		Boring terminated at 20 ft. bgs.		1.8	

ABBREVIATIONS:
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NOTES:

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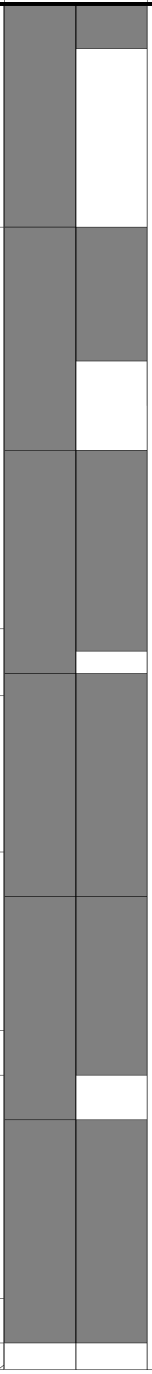
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** GP-33	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/9/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292489.2593	**EASTING:** 1017559.34	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 30.6	**DEPTH TO WATER (ft bgs):** 18.5	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	



Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	GP	Railroad ground road base.		
2				
4				
	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen to 14 ft.		
6			0.0	
8			0.7	
10			0.9	
12			1.2	
14	ML	Olive-gray **SILT** with moderate plasticity; moist; no odor; no sheen.	1.3	GP-33-14-14.5
	SP	Brown, fine to medium **SAND**; wet; no odor.		
16			0.9	
			1.2	
18 ▼			1.4	
		At 19 ft., becomes saturated; slight odor; slight sheen.		GP-33-19.5-20
20			80.6	
			0.6	
22				
	ML	Olive-gray, stiff **SILT** with low plasticity; wet; no odor; no sheen.	1.0	
24	SP	Brown, fine to medium **SAND**; saturated; no odor; no sheen.		GP-33-24-25
			0.7	
26			2.6	
28			0.6	GP-33-28-29
	SM	Olive-gray, silty **SAND**; no odor; no sheen.		
30		Boring terminated at 30 ft. bgs.	0.8	

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NOTES:
Soil Samples Only

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PROJECT: POL-TPH		**LOCATION:** Longview, WA	**BORING ID:** GP-34
LOGGED BY: P. Osterhout		**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/9/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292439.7912	**EASTING:** 1017599.313
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** Not Encountered
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive	Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs.				
1						
2						
3						
4						
5	SP	Brown, medium **SAND** with trace gravel; damp; no odor.	▨	▨		
6			▨	▨	0.1	
7			▨	▨		
8	GM	Dark gray, silty **GRAVEL** with sand; moist; no odor; no sheen.	▨		0.3	
9			▨			
9.5	SP	Fine, gray **SAND**. At 9.5 ft., wood debris.	▨			
10			▨	▨	0.2	
11		Gray, gravelly **SAND**.	▨	▨		
12		At 12 ft., fines downward to very fine **SAND**.	▨		0.6	
13	SM	At 13 ft., grades to silty, very fine **SAND**; wet.	▨			
14	ML	At 14 ft., grades to soft **SILT**; wet; no odor.	▨		0.4	GP-34-GW-14-19 GP-34-14-15
15	SP	Coarse **SAND**; wet; no odor. Fines downward	▨	▨		
16			▨	▨	0.2	
16.5	SP-SM	Gravelly, fine to coarse **SAND** with trace to 20% silt.	▨	▨		
17			▨	▨	0.4	
18	ML	Gray **SILT** with trace to 20% fine sand; wet; no odor. Organics present below 18.75 ft.	▨	▨	0.5	
19			▨	▨		
20		Boring terminated at 20 ft. bgs.			0.5	

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NOTES:
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** GP-35
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/10/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 293006.4502	**EASTING:** 1017856.098
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** Not Encountered
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Hand Auger to 5 ft. bgs; no recovery.				
1						
2						
3						
4						
5	SP	Brown **SAND** with gravel.	■	■		
6	ML	Gray **SILT**; moderate odor; minor metallic sheen.	■	■	3.0	
7			■	■	2.2	GP-35-7-8
8			■		3.0	
9			■			
10			■	■	2.9	
11			■	■		
12		At 12 ft., wood chunk.	■	■	3.3	
13	SP-SM	Gray **SAND** with layers of sand and silty sand at the bottom of the core; mild to no odor throughout; no sheen.	■			
14			■			
15			■	■	2.9	
16			■	■		GP-35-16-17
17			■	■		
18			■	■		
19			■	■		
20		Boring terminated at 20 ft. bgs.			2.1	

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NOTES:
Soil Samples Only

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **GP-36**
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/12/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 292959.6519	**EASTING:** 1017705.684
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; no recovery.			
2					
4					
	SP	Brown, loose, fine to medium, **SAND** with gravel,; dry to moist; no odor.			
6	ML	Brown, clayey **SILT** to fine, sandy **SILT** with 10% organics; moist to wet; no odor.		7.8	
8		At 8 ft., becomes gray; no odor.		25.6	
	SP	Clean **SAND**; strong odor; heavy rainbow sheen and brown droplets.			
10				7.6	
12	SM/CH	At 12 ft., grades to silty **SAND** then silty **CLAY** with 15% organics; rainbow sheen.		20.9	
					GP-36-13-14
14 ▼	SM	Silty **SAND**; strong odor; sheen and some brown droplets. At 14 ft., becomes wet.		612.0	
16				397.0	GP-36-16-17
18				241.0	
20	ML	Gray **SILT**; strong odor; possibly slough.		13.1	
	SP	Gray, poorly-graded **SAND**; moderate odor; metallic sheen.			
22					GP-36-22-23
		At 23 ft., odor and sheen dissipate.		13.7	
24					
		Boring terminated at 25 ft. bgs.		3.4	

ABBREVIATIONS:
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NOTES:
Soil Samples Only

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** GP-37
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/12/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 293081.2618	**EASTING:** 1017687.849
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 15.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; Gravel ground surface.				
1						
2						
3						
4						
5		Brown, fine, loose, clean **SAND**; moist; no odor.	▨	▨		
6			▨	▨	0.3	
7	SP		▨			
8			▨			
9		Brown, silty **SAND**; moist; no odor. Interbedded **SAND** and silty **SAND**.	▨			
10			▨	▨	0.2	
11			▨	▨	0.1	
12	SM/SP	At 12 ft., becomes gray.	▨	▨	0.1	
13			▨	▨		GP-37-12-14 GP-37D-12-14
14 ▼		At 14 ft., becomes saturated.	▨		0.3	
15		Boring terminated at 15 ft. bgs.				

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Soil Samples Only

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PROJECT: POL-TPH		**LOCATION:** Longview, WA	**BORING ID:** GP-38
LOGGED BY: P. Osterhout		**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292423.0772	**EASTING:** 1017421.518
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 19
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0	GP	Railroad ground road base.				
1						
2	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.				
3						
4						
5			▨	▨		
6			▨	▨	1.5	
7			▨	▨		
8			▨		0.9	
9			▨			
10		Same as above; no odor; no sheen throughout the boring.	▨	▨	0.9	
11			▨	▨	0.5	GP-38-11-11.5
12			▨	▨	1.4	
13			▨	▨	1.1	
14			▨			
15			▨	▨		
16			▨	▨	0.8	
17			▨	▨		
18			▨	▨	1.4	
19 ▼		At 19 ft., becomes wet.	▨			
20		Boring terminated at 20 ft. bgs.				

ABBREVIATIONS:
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NOTES:
Soil Samples Only

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-02**
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-2	**DRILL DATE:** 3/11/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292883.8583	**EASTING:** 1017969.462
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 14.5-19.5

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Airknifed to 5 ft.bgs.				
1						
2						
3						
4						
	OL	Dark brown, organic-rich, firm **SILT**; moist; mild odor; no sheen.				
5	CH	Dark brown, silty **CLAY**	▨	▨		OIP-02-5-5.5
6	ML	Gray-brown, sandy **SILT** with wood and grass; mild odor; metallic sheen.	▨	▨	2.3	
7		At 7 ft., becomes wet to saturated (perched); odor dissipates with depth. Interbedded with sandy **SILT** and clayey **SILT**; sheen only on outside of the core.	▨	▨	1.4	
8			▨	▨		
9			▨	▨	1.7	
10			▨	▨	1.5	
11			▨	▨		
12			▨	▨	1.2	
13		At 12.5 ft., becomes firm and damp to moist. At 14 ft., becomes wet to saturated.	▨	▨		
14 ▼		At 14.5 ft., becomes soft and loose.	▨	▨	1.1	OIP-02-14-15 OIP-02-GW-14.5-19.5 OIP-02D-GW-14.5-19.5
15		At 15 ft., mild odor; sheen.	▨	▨		
16			▨	▨	1.1	
17			▨	▨		
18	SP	At 18 ft., grades to clean, loose, coarse **SAND**; saturated; no odor; no sheen.	▨	▨	1.1	
19			▨	▨		
20		Boring terminated at 20 ft. bgs.			1.4	

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-04**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-2	**DRILL DATE:** 3/10/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292948.9647	**EASTING:** 1017938.189	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 15-20	

Depth (feet)	USCS Symbol	Soil Description	Drive	Recovery	PID (ppm)	Sample ID
0	GW	Hand auger to 5 ft. bgs; **GRAVEL** and cobbles observed during clearing.				
1						
2						
3						
4	SP	Hand auger sample collected from 4 to 5 ft. bgs. Gray, clean, loose, fine **SAND** with trace gravel and cobles; damp to dry; no odor.				OIP-04-4-5
5			▨	▨		
6			▨	▨	0.3	
7			▨	▨		
8		Same as above; no odor.	▨		1.2	
9			▨			
10			▨	▨	1.1	
11			▨	▨		
12	SP/SM	Interbedded clean **SAND** and silty **SAND** to **SAND** with silt; trace organics; moist; no odor.	▨	▨	1.0	
13			▨			
14			▨		1.0	
15 ▼		At 15 ft., becomes wet.	▨	▨		OIP-04-15-16 OIP-04-GW-15-20
16			▨	▨	1.0	
17			▨	▨		
18			▨	▨	0.4	
19		At 19.5 ft., very slight odor; no sheen.	▨	▨		
20		Boring terminated at 20 ft. bgs.			2.4	

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NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-05**
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-1	**DRILL DATE:** 3/12/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 291921.5893	**EASTING:** 1017503.128
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 30.5	**DEPTH TO WATER (ft bgs):** 29
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.			
		Brown, loose, **SAND** with gravel; dry; no odor.			
2				1.7	
4	SW			1.7	
6				1.6	
		AT 7 ft., 6 inch layer of dark brown to black **SAND** with vitreous sand grains; no odor. Same as above below.			
8				1.3	
10				1.8	
12				1.6	
14		At 14 ft., becomes lighter in color.			
				1.6	
16					
				1.7	
18	SP				
				1.6	
20		Same as above.		1.0	
				1.7	
22					
				1.9	
24					
		At 24.5 ft., becomes moist.			
		From 25 to 27 ft., potentially slough due to dryness.		1.9	
26				1.4	
		Brown, loose **SAND** with trace gravel; moist; no odor.			OIP-05-27-28
28				1.0	
	SP/ML	At 28.5 ft., becomes gray with lenses of silt and wood; dense; no odor.			
▼	SM	At 29 ft., becomes saturated.			OIP-05-28-29
	SP	Gray, medium **SAND**; dense; wet; no odor.			
30				0.9	
		Boring terminated at 30 ft. bgs.			

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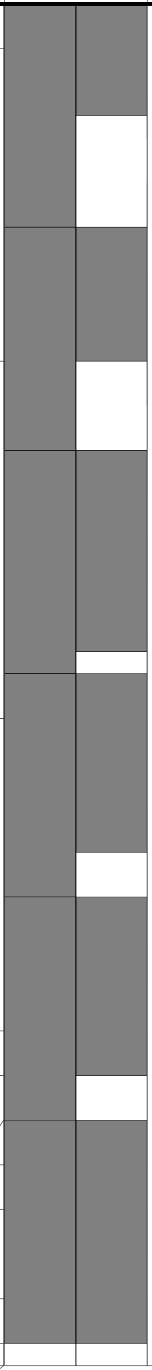
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-06
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-1	**DRILL DATE:** 3/13/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 291947.8346	**EASTING:** 1017471.699
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 30.5	**DEPTH TO WATER (ft bgs):** 25
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 25-30

Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.		
	SW	Gray/brown, loose, fine to coarse **SAND** with gravel; dry; no odor.		
2			0.9	
4			1.0	
6			1.2	
8		Same as above; no odor.	1.3	
10			2.5	
12			1.0	
14			0.9	
16		At 16 ft., begins to fine with 5-10% gravel and coarse sand; dry; no odor.	1.0	
18			1.1	
20			1.4	
			1.6	
22				
	SP	Brown, poorly-graded, medium **SAND**; dry; no odor.	1.3	
24		Brown, well-graded **SAND** with <10% gravel; moist to wet; no odor; no sheen.		
▼		At 25 ft., becomes gray and saturated; no odor; no sheen.	1.2	
26	SW/SM	Brown, well-graded **SAND** with gravel; dry; no odor; no sheen.		
	SW	At 27 ft., becomes dense.	0.9	OIP-06-GW-25-30 OIP-06-27-28 OIP-06-29-30
28				
	SP/SM	At 29 ft., becomes gray with variable silt; wet; no odor.	1.5	
30		Boring terminated at 30 ft. bgs.		



ABBREVIATIONS:
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PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-08**	
LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC8	DRILL DATE: **11/22/19**	
DRILLED BY: **HOLT (Mike)**	NORTHING: **292919**	EASTING: **1017662.15**	
DRILLING EQUIPMENT: **Limited Access Drill Rig**	COORDINATE SYSTEM: **NAD 83 WA SP S**		
DRILLING METHOD: **Geoprobe**	TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **21**	
SAMPLING METHOD: **5' Liners**	BORING DIAMETER: **2 inch**		

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	Fill	Subangular gravelly **FILL**			
	SP	Brown, fine **SAND**; no odor.			
2				0.9	
4				1.0	
		Same as above; no odor; no sheen.			
6				1.0	
8				0.0	
		At 8 ft., becomes medium to fine grained **SAND**.			
10				0.5	
12				1.0	
	SM	Silty **SAND**; very slight sheen; no odor.			
	ML	Low plasticity **SILT**; mild odor; no sheen.			
14				0.5	
	SP	Poorly graded **SAND**; with moderate odor; heavy rainbow sheen and droplets.			
16				1723.0	
		At 16.5 ft., moderate sheen.			
18				1985.0	
					OIP08-19-20-112219
20				2260.0	
▼	ML	Olive gray, sandy **SILT**; strong odor; moderate sheen.			
22				2519.0	
	SP	Poorly graded **SAND**; slight sheen; mild odor.			
24				109.6	
		Bottom of Boring = 25 ft. bgs			

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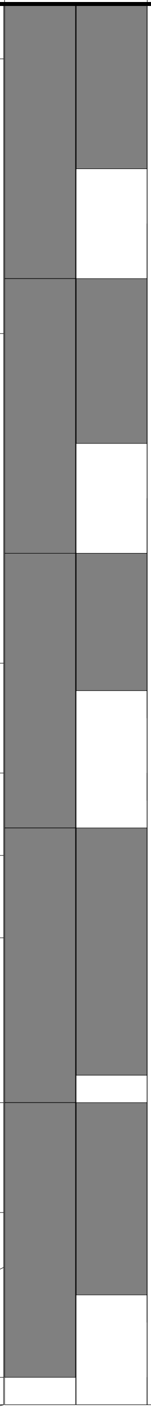
	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-15
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/12/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292869.4791	**EASTING:** 1017593.993
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 19
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 14-19

Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.		
	GP-GM	**GRAVEL** with silt, sand and cobbles; loose; dry to moist; no odor.		
2			2.3	
4			1.5	
6	SP	Brown, loose, fine **SAND**; moist; no odor.		
			2.6	
8				
			2.4	
10				
			3.2	
12		At 12 ft., slight, solvent-like odor; similar odor to fresh cut wood.	1.9	
14 ▼		At 14 ft., becomes saturated; mild TPH odor; slight rainbow and metallic sheen.	1.8	
			6.8	
16	SM	Brown/gray, silty **SAND** with <10% wood/organics; wood/solvent-like odor; metallic sheen.	2.8	OIP-15-15-16 OIP-15-GW-15-19
	ML	At 17 ft., grades to gray/brown sandy to clayey **SILT**; odor and sheen dissipate below 18 ft.		
18			2.1	
20	SM	Loose, silty **SAND**;wet; mild odor; no sheen.	2.2	
			1.8	OIP-15-20-21
22	SM/ML	Interbedded gray, silty **SAND** and sandy **SILT**; wet to saturated; mild odor; no sheen. At 23 ft., odor dissipates.		
			1.1	OIP-15-23-24
24				
		Boring terminates at 25 ft. bgs.	1.3	



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	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-18**
	LOGGED BY: G. Cisneros	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292369.2061	**EASTING:** 1017479.331
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 19.5
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Airknifed to 5 feet bgs.				
1						
2						
3						
4						
5	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.	▨	▨		
6			▨	▨	0.5	
7			▨	▨		
8			▨	▨	0.1	
9			▨			
10			▨	▨		
11			▨	▨	0.2	
12			▨	▨	0.1	
13		Same as above; moist; no odor; no sheen.	▨	▨		
14			▨		0.2	
15			▨	▨		
16			▨	▨	0.2	
17			▨	▨	0.1	
18			▨	▨		
19		At 19 ft., becomes wet to saturated.	▨	▨	0.1	OIP-18-19-19.5
▼		At 19.75 ft., becomes saturated.	▨	▨		
20		Boring terminated at 20 ft. bgs.				

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-19	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292388.078	**EASTING:** 1017502.731	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 19.5	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.			
5	SP-SM	Brown, loose, fine to medium **SAND** with trace to 10% silt interbedded moist to dry; no odor.			
6				0.2	
8				0.5	
10	SP	Brown, clean **SAND** with trace silt; no odor.			
11				0.5	
13				0.8	
15				0.7	
16				0.5	
18				0.7	
19		At 19 ft., becomes moist to wet.			OIP-19-19-20
▼					
20				0.4	
21				1.2	
22	SP/SM	Gray, silty **SAND** interbedded with loose, coarse **SAND**; wet; no odor.			
23				0.6	
24	CH	Gray, firm, silty **CLAY**; wet; no odor.			
24.5	SM	At 24.5 ft., becomes sandy.			
25		Boring terminates at 25 ft. bgs.			

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	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-20**
	LOGGED BY: G. Cisneros	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292415.8279	**EASTING:** 1017466.926
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 19.5
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.			
1					
2					
3					
4					
5	SP	Brown, fine to medium **SAND**; no odor; no sheen.			
6				0.3	
7					
8				0.5	
9					
10					
11	SM	Gray, silty, fine **SAND** with 30% silt; moderate odor; slight sheen.		505.0	OIP-20-11-11.5
12	ML	Olive-gray, stiff **SILT** with moderate plasticity; moderate odor; slight sheen.			
13					
14	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.		1.5	
15				1.5	
16	SM	Olive-gray, silty, fine **SAND**; moist; no odor; no sheen.		199.0	
17	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.			
18				0.4	
19					OIP-20-19-19.5
▼		At 19.5 ft., becomes wet to saturated.			
20		Boring terminated at 20 ft. bgs.		0.0	

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

NOTES:

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	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-21
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/13/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292468.7798	**EASTING:** 1017508.17
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 18
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.				
1						
2						
3						
4						
5	SP	Brown, loose, fine, clean **SAND**; moist; no odor.	■	■		
6			■	■	1.6	
7			■	■		
8		At 8 ft., becomes coppery in color.	■		1.8	
9	SP/ML	Gray **SAND** with interbedded silt; wet (perched aquifer?); no odor; no sheen.	■		1.8	
	SP	Gray/brown, loose, poorly-graded **SAND**; moist; no odor.	■			
10	ML	Gray, **SILT** to sandy **SILT**; saturated; no odor.	■	■	1.9	
11	SP	Gray/brown, loose, poorly-graded **SAND**.	■	■		
12			■	■	2.2	
13			■			
14			■			
15			■	■	2.1	
16			■	■	1.3	
	SM	At 16.5 ft., grades to silty **SAND**.	■	■		
17	ML	Gray **SILT**; wet; no odor; no sheen.	■	■		
18 ▼	SW	Brown, well-graded **SAND** with 15% gravel; wet; no odor.	■	■	1.4	OIP-21-18-19
19		At 20 ft., becomes gray; wet; no odor; no sheen.	■			
20		Boring terminated at 20 ft. bgs.			1.3	

ABBREVIATIONS:
ft bgs = feet below ground surface
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-23
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/10/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 292621.408	**EASTING:** 1017543.662
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 30.5	**DEPTH TO WATER (ft bgs):** 13.5
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	GW-SW	Railroad spall (fill) then loose, sandy **GRAVEL** to gravelly **SAND**; dry; no odor.			
2				1.4	
4	SP	Brown, loose, clean, medium **SAND** with trace organics (wood); dry; no odor.		1.7	
6				1.4	
8				1.5	
10	SW	At 10 ft., becomes well-graded **SAND** with increased gravel content.		1.4	
12				5.3	
14	SM	Gray **SAND** with silt; saturated; no odor; no sheen.		43.4	OIP-23-14-15
16				130.0	
18				137.0	
20		Gray **SAND** to silty, fine to medium **SAND**; mild to moderate TPH odor; no sheen.		184.0	OIP-23-19-20
22				324.0	
24				209.0	OIP-23-23-24
26				337.0	
28		At 28 ft., odor dissipates.		30.7	
	ML	At 29.5 ft., becomes **SILT**.			OIP-23-29.5-30
30		Boring terminates at 30 ft. bgs.		10.1	

ABBREVIATIONS:
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NOTES:

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PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-30**	
LOGGED BY: **G. Cisneros**	BORING LOCATION: AOPC7	DRILL DATE: **11/19/19**	
DRILLED BY: **HOLT (Mike)**	NORTHING: **292549.47**	EASTING: **1017565.76**	
DRILLING EQUIPMENT: **Limited Access Drill Rig**	COORDINATE SYSTEM: **NAD 83 WA SP S**		
DRILLING METHOD: **Geoprobe**	TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **21**	
SAMPLING METHOD: **5' Liners**	BORING DIAMETER: **2 inch**		

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	Fill	Railroad, angular gravelly **FILL**.			
	SP	Brown-gray, fine to medium **SAND**; moist; no odor; no sheen			
2				1.4	
4				6.4	
6	SP	Same as above; no odor; no sheen.			
8				0.3	
10				0.2	
12	SM	Dark gray to black, silty, fine to medium **SAND**; moist; strong hydrocarbon odor; moderately heavy sheen.			
14	ML	Olive gray to black, sandy **SILT** ; moist; strong odor; heavy sheen.		34.0	
	SP	Brown, medium to coarse **SAND**; moist; slight odor; no sheen.			
16				19.0	
	ML	Olive gray, sandy **SILT**; moderate odor; slight sheen.			
18	SM	Olive, silty, fine **SAND**; moist to wet; moderate odor; slight sheen.		36.0	
	ML	Olive, sandy **SILT**; moist.			
20				43.0	OIP30-20-21-111919
▼	SP	Black, fine to medium **SAND** with visible LNAPL; wet to saturated; strong odor; heavy sheen.			
22	SM	Olive, silty **SAND**; moderate odor; moderate sheen.		19.2	
	ML	Olive **SILT** with low plasticity.			
24	SP	Gray, fine to medium **SAND**; saturated; strong odor; moderate sheen.		34.0	
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
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PROJECT: POL-TPH
LOCATION: Longview, WA
BORING ID: OIP-31
LOGGED BY: P. Osterhout
BORING LOCATION: AOPC-7
DRILL DATE: 3/9/2020
DRILLED BY: Holt: Mike Running
NORTHING: 292534.5724
EASTING: 1017589.368
DRILLING EQUIPMENT: LAR Geoprobe
COORDINATE SYSTEM: NAD 83 WA SP S
DRILLING METHOD: Direct Push
TOTAL DEPTH (ft bgs): 20.5
DEPTH TO WATER (ft bgs): 15
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner
BORING DIAMETER: 2 inch
TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft bgs; railroad spall (fill) ground surface.			
1					
2					
3					
4					
5	SW	Brown, well-graded **SAND** with gravel; moist; no odor.			
6				0.8	
7	GM	At 7.5 ft., 1 inch lens of gray, silty **GRAVEL**; wet; no odor.			
8	SP	Fine, clean **SAND**; damp; organic odor.		0.7	
9				1.0	
10					
11					
12	GW-SW	At 12 ft., grades to gravelly **SAND** to sandy **GRAVEL**; moist; organic odor.		0.9	
13	SP	Fine **SAND**; no odor.			
14	ML	At 14 ft., grades to **SILT** with some mottling at 14.75 ft; no odor.		0.8	
15 ▼	SW	Gravelly, fine to coarse **SAND**; no odor.			
16				0.8	
17					OIP-31-17
18	ML SP	At 18 ft., 2 inch **SILT** lens. Gray, fine **SAND** with trace silt; moist to wet; no odor.		1.1	
19					
20		Boring terminated at 20 ft. bgs.		1.3	OIP-31-20

ABBREVIATIONS:
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ppm = parts per million
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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-39
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-3	**DRILL DATE:** 3/10/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 292989.8741	**EASTING:** 1017795.581
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 9.75
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Railroad spall (fill) ground surface blocked any recovery.			
	SW	Brown, loose **SAND** with gravel, silt, and 1 inch black, organic lens at 6 ft. bgs; dry; organic odor.		1.8 2.0	
8	ML	Brown, firm, mottled **SILT**; moist; no odor. At 9 ft., becomes gray; no odor.		2.1	
10	SP	Gray **SAND**; saturated; mild TPH odor; no sheen.			
	SM/ML	Gray, silty **SAND** to **SILT** with organics (moist wood); no odor.		3.2	
	SP	Clean **SAND**; mild odor; rainbow sheen.		3.7	
14	SM	Silty **SAND; mild to moderate odor; minor metallic sheen.**		4.1 2.1	OIP-39-15-15.5 OIP-39-16.5-17
	SP	Interbedded clean **SAND** and silty **SAND** to **SAND**; very slight odor; no sheen. Gray, loose **SAND**; saturated; slight pesticide odor; no sheen.		4.2 3.2	OIP-39-21-22
	SM	Gray, silty **SAND**; saturated; no odor.		2.9	
		Boring terminated at 25 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface
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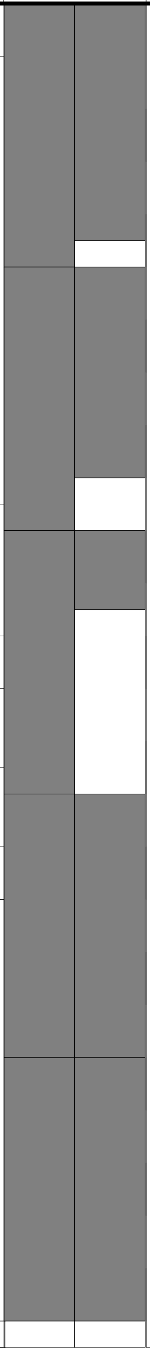
NOTES:
Ambient PID = 1.7 ppm.

FLOYD | SNIDER strategy ▪ science ▪ engineering	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-42**
	LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC5	DRILL DATE: **11/21/19**
DRILLED BY: **HOLT (Mike)**		NORTHING: **292857.39**	EASTING: **1017689.02**
DRILLING EQUIPMENT: **Limited Access Drill Rig**		COORDINATE SYSTEM: **NAD 83 WA SP S**	
DRILLING METHOD: **Geoprobe**		TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **18.5**
SAMPLING METHOD: **5' Liners**		BORING DIAMETER: **2 inch**	



Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	Fill	Railroad, angular gravelly **FILL**.		
	SP	Light brown, fine to medium **SAND**; slight odor at 1 ft. bgs; no sheen.		
2			0.2	
4			0.2	
6			0.8	
8		At 8 ft., color changes to dark brown; slight odor; slight sheen.	33.6	
	ML	Olive gray, organic **SILT**; strong odor; moderate sheen.		
10			460.5	
12			494.6	
	SM	Dark brown, silty, fine **SAND** with thick black product; strong odor; Bunker C-type sheen.		
	ML	Olive gray, sandy **SILT**; strong odor; heavy sheen.		
14			364.2	
	SP	Dark Brown, fine to medium **SAND**; strong odor; heavy sheen.		
16			1180.0	
	ML	Olive gray **SILT**; strong odor; heavy sheen.		
	SP	Brown to black, fine to medium **SAND** with visible product; wet; strong odor; heavy sheen.		OIP42-17-17.5-112119
18			1107.0	
▼				
		At 19.5 ft., grades to brown; saturated; slight odor; slight sheen.		
20			1207.0	
22			64.1	
		At 23 ft., no sheen.		
24			18.0	
		Bottom of Boring = 25 ft. bgs		

ABBREVIATIONS:

ft bgs = feet below ground surface
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-46**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/10/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292745.5217	**EASTING:** 1017672.525	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 8	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft bgs.			
1					
2					
3					
4					
5	SW	Dark brown **SAND** with angular gravel (fill); no odor; no sheen.			
6				1.6	
7	SM/SP	Brown **SAND** and silty **SAND**; moist; no odor; no sheen.			
8 ▼	SM	At 8 ft., becomes wet. At 8.5 ft., becomes saturated.		0.7	OIP-46-8
9					
10	SM/ML	Interbedded **SILT** and silty **SAND**.		1.4	OIP-46-10-11
11					
12					
13	SP	Gray, poorly-graded, medium **SAND**; saturated; mild odor; core is shiny, but no sheen.		11.6	
14	SM/SP	Gray to brown, poorly-graded **SAND** to silty **SAND**; no odor; no sheen.		8.6	OIP-46-14
15					
16				1.4	
17					
18					
19					
20		Boring terminated 20 ft. bgs.		1.5	

ABBREVIATIONS:
ft bgs = feet below ground surface
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ppm = parts per million
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-47**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/9/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292858.0696	**EASTING:** 1017742.196	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 20	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	FILL	Surficial railroad **FILL**.		3.2	
2	ML	Brown **SILT** with trace sand; moist; no odor.			OIP-47-2-3
	SP	Gray-brown, clean, fine to medium **SAND**; no odor.			
	ML	Brown **SILT** with trace sand; moist; no odor.			
4 6	SP	Brown, fine to medium, clean **SAND**; moist; no odor. From 6 to 8 ft. bgs, perched water zone.		1.5 6.3	
	SM	At 6.5 ft, becomes gray and silty.			
8	ML	At 7 ft., grades to **SILT**; mild odor; sheen and droplets.		91.0	
10	SP	Poorly-graded **SAND**; strong odor; sheen.		710.0 786.0	OIP-47-11-12
12 14	SM	At 11.5 ft., grades to silty **SAND**; strong odor.		76.0 114.0	
16	SP	At 15 ft., becomes saturated; strong odor.		133.0	
18	SM	Gray, soft, silty **SAND**; strong odor. At 18 ft., becomes dense.		315.0 110.0	OIP-47-17
20 ▼ 22 24	SP	Clean **SAND**; mild odor. At 22.5 ft., strong odor; brown droplets. At 23 ft., mild odor; no sheen.		750.0 45.0 29.0 7.4	OIP-47-25
		Boring terminated at 25 ft. bgs.			

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-49**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/9/2020	
DRILLED BY: Holt: Mike Running		**NORTHING:** 292829.7502	**EASTING:** 1017779.565
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15.25
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0 1 2		Hand cleaed to 2.5 ft. bgs; railroad base fill.			
3	SP	Fine to medium **SAND** with trace grave; moist; no odor.		0.3	
4 5 6	GM	Well-graded, angular, silty **GRAVEL**; moist to dry; no odor.		0.5	
7 8	SP/ML	Interbedded **SILT** and silty **SAND**; moist.		0.2 0.3	
9	SP	At 9 ft., becomes wet, poorly-graded **SAND**.		168.0	
10 11 12	ML	At 9.5 ft., grades to **SILT** with wood debris. At 10 ft., mild odor.		0.3 0.3	OIP-49-10
13	SP	At 13 ft., 2 inch seam of fine to medium **SAND**; strong odor; brown droplets.		38.0 713.0	
14 15	ML	**SILT**. At 14 ft., piece of wood. At 15.25 ft., becomes saturated.		5.2 2.4	
16	SP	**SAND**; strong odor; brown droplets.		25.0	
17	ML	At 17 ft., grades to **SILT**; moist.		33.0	OIP-49-17
18	SM	At 18 ft., grades to silty **SAND**; wet; no odor.		161.0	
19	SP	At 19 ft., grades to clean **SAND**; wet; no odor.		2.5	
20		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:
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NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-52**
	LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC7	DRILL DATE: **11/22/19**
DRILLED BY: **HOLT (Mike)**		NORTHING: **292623.86**	EASTING: **1017450.06**
DRILLING EQUIPMENT: **Limited Access Drill Rig**		COORDINATE SYSTEM: **NAD 83 WA SP S**	
DRILLING METHOD: **Geoprobe**		TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **21.5**
SAMPLING METHOD: **5' Liners**		BORING DIAMETER: **2 inch**	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	ASPHALT	**ASPHALT** ground surface.			
	GW	Angular **GRAVEL** with some sand (fill).			
		Brown, fine to medium **SAND**; moist; no odor; no sheen.			
2				0.2	
4				0.2	
6				4.0	
		Same as above; no odor; no sheen.			
8				0.6	
10	SP			0.6	
12				0.4	
14		Brown, poorly-graded **SAND**; no odor; no sheen.		19.6	
16				3.9	
		Gray, fine poorly graded **SAND**; moderate odor; moderate sheen.			
18	SM	At 18 ft., grades to silty **SAND**.		55.9	
				94.6	OIP52-19-19.5-112219
20				2.4	
▼	ML	At 21 ft., grades to **SILT**; moderate odor; heavy sheen.			
22				221.0	OIP52-22-22.5-112219
				220.0	
	SP	Gray **SAND**; moderate odor; moderate sheen.			
24		At 24 ft., color changes to brown; no odor; no sheen.		121.0	
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
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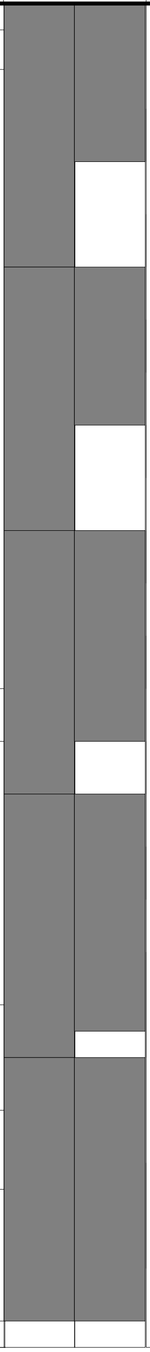
NOTES:

FLOYD | SNIDER strategy ▪ science ▪ engineering	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-53**
	LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC7	DRILL DATE: **11/22/19**
DRILLED BY: **HOLT (Mike)**		NORTHING: **292641.02**	EASTING: **1017432.46**
DRILLING EQUIPMENT: **Limited Access Drill Rig**		COORDINATE SYSTEM: **NAD 83 WA SP S**	
DRILLING METHOD: **Geoprobe**		TOTAL DEPTH (ft bgs): **25**	DEPTH TO WATER (ft bgs): **21**
SAMPLING METHOD: **5' Liners**		BORING DIAMETER: **2 inch**	



Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	ASPHALT	**ASPHALT** ground surface.			
	GW	Angular **GRAVEL** with some sand (fill).			
	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen.			
2				2.4	
4				2.5	
6				2.4	
		Same as above; no odor; no sheen.			
8				2.4	
10				3.1	
12				2.5	
	SM	Olive gray, silty, fine **SAND** with 30% silt; moist; no odor; no sheen.			
14	SP	Olive gray, fine **SAND**; no odor; no sheen.		3.0	
16				4.5	
18				3.2	
	SM	Olive gray, silty, **SAND**; wet; no odor; no sheen.			
20					
▼	ML	Olive gray, sandy **SILT** with moderate plasticity; saturated; no odor; no sheen.			OIP53-21-21.5-112219
22				0.5	
	SP	Gray to light brown, fine to medium **SAND**; saturated; no odor; no sheen.			
24					
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
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ppm = parts per million
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▼ = denotes groundwater table

NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-54	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-7	**DRILL DATE:** 3/11/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 292508.6819	**EASTING:** 1017439.913	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 18	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable	

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.				
1						
2						
3						
4						
5	SW	Brown, loose **SAND** with gravel and cobbles; damp; no odor.	▨	▨		
6			▨	▨	0.2	
7	SP	Clean, loose **SAND** with trace gravel; damp; no odor.	▨	▨		
8			▨		0.5	
9			▨			
10	SP/SW	Interbedded clean **SAND** and well-graded **SAND** with gravel and trace silt throughout; no odor.	▨	▨	0.4	
11			▨	▨		
12			▨	▨	0.4	
13			▨	▨		
14			▨	▨	0.6	
15			▨	▨		OIP-54-15-16
16			▨	▨	0.6	
17			▨	▨		
18 ▼		At 18 ft., becomes wet.	▨	▨	0.7	OIP-54-18-19
19		Becomes saturated at the bottom of the boring.	▨	▨		
20		Boring terminated at 20 ft. bgs.			0.7	

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

NOTES:

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	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-57**
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-4	**DRILL DATE:** 3/10/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 293157.0647	**EASTING:** 1017913.226
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 15.5	**DEPTH TO WATER (ft bgs):** Not Discernible
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0		Hand augered to 6 ft. bgs; railroad spall ground surface over silt and sand.				
1						
2						
3						
4						
5						
6	ML	Brown, mottled **SILT**; moist; no odor.	■	■		
7			■	■	2.4	
8			■	■		
	SP	Brown, loose medium, clean **SAND** with interbedded fine **SAND**; no odor.	■	■		
9			■		2.8	
10	ML	Brown, mottled **SILT**; moist; no odor.	■	■		
11			■	■	2.3	
12	SM/SP	Brown to gray, medium **SAND** with interbedded, fine, clean **SAND** and silty **SAND**.	■	■		
13			■	■	3.2	
14			■	■	3.8	OIP-57-14
15		Boring terminated at 15 ft. bgs.				

ABBREVIATIONS:
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NOTES:

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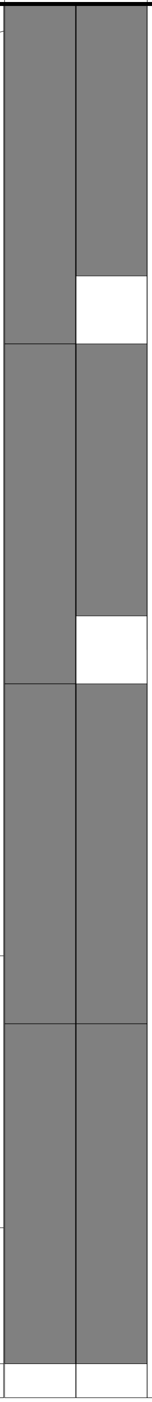
	LOGGED BY: G. Cisneros	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/12/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292772.4434	**EASTING:** 1017549.348
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable



Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface **FILL**.		
	SP	Brown, fine to medium **SAND**; moist; no odor; no sheen throughout boring.		
1				
2			1.0	
3				
4			0.2	
5				
6			0.3	
7				
8			0.4	
9				
10	SP			
11			1.3	
12				
13				
14 ▼		At 14 ft., becomes wet; no odor; no sheen.	1.3	OIP-64-14-15
15			0.2	
16				
17			0.2	
18		Gray, fine to medium **SAND** with 10% red grains; saturated; no odor; no sheen.	1.1	
19			2.2	
20		Boring terminated at 20 ft. bgs.		

ABBREVIATIONS:
ft bgs = feet below ground surface
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NOTES:

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PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **OIP-66**	
LOGGED BY: **G. Cisneros**	**BORING LOCATION:** AOPC8	DRILL DATE: **11/22/19**	
DRILLED BY: **HOLT (Mike)**	NORTHING: **293018.87**	EASTING: **1017712.31**	
DRILLING EQUIPMENT: **Limited Access Drill Rig**	COORDINATE SYSTEM: **NAD 83 WA SP S**		
DRILLING METHOD: **Geoprobe**	TOTAL DEPTH (ft bgs): **20**	DEPTH TO WATER (ft bgs): **17**	
SAMPLING METHOD: **5' Liners**	BORING DIAMETER: **2 inch**		

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0	FILL	Gravel, rounded, base **FILL**.	▨	▨		
1	SP	Brown, fine to medium **SAND**; no odor; no sheen.	▨	▨		
2			▨	▨		
3			▨	▨		
4			▨	▨		
5			▨	▨		
6	ML	Olive gray **SILT** with moderate plasticity and some organics; moist; slight odor; moderate sheen.	▨	▨		
7			▨	▨		
8	SP	Brown, medium to coarse **SAND**; slight odor.	▨	▨		
9			▨			
10	SM ML	Olive gray, silty **SAND**; moderate sheen. Olive gray **SILT** with low plasticity; moist to wet; strong odor; moderate sheen.	▨	▨		
11			▨	▨		OIP66-12-12.5-112219 OIP166D-12-12.5-112219
12	SP	Brown, medium to coarse **SAND**; moist; strong odor; heavy sheen.	▨	▨		
13			▨	▨		
14	SM	Olive gray, silty, fine **SAND**; wet; slight odor; slight sheen.	▨			
15			▨	▨		
16	SP	Olive gray, fine to medium **SAND**; wet, slight odor, slight sheen.	▨	▨		
17 ▼			▨	▨		
18			▨	▨		
19			▨	▨		
20		Bottom of Boring = 20 ft. bgs				

ABBREVIATIONS:
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NOTES: No PID readings were recorded at this location.

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-67**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/12/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 293057.3205	**EASTING:** 1017737.221	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 25.5	**DEPTH TO WATER (ft bgs):** 14	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 14-19	

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	GP	Brown, loose, sandy **GRAVEL** ground surface; no odor.			
		No recovery.		2.0	
2					
4					
	SM	Dark brown, loose, silty **SAND**; dry; no odor.			
6	ML	At 6 ft., grades to brown **SILT** with trace organics; dry to moist; no odor; no sheen.		3.1	
					OIP-67-7-8
8	SM/SP	Gray/brown **SAND** and silty **SAND**; moist; moderate to strong odor; heavy sheen and slight brown droplets.		5.5	
10	SM/ML	Gray/brown, interbedded silty **SAND** and sandy **SILT**; moderate to strong odor; heavy sheen throughout.		188.0	
					OIP-67-11-12
12				573.0	
14 ▼				499.0	
16				268.0	OIP-67-GW-14-19 OIP-67-14.5-15 OIP-67-18-19
18		At 18 ft., odor dissipates; no sheen.		358.0	
20	SP	Clean **SAND**; no odor; no sheen.		5.2	
				1.5	
22					
	ML	SILT; no odor.		2.7	
24	SP	Clean, poorly-graded **SAND**; no odor; no sheen.			
		Boring terminated at 25 ft. bgs.			

ABBREVIATIONS:
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NOTES:

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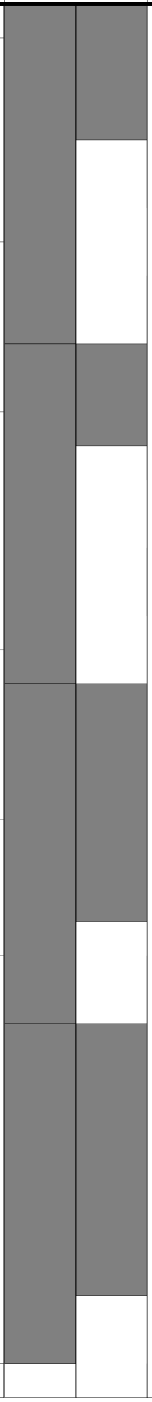
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-68	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-6	**DRILL DATE:** 3/11/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 293091.7803	**EASTING:** 1017765.909	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 14	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 13-18	

Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	GW	**GRAVEL** ground surface. Brown, loose, organic-rich, sandy, silty **GRAVEL**; dry; no odor.		
1				
2			2.1	
3				
4	SP	Gray, fine to medium, loose, clean **SAND** with trace gravels; moist; no odor.	1.4	
5				
6	SM	At 6 ft., becomes silty **SAND**.	1.3	
7				
8			1.4	
9				
10	ML	Gray, clayey **SILT**; moist.	1.2	OIP-68-10-11 OIP-68D-10-11
11				
12	SM	Gray, silty **SAND**; moist; no odor.	1.5	
13				
14 ▼		Gray, silty **SAND** and **SAND** with silt; wet to saturated; no odor; no sheen.	1.9	
15				OIP-68-GW-13-18 OIP-68-13.5-14 OIP-68-14-14.5
16			1.4	
17				
18			1.4	
19				
20		Boring terminated at 20 ft. bgs.	1.0	



ABBREVIATIONS:
ft bgs = feet below ground surface
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NOTES:

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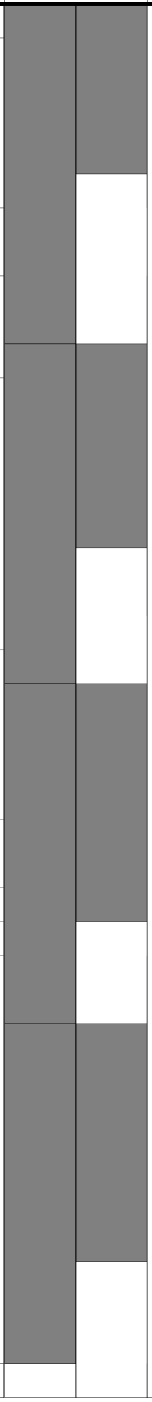
PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** **OIP-69**	
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-4	**DRILL DATE:** 3/11/2020	
DRILLED BY: Holt: Mike Running	**NORTHING:** 293233.2984	**EASTING:** 1017871.838	
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S		
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 12	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** 12-17	

Drive/
Recovery



Depth (feet)	USCS Symbol	Soil Description	PID (ppm)	Sample ID
0	GW	**GRAVEL** ground surface with organics and roots. Brown, loose, sandy, silty **GRAVEL**; moist; no odor.		
1				
2			0.9	
3	SP	Light brown, loose, fine, clean **SAND**; moist; no odor.		
4	SM	Gray, very fine, firm, silty **SAND**; moist.	0.9	
5				
	SM/SP	Light brown, loose, fine, clean **SAND** with some laminations of silty sand; moist; no odor.		
6			1.2	
7				
8			1.9	
9				
	CH	Gray, firm to soft **CLAY** with 5-10% organics; no odor.		
10			1.0	
11				OIP-69-11-12
12 ▼	SM	Gray, very fine, silty **SAND**; wet to saturated; no odor; no sheen.	1.5	
13	ML	**SILT**.	1.1	
	SM	Silty **SAND**.		
14	SP	Medium, loose, clean **SAND**; saturated; no odor; no sheen.	1.2	OIP-69-GW-12-17 OIP-69-14.5-15
15				
16				
17			1.3	
18				
19				
20		Boring terminated at 20 ft. bgs.	0.8	

ABBREVIATIONS:
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NOTES:
Turbidity of temp well at time of sample collection = 6.4 NTU

FLOYD | SNIDER strategy ▪ science ▪ engineering	**PROJECT:** POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-70
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-4	**DRILL DATE:** 3/10/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 293256.003	**EASTING:** 1018014.246
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 15.5	**DEPTH TO WATER (ft bgs):** 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/	Recovery	PID (ppm)	Sample ID
0	GW/SW	Hand auger to 5 ft. bgs; grass and gravel ground surface.				
1						
2						
3						
4						
5	SW	Brown, loose, well-graded **SAND**; saturated (perched groundwater); no odor; no sheen.	▨	▨		
	SM	At 5.5 ft., grades to silty **SAND**.	▨	▨		
6			▨	▨	10.3	
7			▨	▨		
8			▨		10.2	OIP-70-8
9			▨			
10			▨	▨	5.8	
11		At 11 ft., turns gray and brown.	▨	▨		
12	SM/ML	At 12 ft., becomes denser, very fine, silty **SAND** to sandy **SILT**; wet; no odor; no sheen.	▨	▨	0.6	OIP-70-GW-10-15 OIP-70-12-14
13			▨	▨		
14 ▼	SP	Coarse, gray **SAND**; wet to saturated; no odor; no sheen.	▨		0.7	
15		Boring terminated at 15 ft. bgs.				

ABBREVIATIONS:
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NOTES:

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	PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-72
	LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-5	**DRILL DATE:** 3/11/2020
DRILLED BY: Holt: Mike Running		**NORTHING:** 292891.335	**EASTING:** 1017843.702
DRILLING EQUIPMENT: LAR Geoprobe		**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push		**TOTAL DEPTH (ft bgs):** 20.5	**DEPTH TO WATER (ft bgs):** 15
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner		**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive	Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; concrete ground surface.				
1						
2						
3						
4						
5	SP	Clean, loose, medium **SAND**; moist; no odor; no sheen.	▨	▨	0.9	
6	SM/ML	Brown, fine to very fine, silty **SAND** interbedded with sandy to clayey **SILT** with <10% wood/organics; moist to saturated; no odor; no sheen. From 6 to 13 ft. bgs, perched aquifer.	▨	▨		
7			▨	▨	1.2	
8			▨			
9			▨		8.2	
10	SM	Coarse **SAND** with silt; moderate odor; rainbow sheen.	▨	▨	11.2	OIP-72-10-11
11		At 11 ft., odor becomes mild; sheen becomes minimal.	▨	▨		
12			▨	▨		
13			▨	▨	17.0	
13.5		At 13.5 ft., chunk of wood present; moderate odor; sheen visible on core.	▨	▨		
14	ML	Gray/brown, firm **SILT**; mild odor; no sheen.	▨	▨		
	SM/SP	Interbedded **SAND** and silty **SAND**; wet to saturated; no odor; no sheen.	▨	▨		
15			▨	▨	2.3	
16			▨	▨	3.1	OIP-72-16-17
16.5		At 16.5 ft., becomes saturated; moderate odor; sheen on core.	▨	▨		
17			▨	▨	26.2	
18		At 18 ft., odor dissipates; slight sheen.	▨	▨	19.0	
19			▨	▨		
20		Boring terminated at 20 ft. bgs.			1.3	

ABBREVIATIONS:
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NOTES:

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PROJECT: POL-TPH	**LOCATION:** Longview, WA	**BORING ID:** OIP-73
LOGGED BY: P. Osterhout	**BORING LOCATION:** AOPC-4	**DRILL DATE:** 3/12/2020
DRILLED BY: Holt: Mike Running	**NORTHING:** 293169.6157	**EASTING:** 1018034.585
DRILLING EQUIPMENT: LAR Geoprobe	**COORDINATE SYSTEM:** NAD 83 WA SP S	
DRILLING METHOD: Direct Push	**TOTAL DEPTH (ft bgs):** 15.5	**DEPTH TO WATER (ft bgs):** 13
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	**BORING DIAMETER:** 2 inch	**TEMP. WELL INTERVAL:** Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery		PID (ppm)	Sample ID
0	GW/SW	Airknifed to 5 ft. bgs; Gravel ground surface.				
1						
2						
3						
4						
5	SW	Brown, loose, medium **SAND** with gravel; moist; no odor; no sheen.	▨	▨		
6			▨	▨	0.8	
7	ML	At 7 ft., 3 inches of brown **SILT**.	▨	▨		
	SW	At 7.25 ft., transitions to gray.	▨	▨		
8			▨	▨	0.7	
9	SM	Silty **SAND**.	▨			OIP-73-9-10
	SP	Brown, poorly-graded **SAND**; moist; no odor; no sheen.	▨			
10			▨	▨	0.9	
11			▨	▨		
12			▨	▨	0.3	
13 ▼		At 13 ft., becomes saturated.	▨			OIP-73-13-14 OIP-73D-13-14
14	SM	Lenses of silty **SAND**.	▨			
	SP	Clean **SAND**.	▨			
15		Boring terminated at 15 ft. bgs.				

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NOTES:

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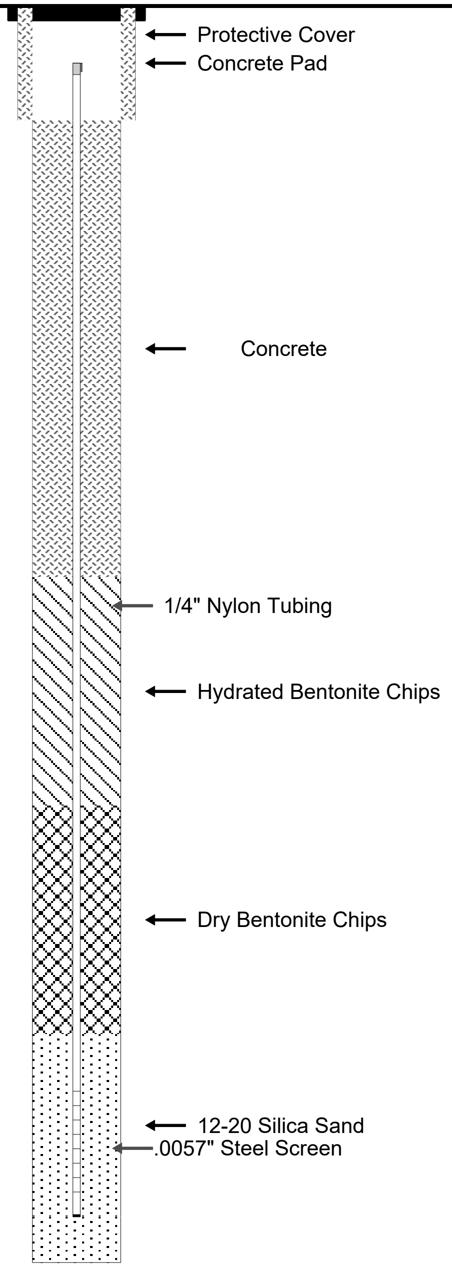
	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **VP-1**
	DRILL DATE: **3/11/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 938**
DRILLED BY: **Holt: Mike Running**	LOGGED BY: **G. Cisneros**	NORTHING: **292929.39**	EASTING: **1017680.61**
DRILLING EQUIPMENT: **LAR Geoprobe**		GROUND SURFACE ELEV.: **27.05**	TOC ELEVATION: **26.69**
DRILLING METHOD: **Direct Push**		TOTAL DEPTH (ft bgs): **5.5**	DEPTH TO WATER (ft bgs): **Not Encountered**
SAMPLING METHOD: **Not Applicable**		BORING DIAMETER: **2 inch**	SCREENED INTERVAL: **4.75-5.25**

Depth (feet)	USCS Symbol	Description
0	FILL	Asphalt ground surface **FILL**.
0.4	SP	Brown, fine to medium **SAND**.
0.8		
1.2		
1.6		
2		
2.4		
2.8		
3.2		
3.6		
4		
4.4		
4.8		
5.2		
5.6		Bottom of vapor point = 5.5 ft. bgs.

Well Construction



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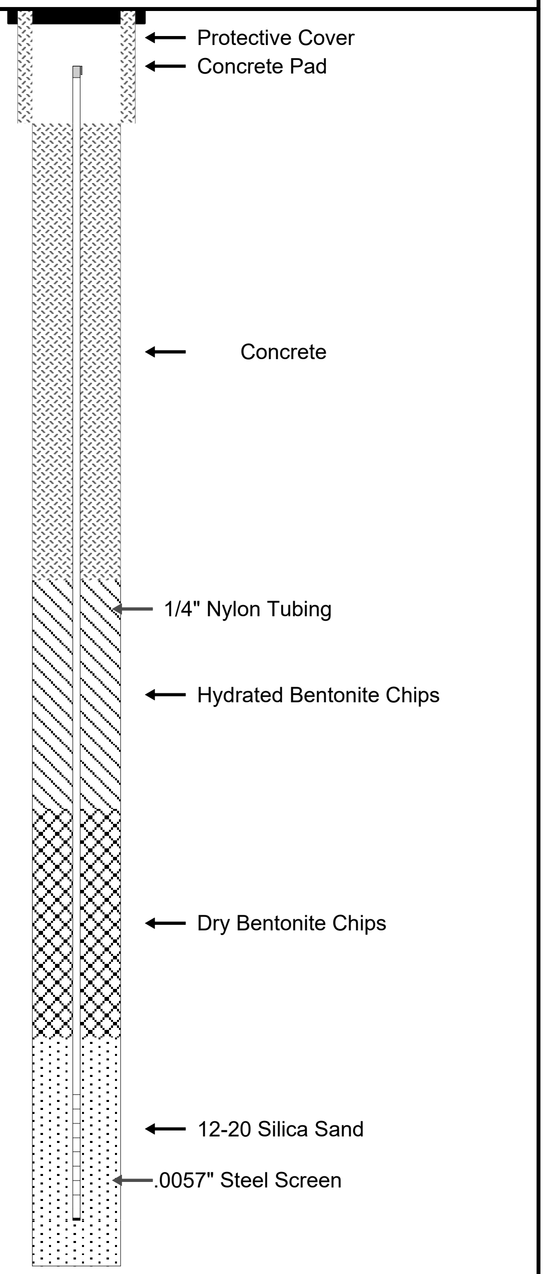
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES: No samples collected for drive/recovery, PID, or analytical sampling.

FLOYD | SNIDER strategy ▪ science ▪ engineering	PROJECT: **POL-TPH**	LOCATION: **Longview, WA**	WELL ID: **VP-2**
	DRILL DATE: **3/11/2020**	COORDINATE SYSTEM: **NAD 83 WA SP S/ NAVD88**	ECOLOGY WELL ID: **BME 939**
DRILLED BY: **Holt: Mike Running**	LOGGED BY: **G. Cisneros**	NORTHING: **292840.01**	EASTING: **1017581.2**
DRILLING EQUIPMENT: **LAR Geoprobe**		GROUND SURFACE ELEV.: **27**	TOC ELEVATION: **26.77**
DRILLING METHOD: **Direct Push**		TOTAL DEPTH (ft bgs): **5.5**	DEPTH TO WATER (ft bgs): **Not Encountered**
SAMPLING METHOD: **Not Applicable**		BORING DIAMETER: **2 inch**	SCREENED INTERVAL: **4.75-5.25**

Depth (feet)	USCS Symbol	Description
0	FILL	Asphalt ground surface **FILL**.
0.4	SP	Brown, fine to medium **SAND**.
0.8		
1.2		
1.6		
2		
2.4		
2.8		
3.2		
3.6		
4		
4.4		
4.8		
5.2		
5.6		Bottom of vapor point = 5.5 ft. bgs.

Well Construction



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

NOTES: No samples collected for drive/recovery, PID, or analytical sampling.

Project: POL-TPH ~~Test Pit~~ Surface Sampling Sheet Date: 3/12/20

~~Test Pit #~~ Surface Sample	P3
Total Depth	6 inches
Lithology?	Brown, fine to coarse sand & gravel within rip rap; No odor, no sheen.
Depth to Native	No Native
Photo taken (list ID#)?	yes
Photo with ruler?	N/A
Presence of debris? Depth?	None
PID Concentration (ppm) & Depth?	0.1 ppm 0-6"
Sheen?	None
Odor?	None
GPS measurement taken?	No satallites available below Berth
Other Observations:	Just below Pipe E & within riprap ~21 feet South of Bulkhead
Samples Details (ID, depth, date, time, analyses) collected at depths of ..... Lead? cPAH? GRO/DRO?	P3-0-0.5 @ 1440

Project: POL-TPH ~~Test Pit~~ Surface Sampling Sheet Date: 3/12/20

~~Test Pit #~~ Surface Sample	P4
Total Depth	6 inches
Lithology?	Rip Rap Armor: Brown sand & gravel accumulated within riprap; No odor; No sheen
Depth to Native	N/A
Photo taken (list ID#)?	yes
Photo with ruler?	N/A
Presence of debris? Depth?	N/A - None except for riprap
PID Concentration (ppm) & Depth?	0.1 ppm 0-6"
Sheen?	None
Odor?	None
GPS measurement taken?	N/A
Other Observations:	East & below Pipe E & within riprap of unknown thickness; ~21 feet south of Bulkhead
Samples Details (ID, depth, date, time, analyses) collected at depths of ..... Lead? cPAH? GRO/DRO?	P4-0-0.5 @ 1450

Project: POL-TPH Surface ~~Test Pit~~ **Sampling Sheet** **Date:** 3/12/20

~~Test Pit #~~ Surface Sample	P5
Total Depth	6 inches
Lithology?	Brown fine sand w/some gravel; no odor; No sheen
Depth to Native	N/A
Photo taken (list ID#)?	Yes
Photo with ruler?	No
Presence of debris? Depth?	N/A Some wood debris & soft disturbed soil @ top 1 inch
PID Concentration (ppm) & Depth?	0.0 ppm 0-6 inches
Sheen?	None
Odor?	None
GPS measurement taken?	N/A
Other Observations:	Soil disturbed @ top 1 inch. Adjacent to pipes A&B ~ 3 to 11 ft south of bulkhead.
Samples Details (ID, depth, date, time, analyses) collected at depths of ..... Lead? cPAH? GRO/DRO?	P5-0-0.5 @1455

Surface 3/12/20

Project: POL-TP4	~~Test Pit~~ Surface Sampling Sheet
	Date: 03/12/20
~~Test Pit #~~ Surface Sample	P6
Total Depth	6-12"
Lithology?	Brown, dense, fine to medium SAND; no odor; NO Sheen
Depth to Native	N/A
Photo taken (list ID#)?	yes
Photo with ruler?	no
Presence of debris? Depth?	Yes, abundant wood, fabric & other debris in to 6 inches. Soft disturbed ~~soils~~ soil, that appears to be fresh soil in top 6 inches
PID Concentration (ppm) & Depth?	0.0 ppm
Sheen?	None
Odor?	None
GPS measurement taken?	N/A
Other Observations:	Abundant debris & soft disturbed soil in top 6 inches including cloth fabric Not in-place. Removed top 6 inches to collect a representative sample
Samples Details (ID, depth, date, time, analyses) collected at depths of ..... Lead? cPAH? GRO/DRO?	~~P6-6.0-12.0 @ 14~~ P6-0.5-1.0' @1315 P6-0.5-1.0D @1320 Duplicate

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix K

OIP Results and Fluorescence Response Cross Sections

Former 80,000-Barrel AST Area

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.

Dissipation Test
@32.4':DTW=15.75'

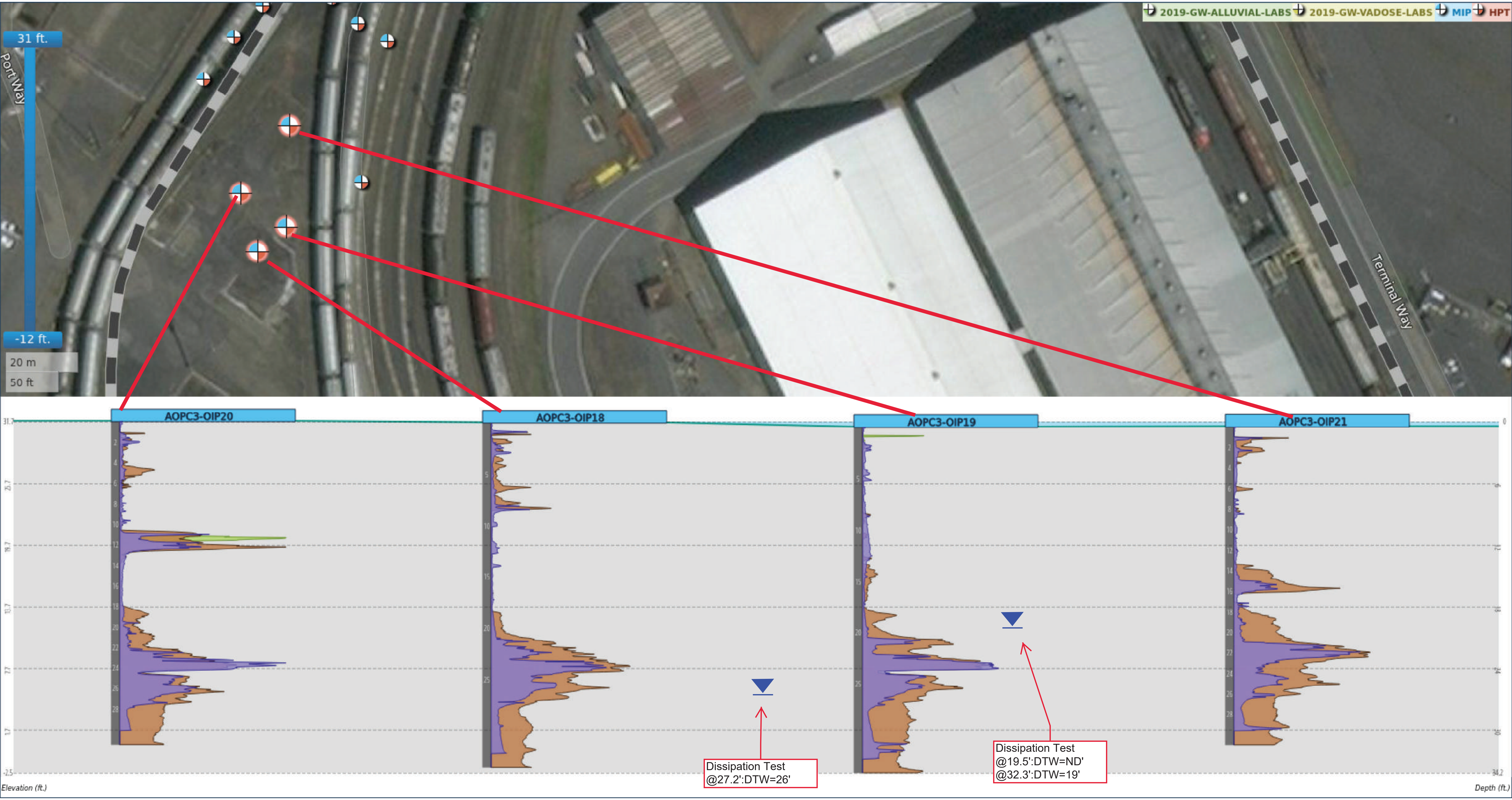
Dissipation Test
@32':DTW=15.5'

Legend

🟩 Fluorescence 🟫 EC 🟪 HPT Pressure

Former Mechanic's Shop Area

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Test
@27.2':DTW=26'

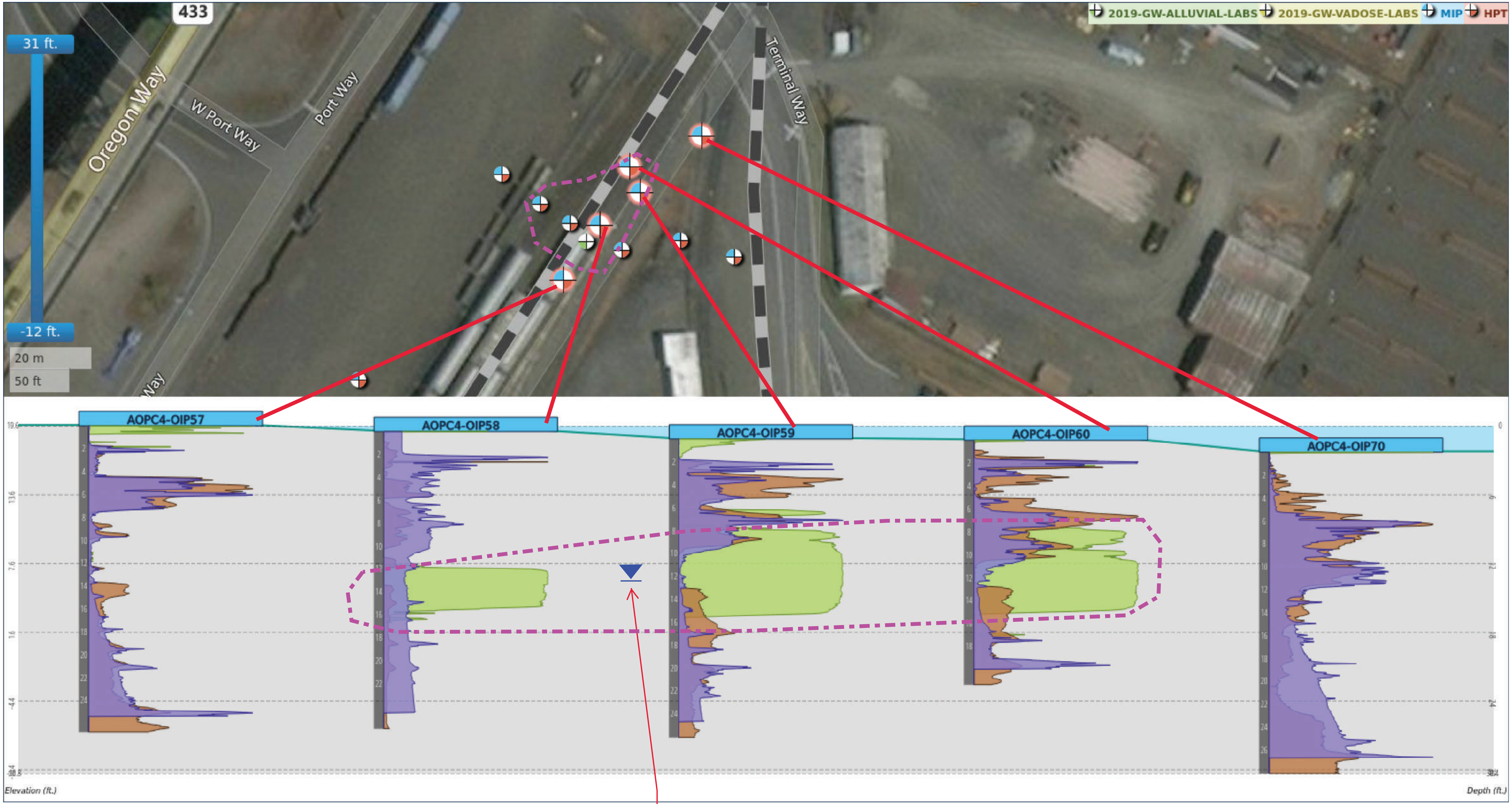
Dissipation Test
@19.5':DTW=ND'
@32.3':DTW=19'

Legend

🟩 Flourescence 🟫 EC 🟪 HPT Pressure

Northern Portion of the Former Standard Pipeline Area
N-S Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Tests
@17.85':DTW=13.75'
@25.05':DTW=13.75'

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Legend

🟩 Fluorescence
🟫 EC
🟪 HPT Pressure

Northern Portion of the Former Standard Pipeline Area
E-W Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

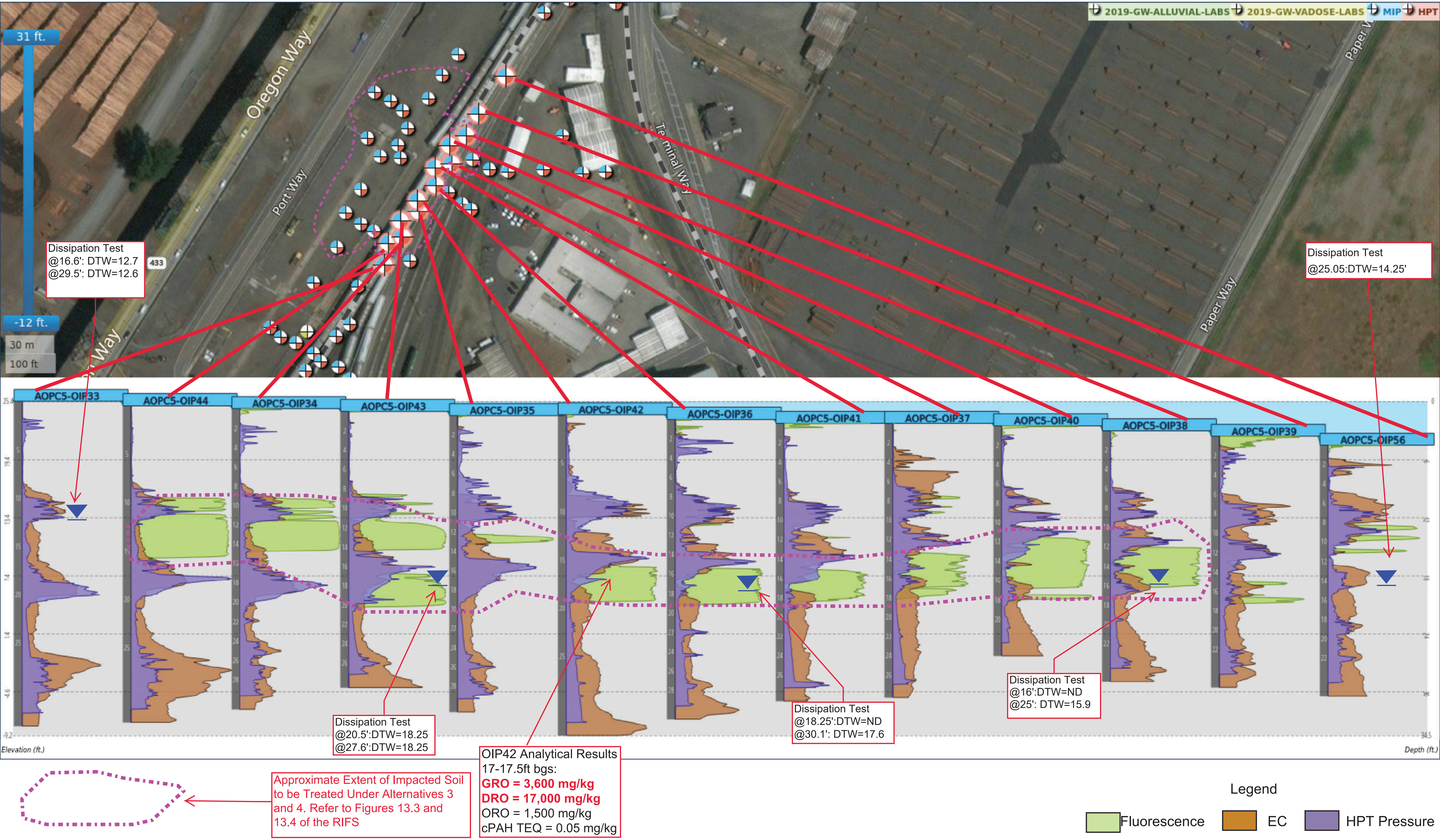
Dissipation Tests
@17.85':DTW=13.75'
@25.05':DTW=13.75'

Legend

🟩 Fluorescence 🟫 EC 🟪 HPT Pressure

Pipelines and Former Loading Rack Area
N-S Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Test
@16.6': DTW=12.7
@29.5': DTW=12.6

Dissipation Test
@25.05:DTW=14.25'

Dissipation Test
@20.5':DTW=18.25
@27.6':DTW=18.25

Dissipation Test
@18.25':DTW=ND
@30.1': DTW=17.6

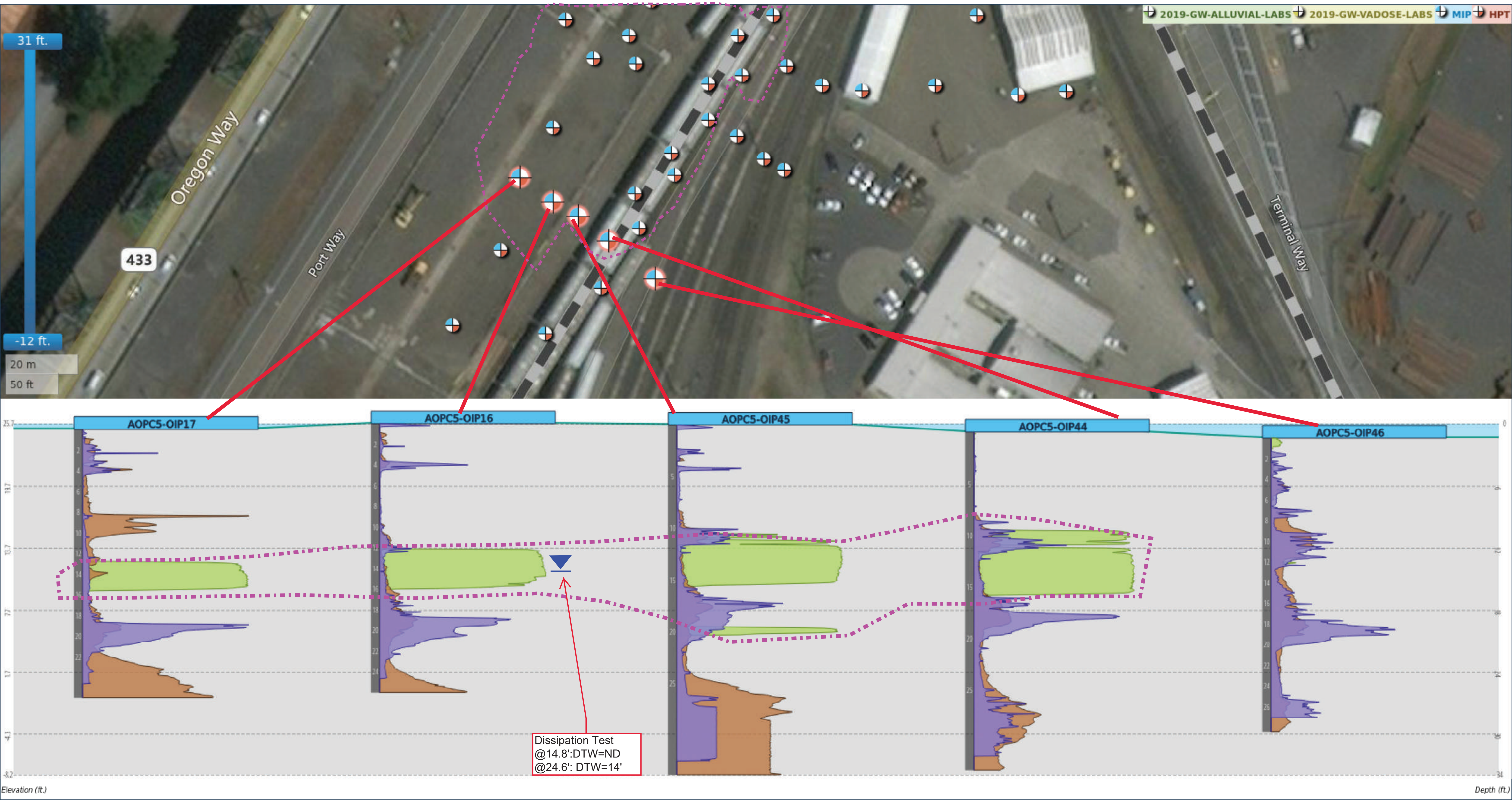
Dissipation Test
@16':DTW=ND
@25': DTW=15.9

OIP42 Analytical Results
17-17.5ft bgs:
GRO = 3,600 mg/kg
DRO = 17,000 mg/kg
ORO = 1,500 mg/kg
cPAH TEQ = 0.05 mg/kg

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Pipelines and Former Loading Rack Area
E-W Southern Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Test
@14.8':DTW=ND
@24.6': DTW=14'

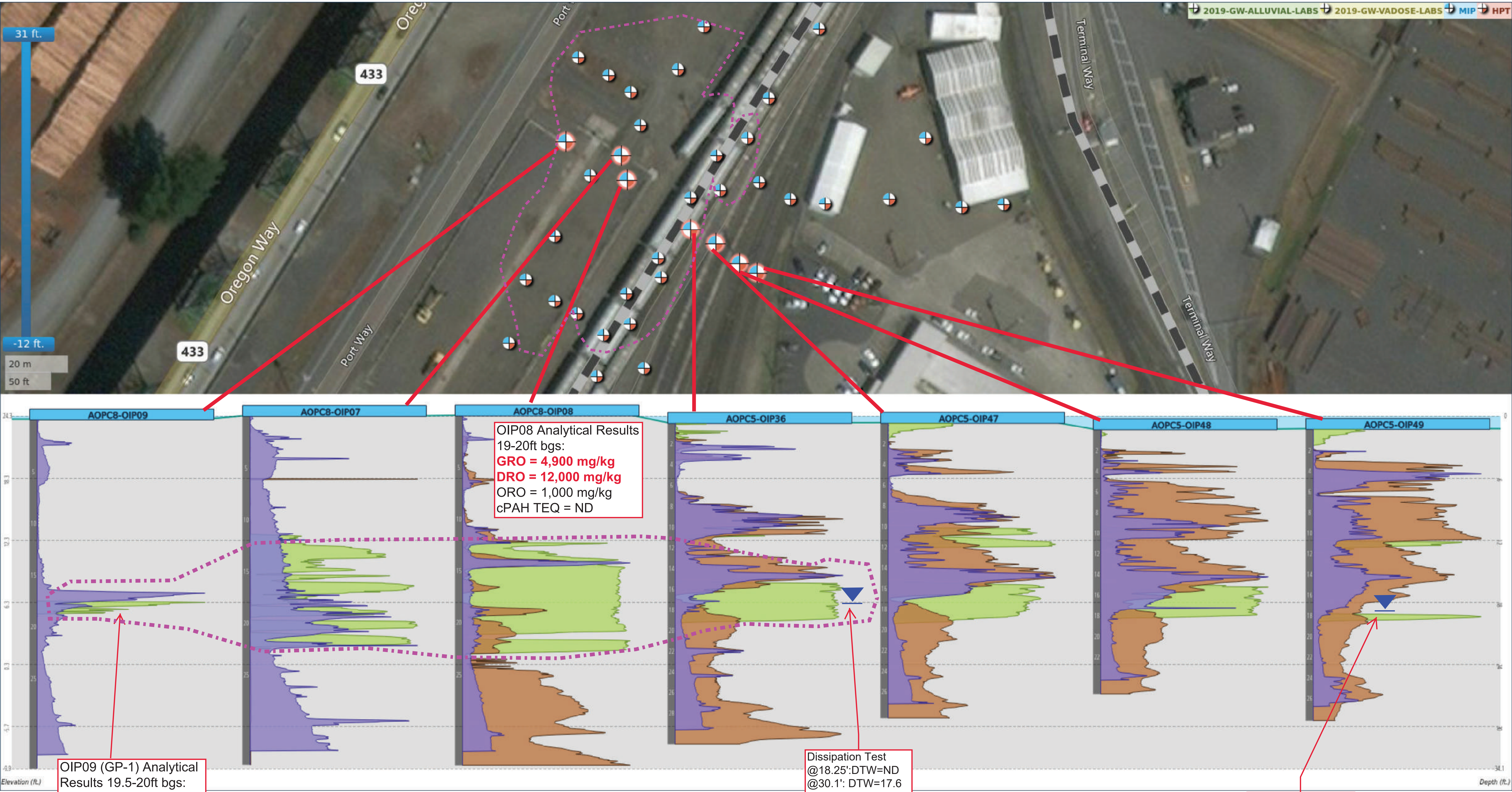
Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Legend

🟩	Fluorescence
🟫	EC
🟪	HPT Pressure

Pipelines and Former Loading Rack Area
E-W Central Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



OIP08 Analytical Results
19-20ft bgs:
GRO = 4,900 mg/kg
DRO = 12,000 mg/kg
ORO = 1,000 mg/kg
cPAH TEQ = ND

OIP09 (GP-1) Analytical
Results 19.5-20ft bgs:
GRO = 18 mg/kg
DRO = 280 mg/kg
ORO = ND

Dissipation Test
@18.25':DTW=ND
@30.1': DTW=17.6

Dissipation Test
@19.9':DTW= 17.3
@27.25': DTW=17.3

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Pipelines and Former Loading Rack Area
E-W Northern Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.

Dissipation Test
@24.6':DTW=16.25'

Dissipation Test
@17.5':DTW=ND
@25':DTW=17'

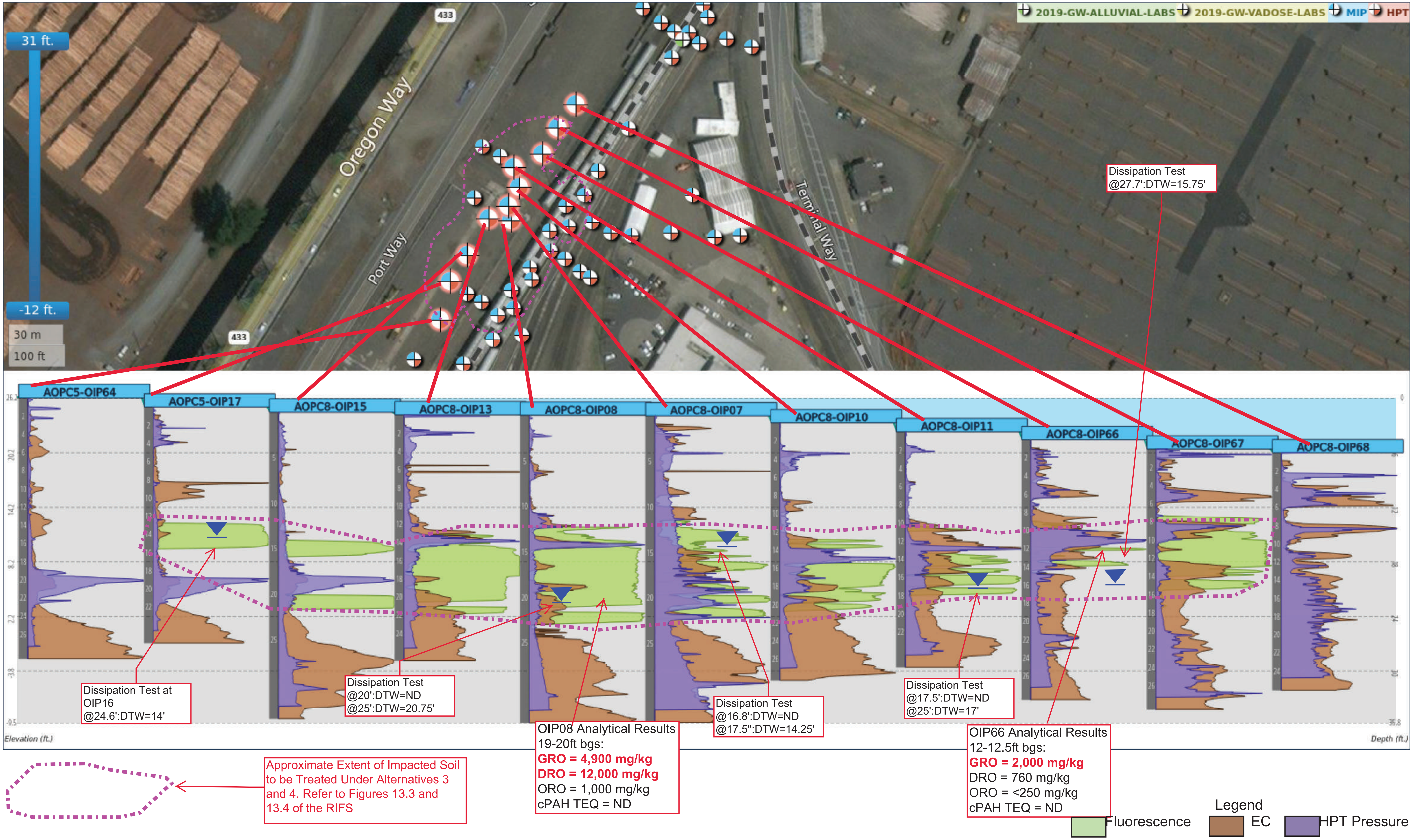
Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Legend

🟩 Fluorescence 🟫 EC 🟪 HPT Pressure

Former Calloway Ross and Warehouse 9 Area
N-S Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Test
@27.7':DTW=15.75'

Dissipation Test at
OIP16
@24.6':DTW=14'

Dissipation Test
@20':DTW=ND
@25':DTW=20.75'

Dissipation Test
@16.8':DTW=ND
@17.5'':DTW=14.25'

Dissipation Test
@17.5':DTW=ND
@25':DTW=17'

OIP08 Analytical Results
19-20ft bgs:
GRO = 4,900 mg/kg
DRO = 12,000 mg/kg
ORO = 1,000 mg/kg
cPAH TEQ = ND

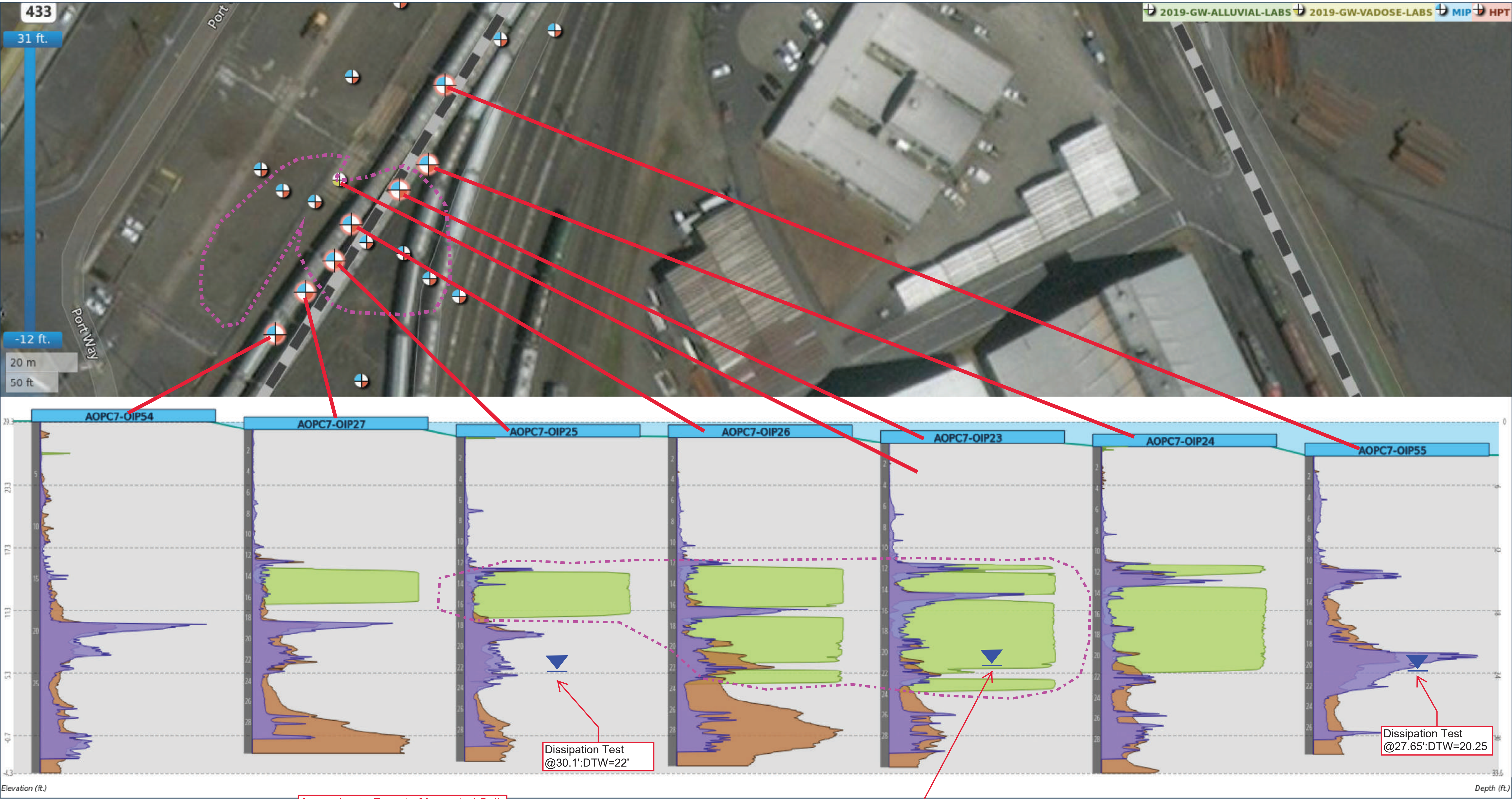
OIP66 Analytical Results
12-12.5ft bgs:
GRO = 2,000 mg/kg
DRO = 760 mg/kg
ORO = <250 mg/kg
cPAH TEQ = ND

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Legend
🟩 Fluorescence
🟫 EC
🟪 HPT Pressure

Monitoring Wells MW-26 and MW-28 Area
N-S Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Test
@30.1':DTW=22'

Dissipation Test
@27.65':DTW=20.25

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

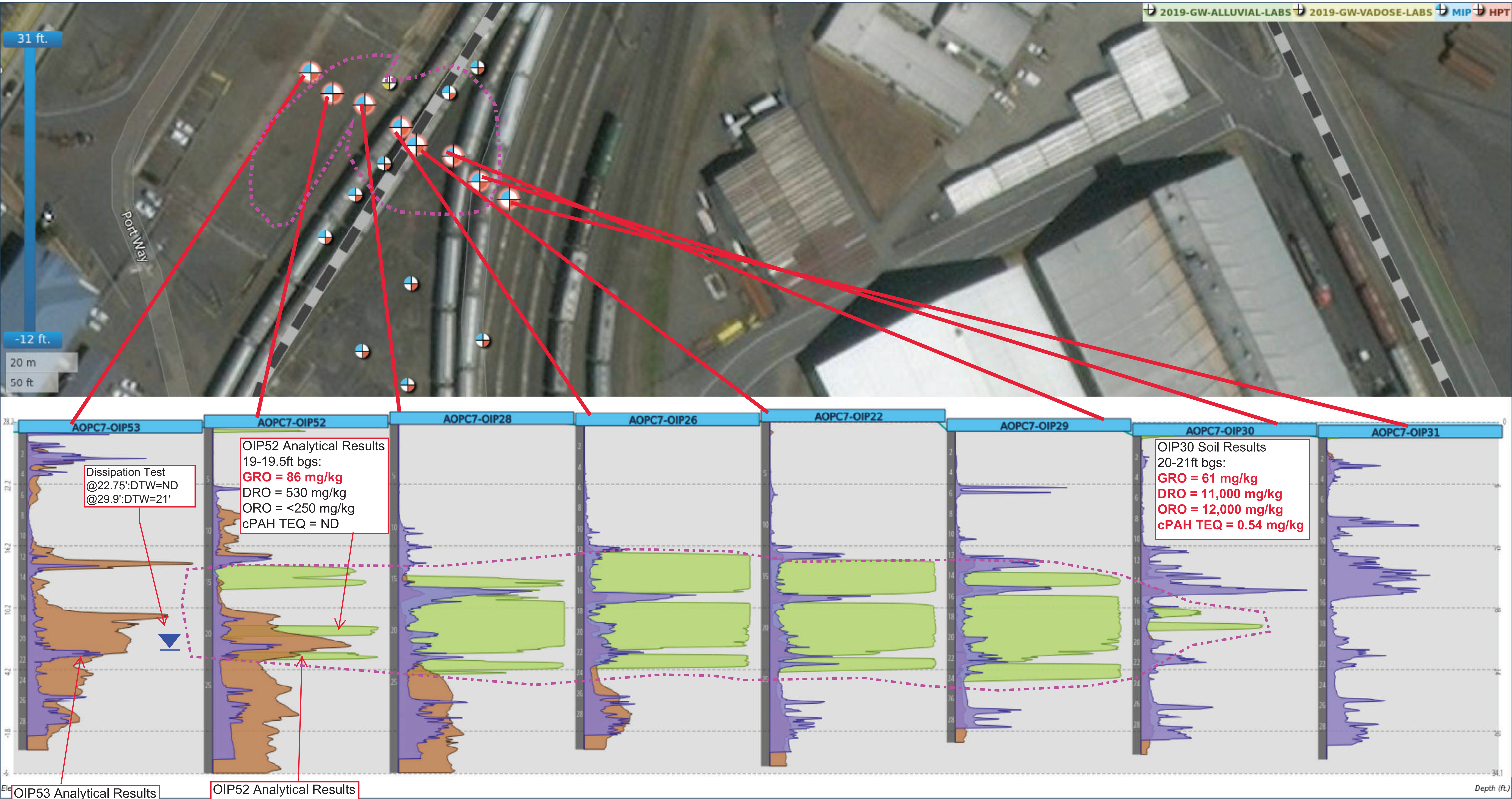
Dissipation Test
@30':DTW=21.2

Legend

🟩 Fluorescence
🟫 EC
🟪 HPT Pressure

Monitoring Wells MW-26 and MW-28 Area
E-W Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Test
@22.75':DTW=ND
@29.9':DTW=21'

OIP52 Analytical Results
19-19.5ft bgs:
GRO = 86 mg/kg
DRO = 530 mg/kg
ORO = <250 mg/kg
cPAH TEQ = ND

OIP30 Soil Results
20-21ft bgs:
GRO = 61 mg/kg
DRO = 11,000 mg/kg
ORO = 12,000 mg/kg
cPAH TEQ = 0.54 mg/kg

OIP53 Analytical Results
21-21.5ft bgs:
GRO = <5 mg/kg
DRO = <50 mg/kg
ORO = <250 mg/kg
cPAH TEQ = ND

OIP52 Analytical Results
22-22.5ft bgs:
GRO = 260 mg/kg
DRO = 2,200 mg/kg
ORO = <250 mg/kg
cPAH TEQ = ND

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Legend

Fluorescence	EC	HPT Pressure
🟩	🟫	🟪