Seeds, Tena (ECY)

From:	Seeds, Tena (ECY)
Sent:	Tuesday, March 5, 2024 9:32 AM
To:	Kim Hempel
Cc:	doug@cantera-group.com; mike@cantera-group.com; william.joyce@hcmp.com; jamie.stevens@creteconsulting.com; Kristin.Anderson@floydsnider.com
Subject:	RE: Time Oil Bulk Terminal - Long-Term Compliance Monitoring Annual Report
Attachments:	2024.03.01 TOC LTCM Annual Report-ECYcomments.pdf

Hi Kim,

Thank you for submitting the Annual Report for the Time Oil Bulk Terminal Site. Ecology has completed review of the report and provides the following comments:

- **Page A-2, Section 1.1 third bullet (comment for clarification purposes):** Regarding the cleanup action summary for CAA-4, the groundwater flowing onto ASKO from the upgradient BNSF parcel that has elevated concentrations of chlorinated VOCs is from the perched water-bearing zone. The interceptor trench and permeable reactive barrier are designed to only capture and treat water from the perched WBZ. The gravity well that receives the treated water is screened into the shallow WBZ.
- **Page A-15, Section 4.2.2 first paragraph:** The TCE-contaminated source soil was encapsulated by ISS, not removed.
- **Page A-15, Section 4.2.2 second paragraph:** 01MW53 was also a downgradient well (in addition to 01MW56 and 01MW85 that were mentioned) where TCE spiked then showed increasing DCE and/or VC. Also, regarding detections of ethene and methane at downgradient well 01MW85, I would expect those to be detected at higher concentrations given the relatively high concentrations of cDCE in that well. Those parameters should continue to be monitored at 01MW85 and also at other locations where CVOCs are elevated to demonstrate that complete reductive dechlorination is occurring.
- **Page A-17, Section 4.3 last paragraph:** The statement that during previous Site investigations TCE did not exceed the cleanup level in groundwater in the shallow WBZ on the BNSF parcel is not accurate. Shallow WBZ well 01MW93 on the BNSF property contained detectable TCE ranging from 1.5 ug/L to 5.5 ug/L during events performed in 2012, 2013, and 2014. While these concentrations are significantly lower than the 2023 RI detection in 01MW93 (1410 ug/L), they are still higher than the Site CUL of 0.5 ug/L.
- **Page A-19, Section 5.1:** A comprehensive well gauging event should be performed at all accessible wells on the ASKO, Bulk Terminal, and BNSF parcels and in W. Commodore to further evaluate flow conditions and groundwater migration patterns that may be associated with the increased CVOC concentrations observed in the shallow WBZ on BNSF and on ASKO (i.e., the gravity well screened in the shallow WBZ) and downgradient of the ASKO boundary. Collection and analysis of groundwater samples from those wells for CVOCs (and possibly other parameters) should also be performed concurrent with the site-wide, multi-party event. Ecology expects that both parties (BNSF and Cantera/TOC Seattle Terminal 1, LLC) will coordinate with each other to conduct this event sometime during 2024.
- **Pages A-19 and A-10, Sections 5.2, 5.3, and 5.4:** Ecology agrees with all of the recommendations provided in these sections for the Bulk Terminal, ASKO, and East Waterfront.

These comments have also been inserted into the PDF file for this report (attached), which Ecology will be uploading to the online document repository for the Time Oil Bulk Terminal Site. That copy will be publicly accessible from Ecology's web page for this site at https://apps.ecology.wa.gov/cleanupsearch/site/14604#site-documents.

Regards,

Tena Seeds, PE (she/her)
Senior Engineer, Uplands Unit
Northwest Region Toxics Cleanup Program
Washington State Department of Ecology
Mailing Address: PO Box 330316, Shoreline, WA 98133-9716
Physical Address: 15700 Dayton Ave N, Shoreline, WA 98133
Phone: (425) 457-3143
24-hour reception line: 206-594-0000
tena.seeds@ecy.wa.gov
Chat or call in Teams

From: Kim Hempel <khempel@pioneerees.com>
Sent: Friday, March 1, 2024 11:28 AM
To: Seeds, Tena (ECY) <TSEE461@ECY.WA.GOV>
Cc: doug@cantera-group.com; mike@cantera-group.com; william.joyce@hcmp.com; jamie.stevens@creteconsulting.com; Kristin.Anderson@floydsnider.com
Subject: Time Oil Bulk Terminal - Long-Term Compliance Monitoring Annual Report

External Email

Good morning Tena,

As required by Prospective Purchaser Consent Decree (PPCD No. 20-2-15215-3 SEA), the Long-Term Compliance Monitoring Annual Report for the Time Oil Bulk Terminal Site is available for download at the link below, which documents activities performed in 2023 in accordance with the Long-Term Compliance Monitoring Plan (LTCMP).

Please let me know if you have any questions.

Thanks,
Kim

Kim Hempel | *Senior Project Manager*

Pioneer Engineering & Environmental Services, LLC
2753 West 31st Street
Chicago, Illinois 60608

Main: 773.722.9200 **Direct:** 773.435.3725 **Fax:** 773.722.9201 **Web:** PioneerEES.com

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Files attached to this message

Filename	Size	Checksum (SHA256)
2024.03.01 TOC LTCM Annual Report-compressed.pdf	7.47 MB	a3fe291ce3a5dd8f5104bf7d6dd345e283bb18968047b8d2ce787ca21c4f29d2

PIONEER
Engineering & Environmental Services, LLC

2753 West 31st Street | Chicago, IL 60608
Tel: 773-722-9200 | Fax: 773-722-9201 | pioneerEES.com

Transmitted via Electronic Mail

March 1, 2024

Ms. Tena Seeds
Washington State Department of Ecology
Toxics Cleanup Program
15700 Dayton Ave N., Shoreline, WA 98133

RE: Long-Term Compliance Monitoring Annual Report
Time Oil Bulk Terminal Site, Facility Site ID #75486194 and Cleanup Site ID #14604
Prospective Purchaser Consent Decree No. 20-2-15215-3 SEA

Dear Ms. Seeds:

As required by Prospective Purchaser Consent Decree (PPCD No. 20-2-15215-3 SEA), Pioneer Engineering & Environmental Services, LLC on behalf of TOC Seattle Terminal 1, LLC submits the attached Long-Term Compliance Monitoring Annual Report for the Time Oil Bulk Terminal Site for the 2023 reporting period.

If you have any questions about this report, please contact me at 773-435-3725.

Sincerely,

Kim Hempel

Kim Hempel
Project Coordinator
Pioneer Engineering & Environmental Services, LLC

Distribution List:
Doug Ciserella and Mike Ciserella, TOC Seattle Terminal 1, LLC
Bill Joyce, Hillis Clark Martin & Peterson P.S.
Jamie Stevens, CRETE Consulting
Kristin Anderson, Floyd|Snider

Long-Term Compliance Monitoring Annual Report

Time Oil Bulk Terminal Site
Facility Site ID #75486194
Cleanup Site ID #14604
PPCD No. 20-2-15215-3 SEA
Seattle, Washington

Pioneer Project Number:
18-0317-101

Date Submitted:
March 1, 2024

Prepared for:
TOC Seattle Terminal 1, LLC
2753 West 31st Street
Chicago, Illinois 60608

Submitted to:
Washington State Department of Ecology
Toxics Cleanup Program
15700 Dayton Ave N.
Shoreline, Washington 98133
Attn: Ms. Tena Seeds

PIONEER
Engineering & Environmental Services, LLC

TIME OIL BULK TERMINAL SITE
PROSPECTIVE PURCHASER CONSENT DECREE NO. 20-2-15215-3 SEA
LONG-TERM COMPLIANCE MONITORING ANNUAL REPORT

This Long-Term Compliance Monitoring Annual Report has been prepared to document the post-remedial construction compliance monitoring items detailed in Section 3 of the Long-Term Compliance Monitoring Plan (LTCMP[1]) for the Time Oil Bulk Terminal Site (Site) for the 2023 reporting period. The LTCMP includes a Groundwater Monitoring Plan (GMP), a Soil and Remedial Element Management Plan (SREMP) and a Vapor Intrusion Assessment and Mitigation Plan (VI Plan). Activities performed in 2023 in accordance with each of these plans are described below.

Summary of Monitoring Activities Performed per the GMP

- The 2023 Groundwater Monitoring Annual Report includes the following required LTCMP items:
  - Monitoring well network updates
  - Summary of quarterly short-term groundwater monitoring activities, data collected, and results
  - Assessment of Compliance with Groundwater Cleanup Standards
  - Indications of Organic Contaminant Degradation
  - Groundwater Flow Patterns
  - Recommendations for Updates to Monitoring Locations or Frequency

  Refer to the 2023 Groundwater Monitoring Annual Report included as Appendix A for a summary of activities and data collected.

Summary of Assessment or Mitigation Activities Performed per the VI Plan

- No buildings are present on the site; therefore, vapor barriers were not installed and vapor intrusion monitoring was not performed during the reporting period.

Summary of Inspection and Maintenance Activities Performed per the SREMP

- The site remains undeveloped and routine inspections have not yet been triggered per Section 7 of the SREMP. The perimeter fencing has been maintained during the reporting period, which limits site access to authorized personnel only. Interim caps/surfaces installed during the remedial action have been observed during groundwater monitoring events and construction oversight with no significant degradation or changes noted.
- The eastern lot on the Bulk Terminal parcel, hereinafter referred to as Lot F, is currently being developed. The boundaries of Lot F are depicted on Figure A.1 in Appendix A. Work is anticipated to be completed by December 2024. Routine inspections of Lot F will begin 2 years after development.

Anticipated 2024 Activities

- Development at Lot F started in October 2023 and is anticipated to be completed by December 2024.
- No other property modifications have occurred at the site or are currently anticipated in 2024.
- Quarterly groundwater monitoring will continue as described in Appendix A.
- Quarterly progress reports will provide Ecology with periodic updates regarding redevelopment plans and other Site activities.
- The next Long-Term Compliance Monitoring Annual Report will be submitted on or by March 1, 2025.

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[1] Long-Term Compliance Monitoring Plan, Prepared by CRETE Consulting, February 10, 2023.

Appendices

- Appendix A – Groundwater Monitoring Annual Report

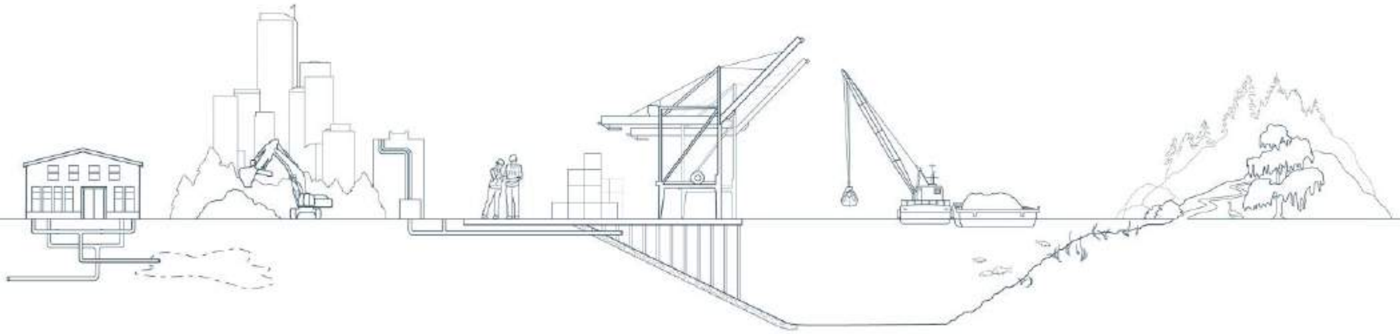
END LONG-TERM COMPLIANCE MONITORING ANNUAL REPORT

Long-Term Compliance Monitoring Annual Report
Appendix A: 2023 Groundwater Monitoring Annual Report

Time Oil Bulk Terminal

Prepared for
Cantera Development Group, LLC

February 2024



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strategy ▪ science ▪ engineering

LIMITATIONS

This report has been prepared for the exclusive use of Cantera Development Group, LLC, 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.

The interpretations and conclusions contained in this report are based in part on previous site characterization data collected by others and Floyd|Snider cannot assure the accuracy of this information.

Long-Term Compliance Monitoring Annual Report
Appendix A: 2023 Groundwater Monitoring Annual Report

This document was prepared for
Cantera Development Group, LLC
under the supervision of:

State of Washington
Licensed Geologist
20120229
PAMELA OSTERHOUT

Name: Pamela Osterhout
Date: 02/27/2024

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List of Abbreviations

Abbreviation	Definition
AOC	Area of Concern
ASKO	ASKO Hydraulic
BNSF	BNSF Railway Company
CAA	Cleanup action area
CAP	Cleanup Action Plan
CPOC	Conditional point of compliance
CUL	Cleanup level
cVOC	Chlorinated volatile organic compound
DCE	Dichloroethene
DO	Dissolved oxygen
DRO	Diesel-range organics
Ecology	Washington State Department of Ecology
GMAR	Groundwater Monitoring Annual Report
GMP	Groundwater Monitoring Plan
GRO	Gasoline-range organics
IHS	Indicator hazardous substance
ISS	In situ solidification and stabilization
LTCMP	Long-Term Compliance Monitoring Plan
µg/L	Micrograms per liter
MNA	Monitored natural attenuation
ORO	Oil-range organics
ORP	Oxidation–reduction potential
penta	Pentachlorophenol
POC	Point of compliance
PRB	Permeable reactive barrier
Property	The four parcels identified as “Bulk Terminal,” “ASKO,” “East Waterfront,” and “West Waterfront”
REL	Remediation level
ROW	Right-of-way

Abbreviation	**Definition**
Site	Time Oil Bulk Terminal Site
TCE	Trichloroethene
TPH	Total petroleum hydrocarbons
WBZ	Water-bearing zone

1.0 Introduction

This Groundwater Monitoring Annual Report (GMAR) was prepared at the request of TOC Seattle Terminal 1, LLC, to fulfill requirements of the Prospective Purchaser Consent Decree (No 20-2-15215-3 SEA). The GMAR presents the results of post-cleanup action groundwater monitoring completed in 2023 in accordance with the Groundwater Monitoring Plan (GMP; Floyd|Snider 2023), which was presented as an appendix to the Long-Term Compliance Monitoring Plan (LTCMP; Crete 2023) for the Time Oil Bulk Terminal Site (Site). The LTCMP for the Site was approved by the Washington State Department of Ecology (Ecology) in a letter dated February 14, 2023. The GMAR is presented as an appendix to the Long-Term Compliance Monitoring Annual Report for the Site.

The Site is the location of the former Time Oil Company Seattle Terminal facility located on W. Commodore Way in Seattle, Washington. For the purposes of this document, the Property is defined as the four separate upland parcels within the Site commonly identified as the Bulk Terminal, ASKO Hydraulic (ASKO), East Waterfront, and West Waterfront. A cleanup action was performed in 2021 in accordance with the Cleanup Action Plan (CAP; Ecology 2020) for the Site.

This GMAR provides an evaluation of compliance with Site groundwater cleanup levels (CULs) for indicator hazardous substances (IHSs; arsenic, gasoline-range organics [GRO], total diesel-range organics [DRO] and oil-range organics [ORO], benzene, trichloroethene [TCE], vinyl chloride, and pentachlorophenol [penta]) specified in the CAP at the applicable point of compliance (POC). Cleanup standards are defined as a CUL combined with a POC where the CUL applies. A conditional POC (CPOC) was established at the downgradient edge of the Upland Area of Concern (AOC) and within the W. Commodore Way right-of-way (ROW), as shown on Figure A.1.

1.1 CLEANUP ACTION SUMMARY

Remedial action construction was completed at the Site between July and December 2021 and included removal or in situ solidification and stabilization (ISS) of contaminated soil acting as a source of IHSs to groundwater in designated cleanup action areas (CAAs) and focused in situ groundwater treatment as shown on Figure A.1. Those activities, which are documented in the Remedial Action Completion Report Phase 1 (Crete 2022), were designed to remove source soil contributing to groundwater contamination in three water-bearing zones (WBZs) at the Site, including a perched WBZ (encountered only on ASKO and the upgradient BNSF Railway Company [BNSF] parcel), shallow WBZ, and intermediate WBZ.

The goals of source soil removal for the cleanup action were determined based on the AOC in which each CAA was located. In the upgradient Upland AOC, comprising the Bulk Terminal, ASKO, and the adjacent W. Commodore Way ROW, the cleanup action was designed to achieve remediation levels (RELs) in soil to meet CULs long-term in groundwater at the CPOC. In the downgradient Shoreline AOC, comprising the East Waterfront, the cleanup action was designed to achieve CULs in soil to meet CULs in all groundwater downgradient of the CPOC in a shorter time frame.

The cleanup action encompassed multiple CAAs, summarized as follows.

- In CAA-1 and CAA-2 on the Bulk Terminal, excavation and ISS were conducted to address soil with GRO, total DRO+ORO, and benzene exceeding RELs and contributing to groundwater contamination in the shallow WBZ. Limited petroleum impacts to groundwater in the intermediate WBZ were also present in the W. Commodore Way ROW downgradient of CAA-2. An oxygen-releasing compound (ORC-A) was applied in the northeast and northwest corners of CAA-2 after excavation.
- In CAA-3, located between the Bulk Terminal and ASKO, excavation was conducted to address soil with GRO, total DRO+ORO, benzene, and TCE exceeding RELs. Soil contamination in this CAA was shallow and did not appear to contribute to groundwater contamination.
- In CAA-4 on ASKO, soil with TCE exceeding RELs and contributing to groundwater contamination in the perched, shallow, and intermediate WBZs was addressed by ISS. An in situ groundwater treatment barrier of trademarked colloidal biomatrix (PlumeStop) mixed with sulfidated microscale zero-valent iron was injected along the northern boundary of ASKO, downgradient of CAA-4. Groundwater flowing onto ASKO from the upgradient BNSF parcel that has elevated concentrations of chlorinated volatile organic compounds (cVOCs) is additionally treated via an interceptor trench and permeable reactive barrier (PRB) wall amended with zero-valent iron. The treated groundwater is infiltrated through an on-Property gravity well.
- In CAA-5 on ASKO, shallow soil with arsenic, GRO, and total DRO+ORO exceeding CULs and contributing to groundwater contamination in the perched WBZ was removed via excavation.
- In CAA-6 on the East Waterfront, soil with GRO, total DRO+ORO, and benzene exceeding CULs and contributing to groundwater contamination in the shallow WBZ was removed via excavation.
- In CAA-7 on the East Waterfront, soil with arsenic exceeding CULs and contributing to limited contamination in the shallow WBZ was removed via excavation.

Monitored natural attenuation (MNA) is a component of the cleanup action and is expected to occur in the dissolved-phase organic contaminant plumes remaining after completion of remedial action construction. The areas where MNA is expected to occur include:

- areas within and downgradient of groundwater plumes where soil contaminant source removal was performed via excavation;
- adjacent to and downgradient of areas where soil source contamination was immobilized with ISS; and
- downgradient of areas where bio-amendments or in situ groundwater treatment were used to accelerate biodegradation of organic contaminants.

The final component of the cleanup action will include installation of a cap and implementation of institutional controls on the Upland AOC in conjunction with property redevelopment to provide a protective barrier to remaining contamination.

1.2 PROPERTY REDEVELOPMENT STATUS

Redevelopment is in progress for a portion of the Bulk Terminal on Lot F. Redevelopment began on Lot F (Refer to Figure A.1) on October 30, 2023, and includes grading, installation of underground utilities, and construction of a multi-story public storage building. Redevelopment of ASKO and the remaining portions of the Bulk Terminal has been delayed and other redevelopment plans are currently being considered.

Impacts to the monitoring well network and modifications to the network to accommodate property redevelopment are discussed in further detail in Section 2.0. Locations of the planned buildings are shown on Figure A.1.

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2.0 Monitoring Well Network Updates

A monitoring well network was established at the Property to assess performance of the cleanup action and compliance with the CULs for groundwater specified in the CAP. This network includes monitoring wells located at the CPOC and downgradient of the CPOC to measure compliance with cleanup standards, wells upgradient of the CPOC to measure and quantify the effects of remediation, and sentinel wells to monitor the nature and extent of contaminants in groundwater when CULs have not been achieved at the CPOC or to evaluate plume boundary conditions.

The network of monitoring wells was updated following remedial action construction with four additional monitoring wells installed to replace certain wells decommissioned during construction and to fill remaining gaps in the monitoring well network, including shallow WBZ well 01MW19R on the Bulk Terminal, intermediate WBZ well 01MW49R near the ROW downgradient of the Bulk Terminal, perched WBZ well MW03R on ASKO, and shallow WBZ well 02MW04R on the East Waterfront. These wells were installed in December 2022 as described in Section 2.4 of the GMP. Well completion logs for these four new wells are included in Attachment A.1.

Additionally, four wells were decommissioned in June 2023 in preparation for redevelopment on Lot F of the Bulk Terminal parcel including 01MW17, 01MW99, 01MW105, and 01MW110. In the GMP, 01MW17 was designated to be retained for additional performance data if needed; however, it was located within a driveway for the new building to be constructed on Lot F. Therefore, in coordination with Ecology, 01MW100 was retained instead to fulfill the monitoring objectives at 01MW17 specified in the GMP. Monitoring wells were decommissioned by a Washington State licensed driller in accordance with WAC 173-160-381.

The current status of Site monitoring wells is summarized in Table A.1 and shown on Figure A.1. The monitoring well network used for the short-term performance monitoring includes monitoring well locations as shown on Figure A.2 and is discussed in further detail in Section 3.0.

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3.0 Short-Term Performance Monitoring Activities

The groundwater monitoring activities completed in 2023 represent the first year of short-term performance monitoring at the Site. Short-term monitoring will be conducted for 2 years in the shoreline AOC (East Waterfront) and 4 years in the upland AOCs (ASKO and Bulk Terminal) and will transition to long-term monitoring per the GMP following completion of the short-term monitoring schedule. Post-remediation short-term performance monitoring was outlined in the GMP in pre-redevelopment (initial) and post-redevelopment phases. Short-term performance monitoring was conducted quarterly per the GMP starting in January 2023. Due to changes in the property redevelopment plans and schedule, short-term monitoring has not yet transitioned to post-development short-term monitoring.

Performance monitoring is being conducted to assess remedy effectiveness within and downgradient of active treatment areas and includes assessment of the natural attenuation processes, groundwater flow patterns, and groundwater quality trends after remediation. Short-term performance monitoring was conducted in 2023 at wells illustrated on Figure A.2 on a quarterly, semiannual, or annual basis. A detailed field sampling and analytical schedule for each well included in the 2023 short-term performance monitoring program is presented in Table A.2.

Quarterly groundwater monitoring was conducted on January 31 through February 1, April 7, June 28 and 29, and October 10, 2023. The third quarterly monitoring event was conducted early in coordination with Ecology to complete the sampling prior to the anticipated start of redevelopment construction on Lot F in July 2023; construction on Lot F was later delayed until late October 2023.

Monitoring wells were sampled using standard low-flow methods with either a peristaltic pump (shallow WBZ wells) or a bladder pump (intermediate WBZ wells). Depth to groundwater and field parameters (pH, temperature, specific conductance, dissolved oxygen [DO], and oxidation–reduction potential [ORP]) were also recorded at each well sampled in 2023.

Groundwater elevations and flow patterns measured each quarter are presented in Figures A.3a through A.3d for the shallow WBZ and A.4a through A.4c for the intermediate WBZ. The 2023 IHS analytical results are presented in Table A.3 along with the result collected most recently prior to remediation for comparison (shown as pre-remediation). Results are illustrated by IHS or IHS groups: GRO, total DRO and ORO, TCE and VC, and benzene, in Figures A.5, A.6, A.7, and A.8, respectively. Penta and total arsenic results are not shown on a figure because analysis of these IHSs were spatially limited (one to two wells). IHS (and secondary MNA parameter *cis*-1,2-dichloroethene [DCE]) analytical results are presented in Table A.3. All other secondary MNA parameters and field parameters are presented in Table A.4. Laboratory reports for all monitoring events are included in Attachment A.2.

3.1 GROUNDWATER FLOW PATTERN ANALYSIS

Groundwater flow directions and gradients were evaluated quarterly by collecting depth to groundwater measurements in accessible shallow WBZ and intermediate WBZ wells during each quarterly monitoring event. Site-wide depth to groundwater measurements were collected during the first three monitoring events of 2023 and at a reduced list of locations in the shallow WBZ during the fourth quarter of 2023 in coordination with Ecology. Potentiometric maps of the shallow WBZ were prepared for each of the four quarterly events and are presented in Figures A.3a through A.3d. Potentiometric maps of the intermediate WBZ were prepared for the first three quarterly events and are presented in Figures A.4a through A.4c.

In the upland AOCs, shallow WBZ groundwater flow patterns were monitored to assess whether flow patterns changed from pre-remediation conditions because of influence from the ISS monoliths.

- On the Bulk Terminal, groundwater mounding continues to be observed in the central portion of the parcel in the vicinity of 01MW12, likely because this remains a relatively large unpaved area at the Site with predominantly gravel fill from various excavations. The primary groundwater flow is to the north-northwest, with secondary flow directions (likely caused by mounding) to the west and northeast. The steepest gradients were measured between the CAA-2 and CAA-4 ISS monoliths in the vicinity of 01MW30 and 01MW19R. Groundwater levels and flow direction were relatively consistent between the wet and dry seasons and consistent with the pre-ISS modeling presented in the Engineering Design Report (Crete 2021).
- On ASKO, shallow WBZ gradients remain relatively flat downgradient of the CAA-4 ISS monolith relative to pre-remediation conditions. Gradients have become steeper between the CAA-4 and CAA-2 monoliths relative to pre-remediation conditions; however, groundwater flow directions remain relatively consistent between pre- and post-remediation conditions with a primary flow direction to the north. No significant change in water level elevations was observed between the wet and dry seasons. The perched WBZ was monitored at MW03R, which remained dry throughout 2023. The perched WBZ, which was previously only observed on ASKO and the upgradient BNSF parcel, may no longer be present because of the capture of perched groundwater in the interceptor trench and ISS completed on ASKO.

In the shoreline AOC, at the East Waterfront, shallow WBZ groundwater elevations were consistent throughout 2023 with a primary flow direction to the north-northwest, relatively flat gradients toward the shoreline, and steeper gradients in the southern portion of the parcel consistent with topography and pre-remediation flow patterns. The primary groundwater flow direction of the intermediate WBZ is north-northwest, toward Salmon Bay, consistent with pre-remediation flow patterns. Spatial coverage of the intermediate WBZ wells is limited, and water levels were relatively consistent through the first three quarters of 2023. In coordination with Ecology, water level monitoring of the intermediate WBZ wells was discontinued after the third quarter of 2023.

3.2 BULK TERMINAL GROUNDWATER MONITORING

Short-term performance monitoring on the Bulk Terminal in 2023 included the following:

- Quarterly monitoring of shallow WBZ wells 01MW35 and 01MW84 downgradient of the CPOC at the edges of the current total petroleum hydrocarbons (TPH) plume and 01MW19R adjacent to the ISS monolith
- Semiannual monitoring of shallow WBZ wells 01MW12 and 01MW40 and intermediate WBZ well 01MW49R within the groundwater contaminant plumes and downgradient of ISS and excavation areas
- Annual monitoring of shallow WBZ well 01MW66 in the localized penta plume
- Shallow WBZ well 01MW87 and intermediate WBZ well 01MW51 sampling during the second quarterly event to establish post-remedy baseline conditions for those wells located downgradient of the ISS and excavation areas

On the Bulk Terminal, GRO concentrations remain greater than the CUL (800 micrograms per liter [µg/L]) but decreased significantly (35% to 90%) compared to pre-remediation conditions in two downgradient wells (01MW19R and 01MW84), with GRO concentrations ranging from 990 to 5,500 µg/L. GRO concentrations were less than the CUL at wells 01MW12, 01MW35, 01MW40, 01MW49R, 01MW51, and 01MW87 with concentrations ranging from non-detect to 110 µg/L.

Total DRO and ORO concentrations remain greater than the CUL (500 µg/L) and have slightly increased at shallow WBZ wells 01MW12 and 01MW40 upgradient of the CAA-2 ISS monolith with concentrations ranging from 620 to 5,300 µg/L compared to pre-remediation concentrations of 590 to 1,100 µg/L. Benzene also exceeded the CUL (0.44 µg/L) at 01MW12 and 01MW40 during the 2023 monitoring at concentrations ranging from 0.73 to 1.3 µg/L. The TPH and benzene concentrations at 01MW40 were much lower during the third quarter, indicating that residual TPH may be effected by temporary remobilization of contaminants where excavation was completed to achieve RELs in CAA-1, but concentrations are expected to continue to decline over time as TPH degrades and the Site becomes more stable. Total DRO and ORO decreased by about 46% or more at downgradient wells 01MW19R, 01MW35, 01MW49R, 01MW51, and 01MW84 relative to pre-remediation conditions.

Penta was only monitored in shallow WBZ well 01MW66 during January 2023. Penta concentrations decreased from 3.6 to 1.9 µg/L between 2019 and 2023, but remain above the CUL of 0.20 µg/L.

3.3 ASKO GROUNDWATER MONITORING

Short-term performance monitoring on ASKO in 2023 included the following:

- Shallow WBZ wells 01MW53 and 01MW85 downgradient of the PlumeStop at the CPOC and at the edges of the current cVOC plume, and 01MW46 adjacent to the ISS monolith were monitored quarterly.

- Shallow WBZ well 01MW15 upgradient and adjacent to the ISS treatment area, shallow WBZ wells MW05 and 01MW56, and intermediate WBZ well 01MW108 were monitored semiannually.
- Shallow WBZ MW06 was monitored once post-remedy in January 2023 to evaluate a baseline of results relative to MW05 ahead of property redevelopment when MW05 will presumably be decommissioned.
- Contingency shallow WBZ well 01MW107 was sampled in June (Q3) and October (Q4) 2023 because of elevated cVOC concentrations observed in the shallow WBZ at 01MW53 (per the GMP).

The perched WBZ well MW03R was dry during all four quarterly events and therefore was not sampled in 2023.

On ASKO, TCE concentrations have decreased relative to pre-remediation conditions in the vicinity of the CAA-4 source area (01MW46 and MW05) from 880 µg/L and 240 µg/L to 300 µg/L and 160 µg/L, respectively, but remain above the CUL of 0.50 µg/L. MW06, which is within the radius of the PlumeStop, did not have detectable TCE post-remediation. TCE concentrations increased at downgradient ROW wells 01MW53 and 01MW85 with concentrations ranging from 1.5 to 2.9 µg/L and 5.7 to 110 µg/L relative to pre-remediation conditions when TCE was non-detect. This increased TCE is attributed primarily to increases of TCE in the shallow zone upgradient of ASKO, which is discussed further in Section 4.3, and may also be influenced by temporary remobilization of contamination by ISS prior to installation of the PlumeStop. cVOCs were not detected downgradient at contingency monitoring well 01MW107.

Vinyl chloride, which is a breakdown product of TCE, has slightly increased relative to pre-remediation conditions at several ASKO monitoring wells, including 01MW15, 01MW46, 01MW53, 01MW56, and 01MW85. This is expected as TCE continues to degrade. Vinyl chloride decreased relative to pre-remediation conditions at shallow WBZ well MW05 from 27 µg/L to 6.9 µg/L, but remains above the CUL of 0.20 µg/L. Vinyl chloride also decreased at intermediate WBZ well 01MW108 from 0.33 µg/L to 0.065 µg/L. Results of natural attenuation parameters on ASKO are summarized in Section 4.2.2.

Benzene concentrations were monitored at source area wells 01MW46 and MW05 and downgradient well MW06. Benzene concentrations have decreased relative to pre-remediation conditions at 01MW46 from 14 to 4.8 µg/L, and benzene concentrations at MW05 were relatively consistent with pre-remediation concentrations (1.0 µg/L) at 1.4 to 1.5 µg/L. Benzene was not detected at MW06, downgradient from MW05.

3.4 EAST WATERFRONT

Short-term performance monitoring on the East Waterfront in 2023 included the following:

- Shallow WBZ wells 02MW04R and 02MW19, within the groundwater contaminant plumes and downgradient of the excavation areas, and shallow WBZ well 02MW07 within the groundwater TPH plume were monitored quarterly.

TPH (GRO and total DRO + ORO), benzene, and total arsenic results at all locations were less than CULs at the three monitored wells (02MW04R, 02MW07, and 02MW19) each quarter, except for one exceedance of benzene (29 µg/L) at 02MW04R during the June 2023 event. Benzene concentrations were non-detect during the first, second, and fourth quarters, indicating that this third quarter result was anomalous.

3.5 CONTINGENCY SAMPLING AND GROUNDWATER MONITORING PLAN DEVIATIONS

The 2023 monitoring events were adaptively managed each quarter in coordination with Ecology based on the cumulative data collected. Each quarter, the IHS results were evaluated relative to the GMP decision framework for contingency sampling. Additionally, because of a change in the redevelopment schedule, the planned decommissioning of short-term performance monitoring wells was put on hold until redevelopment begins.

3.5.1 2023 Contingency Sampling

Contingency sample collection and analysis was conducted per the GMP to fulfill the short-term performance monitoring goals. Contingency sampling of one additional well, 01MW107, downgradient of the ASKO parcel was implemented during the third and fourth quarters of 2023 because of elevated cVOC concentrations observed in monitoring wells 01MW53 and 01MW85.

An additional contingency sampling action outside of the scope of the GMP included deployment of a FluxTracer in 01MW85 to evaluate elevated TCE concentrations in groundwater at this location during the third quarter of 2023. The 5-foot long FluxTracer was deployed for 4 weeks spanning the saturated screen interval of 01MW85 and then analyzed by Regenesis Remediation Services for Darcy velocity and mass flux of TCE and *cis*-1,2-DCE through each 1-foot interval of screen. The results of the FluxTracer were used as a line of evidence to evaluate the elevated TCE concentrations observed in that well during the June 2023 monitoring event. Dissolved gases were also re-collected at 01MW85 at lower reporting limits during Q4 to supplement the FluxTracer analysis.

The results of the FluxTracer showed that TCE results were below the detection limit of 10 µg/L in October 2023, which is consistent with the concentrations at 01MW85 from the first, second, and fourth monitoring events (which ranged from 5.7 to 13 µg/L). The groundwater (Darcy) velocity at 01MW85 ranged from less than 2 to 4.5 cm/day, which is a relatively low velocity and is consistent with stagnant groundwater conditions and slow recharge observed in nearby monitoring 01MW53. The FluxTracer report is included in Attachment A.3. Contingency sampling recommendations for the 2024 monitoring year are presented in Section 5.3.

3.5.2 Groundwater Monitoring Plan Deviations

Minor deviations from the GMP during the 2023 monitoring year include the following:

- Schedule deviations:
    - Shallow WBZ wells 01MW51 and 01MW87 were designated for baseline sampling in Q1; however, they were sampled in Q2 to allow time to acquire a ROW permit because wells are located within the drive lane of W. Commodore Way.
    - The third quarterly monitoring event occurred early (end of June rather than beginning of July) to accommodate the redevelopment construction mobilization originally scheduled for July 1, 2023.
- Sampling methodology deviations:
    - At well 01MW53, the well casing was pumped dry using low-flow sampling methods and slow recharge was observed. The low productivity at this location is attributed to shallow WBZ stagnation downgradient of ISS, which is exacerbated by a thin saturated zone and a well casing that does not fully extend to the bottom of the shallow WBZ. After purging this well dry, samples were collected without further purging once sufficient recharge occurred to collect the required sample volume.

3.6 DATA VALIDATION

A Compliance Screening (USEPA Stage 2A) data quality review was performed on TPH, total arsenic, select VOCs, conventionals, and dissolved gases data resulting from laboratory analysis. The data were reviewed using guidance and quality control criteria documented in the GMP (Floyd|Snider 2023), Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (USEPA 1986), National Functional Guidelines for Organic Superfund Methods Data Review (USEPA 2020a), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA 2020b).

Based on the data quality review, data are determined to be of acceptable quality for use as reported or qualified. Data validation summaries with additional details for each quarterly event are included in Attachment A.4.

All data collected in 2023 were submitted to Ecology's Environmental Information Management system in February 2024.

4.0 Year 1 Data Evaluation and Performance Summary

Data evaluation is performed to assess compliance with cleanup standards, determine whether indications of organic contaminant degradation are present, and identify long-term groundwater quality trends and flow patterns as described in the following sections. The anticipated restoration time frame for the Shoreline AOC (East Waterfront) monitoring wells to achieve CULs is 5 years. The anticipated restoration time frame for the Upland AOC (including both ASKO and the Bulk Terminal) is 15 years at and downgradient of the CPOC. The post-remediation dataset from 2023 is not robust enough yet for evaluation of long-term trends related to meeting the restoration time frame goals, so discussion of 2023 groundwater quality is limited to general observations only. A more thorough discussion of long-term trends will be included in the 2024 GMAR after a more robust dataset is available for trend analysis.

4.1 COMPLIANCE WITH CLEANUP STANDARDS

Cleanup standards are defined as a CUL combined with a POC where the CUL must be met. Because this first year of groundwater monitoring is focused on performance monitoring and establishing post-remedial groundwater conditions, this section summarizes the first year of compliance data relative to pre-remedial conditions and CULs and not cleanup standards.

4.1.1 Bulk Terminal

Groundwater compliance will be evaluated for the Bulk Terminal through long-term confirmation monitoring of wells at the CPOC (shallow WBZ wells 01MW03, 01MW19R, 01MW11R, 01MW86, and 01MW87 and intermediate WBZ well 01MW51). Of these wells, short-term monitoring is currently being conducted at 01MW19R. GRO, total DRO and ORO, and benzene all exceed the CULs at well at 01MW19R with exceedance factors ranging from 1.2 to 1.6 for GRO, 1.4 to 1.8 for total DRO and ORO, and 3.6 to 11.8 for benzene. Overall, groundwater concentrations have significantly decreased relative to pre-remediation conditions and are on an apparent track to comply with cleanup standards within the prescribed restoration time frame.

In the intermediate WBZ, evidence of complete attenuation of TPH downgradient of the excavation and ISS areas is observed at 01MW49R and 01MW51 where previously elevated total DRO+ORO decreased to less than the CUL during post-remediation monitoring.

4.1.2 ASKO Hydraulic

Groundwater compliance will be evaluated for ASKO through long-term confirmation monitoring of wells at the CPOC (shallow WBZ wells 01MW53, 01MW85, and 01MW89 and intermediate WBZ well 01MW112). Of these wells, short-term monitoring is currently being conducted at 01MW53 and 01MW85. In 2023, TCE and VC exceeded the CULs at both wells 01MW53 and 01MW85. Exceedance factors at 01MW53 ranged from 1.8 to 5.8 and at 01MW85 exceedance factors ranged from 11.4 to 220. Contingency monitoring of 01MW107 showed non-detect results of cVOCs downgradient of the CPOC, which indicates that the cVOC exceedances at

01MW53 and 01MW85 are localized and not migrating. Persistent lower-level TCE exceedances and low productivity at 01MW53 may also be reflective of groundwater stagnation downgradient of ISS. The results of the FluxTracer show slow groundwater velocity downgradient of the PlumeStop, which indicates that groundwater may take longer to remediate as it flows through the CPOC.

4.1.3 East Waterfront

Groundwater compliance will be evaluated for the East Waterfront through long-term confirmation monitoring of shallow WBZ wells 02MW04R, 02MW07, 02MW17, 02MW19, and 02MW20R. Of these wells, short-term monitoring is currently being conducted at 02MW04R, 02MW07, and 02MW19. Groundwater results from 2023 indicate that compliance with cleanup standards will be achieved within the anticipated restoration time frame. All 2023 IHS results were less than CULs, with one exception of benzene at 02MW04R, which is being evaluated further as a potentially anomalous result not representative of groundwater quality.

4.2 ASSESSMENT OF NATURAL ATTENUATION

Natural attenuation is expected to occur following removal of source soil contamination via excavation and ISS. The primary evidence of natural attenuation is decreasing IHS concentrations. Measurement of primary geochemical parameters collected during field sampling (particularly DO and ORP, and also pH, conductivity, and temperature) and secondary geochemical parameters (such as dissolved gases and ferrous iron) provides additional information regarding the mechanisms of biotic degradation and favorability of site conditions for ongoing attenuation.

4.2.1 Bulk Terminal

On the Bulk Terminal, natural attenuation is expected to occur in the shallow and intermediate WBZ following removal of TPH-contaminated source soil by excavation in CAA-1 and CAA-2 and by ISS in CAA-2. The primary mechanism of attenuation of TPH is aerobic degradation as discussed in Section 3.3.1 of the GMP. Downgradient of CAA-2, aerobic degradation was additionally enhanced by addition of ORC within the CAA-2 excavation. The primary evidence of attenuation is an apparent trend of decreasing concentrations of TPH constituents including GRO, total DRO+ORO, and benzene.

There is strong evidence of TPH degradation occurring in the shallow WBZ on the Bulk Terminal. For instance, at 01MW19/01MW19R at the downgradient property line, benzene has decreased from 2,600 µg/L pre-remediation to 1.8 µg/L post-remediation, and during the same period, GRO decreased from 10,000 to 1,300 µg/L and total DRO+ORO decreased from 1,900 to 920 µg/L. Similar trends of decreasing TPH constituent concentrations are observed at 01MW35 and 01MW84 near the downgradient edge of the pre-remediation TPH plume as shown on Table A.3. At wells on-property closer to the TPH source soil areas where temporary spikes in concentrations relative to pre-remediation conditions appear to have occurred because of remobilization during excavation and ISS, including 01MW12 and 01MW40, post-remediation trends also indicate active breakdown of TPH at 01MW40. Eventual decreasing trends are expected at 01MW12; however, this well may be influenced by stagnation upgradient of the ISS monolith.

The results of primary geochemical parameter analysis in groundwater at the Bulk Terminal parcel indicate that conditions are favorable for continued aerobic degradation. Oxidizing conditions, indicated by positive ORP, were generally prevalent in shallow-zone groundwater except at 01MW12 and 01MW19R where negative ORP was regularly observed. DO concentrations were variable during the first year of post-remediation monitoring and are assumed to be influenced by placement of ORC-A and permeable backfill on the Bulk Terminal. DO generally also appeared to be favorable to aerobic degradation and will continue to be assessed during subsequent monitoring events.

4.2.2 ASKO Hydraulic

On ASKO, natural attenuation is expected to occur following removal of TCE-contaminated source soil by ISS in CAA-4. The primary mechanism of attenuation of TCE is anaerobic degradation by reductive dechlorination as discussed in Section 3.3.2 of the GMP. During reductive dechlorination, chlorine atoms on the cVOC molecule are replaced by other negatively charged particles, resulting in a non-chlorinated and non-hazardous end product. Downgradient of CAA-4, reductive dechlorination is expected to occur biotically from *Dehalococcoides* bacteria, which are naturally present in saturated soil. Additionally, at the downgradient property line where PlumeStop was amended with a zero-valent iron electron donor, abiotic degradation is expected to occur concurrently with biotic degradation. The primary evidence of reductive dechlorination is a trend of decreasing concentrations of the parent product TCE accompanied by increasing concentrations of the intermediate breakdown products of DCE and vinyl chloride.

There is strong evidence of reductive dechlorination occurring in the shallow WBZ on ASKO. For instance, at 01MW46 located immediately downgradient of the ISS monolith, TCE has decreased from 880 µg/L pre-remediation to 300 µg/L post-remediation, and during the same period, *cis*-1,2-DCE increased from 220 to 400 µg/L and vinyl chloride increased from 11 to 36 µg/L. Similar trends of decreasing TCE and increasing DCE and/or vinyl chloride are observed at 01MW15 at the upgradient edge of the pre-remediation TCE plume and at downgradient wells MW05 and MW06 as shown on Table A.3. At downgradient wells where temporary spikes in TCE relative to pre-remediation conditions appear to have occurred because of remobilization during ISS or ongoing migration from upgradient sources, including 01MW56 and 01MW85, post-remediation trends of increasing DCE and/or vinyl chloride also indicate active breakdown of TCE. Detections of ethene and methane at downgradient well 01MW85 are additional evidence of breakdown of vinyl chloride.

In the intermediate WBZ, evidence of complete attenuation of cVOCs downgradient of the ISS monolith is observed at 01MW108, where TCE and DCE remain non-detect and vinyl chloride concentrations decreased to less than the CUL during the most recent monitoring event. Attenuation of cVOCs could not be assessed in the perched WBZ because this saturated zone no longer appears to be present on ASKO following installation of an upgradient interceptor trench.

The results of geochemical parameter analysis in groundwater at ASKO indicate that conditions are favorable to continued reductive dechlorination. Reducing conditions, indicated by negative ORP, were prevalent in groundwater on-property within the pre-remediation TCE plume during all monitoring events. DO measurements were variable and may still be partially influenced by disturbance during remediation; DO will continue to be assessed during subsequent monitoring events.

4.2.3 East Waterfront

On the East Waterfront, all TPH-contaminated source soil was removed by excavation in CAA-6 and attenuation of the post-excavation dissolved-phase TPH constituents in groundwater was expected to occur quickly by aerobic degradation.

Observed groundwater conditions downgradient of CAA-6 are generally consistent with the expected observation of rapid attenuation. For instance, at 02MW04R, GRO decreased from a pre-remediation concentration of 3,100 µg/L to non-detect and total DRO+ORO decreased from 2,000 µg/L to non-detect. Except for an anomalous detection during Q3, benzene concentrations were also non-detect at 02MW04R. Additionally, at 02MW07 and 02MW19, which had pre-remediation exceedances of total DRO+ORO and GRO, respectively, all concentrations were less than CULs during post-remediation monitoring.

Geochemical conditions on the East Waterfront are also favorable for continued aerobic degradation, with generally positive ORP and consistently high DO ranging from approximately 1 to 5 milligrams per liter at 02MW04R nearest to the former TPH source area.

4.3 BNSF RAILWAY COMPANY PROPERTY INVESTIGATION

In 2023, additional remedial investigation was performed by BNSF on the portion of their property upgradient of CAA-4 on ASKO under a separate AO between BNSF and Ecology. The investigation consisted of additional soil and groundwater reconnaissance sample collection from subsurface borings, installation of monitoring wells in the perched and shallow WBZs, and groundwater sample collection from existing and new monitoring wells. The results of this investigation were summarized in the 4th quarter 2023 AO progress report provided to Ecology by Arcadis U.S. Inc. (Arcadis 2024) and are relevant to both short-term and long-term compliance monitoring on ASKO.

The materials provided for the BNSF parcel investigation included raw data packages for cVOC analysis for 10 soil borings, 5 groundwater reconnaissance locations, 7 existing monitoring wells, and 4 new monitoring wells.

In soil, TCE was detected at concentrations exceeding the Site CUL of 0.02 milligrams per kilogram at multiple locations, with the maximum TCE concentrations detected between 12 and 20 feet below ground surface at borings immediately upgradient of the ASKO property line. These elevated TCE concentrations were detected within the perched WBZ and in the silt unit separating the perched and shallow WBZs. Soil data were not collected between 20 and 35 feet below ground surface, which is the interval generally corresponding to the shallow WBZ.

In groundwater, TCE was detected at concentrations exceeding the Site CUL of 0.5 µg/L at multiple reconnaissance boring and monitoring well locations. In the perched WBZ, significantly elevated TCE concentrations of up to 1,350 µg/L were detected upgradient of CAA-4, generally consistent with previous findings at the Site. Significantly elevated TCE concentrations of up to 4,210 µg/L were also detected in the shallow WBZ in both new and existing monitoring wells and groundwater reconnaissance borings. During previous Site investigations, TCE did not exceed the CUL in groundwater in the shallow WBZ on the BNSF parcel. This finding is particularly concerning because the interceptor trench and treatment vault were installed on ASKO along the BNSF parcel boundary to treat cVOC contamination in the perched WBZ and not the shallow WBZ. Contaminant migration in the shallow WBZ from BNSF onto ASKO could have adverse effects on the cleanup action and associated restoration time frame.

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5.0 Recommended Short-Term Groundwater Monitoring Updates

The Year 1 compliance monitoring data were evaluated quarterly, and minor modifications were made to the monitoring program each quarter, in coordination with Ecology, using the adaptive management decision framework presented in Attachment A.3 of the GMP. The recommendations for the 2024 short-term groundwater monitoring program based on the full Year 1 dataset are summarized in this section by site-wide and parcel-specific recommendations. The 2024 short-term groundwater monitoring program with these recommendations is also presented in an updated table of monitoring wells and analytical schedule in Attachment A.4.

5.1 SITE-WIDE GROUNDWATER FLOW PATTERNS

The 2023 water level network has yielded sufficient data to understand groundwater flow patterns without collecting extraneous measurements. Hydrogeologic measurements of the shallow WBZ are recommended to occur semiannually in the first and third quarters of the year to represent the wet and dry seasons. Water levels will be recorded from all shallow WBZ wells designated for sampling in the monitoring network, plus an upgradient well for each parcel (01MW61, 01MW83, and 01MW100), and a few additional locations for full spatial coverage across the shallow WBZ (01MW30, 01MW102, 02MW16, and 02MW18). Potentiometric contour maps of the shallow WBZ for the wet and dry seasons will be prepared for the 2024 GMAR.

Water levels will be recorded from the intermediate WBZ during sample collection only, and no additional evaluation of intermediate WBZ flow direction and gradients is recommended.

5.2 BULK TERMINAL

Continue monitoring the Bulk Terminal monitoring wells per the GMP from the designated “initial” short-term monitoring network, with the following considerations in 2024:

- Discontinue monitoring of 01MW35 because CULs have been achieved for four consecutive quarters.
- If construction begins on any other portions of the Bulk Terminal parcel, transition monitoring to the “after redevelopment” short-term monitoring program in coordination with Ecology.

5.3 ASKO HYDRAULIC

Groundwater monitoring is recommended to continue on the ASKO parcel per the GMP from the designated “initial” short-term monitoring network, with the following additional considerations for the 2024 monitoring year:

- Reinstall 01MW53 (01MW53R) to the south of its current location to deepen the screened interval by an additional 0.5 to 1 foot within the saturated zone relative to the current well screen to improve the well connection with the shallow WBZ. The current location of 01MW53 has very low productivity and cannot be sampled with standard low-flow methodology.

- Retain the contingency well 01MW107, downgradient of 01MW53 and 01MW85, for the Q1 2024 monitoring event. Continued contingency monitoring of 01MW107 will be re-evaluated after each quarterly event based on cVOC concentrations at 01MW53R and 01MW85.
- Continue monitoring select MNA parameters (dissolved gases, total iron, and dissolved iron) at MW05, MW06, and 01MW85 in Q1 2024 to evaluate changes in water quality as it flows through the PlumeStop. Continued MNA monitoring at these locations will be reevaluated for Q3 based on the Q1 results.
- Replace shallow WBZ well 01MW58 (01MW58R) ahead of redevelopment to assess migration of TCE in upgradient shallow WBZ groundwater from the BNSF parcel onto the ASKO parcel.
- If construction begins on any portions of the ASKO parcel, transition monitoring to the "after redevelopment" short-term monitoring. Based on the 2023 monitoring data, contingency wells designated in the GMP for installation after redevelopment are not currently needed for performance or confirmation monitoring. The final locations of wells to be installed after redevelopment will be determined in coordination with Ecology.

5.4 EAST WATERFRONT

Groundwater monitoring is recommended to continue on the East Waterfront parcel per the GMP, with the following additional considerations for the 2024 monitoring year:

- Reduce frequency of monitoring from quarterly to annual at monitoring wells 02MW07 and 02MW19 that have four consecutive results of IHSs less than CULs.

5.5 CONTINGENCY ACTIONS

No contingency cleanup actions are recommended based on the 2023 short-term groundwater monitoring results, which demonstrate that removal of contaminant source mass had caused a significant overall improvement in groundwater quality at the Site. Contingency monitoring is recommended on ASKO, as described above, to further assess the distribution and migration of TCE.

5.6 SCHEDULE AND REPORTING

Monitoring will be completed on a quarterly basis in 2024 in accordance with the GMP and the recommendations contained in this GMAR, in coordination with Ecology. Per the PPCD, quarterly reports will be submitted by the 15th of the month after each quarter and the 2024 GMAR will be submitted by March 1, 2025.

6.0 References

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Long-Term Compliance Monitoring Annual Report
Appendix A: 2023 Groundwater Monitoring Annual Report

Time Oil Bulk Terminal

Tables

Table A.1
Well Inventory and Status

Well ID	Parcel	Water-Bearing Zone	Screened Interval (feet below TOC)	Status
01MW03	BT	Shallow	10–25	
01MW06	BT	Shallow	10–25	To be decommissioned during redevelopment (within anticipated redevelopment structure footprint).
01MW08	BT	Shallow	9–25	To be decommissioned during redevelopment (within anticipated redevelopment structure footprint).
01MW15	ASKO	Shallow	10–30	To be decommissioned during redevelopment and replaced by 01MW60R (within anticipated redevelopment structure footprint).
01MW17	BT	Shallow	20–30	Decommissioned in June 2023 (within footprint of future driveway; monitoring purpose fulfilled by 01MW100).
01MW19R	BT	Shallow	10–20	
01MW30	BT	Shallow	15–28	
01MW34	BT	Shallow	10–20	
01MW35	BT	Shallow	10–20	
01MW36	BT	Shallow	10–20	
01MW39	BT	Shallow	7–22	Damaged during cleanup action and unusable. To be decommissioned during redevelopment (Monitoring objective fulfilled by 01MW100 and 01MW40/01MW90R).
01MW40	BT	Shallow	7–22	To be decommissioned during redevelopment and replaced by 01MW90R (within redevelopment structure footprint).
01MW46	ASKO	Shallow	13–28	To be decommissioned during redevelopment and replaced by 01MW58R (within redevelopment structure footprint).
01MW47	BT	Shallow	6–21	
01MW48	BT	Intermediate	28–32	
01MW49R	BT	Intermediate	35–40	
01MW51	BT	Intermediate	29–39	
01MW52	ASKO	Shallow	14–24	To be decommissioned during redevelopment (monitoring purpose fulfilled by 01MW89).
01MW53	ASKO	Shallow	16–26	
01MW56	ASKO	Shallow	16–26	
01MW57	ASKO	Intermediate	35.5–40.5	To be decommissioned during redevelopment. Within redevelopment structure footprint.
01MW58	ASKO	Shallow	25.5–35.5	Damaged during cleanup action and unusable. To be decommissioned during redevelopment. Monitoring objective fulfilled by 01MW46.
01MW61	ASKO	Shallow	22–37.5	
01MW66	BT	Shallow	12–22	
01MW80	ASKO	Shallow	20–28	To be decommissioned during redevelopment. Within redevelopment structure footprint.
01MW83	EW	Shallow	14–24	
01MW84	BT	Shallow	17–23	
01MW85	ASKO	Shallow	18–27	
01MW86	BT	Shallow	14–24	
01MW87	BT	Shallow	11–21	
01MW88	BT	Shallow	11–21	To be decommissioned (monitoring purpose fulfilled by 01MW36).
01MW89	ASKO	Shallow	18–26	
01MW99	BT	Shallow	20–30	Decommissioned in June 2023 (within footprint of future driveway; monitoring purpose fulfilled by 01MW100).
01MW100	BT	Shallow	20–30	Retained for monitoring in place of 01MW17.
01MW101	BT	Shallow	17–21	
01MW102	BT	Shallow	10–20	
01MW103	BT	Shallow	7–17	To be decommissioned during redevelopment (Dry well, montioring purpose fulfulled by 01MW11R).
01MW104	BT	Intermediate	28–33	
01MW105	BT	Shallow	5–15	Decommissioned in June 2023.
01MW106	ASKO	Shallow	15–25	
01MW107	ASKO	Shallow	17–27	
01MW108	ASKO	Intermediate	30–35	To be decommissioned during redevelopment and replaced by 01MW112 (within redevelopment structure footprint).
01MW109	BT	Shallow	8–18	To be decommissioned during redevelopment (dry well, outside and cross-gradient of TPH impacts).
01MW110	BT	Shallow	11–21	Decommissioned in June 2023.
01MW111	BT	Intermediate	30–35	To be decommissioned during redevelopment (outside of TPH impacts).
01MW12	BT	Shallow	4–19	
02MW01	EW	Shallow	10–20	
02MW03	EW	Shallow	10–20	
02MW04R	EW	Shallow	5–15	
02MW05	EW	Intermediate	20–35	Damaged during cleanup action and unusable. To be decommissioned during redevelopment. Monitoring objective fulfilled by 01MW48, 01MW51.
02MW07	EW	Shallow	1.5–11.5	
02MW08	EW	Shallow	13–22	Damaged during cleanup action and unusable. To be decommissioned during redevelopment. Monitoring objective fulfilled by 01MW84.
02MW09	EW	Shallow	7–12	Damaged during cleanup action and unusable. To be decommissioned during redevelopment. Monitoring objective fulfilled by 02MW03.
02MW10	EW	Shallow	2.5–7.5	Damaged during cleanup action and unusable. To be decommissioned during redevelopment. Monitoring objective fulfilled by 01MW84, 01MW102.
02MW13	EW	Shallow	5–15	To be decommissioned during redevelopment. Outside and cross-gradient of TPH impacts.
02MW14	EW	Shallow	5–15	Overgrown; inaccessible.
02MW16	EW	Shallow	5–15	
02MW17	EW	Shallow	1–11	
02MW18	EW	Shallow	4–14	
02MW19	EW	Shallow	3–13	
02MW21	EW	Intermediate	18–28	
02MW22	EW	Intermediate	17–27	Inaccessible (buried by gravel).
MW01	ASKO	Shallow	18–28	To be decommissioned during redevelopment. Outside and cross-gradient of cVOC impacts.
MW02	ASKO	Shallow	18–28	
MW03R	ASKO	Perched	13–18	
MW05	ASKO	Shallow	19–29	To be decommissioned during redevelopment (within anticipated redevelopment structure footprint).
MW06	ASKO	Shallow	18–28	

Notes:

Locations are listed alphanumerically.

Abbreviations:

ASKO	ASKO Hydraulic
BT	Bulk Terminal
cVOC	Chlorinated volatile organic compound
EW	East Waterfront
TOC	Top of casing
TPH	Total petroleum hydrocarbons

Table A.2
Summary of 2023 Short-Term Performance Monitoring

Well ID	Water-Bearing Zone	Screened Interval (feet below TOC)	Designation	Monitoring Schedule	GMP Notes	2023 Monitoring Schedule													Monitoring Schedule Deviation Notes
						MNA Parameters (1)		Indicator Hazardous Substances							2023 Monitoring Schedule				
						Primary	Secondary	Total Arsenic	GRO	Total DRO+ORO	Benzene	TCE	Vinyl Chloride	Penta	Q1	Q2	Q3	Q4	
Bulk Terminal Wells																			
01MW12	Shallow	4–19	CAA-1 Downgradient Plume	Semiannual		X			X	X	X				IHS		IHS		
01MW19R	Shallow	10–20	CAA-2 Source Area	Quarterly		X			X	X	X				IHS	IHS	IHS	IHS	
01MW35	Shallow	10–20	CAA-2 Downgradient Plume	Quarterly		X			X	X	X				IHS	IHS	IHS	IHS	
01MW40	Shallow	7–22	CAA-1 Source Area	Initial Semiannual	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).	X			X	X	X				IHS		IHS		
01MW49R	Intermediate	35–40	CAA-2 Downgradient Plume	Semiannual		X			X	X	X				IHS		IHS		
01MW51	Intermediate	29–39	CAA-2 Downgradient Plume	Initial Baseline	Sample once during first quarter of initial montoring.	X			X	X	X					IHS			Baseline sample collected in Q2 instead of Q1.
01MW66	Shallow	12–22	--	Annual	On-property penta plume	X								X	IHS				
01MW84	Shallow	17–23	CAA-2 Downgradient Plume	Quarterly		X			X	X	X				IHS	IHS	IHS	IHS	
01MW87	Shallow	11–21	CAA-2 Downgradient Sentinel	Initial Baseline/ Contingency	Sample once during first quarter of initial monitoring; sample if IHS concentrations increasing at 01MW12.	X			X	X	X					IHS			Baseline sample collected in Q2 instead of Q1.
ASKO Wells																			
01MW15	Shallow	10–30	CAA-4 Source Area	Initial Semiannual	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).	X						X	X		IHS		IHS		
01MW46	Shallow	13–28	CAA-4 Source Area	Quarterly	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).	X	X				X	X	X		IHS + MNA	IHS	IHS + MNA	IHS	
01MW53	Shallow	16–26	CAA-4 Downgradient Plume	Quarterly		X						X	X		IHS	IHS	IHS	IHS	
01MW56	Shallow	16–26	CAA-4 Downgradient Plume	Semiannual		X	X					X	X		IHS + MNA		IHS + MNA		
01MW85	Shallow	18–27	CAA-4 Downgradient Plume	Quarterly		X	X					X	X		IHS + DG + MNA	IHS	IHS + MNA	IHS + DG	Dissolved gases collected in Q4.
01MW107	Shallow	17–27	CAA-4 Downgradient Sentinel	Contingency	Sample if increasing IHS concentrations at 01MW53 or 01MW85.	X						X	X				IHS	IHS	Contingency location added in Q3 due to increasing IHS concentrations at 01MW53 and 01MW85.
01MW108	Intermediate	30–35	CAA-4 Downgradient Plume	Initial Semiannual	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).	X						X	X		IHS		IHS		
MW03R	Perched	13–18	CAA-5 Source Area	Semiannual		X		X	X	X	X	X	X						Well was dry.
MW05	Shallow	19–29	CAA-4 Downgradient Plume	Initial Semiannual	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).	X	X				X	X	X		IHS + MNA		IHS + MNA		
MW06	Shallow	18–28	CAA-4 Downgradient Plume	Initial Baseline	Sample once during first quarter of initial monitoring; contingency sample if increasing IHS concentrations at 01MW46, 01MW53, 01MW85, or MW05; monitor semiannually after redevelopment grading.	X	X				X	X	X		IHS + MNA				

Table A.2
Summary of 2023 Short-Term Performance Monitoring

						2023 Monitoring Schedule													
						MNA Parameters (1)		Indicator Hazardous Substances							2023 Monitoring Schedule				
Well ID	Water-Bearing Zone	Screened Interval (feet below TOC)	Designation	Monitoring Schedule	GMP Notes	Primary	Secondary	Total Arsenic	GRO	Total DRO+ORO	Benzene	TCE	Vinyl Chloride	Penta	Q1	Q2	Q3	Q4	Monitoring Schedule Deviation Notes
East Waterfront Wells																			
02MW04R	Shallow	5–15	CAA-6 Source Area	Quarterly		X			X	X	X				IHS	IHS	IHS	IHS	
02MW07	Shallow	1.5–11.5	CAA-6 Downgradient Plume	Quarterly		X		X	X	X	X				IHS	IHS	IHS	IHS	
02MW19	Shallow	3–13	CAA-6 Downgradient Sentinel	Quarterly		X		X	X	X	X				IHS	IHS	IHS	IHS	

Notes:

Blank cells are intentional.

Wells not designated for short-term monitoring are considered sentinels and may be sampled at the Property Owner's discretion to obtain additional performance data, if needed.

-- Not established.

1 Primary MNA parameters include field measurement of dissolved oxygen, oxidation–reduction potential, pH, conductivity, and temperature. Primary MNA parameters were collected during all sampling events specified in the short-term performance monitoring plan. Secondary MNA parameters include ferrous iron (field method) and laboratory analysis of nitrate, nitrite, sulfate, sulfide, cis-1,2-dichloroethene, and dissolved gases (methane, ethene, and ethane). Secondary MNA parameters were analyzed from select wells semiannually to determine baseline geochemical conditions during Year 1. Dissolved gases were designated for annual sampling only at 01MW85.

Abbreviations:

ASKO	ASKO Hydraulic	IHS	Indicator hazardous substance
BSNF	BNSF Railway Company	MNA	Monitored natural attenuation
DG	Dissolved gasses	ORO	Oil-range organics
DRO	Diesel-range organics	penta	Pentachlorophenol
GMP	Groundwater Monitoring Plan	TCE	Trichloroethene
GRO	Gasoline-range organics	TOC	Top of casing

Table A.3
Pre- and Post-Remediation Groundwater Results for Indicator Hazardous Substances

		Analyte Class	Total Metals	TPH		VOCs	cVOCs			SVOCs
		Analyte	**Arsenic**	**GRO**	**Total DRO+ORO**	**Benzene**	**TCE**	***cis* -1,2-DCE**	**Vinyl Chloride**	**Penta**
		CAS No.	**7440-38-2**	**--**	**-- (U=0)**	**71-43-2**	**79-01-6**	**156-59-2**	**75-01-4**	**87-86-5**
		Unit	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
		Cleanup Level	**5.0**	**800**	**500**	**0.44**	**0.50**		**0.20**	**0.20**
Parcel	**Location**	**Sample Date**								
Bulk Terminal	**01MW12**									
	Pre-remediation	4/30/2019		100 U	**590** (1)	**3.0**				
	Post-remediation	1/31/2023		100 U	**1,000** (1)	0.35 U				
		6/28/2023		110	**1,200** (1)	**1.3**				
	01MW19/01MW19R									
	Pre-remediation	4/30/2019		**10,000**	**1,900** (1)	**2,600**	*1.0 U*	1.0 U	0.20 U	
	Post-remediation	1/31/2023		**990**	**910** (1)	**5.2**				
		4/7/2023		**1,100**	**700** (1)	**4.4**				
		6/28/2023		**1,300**	**810** (1)	**2.1**				
		10/10/2023		**1,200**	**890** (1)	**1.6**				
				1,300	**920** (1)	**1.8**				
	01MW35									
	Pre-remediation	5/1/2019		100 U	**550** (1)	0.35 UJ				
	Post-remediation	1/31/2023		100 U	110 (1)	0.35 U				
		4/7/2023		100 U	120 (1)	0.35 U				
		6/28/2023		100 U	76 (1)	0.35 U				
		10/10/2023		100 U	56 (1)	0.35 U				
	01MW40									
	Pre-remediation	4/30/2019			**1,100** (1)	0.35 UJ				
	Post-remediation	1/31/2023		100 U	**5,300** (1)	**0.73**				
		6/28/2023		100 U	**620** (1)	0.35 U				
	01MW49/01MW49R									
	Pre-remediation	5/1/2019		100 U	**850** (1)	0.35 UJ				
	Post-remediation	1/31/2023		100 U	260 (1)	0.35 U				
		6/29/2023		100 U	160 (1)	0.35 U				
	01MW51									
	Pre-remediation	5/26/2016		370	**1,800** (1)	*1.0 U*				
	Post-remediation	4/7/2023		100 U	250 U	0.35 U				
	01MW66									
	Pre-remediation	4/30/2019		100 U	250	0.35 UJ				**3.6**
	Post-remediation	1/31/2023								**1.9**
	01MW84									
	Pre-remediation	5/1/2019		**8,400**	**2,800** (1)	*5.0 U*				
	Post-remediation	1/31/2023		**2,300**	**810** (1)	0.35 U				
				2,200	**830** (1)	0.35 U				
		4/7/2023		**5,500**	**1,500** (1)	0.35 U				
		6/28/2023		**4,600**	**1,400** (1)	0.35 U				
				4,300	**1,300** (1)	0.35 U				
		10/10/2023		**3,500**	**1,500** (1)	0.35 U				
	01MW87									
	Pre-remediation	5/26/2019		100 U		*1.0 U*				
		5/1/2019			110					
	Post-remediation	4/7/2023		100 U	250 U	0.35 U				
ASKO	**01MW15**									
	Pre-remediation	5/2/2019		100 U	220 (1)	0.41	0.50 U	1.7	**7.2**	
	Post-remediation	2/1/2023					0.50 U	6.4	**36**	
		6/28/2023					0.50 U	5.7	**28**	
	01MW46									
	Pre-remediation	5/2/2019			280 (1)	**14**	**880**	220	**11**	
	Post-remediation	2/1/2023				**3.8**	**240**	140	**17**	
		4/7/2023				*3.5 U*	**140**	110	**9.3**	
		6/28/2023				**4.3**	**280**	260	**25**	
		10/10/2023				**4.8**	**300**	400	**36**	
	01MW53									
	Pre-remediation	5/2/2019			94 (1)	0.35 U	0.50 U	4.4	**0.26**	
	Post-remediation	2/1/2023					**2.9**	5.4	**0.57**	
		4/7/2023					**2.1**	3.2	**0.36**	
		6/28/2023					**2.0**	2.9	**0.51**	
		10/10/2023					**1.5**	2.4	**0.59**	
	01MW56									
	Pre-remediation	5/2/2019			**1,000** (1)	0.35 U	0.50 U	1.0 U	**0.61**	
	Post-remediation	2/1/2023					**0.81**	1.0 U	**0.99**	
		6/28/2023					**0.62**	1.0 U	**0.97**	
	01MW85									
	Pre-remediation	5/3/2019			450 (1)		0.50 U	2.4	**7.9**	
	Post-remediation	1/31/2023					**5.7**	1,200	**13**	
		4/7/2023					**6.2**	1,200	**17**	
		6/28/2023					**110**	1,000	**13**	
		10/10/2023					**13**	1,100	**18**	
	01MW107									
	Pre-remediation	5/6/2019					0.50 U	1.0 U	0.020 U	
	Post-remediation	6/28/2023					0.50 U	1.0 U	0.020 U	
	Post-remediation	10/10/2023					0.50 U	1.0 U	0.020 U	
	01MW108									
	Pre-remediation	5/3/2019					0.50 U	1.0 U	**0.33**	
	Post-remediation	2/1/2023					0.50 U	1.0 U	**0.27**	
		6/29/2023					0.50 U	1.0 U	0.065	

Table A.3
Pre- and Post-Remediation Groundwater Results for Indicator Hazardous Substances

		Analyte Class	**Total Metals**	**TPH**		**VOCs**	**cVOCs**			**SVOCs**
		Analyte	**Arsenic**	**GRO**	**Total DRO+ORO**	**Benzene**	**TCE**	***cis*-1,2-DCE**	**Vinyl Chloride**	**Penta**
		CAS No.	**7440-38-2**	**--**	**-- (U=0)**	**71-43-2**	**79-01-6**	**156-59-2**	**75-01-4**	**87-86-5**
		Unit	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
		Cleanup Level	**5.0**	**800**	**500**	**0.44**	**0.50**		**0.20**	**0.20**
Parcel	**Location**	**Sample Date**								
ASKO (cont.)	**MW05**									
	Pre-remediation	5/3/2019		140	310 (1)	**1.0**	**240**	120	**27**	
	Post-remediation	2/1/2023				**1.4**	**140**	360	**6.8**	
		6/28/2023				**1.5 J**	**160**	360	**6.9**	
	MW06									
	Pre-remediation	5/3/2019			370 (1)	**2.6**	**330**	31	**2.8**	
	Post-remediation	2/1/2023				0.35 U	0.50 U	1.0 U	**2.6**	
East Waterfront	**02MW04/02MW04R**									
	Pre-remediation	5/18/2016		**3,100**	**2,000 (1)**	**19**				
		5/3/2019				**3.7**				
	Post-remediation	2/1/2023		100 U	69 (1)	0.35 U				
		4/7/2023		100 U	250 U	0.35 U				
		6/29/2023		100 U	65 (1)	**29**				
		10/10/2023		100 U	250 U	0.35 U				
	02MW07									
	Pre-remediation	5/19/2016		100 U	160 (1)	*1.0 U*				
		5/3/2019			**670 (1)**					
		7/25/2019	3.9							
	Post-remediation	2/1/2023	1.0 U	100 U	86 (1)	0.35 U				
		4/7/2023	1.0 U	100 U	250 U	0.35 U				
		6/29/2023	1.1	100 U	76 (1)	0.35 U				
		10/10/2023	1.2	100 U	73 (1)	0.35 U				
	02MW19									
	Pre-remediation	5/6/2019		100 U	380 (1)					
		7/25/2019	**14**							
	Post-remediation	2/1/2023	3.3	100 U	150 (1)	0.35 U				
		4/7/2023	4.7	100 U	76 (1)	0.35 U				
			4.8	100 U	84 (1)	0.35 U				
		6/29/2023	4.2	100 U	76 (1)	0.35 U				
		10/10/2023	3.1	100 U	81 (1)	0.35 U				

Notes:

	Blanks are intentional. Data not collected for specific analyte.
Italic	Reporting limit exceeds cleanup level.
BOLD	Detected exceedance of cleanup level.
1	Laboratory noted that the sample chromatographic pattern does not resemble the fuel standard used for quantitation for one or more of the detected concentrations in the sum.

Abbreviations:

CAS	Chemical Abstracts Service
cVOC	Chlorinated volatile organic compound
DCE	Dichloroethene
DRO	Diesel-range organics
GRO	Gasoline-range organics
µg/L	Micrograms per liter
ORO	Oil-range organics
penta	Pentachlorophenol
SVOC	Semivolatile organic compound
TCE	Trichloroethene
TPH	Total petroleum hydrocarbons
VOC	Volatile organic compound

Qualifiers:

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

Table A.4
Monitored Natural Attenuation and Field Parameters

			Water Level	Primary MNA Parameters						Secondary MNA Parameters								
		Analyte Class	Field Measurement								Anions			Conventional	Dissolved Gasses		
		Analyte	Depth to Water	Dissolved Oxygen	Specific Conductance	ORP	pH	Temperature	Turbidity	Ferrous Iron	Nitrate (as Nitrogen)	Nitrite (as Nitrogen)	Sulfate	Sulfide	Ethane	Ethene	Methane
		CAS No.	--	--	--	--	--	--	--	15438-31-0	14797-55-8	14797-65-0	14808-79-8	18496-25-8	74-84-0	74-85-1	74-82-8
		Unit	Feet	mg/L	µS/cm	mV	pH	°C	ntu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Parcel	Location Name	Sample Date															
Bulk Terminal	01MW12	1/31/2023	1.05	7.44	586	-22.2	6.61	10.8	3.44								
		6/28/2023	6.40	0.10	625	-47.1	6.69	14.6	3.02								
	01MW19R	1/31/2023	11.90	7.11	217.3	-63.4	6.92	14.6	1.11								
		4/7/2023	11.90	2.16	190.3	-33.6	6.90	14.4	1.32								
		6/28/2023	13.90	0.24	216.2	-84.6	7.08	16.3	0.61								
		10/10/2023	13.38	0.28	173.4	10.4	6.79	15.7	0.87								
	01MW35	1/31/2023	15.66	2.17	190.1	175.6	6.41	12.6	0.79								
		4/7/2023	16.72	2.86	203.5	66.6	6.23	13.0	0.45								
		6/28/2023	17.28	0.41	160.7	82.5	6.39	14.8	0.50								
		10/10/2023	17.23	0.68	77.2	97.1	6.38	18.6	2.04								
	01MW40	1/31/2023	10.61	7.59	402.9	79.4	6.43	11.2	1.17								
		6/28/2023	14.16	0.11	431.8	14.2	6.68	15.2	1.89								
	01MW49R	1/31/2023	26.59	5.78	914	-95.4	7.06	14.3	3.03								
		6/29/2023	25.86	1.22	828	-110.8	7.14	15.2	1.32								
	01MW51	4/7/2023	20.38	2.64	881	-46.6	6.86	13.5	3.23								
	01MW66	1/31/2023	4.78	7.14	356.5	-9.1	6.58	12.5	4.79								
	01MW84	1/31/2023	14.69	2.04	81.4	-49.5	6.61	12.8	2.10								
		4/7/2023	15.30	2.28	72.0	11.9	6.57	12.6	2.21								
		6/28/2023	15.71	0.20	86.8	-18.6	6.51	14.5	11.83								
		10/10/2023	15.85	0.26	84.3	50.8	6.46	16.7	3.77								
	01MW87	4/7/2023	13.55	5.12	190.8	86.0	6.26	12.6	3.95								
ASKO	MW05	2/1/2023	20.14	6.49	392.3	-82.1	7.17	12.9	0.68	3.0	1.0 U	1.2 U	77	1.0 J			
		6/28/2023	20.99	0.13	576	-84.6	7.29	14.0	1.99	3.0	0.50 U		130	3.6			
	MW06	2/1/2023	21.38	1.97	459.9	-55.2	6.84	14.1	7.51	3.5	1.0 U	1.2 U	42	0.50 U			
	01MW15	2/1/2023	19.32	6.26	422.1	-29.8	6.85	14.4	1.14								
		6/28/2023	19.51	0.23	591	-50.3	7.06	15.4	0.93								
	01MW46	2/1/2023	22.33	1.71	358.3	-113.2	7.27	14.8	1.04	3.5	1.0 U	1.2 U	140	0.20 J			
		4/7/2023	22.37	2.68	332.6	-38.9	6.75	15.5	1.32								
		6/28/2023	23.82	0.19	490.9	-68.9	7.21	15.4	2.44	3.5	0.50 U		190	2.4			
		10/10/2023	23.72	0.20	366.2	3.7	6.74	14.9	5.70								
	01MW53	2/1/2023	22.47	5.31	599	0.1	6.60	14.1	27.9								
		4/7/2023	22.42	6.07	640	-56.1	6.78	13.3	41.5								
		6/28/2023	22.70	0.19	729	-24.6	6.69	15.8	5.54								
		10/10/2023	22.94	0.23	528	-12.5	6.57	16.3	6.86								
	01MW56	2/1/2023	19.62	6.74	568	-9.5	6.66	14.6	2.11	4.5	0.33 J	1.2 U	25	0.50 U			
		6/28/2023	20.35	0.17	702	20.1	6.69	14.7	1.83	4.5	0.91		29	4.4			
	01MW85	1/31/2023	22.50	2.41	577	-57.7	6.89	14.9	3.32	5.0	1.0 UJ	1.2 UJ	7.7	0.50 UJ	0.015 U	0.015 U	1.8
		4/7/2023	22.56	5.50	596	-87.8	7.05	14.9	1.67								
		6/28/2023	23.00	0.11	619	-59.7	6.98	15.3	2.59	4.0	0.50 U		61	4.8			
		10/10/2023	23.44	0.29	475.9	34.5	6.78	14.9	1.10						0.00022 U	0.0027 J	0.32 J
	01MW107	6/28/2023	23.31	0.93	320.2	100.2	6.22	15.4	2.41								
		10/10/2023	24.34	1.00	236.9	73.7	6.14	14.7	0.94								
	01MW108	2/1/2023	24.36	1.43	569	-81.0	6.93	14.2	10.17								
		6/29/2023	25.18	1.43	697	-86.4	7.02	15.3	4.40								

Table A.4
Monitored Natural Attenuation and Field Parameters

			Water Level	Primary MNA Parameters						Secondary MNA Parameters							
		Analyte Class	**Field Measurement**								**Anions**			**Conventional**	**Dissolved Gasses**		
		Analyte	**Depth to Water**	**Dissolved Oxygen**	**Specific Conductance**	**ORP**	**pH**	**Temperature**	**Turbidity**	**Ferrous Iron**	**Nitrate (as Nitrogen)**	**Nitrite (as Nitrogen)**	**Sulfate**	**Sulfide**	**Ethane**	**Ethene**	**Methane**
		CAS No.	--	--	--	--	--	--	--	**15438-31-0**	**14797-55-8**	**14797-65-0**	**14808-79-8**	**18496-25-8**	**74-84-0**	**74-85-1**	**74-82-8**
		Unit	**Feet**	**mg/L**	**µS/cm**	**mV**	**pH**	**°C**	**ntu**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Parcel	**Location Name**	**Sample Date**															
East Waterfront	02MW04R	2/1/2023	7.79	4.52	262	32.1	6.85	9.2	3.22								
		4/7/2023	6.73	5.25	237.2	84.5	6.76	8.4	1.82								
		6/29/2023	7.84	3.25	352.6	50.8	6.82	15.4	1.52								
		10/10/2023	8.01	1.04	298.1	99.9	6.76	16.9	1.52								
	02MW07	2/1/2023	2.79	4.96	312.1	74.8	6.36	9.8	1.81								
		4/7/2023	1.70	3.19	373.6	126.2	6.10	9.8	2.04								
		6/29/2023	2.28	2.52	844	91.1	6.04	16.5	1.57								
		10/10/2023	2.72	0.79	536	89.6	5.92	17.3	0.86								
	02MW19	2/1/2023	3.02	3.24	387.2	4.9	6.42	11.4	3.86								
		4/7/2023	2.22	3.62	440.3	-21.9	6.54	11.4	2.86								
		6/29/2023	2.60	0.17	576	-6.8	6.50	14.1	1.68								
		10/10/2023	3.21	0.16	338.9	-16.5	6.48	15.7	1.87								

Notes:

Lab-reported concentrations for anions, dissolved gasses, and conventionals have been rounded to two significant figures. Field measurements are presented to the decimal places reported on the field meters.

Abbreviations:

CAS	Chemical Abstracts Service
°C	Degrees Celsius
µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter
MNA	Monitored natural attenuation
mV	Millivolts
ntu	Nephelometric turbidity units
ORP	Oxidation–reduction potential

Qualifiers:

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

Long-Term Compliance Monitoring Annual Report Appendix A: 2023 Groundwater Monitoring Annual Report

Time Oil Bulk Terminal

Figures

Legend

Existing Monitoring Well Locations

- ◐ Shallow WBZ Monitoring Well
- ◐ Intermediate WBZ Monitoring Well
- ⊕ Perched WBZ Monitoring Well
- ◐ Monitoring Well Decommissioned in 2023

Well Decommissioning Plan

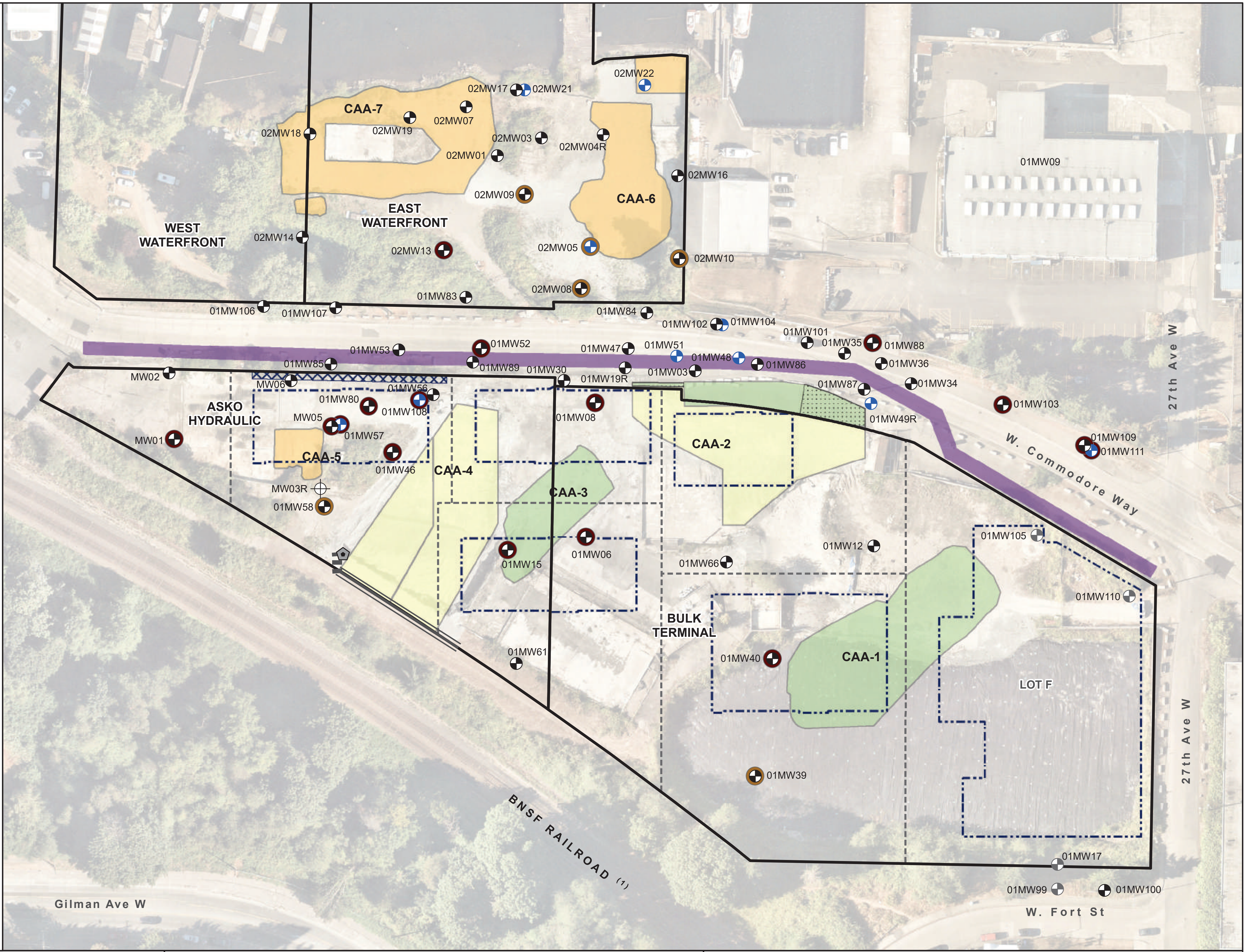
- ● Damaged—Decommission Required
- ● Decommission During Redevelopment

Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- 🟨 In Situ Stabilization/Solidification
- ▨ PlumeStop Injection
- ▨ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬠ Gravity Well

Other Site Features

- ☐ Property Boundary for the Former TOC Seattle Terminal
- ‐ ‐ ‐ King County Tax Parcel
- ☐ Planned Property Redevelopment Structure
- ▬ Conditional Point of Compliance



Notes:
1. Remedial Investigation on the BNSF Railroad property upgradient of ASKO is in progress under a separate Agreed Order with Ecology.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2022. King County tax parcel boundaries were updated for redevelopment after approval of the Cleanup Action Plan and completion of cleanup action construction. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:
CUL = Cleanup level
ORC-A = Oxygen Release Compound Advanced
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

0 45 90 180
Scale in Feet
N

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Long-Term Compliance Monitoring Annual Report
Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.1
Site Features and Monitoring Well Status Summary

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.1 Site Features and Monitoring Well Status Summary.mxd
2/12/2024

Legend

Monitoring Well Locations

- ◐ Shallow WBZ Monitoring Well
- ◐ Intermediate WBZ Monitoring Well
- ⊕ Perched WBZ Monitoring Well

2023 Monitoring Locations

- ● Quarterly Performance
- ● Semiannual Performance
- ● Annual Performance
- ● Contingency Performance [1]
- ● Baseline [2]

Cleanup Action Components

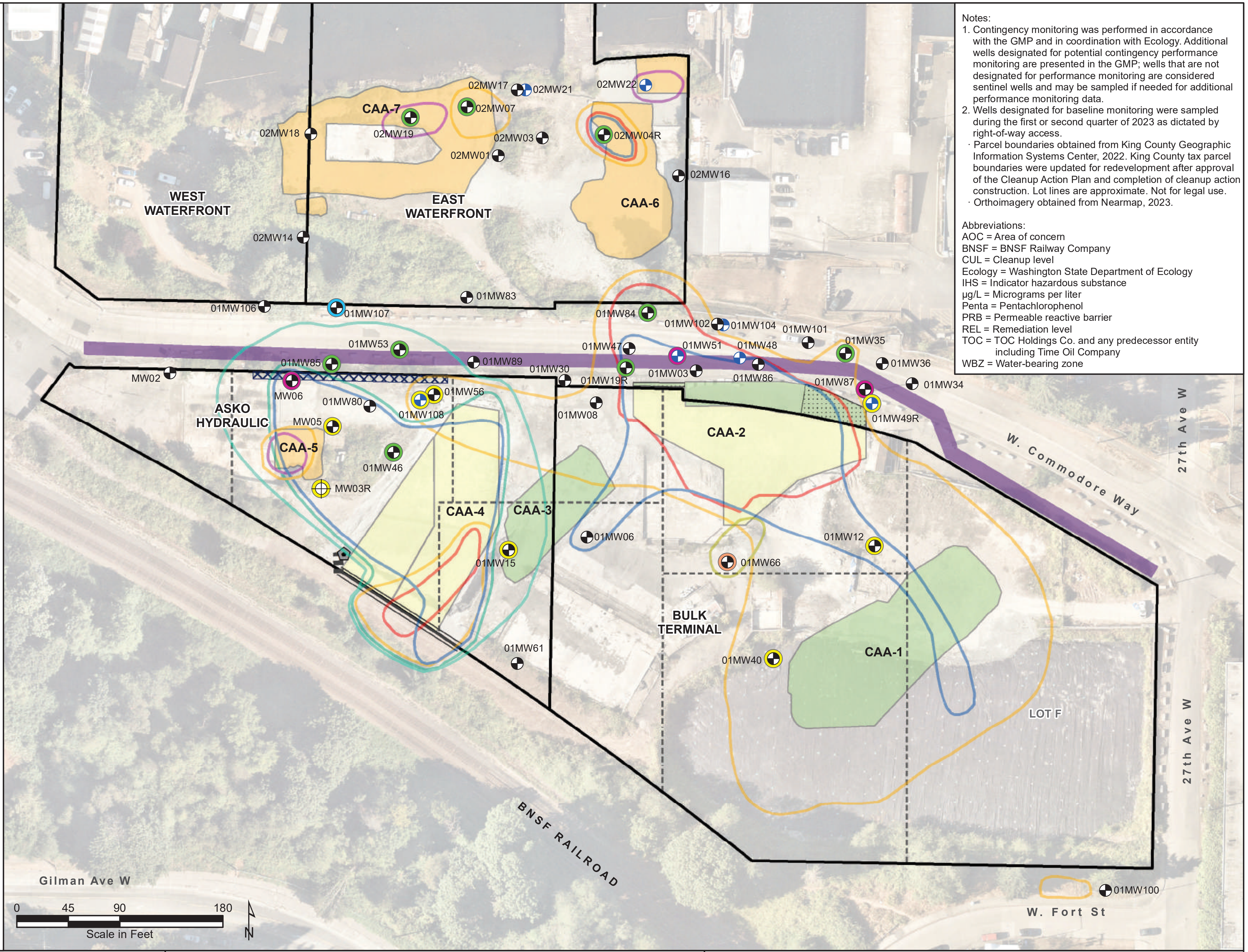
- ▭ Excavated to CULs
- ▭ Excavated to RELs
- ▭ In Situ Stabilization/Solidification
- ▨ PlumeStop Injection Area
- ▨ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬟ Gravity Well

Approximate Extent of IHSs Exceeding CULs Before Cleanup Action (2019)

- ▭ Arsenic >5.0 µg/L
- ▭ Gasoline-Range Organics >800 µg/L
- ▭ Diesel- and Oil-Range Organics >500 µg/L
- ▭ Benzene >0.44 µg/L
- ▭ Trichloroethene >0.50 µg/L
- ▭ Vinyl Chloride >0.20 µg/L
- ▭ Penta >0.20 µg/L

Other Site Features

- ▭ Property Boundary for the Former TOC Seattle Terminal
- ---- King County Tax Parcel
- ▬ Conditional Point of Compliance



Notes:
1. Contingency monitoring was performed in accordance with the GMP and in coordination with Ecology. Additional wells designated for potential contingency performance monitoring are presented in the GMP; wells that are not designated for performance monitoring are considered sentinel wells and may be sampled if needed for additional performance monitoring data.
2. Wells designated for baseline monitoring were sampled during the first or second quarter of 2023 as dictated by right-of-way access.

- Parcel boundaries obtained from King County Geographic Information Systems Center, 2022. King County tax parcel boundaries were updated for redevelopment after approval of the Cleanup Action Plan and completion of cleanup action construction. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:
AOC = Area of concern
BNSF = BNSF Railway Company
CUL = Cleanup level
Ecology = Washington State Department of Ecology
IHS = Indicator hazardous substance
µg/L = Micrograms per liter
Penta = Pentachlorophenol
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

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Long-Term Compliance Monitoring Annual Report
Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.2
2023 Short-Term Performance Monitoring Locations

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.2 2023 Short-Term PM Locs.mxd
2/12/2024

Legend

Groundwater Contour (feet NAVD 88)

Shallow WBZ Groundwater Flow Direction

Existing Monitoring Well Locations

Shallow WBZ Monitoring Well

Well Decomissioning Plan

● Damaged—Decommission Required

● Decommission During Redevelopment

Cleanup Action Components

🟧 Excavated to CULs

🟩 Excavated to RELs

🟨 In Situ Stabilization/Solidification

▨ PlumeStop Injection

▨ ORC-A Treatment

Interceptor Trench

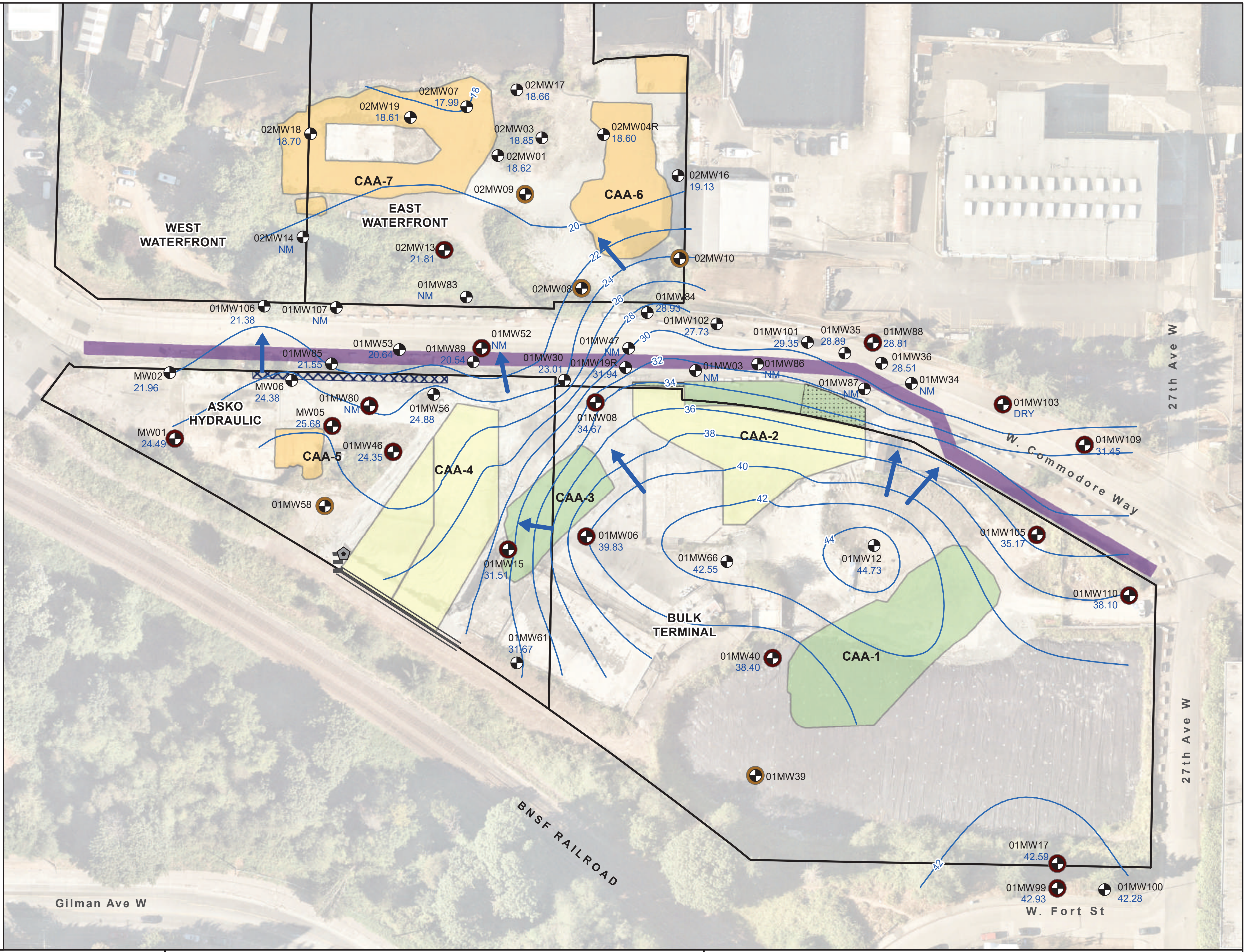
PRB Wall for Trench

⬠ Gravity Well

Other Site Features

☐ Property Boundary for the Former TOC Seattle Terminal

Conditional Point of Compliance



Notes:

- Depth to water measurements not collected at select wells that were inaccessible because they are located within the W. Commodore Way right-of-way or buried by gravel or vegetation.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2011. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:

CUL = Cleanup level

ORC-A = Oxygen Release Compound Advanced

NAVD 88 = North American Vertical Datum of 1988

NM = Not measured

PRB = Permeable reactive barrier

REL = Remediation level

TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company

WBZ = Water-bearing zone

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Time Oil Bulk Terminal
Seattle, Washington

Figure A.3a
Shallow WBZ Groundwater Elevations—
January 2023

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.3a Shallow WBZ GW Elevations Jan 2023.mxd.mxd
2/12/2024

Legend

- ∼ Groundwater Contour (feet NAVD 88)
- ← Shallow WBZ Groundwater Flow Direction

Existing Monitoring Well Locations

- ◐ Shallow WBZ Monitoring Well

Well Decomissioning Plan

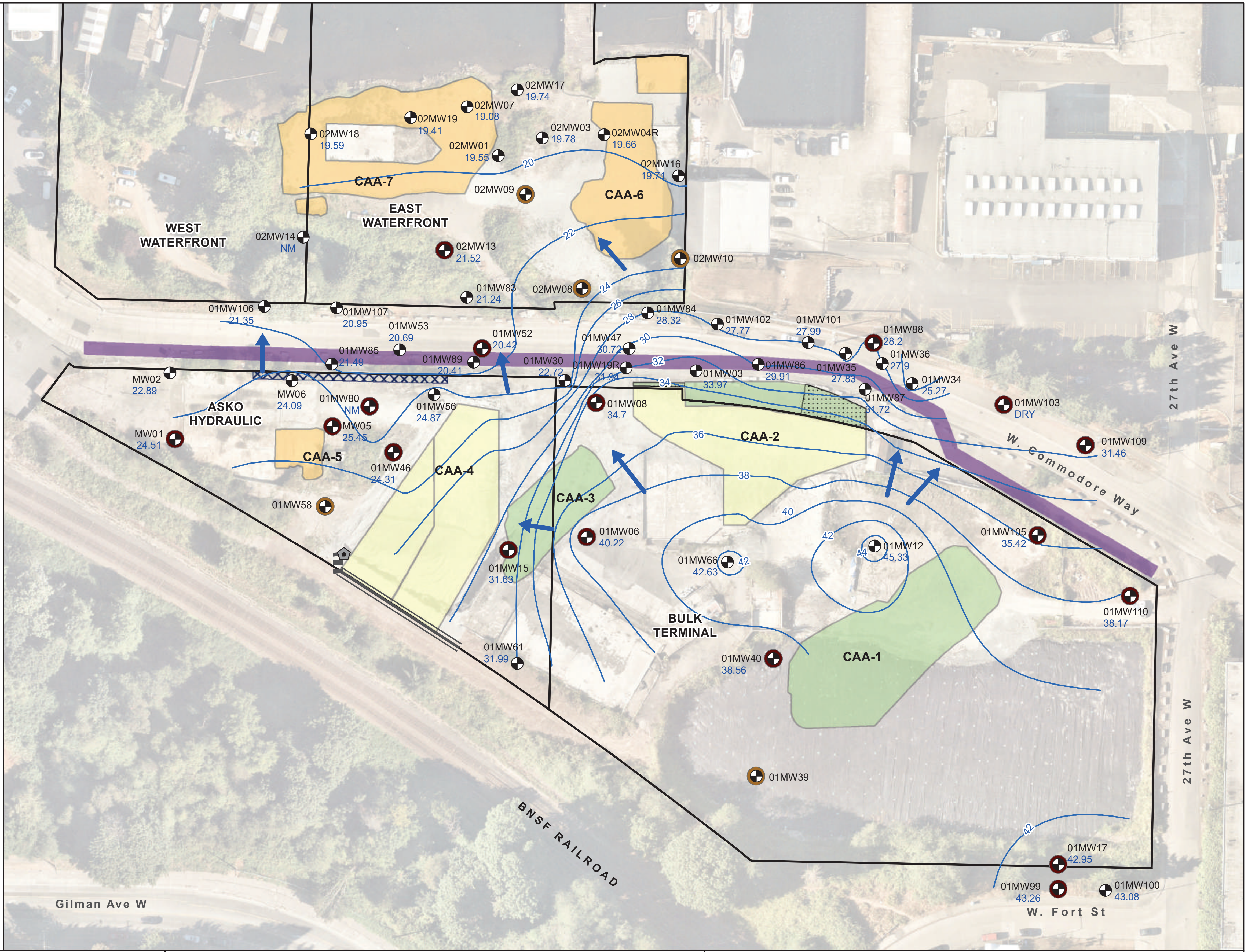
- ● Damaged—Decommission Required
- ● Decommission During Redevelopment

Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- ▢ In Situ Stabilization/Solidification
- ▨ PlumeStop Injection
- ▨ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬠ Gravity Well

Other Site Features

- ▭ Property Boundary for the Former TOC Seattle Terminal
- ▬ Conditional Point of Compliance



Notes:
- Depth to water measurements not collected at select wells that were inaccessible because they are located within the W. Commodore Way right-of-way or buried by gravel or vegetation.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2011. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:
CUL = Cleanup level
ORC-A = Oxygen Release Compound Advanced
NAVD 88 = North American Vertical Datum of 1988
NM = Not measured
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

0 45 90 180
Scale in Feet
N

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Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.3b
Shallow WBZ Groundwater Elevations—
April 2023

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.3b Shallow WBZ GW Elevations April 2023.mxd.mxd
2/12/2024

Legend

〜 Groundwater Contour (feet NAVD 88)

← Shallow WBZ Groundwater Flow Direction

Existing Monitoring Well Locations

⊕ Shallow WBZ Monitoring Well

⊕ Decommissioned Well

Well Decomissioning Plan

● Damaged—Decommission Required

● Decommission During Redevelopment

Cleanup Action Components

🟧 Excavated to CULs

🟩 Excavated to RELs

🟨 In Situ Stabilization/Solidification

▨ PlumeStop Injection

▒ ORC-A Treatment

═ Interceptor Trench

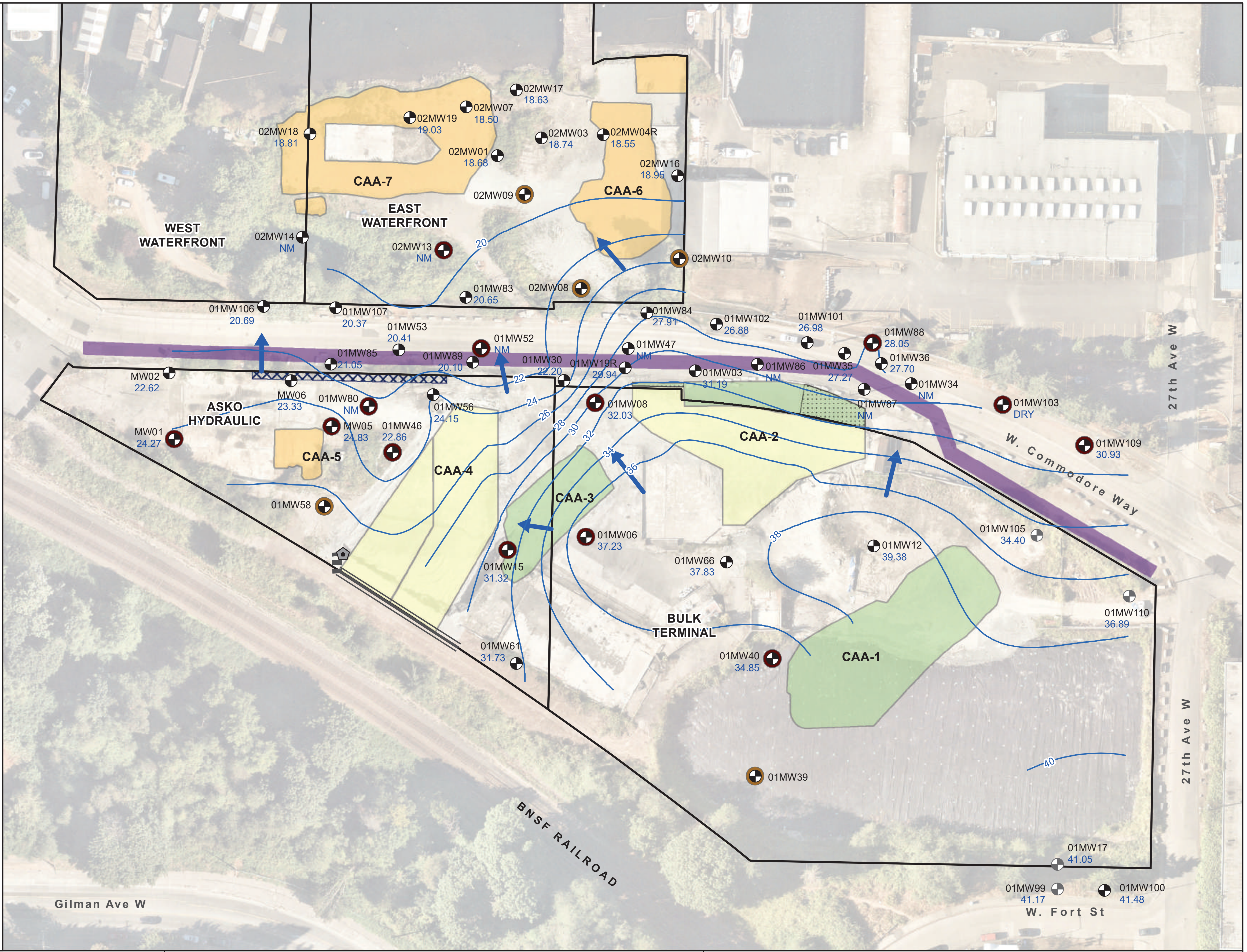
▮▮▮▮ PRB Wall for Trench

⬠ Gravity Well

Other Site Features

☐ Property Boundary for the Former TOC Seattle Terminal

▬ Conditional Point of Compliance



Notes:
- Depth to water measurements not collected at select wells that were inaccessible because they are located within the W. Commodore Way right-of-way or buried by gravel or vegetation.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2011. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:

CUL = Cleanup level
ORC-A = Oxygen Release Compound Advanced
NAVD 88 = North American Vertical Datum of 1988
NM = Not measured
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

0 45 90 180
Scale in Feet
N

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Time Oil Bulk Terminal
Seattle, Washington

Figure A.3c
Shallow WBZ Groundwater Elevations—
June 2023

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.3c Shallow WBZ GW Elevations June 2023.mxd.mxd
2/12/2024

Legend

- Groundwater Contour (feet NAVD 88)
- ← Shallow WBZ Groundwater Flow Direction

Existing Monitoring Well Locations

- ◐ Shallow WBZ Monitoring Well

Well Decommissioning Plan

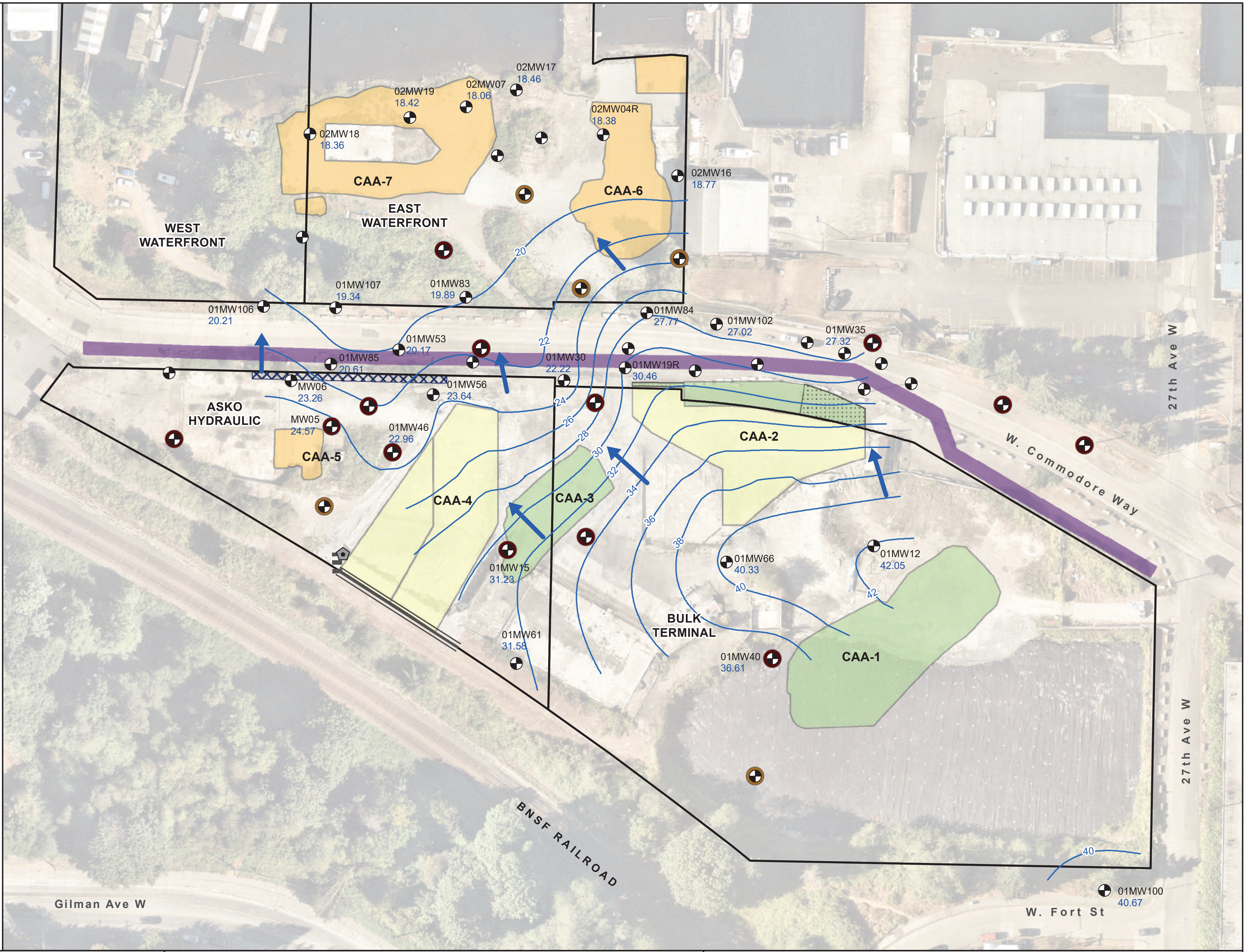
- ● Damaged—Decommission Required
- ● Decommission During Redevelopment

Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- 🟨 In Situ Stabilization/Solidification
- ▨ PlumeStop Injection
- ▦ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬟ Gravity Well

Other Site Features

- ☐ Property Boundary for the Former TOC Seattle Terminal
- ▬ Conditional Point of Compliance



Notes:
- Depth to water measurements were collected at a key subset of well locations in coordination with Ecology.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2011. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:
CUL = Cleanup level
ORC-A = Oxygen Release Compound Advanced
NAVD 88 = North American Vertical Datum of 1988
NM = Not measured
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

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Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.3d
Shallow WBZ Groundwater Elevations—
October 2023

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.3d Shallow WBZ GW Elevations Oct 2023.mxd.mxd
2/12/2024

Legend

- Groundwater Contour (feet NAVD 88)
- Intermediate WBZ Groundwater Flow Direction

Existing Monitoring Well Locations

- Intermediate WBZ Monitoring Well

Well Decomissioning Plan

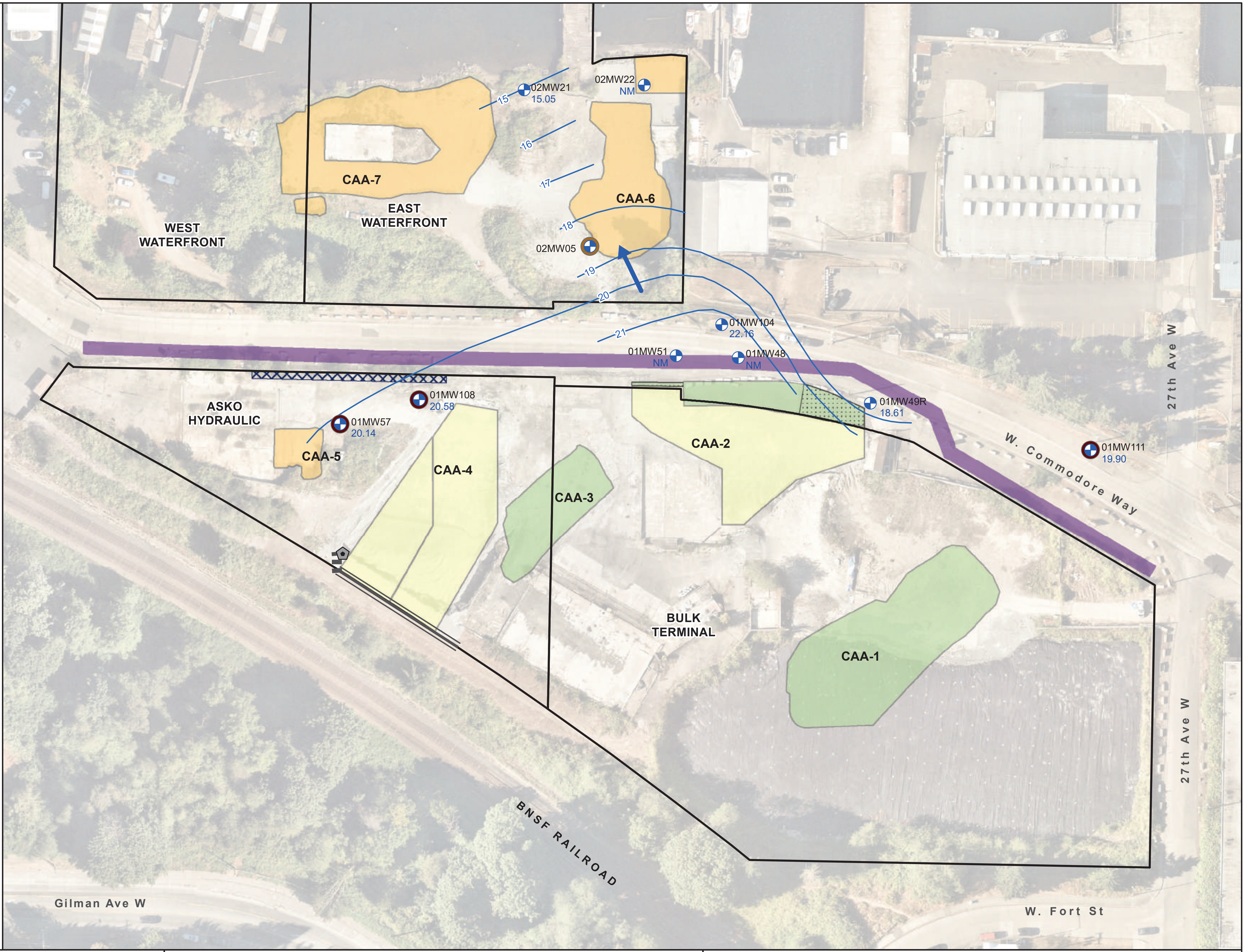
- ● Damaged—Decommission Required
- ● Decommission During Redevelopment

Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- 🟨 In Situ Stabilization/Solidification
- ▨ PlumeStop Injection
- ▨ ORC-A Treatment
- Interceptor Trench
- PRB Wall for Trench
- Gravity Well

Other Site Features

- ☐ Property Boundary for the Former TOC Seattle Terminal
- Conditional Point of Compliance



Notes:

- Depth to water measurements not collected at select wells that were inaccessible because they are located within the W. Commodore Way right of way or buried.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2011. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:

CUL = Cleanup level
ORC-A = Oxygen Release Compound Advanced
NAVD 88 = North American Vertical Datum of 1988
NM = Not measured
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

0 45 90 180
Scale in Feet
N

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Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.4a
Intermediate WBZ Groundwater Elevations—
January 2023

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.4a Int. WBZ GW Elevations Jan 2023.mxd.mxd
2/12/2024

Legend

- 〰 Groundwater Contour (feet NAVD 88)
- ← Intermediate WBZ Groundwater Flow Direction

Existing Monitoring Well Locations

- ⊕ Intermediate WBZ Monitoring Well

Well Decomissioning Plan

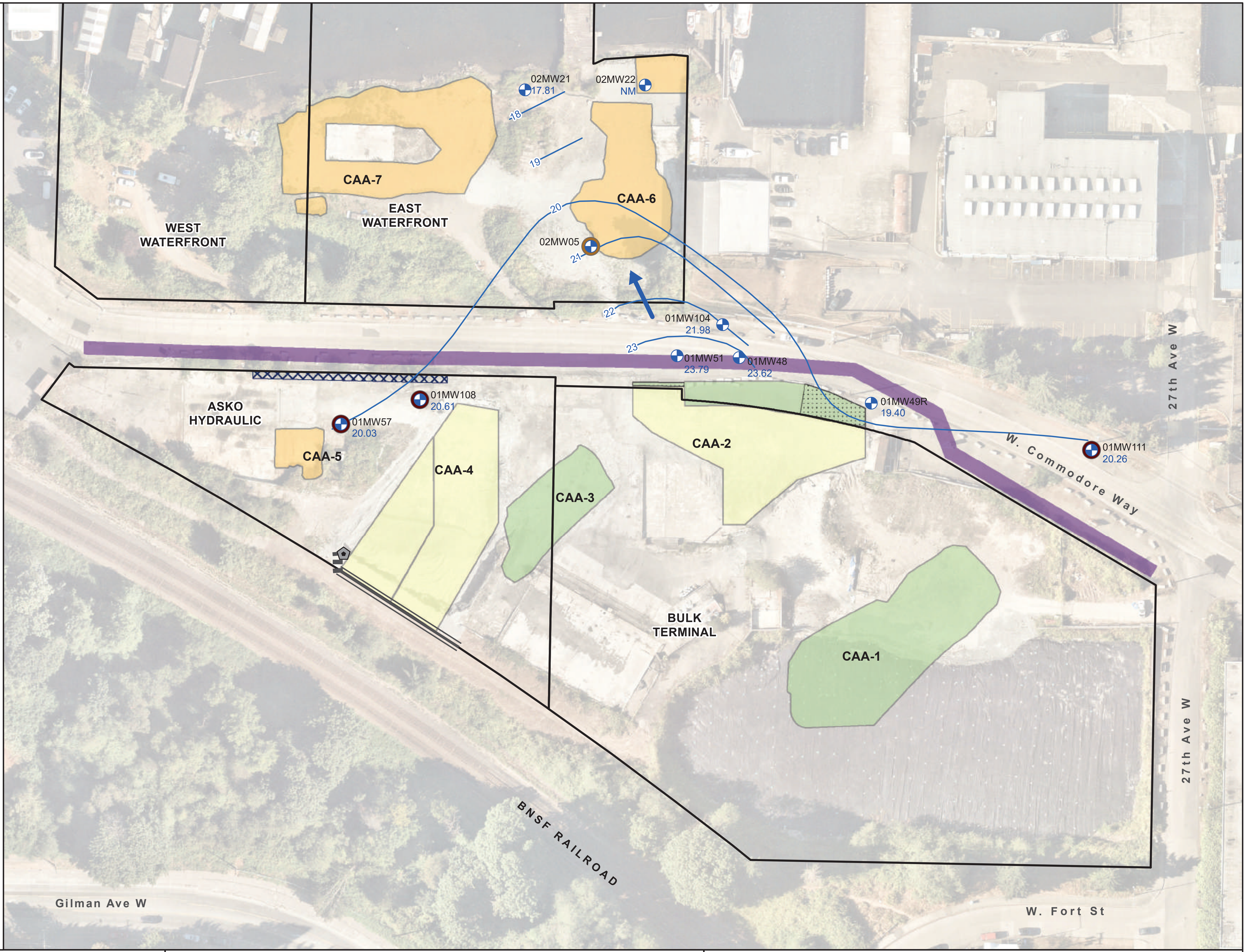
- ● Damaged—Decommission Required
- ● Decommission During Redevelopment

Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- 🟨 In Situ Stabilization/Solidification
- ▨ PlumeStop Injection
- ▤ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬟ Gravity Well

Other Site Features

- ☐ Property Boundary for the Former TOC Seattle Terminal
- ▬ Conditional Point of Compliance



Notes:

- Depth to water measurements were not collected at select wells that were inaccessible because they were buried.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2011. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:
CUL = Cleanup level
ORC-A = Oxygen Release Compound Advanced
NAVD 88 = North American Vertical Datum of 1988
NM = Not measured
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

0 45 90 180
Scale in Feet
N

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Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.4b
Intermediate WBZ Groundwater Elevations—
April 2023

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.4b Int. WBZ GW Elevations April 2023.mxd.mxd
2/12/2024

Legend

- Groundwater Contour (feet NAVD 88)
- ← Intermediate WBZ Groundwater Flow Direction

Existing Monitoring Well Locations

- Intermediate WBZ Monitoring Well

Well Decomissioning Plan

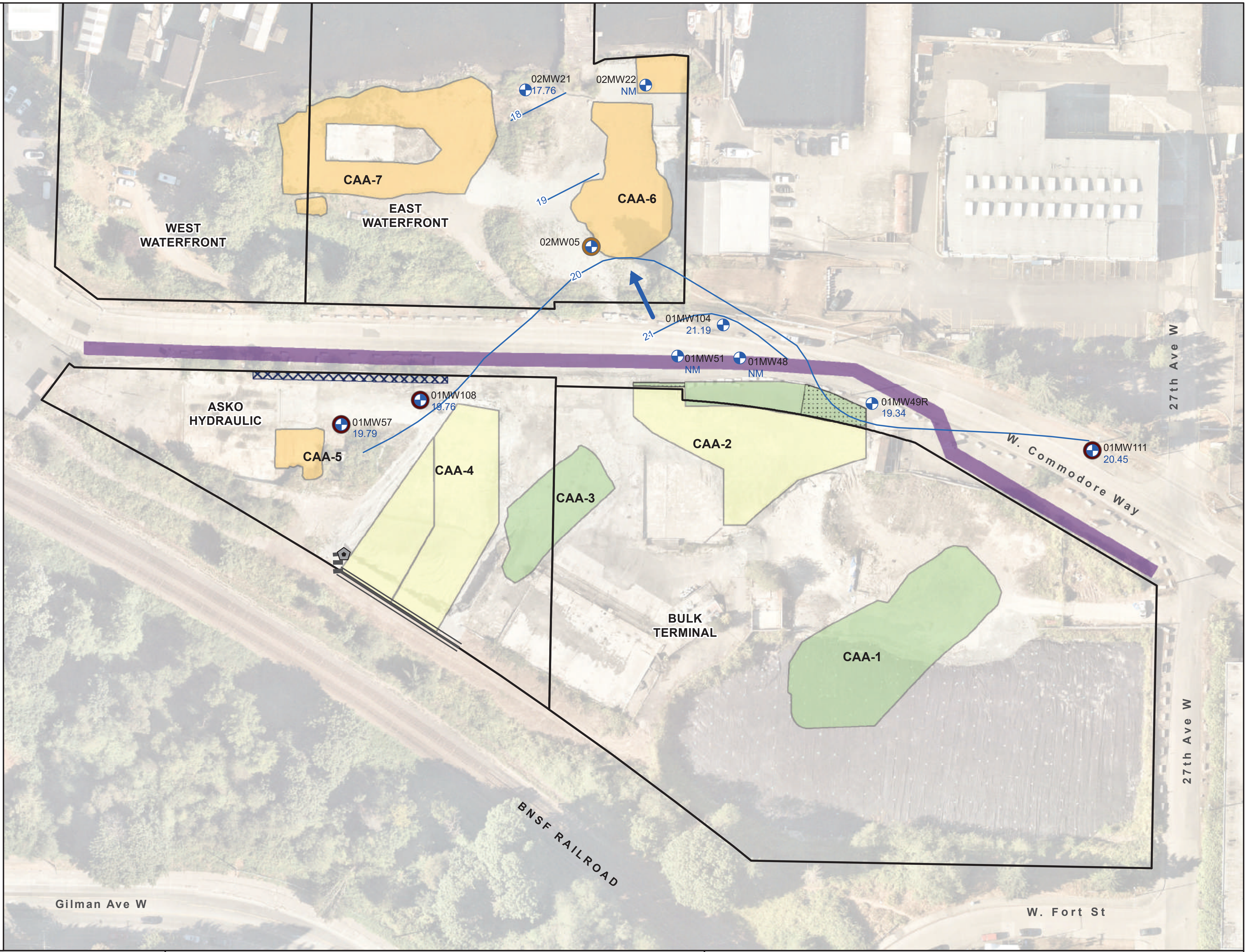
- ● Damaged—Decommission Required
- ● Decommission During Redevelopment

Cleanup Action Components

- Excavated to CULs
- Excavated to RELs
- In Situ Stabilization/Solidification
- ▨ PlumeStop Injection
- ORC-A Treatment
- Interceptor Trench
- PRB Wall for Trench
- ⬟ Gravity Well

Other Site Features

- ☐ Property Boundary for the Former TOC Seattle Terminal
- Conditional Point of Compliance



Notes:

- Depth to water measurements not collected at select wells that were inaccessible because they are located within the W. Commodore Way right-of-way or buried.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2011. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:

CUL = Cleanup level
ORC-A = Oxygen Release Compound Advanced
NAVD 88 = North American Vertical Datum of 1988
NM = Not measured
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

0 45 90 180
Scale in Feet

N

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Long-Term Compliance Monitoring Annual Report
Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.4c
Intermediate WBZ Groundwater Elevations—
June 2023

Legend

Groundwater Sample Result

- 🟢 Non-detect or ≤ CUL
- 🟡 > CUL–≤ 2x CUL
- 🔴 > 2x CUL

Monitoring Well Locations

- ◐ Shallow WBZ Monitoring Well
- ◐ Intermediate WBZ Monitoring Well
- ⌖ Perched WBZ Monitoring Well

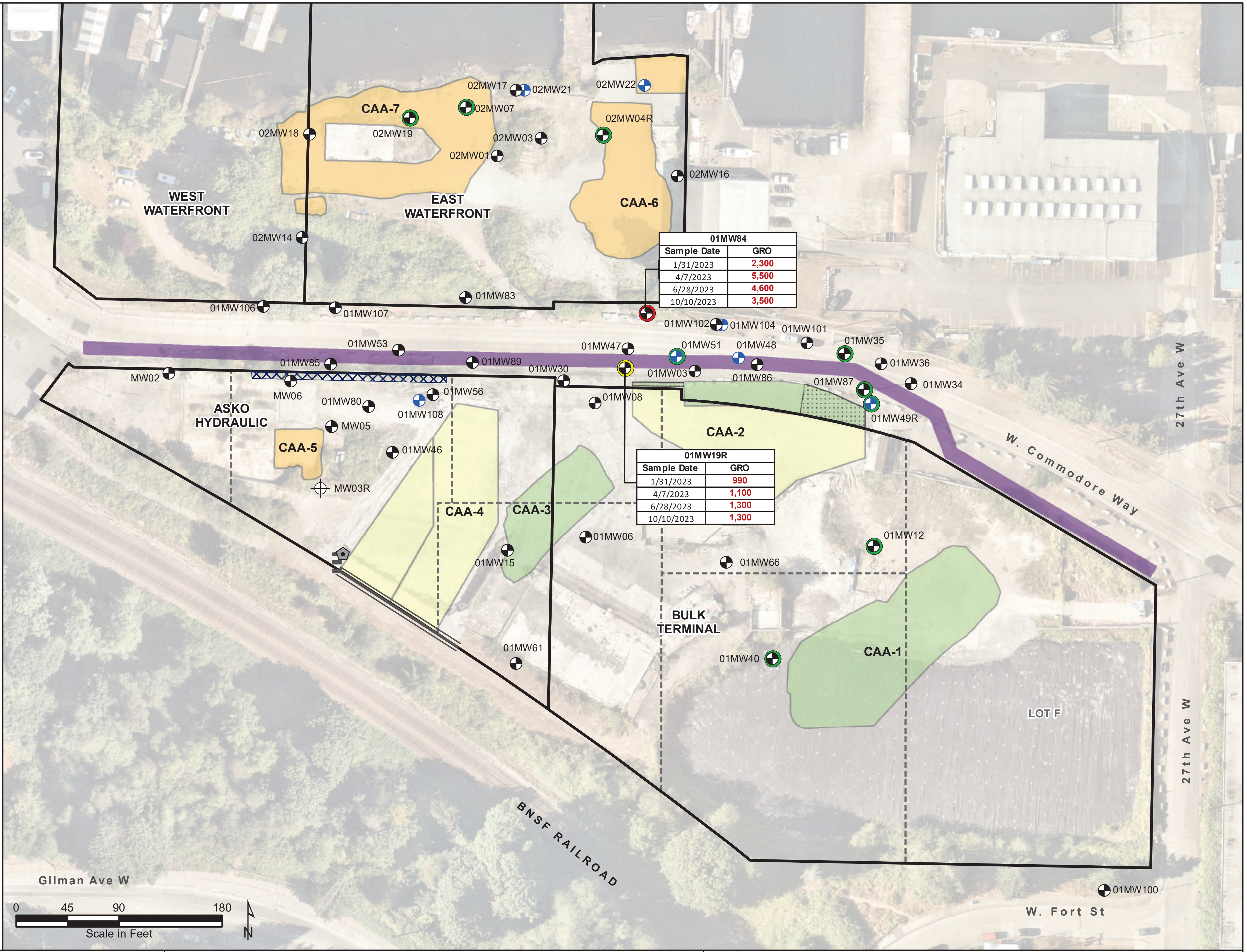
Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- 🟨 In Situ Stabilization/Solidification
- ▨ PlumeStop Injection Area
- ▒ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬟ Gravity Well

Other Site Features

- ▭ Property Boundary for the Former TOC Seattle Terminal
- ╌ King County Tax Parcel
- ▬ Conditional Point of Compliance

CUL
GRO: 800 µg/L



01MW84	
Sample Date	GRO
1/31/2023	2,300
4/7/2023	5,500
6/28/2023	4,600
10/10/2023	3,500

01MW19R	
Sample Date	GRO
1/31/2023	990
4/7/2023	1,100
6/28/2023	1,300
10/10/2023	1,300

Notes:

- Chemical results are presented only at locations where detected result exceeds the CUL. When a field duplicate sample was collected, the maximum result of the parent sample and duplicate is shown.
- Results displayed in **RED** indicate an exceedance of the CUL.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2022. King County tax parcel boundaries were updated for redevelopment after approval of the Cleanup Action Plan and completion of cleanup action construction. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:
BNSF = BNSF Railway Company
CUL = Cleanup level
GRO = Gasoline-range organics
IHS = Indicator hazardous substance
µg/L = Micrograms per liter
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

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Long-Term Compliance Monitoring Annual Report
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Time Oil Bulk Terminal
Seattle, Washington

Figure A.5
2023 IHS Analytical Results: Gasoline-Range Organics

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.5 2023 IHS Analytical Results Gasoline-range Organics.mxd
2/13/2024

Legend

Groundwater Sample Result

- ● Non-detect or ≤ CUL
- ● > CUL–≤ 2x CUL
- ● > 2x CUL

Monitoring Well Locations

- ◕ Shallow WBZ Monitoring Well
- ◕ Intermediate WBZ Monitoring Well
- ⊕ Perched WBZ Monitoring Well

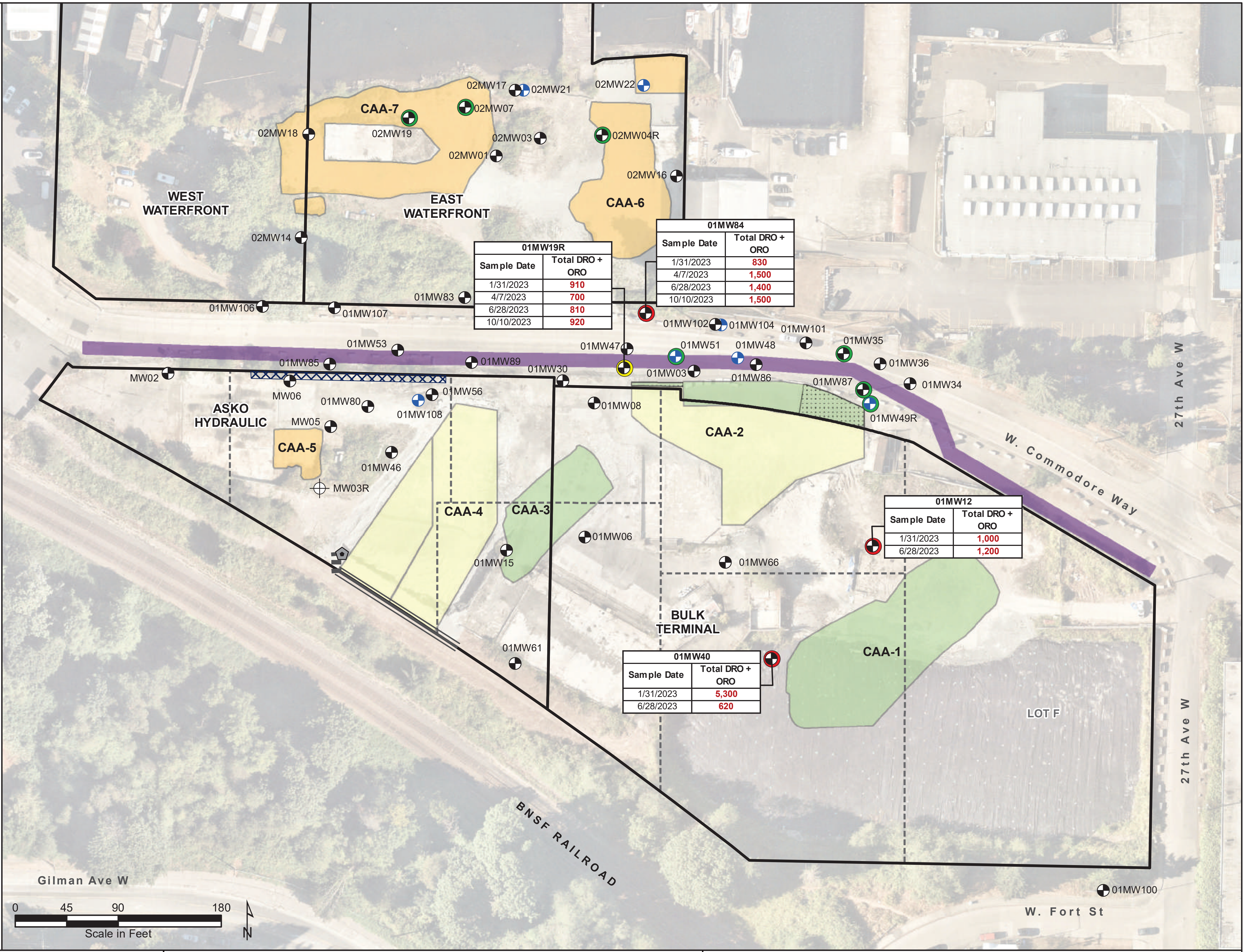
Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- ▢ In Situ Stabilization/Solidification
- ▩ PlumeStop Injection
- ▨ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬟ Gravity Well

Other Site Features

- ▭ Property Boundary for the Former TOC Seattle Terminal
- ---- King County Tax Parcel
- ▬ Conditional Point of Compliance

CUL
Total DRO + ORO: 500 µg/L



01MW19R	
Sample Date	Total DRO + ORO
1/31/2023	910
4/7/2023	700
6/28/2023	810
10/10/2023	920

01MW84	
Sample Date	Total DRO + ORO
1/31/2023	830
4/7/2023	1,500
6/28/2023	1,400
10/10/2023	1,500

01MW12	
Sample Date	Total DRO + ORO
1/31/2023	1,000
6/28/2023	1,200

01MW40	
Sample Date	Total DRO + ORO
1/31/2023	5,300
6/28/2023	620

Notes:

- Chemical results are presented only at locations where detected result exceeds the CUL. When a field duplicate sample was collected, the maximum result of the parent sample and duplicate is shown.
- Results displayed in **RED** indicate an exceedance of the CUL.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2022. King County tax parcel boundaries were updated for redevelopment after approval of the Cleanup Action Plan and completion of cleanup action construction. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023

Abbreviations:

BNSF = BNSF Railway Company
CUL = Cleanup level
DRO = Disel-range organics
IHS = Indicator hazardous substance
µg/L = Micrograms per liter
ORO = Oil-range organics
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

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Long-Term Compliance Monitoring Annual Report
Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.6
2023 IHS Analytical Results:
Total Diesel-Range and Oil-Range Organics

Legend

Groundwater Sample Result

- 🟢 Non-detect or ≤ CUL
- 🟡 > CUL–≤ 2x CUL
- 🔴 > 2x CUL

TCE Result → ◐ ← VC Result

Monitoring Well Locations

- ◕ Shallow WBZ Monitoring Well
- ◕ Intermediate WBZ Monitoring Well
- ⌖ Perched WBZ Monitoring Well

Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- 🟨 In Situ Stabilization/Solidification
- ▨ PlumeStop Injection
- ▨ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬠ Gravity Well

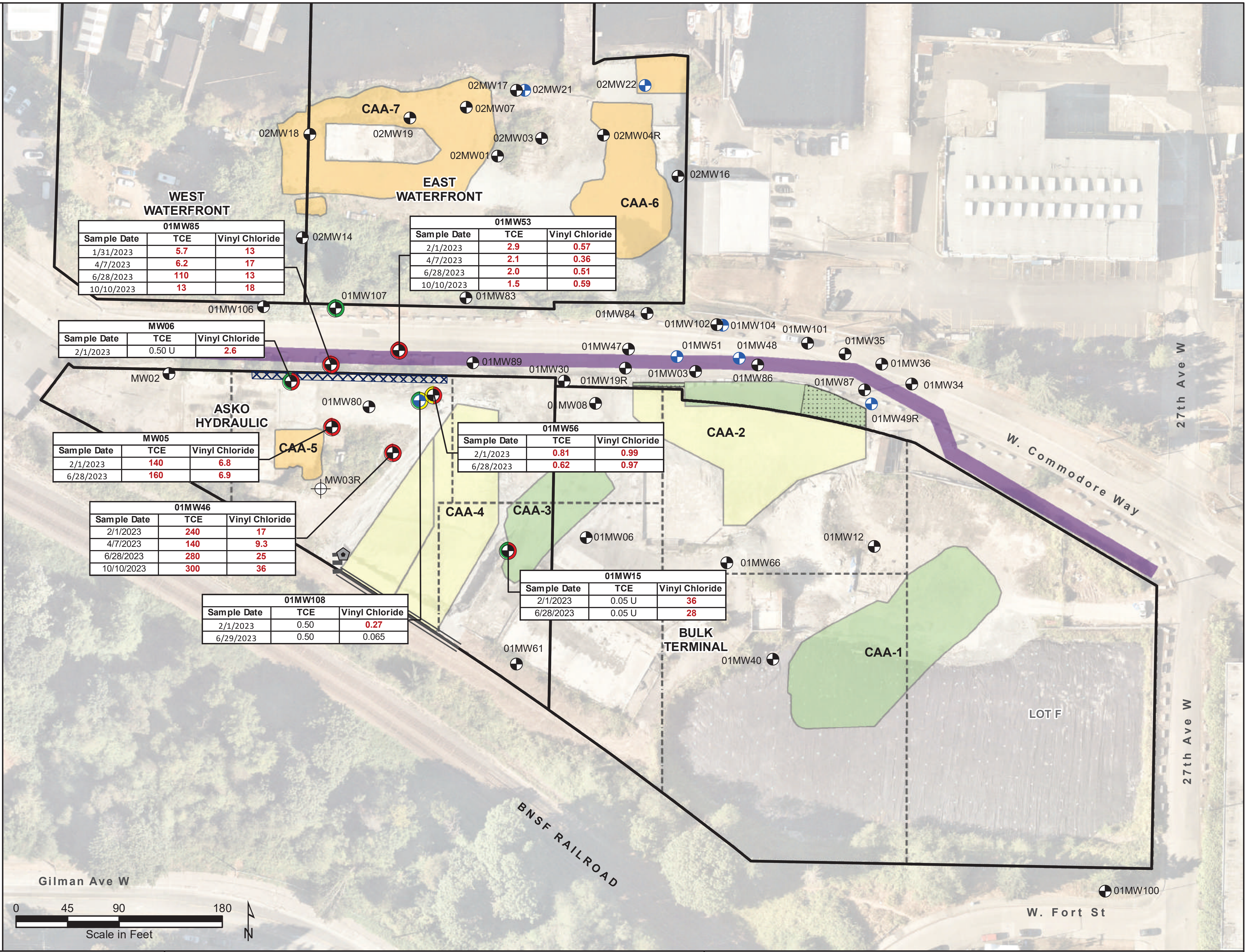
Other Site Features

- ▭ Property Boundary for the Former TOC Seattle Terminal
- - - - King County Tax Parcel
- ▬ Conditional Point of Compliance

CULs
Trichloroethene: 0.50 µg/L
Vinyl Chloride: 0.20 µg/L

Notes:
- Chemical results are presented only at locations where detected result exceeds the CUL. When a field duplicate sample was collected, the maximum result of the parent sample and duplicate is shown.
- Results displayed in RED indicate an exceedance of the CUL.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2022. King County tax parcel boundaries were updated for redevelopment after approval of the Cleanup Action Plan and completion of cleanup action construction. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:
BNSF = BNSF Railway Company
CUL = Cleanup level
IHS = Indicator hazardous substance
µg/L = Micrograms per liter
PRB = Permeable reactive barrier
REL = Remediation level
TCE = Trichloroethene
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone
VC = Vinyl Chloride



01MW85

Sample Date	TCE	Vinyl Chloride
1/31/2023	5.7	13
4/7/2023	6.2	17
6/28/2023	110	13
10/10/2023	13	18

01MW53

Sample Date	TCE	Vinyl Chloride
2/1/2023	2.9	0.57
4/7/2023	2.1	0.36
6/28/2023	2.0	0.51
10/10/2023	1.5	0.59

MW06

Sample Date	TCE	Vinyl Chloride
2/1/2023	0.50 U	2.6

MW05

Sample Date	TCE	Vinyl Chloride
2/1/2023	140	6.8
6/28/2023	160	6.9

01MW56

Sample Date	TCE	Vinyl Chloride
2/1/2023	0.81	0.99
6/28/2023	0.62	0.97

01MW46

Sample Date	TCE	Vinyl Chloride
2/1/2023	240	17
4/7/2023	140	9.3
6/28/2023	280	25
10/10/2023	300	36

01MW15

Sample Date	TCE	Vinyl Chloride
2/1/2023	0.05 U	36
6/28/2023	0.05 U	28

01MW108

Sample Date	TCE	Vinyl Chloride
2/1/2023	0.50	0.27
6/29/2023	0.50	0.065

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Long-Term Compliance Monitoring Annual Report
Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.7
2023 IHS Analytical Results: Trichloroethene and Vinyl Chloride

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.7 2023 IHS Analytical Results TCE and VC.mxd
2/13/2024

Legend

Groundwater Sample Result

- 🟢 Non-detect or ≤ CUL
- 🟡 > CUL–≤ 2x CUL
- 🔴 > 2x CUL

Monitoring Well Locations

- ◐ Shallow WBZ Monitoring Well
- ◐ Intermediate WBZ Monitoring Well
- ⊕ Perched WBZ Monitoring Well

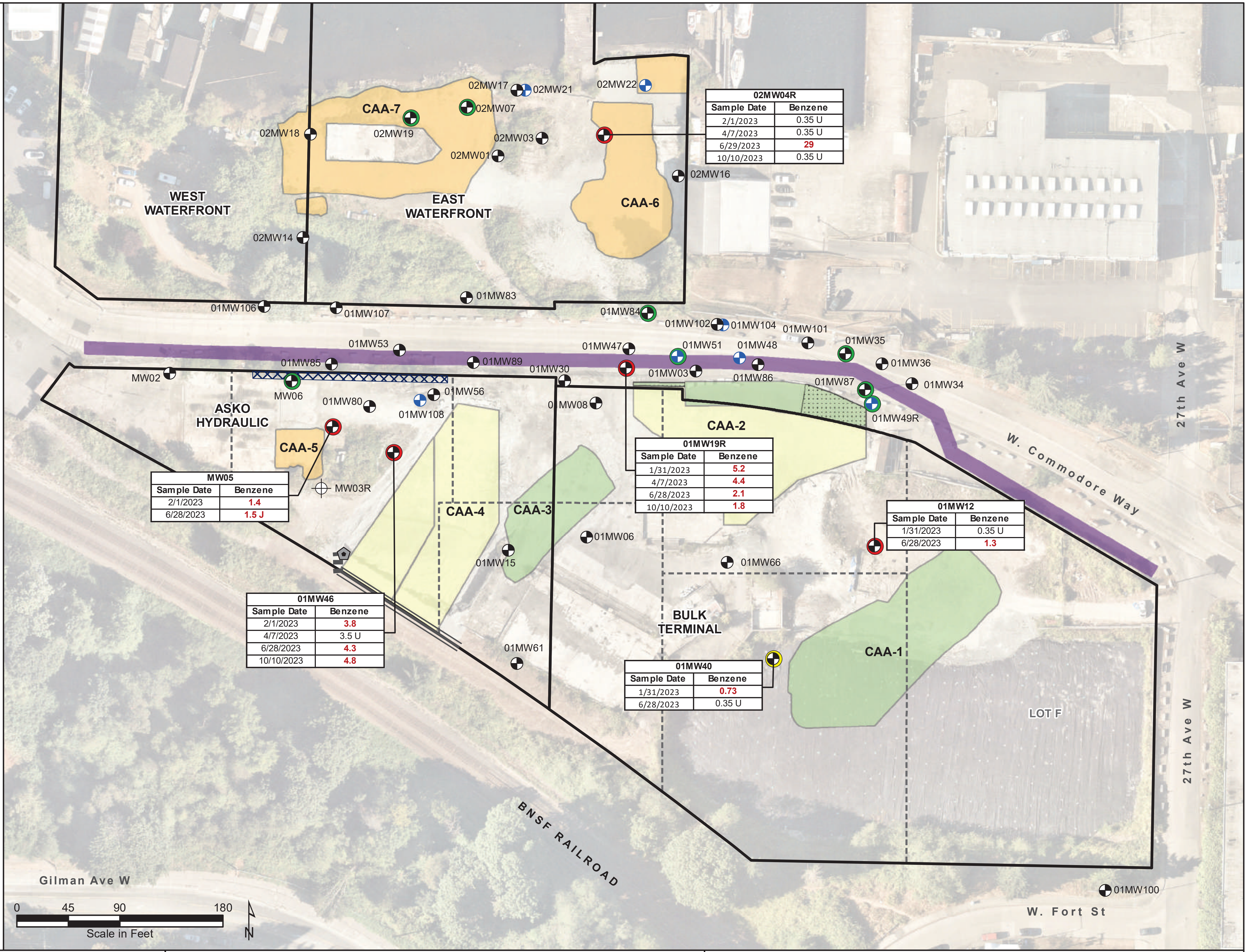
Cleanup Action Components

- 🟧 Excavated to CULs
- 🟩 Excavated to RELs
- 🟨 In Situ Stabilization/Solidification
- ▩ PlumeStop Injection Area
- ▨ ORC-A Treatment
- ═ Interceptor Trench
- ▮▮▮▮ PRB Wall for Trench
- ⬟ Gravity Well

Other Site Features

- ▭ Property Boundary for the Former TOC Seattle Terminal
- - - - Current Tax Parcel Boundary
- ▬ Conditional Point of Compliance

CUL
Benzene: 0.44 µg/L



02MW04R	
Sample Date	Benzene
2/1/2023	0.35 U
4/7/2023	0.35 U
6/29/2023	29
10/10/2023	0.35 U

01MW19R	
Sample Date	Benzene
1/31/2023	5.2
4/7/2023	4.4
6/28/2023	2.1
10/10/2023	1.8

MW05	
Sample Date	Benzene
2/1/2023	1.4
6/28/2023	1.5 J

01MW12	
Sample Date	Benzene
1/31/2023	0.35 U
6/28/2023	1.3

01MW46	
Sample Date	Benzene
2/1/2023	3.8
4/7/2023	3.5 U
6/28/2023	4.3
10/10/2023	4.8

01MW40	
Sample Date	Benzene
1/31/2023	0.73
6/28/2023	0.35 U

Notes:
- Chemical results are presented only at locations where detected result exceeds the CUL. When a field duplicate sample was collected, the maximum result of the parent sample and duplicate is shown.
- Results displayed in RED indicate an exceedance of the CUL.
- Parcel boundaries obtained from King County Geographic Information Systems Center, 2022. King County tax parcel boundaries were updated for redevelopment after approval of the Cleanup Action Plan and completion of cleanup action construction. Lot lines are approximate. Not for legal use.
- Orthoimagery obtained from Nearmap, 2023.

Abbreviations:
BNSF = BNSF Railway Company
CUL = Cleanup level
GRO = Gasoline-range organics
IHS = Indicator hazardous substance
µg/L = Micrograms per liter
PRB = Permeable reactive barrier
REL = Remediation level
TOC = TOC Holdings Co. and any predecessor entity including Time Oil Company
WBZ = Water-bearing zone

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Long-Term Compliance Monitoring Annual Report
Appendix A 2023 Groundwater Monitoring Annual Report
Time Oil Bulk Terminal
Seattle, Washington

Figure A.8
2023 IHS Analytical Results: Benzene

I:\GIS\Projects\Cantera-TOC\MXD\06-Groundwater Monitoring\LTCMP AND GMP\Appendix A-2023\A.8 2023 IHS Analytical Results Benzene.mxd
2/13/2024

Long-Term Compliance Monitoring Annual Report Appendix A: 2023 Groundwater Monitoring Annual Report

Time Oil Bulk Terminal

Attachment A.1

Well Logs

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PROJECT: Cantera-TOC

LOCATION: 2737 W Commodore Way

WELL ID: 01MW19R

LOGGED BY: K. Anderson

BORING LOCATION: BT ROW, West of CAA-2

ECOLOGY WELL ID: BNM 532

DRILLED BY: AEC

COORDINATE SYSTEM: NAD 1983/ NAVD88 ft

NORTHING: 245601.3

EASTING: 1256099.47

DRILLING EQUIPMENT: Terra Sonic

SCREENED INTERVAL (ft bgs): 10-20

GROUND SURFACE ELEV.:

TOC ELEVATION: 43.84

DRILLING METHOD: Sonic LAR

TOTAL DEPTH (ft bgs): 25

DEPTH TO WATER (ft bgs): 15.5

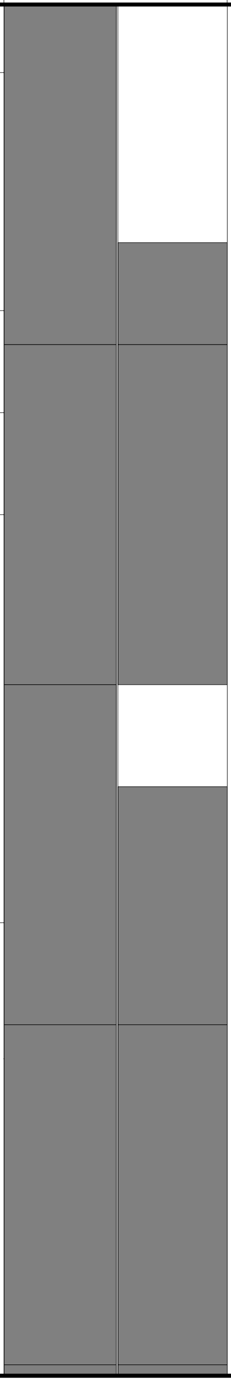
SAMPLING METHOD: Continuous - Liner Bags

BORING DIAMETER (inch): 4" inner/6" outer

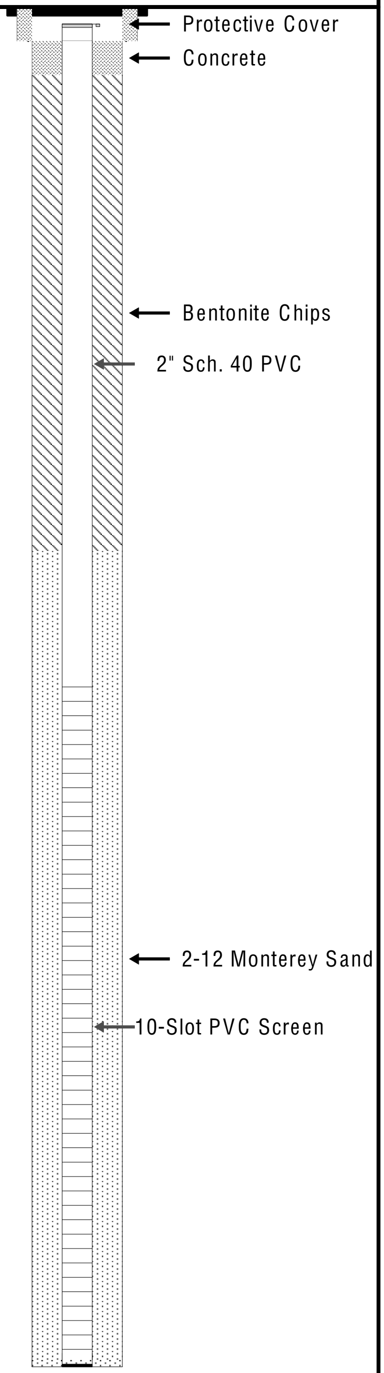
DRILL DATE: 12/19/2022

Depth (feet)	USCS Symbol	Description
0	Asphalt	Asphalt ground surface.
2 4	GW	Gray **sandy GRAVEL**; dry.
	SW-SM	Gray, well-graded **SAND** with silt; moist.
6	ML	Gray **sandy SILT**.
8 10 12	SM	Gray-brown **silty SAND**; wood fragments in underlying material suggests fill; slight sulfide odor in sand at 7.5 ft.
14	SP-SM	Gray, poorly-graded, fine **SAND** with silt; moderate to strong hydrocarbon odor.
▼ 16 18 20		Becomes moist to wet.

Drive/ Recovery



Well Construction



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

NOTES:
All intervals evenly decompressed for log/sample unless noted.

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PROJECT: **Cantera-TOC**
LOCATION: **2737 W Commodore Way**
WELL ID: **01MW19R**
LOGGED BY: **K. Anderson**
BORING LOCATION: **BT ROW, West of CAA-2**
ECOLOGY WELL ID: **BNM 532**
DRILLED BY: **AEC**
COORDINATE SYSTEM: **NAD 1983/ NAVD88 ft**
NORTHING: **245601.3**
EASTING: **1256099.47**
DRILLING EQUIPMENT: **Terra Sonic**
SCREENED INTERVAL (ft bgs): **10-20**
GROUND SURFACE ELEV.:
TOC ELEVATION: **43.84**
DRILLING METHOD: **Sonic LAR**
TOTAL DEPTH (ft bgs): **25**
DEPTH TO WATER (ft bgs): **15.5**
SAMPLING METHOD: **Continuous - Liner Bags**
BORING DIAMETER (inch): **4" inner/6" outer**
DRILL DATE: **12/19/2022**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Construction
		Gray **sandy SILT**; hard; dry; no odor.		
22	ML			
24				
		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:
All intervals evenly decompressed for log/sample unless noted.

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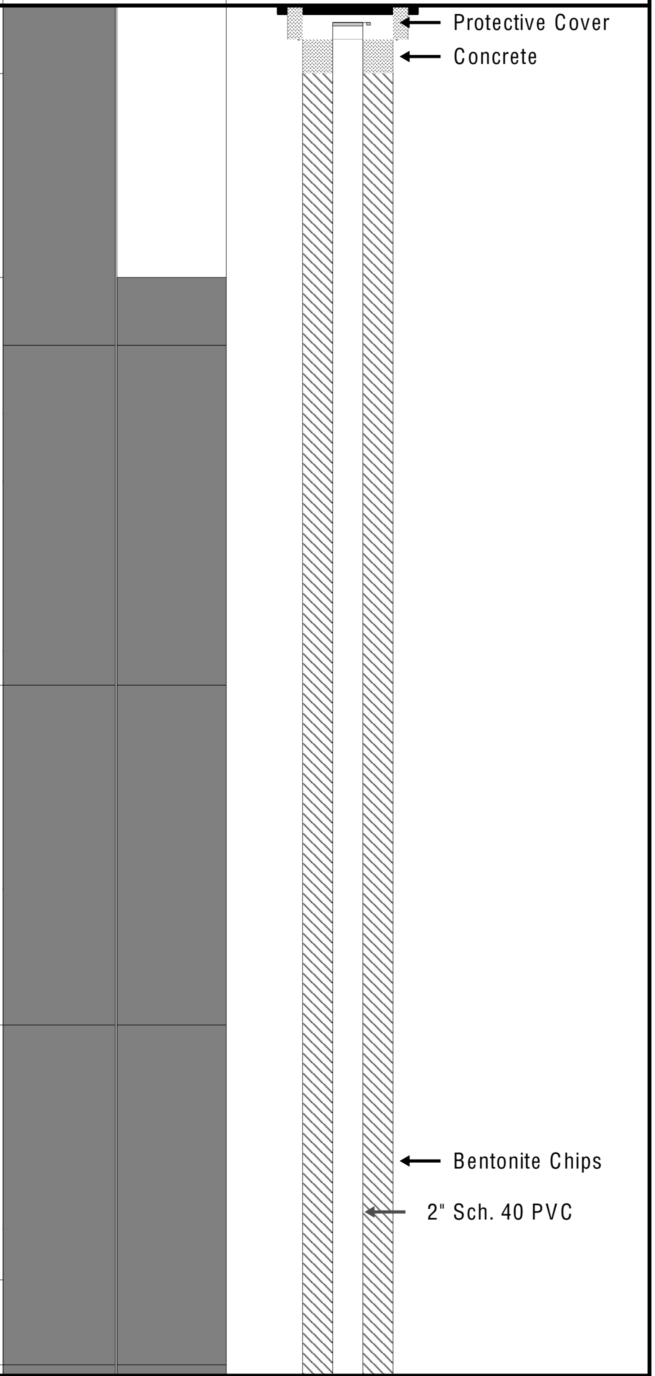
PROJECT: **Cantera-TOC**
LOCATION: **2737 W Commodore Way**
WELL ID: **01MW49R**
LOGGED BY: **K. Anderson**
BORING LOCATION: **BT ROW, NE corner of CAA-2**
ECOLOGY WELL ID: **BNM 533**
DRILLED BY: **AEC**
COORDINATE SYSTEM: **NAD 1983/ NAVD88 ft**
NORTHING: **245570**
EASTING: **1256314.53**
DRILLING EQUIPMENT: **Terra Sonic**
SCREENED INTERVAL (ft bgs): **35-40**
GROUND SURFACE ELEV.:
TOC ELEVATION: **45.2**
DRILLING METHOD: **Sonic LAR**
TOTAL DEPTH (ft bgs): **40**
DEPTH TO WATER (ft bgs): **13**
SAMPLING METHOD: **Continuous - Liner Bags**
BORING DIAMETER (inch): **4" inner/6" outer**
DRILL DATE: **12/19/2022**

Depth (feet)	USCS Symbol	Description
0	Asphalt	Asphalt ground surface.
	GW	Well-graded **GRAVEL** fill; poor recovery .
2		
4	SM	Brown, **silty SAND**; moist; no odor.
6		Lens of brown **SAND** with silt.
		Brown, **silty SAND**; moist; no odor.
8		
		Becomes gray with hydrocarbon odor.
10	SP-SM	Brown, poorly-graded, fine **SAND** with silt; no odor.
12		
▼		Becomes moist to wet.
14		
	SP	Gray, poorly-graded **SAND**; no odor.
16		
18		4 in. silt lens.
	ML	Gray **sandy SILT**, stiff, dry to slightly moist; no odor.
20		

Drive/ Recovery

Well Construction



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

NOTES:
All intervals evenly decompressed for log/sample unless noted.

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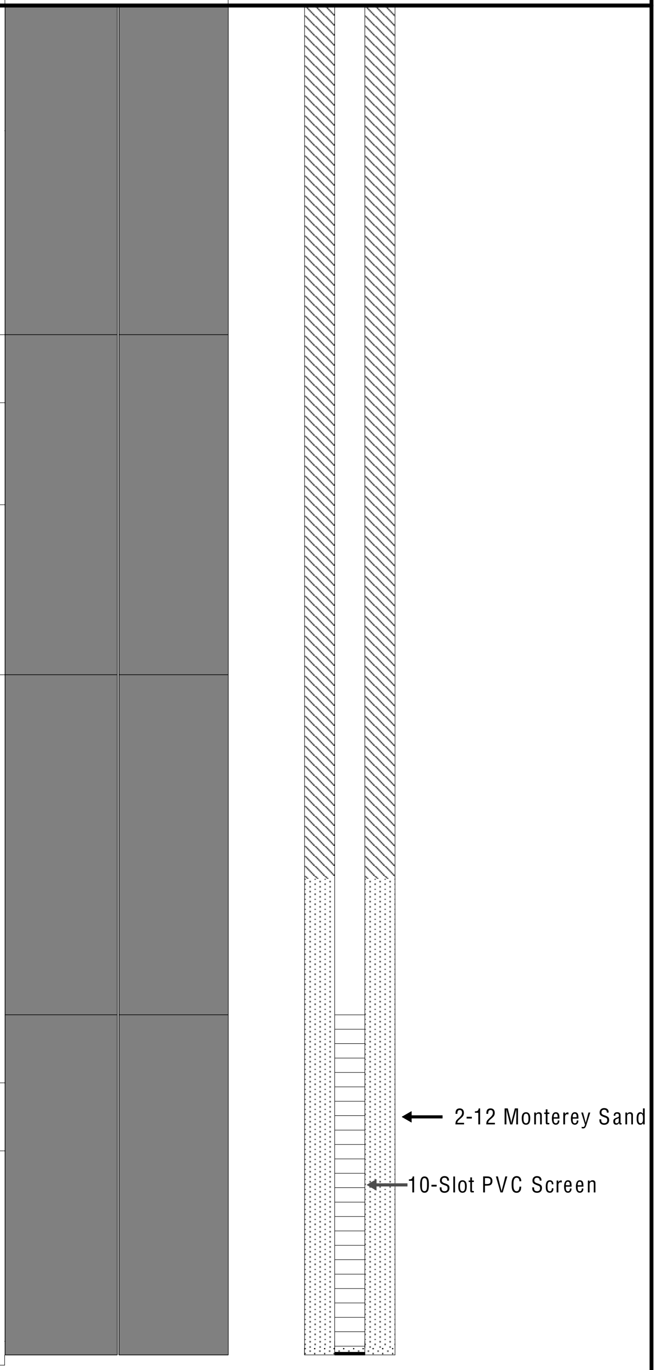
PROJECT: **Cantera-TOC**
LOCATION: **2737 W Commodore Way**
WELL ID: **01MW49R**
LOGGED BY: **K. Anderson**
BORING LOCATION: **BT ROW, NE corner of CAA-2**
ECOLOGY WELL ID: **BNM 533**
DRILLED BY: **AEC**
COORDINATE SYSTEM: **NAD 1983/ NAVD88 ft**
NORTHING: **245570**
EASTING: **1256314.53**
DRILLING EQUIPMENT: **Terra Sonic**
SCREENED INTERVAL (ft bgs): **35-40**
GROUND SURFACE ELEV.:
TOC ELEVATION: **45.2**
DRILLING METHOD: **Sonic LAR**
TOTAL DEPTH (ft bgs): **40**
DEPTH TO WATER (ft bgs): **13**
SAMPLING METHOD: **Continuous - Liner Bags**
BORING DIAMETER (inch): **4" inner/6" outer**
DRILL DATE: **12/19/2022**

Depth (feet)	USCS Symbol	Description
	SP-SM	Gray very fine, poorly-graded **SAND** with silt; very dense; moist to wet.
22		Sand grain size coarsens to fine at 22 ft; no odor.
24		
	ML	Gray **sandy SILT**; very dense; dry.
26	SP-SM	Gray, very fine **SAND** with silt.
	SM	Grades to very fine, gray **silty SAND**; silt increases with depth.
28		
30	ML	Gray, fine sandy **SILT**.
32		
34		
36	SM	Gray silty **SAND**; wet.
	SP-SM	Gray, poorly-graded, fine **SAND** with silt; wet.
38		
40		Bottom of boring = 40 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:
All intervals evenly decompressed for log/sample unless noted.

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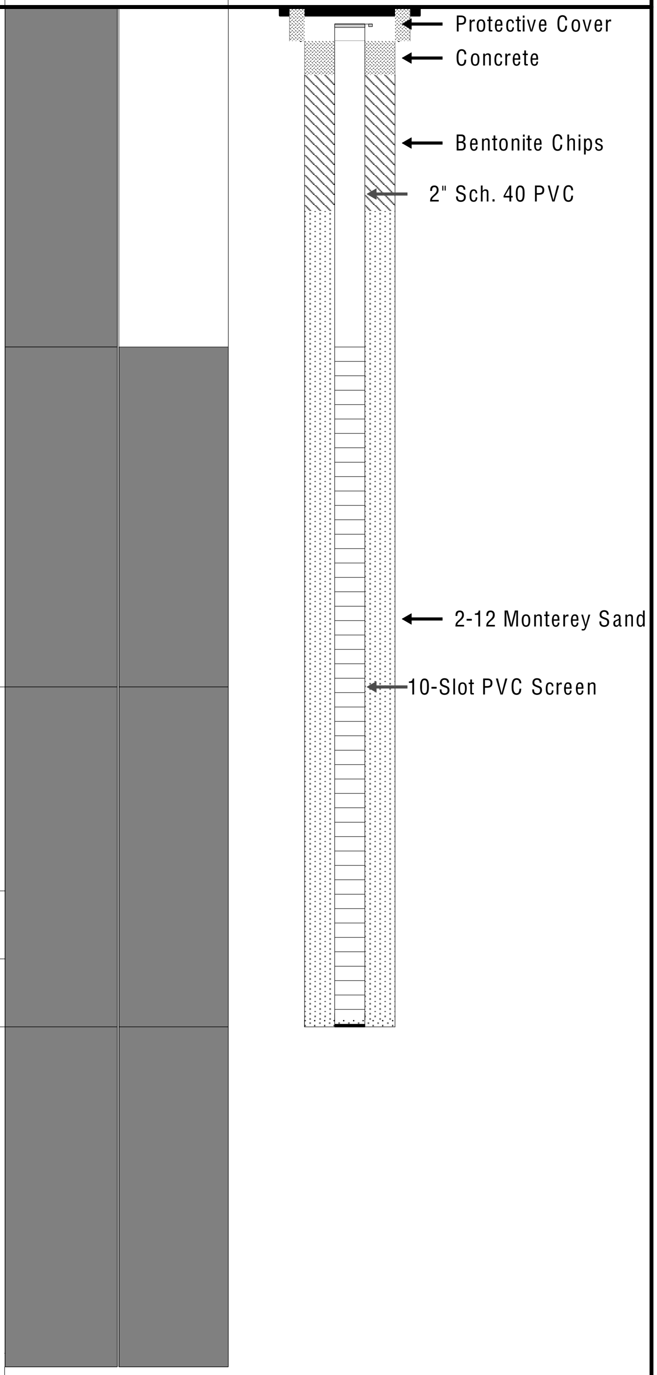
PROJECT: **Cantera-TOC**
LOCATION: **2737 W Commodore Way**
WELL ID: **02MW04R**
LOGGED BY: **K. Anderson**
BORING LOCATION: **EW, West of CAA-6**
ECOLOGY WELL ID: **BNM 534**
DRILLED BY: **AEC**
COORDINATE SYSTEM: **NAD 1983/ NAVD88 ft**
NORTHING: **245805**
EASTING: **1256080.26**
DRILLING EQUIPMENT: **Terra Sonic**
SCREENED INTERVAL (ft bgs): **5-15**
GROUND SURFACE ELEV.:
TOC ELEVATION: **26.39**
DRILLING METHOD: **Sonic LAR**
TOTAL DEPTH (ft bgs): **20**
DEPTH TO WATER (ft bgs): **10**
SAMPLING METHOD: **Continuous - Liner Bags**
BORING DIAMETER (inch): **4" inner/6" outer**
DRILL DATE: **12/19/2022**

Depth (feet)	USCS Symbol	Description
0	SW	Brown, well-graded **SAND** with poorly-graded gravel and little silt (backfill); poor recovery in backfill; no odor.
10 ▼	SP-SM	Gray, poorly-graded, fine **SAND** with silt; silt decreases with depth; wet; no odor.
13	ML	Very fine **sandy SILT**
14	SP-SM	Gray, poorly-graded, fine **SAND** with silt; wet; no odor.
15	ML	Gray **sandy SILT**; very firm to hard; dry to slightly moist.
20		Bottom of boring = 20 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:
All intervals evenly decompressed for log/sample unless noted.

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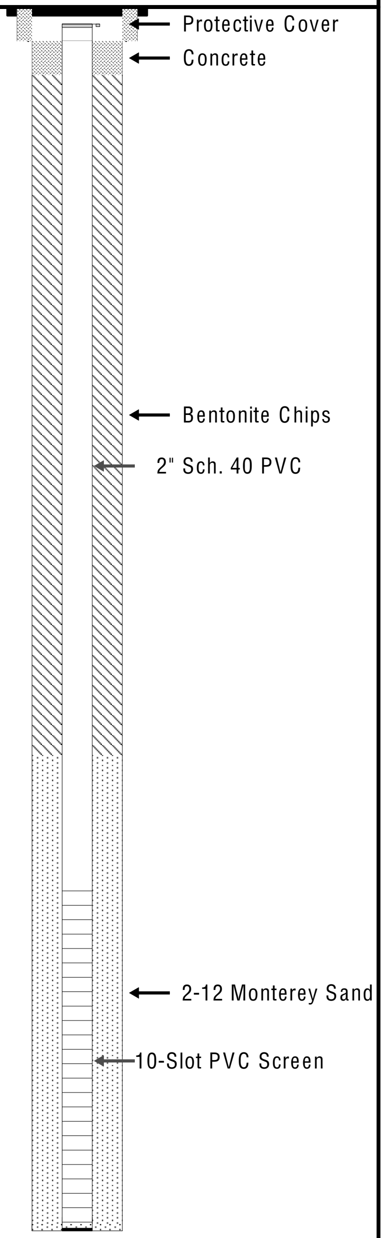
PROJECT: **Cantera-TOC**
LOCATION: **2737 W Commodore Way**
WELL ID: **MW03R**
LOGGED BY: **K. Anderson**
BORING LOCATION: **ASKO, South of CAA-5**
ECOLOGY WELL ID: **BNM 531**
DRILLED BY: **AEC**
COORDINATE SYSTEM: **NAD 1983/ NAVD88 ft**
NORTHING: **245495.72**
EASTING: **1255833.26**
DRILLING EQUIPMENT: **Terra Sonic**
SCREENED INTERVAL (ft bgs): **13-18**
GROUND SURFACE ELEV.:
TOC ELEVATION: **52.26**
DRILLING METHOD: **Sonic LAR**
TOTAL DEPTH (ft bgs): **20**
DEPTH TO WATER (ft bgs): **13.5**
SAMPLING METHOD: **Continuous - Liner Bags**
BORING DIAMETER (inch): **4" inner/6" outer**
DRILL DATE: **12/19/2022**

Depth (feet)	USCS Symbol	Description
0	ML	Brown **sandy SILT**; gray mottling; few fine gravel and rootlets; stiff with low-medium plasticity; moist; no odor.
1		
2		
3		
4		Begins to grade to gray with brown mottling; very stiff, hard, and dry.
5		
6		
7		
8		Becomes brown.
9		
10		
11		
12		
13		
▼	SM	Gray and brown mottled **silty SAND**; dry; no odor.
14		
15		
	SP	Gray, poorly-graded, fine **SAND**; medium dense; moist.
16		
17		
18	ML	Gray **sandy SILT**; slightly moist.
19	SM	Interbedded gray **sandy SILT** with **silty SAND**.
20		Bottom of boring = 20 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:
Samples evenly decompressed for logging unless otherwise noted; new well ~5 ft higher in elevation than original MW03

Long-Term Compliance Monitoring Annual Report
Appendix A: 2023 Groundwater Monitoring Annual Report

Time Oil Bulk Terminal

Attachment A.2
Laboratory Reports

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

February 13, 2023

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

Dear Ms Anderson:

Included are the results from the testing of material submitted on February 1, 2023 from the Cantera TOC, F&BI 302018 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
FDS0213R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on February 1, 2023 by Friedman & Bruya, Inc. from the Floyd-Snider Cantera TOC, F&BI 302018 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
302018 -01	01MW12-013123
302018 -02	01MW35-013123
302018 -03	01MW40-013123
302018 -04	01MW49R-013123
302018 -05	01MW84-013123
302018 -06	01MW84D-013123
302018 -07	01MW85-013123
302018 -08	01MW19R-013123
302018 -09	01MW66-013123
302018 -10	BT-TRIP-BLANK
302018 -11	01MW56-020123
302018 -12	01MW108-020123
302018 -13	01MW46-020123
302018 -14	01MW15-020123
302018 -15	MW05-020123
302018 -16	MW06-020123
302018 -17	02MW19-020123
302018 -18	02MW07-020123
302018 -19	02MW04R-020123
302018 -20	EW-TRIP-BLANK
302018 -21	01MW53-020123

All quality control requirements were acceptable.

Date of Report: 02/13/23
Date Received: 02/01/23
Project: Cantera TOC, F&BI 302018
Date Extracted: 02/07/23
Date Analyzed: 02/07/23

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)
01MW12-013123 302018-01	<100	111
01MW35-013123 302018-02	<100	108
01MW40-013123 302018-03	<100	112
01MW49R-013123 302018-04	<100	112
01MW84-013123 302018-05	2,300	105
01MW84D-013123 302018-06	2,200	99
01MW19R-013123 302018-08	990	110
BT-TRIP-BLANK 302018-10	<100	110
02MW19-020123 302018-17	<100	105
02MW07-020123 302018-18	<100	103
02MW04R-020123 302018-19	<100	101

Date of Report: 02/13/23
Date Received: 02/01/23
Project: Cantera TOC, F&BI 302018
Date Extracted: 02/07/23
Date Analyzed: 02/07/23

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)
EW-TRIP-BLANK 302018-20	<100	98
Method Blank 03-220 MB	<100	103

Date of Report: 02/13/23
Date Received: 02/01/23
Project: Cantera TOC, F&BI 302018
Date Extracted: 02/03/23
Date Analyzed: 02/03/23

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 50-150)
01MW12-013123 302018-01	1,000 x	<250	111
01MW35-013123 302018-02	110 x	<250	108
01MW40-013123 302018-03	4,700 x	600 x	96
01MW49R-013123 302018-04	260 x	<250	108
01MW84-013123 302018-05	810 x	<250	104
01MW84D-013123 302018-06	830 x	<250	101
01MW19R-013123 302018-08	910 x	<250	108
02MW19-020123 302018-17	150 x	<250	114
02MW07-020123 302018-18	86 x	<250	109
02MW04R-020123 302018-19	69 x	<250	107
Method Blank 03-308 MB	<50	<250	98

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW19-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/02/23	Lab ID:	302018-17 x2
Date Analyzed:	02/08/23	Data File:	302018-17 x2.034
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	3.25

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW07-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/02/23	Lab ID:	302018-18
Date Analyzed:	02/03/23	Data File:	302018-18.095
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	MG

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/02/23	Lab ID:	I3-72 mb2
Date Analyzed:	02/03/23	Data File:	I3-72 mb2.034
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	MG

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

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW12-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-01
Date Analyzed:	02/06/23	Data File:	020609.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	71	132
Toluene-d8	91	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW35-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-02
Date Analyzed:	02/06/23	Data File:	020610.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	71	132
Toluene-d8	91	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW40-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-03
Date Analyzed:	02/06/23	Data File:	020611.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	71	132
Toluene-d8	92	68	139
4-Bromofluorobenzene	102	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	0.73

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW49R-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-04
Date Analyzed:	02/06/23	Data File:	020612.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	71	132
Toluene-d8	88	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW84-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-05
Date Analyzed:	02/06/23	Data File:	020613.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW84D-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-06
Date Analyzed:	02/06/23	Data File:	020614.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	71	132
Toluene-d8	101	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW85-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-07 1/10
Date Analyzed:	02/06/23	Data File:	020624.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	71	132
Toluene-d8	91	68	139
4-Bromofluorobenzene	96	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	13
cis-1,2-Dichloroethene	1,200
Trichloroethene	5.7

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW19R-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-08
Date Analyzed:	02/06/23	Data File:	020615.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	101	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	5.2

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	BT-TRIP-BLANK	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-10
Date Analyzed:	02/03/23	Data File:	020316.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	78	126
Toluene-d8	105	84	115
4-Bromofluorobenzene	102	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW56-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-11
Date Analyzed:	02/06/23	Data File:	020616.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	71	132
Toluene-d8	101	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.99
cis-1,2-Dichloroethene	<1
Trichloroethene	0.81

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW108-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-12
Date Analyzed:	02/06/23	Data File:	020617.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	71	132
Toluene-d8	99	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.27
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW46-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-13 1/10
Date Analyzed:	02/06/23	Data File:	020625.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	71	132
Toluene-d8	98	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	17
cis-1,2-Dichloroethene	140
Trichloroethene	240
Benzene	3.8

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW15-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-14
Date Analyzed:	02/06/23	Data File:	020618.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	36
cis-1,2-Dichloroethene	6.4
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW05-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-15 1/10
Date Analyzed:	02/06/23	Data File:	020626.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	71	132
Toluene-d8	99	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	6.8
cis-1,2-Dichloroethene	360
Trichloroethene	140

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW05-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-15
Date Analyzed:	02/03/23	Data File:	020318.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	78	126
Toluene-d8	105	84	115
4-Bromofluorobenzene	103	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	1.4

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW06-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-16
Date Analyzed:	02/06/23	Data File:	020619.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	71	132
Toluene-d8	92	68	139
4-Bromofluorobenzene	104	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	2.6
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW19-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-17
Date Analyzed:	02/06/23	Data File:	020620.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	71	132
Toluene-d8	98	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW07-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-18
Date Analyzed:	02/06/23	Data File:	020621.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	71	132
Toluene-d8	101	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW04R-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-19
Date Analyzed:	02/06/23	Data File:	020622.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	71	132
Toluene-d8	89	68	139
4-Bromofluorobenzene	101	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	EW-TRIP-BLANK	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-20
Date Analyzed:	02/03/23	Data File:	020317.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	78	126
Toluene-d8	110	84	115
4-Bromofluorobenzene	102	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW53-020123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-21
Date Analyzed:	02/06/23	Data File:	020623.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	71	132
Toluene-d8	99	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.57
cis-1,2-Dichloroethene	5.4
Trichloroethene	2.9

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	03-0264 mb
Date Analyzed:	02/03/23	Data File:	020315.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	78	126
Toluene-d8	106	84	115
4-Bromofluorobenzene	103	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Analysis for Semivolatile Phenols By EPA Method 8270E SIM

Client Sample ID:	01MW66-013123	Client:	Floyd-Snider
Date Received:	02/01/23	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	302018-09
Date Analyzed:	02/03/23	Data File:	020320.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2,4,6-Tribromophenol	109	50	150

Compounds:	Concentration ug/L (ppb)
Pentachlorophenol	1.9

Analysis for Semivolatile Phenols By EPA Method 8270E SIM

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Cantera TOC, F&BI 302018
Date Extracted:	02/03/23	Lab ID:	03-310 mb
Date Analyzed:	02/03/23	Data File:	020319.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2,4,6-Tribromophenol	79	50	150

Compounds:	Concentration ug/L (ppb)
Pentachlorophenol	<0.2

Date of Report: 02/13/23
Date Received: 02/01/23
Project: Cantera TOC, F&BI 302018

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

Laboratory Code: 302017-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	93	70-130

Date of Report: 02/13/23
Date Received: 02/01/23
Project: Cantera TOC, F&BI 302018

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	120	112	70-130	7

Date of Report: 02/13/23
Date Received: 02/01/23
Project: Cantera TOC, F&BI 302018

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

Laboratory Code: 301238-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.06	83	79	75-125	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	89	80-120

Date of Report: 02/13/23
Date Received: 02/01/23
Project: Cantera TOC, F&BI 302018

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

Laboratory Code: 302018-15 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	7.8	96	108	50-150	12
cis-1,2-Dichloroethene	ug/L (ppb)	10	350	145	270 b	50-150	60 b
Benzene	ug/L (ppb)	10	1.4	105	106	50-150	1
Trichloroethene	ug/L (ppb)	10	140	7 b	109	50-150	176 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	113	111	70-130	2
cis-1,2-Dichloroethene	ug/L (ppb)	10	98	104	70-130	6
Benzene	ug/L (ppb)	10	100	104	70-130	4
Trichloroethene	ug/L (ppb)	10	97	100	70-130	3
Toluene	ug/L (ppb)	10	97	107	70-130	10

Date of Report: 02/13/23
Date Received: 02/01/23
Project: Cantera TOC, F&BI 302018

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR SEMIVOLATILE PHENOLS BY EPA METHOD 8270E SIM

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 30)
Pentachlorophenol	ug/L (ppb)	2.5	101	88	70-130	14

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.

302018

SAMPLE CHAIN OF CUSTODY

02-01-23 VW4/F3/J2

Page # 1 of 3

Report To Kristin Anderson
Company Floyd Snider
Address 601 Union St, Suite 600
City, State, ZIP Seattle, WA 98101
Phone 206 292-2078 Email

SAMPLERS (signature)
PROJECT NAME Cantera TCC
PO #
REMARKS cVOCs = TCE, cis-1,2-DCE and vinyl chloride
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	NWTPH-HCID	VOCs EPA 8260	~~SVOCs~~ Penta EPA 8270D SIM	PCBs EPA 8082	Benzene by 8260D	cVOCs 8260D	Nitrate, Nitrite + Sulfate (300.0)	Sulfide SM4500	Methane, Ethane Ethene (RSK-175)	Notes
01MW12-013123	01 A-H	1/31/23	09:30	GW	8	✓	✓						✓					
01MW35-013123	02		10:37	GW	8	✓	✓						✓					
01MW40-013123	03		11:20	GW	8	✓	✓						✓					
01MW49R-013123	04		12:02	GW	8	✓	✓						✓					
01MW84-013123	05		13:47	GW	8	✓	✓						✓					
01MW84D-013123	06		13:57	GW	8	✓	✓						✓					
01MW85-013123	07 A-K		16:12	GW	11									✓	✓	✓	✓	
01MW19R-013123	08 A-H		16:30	GW	8	✓	✓						✓					
01MW66-013123	09 A-C		14:15	GW	3						✓							
BT-TRIP-BLANK	10 A-B		09:00	W	2		✓						✓					

Friedman & Bruya, Inc.
Ph. (206) 285-8282

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Pamela Osterhout	Floyd Snider	2/1/23	1801
Received by:		VINH	FBI	2-1-23	1801
Relinquished by:					
Received by:			Samples received at	4 °C	

302018

02-01-23 VW4/F3/J2

SAMPLE CHAIN OF CUSTODY

Page # 2 of 3

Report To Kristin Anderson
Company Floyd Snider
Address see page 1
City, State, ZIP
Phone Email

SAMPLERS (*signature*)
PROJECT NAME Cantera TOC
PO #
REMARKS cVOCs = TCE, cis-1,2-DCE + vinyl chloride
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	Benzene 8260 ~~BTEX EPA 8021~~	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	cVOCs (8260)	Nitrate, Nitrite + sulfate 300.0	Sulfide SM4500	Total Arsenic 6020B	Notes
01MW56-~~013~~ 020123 (pc)	11 A-H	2/1/23	0907	GW	8								✓	✓	✓		
01MW108-020123	12 A-F		09.10	GW	6								✓				
01MW46-02a23	13 A-H		09:30	GW	8			✓					✓	✓	✓		
01MW15-020123	14 A-F		11:00	GW	6			~~✓~~ NO					✓				(No Benzene)
MW05-020123	15 A-N		12:26	GW	~~8~~ 14 (NP)			✓					✓	✓	✓		MS/MSD
MW06-020123	16 A-H		1235	GW	8			✓					✓	✓	✓		
02MW19-020123	17 A-I		14:12	GW	9	✓	✓	✓								✓	
02MW07-020123	18 A-I		14:20	GW	9	✓	✓	✓								✓	
02MW04R-020123	19 A-H		15:35	GW	8	✓	✓	✓									
EW-TRIP-BLANK	20 A-B		09.00	W	2		✓	✓									

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	P Osterhout	FS	2/1/23	1801
Received by:	VINH	FBI	2-1-23	1801
Relinquished by:				
Received by:		Samples received at 4 °C		

302018

SAMPLE CHAIN OF CUSTODY

02-01-23

VW4/F3/J2

Page # 3 of 3

Report To Kristin Anderson

Company Floyd Snider

Address See page)

City, State, ZIP

Phone Email

SAMPLERS (signature)

PROJECT NAME Cantera TCC

PO #

REMARKS ~~TCC~~

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]

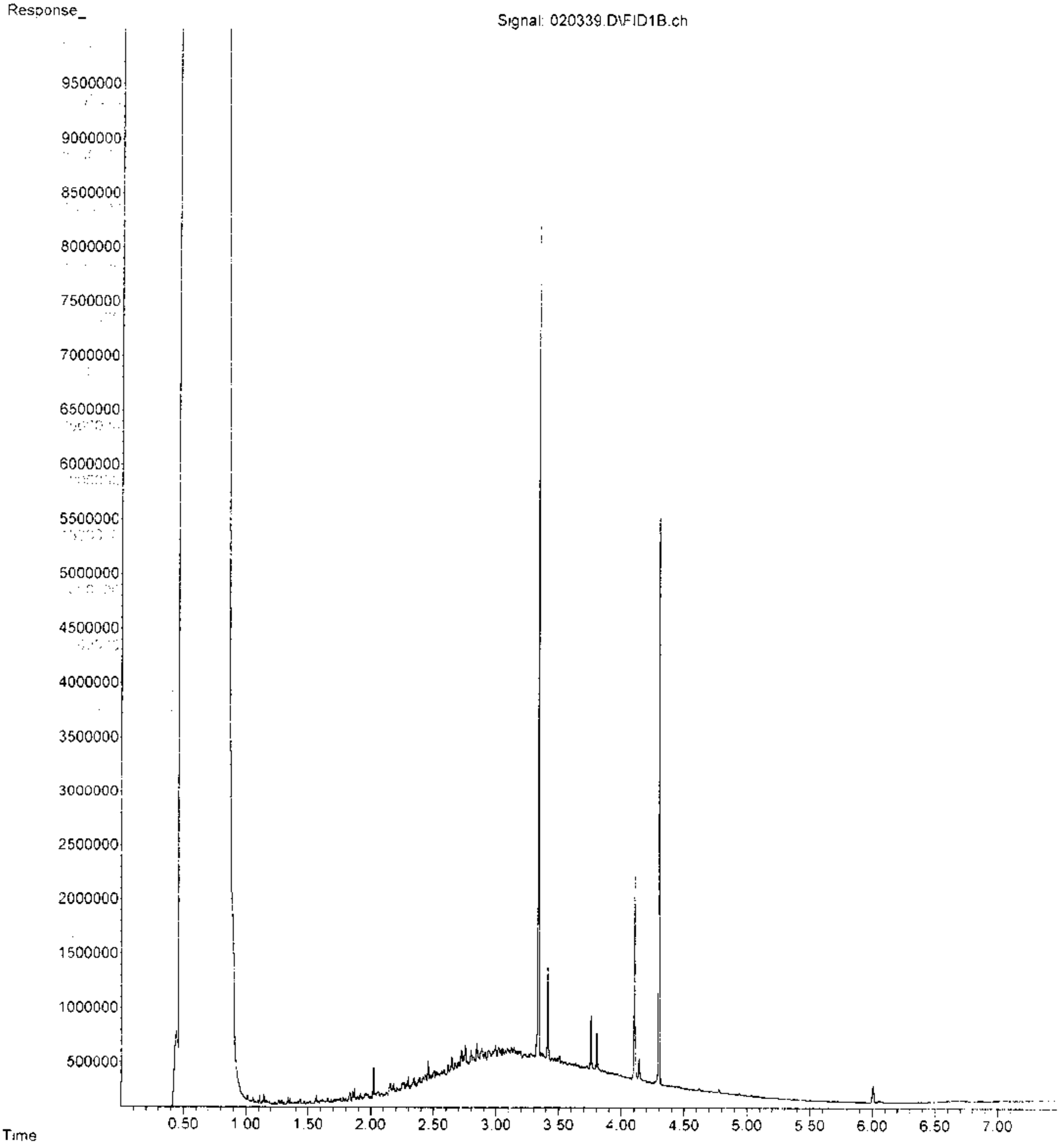
ANALYSES REQUESTED

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	TCE, cis-1,2-DCE, vinyl	chloride by 8260			Notes
01MW53-020123	21 A-F	2/1/23	16:50	GW	6								✓	✓			

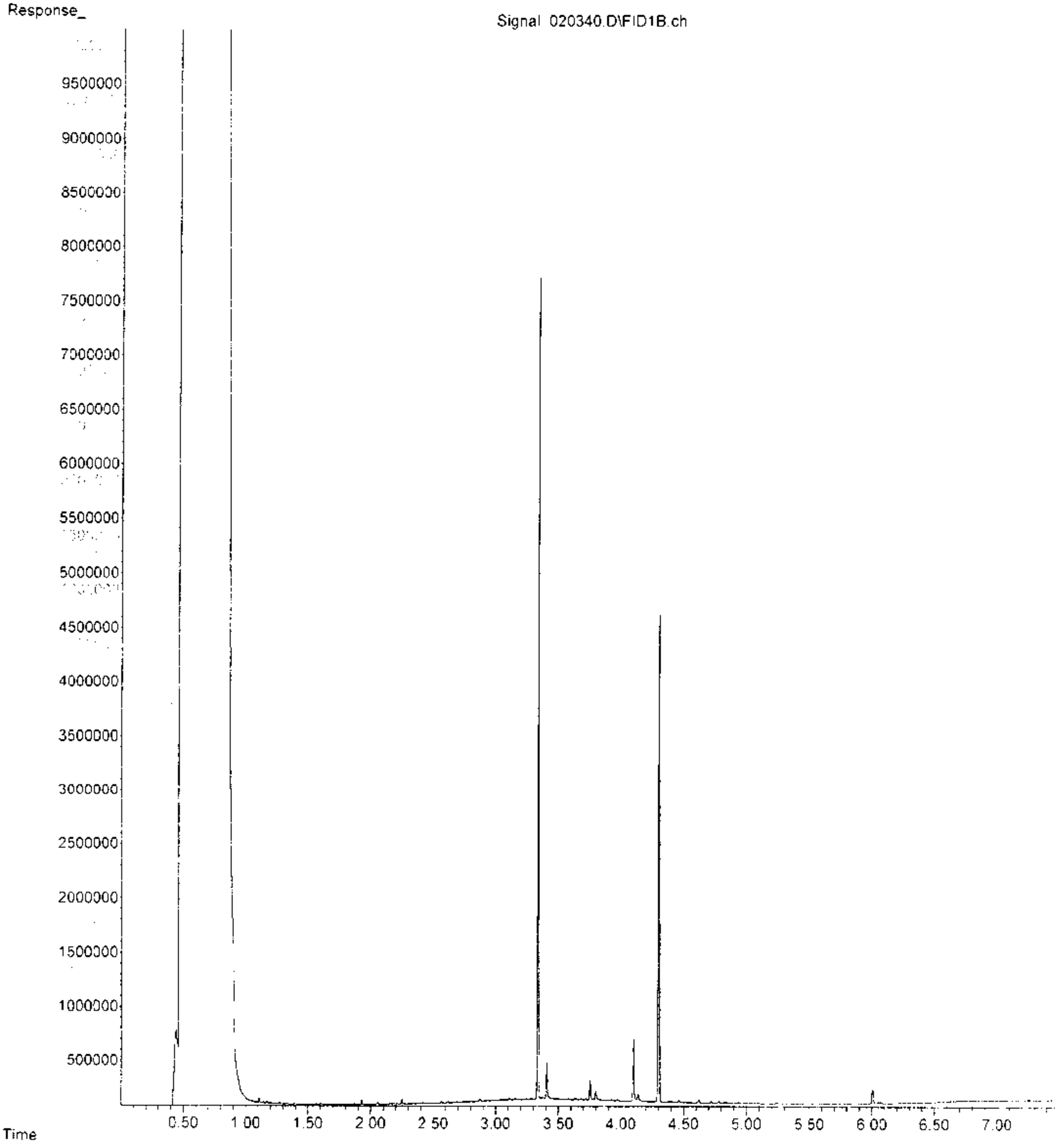
Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	P. Osterhout	F/S	2/1/23	1801
Received by:	VINH	FBI	2-1-23	1801
Relinquished by:				
Received by:		Samples received at 4 °C		

```
File        :P:\Proc_GC13\02-03-23\020339.D
Operator    : TL
Acquired    : 03 Feb 2023  04:08 pm using AcqMethod Dx.M
Instrument :   GC13
Sample Name: 302018-01
Misc Info  :                                              ERR
Vial Number: 37
```

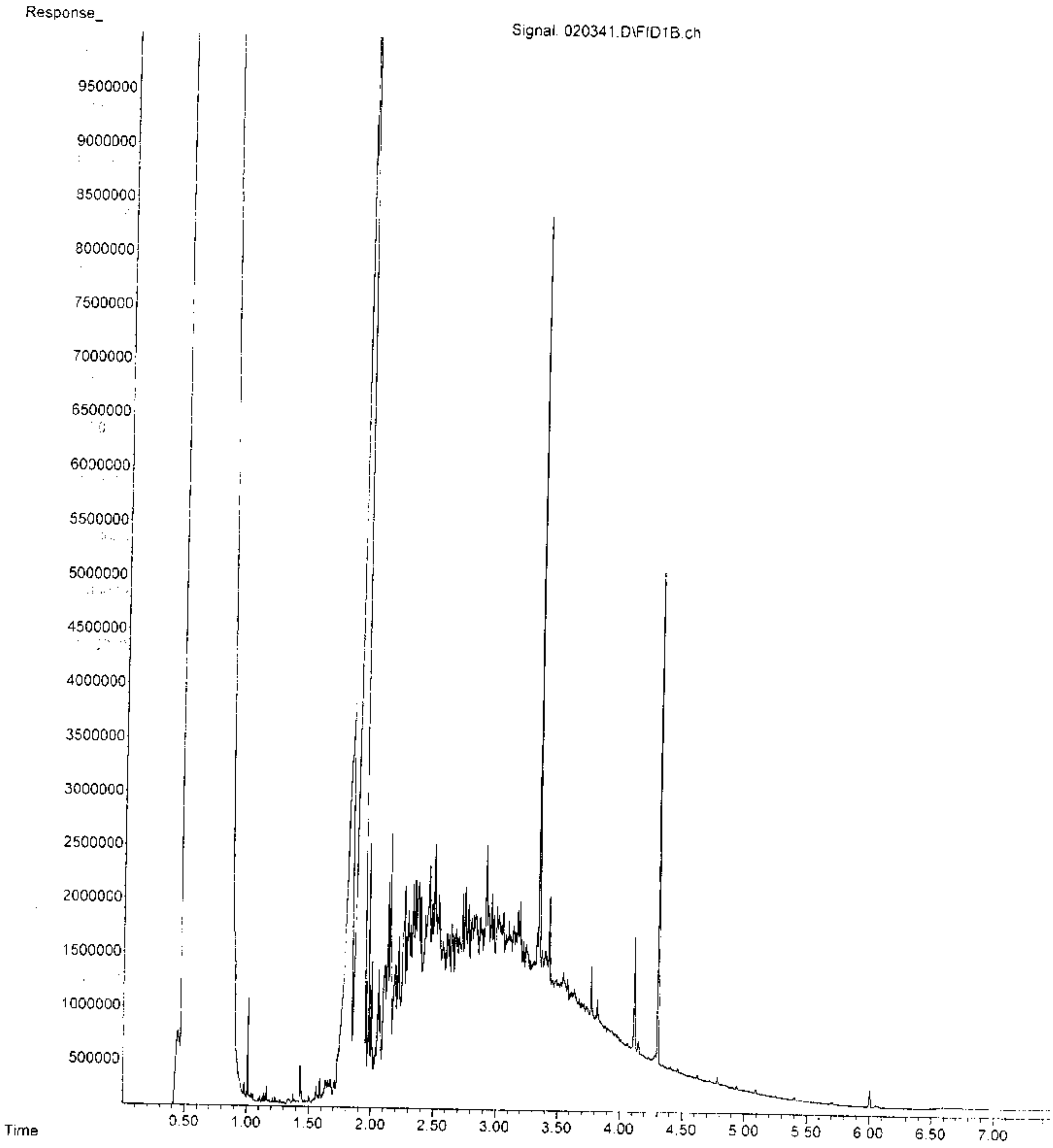


```
File       :P:\Proc_GC13\02-03-23\020340.D
Operator   : TL
Acquired   : 03 Feb 2023  04:19 pm using AcqMethod Dx.M
Instrument :   GC13
Sample Name: 302018-02
Misc Info  :                                              ERR
Vial Number: 38
```

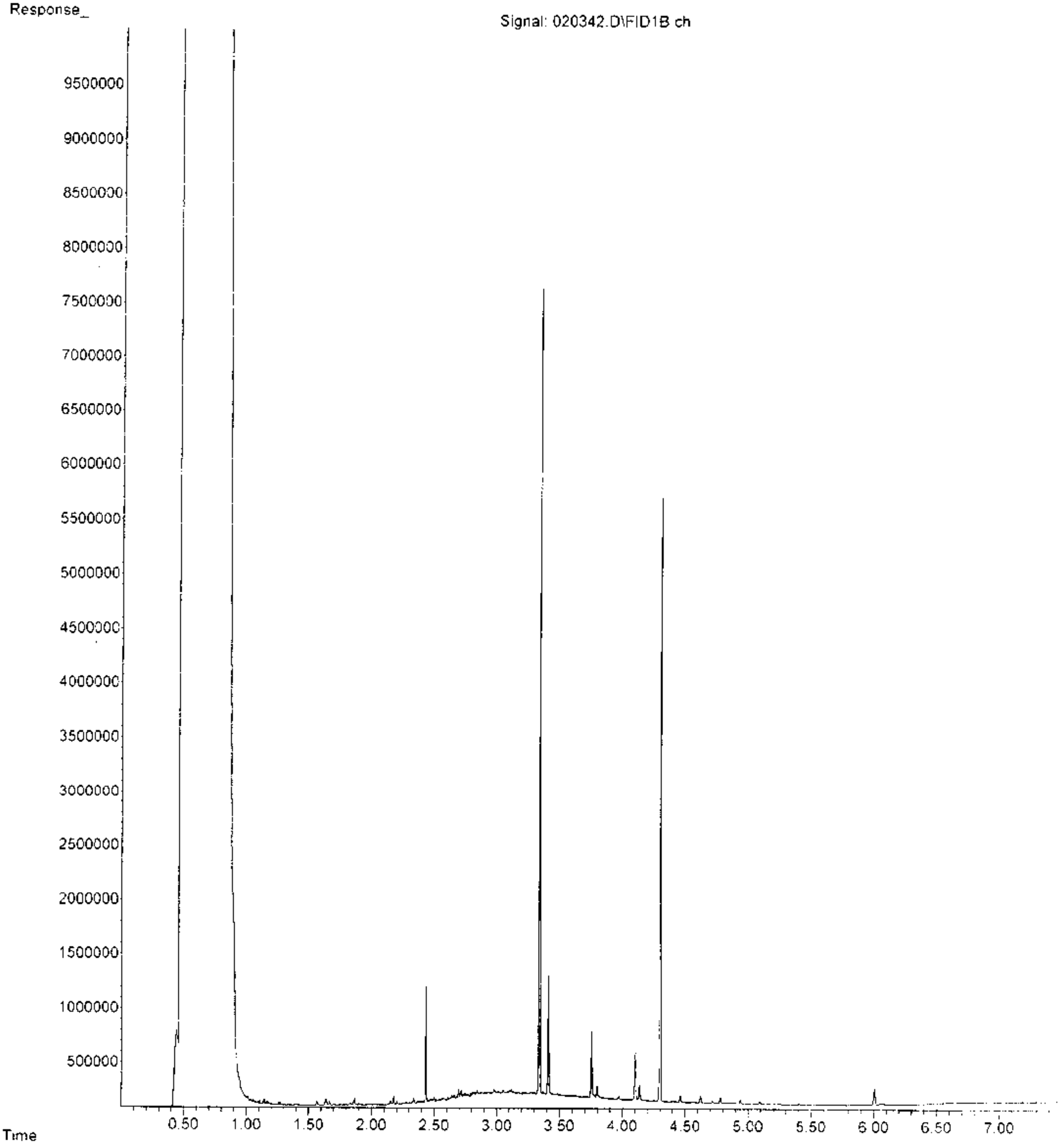


```
File        :P:\Proc_GC13\02-03-23\020341.D
Operator    : TL
Acquired    : 03 Feb 2023  04:30 pm using AcqMethod Dx.M
Instrument :   GC13
Sample Name: 302018-03
Misc Info  :
Vial Number: 39
```

ERR

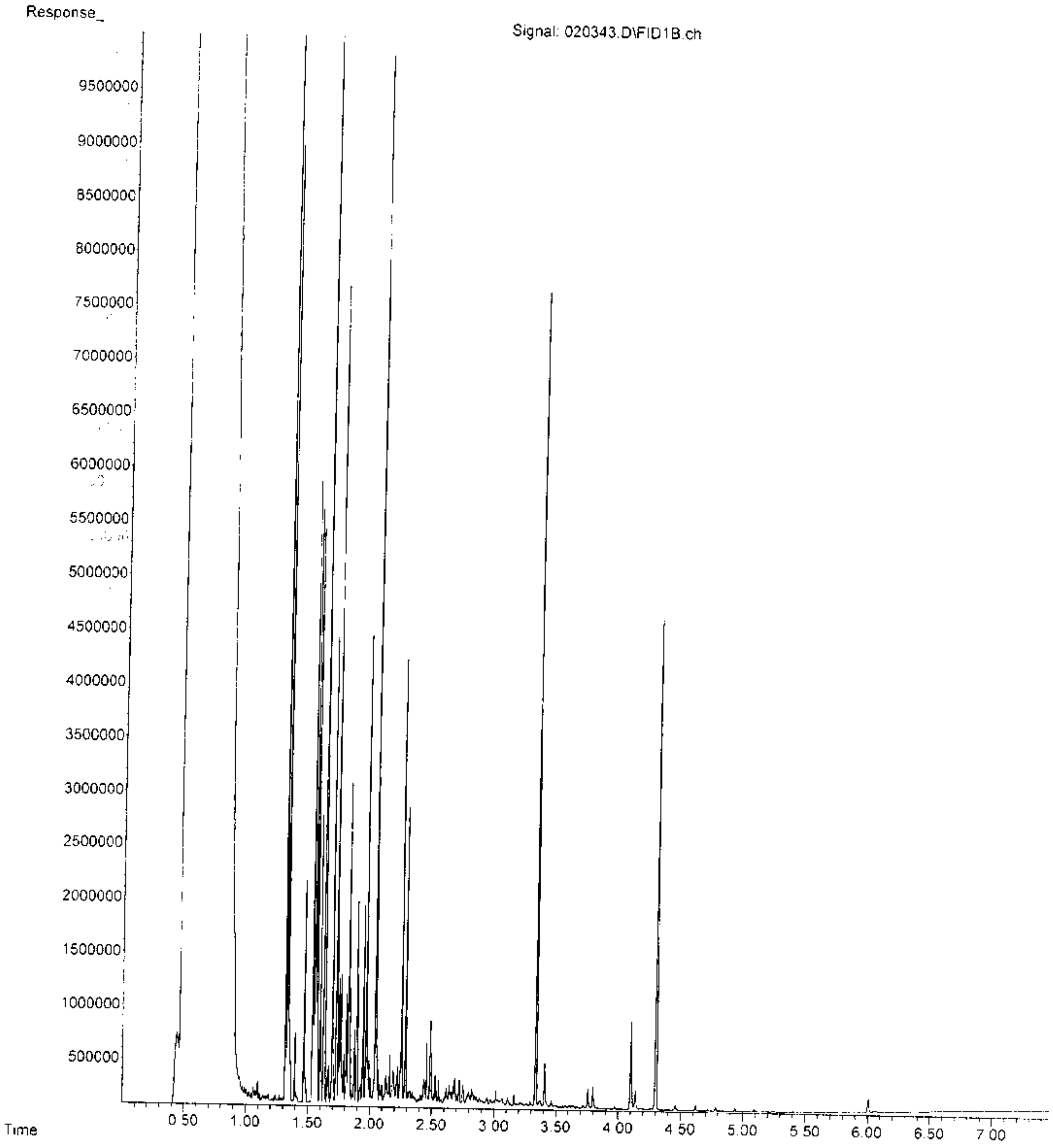


```
File        :P:\Proc_GC13\02-03-23\020342.D
Operator    : TL
Acquired    : 03 Feb 2023  04:42 pm using AcqMethod Dx.M
Instrument :    GC13
Sample Name: 302018-04
Misc Info  :                                              ERR
Vial Number: 40
```



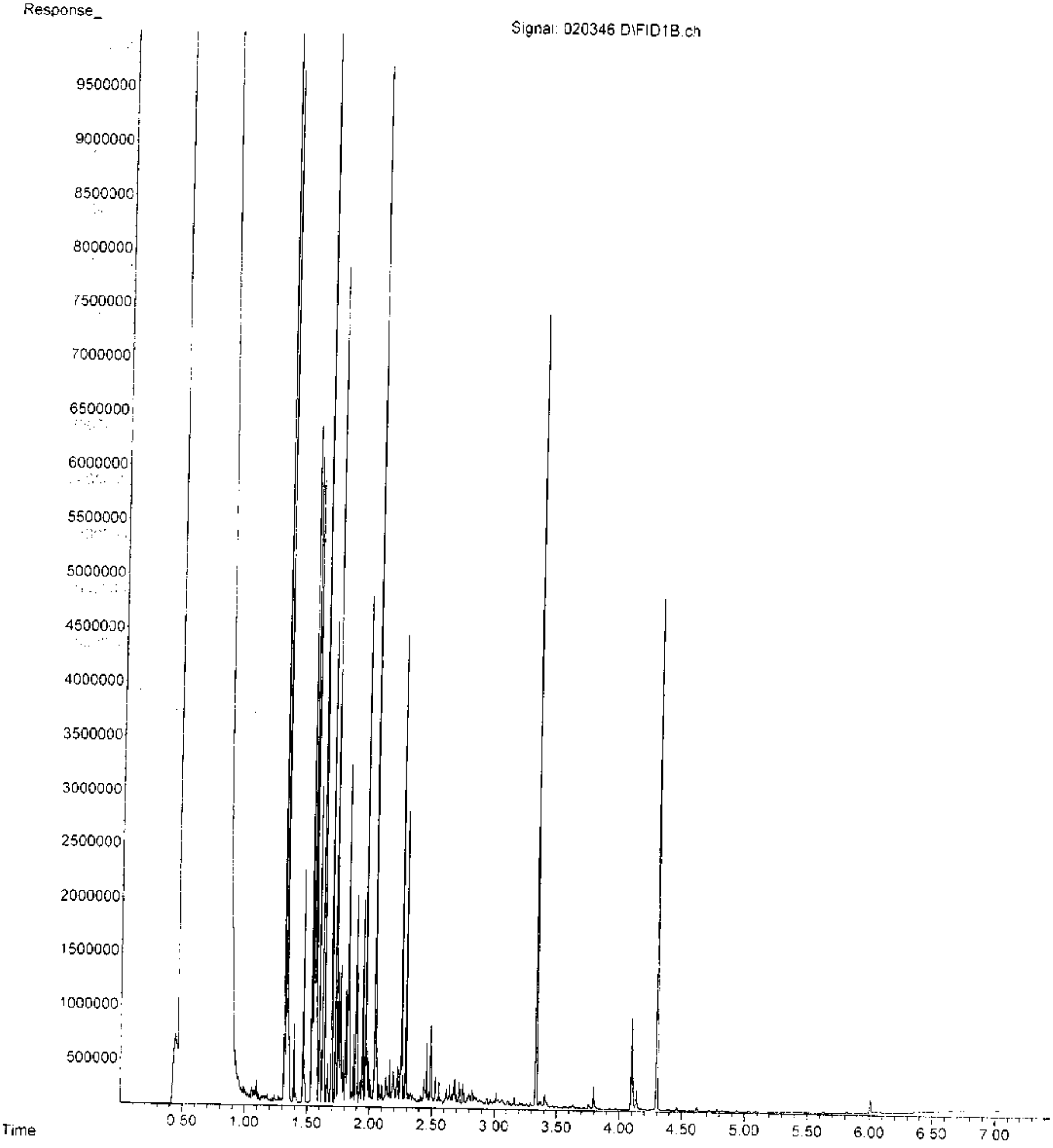
File :P:\Proc_GC13\02-03-23\020343.D
Operator : TL
Acquired : 03 Feb 2023 04:53 pm using AcqMethod Dx.M
Instrument : GC13
Sample Name: 302018-05
Misc Info :
Vial Number: 41

ERR



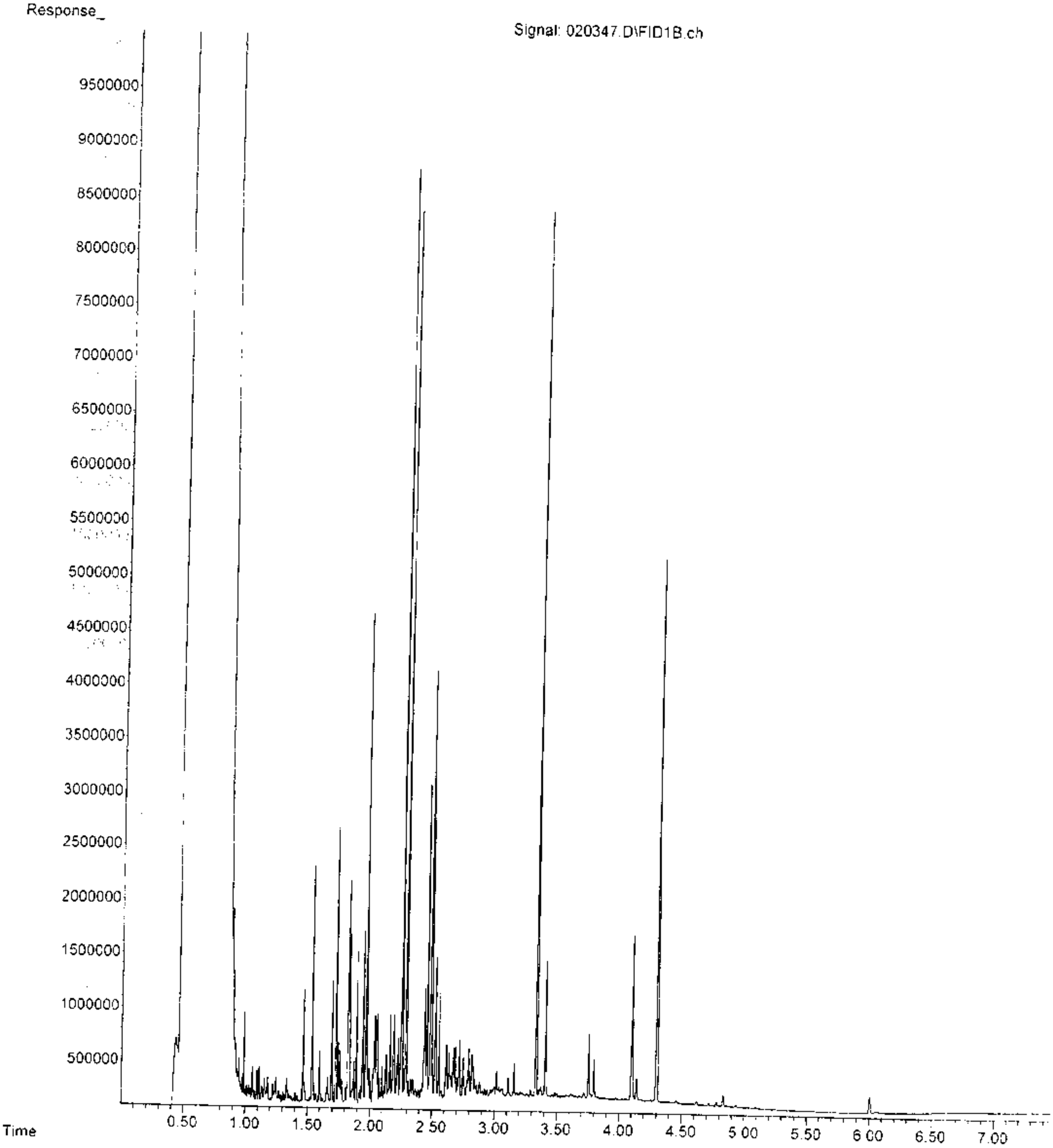
```
File        :P:\Proc_GC13\02-03-23\020346.D
Operator    : TL
Acquired    : 03 Feb 2023  05:27 pm using AcqMethod Dx.M
Instrument :   GC13
Sample Name: 302018-06
Misc Info   :
Vial Number: 42
```

ERR

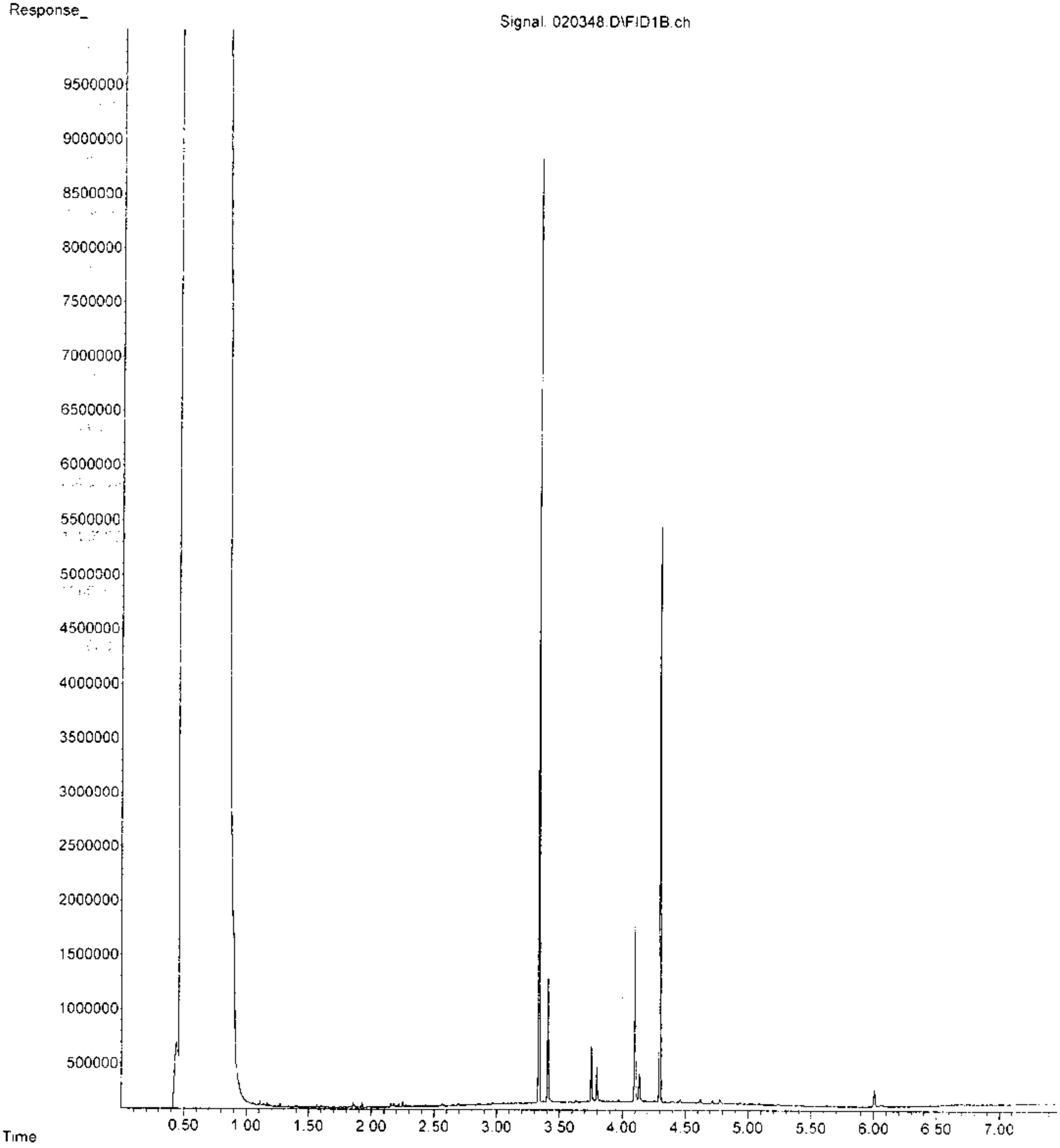


File :P:\Proc_GC13\02-03-23\020347.D
Operator : TL
Acquired : 03 Feb 2023 05:38 pm using AcqMethod Dx.M
Instrument : GC13
Sample Name: 302018-08
Misc Info :
Vial Number: 43

ERR

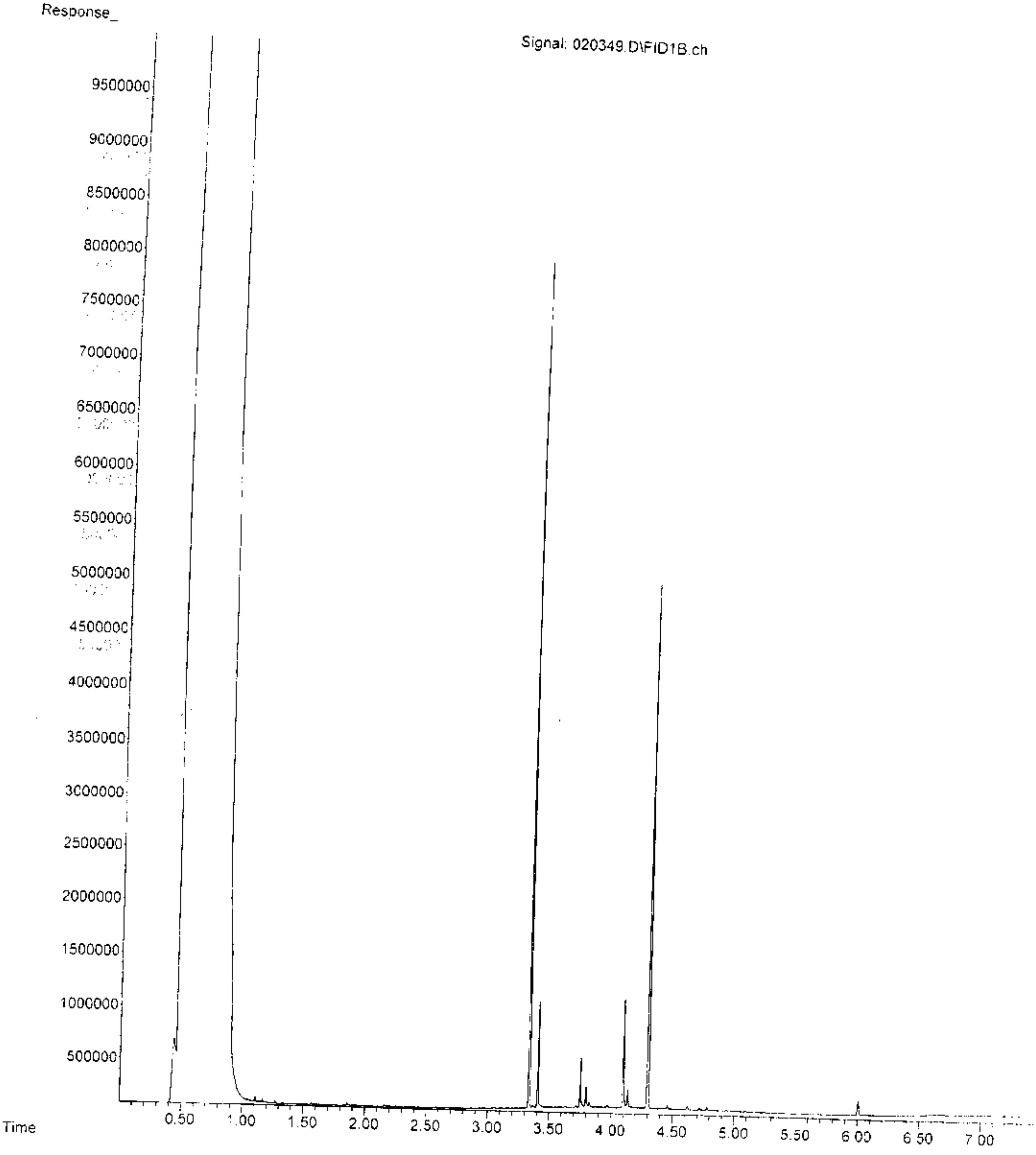


```
File        :P:\Proc_GC13\02-03-23\020348.D
Operator    : TL
Acquired    : 03 Feb 2023  05:49 pm using AcqMethod Dx.M
Instrument :   GC13
Sample Name: 302018-17
Misc Info   :                                         ERR
Vial Number: 44
```

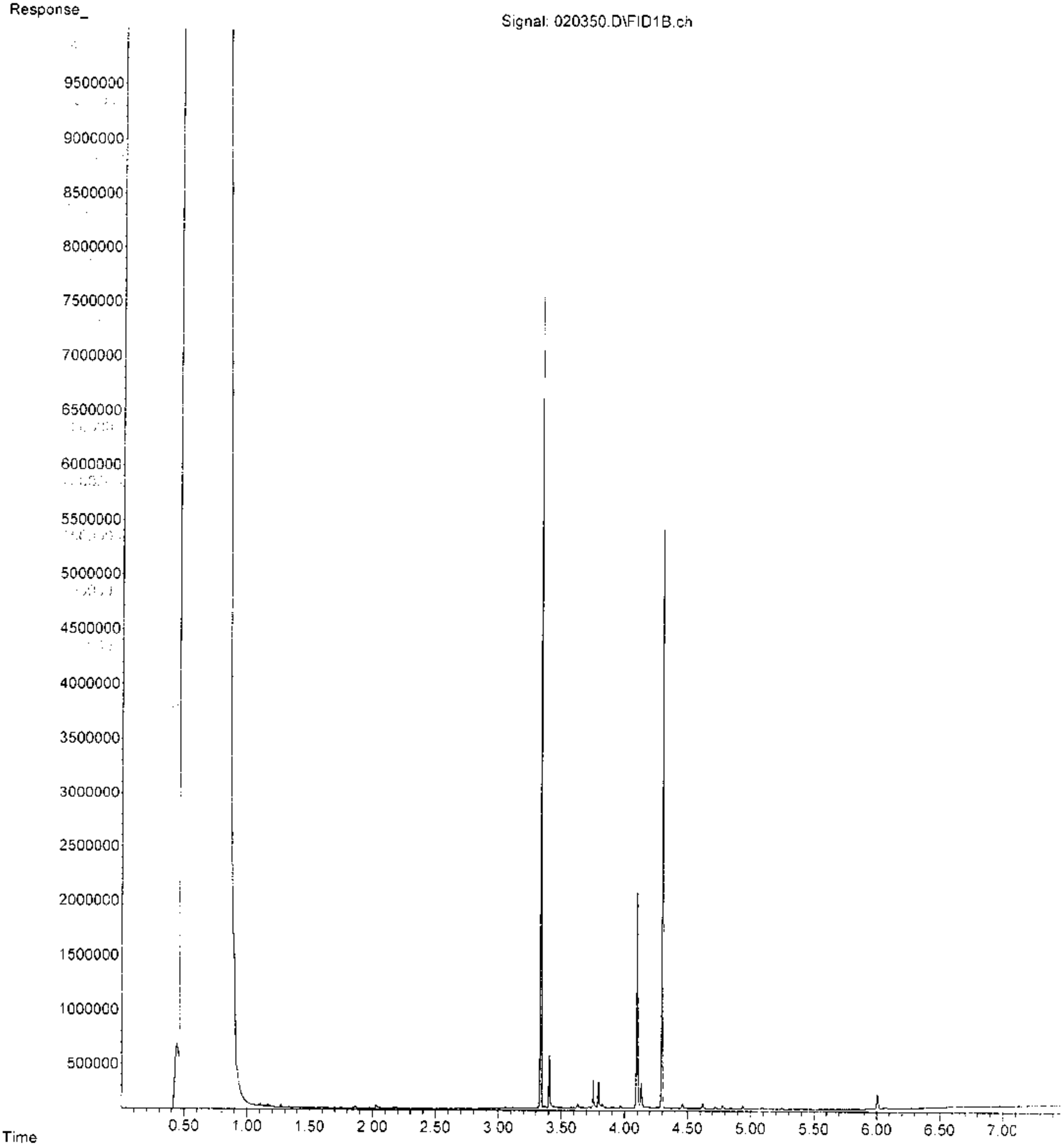


File :P:\Proc_GC13\02-03-23\020349.D
Operator : TL
Acquired : 03 Feb 2023 06:01 pm using AcqMethod Dx.M
Instrument : GC13
Sample Name: 302018-18
Misc Info :
Vial Number: 45

ERR

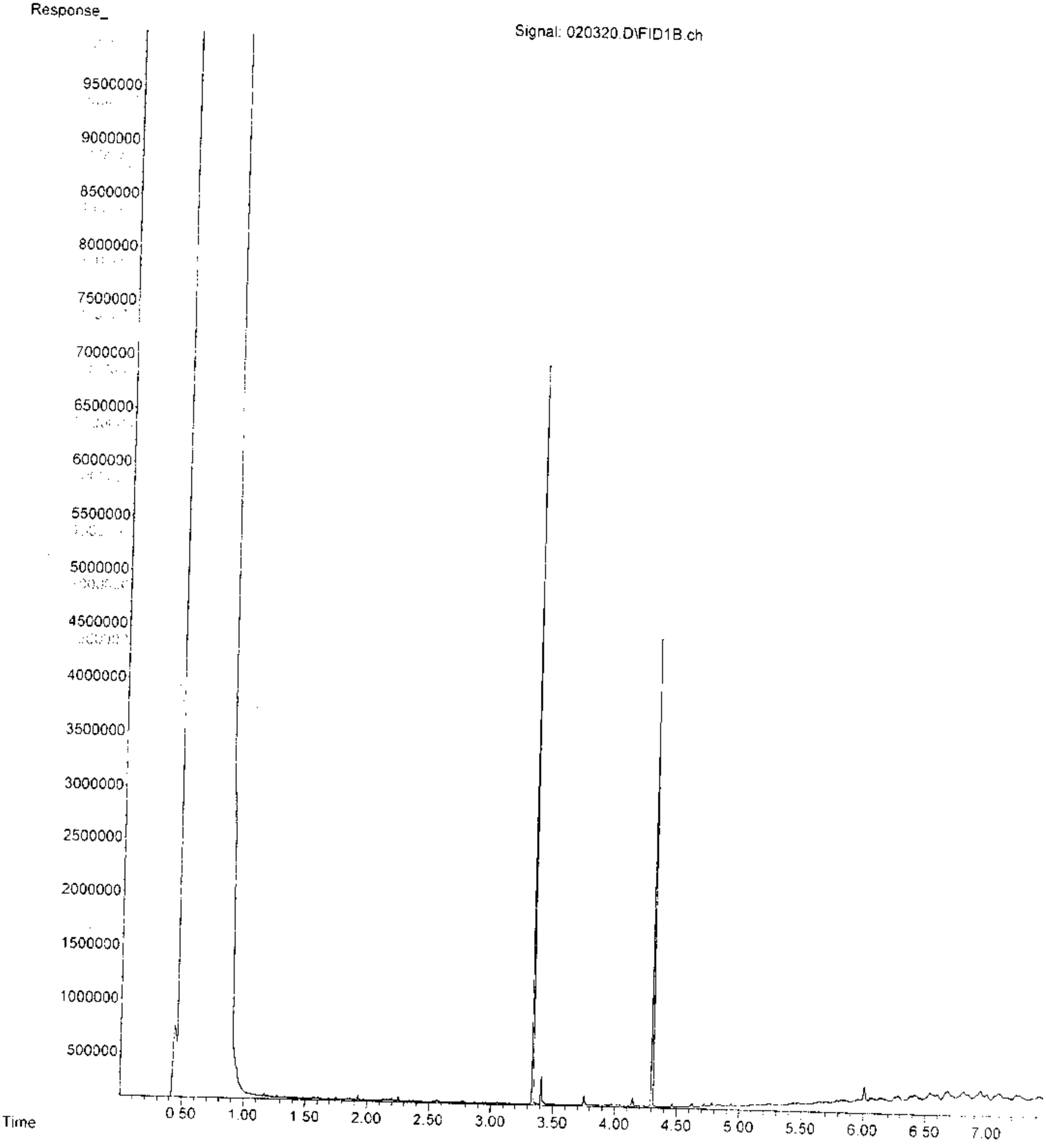


```
File        :P:\Proc_GC13\02-03-23\020350.D
Operator    : TL
Acquired    : 03 Feb 2023  06:12 pm using AcqMethod Dx.M
Instrument :   GC13
Sample Name: 302018-19
Misc Info   :                                                   ERR
Vial Number: 46
```



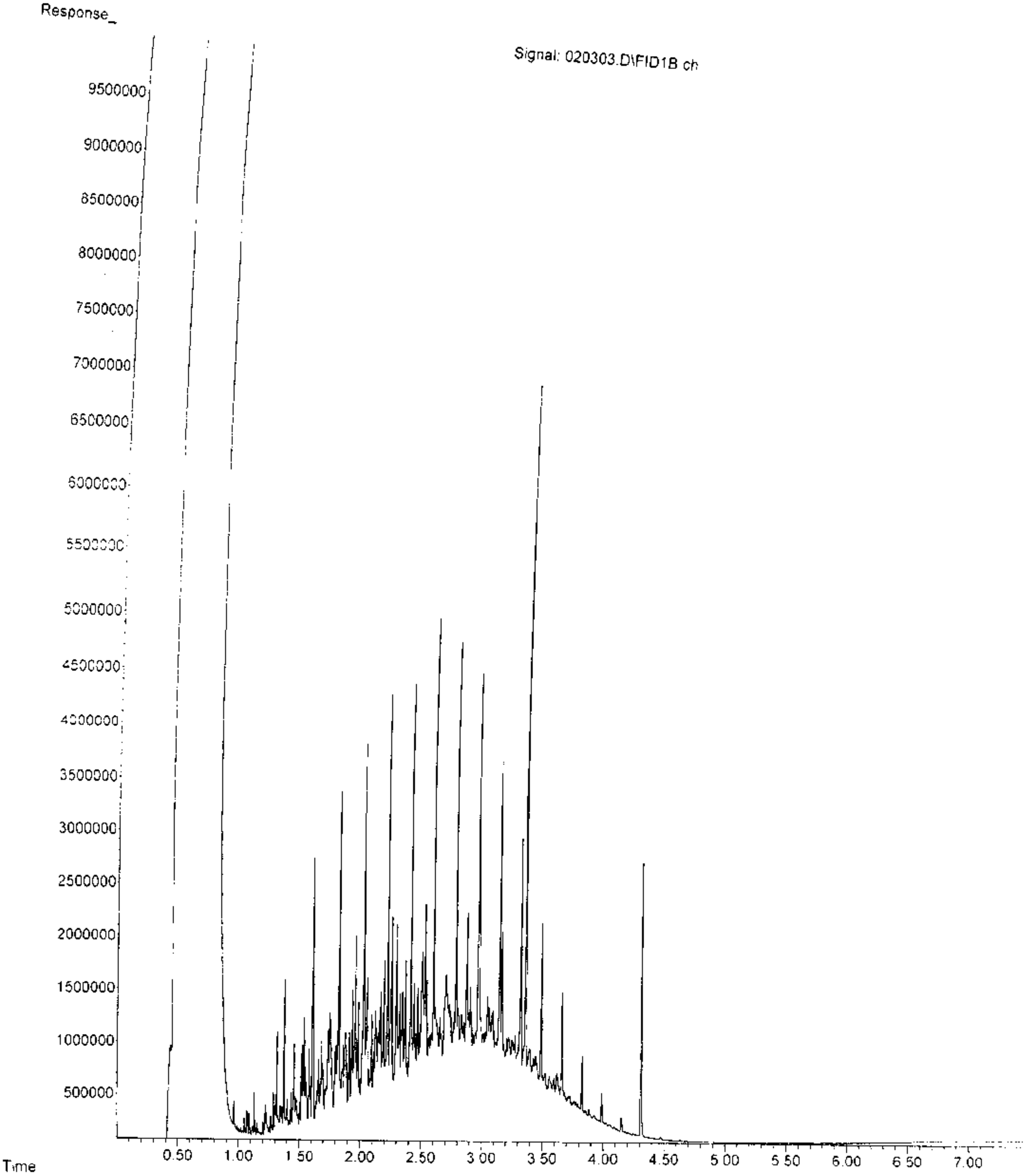
```
File      :P:\Proc_GC13\02-03-23\020320.D
Operator  : TL
Acquired  : 03 Feb 2023  12:34 pm using AcqMethod Dx.M
Instrument :   GC13
Sample Name: 03-308 mb
Misc Info  :
Vial Number: 22
```

ERR



File :P:\Proc_GC13\02-03-23\020303.D
Operator : TL
Acquired : 03 Feb 2023 08:52 am using AcqMethod Dx.M
Instrument : GC13
Sample Name: 500 Dx 67-143B
Misc Info :
Vial Number: 3

ERR



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 302018
Work Order Number: 2302048

February 10, 2023

Attention Michael Erdahl:

Fremont Analytical, Inc. received 5 sample(s) on 2/2/2023 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA Method 300.0
Sulfide by SM 4500-S2-F

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

Date: *02/10/2023*

CLIENT: Friedman & Bruya
Project: 302018
Work Order: 2302048

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2302048-001	01MW85-013123	01/31/2023 4:12 PM	02/02/2023 2:14 PM
2302048-002	01MW56-020123	02/01/2023 9:07 AM	02/02/2023 2:14 PM
2302048-003	01MW46-020123	02/01/2023 9:30 AM	02/02/2023 2:14 PM
2302048-004	MW05-020123	02/01/2023 12:26 PM	02/02/2023 2:14 PM
2302048-005	MW06-020123	02/01/2023 12:35 PM	02/02/2023 2:14 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2302048**

Date: **2/10/2023**

CLIENT: Friedman & Bruya

Project: 302018

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
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
MCL - Maximum Contaminant Level
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

CLIENT: Friedman & Bruya
Project: 302018

Lab ID: 2302048-001
Client Sample ID: **01MW85-013123**
Collection Date: 1/31/2023 4:12:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R81757		Analyst: LB
Methane	1.75	0.0675	D	mg/L	10	2/9/2023 3:38:00 PM
Ethene	ND	0.0146		mg/L	1	2/9/2023 3:14:00 PM
Ethane	ND	0.0151		mg/L	1	2/9/2023 3:14:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 39317		Analyst: AT
Nitrite (as N)	ND	1.20	DH	mg/L	10	2/2/2023 10:51:00 PM
Nitrate (as N)	ND	1.00	DH	mg/L	10	2/2/2023 10:51:00 PM
Sulfate	7.69	6.00	D	mg/L	10	2/2/2023 10:51:00 PM
Sulfide by SM 4500-S2-F				Batch ID: R81758		Analyst: SS
Sulfide	ND	0.500	H	mg/L	1	2/8/2023 4:00:00 PM

Lab ID: 2302048-002
Client Sample ID: **01MW56-020123**
Collection Date: 2/1/2023 9:07:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 39317		Analyst: AT
Nitrite (as N)	ND	1.20	D	mg/L	10	2/2/2023 11:15:00 PM
Nitrate (as N)	0.330	1.00	DJ	mg/L	10	2/2/2023 11:15:00 PM
Sulfate	25.1	6.00	D	mg/L	10	2/2/2023 11:15:00 PM
Sulfide by SM 4500-S2-F				Batch ID: R81758		Analyst: SS
Sulfide	ND	0.500		mg/L	1	2/8/2023 4:00:00 PM

Analytical Report

Work Order: **2302048**
Date Reported: **2/10/2023**

CLIENT: Friedman & Bruya
Project: 302018

Lab ID: 2302048-003
Client Sample ID: **01MW46-020123**
Collection Date: 2/1/2023 9:30:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 39317		Analyst: AT
Nitrite (as N)	ND	1.20	D	mg/L	10	2/2/2023 11:38:00 PM
Nitrate (as N)	ND	1.00	D	mg/L	10	2/2/2023 11:38:00 PM
Sulfate	144	6.00	D	mg/L	10	2/2/2023 11:38:00 PM
Sulfide by SM 4500-S2-F				Batch ID: R81758		Analyst: SS
Sulfide	0.200	0.500	J	mg/L	1	2/8/2023 4:00:00 PM

Lab ID: 2302048-004
Client Sample ID: **MW05-020123**
Collection Date: 2/1/2023 12:26:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 39317		Analyst: AT
Nitrite (as N)	ND	1.20	D	mg/L	10	2/3/2023 12:01:00 AM
Nitrate (as N)	ND	1.00	D	mg/L	10	2/3/2023 12:01:00 AM
Sulfate	76.6	6.00	D	mg/L	10	2/3/2023 12:01:00 AM
Sulfide by SM 4500-S2-F				Batch ID: R81758		Analyst: SS
Sulfide	1.00	0.500		mg/L	1	2/8/2023 4:00:00 PM

CLIENT: Friedman & Bruya
Project: 302018

Lab ID: 2302048-005
Client Sample ID: **MW06-020123**

Collection Date: 2/1/2023 12:35:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 39317		Analyst: AT
Nitrite (as N)	ND	1.20	D	mg/L	10	2/3/2023 1:34:00 AM
Nitrate (as N)	ND	1.00	D	mg/L	10	2/3/2023 1:34:00 AM
Sulfate	42.1	6.00	D	mg/L	10	2/3/2023 1:34:00 AM
Sulfide by SM 4500-S2-F				Batch ID: R81758		Analyst: SS
Sulfide	ND	0.500		mg/L	1	2/8/2023 4:00:00 PM

Work Order: 2302048
CLIENT: Friedman & Bruya
Project: 302018

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-39317A** SampType: **MBLK** Units: **mg/L** Prep Date: **2/2/2023** RunNo: **81754**
Client ID: **MBLKW** Batch ID: **39317** Analysis Date: **2/2/2023** SeqNo: **1694599**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	0.120									
Nitrate (as N)	ND	0.100									
Sulfate	ND	0.600									

Sample ID: **LCS-39317** SampType: **LCS** Units: **mg/L** Prep Date: **2/2/2023** RunNo: **81754**
Client ID: **LCSW** Batch ID: **39317** Analysis Date: **2/2/2023** SeqNo: **1694600**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.739	0.120	0.7500	0	98.5	90	110				
Nitrate (as N)	0.746	0.100	0.7500	0	99.5	90	110				
Sulfate	3.66	0.600	3.750	0	97.5	90	110				

Sample ID: **2302048-004ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **2/2/2023** RunNo: **81754**
Client ID: **MW05-020123** Batch ID: **39317** Analysis Date: **2/3/2023** SeqNo: **1694614**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	1.20						0	0	20	D
Nitrate (as N)	ND	1.00						0	0	20	D
Sulfate	76.1	6.00						76.60	0.668	20	D

Sample ID: **2302048-004AMS** SampType: **MS** Units: **mg/L** Prep Date: **2/2/2023** RunNo: **81754**
Client ID: **MW05-020123** Batch ID: **39317** Analysis Date: **2/3/2023** SeqNo: **1694615**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	7.24	1.20	7.500	0	96.5	80	120				D
Nitrate (as N)	7.29	1.00	7.500	0	97.2	80	120				D
Sulfate	112	6.00	37.50	76.60	95.1	80	120				D

Work Order: 2302048
CLIENT: Friedman & Bruya
Project: 302018

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2302048-004AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **2/2/2023** RunNo: **81754**
Client ID: **MW05-020123** Batch ID: **39317** Analysis Date: **2/3/2023** SeqNo: **1694616**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	7.11	1.20	7.500	0	94.8	80	120	7.240	1.81	20	D
Nitrate (as N)	7.14	1.00	7.500	0	95.2	80	120	7.290	2.08	20	D
Sulfate	111	6.00	37.50	76.60	91.9	80	120	112.3	1.09	20	D

Sample ID: **2302028-001ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **2/2/2023** RunNo: **81754**
Client ID: **BATCH** Batch ID: **39317** Analysis Date: **2/3/2023** SeqNo: **1694635**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	12.0						0	0	20	D
Nitrate (as N)	ND	10.0						0	0	20	D
Sulfate	ND	60.0						0	0	20	D

Sample ID: **2302028-001AMS** SampType: **MS** Units: **mg/L** Prep Date: **2/2/2023** RunNo: **81754**
Client ID: **BATCH** Batch ID: **39317** Analysis Date: **2/3/2023** SeqNo: **1694636**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	73.2	12.0	75.00	0	97.6	80	120				D
Nitrate (as N)	72.8	10.0	75.00	0	97.1	80	120				D
Sulfate	354	60.0	375.0	0	94.4	80	120				D

Work Order: 2302048
CLIENT: Friedman & Bruya
Project: 302018

QC SUMMARY REPORT

Sulfide by SM 4500-S2-F

Sample ID: **MB-R81758** SampType: **MBLK** Units: **mg/L** Prep Date: **2/8/2023** RunNo: **81758**
Client ID: **MBLKW** Batch ID: **R81758** Analysis Date: **2/8/2023** SeqNo: **1694731**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	ND	0.500									

Sample ID: **LCS-R81758** SampType: **LCS** Units: **mg/L** Prep Date: **2/8/2023** RunNo: **81758**
Client ID: **LCSW** Batch ID: **R81758** Analysis Date: **2/8/2023** SeqNo: **1694732**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	1.60	0.500	2.000	0	80.0	55.8	124				

Sample ID: **2302048-004BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **2/8/2023** RunNo: **81758**
Client ID: **MW05-020123** Batch ID: **R81758** Analysis Date: **2/8/2023** SeqNo: **1694737**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	1.00	0.500						1.000	0	30	

Sample ID: **2302048-004BMS** SampType: **MS** Units: **mg/L** Prep Date: **2/8/2023** RunNo: **81758**
Client ID: **MW05-020123** Batch ID: **R81758** Analysis Date: **2/8/2023** SeqNo: **1694738**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	6.00	0.500	2.000	1.000	250	21.5	190				S

NOTES:
S - Spike recovery indicates a possible matrix effect.

Sample ID: **2302048-004BMSD** SampType: **MSD** Units: **mg/L** Prep Date: **2/8/2023** RunNo: **81758**
Client ID: **MW05-020123** Batch ID: **R81758** Analysis Date: **2/8/2023** SeqNo: **1694739**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	2.40	0.500	2.000	1.000	70.0	21.5	190	6.000	85.7	30	R

NOTES:
R - High RPD observed.

Work Order: 2302048
CLIENT: Friedman & Bruya
Project: 302018

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **LCS-R81757** SampType: **LCS** Units: **ppmv** Prep Date: **2/9/2023** RunNo: **81757**
Client ID: **LCSW** Batch ID: **R81757** Analysis Date: **2/9/2023** SeqNo: **1694763**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	967	0.00675	1,000	0	96.7	68.9	131				
Ethene	967	0.0146	1,000	0	96.7	72	129				
Ethane	974	0.0151	1,000	0	97.4	73.4	128				

Sample ID: **MB-R81757** SampType: **MBLK** Units: **mg/L** Prep Date: **2/9/2023** RunNo: **81757**
Client ID: **MBLKW** Batch ID: **R81757** Analysis Date: **2/9/2023** SeqNo: **1694770**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675									
Ethene	ND	0.0146									
Ethane	ND	0.0151									

Sample ID: **2302021-001FREP** SampType: **REP** Units: **mg/L** Prep Date: **2/9/2023** RunNo: **81757**
Client ID: **BATCH** Batch ID: **R81757** Analysis Date: **2/9/2023** SeqNo: **1694743**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	3.11	0.00675						2.811	10.0	30	
Ethene	ND	0.0146						0	0	30	
Ethane	ND	0.0151						0	0	30	

Sample Log-In Check List

Client Name: FB
Work Order Number: 2302048
Logged by: Clare Griggs
Date Received: 2/2/2023 2:14:00 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 ☐
    NaOH & Zn Acetate to B fractions
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 °C
Sample	4.7

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY 2302048

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 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO.	PO #
302018	D-135

REMARKS Floyd Snider EDD
Please Email Results

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	ANALYSES REQUESTED										Notes
						Dioxins/Furans	EPH	VPH	Nitrate	Nitrite	Sulfate	Sulfide	Methane, Ethane, Ethene RSK			
01MW85-013123		1/31/23	1612	water	5				x	x	x	x	x			
01MW56-020123		2/1/23	0907	water.	2				x	x	x	x				
01MW46-020123		2/1/23	0930	water.	2				x	x	x	x				
MW05-020123		2/1/23	1226	water	2				x	x	x	x				MS/MSD
MW06-020123		2/1/23	1235	water.	2				x	x	x	x				

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Michael Erdahl	Friedman & Bruya	2/2/23	0800AM
Received by:	Nate Ries	FAL	2/2/23	1414
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 17, 2023

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

Dear Ms Anderson:

Included are the results from the testing of material submitted on April 10, 2023 from the Cantera TOC, F&BI 304125 project. There are 26 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: Pamela Osterhout
FDS0417R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 10, 2023 by Friedman & Bruya, Inc. from the Floyd-Snider Cantera TOC, F&BI 304125 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
304125 -01	01MW46-040723
304125 -02	01MW53-040723
304125 -03	01MW85-040723
304125 -04	01MW19R-040723
304125 -05	01MW35-040723
304125 -06	01MW-51-040723
304125 -07	01MW-84-040723
304125 -08	01MW87-040723
304125 -09	02MW04R-040723
304125 -10	02MW07-040723
304125 -11	02MW19-040723
304125 -12	02MW19-040723-D
304125 -13	Trip Blank

All quality control requirements were acceptable.

Date of Report: 04/17/23
Date Received: 04/10/23
Project: Cantera TOC, F&BI 304125
Date Extracted: 04/10/23
Date Analyzed: 04/11/23

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)
01MW19R-040723 304125-04	1,100	109
01MW35-040723 304125-05	<100	107
01MW-51-040723 304125-06	<100	104
01MW-84-040723 304125-07 1/10	5,500	110
01MW87-040723 304125-08	<100	102
02MW04R-040723 304125-09	<100	103
02MW07-040723 304125-10	<100	104
02MW19-040723 304125-11	<100	103
02MW19-040723-D 304125-12	<100	105
Method Blank 03-768 MB	<100	103

Date of Report: 04/17/23
Date Received: 04/10/23
Project: Cantera TOC, F&BI 304125
Date Extracted: 04/11/23
Date Analyzed: 04/11/23

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)
01MW19R-040723 304125-04	700 x	<250	118
01MW35-040723 304125-05	120 x	<250	122
01MW-51-040723 304125-06	<50	<250	119
01MW-84-040723 304125-07	1,500 x	<250	118
01MW87-040723 304125-08	<50	<250	122
02MW04R-040723 304125-09	<50	<250	114
02MW07-040723 304125-10	<50	<250	130
02MW19-040723 304125-11	76 x	<250	122
02MW19-040723-D 304125-12	84 x	<250	123
Method Blank 03-893 MB	<50	<250	121

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW07-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/10/23	Lab ID:	304125-10
Date Analyzed:	04/10/23	Data File:	304125-10.173
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW19-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/10/23	Lab ID:	304125-11
Date Analyzed:	04/10/23	Data File:	304125-11.174
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	4.65

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW19-040723-D	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/10/23	Lab ID:	304125-12
Date Analyzed:	04/10/23	Data File:	304125-12.175
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	4.83

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/10/23	Lab ID:	I3-274 mb
Date Analyzed:	04/10/23	Data File:	I3-274 mb.037
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW46-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-01 1/10
Date Analyzed:	04/11/23	Data File:	041115.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	118	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	9.3
cis-1,2-Dichloroethene	110
Trichloroethene	140
Benzene	<3.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW53-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-02
Date Analyzed:	04/11/23	Data File:	041114.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	71	132
Toluene-d8	104	68	139
4-Bromofluorobenzene	103	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.36
cis-1,2-Dichloroethene	3.2
Trichloroethene	2.1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW85-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-03 1/10
Date Analyzed:	04/11/23	Data File:	041116.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	119	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	17
cis-1,2-Dichloroethene	1,200
Trichloroethene	6.2

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW19R-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-04
Date Analyzed:	04/11/23	Data File:	041117.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	71	132
Toluene-d8	107	68	139
4-Bromofluorobenzene	105	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	4.4

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW35-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-05
Date Analyzed:	04/11/23	Data File:	041118.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	103	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW-51-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-06
Date Analyzed:	04/11/23	Data File:	041119.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	71	132
Toluene-d8	91	68	139
4-Bromofluorobenzene	108	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW-84-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-07
Date Analyzed:	04/11/23	Data File:	041120.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	71	132
Toluene-d8	104	68	139
4-Bromofluorobenzene	107	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW87-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-08
Date Analyzed:	04/11/23	Data File:	041121.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	90	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	90	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW04R-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-09
Date Analyzed:	04/11/23	Data File:	041122.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	71	132
Toluene-d8	92	68	139
4-Bromofluorobenzene	109	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW07-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-10
Date Analyzed:	04/11/23	Data File:	041123.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	107	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW19-040723	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-11
Date Analyzed:	04/11/23	Data File:	041138.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	90	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	101	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW19-040723-D	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-12
Date Analyzed:	04/11/23	Data File:	041139.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	81	71	132
Toluene-d8	115	68	139
4-Bromofluorobenzene	104	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Trip Blank	Client:	Floyd-Snider
Date Received:	04/10/23	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	304125-13
Date Analyzed:	04/11/23	Data File:	041111.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	71	132
Toluene-d8	95	68	139
4-Bromofluorobenzene	103	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Cantera TOC, F&BI 304125
Date Extracted:	04/11/23	Lab ID:	03-0723 mb
Date Analyzed:	04/11/23	Data File:	041109.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	71	132
Toluene-d8	98	68	139
4-Bromofluorobenzene	104	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Date of Report: 04/17/23
Date Received: 04/10/23
Project: Cantera TOC, F&BI 304125

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

Laboratory Code: 304097-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	100	70-130

Date of Report: 04/17/23
Date Received: 04/10/23
Project: Cantera TOC, F&BI 304125

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	112	120	70-130	7

Date of Report: 04/17/23
Date Received: 04/10/23
Project: Cantera TOC, F&BI 304125

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

Laboratory Code: 304113-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	77.8	34 b	24 b	75-125	34 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	98	80-120

Date of Report: 04/17/23
Date Received: 04/10/23
Project: Cantera TOC, F&BI 304125

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

Laboratory Code: 304125-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	0.73	100	16-176
cis-1,2-Dichloroethene	ug/L (ppb)	10	3.9	96 b	50-150
Benzene	ug/L (ppb)	10	4.4	94 b	50-150
Trichloroethene	ug/L (ppb)	10	<0.5	99	43-133

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	101	99	70-130	2
cis-1,2-Dichloroethene	ug/L (ppb)	10	107	108	70-130	1
Benzene	ug/L (ppb)	10	101	102	70-130	1
Trichloroethene	ug/L (ppb)	10	103	104	70-130	1

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, biased high; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. 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 standard reporting limit. 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.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

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.

304125

SAMPLE CHAIN OF CUSTODY

04/10/23

J2/C2/VW4

Page # 1 of 2

Report To Kristin Anderson + Pamela Osterhout
Company Floyd Snider
Address 601 Union St, Suite 600
City, State, ZIP Seattle, WA 98101
Phone 206-292-2078 Email

SAMPLERS (*signature*)	
PROJECT NAME Cantera TDC	PO #
REMARKS ★ CVOC list by 8260 includes TCE, cis-1,2-DCE and vinyl chloride 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	Benzene 8260	CVOCs ★	Total Arsenic 6020B		Notes
01MW46-040723	01 A-E	4/7/23	15:05	GW	6								✓	✓			Rec 5 samples at lab (AP)
01MW53-040723	02 A-F		1130		6									✓			
01MW85-040723	03 ↓		12:50		6									✓			
01MW19R-040723	04 A-G		12:05		7	✓	✓						✓				
01MW35-040723	05		14:10		7	✓	✓						✓				
01MW51-040723	06		09:45		7	✓	✓						✓				
01MW84-040723	07		13:20		7	✓	✓						✓				
01MW87-040723	08		10:50		7	✓	✓						✓				
02MW04R-040723	09 ↓		16:35		7	✓	✓						✓				
02MW07-040723	10 A-H		17:25		7	✓	✓						✓		✓		Rec 8 samples at lab (AP)

Samples received at 2

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	C. Oreiro	FLOYD SNIDER	4/10/23	0850
Received by:	Nhan Phan	FeBI	4/10/23	0852
Relinquished by:				
Received by:				

304125

SAMPLE CHAIN OF CUSTODY

04/10/23 J2/C2/VW4

Page # 2 of 2

Report To Kristin / Pamela
Company Floyd Snider
Address see page 1
City, State, ZIP
Phone Email

SAMPLERS (signature)

PROJECT NAME Cantera TOC

PO #

REMARKS cVOCs = TCE, cis-1,2-DCE, vinyl chloride 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	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Benzene by 8260	cVOCs *	Total arsenic 6020B		Notes
02MW19-040723	11 A-H	4/7/23	1655	GW	8	✓	✓						✓		✓		
02MW19-040723-D	12 ↓	4/7/23	17:00	GW	8	✓	✓						✓		✓		
TRIP BLANK	13 A-B	4/7/23	09:30	QC	2								✓	✓			

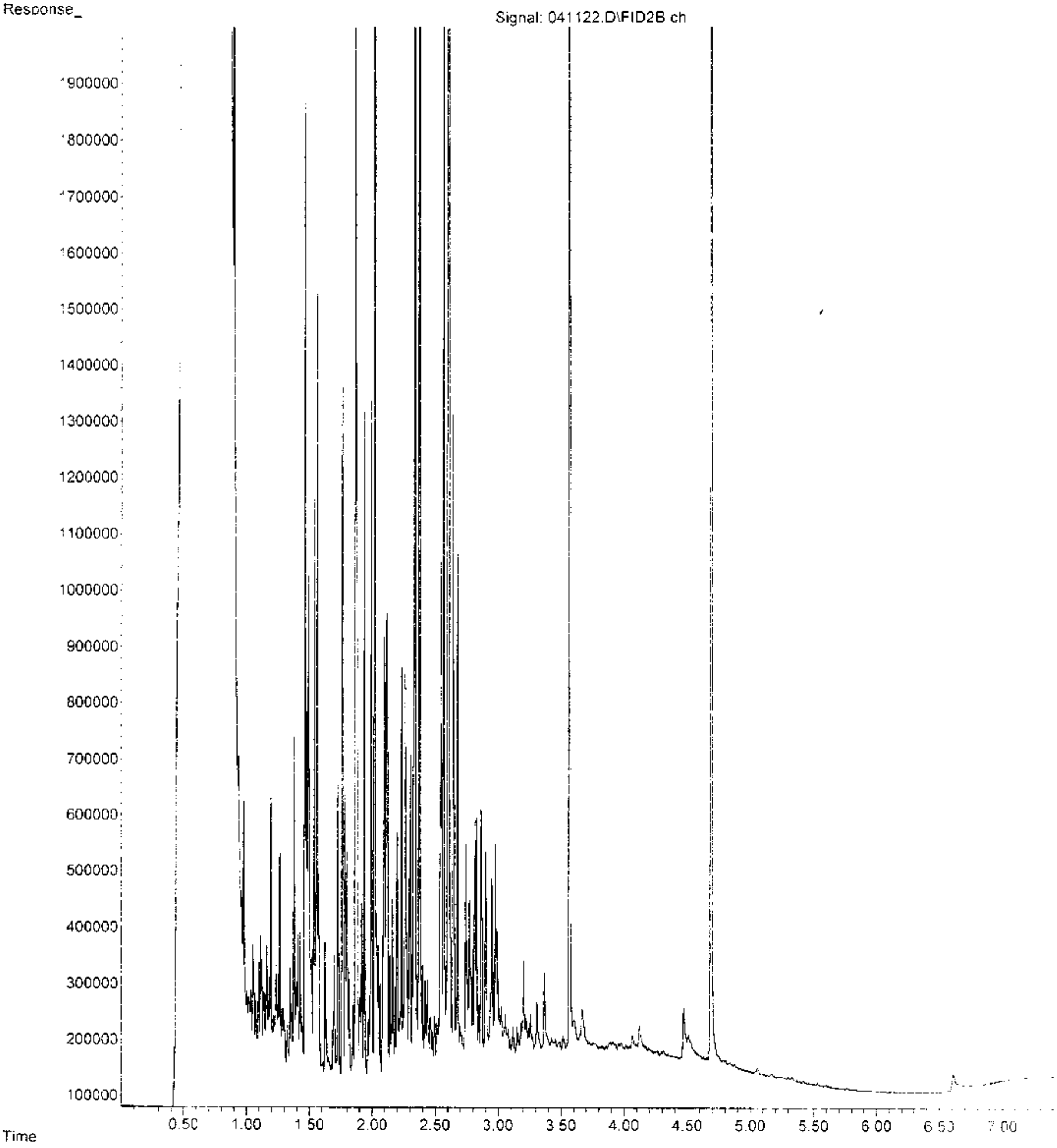
P.O.

Samples received at 2 °C

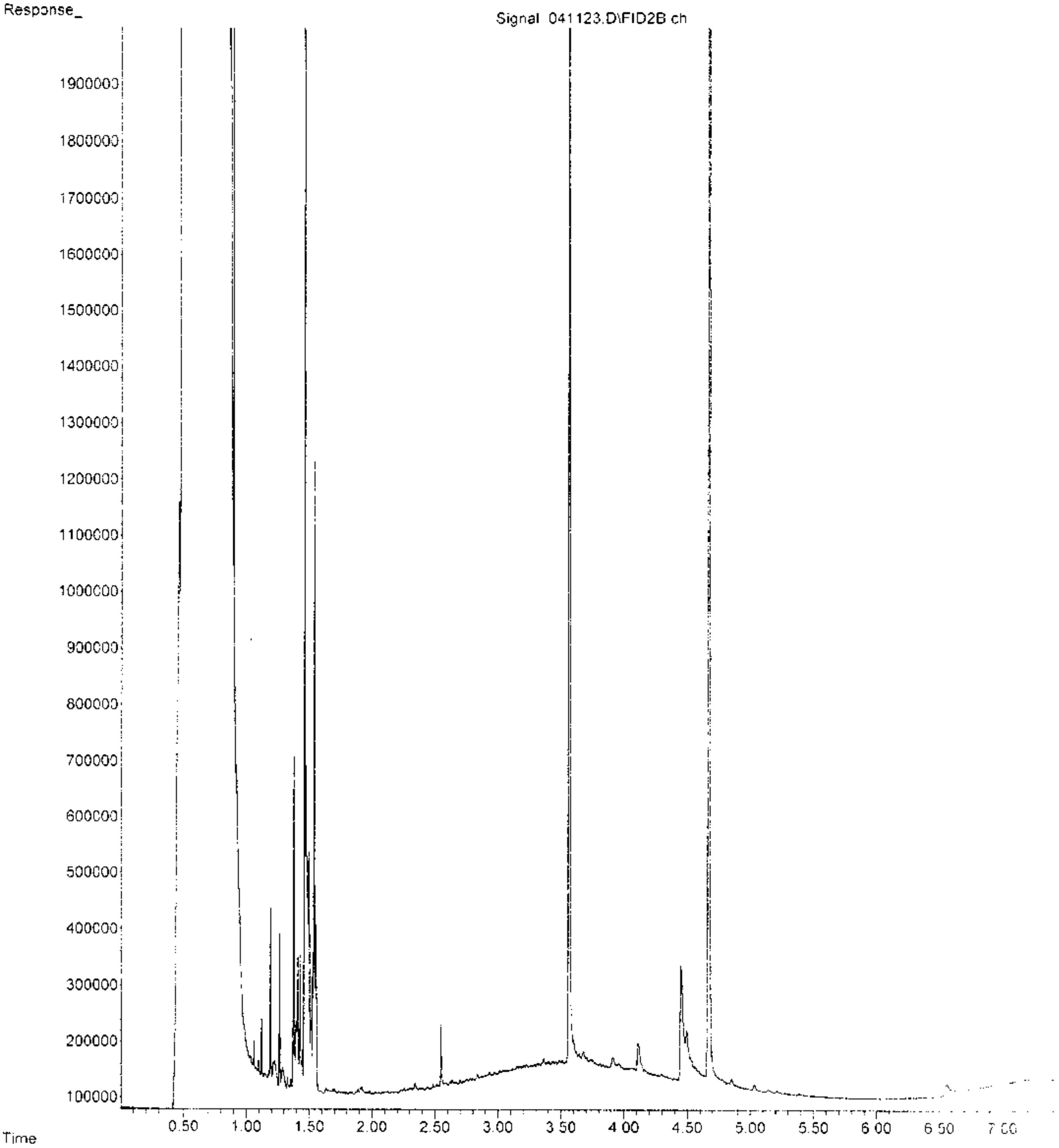
Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	C. OREIRO	FLOYD SNIDER	4/10/23	0850
Received by:	Nhan Phan	F&BT	4/10/23	0850
Relinquished by:				
Received by:				

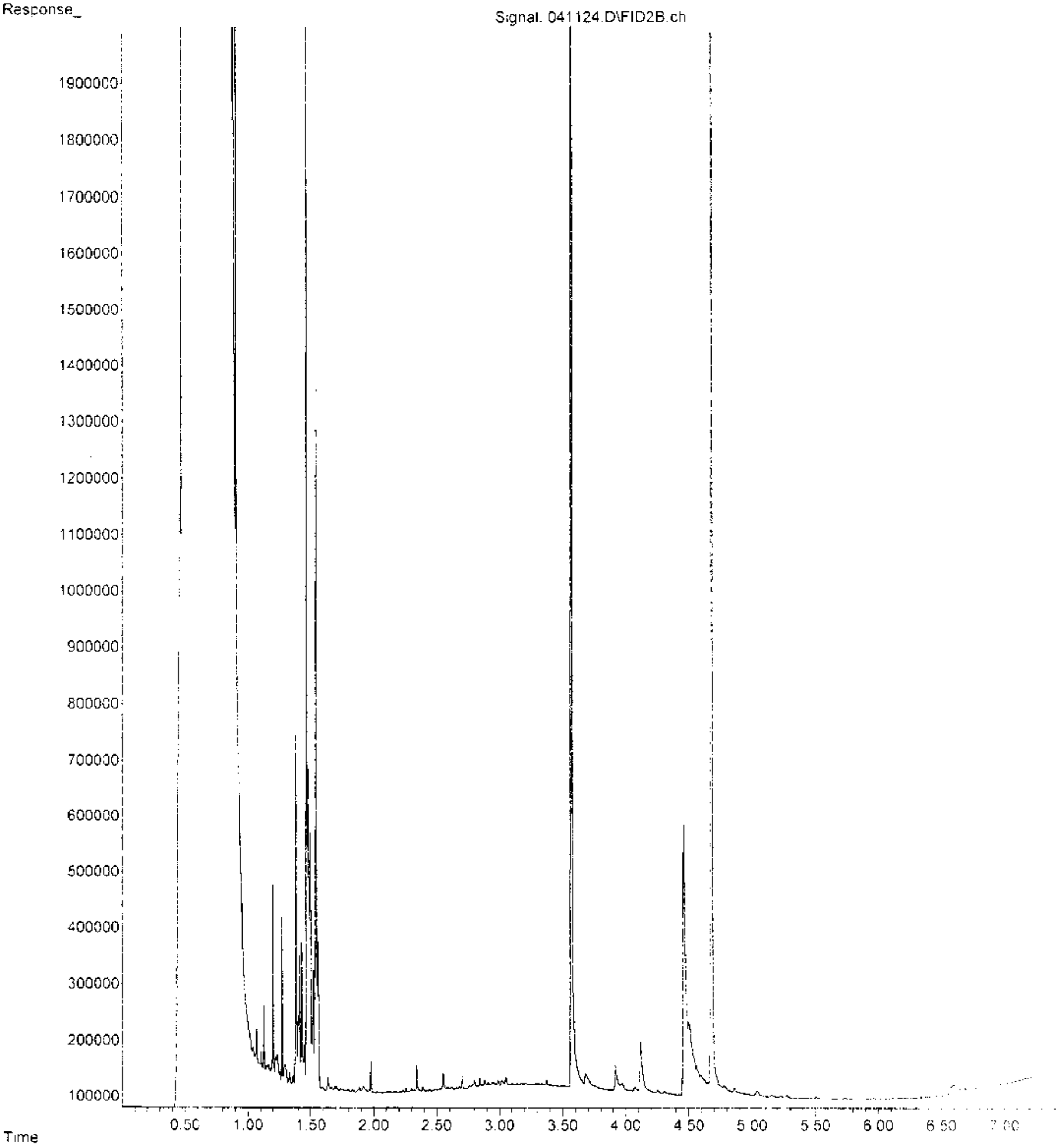
```
File       :P:\Proc_GC10\04-11-23\041122.D
Operator   : TL
Acquired   : 11 Apr 2023  01:05 pm using AcqMethod DX.M
Instrument :   GC10
Sample Name: 304125-04
Misc Info  :
Vial Number: 20
```



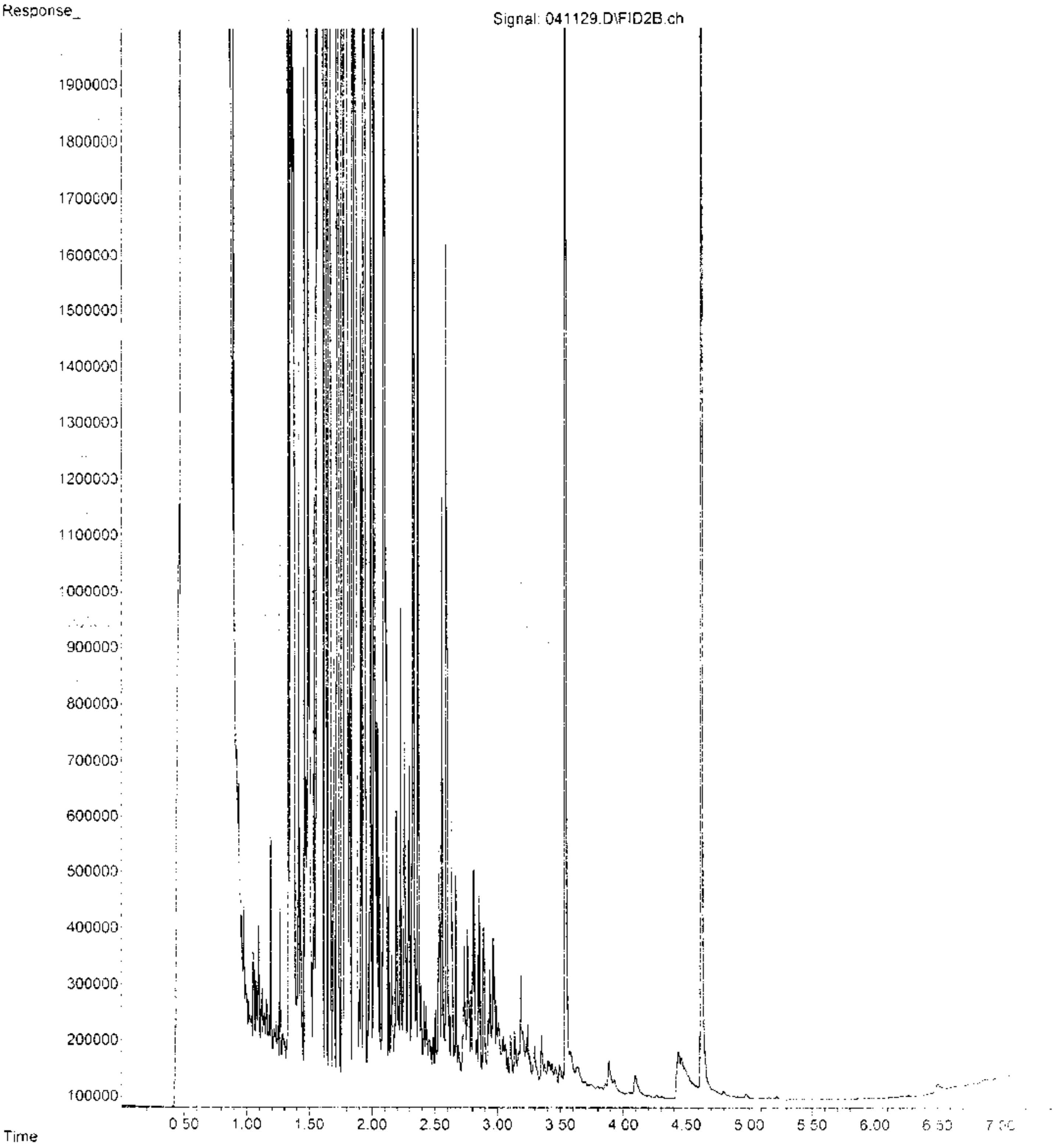
```
File        :P:\Proc_GC10\04-11-23\041123.D
Operator    : TL
Acquired    : 11 Apr 2023  01:17 pm using AcqMethod DX.M
Instrument :    GC10
Sample Name: 304125-05
Misc Info  :
Vial Number: 21
```



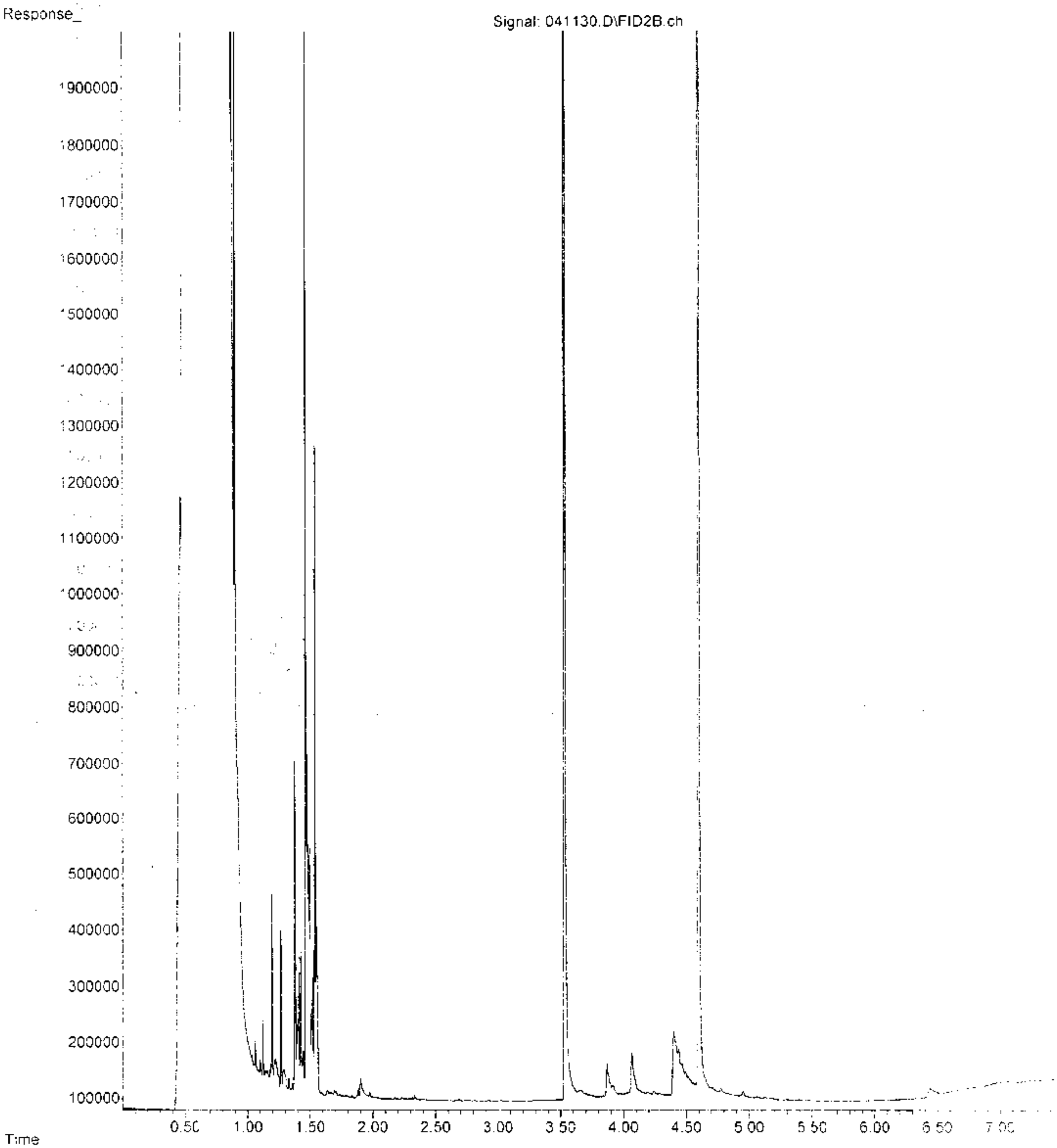
```
File        :P:\Proc GC10\04-11-23\041124.D
Operator    : TL
Acquired    : 11 Apr 2023  01:28 pm using AcqMethod DX.M
Instrument :    GC10
Sample Name: 304125-06
Misc Info  :
Vial Number: 22
```



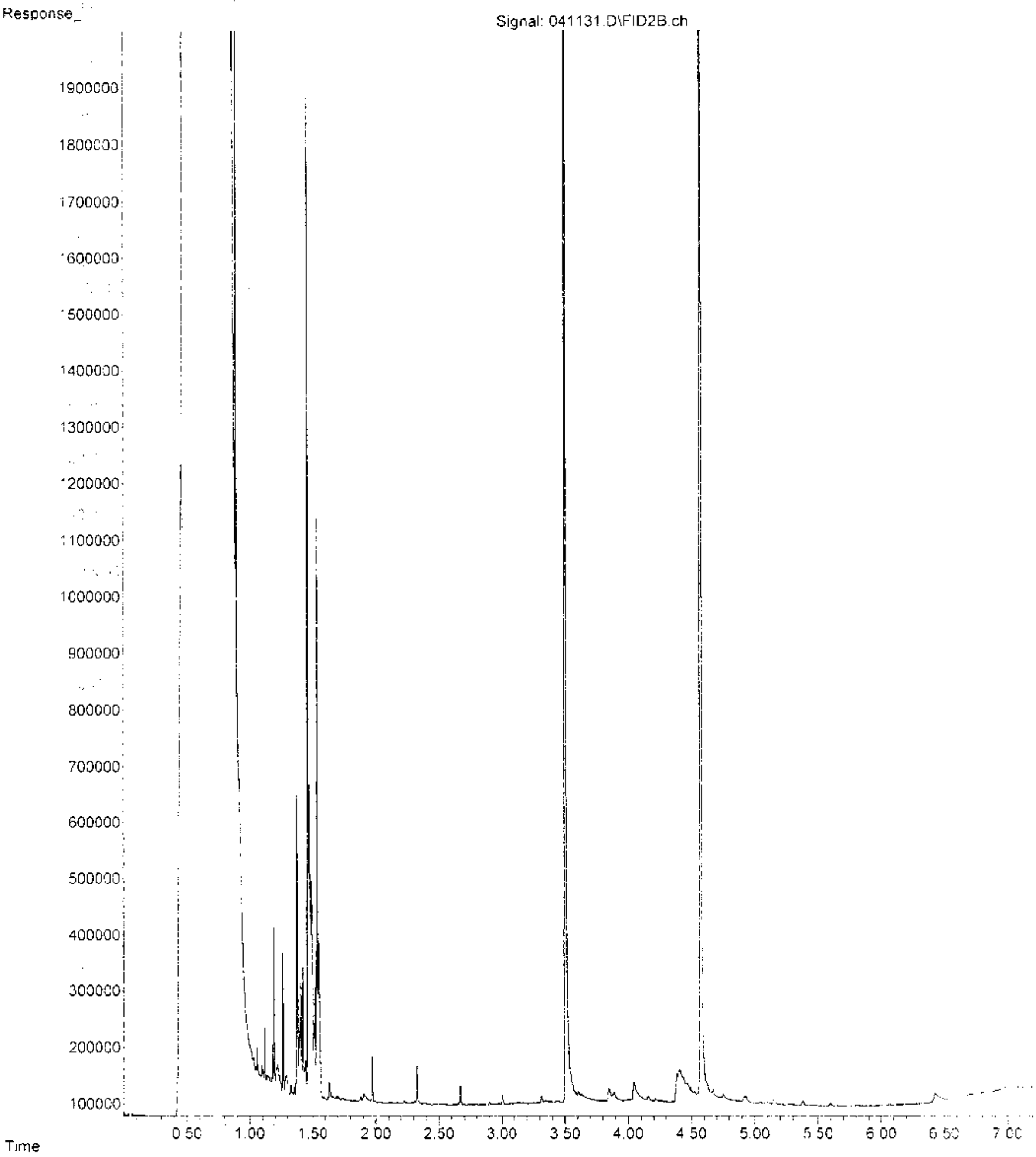
```
File       :P:\Proc_GC10\04-11-23\041129.D
Operator   : TL
Acquired   : 11 Apr 2023  02:26 pm using AcqMethod DX.M
Instrument :   GC10
Sample Name: 304125-07
Misc Info  :
Vial Number: 23
```



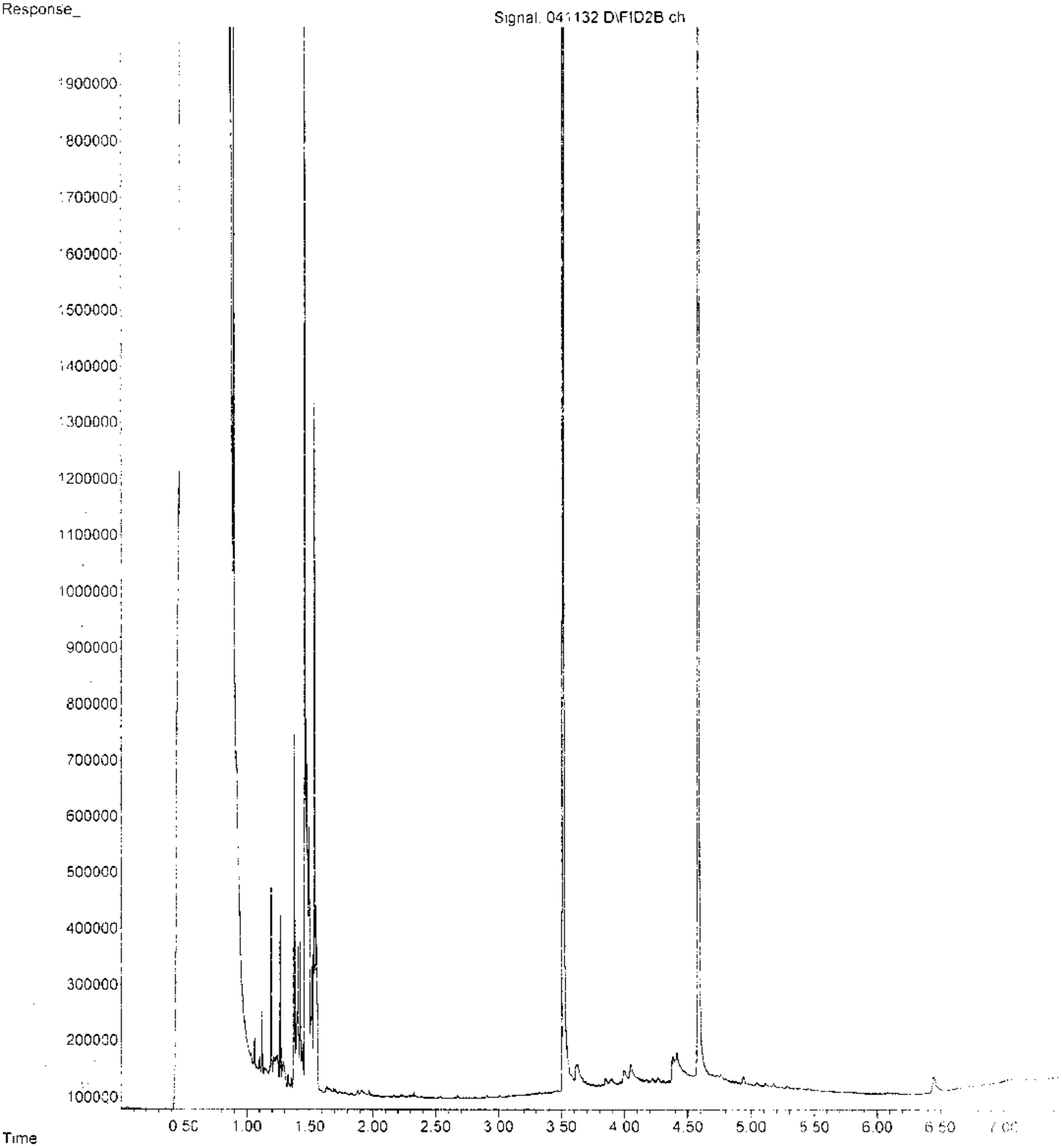
```
File        :P:\Proc_GC10\04-11-23\041130.D
Operator    : TL
Acquired    : 11 Apr 2023  02:37 pm using AcqMethod DX.M
Instrument :    GC10
Sample Name: 304125-08
Misc Info  :
Vial Number: 24
```



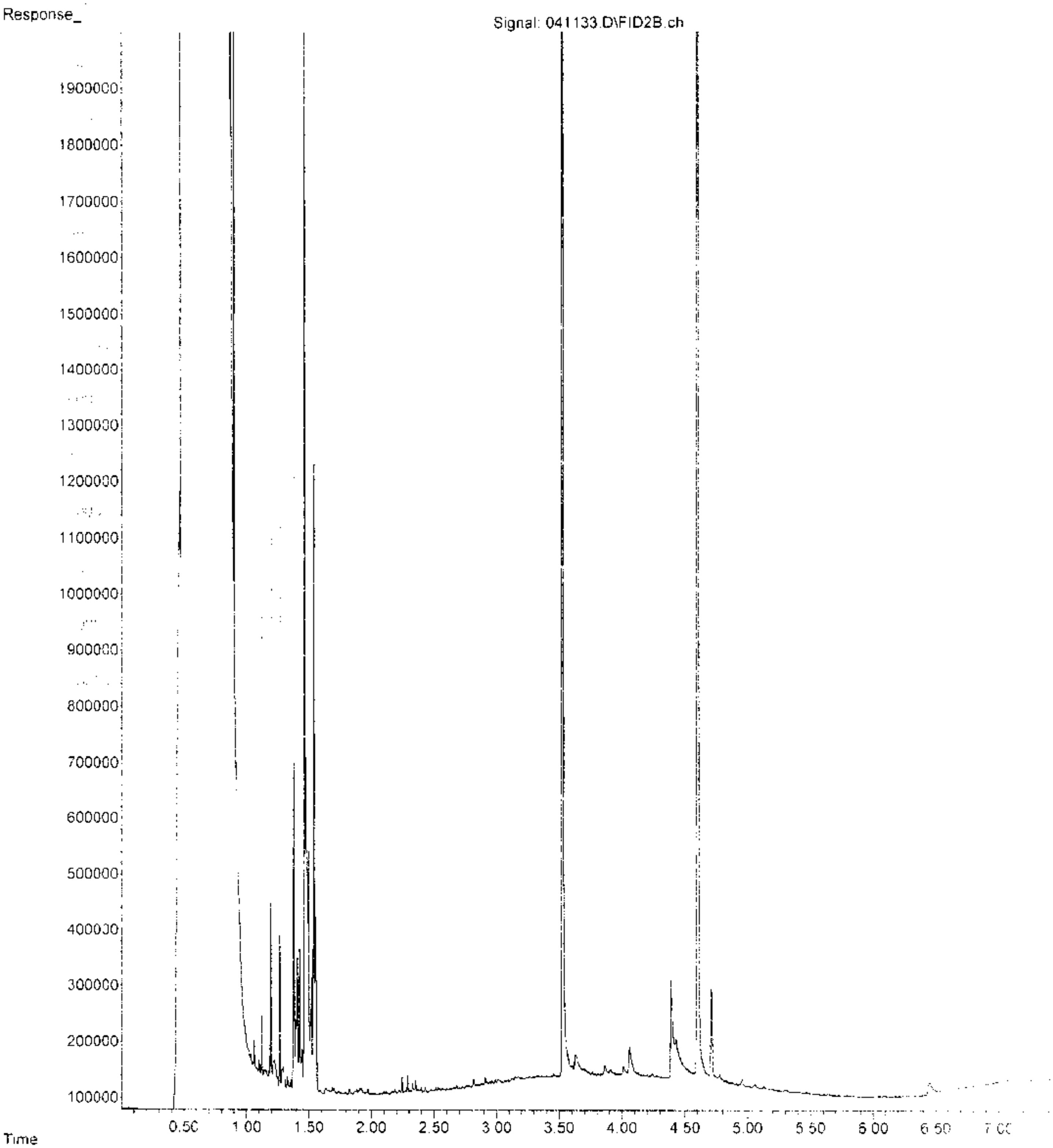
```
File       :P:\Proc GC10\04-11-23\041131.D
Operator   : TL
Acquired   : 11 Apr 2023  02:49 pm using AcqMethod DX.M
Instrument :   GC10
Sample Name: 304125-09
Misc Info  :
Vial Number: 25
```



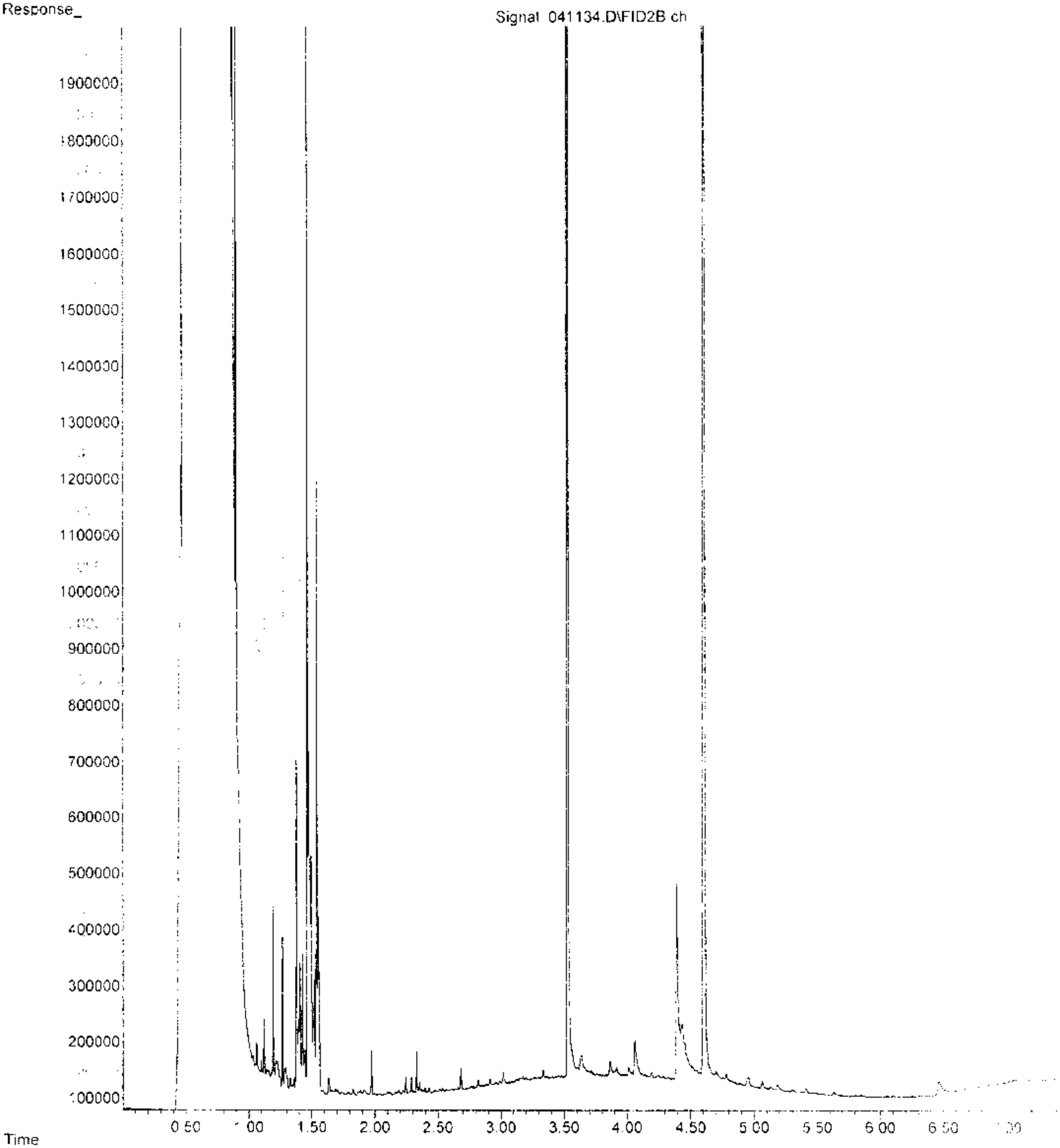
```
File       :P:\Proc_GC10\04-11-23\041132.D
Operator   : TL
Acquired   : 11 Apr 2023  03:00 pm using AcqMethod DX.M
Instrument :   GC10
Sample Name: 304125-10
Misc Info  :
Vial Number: 26
```



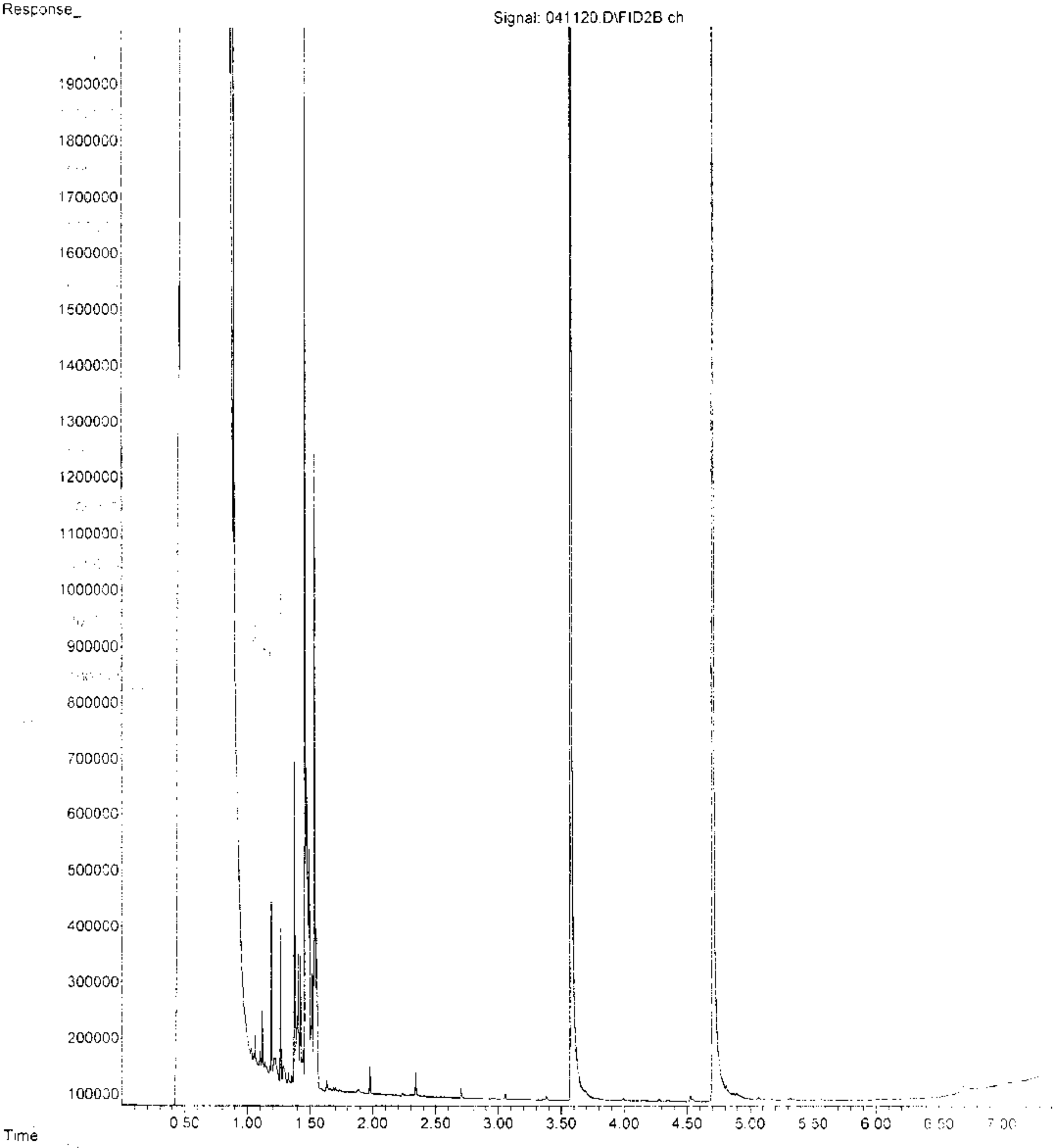
```
File        :P:\Proc_GC10\04-11-23\041133.D
Operator    : TL
Acquired    : 11 Apr 2023  03:12 pm using AcqMethod DX.M
Instrument :   GC10
Sample Name: 304125-11
Misc Info  :
Vial Number: 27
```



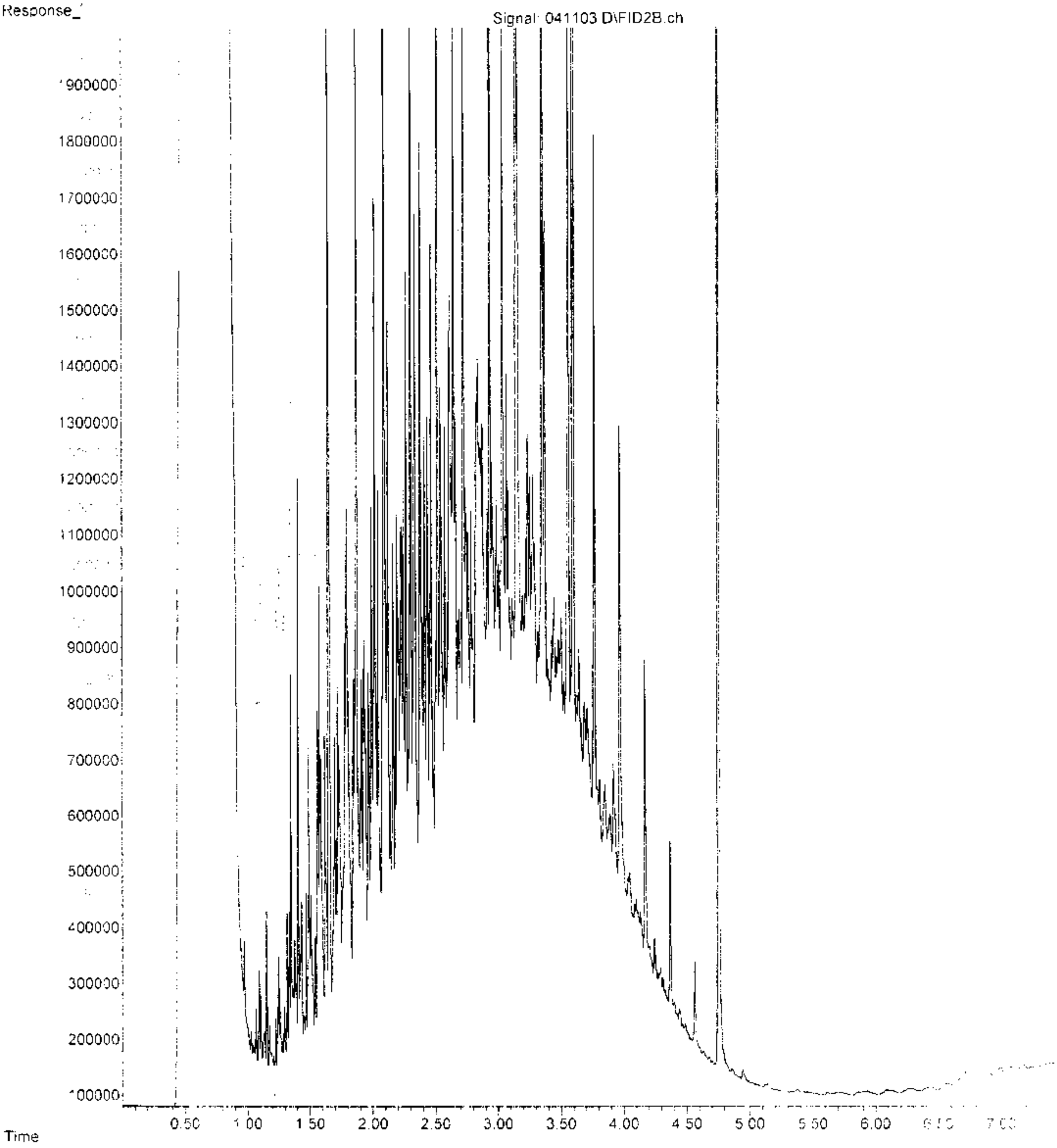
```
File        :P:\Proc_GC10\04-11-23\041134.D
Operator    : TL
Acquired    : 11 Apr 2023  03:23 pm using AcqMethod DX.M
Instrument :    GC10
Sample Name: 304125-12
Misc Info   :
Vial Number: 28
```



```
File       :P:\Proc_GC10\04-11-23\041120.D
Operator   : TL
Acquired   : 11 Apr 2023  12:42 pm using AcqMethod DX.M
Instrument :   GC10
Sample Name: 03-893 mb
Misc Info  :
Vial Number: 18
```



```
File       :P:\Proc_GC10\04-11-23\041103.D
Operator   : TL
Acquired   : 11 Apr 2023  08:02 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 500 DX 68-66F
Misc Info  :
Vial Number: 3
```



FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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Seattle, WA 98108
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fbi@isomedia.com
www.friedmanandbruya.com

July 7, 2023

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

Dear Ms Anderson:

Included are the results from the testing of material submitted on June 28, 2023 from the Cantera-TOC, F&BI 306447 project. There are 25 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: Floyd Snider Lab Data, Pamela Osterhout
FDS0707R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 28, 2023 by Friedman & Bruya, Inc. from the Floyd-Snider Cantera-TOC, F&BI 306447 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
306447 -01	01MW12-062823
306447 -02	01MW19R-062823
306447 -03	01MW35-062823
306447 -04	01MW40-062823
306447 -05	01MW84-062823
306447 -06	MW05-062823
306447 -07	01MW15-062823
306447 -08	01MW46-062823
306447 -09	01MW53-062823
306447 -10	01MW56-062823
306447 -11	01MW85-062823
306447 -12	01MW84-D-062823
306447 -13	01MW107-062823
306447 -14	TB-062823

Samples MW05-062823, 01MW46-062823, 01MW56-062823, and 01MW85-062823 were sent to Fremont Analytical for sulfide, nitrate, nitrite, and sulfate analyses. The report is enclosed.

The 8260D vinyl chloride laboratory control sample and duplicate relative percent difference was outside of control limits. The samples associated were non-detect for vinyl chloride. The data were qualified accordingly.

All other quality control requirements were acceptable.

Date of Report: 07/07/23
Date Received: 06/28/23
Project: Cantera-TOC, F&BI 306447
Date Extracted: 06/29/23
Date Analyzed: 06/30/23

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)
01MW12-062823 306447-01	110	118
01MW19R-062823 306447-02	1,300	122
01MW35-062823 306447-03	<100	113
01MW40-062823 306447-04	<100	119
01MW84-062823 306447-05	4,600	121
01MW84-D-062823 306447-12	4,300	120
Method Blank 03-1407 MB	<100	139

Date of Report: 07/07/23
Date Received: 06/28/23
Project: Cantera-TOC, F&BI 306447
Date Extracted: 06/29/23
Date Analyzed: 06/29/23

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 50-150)
01MW12-062823 306447-01	860 x	360 x	107
01MW19R-062823 306447-02	810 x	<250	116
01MW35-062823 306447-03	76 x	<250	116
01MW40-062823 306447-04	620 x	<250	118
01MW84-062823 306447-05	1,400 x	<250	129
01MW84-D-062823 306447-12	1,300 x	<250	120
Method Blank 03-1565 mb2	<50	<250	118

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW12-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	06/30/23	Lab ID:	306447-01
Date Analyzed:	06/30/23	Data File:	063021.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	78	126
Toluene-d8	103	84	115
4-Bromofluorobenzene	104	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	1.3

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW19R-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	06/30/23	Lab ID:	306447-02
Date Analyzed:	06/30/23	Data File:	063022.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	78	126
Toluene-d8	110	84	115
4-Bromofluorobenzene	109	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	2.1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW35-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	06/30/23	Lab ID:	306447-03
Date Analyzed:	06/30/23	Data File:	063023.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	78	126
Toluene-d8	105	84	115
4-Bromofluorobenzene	101	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW40-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	06/30/23	Lab ID:	306447-04
Date Analyzed:	06/30/23	Data File:	063024.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	78	126
Toluene-d8	103	84	115
4-Bromofluorobenzene	99	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW84-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	06/30/23	Lab ID:	306447-05
Date Analyzed:	06/30/23	Data File:	063025.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	78	126
Toluene-d8	105	84	115
4-Bromofluorobenzene	100	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW05-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-06 1/10
Date Analyzed:	07/03/23	Data File:	070341.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	6.9
cis-1,2-Dichloroethene	360
Trichloroethene	160
Benzene	1.5 j

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW15-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-07
Date Analyzed:	07/03/23	Data File:	070342.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	28
cis-1,2-Dichloroethene	5.7
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW46-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-08
Date Analyzed:	07/03/23	Data File:	070343.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	86	71	132
Toluene-d8	92	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	25
Benzene	4.3

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW46-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-08 1/10
Date Analyzed:	07/05/23	Data File:	070511.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	90	71	132
Toluene-d8	91	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
cis-1,2-Dichloroethene	260
Trichloroethene	280

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW53-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-09
Date Analyzed:	07/03/23	Data File:	070344.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	88	71	132
Toluene-d8	91	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.51
cis-1,2-Dichloroethene	2.9
Trichloroethene	2.0

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW56-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-10
Date Analyzed:	07/03/23	Data File:	070345.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	71	132
Toluene-d8	100	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.97
cis-1,2-Dichloroethene	<1
Trichloroethene	0.62

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW85-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-11 1/10
Date Analyzed:	07/03/23	Data File:	070346.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	101	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	13
cis-1,2-Dichloroethene	1,000
Trichloroethene	110

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW84-D-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-12
Date Analyzed:	07/04/23	Data File:	070347.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	71	132
Toluene-d8	103	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW107-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	306447-13
Date Analyzed:	07/04/23	Data File:	070348.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	90	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	TB-062823	Client:	Floyd-Snider
Date Received:	06/28/23	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	06/30/23	Lab ID:	306447-14
Date Analyzed:	06/30/23	Data File:	063014.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	108	78	126
Toluene-d8	101	84	115
4-Bromofluorobenzene	102	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	06/30/23	Lab ID:	03-1526 mb
Date Analyzed:	06/30/23	Data File:	063009.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	110	78	126
Toluene-d8	100	84	115
4-Bromofluorobenzene	103	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Cantera-TOC, F&BI 306447
Date Extracted:	07/03/23	Lab ID:	03-1530 mb
Date Analyzed:	07/03/23	Data File:	070314.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	78	126
Toluene-d8	100	84	115
4-Bromofluorobenzene	102	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Date of Report: 07/07/23
Date Received: 06/28/23
Project: Cantera-TOC, F&BI 306447

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

Laboratory Code: 306422-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	100	70-130

Date of Report: 07/07/23
Date Received: 06/28/23
Project: Cantera-TOC, F&BI 306447

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	104	116	65-151	11

Date of Report: 07/07/23
Date Received: 06/28/23
Project: Cantera-TOC, F&BI 306447

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

Laboratory Code: 306439-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	<0.02	125	50-150
cis-1,2-Dichloroethene	ug/L (ppb)	10	<1	110	10-211
Benzene	ug/L (ppb)	10	<0.35	109	50-150
Trichloroethene	ug/L (ppb)	10	<0.5	108	35-149

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	99	133	64-142	29 vo
cis-1,2-Dichloroethene	ug/L (ppb)	10	99	104	70-130	5
Benzene	ug/L (ppb)	10	100	104	70-130	4
Trichloroethene	ug/L (ppb)	10	97	102	70-130	5

Date of Report: 07/07/23
Date Received: 06/28/23
Project: Cantera-TOC, F&BI 306447

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

Laboratory Code: 306490-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	<0.02	130	50-150
cis-1,2-Dichloroethene	ug/L (ppb)	10	<1	107	10-211
Benzene	ug/L (ppb)	10	<0.35	107	50-150
Trichloroethene	ug/L (ppb)	10	<0.5	106	35-149

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	115	122	64-142	6
cis-1,2-Dichloroethene	ug/L (ppb)	10	84	88	70-130	5
Benzene	ug/L (ppb)	10	85	91	70-130	7
Trichloroethene	ug/L (ppb)	10	84	89	70-130	6

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. 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 standard reporting limit. 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.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

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.

306447

SAMPLE CHAIN OF CUSTODY

06/28/23

~~Page~~# 1 of 2 VW6/D/LS

Report To Kristin Anderson + Pamela Osterhout
Company Floyd Snider
Address 601 Union St, Suite 600
City, State, ZIP Seattle, WA 98101
Phone 206 292-2078 Email labdala@floydsnider.com

SAMPLERS (signature)

PROJECT NAME Canterra - TDC

PO #

REMARKS cVOCs by 8260

Project specific RLs? - Yes / No

INVOICE TO Pioneer

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	Benzene by 8260	TCE, cis-1,2-DCE and vinyl chloride	Nitrate, nitrite sulfate by 300.0	Sulfide by SM4500	Notes
01MW12-062823	01 A-G	6/28/23	1420	GW	7	✓	✓						✓				
01MW19R-062823	02		1308	GW	7	✓	✓						✓				
01MW35-062823	03		1555	GW	7	✓	✓						✓				
01MW40-062823	04		1515	GW	7	✓	✓						✓				
01MW84-062823	05 A-F		1440	GW	6	✓	✓						✓				
MW05-062823	06 A-H		1052	GW	8								✓	✓	✓	✓	
01MW15-062823	07 A-F		1135	GW	6									✓			
01MW46-062823	08 A-H		1000	GW	8								✓	✓	✓	✓	
01MW53-062823	09 A-C		1144	GW	3									✓			
01MW56-062823	10 A-H		0950	GW	8									✓	✓	✓	

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	C OREICO	FLOYD SNIDER	6/28/23	1802
Received by:	André Lagron	FBI	6/28/23	1802
Relinquished by:	Samples received at 3 °C			
Received by:				

306447

SAMPLE CHAIN OF CUSTODY

06/28/23 VW6/I3/L5

Report To Kristin + Pamela
Company Floyd Snider
Address
City, State, ZIP see page 1
Phone Email labdata@floydsnider.com

SAMPLERS (signature)

PROJECT NAME Cantera TOC

PO #

REMARKS

INVOICE TO Pioneer

Project specific RLs? - Yes / No

Page # 2 of 2

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

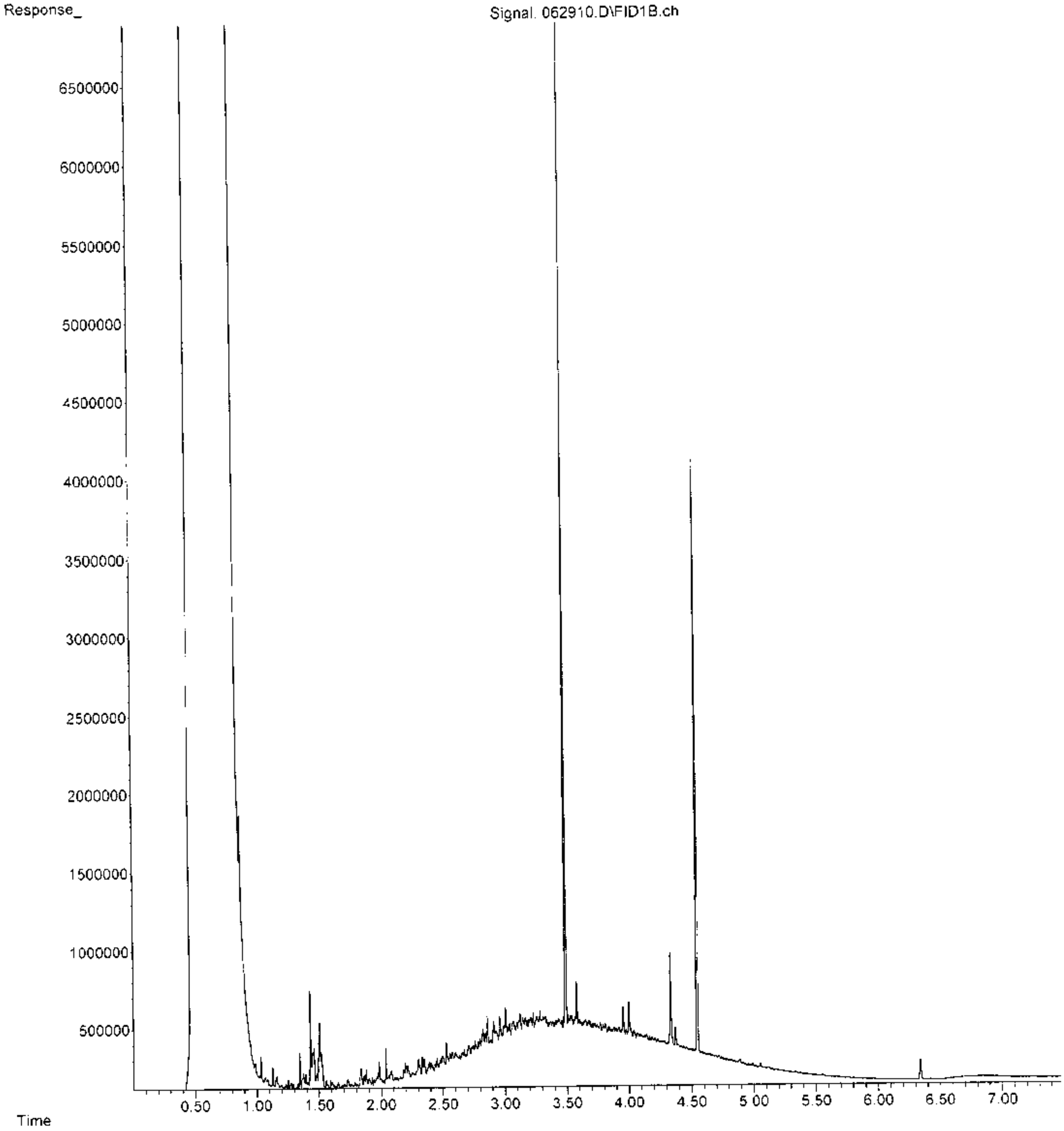
SAMPLE DISPOSAL
☐ Archive samples
☐ Other
[✓ Default]: Dispose after 30 days

						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	TCE, CIS-1,2 DCE, vinyl chloride	Nitrate, Nitrite Sulfate 300.0	Sulfide SM 4500	Benzene by 8260	Notes
01MW85-062823	~~6/28~~ 11 A-H	6/28/23	1230	GW	8								X	X	X		
01MW84-D-062823	12 A-E	↓	1443	GW	5	X	X									X	
01MW107-062823	13 A-F		1640	GW	6								X				
TB-062823	14	6/28/23	1700	TB	1								X			X	

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	G. OREIRO	FLOYD SNIDER	6/28/23	1802
Received by:	André Lagron	FBI	6/28/23	1802
Relinquished by:	Samples received at 3 °C			
Received by:				

```
File       :Q:\GC10\GC10_Data\06-29-23\062910.D
Operator   : TL
Acquired   : 29 Jun 2023  11:30 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 306447-01
Misc Info  :
Vial Number: 11
```



```
File       :Q:\GC10\GC10_Data\06-29-23\062911.D
Operator   : TL
Acquired   : 29 Jun 2023  11:42 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 306447-02
Misc Info  :
Vial Number: 12
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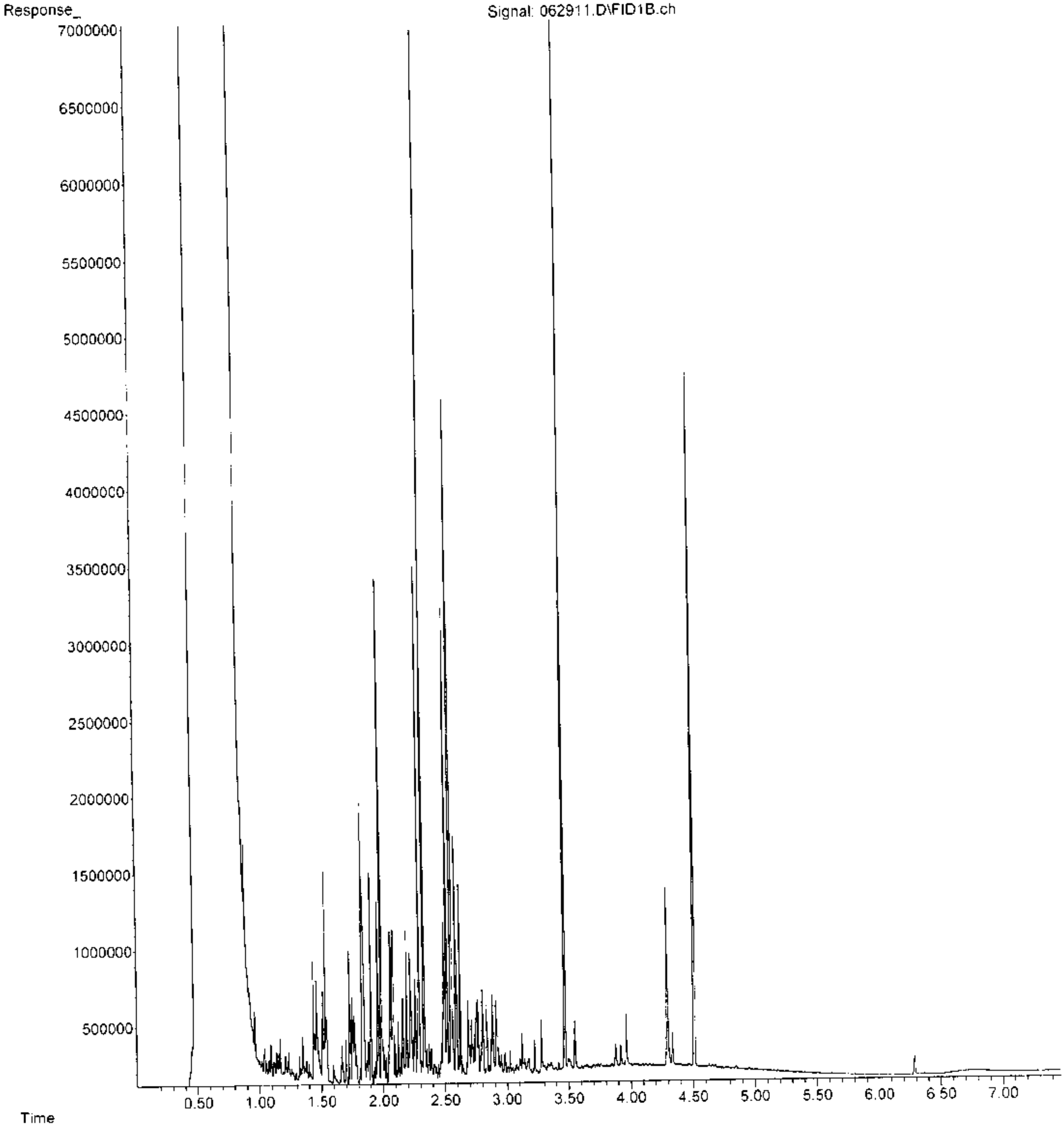

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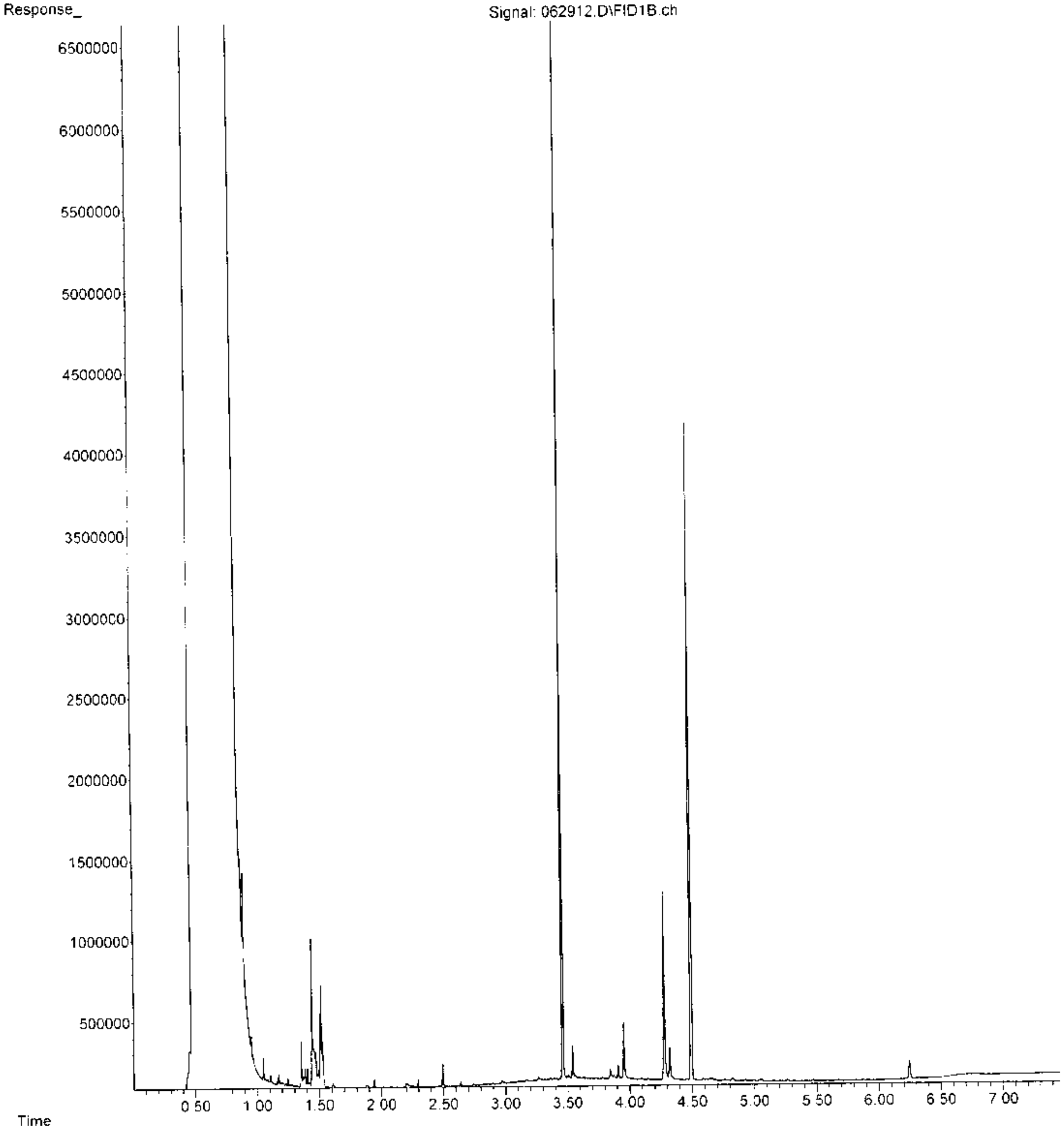
File       :Q:\GC10\GC10_Data\06-29-23\062912.D
Operator   : TL
Acquired   : 29 Jun 2023  11:54 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 306447-03
Misc Info  :
Vial Number: 13
```



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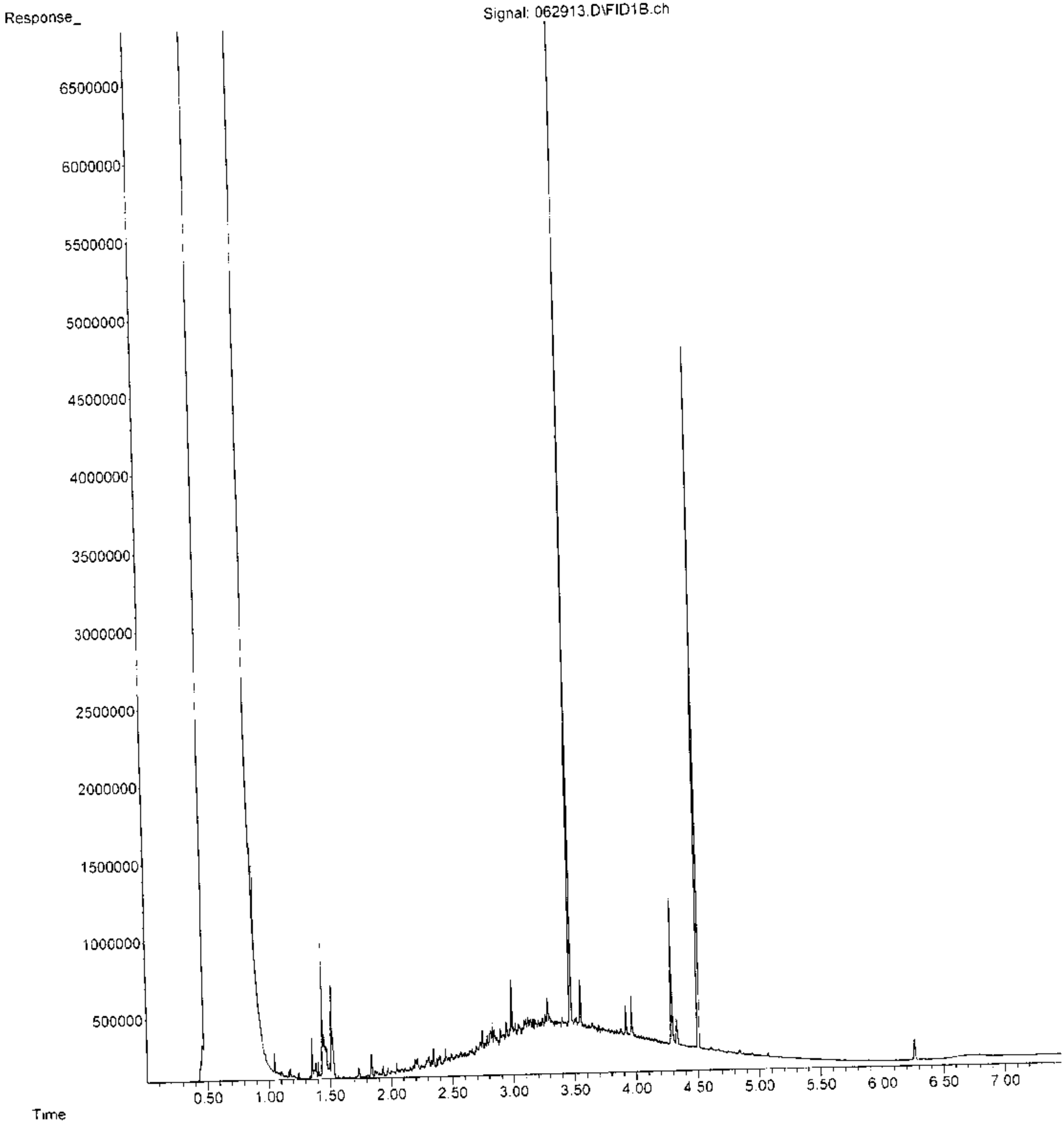
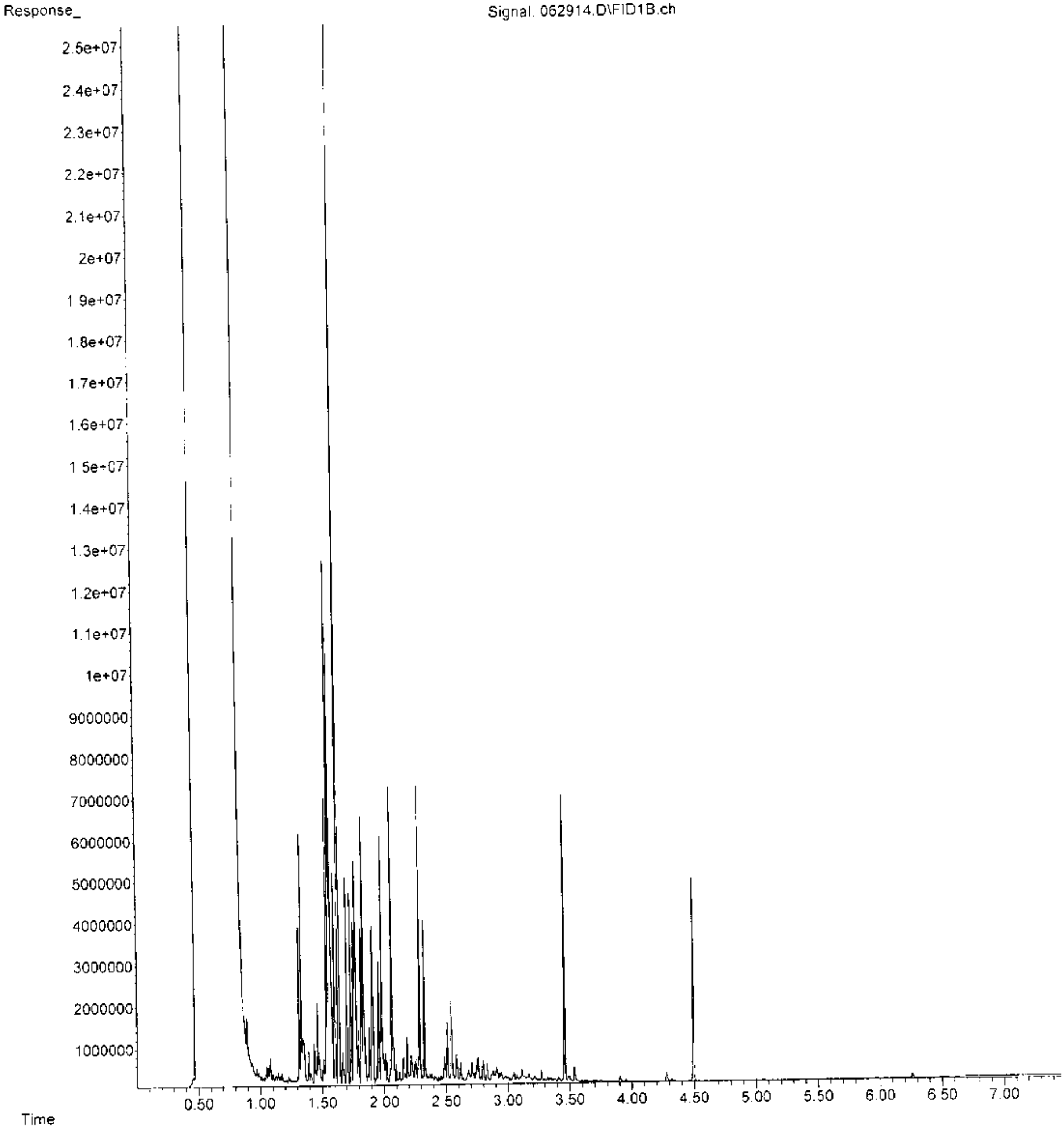
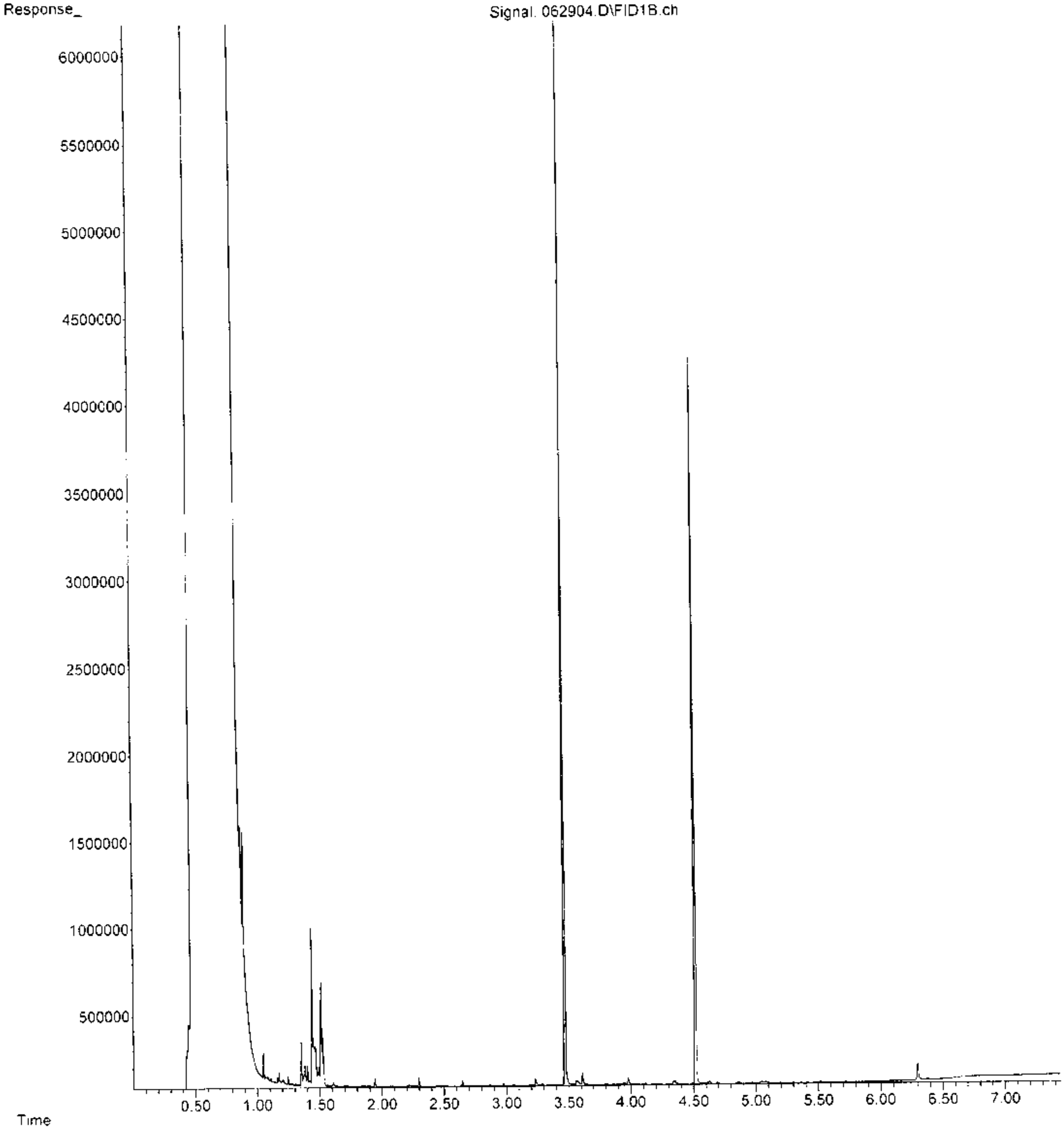
File       :Q:\GC10\GC10_Data\06-29-23\062913.D
Operator   : TL
Acquired   : 29 Jun 2023  12:05 pm using AcqMethod DX.M
Instrument :   GC10
Sample Name: 306447-04
Misc Info  :
Vial Number: 14
```



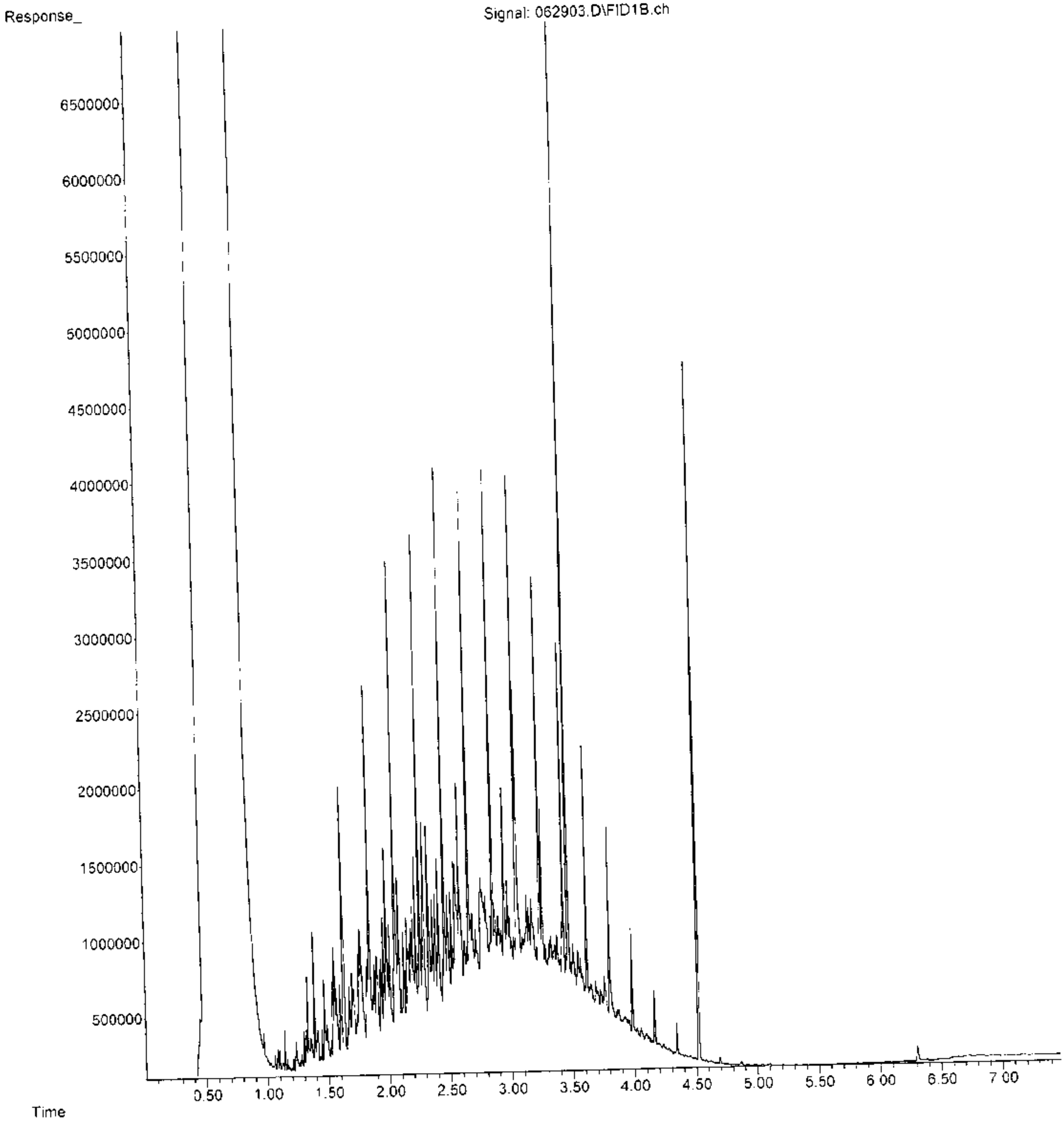
File   :Q:\GC10\GC10_Data\06-29-23\062914.D
Operator   : TL
Acquired   : 29 Jun 2023 12:17 pm using AcqMethod DX.M
Instrument :   GC10
Sample Name: 306447-05
Misc Info :
Vial Number: 15



File   :Q:\GC10\GC10_Data\06-29-23\062904.D
Operator   : TL
Acquired   : 29 Jun 2023 09:02 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 03-1565 mb2
Misc Info :
Vial Number: 6



```
File        :Q:\GC10\GC10_Data\06-29-23\062903.D
Operator    : TL
Acquired    : 29 Jun 2023  08:50 am using AcqMethod DX.M
Instrument :    GC10
Sample Name: 500 DX 68-66J
Misc Info  :
Vial Number: 3
```



An Alliance Technical Group Company
3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 306447
Work Order Number: 2306503

July 07, 2023

Attention Michael Erdahl:

Fremont Analytical, Inc. received 4 sample(s) on 6/29/2023 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0
Sulfide by SM 4500-S2-F

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

CLIENT: Friedman & Bruya
Project: 306447
Work Order: 2306503

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2306503-001	MW05-062823	06/28/2023 10:52 AM	06/29/2023 12:06 PM
2306503-002	01MW46-062823	06/28/2023 10:00 AM	06/29/2023 12:06 PM
2306503-003	01MW56-062823	06/28/2023 9:50 AM	06/29/2023 12:06 PM
2306503-004	01MW85-062823	06/28/2023 12:30 PM	06/29/2023 12:06 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2306503**

Date: **7/7/2023**

CLIENT: Friedman & Bruya

Project: 306447

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
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
MCL - Maximum Contaminant Level
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: **2306503**
Date Reported: **7/7/2023**

CLIENT: Friedman & Bruya
Project: 306447

Lab ID: 2306503-001 **Collection Date:** 6/28/2023 10:52:00 AM
Client Sample ID: **MW05-062823** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40807		Analyst: AT
Nitrite (as N)	ND	0.600	D	mg/L	5	6/29/2023 6:51:00 PM
Nitrate (as N)	ND	0.500	D	mg/L	5	6/29/2023 6:51:00 PM
Sulfate	132	30.0	D	mg/L	50	6/30/2023 9:54:00 PM

NOTES:
Diluted due to matrix.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sulfide by SM 4500-S2-F				Batch ID: R85056		Analyst: SS
Sulfide	3.60	0.500		mg/L	1	7/3/2023 11:22:17 AM

Lab ID: 2306503-002 **Collection Date:** 6/28/2023 10:00:00 AM
Client Sample ID: **01MW46-062823** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40807		Analyst: AT
Nitrite (as N)	ND	0.600	D	mg/L	5	6/29/2023 7:14:00 PM
Nitrate (as N)	ND	0.500	D	mg/L	5	6/29/2023 7:14:00 PM
Sulfate	186	30.0	D	mg/L	50	6/30/2023 10:17:00 PM

NOTES:
Diluted due to matrix.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sulfide by SM 4500-S2-F				Batch ID: R85056		Analyst: SS
Sulfide	2.40	0.500		mg/L	1	7/3/2023 11:22:17 AM

Lab ID: 2306503-003 **Collection Date:** 6/28/2023 9:50:00 AM
Client Sample ID: **01MW56-062823** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40807		Analyst: AT
Nitrite (as N)	ND	0.600	D	mg/L	5	6/29/2023 7:37:00 PM
Nitrate (as N)	0.910	0.500	D	mg/L	5	6/29/2023 7:37:00 PM
Sulfate	28.5	3.00	D	mg/L	5	6/29/2023 7:37:00 PM

NOTES:
Diluted due to matrix.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sulfide by SM 4500-S2-F				Batch ID: R85056		Analyst: SS
Sulfide	4.40	0.500		mg/L	1	7/3/2023 11:22:17 AM

Lab ID: 2306503-004 **Collection Date:** 6/28/2023 12:30:00 PM
Client Sample ID: **01MW85-062823** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40807		Analyst: AT
Nitrite (as N)	ND	0.600	D	mg/L	5	6/29/2023 8:00:00 PM
Nitrate (as N)	ND	0.500	D	mg/L	5	6/29/2023 8:00:00 PM
Sulfate	60.9	3.00	D	mg/L	5	6/29/2023 8:00:00 PM

NOTES:
Diluted due to matrix.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sulfide by SM 4500-S2-F				Batch ID: R85056		Analyst: SS
Sulfide	4.80	0.500		mg/L	1	7/3/2023 11:22:17 AM

Work Order: 2306503
CLIENT: Friedman & Bruya
Project: 306447

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-40807** SampType: **MBLK** Units: **mg/L** Prep Date: **6/29/2023** RunNo: **85091**
Client ID: **MBLKW** Batch ID: **40807** Analysis Date: **6/29/2023** SeqNo: **1776288**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	0.120									
Nitrate (as N)	ND	0.100									
Sulfate	ND	0.600									

Sample ID: **LCS-40807** SampType: **LCS** Units: **mg/L** Prep Date: **6/29/2023** RunNo: **85091**
Client ID: **LCSW** Batch ID: **40807** Analysis Date: **6/29/2023** SeqNo: **1776289**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.700	0.120	0.7500	0	93.3	90	110				
Nitrate (as N)	0.711	0.100	0.7500	0	94.8	90	110				
Sulfate	3.58	0.600	3.750	0	95.3	90	110				

Sample ID: **2306479-001BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **6/29/2023** RunNo: **85091**
Client ID: **BATCH** Batch ID: **40807** Analysis Date: **6/29/2023** SeqNo: **1776291**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	0.120						0		20	
Nitrate (as N)	ND	0.100						0		20	
Sulfate	2.29	0.600						2.332	1.82	20	

Sample ID: **2306479-001BMS** SampType: **MS** Units: **mg/L** Prep Date: **6/29/2023** RunNo: **85091**
Client ID: **BATCH** Batch ID: **40807** Analysis Date: **6/29/2023** SeqNo: **1776292**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.702	0.120	0.7500	0	93.6	80	120				
Nitrate (as N)	0.701	0.100	0.7500	0	93.5	80	120				
Sulfate	5.88	0.600	3.750	2.332	94.6	80	120				

Work Order: 2306503
CLIENT: Friedman & Bruya
Project: 306447

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2306479-001BMSD** SampType: **MSD** Units: **mg/L** Prep Date: **6/29/2023** RunNo: **85091**
Client ID: **BATCH** Batch ID: **40807** Analysis Date: **6/29/2023** SeqNo: **1776293**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.727	0.120	0.7500	0	96.9	80	120	0.7020	3.50	20	
Nitrate (as N)	0.728	0.100	0.7500	0	97.1	80	120	0.7010	3.78	20	
Sulfate	6.14	0.600	3.750	2.332	101	80	120	5.879	4.29	20	

Sample ID: **LCS-40808** SampType: **LCS** Units: **mg/L** Prep Date: **6/30/2023** RunNo: **85099**
Client ID: **LCSW** Batch ID: **40808** Analysis Date: **6/30/2023** SeqNo: **1776368**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	3.61	0.600	3.750	0	96.3	90	110				

Sample ID: **MB-40808** SampType: **MBLK** Units: **mg/L** Prep Date: **6/30/2023** RunNo: **85099**
Client ID: **MBLKW** Batch ID: **40808** Analysis Date: **6/30/2023** SeqNo: **1776370**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	0.600									

Sample ID: **2306503-002ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **6/30/2023** RunNo: **85099**
Client ID: **01MW46-062823** Batch ID: **40808** Analysis Date: **6/30/2023** SeqNo: **1776378**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	173	30.0						186.2	7.23	20	D

Sample ID: **2306503-002AMS** SampType: **MS** Units: **mg/L** Prep Date: **6/30/2023** RunNo: **85099**
Client ID: **01MW46-062823** Batch ID: **40808** Analysis Date: **6/30/2023** SeqNo: **1776379**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	352	30.0	187.5	186.2	88.4	80	120				D

Work Order: 2306503
CLIENT: Friedman & Bruya
Project: 306447

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2306503-002AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **6/30/2023** RunNo: **85099**
Client ID: **01MW46-062823** Batch ID: **40808** Analysis Date: **6/30/2023** SeqNo: **1776380**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	355	30.0	187.5	186.2	90.2	80	120	352.0	0.961	20	D

Work Order: 2306503
CLIENT: Friedman & Bruya
Project: 306447

QC SUMMARY REPORT

Sulfide by SM 4500-S2-F

Sample ID: **MB-R85056** SampType: **MBLK** Units: **mg/L** Prep Date: **7/3/2023** RunNo: **85056**
Client ID: **MBLKW** Batch ID: **R85056** Analysis Date: **7/3/2023** SeqNo: **1775518**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	ND	0.500									

Sample ID: **LCS-R85056** SampType: **LCS** Units: **mg/L** Prep Date: **7/3/2023** RunNo: **85056**
Client ID: **LCSW** Batch ID: **R85056** Analysis Date: **7/3/2023** SeqNo: **1775519**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	2.40	0.500	2.000	0	120	45.6	120				

Sample ID: **2306470-001ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **7/3/2023** RunNo: **85056**
Client ID: **BATCH** Batch ID: **R85056** Analysis Date: **7/3/2023** SeqNo: **1775521**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	2.40	0.500						1.600	40.0	30	R

NOTES:
R - High RPD observed.

Sample ID: **2306536-002AMS** SampType: **MS** Units: **mg/L** Prep Date: **7/3/2023** RunNo: **85056**
Client ID: **BATCH** Batch ID: **R85056** Analysis Date: **7/3/2023** SeqNo: **1776234**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	4.00	0.500	2.000	1.200	140	21.5	190				

Sample Log-In Check List

Client Name: FB
Work Order Number: 2306503
Logged by: Morgan Wilson
Date Received: 6/29/2023 12:06:00 PM

Chain of Custody

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

Log In

3. Custody Seals present on shipping container/cooler? Yes ☐ No ☐ Not Present ☑
(Refer to comments for Custody Seals not intact)
4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all items received at a temperature of >2°C to 6°C * Yes ☑ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☑ No ☐ NA ☐
NaOH
10. Is there headspace in the VOA vials? Yes ☐ No ☐ NA ☑
11. Did all samples containers arrive in good condition(unbroken)? Yes ☑ No ☐
12. Does paperwork match bottle labels? Yes ☑ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐

Special Handling (if applicable)

16. 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:

17. Additional remarks:

Item Information

Item #	Temp ºC
Sample	0.6

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2306503

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 merdahl@friedmanandbruya.com

SUBCONTRACTER
Fremont

PROJECT NAME/NO.	PO #
306447	D-363

REMARKS

Floyd Snider EDD

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	Nitrate	Nitrite	Sulfate	Sulfide							Notes
MW05-062823		6/28/2023	1052	water	2	x	x	x	x							
01MW46-062823		6/28/2023	1000	water	2	x	x	x	x							
01MW56-062823		6/28/2023	950	water	2	x	x	x	x							
01MW85-062823		6/28/2023	1230	water	2	x	x	x	x							

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Michael Erdahl	Friedman & Bruya	6/29/23	0812
Received by:	Emma Tuck	FAI	6/29/23	12:06
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

July 6, 2023

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

Dear Ms Anderson:

Included are the results from the testing of material submitted on June 29, 2023 from the Cantera-TOC, F&BI 306460 project. There are 17 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: Floyd Snider Lab Data, Pamela Osterhout
FDS0706R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 29, 2023 by Friedman & Bruya, Inc. from the Floyd-Snider Cantera-TOC, F&BI 306460 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
306460 -01	01MW108-062923
306460 -02	01MW49R-062923
306460 -03	02MW04R-062923
306460 -04	02MW07-062923
306460 -05	02MW19-062923

All quality control requirements were acceptable.

Date of Report: 07/06/23
Date Received: 06/29/23
Project: Cantera-TOC, F&BI 306460
Date Extracted: 07/03/23
Date Analyzed: 07/03/23

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)
01MW49R-062923 306460-02	<100	116
02MW04R-062923 306460-03	<100	110
02MW07-062923 306460-04	<100	112
02MW19-062923 306460-05	<100	116
Method Blank 03-1412 MB	<100	107

Date of Report: 07/06/23
Date Received: 06/29/23
Project: Cantera-TOC, F&BI 306460
Date Extracted: 06/30/23
Date Analyzed: 06/30/23

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 50-150)
01MW49R-062923 306460-02	160 x	<250	120
02MW04R-062923 306460-03	65 x	<250	113
02MW07-062923 306460-04	76 x	<250	116
02MW19-062923 306460-05	76 x	<250	118
Method Blank 03-1570 MB2	<50	<250	108

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW07-062923	Client:	Floyd-Snider
Date Received:	06/29/23	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	06/29/23	Lab ID:	306460-04
Date Analyzed:	06/30/23	Data File:	306460-04.120
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.13

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW19-062923	Client:	Floyd-Snider
Date Received:	06/29/23	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	06/29/23	Lab ID:	306460-05
Date Analyzed:	06/30/23	Data File:	306460-05.123
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	4.24

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	06/29/23	Lab ID:	I3-521 mb
Date Analyzed:	06/30/23	Data File:	I3-521 mb.042
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW108-062923	Client:	Floyd-Snider
Date Received:	06/29/23	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	07/03/23	Lab ID:	306460-01
Date Analyzed:	07/03/23	Data File:	070340.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	71	132
Toluene-d8	92	68	139
4-Bromofluorobenzene	102	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.065
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW49R-062923	Client:	Floyd-Snider
Date Received:	06/29/23	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	07/03/23	Lab ID:	306460-02
Date Analyzed:	07/03/23	Data File:	070322.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	101	84	115
4-Bromofluorobenzene	107	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW04R-062923	Client:	Floyd-Snider
Date Received:	06/29/23	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	07/03/23	Lab ID:	306460-03
Date Analyzed:	07/03/23	Data File:	070323.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	78	126
Toluene-d8	102	84	115
4-Bromofluorobenzene	107	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	29

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW07-062923	Client:	Floyd-Snider
Date Received:	06/29/23	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	07/03/23	Lab ID:	306460-04
Date Analyzed:	07/03/23	Data File:	070324.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	78	126
Toluene-d8	99	84	115
4-Bromofluorobenzene	103	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW19-062923	Client:	Floyd-Snider
Date Received:	06/29/23	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	07/03/23	Lab ID:	306460-05
Date Analyzed:	07/03/23	Data File:	070325.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	78	126
Toluene-d8	99	84	115
4-Bromofluorobenzene	98	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Cantera-TOC, F&BI 306460
Date Extracted:	07/03/23	Lab ID:	03-1527 mb
Date Analyzed:	07/03/23	Data File:	070308.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	101	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Date of Report: 07/06/23
Date Received: 06/29/23
Project: Cantera-TOC, F&BI 306460

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

Laboratory Code: 306460-05 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	97	70-130

Date of Report: 07/06/23
Date Received: 06/29/23
Project: Cantera-TOC, F&BI 306460

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	108	116	65-151	7

Date of Report: 07/06/23
Date Received: 06/29/23
Project: Cantera-TOC, F&BI 306460

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

Laboratory Code: 306460-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	1.13	108	103	75-125	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	97	80-120

Date of Report: 07/06/23
Date Received: 06/29/23
Project: Cantera-TOC, F&BI 306460

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

Laboratory Code: 306440-06 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	<0.02	107	16-176
cis-1,2-Dichloroethene	ug/L (ppb)	10	<1	102	50-150
Benzene	ug/L (ppb)	10	<0.35	104	50-150
Trichloroethene	ug/L (ppb)	10	<0.5	106	43-133

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	96	96	43-149	0
cis-1,2-Dichloroethene	ug/L (ppb)	10	98	103	70-130	5
Benzene	ug/L (ppb)	10	101	105	70-130	4
Trichloroethene	ug/L (ppb)	10	102	105	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, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. 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 standard reporting limit. 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.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

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.

306460

SAMPLE CHAIN OF CUSTODY

06/29/23 VW2/I3/L2

Page # 1 of 1

Report To Kristin Anderson + Pamela Osterhout

Company Floyd Snider

Address 601 Union St, Suite 600

City, State, ZIP Seattle, WA 98101

Phone 206 292-2078 Email

SAMPLERS (*signature*)

PROJECT NAME	PO #
Cantera - TDC	

REMARKS	INVOICE TO
CVOCs + Benzene by 8260 Project specific RLs? - Yes / No	Pioneer

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	TCE, cis-1,2-DCE + vinyl chloride	Benzene by 8260	Total Arsenic by 6020B		Notes
01MW108-062923	01 A-F	6/29/23	09:45	GW	6								✓				
01MW49R-062923	02 A-G	|	10:55	|	7	✓	✓							✓			
02MW04R-062923	03 ↓	|	11:30	|	7	✓	✓							✓			
02MW07-062923	04 A-H	|	12:42	|	8	✓	✓							✓	✓		
02MW19-062923	05 ↓	⊥	11:55	⊥	8	✓	✓							✓	✓		

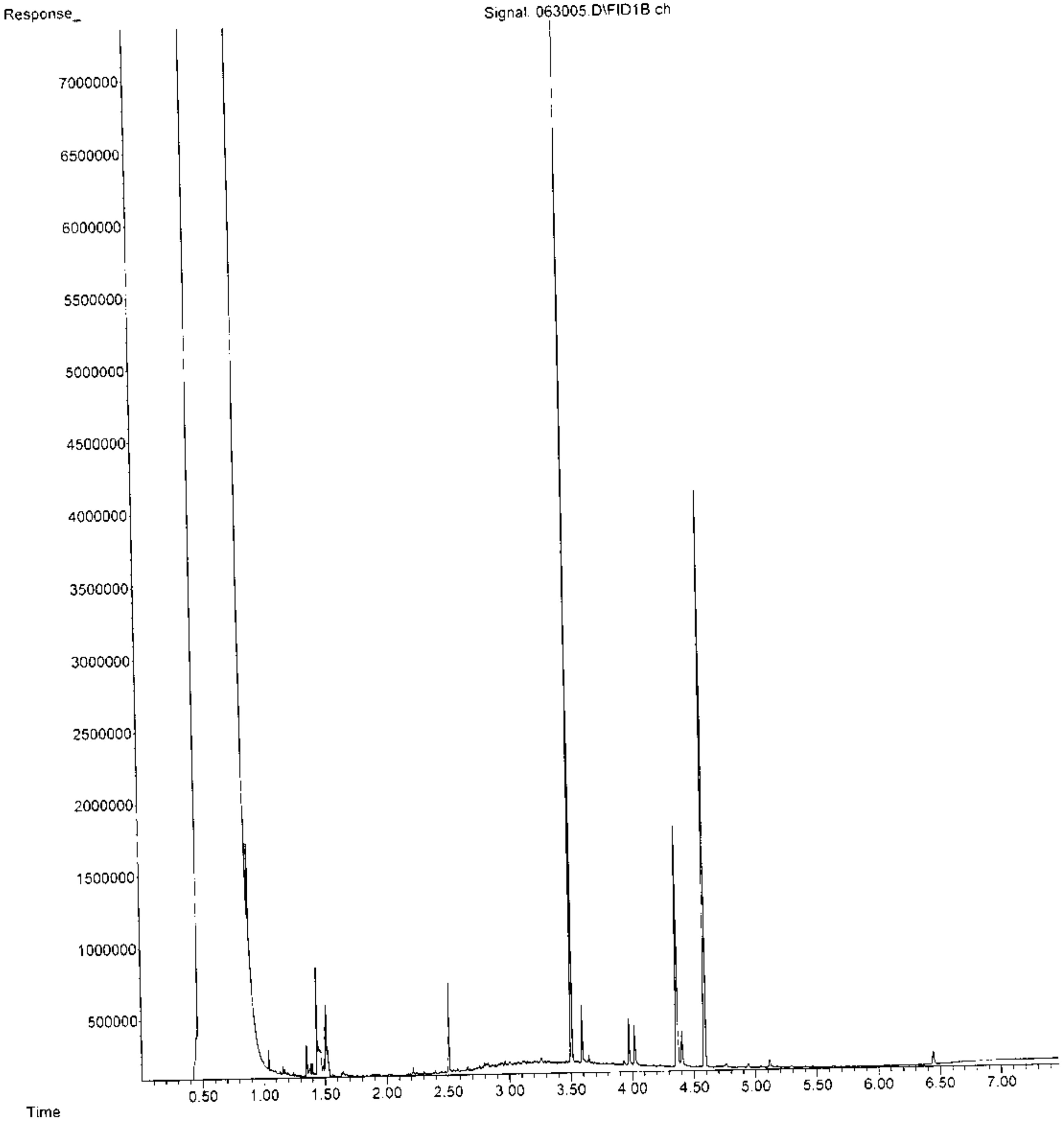
PO

Samples received at 3 °C

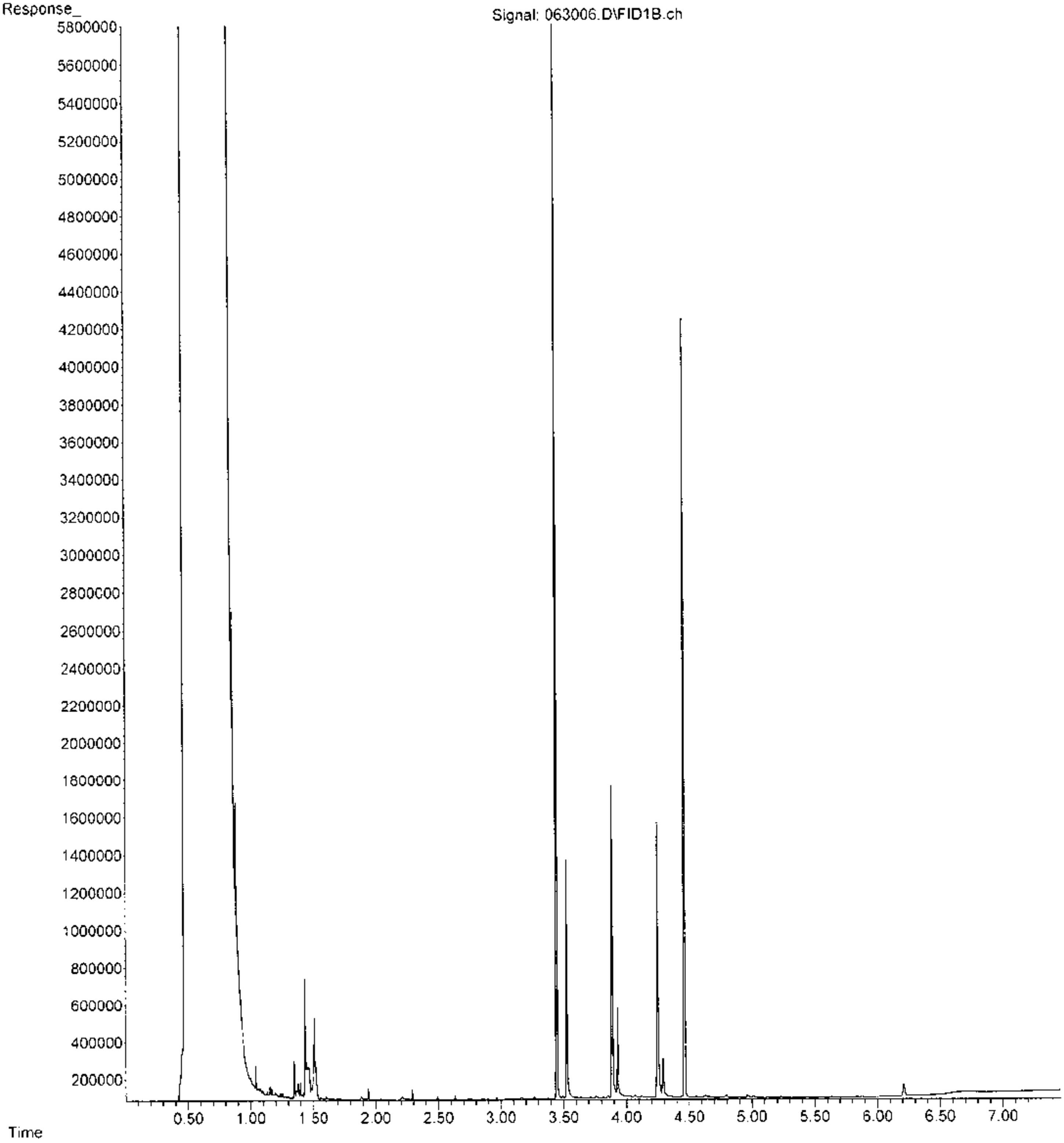
Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	meg mccann	Floyd / Snider	6/29/23	13:35
Received by:	DeeDee Webber	F&BI	6/29	13:35
Relinquished by:				
Received by:				

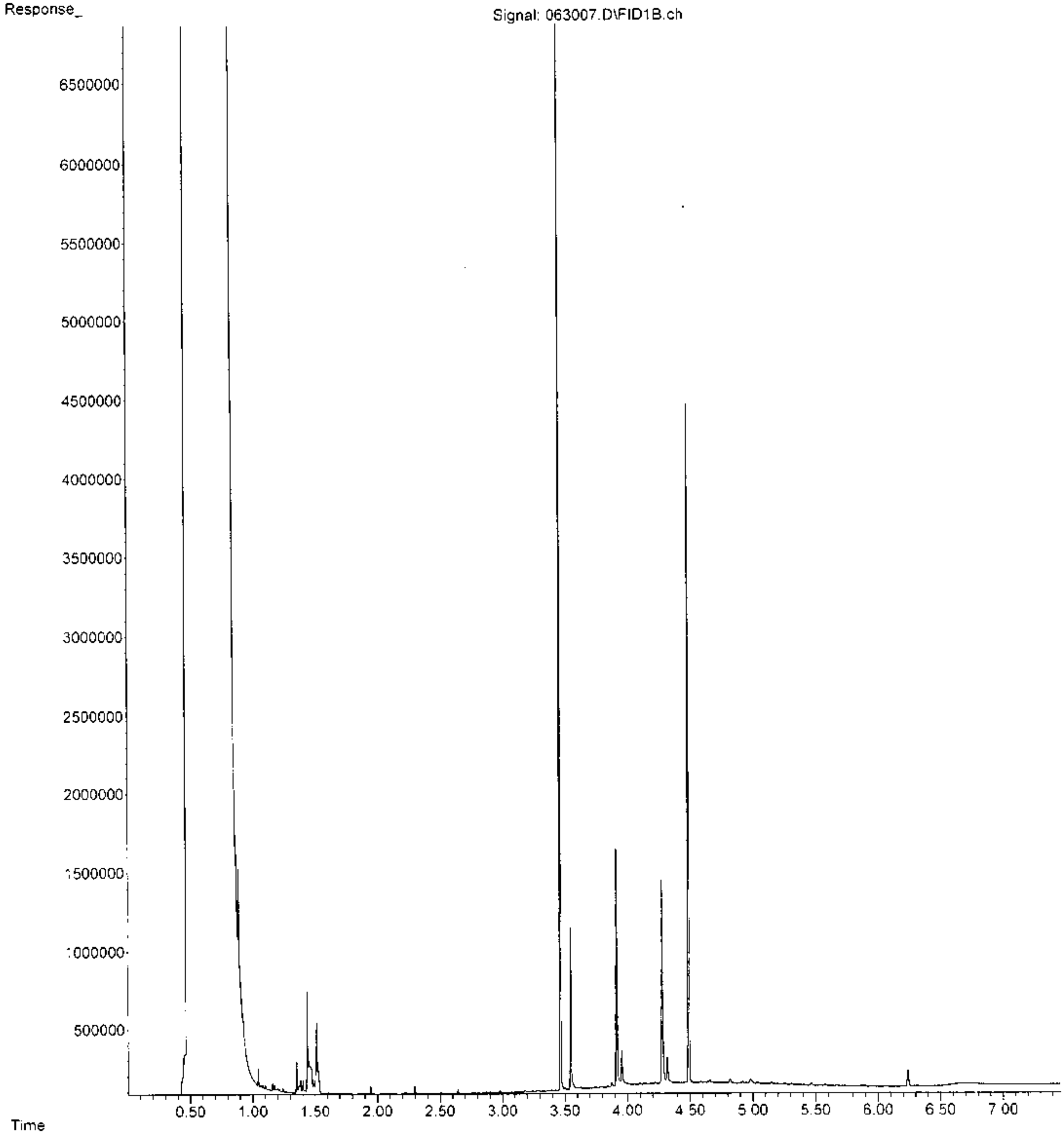
```
File        :P:\Proc_GC10\06-30-23\063005.D
Operator    : TL
Acquired    : 30 Jun 2023  08:59 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 306460-02
Misc Info   :
Vial Number: 7
```



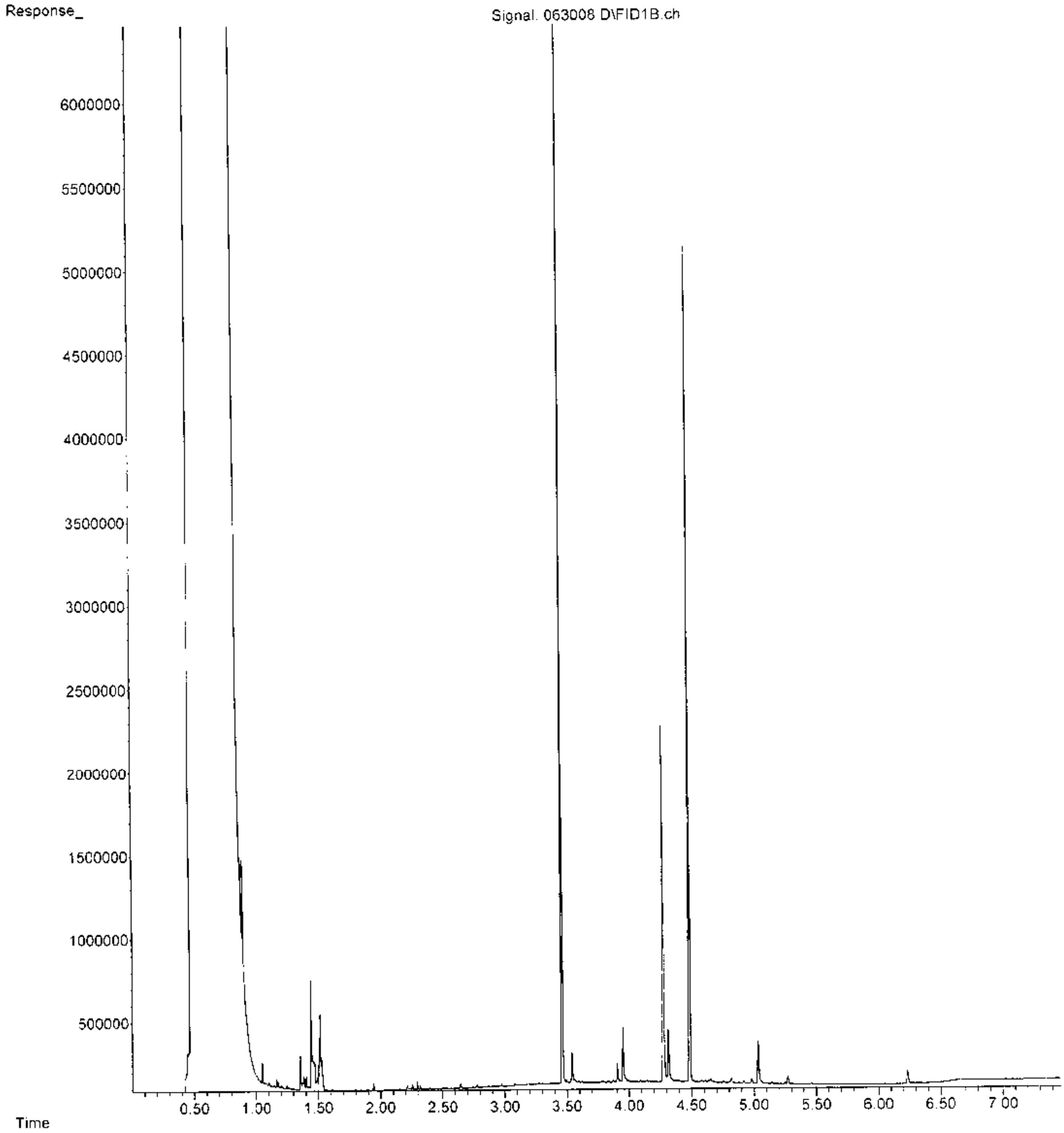
```
File        :P:\Proc_GC10\06-30-23\063006.D
Operator    : TL
Acquired    : 30 Jun 2023  09:11 am using AcqMethod DX.M
Instrument :    GC10
Sample Name: 306460-03
Misc Info  :
Vial Number: 8
```



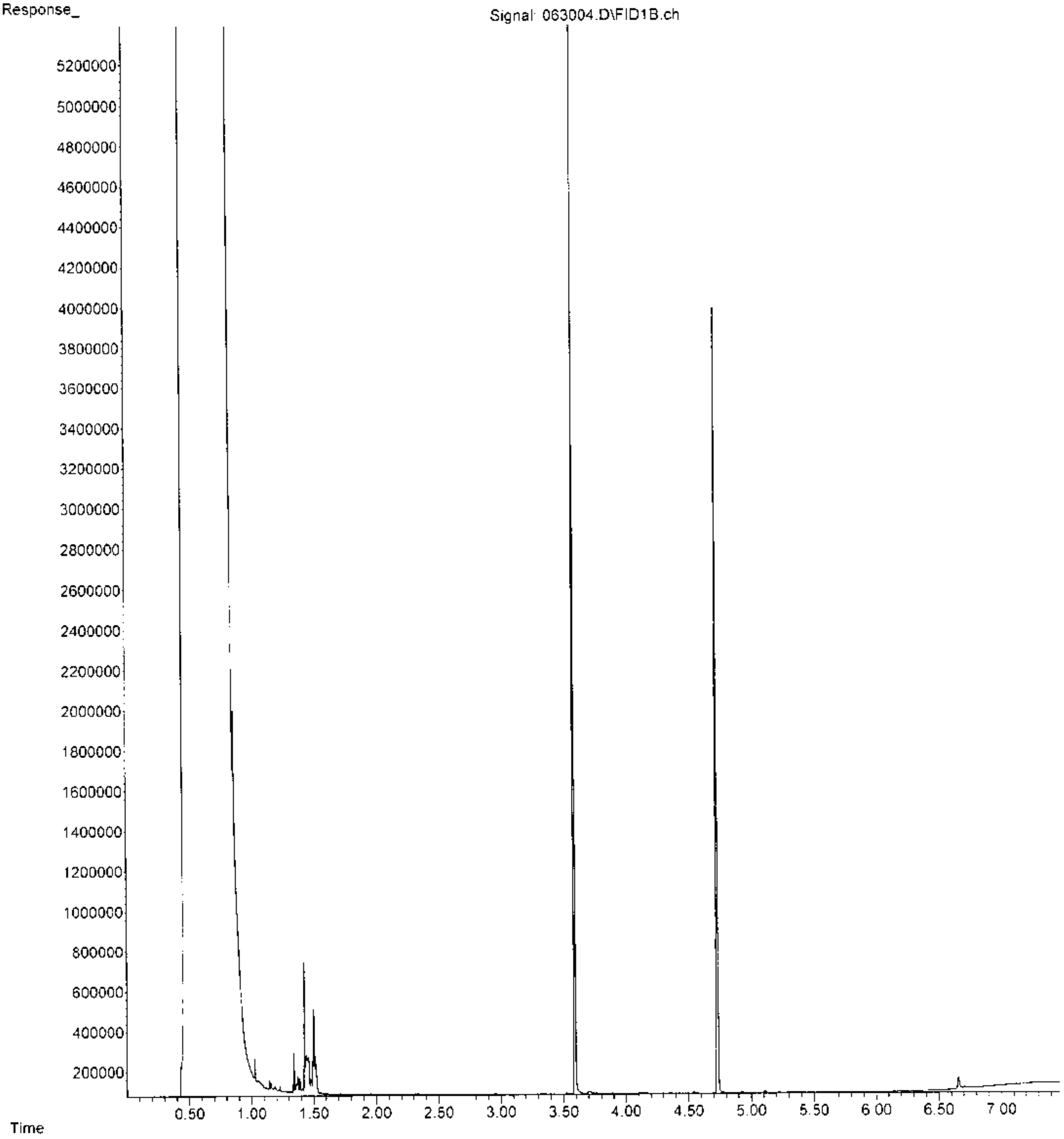
```
File       :P:\Proc_GC10\06-30-23\063007.D
Operator   : TL
Acquired   : 30 Jun 2023  09:23 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 306460-04
Misc Info  :
Vial Number: 9
```



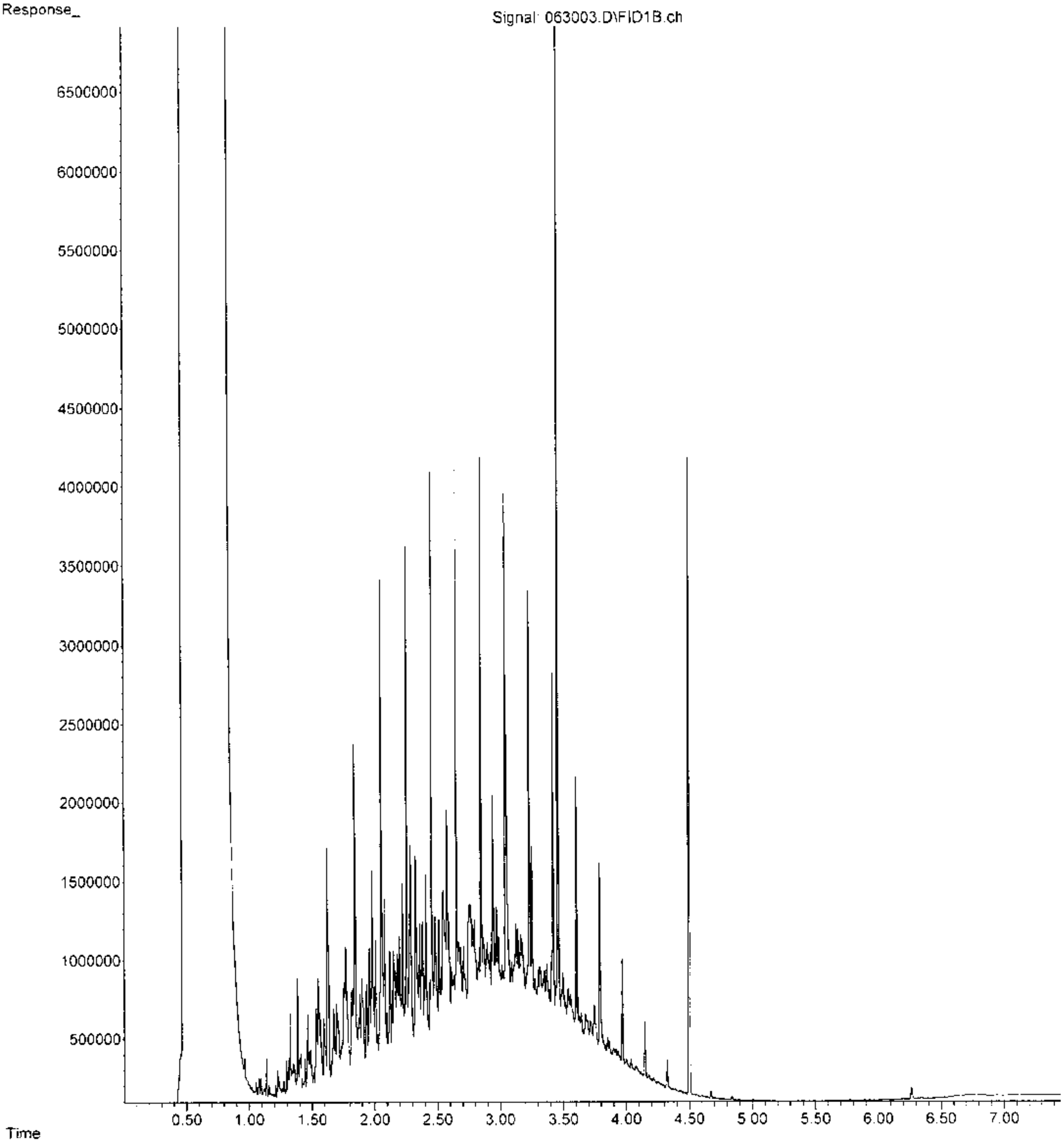
File   :P:\Proc_GC10\06-30-23\063008.D
Operator   : TL
Acquired   : 30 Jun 2023 09:34 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 306460-05
Misc Info :
Vial Number: 10



```
File        :P:\Proc_GC10\06-30-23\063004.D
Operator    : TL
Acquired    : 30 Jun 2023  08:48 am using AcqMethod DX.M
Instrument :    GC10
Sample Name: 03-1570 mb2
Misc Info  :
Vial Number: 6
```



```
File       :P:\Proc_GC10\06-30-23\063003.D
Operator   : TL
Acquired   : 30 Jun 2023  07:10 am using AcqMethod DX.M
Instrument :   GC10
Sample Name: 500 DX 68-66J
Misc Info  :
Vial Number: 3
```



FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

October 19, 2023

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

Dear Ms Osterhout:

Included are the results from the testing of material submitted on October 10, 2023 from the Cantera-TOC, F&BI 310168 project. There are 24 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: Floyd Snider Lab Data
FDS1019R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 10, 2023 by Friedman & Bruya, Inc. from the Floyd-Snider Cantera-TOC, F&BI 310168 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
310168 -01	01MW46-101023
310168 -02	01MW19R-101023
310168 -03	01MW53-101023
310168 -04	01MW85-101023
310168 -05	01MW107-101023
310168 -06	01MW35-101023
310168 -07	01MW84-101023
310168 -08	02MW04R-101023
310168 -09	02MW19-101023
310168 -10	02MW07-101023
310168 -11	01MW19R-D-101023
310168 -12	TB-101023

Sample 01MW85-101023 was sent to Onsite Environmental for RSK dissolved gases analysis. The report is enclosed.

All quality control requirements were acceptable.

Date of Report: 10/19/23
Date Received: 10/10/23
Project: Cantera-TOC, F&BI 310168
Date Extracted: 10/12/23
Date Analyzed: 10/12/23

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)
01MW19R-101023 310168-02	1,200	124
01MW35-101023 310168-06	<100	102
01MW84-101023 310168-07	3,500	105
02MW04R-101023 310168-08	<100	100
02MW19-101023 310168-09	<100	93
02MW07-101023 310168-10	<100	94
01MW19R-D-101023 310168-11	1,200	119
Method Blank 03-2235 MB	<100	102

Date of Report: 10/19/23
Date Received: 10/10/23
Project: Cantera-TOC, F&BI 310168
Date Extracted: 10/12/23
Date Analyzed: 10/17/23

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 50-150)
01MW19R-101023 310168-02	890 x	<250	118
01MW35-101023 310168-06	56 x	<250	139
01MW84-101023 310168-07	1,500 x	<250	126
02MW04R-101023 310168-08	<50	<250	132
02MW19-101023 310168-09	81 x	<250	136
02MW07-101023 310168-10	73 x	<250	139
01MW19R-D-101023 310168-11	920 x	<250	131
Method Blank 03-2400 MB	<50	<250	121

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW19-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/11/23	Lab ID:	310168-09
Date Analyzed:	10/11/23	Data File:	310168-09.151
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	3.13

Analysis For Total Metals By EPA Method 6020B

Client ID:	02MW07-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/11/23	Lab ID:	310168-10
Date Analyzed:	10/11/23	Data File:	310168-10.152
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.24

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Floyd-Snider
Date Received:	NA	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/11/23	Lab ID:	I3-804 mb
Date Analyzed:	10/11/23	Data File:	I3-804 mb.086
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW46-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-01 1/10
Date Analyzed:	10/12/23	Data File:	101221.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	71	132
Toluene-d8	109	68	139
4-Bromofluorobenzene	101	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	36
cis-1,2-Dichloroethene	400
Trichloroethene	300
Benzene	4.8

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW19R-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-02
Date Analyzed:	10/12/23	Data File:	101223.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	78	126
Toluene-d8	104	84	115
4-Bromofluorobenzene	108	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	1.6

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW53-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-03
Date Analyzed:	10/12/23	Data File:	101213.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	107	71	132
Toluene-d8	110	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.59
cis-1,2-Dichloroethene	2.4
Trichloroethene	1.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW85-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-04 1/10
Date Analyzed:	10/12/23	Data File:	101222.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	71	132
Toluene-d8	116	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	18
cis-1,2-Dichloroethene	1,100
Trichloroethene	13

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW107-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-05
Date Analyzed:	10/12/23	Data File:	101214.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	71	132
Toluene-d8	99	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW35-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-06
Date Analyzed:	10/12/23	Data File:	101215.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	71	132
Toluene-d8	112	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID: 01MW84-101023
Date Received: 10/10/23
Date Extracted: 10/12/23
Date Analyzed: 10/12/23
Matrix: Water
Units: ug/L (ppb)

Client: Floyd-Snider
Project: Cantera-TOC, F&BI 310168
Lab ID: 310168-07
Data File: 101216.D
Instrument: GCMS13
Operator: MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	71	132
Toluene-d8	113	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW04R-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-08
Date Analyzed:	10/12/23	Data File:	101217.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	71	132
Toluene-d8	110	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW19-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-09
Date Analyzed:	10/12/23	Data File:	101218.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	110	71	132
Toluene-d8	111	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	02MW07-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-10
Date Analyzed:	10/12/23	Data File:	101219.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	71	132
Toluene-d8	113	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	01MW19R-D-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-11
Date Analyzed:	10/12/23	Data File:	101220.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	71	132
Toluene-d8	118	68	139
4-Bromofluorobenzene	102	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	1.8

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	TB-101023	Client:	Floyd-Snider
Date Received:	10/10/23	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	310168-12
Date Analyzed:	10/12/23	Data File:	101212.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	113	71	132
Toluene-d8	113	68	139
4-Bromofluorobenzene	102	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Cantera-TOC, F&BI 310168
Date Extracted:	10/12/23	Lab ID:	03-2330 mb
Date Analyzed:	10/12/23	Data File:	101208.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	78	126
Toluene-d8	92	84	115
4-Bromofluorobenzene	99	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Benzene	<0.35

Date of Report: 10/19/23
Date Received: 10/10/23
Project: Cantera-TOC, F&BI 310168

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

Laboratory Code: 310168-06 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	110	70-130

Date of Report: 10/19/23
Date Received: 10/10/23
Project: Cantera-TOC, F&BI 310168

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	112	120	65-151	7

Date of Report: 10/19/23
Date Received: 10/10/23
Project: Cantera-TOC, F&BI 310168

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

Laboratory Code: 310160-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	37.8	102 b	90 b	75-125	12 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	91	80-120

Date of Report: 10/19/23
Date Received: 10/10/23
Project: Cantera-TOC, F&BI 310168

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

Laboratory Code: 310168-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	0.41	95	50-150
cis-1,2-Dichloroethene	ug/L (ppb)	10	2.8	105 b	10-211
Benzene	ug/L (ppb)	10	1.6	104	50-150
Trichloroethene	ug/L (ppb)	10	<0.5	102	35-149

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	91	91	64-142	0
cis-1,2-Dichloroethene	ug/L (ppb)	10	99	100	70-130	1
Benzene	ug/L (ppb)	10	103	103	70-130	0
Trichloroethene	ug/L (ppb)	10	98	98	70-130	0

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, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. 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 standard reporting limit. 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.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

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.

310168

SAMPLE CHAIN OF CUSTODY 10/10/23 vw5/c2/J1

[redacted] Page # 1 of 2

[redacted] Report To Pam Osterhout / labdata@floydsnider.com
Company Floyd Snider
Address 601 Union St
City, State, ZIP Seattle, WA 98101
Phone 206-292-2078 Email labdata@floydsnider.com

SAMPLERS (*signature*) CO, PO

PROJECT NAME	PO #
Cantera-TOC	

REMARKS	INVOICE TO
Sub RSK-175 to Onsite for methane, ethane + ethene Project specific RLs? - Yes / No	Pioneer

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	cVOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	BENZENE (8260)	DISSOLVED GASES RSK 175	ARSENIC 6020B		Notes
~~01MW46-101023~~																	cVOCs = TCE, VC
01MW46-101023	01 A-F	10/10/23	0930	WATER	6					X			X				cis 1,2 DCE per PO 10/11/23
01MW19R-101023	02 A-G	↓	0945	↓	7	X	X						X				ME
01MW53-101023	03 A-C		1022		3					X			~~X~~ PO				cVOCs only
01MW85-101023	04 A-F		11:11		6					X				X			Sub to onsite for low RL's (diss. gases only)
01MW107-101023	05 A-C		1112		3					X							
01MW35-101023	06 A-G		1243		7	X	X						X				
01MW84-101023	07 A-G		1244		7	X	X						X				
~~01M~~ 02MW04R-101023	08 A-G		1356		7	X	X						X				
02MW19-101023	09 A-H		1402		8	X	X						X		X		
02MW07-101023	10 A-H	↓	1513	↓	8	X	X						X		X		

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	C. OBEIRO	FLOYDSNIDER	10/10/23	1727
Received by:	JOE MOHAMMED	FBI	10/10/23	1727
Relinquished by:		Samples received at 2 °C		
Received by:				

310168

SAMPLE CHAIN OF CUSTODY

10/10/23 VW5/C2/JI

Page # 2 of 2

Report To PAM OSTERHOUT | labdata@floydsnider.com
Company FLOYD SNIDER
Address 601 UNION ST
City, State, ZIP SEATTLE, WA 98101
Phone 206-292-2078 Email labdata@floydsnider.com

SAMPLERS (*signature*) PO, CO

PROJECT NAME	PO #
Cantera-Toc	

REMARKS	INVOICE TO
Project specific RLs? - Yes / No	Pioneer

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	BENZENE (8260)				Notes
01MW19R-D-101023	11 A-D	10/10/23	1010	WATER	4	X	X						X				
TB-101023	12 A-B	10/10/23	1700	WATER	2					X			X				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	C. CORREIRO	FLOYD SNIDER	10/10/23	1727
Received by:	JOE MOHAMMED	FBI	10/10/23	1727
Relinquished by:		Samples received at 2 °C		
Received by:				

```
File        :D:\GC14\GC14_Data\10-16-23\101691.D
Operator    : TL
Acquired    : 17 Oct 2023  03:37 am using AcqMethod DX.M
Instrument :   GC14
Sample Name: 310168-02 rr
Misc Info  :                                                ERR
Vial Number: 75
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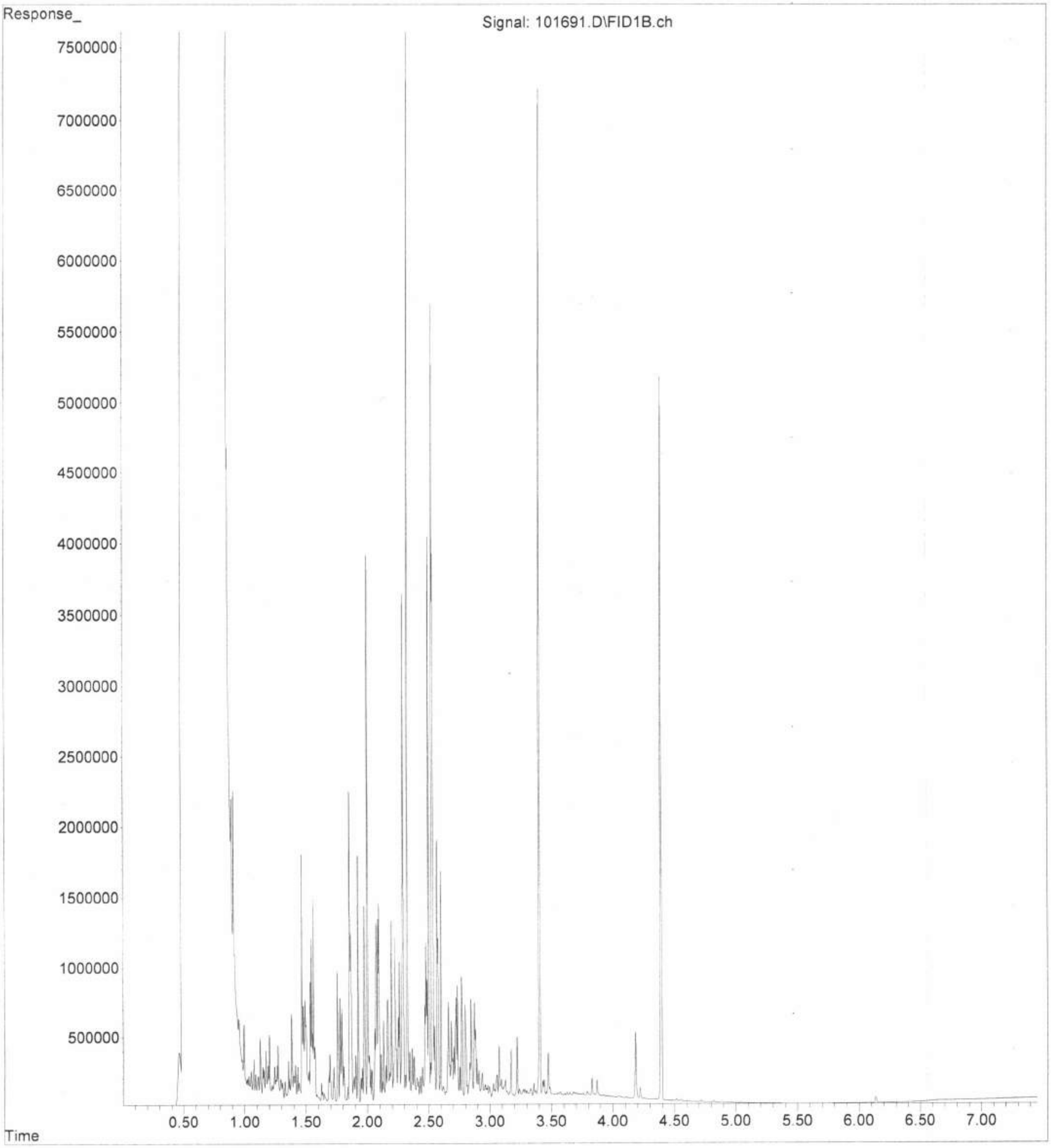

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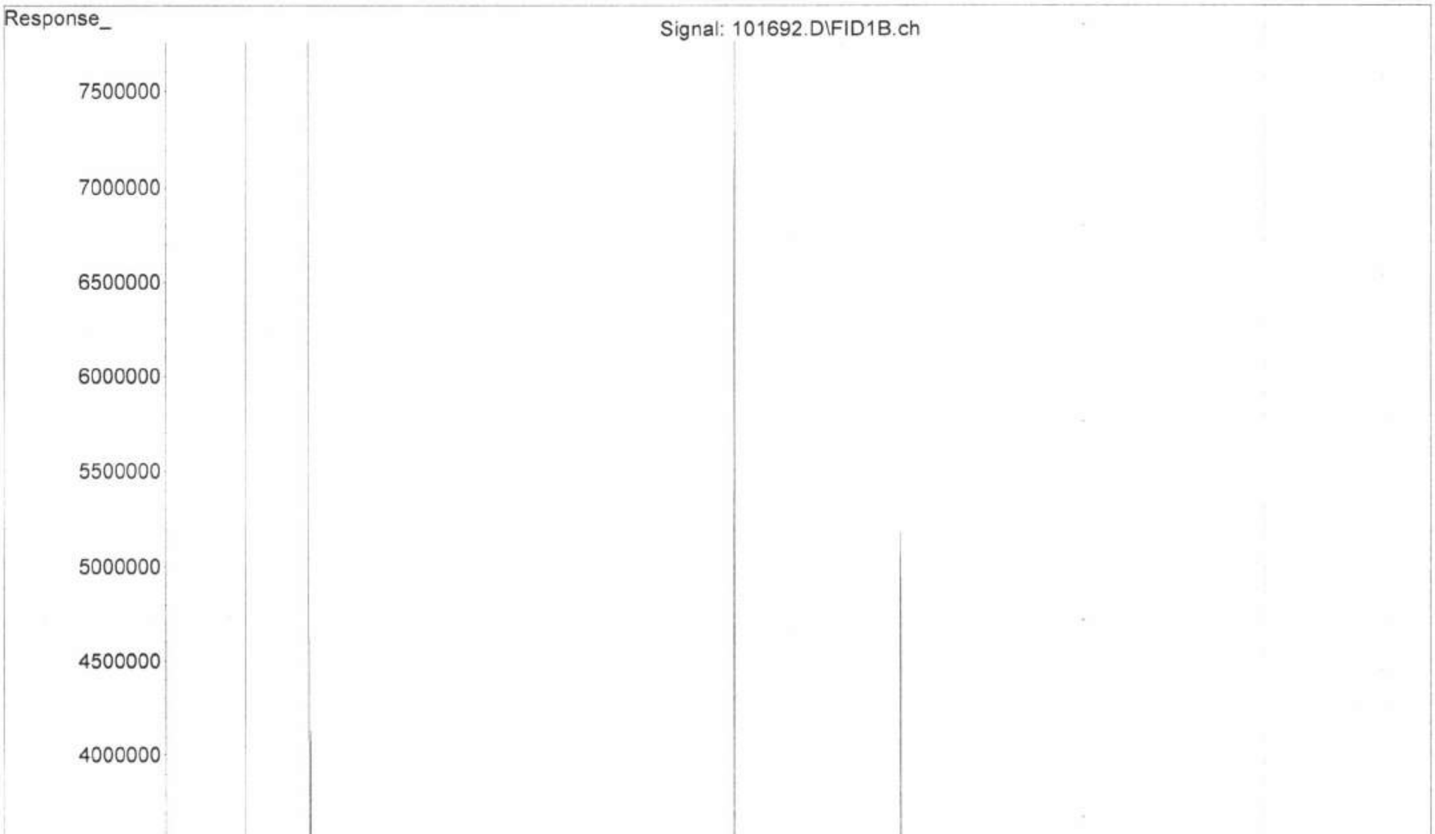
File        :D:\GC14\GC14_Data\10-16-23\101692.D
Operator    : TL
Acquired    : 17 Oct 2023  03:49 am using AcqMethod DX.M
Instrument :   GC14
Sample Name: 310168-06 rr
Misc Info  :                                                ERR
Vial Number: 76
```



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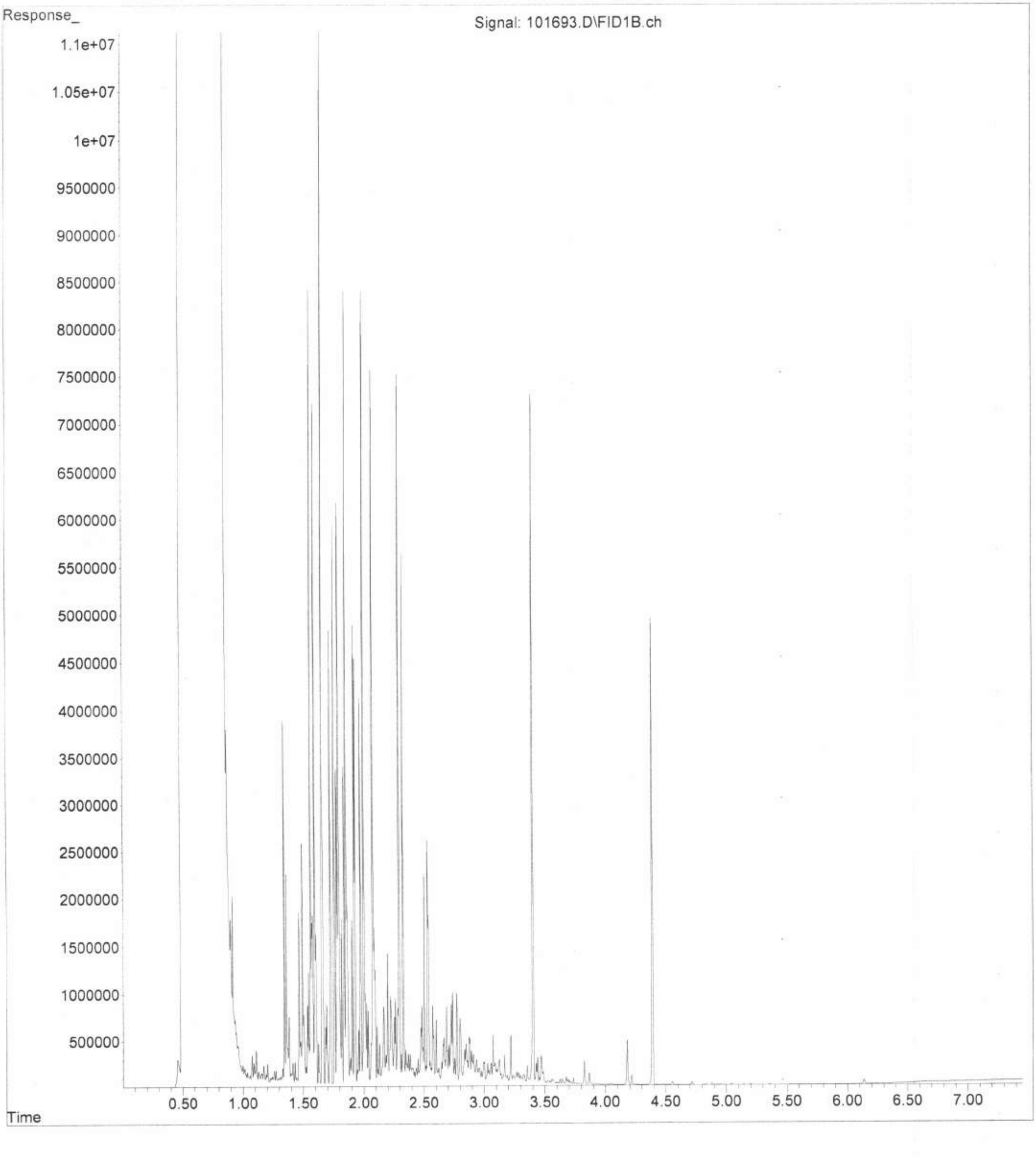
Operator    : TL
Acquired    : 17 Oct 2023  04:01 am using AcqMethod DX.M
Instrument :   GC14
Sample Name: 310168-07 rr
Misc Info  :                                               ERR
Vial Number: 77
```



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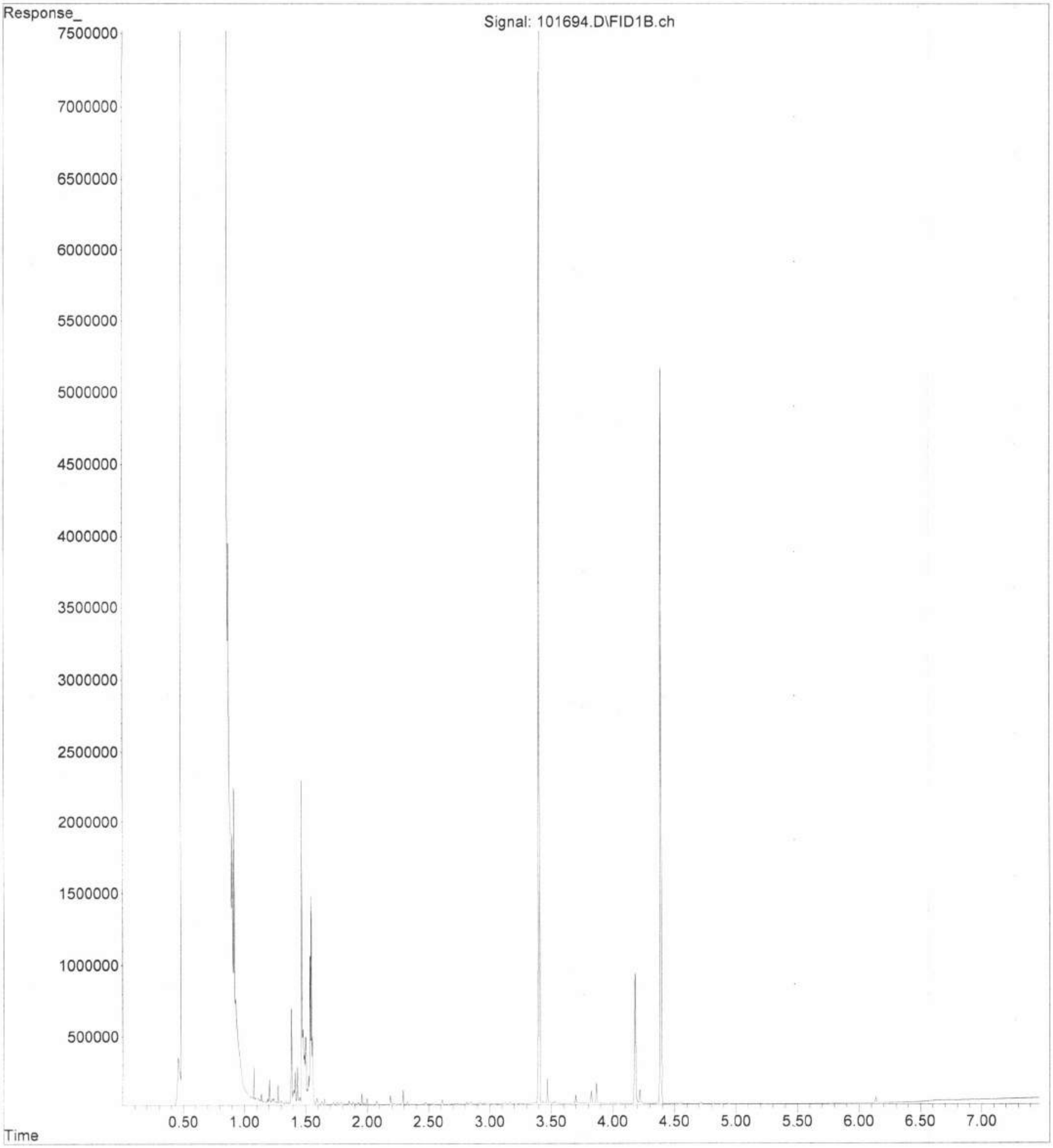
File        :D:\GC14\GC14_Data\10-16-23\101694.D
Operator    : TL
Acquired    : 17 Oct 2023  04:12 am using AcqMethod DX.M
Instrument :   GC14
Sample Name: 310168-08 rr
Misc Info  :                                            ERR
Vial Number: 78
```



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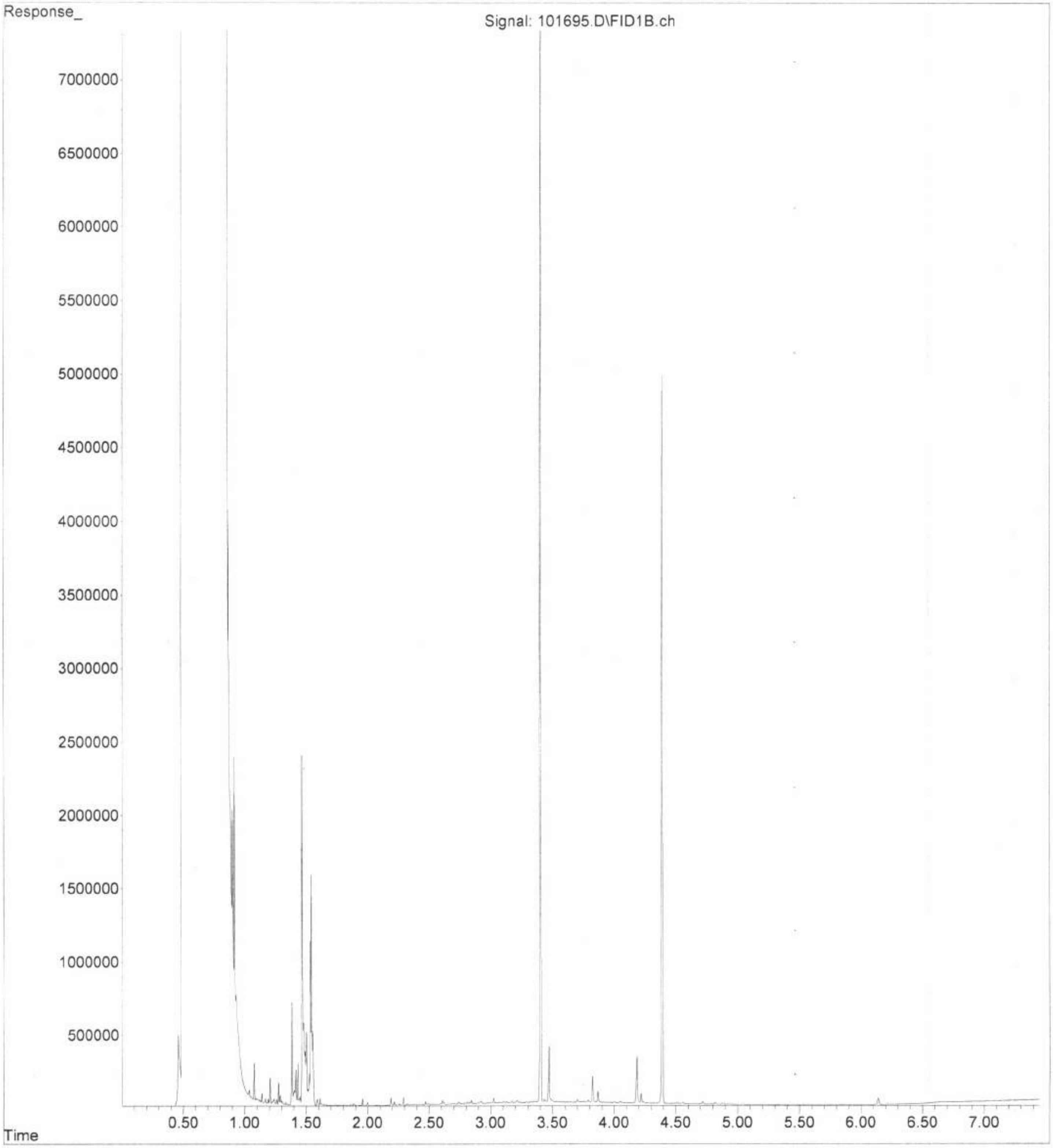
File        :D:\GC14\GC14_Data\10-16-23\101695.D
Operator    : TL
Acquired    : 17 Oct 2023  04:24 am using AcqMethod DX.M
Instrument :   GC14
Sample Name: 310168-09 rr
Misc Info  :                                          ERR
Vial Number: 79
```



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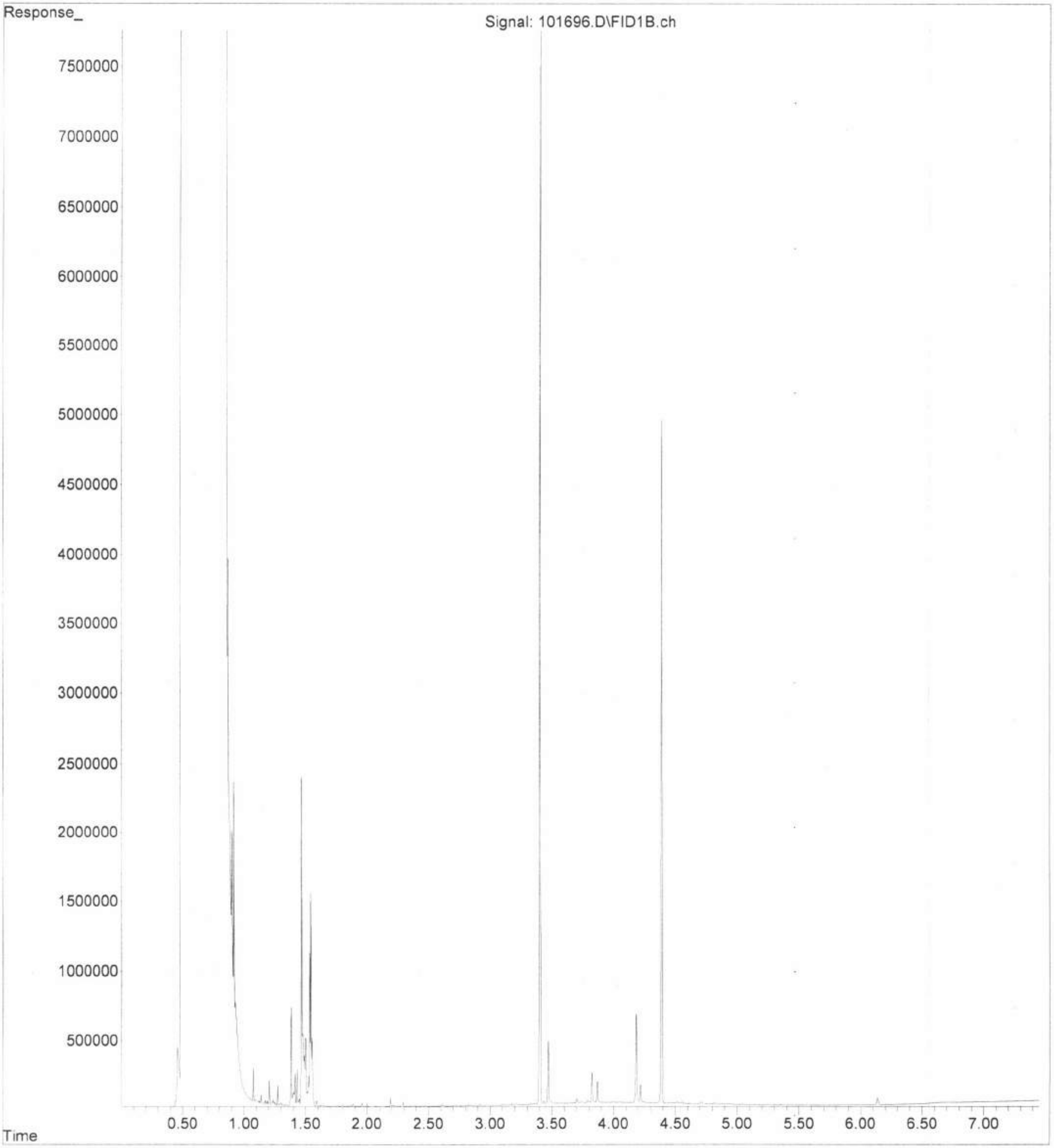
File        :D:\GC14\GC14_Data\10-16-23\101696.D
Operator    : TL
Acquired    : 17 Oct 2023  04:35 am using AcqMethod DX.M
Instrument :   GC14
Sample Name: 310168-10 rr
Misc Info  :                                               ERR
Vial Number: 80
```



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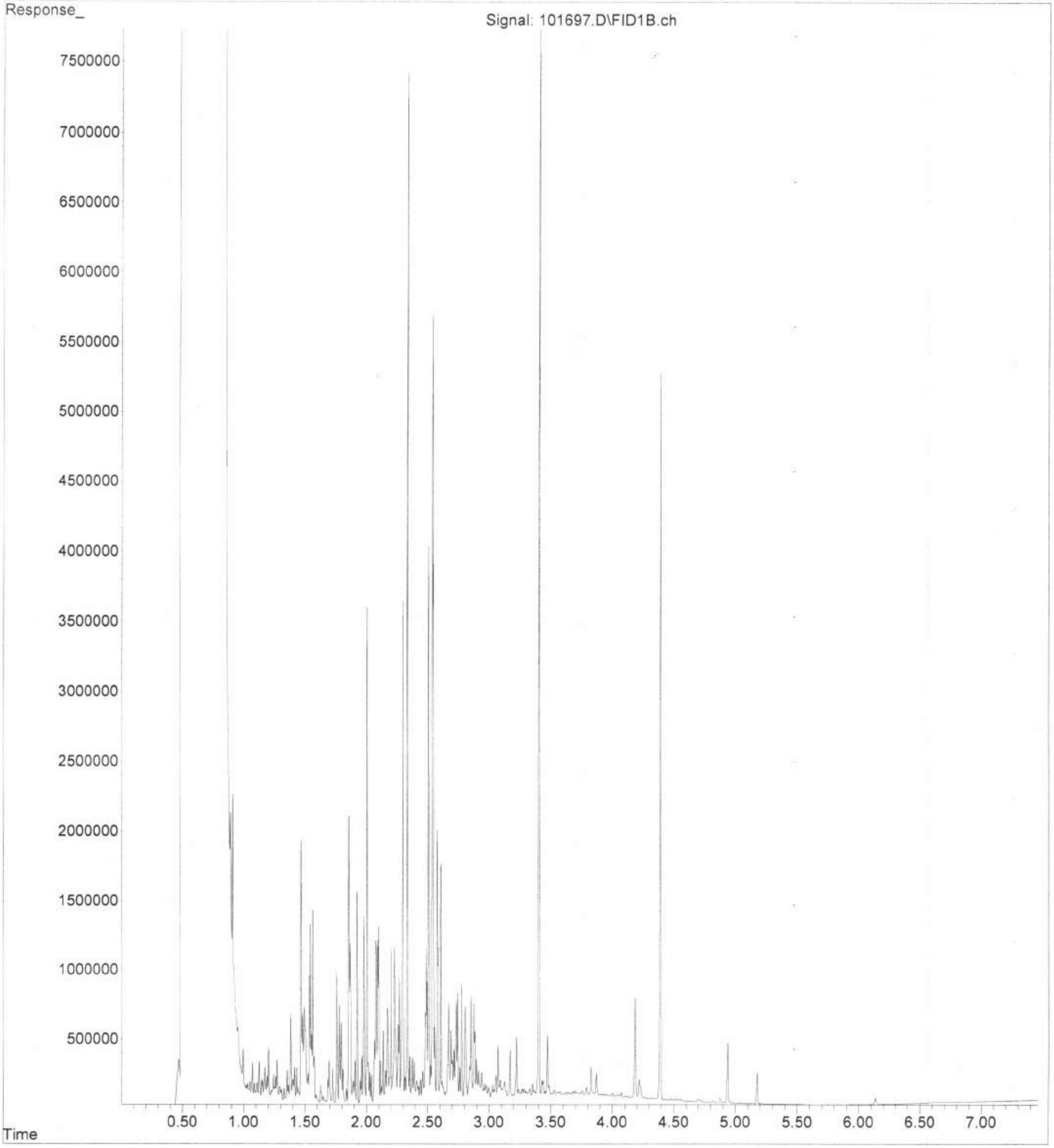
File        :D:\GC14\GC14_Data\10-16-23\101697.D
Operator    : TL
Acquired    : 17 Oct 2023  04:47 am using AcqMethod DX.M
Instrument :   GC14
Sample Name: 310168-11 rr
Misc Info  :                                               ERR
Vial Number: 81
```



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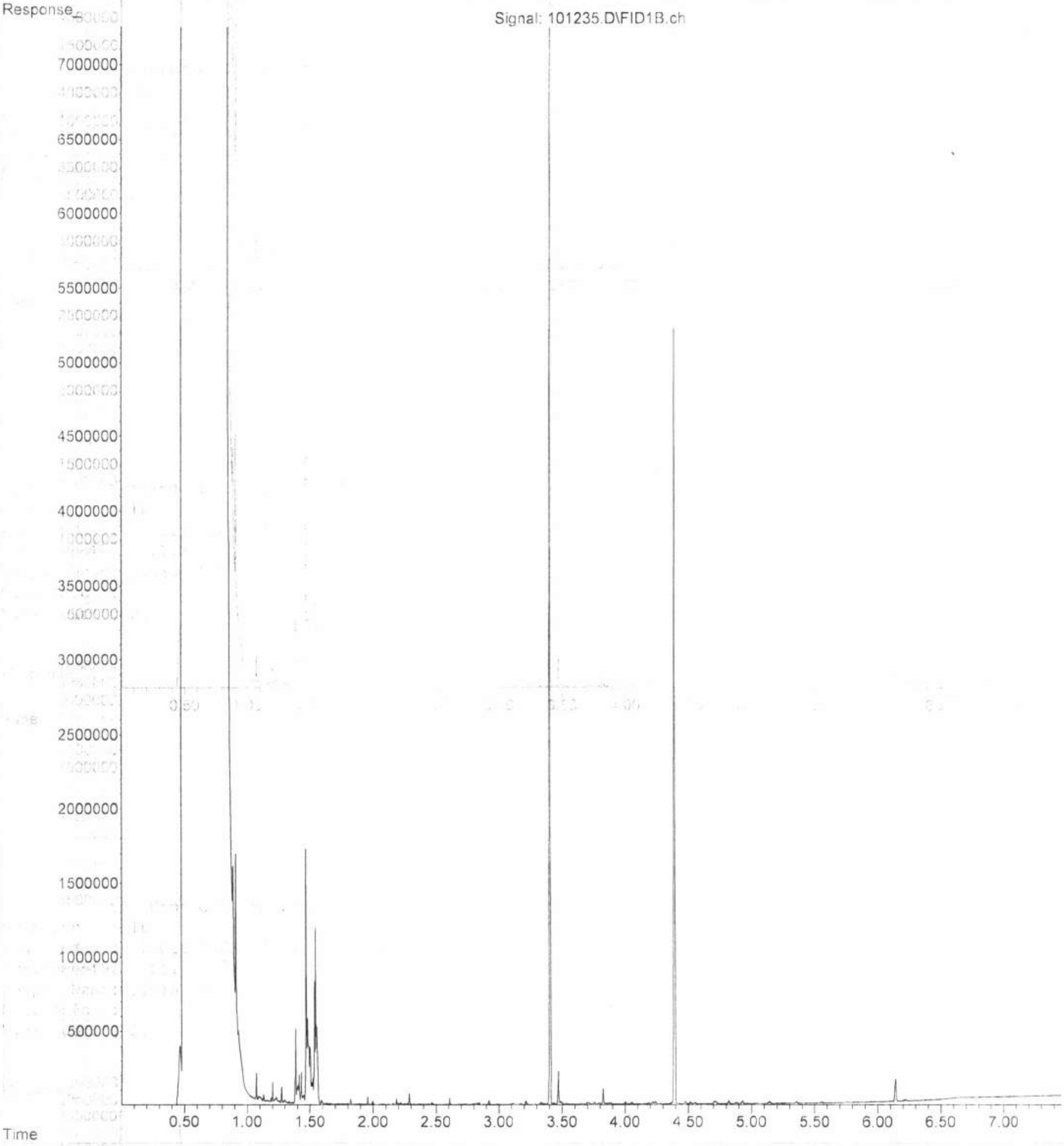
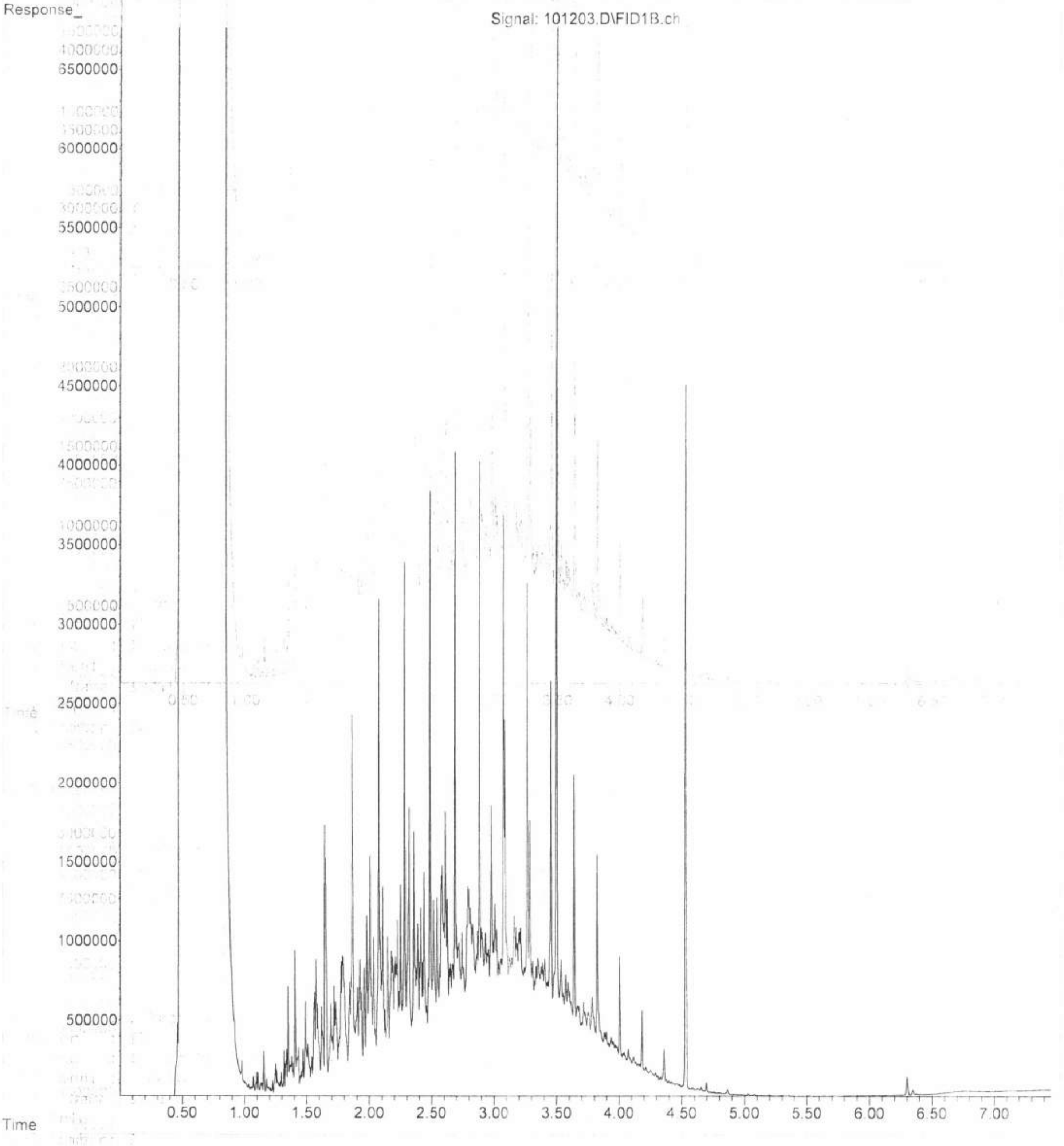
Operator    : TL
Acquired    : 12 Oct 2023  04:44 pm using AcqMethod DX.M
Instrument :   GC14
Sample Name: 03-2400 mb
Misc Info   :
Vial Number: 29
```

ERR



File :P:\Proc_GC14\10-12-23\101203.D
Operator : TL
Acquired : 12 Oct 2023 08:54 am using AcqMethod DX.M
Instrument : GC14
Sample Name: 500 Dx 69-104J
Misc Info :
Vial Number: 3

ERR



OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

October 17, 2023

Michael Erdahl
Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108

Re: Analytical Data for Project 310168
Laboratory Reference No. 2310-150

Dear Michael:

Enclosed are the analytical results and associated quality control data for samples submitted on October 11, 2023.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: October 17, 2023
Samples Submitted: October 11, 2023
Laboratory Reference: 2310-150
Project: 310168

Case Narrative

Samples were collected on October 10, 2023 and received by the laboratory on October 11, 2023. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below. However the soil results for the QA/QC samples are reported on a wet-weight basis.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Dissolved Gases RSK 175 Analysis

Sample 01MW85-101023 had a surrogate recovery outside control limits believed to be caused by sample matrix interference. Sample was re-run with similar results. All other quality control parameters were in control, no further action was taken.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: October 17, 2023
Samples Submitted: October 11, 2023
Laboratory Reference: 2310-150
Project: 310168

DISSOLVED GASES
RSK 175

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**01MW85-101023**					
Laboratory ID:	10-150-01					
Methane	**320**	2.2	RSK 175	10-16-23	10-16-23	
Ethane	**ND**	0.22	RSK 175	10-16-23	10-16-23	
Ethene	**2.7**	0.29	RSK 175	10-16-23	10-16-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
1-Butene	*152*	*50-150*				Q

Date of Report: October 17, 2023
Samples Submitted: October 11, 2023
Laboratory Reference: 2310-150
Project: 310168

DISSOLVED GASES
RSK 175
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1016W1					
Methane	**ND**	0.55	RSK 175	10-16-23	10-16-23	
Ethane	**ND**	0.22	RSK 175	10-16-23	10-16-23	
Ethene	**ND**	0.29	RSK 175	10-16-23	10-16-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
1-Butene	*102*	*50-150*				

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANK										
Laboratory ID:	SB1016W1									
	SB	SBD	SB	SBD	SB	SBD				
Methane	**44.2**	**44.2**	44.2	44.2	100	100	75-125	0	25	
Ethane	**82.5**	**83.4**	83.2	83.2	99	100	75-125	1	25	
Ethene	**76.6**	**77.1**	77.7	77.7	99	99	75-125	1	25	
Surrogate:										
1-Butene					*99*	*99*	*50-150*			

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

X2 - Sample extract treated with a silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 5500 4th Ave S

City, State, ZIP Seattle, WA 98108

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Onsite	10-150
PROJECT NAME/NO. 310168	PO # D-489
REMARKS Floyd Snider RDD—Report to MDL	

Page # 1 of 1

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	DISSOLVED GASES RSK, MEE *										Notes
01MW85-101023	1	10/10/2023	1111	water	3	x										
																* Methane,
																Ethane,
																Ethene.

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	10/11/23	0830
Received by:	M.Vouw	OSE	10/11/23	1315
Relinquished by:				
Received by:				

Long-Term Compliance Monitoring Annual Report
Appendix A: 2023 Groundwater Monitoring Annual Report

Time Oil Bulk Terminal

Attachment A.3
FluxTracer Report

FluxTracer® Results: Darcy Velocity, Mass Flux, and Contaminant Concentrations

November 17, 2023

TO: Kristin Anderson
Floyd Snider
601 Union St. Ste. 600
Seattle, WA 98101-2390

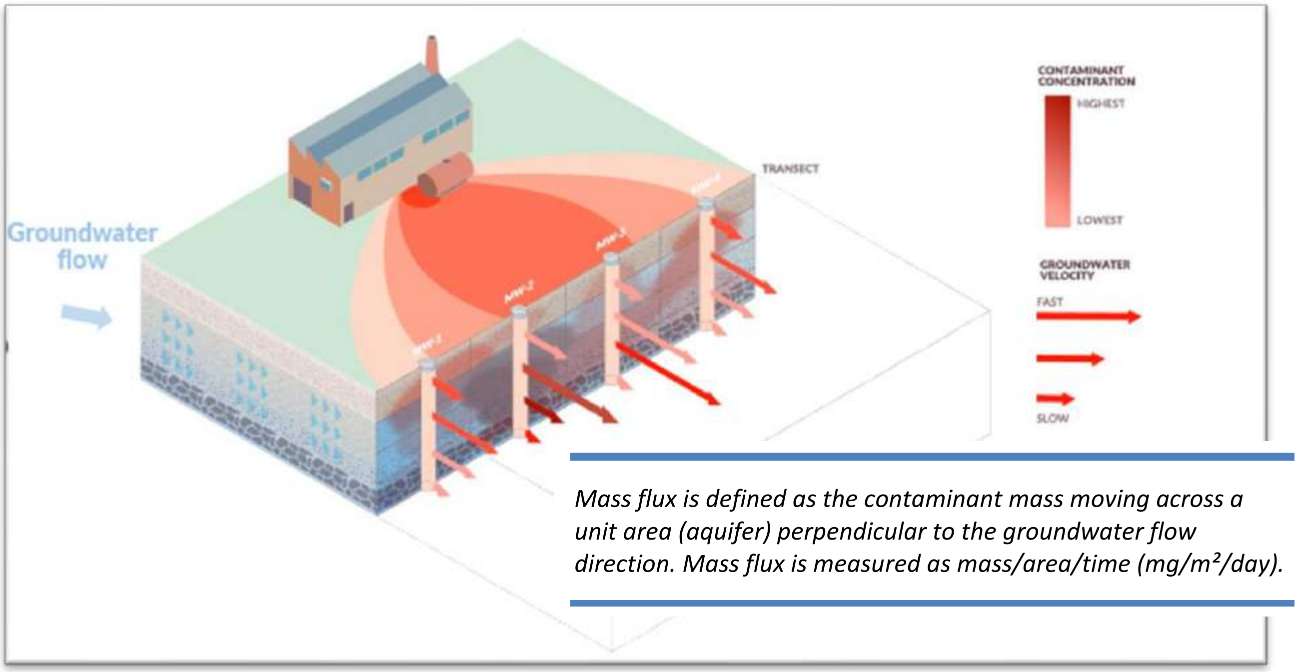
FROM: Joshua Moreno, REGENESIS
Chris Lee, REGENESIS

RE: Flux Tracer Results for Kristin, Time Oil Cantera Site

Scope of Work

FluxTracer® testing was conducted to assess groundwater velocity and contaminant mass flux within existing monitoring wells to aid in site characterization and remedial designs. REGENESIS received 1 set of 5’ passive flux meter device from Floyd Snider and performed FluxTracer analysis to determine Darcy flux, mass flux, and flux derived contaminant concentration. The quantitative FluxTracer test measures the amount of alcohol tracers that desorbed from the activated carbon due to groundwater passively flowing through the cylinder cannisters. Concurrently, contaminants present in the plume will adsorb to the activated carbon during the deployed period after which will be extracted from the activated carbon to quantify mass flux and flux derived contaminant concentration.

What is Mass Flux?



Mass flux is defined as the contaminant mass moving across a unit area (aquifer) perpendicular to the groundwater flow direction. Mass flux is measured as mass/area/time (mg/m²/day).

Conceptual site modeling overlaying hydraulic conductivity, groundwater velocity, and contaminant concentrations.

Mass flux refers to the movement of contaminant mass from one location to another, measured in units of mass per unit of time and area. Contaminant mass flux data is used in environmental remediation to identify the pathways through which contaminants are moving through the aquifer. This can involve the use of monitoring wells and various technologies to collect data on the flow of water and contaminants through the soil and rock formations. This information can help determine the locations of plumes and the direction of contaminant movement which is important for identifying the sources of contamination and designing remediation strategies.

Contaminant mass flux data can also be used to assess the potential risks to human and ecosystem health. By understanding the rate at which contaminants are moving through the groundwater and the concentrations at which they are present, it is possible to evaluate the potential impacts of environmental hazards on human and ecological receptors. Mass flux data can be used to prioritize remediation efforts and to develop risk management plans. For example, the use of permeable reactive barriers or in-situ bioremediation techniques may be more effective in certain locations based on contaminant mass flux data (ITRC, 2010). Contaminant mass flux data is an important tool in environmental remediation as it helps to understand and predict the movement of contaminants in the environment, assess potential risks to humans and ecosystems, and design effective remediation strategies.

ITRC. (2010). Use and Measurement of Mass Flux and Mass Discharge. www.itrcweb.org.

Results

Table 1. 01MW85 Darcy velocity and mass flux data

Sample No.	Depth below top of well casing (ft)	Darcy velocity (cm/day)	PCE (mg/m^2/day)	TCE (mg/m^2/day)	cDCE (mg/m^2/day)
1	22.5	<2.0	<1	<0.9	1
2	23.5	<2.0	<1	<0.9	5
3	24.5	3.4	<1	<0.9	6
4	25.5	4.5	<1	<0.9	33
5	26.5	4.4	<1	<0.9	10

Table 2. 01MW85 Flux-derived concentration

Sample No.	Depth Below Casing (ft)	PCE (µg/L)	TCE (µg/L)	cDCE (µg/L)
1	22.5	N/A	N/A	N/A
2	23.5	N/A	N/A	N/A
3	24.5	N/A	N/A	180
4	25.5	N/A	N/A	730
5	26.5	N/A	N/A	230

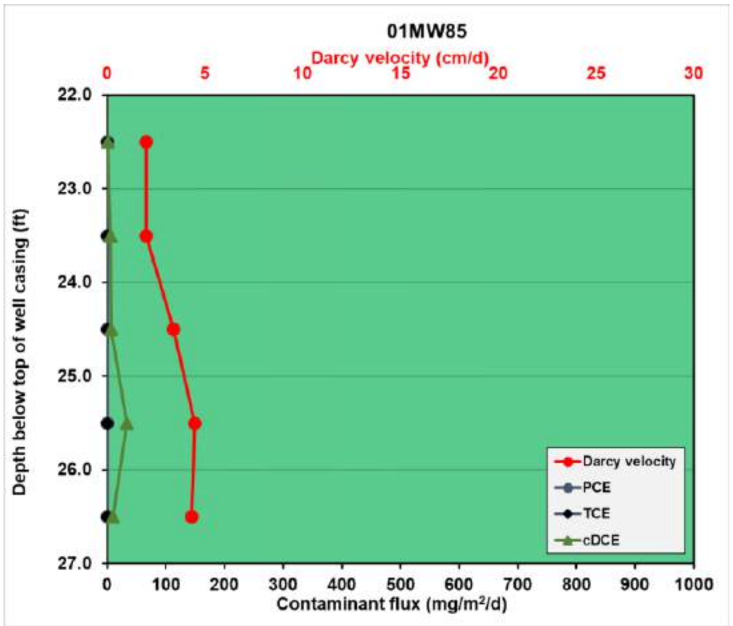


Figure 1. 01MW85 Contaminant flux (mg/m^2/d), Darcy velocity (cm/d), and depth below casing.

Interpretation of Results:

The FluxTracer test provides contaminant flux and Darcy velocity at 1-foot intervals. Contaminant flux and Darcy velocity are then used to derive contaminant mass at 1-foot intervals.

Under these test conditions, the Darcy velocity and contaminant flux for the groundwater plume can be interpreted as follows:

Qualitative Interpretation	Darcy Velocity (cm/day)	*Seepage Rate (ft/yr)	Contaminant Flux (mg/m^2/day)
Low	<2 - 5	<96 - 240	<10 - 300
Medium	5 - 15	240 - 719	300 - 800
High	15- >30	719 - 1437	800 - >2000

*Seepage rate assumes a 0.25 porosity

Flux derived concentration is derived using the following equation:

$$GW\ concentration\ (\mu g/L) = \frac{Mass\ flux\ (\mu g/m^2/d)}{Darcy(cm/d) * 10}$$

A non-applicable (N/A) is applied to the intervals where either the Darcy velocity, contaminant of concern, or both is less than the reporting limit.

A value of ND <X indicates that the analyte of concern is NOT detected above the method detection limit (MDL) or the method reporting limit (MRL).

A J-value indicates that the analyte of concern was detected and that the analyte concentration is an estimated value which is between the method detection limit (MDL) and the method reporting limit (MRL).

Description of Experimental Methods

A batch reactor is filled with 10 grams of sample from each 1-foot interval and is extracted for alcohol tracers followed by extraction of chlorinated volatile organic solvents (CVOCs) using of isobutanol and acetone-hexane, respectively. Batch reactors are then placed on a shaker for 24 hours. A 1 ml extract from each batch reactor is transferred to a liquid gas chromatography vial and each sample is analyzed by a GC-FID for alcohol tracers and GC-MS for CVOCs. Quantitation procedures of Darcy and mass flux can be found in, https://pubs.acs.org/doi/10.1021/es050074g.

Long-Term Compliance Monitoring Annual Report
Appendix A: 2023 Groundwater Monitoring Annual Report

Time Oil Bulk Terminal

Attachment A.4
Data Validation Memoranda

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Data Validation Summary

Prepared by:	Chell Black
Date:	February 14, 2024
Project No.:	Cantera-TOC
Sample Event(s):	2023 Q1 Groundwater Monitoring
Sample Delivery Group(s):	302018 and 2302048
Sample Media:	Groundwater

A Compliance Screening (USEPA Stage 2A) data quality review was performed on total petroleum hydrocarbons, total arsenic, select volatile organic compounds, pentachlorophenol, anions (nitrate, nitrite, and sulfate), and dissolved gases data resulting from laboratory analysis. The data were reviewed using guidance and quality control (QC) criteria documented in the Groundwater Monitoring Plan (Floyd|Snider 2023), *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA 1986), *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2020a), and the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2020b).

A total of 14 groundwater samples, 1 field duplicate sample, and 2 trip blank samples were submitted to Friedman & Bruya, Inc. (FBI) in Seattle, Washington, for chemical analysis by NWTPH-Gx, NWTPH-Dx, EPA 6020B, EPA 8260D, EPA8270D, EPA 300.0, and Standard Method (SM) 4500-S2-F. FBI subcontracted select dissolved gases sample volume to Fremont Analytical (Fremont) in Seattle, Washington, to be analyzed by method RSK 175. FBI reported results under one sample delivery group, 302018, and Fremont reported results under one sample delivery group, 2302048.

DATA QUALITY REVIEW

All sample results reported between the method detection limit and the reporting limit were qualified “J” to indicate they are estimated. Field and laboratory QC parameters for samples met project criteria with exceptions noted as follows:

Volatile Organic Compounds

The trichloroethene matrix spike (MS) for sample MW05-020123 fell outside the control limit low. The *cis*-1,2-dichloroethene matrix spike duplicate (MSD) was outside the control limit high for the same sample. The MS/MSD relative percent differences (RPDs) were also above control limits for both analytes. The sample concentrations were greater than four times the spike levels, so no data were qualified.

Anions

Sample 01MW85-013123 was analyzed for nitrate and nitrite outside the recommended hold time of 48-hours. Associated sample results were qualified "UJ" to indicate they are estimated.

Sulfide

Sample 01MW85-013123 was analyzed for sulfide outside the recommended hold time of 7 days. The associated sample result was qualified "UJ" to indicate it is estimated.

The sulfide MS and MS/MSD were outside control limits high. Associated detected results were qualified "J" to indicate they are estimated.

DATA QUALITY SUMMARY

Based on the data quality review, data are determined to be of acceptable quality for use as reported or qualified.

REFERENCES

Floyd|Snider. 2023. Time Oil Bulk Terminal Site Groundwater Monitoring Plan. January.

U.S. Environmental Protection Agency (USEPA). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* U.S. Prepared by the Office of Solid Waste and Emergency Response. EPA-530/SW-846.

_____. 2020a. *National Functional Guidelines for Organic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-540-R-20-005/OLEM 9240.0-51. November.

_____. 2020b. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-542-R-20-006/OLEM 9240.1-66. November.

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Data Validation Summary

Prepared by:	Gretchen Heavner
Date:	February 14, 2024
Project No.:	Cantera-TOC
Sample Event(s):	Q2 2023 Quarterly Groundwater Monitoring
Sample Delivery Group(s):	FBI304125
Sample Media:	Groundwater

A Compliance Screening (Stage 2A) data quality review was performed on TPH, total arsenic, and select VOC data resulting from laboratory analysis. The data were reviewed using guidance and quality control (QC) criteria documented in in the Groundwater Monitoring Plan (Floyd|Snider 2023), *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA 1986), *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2020a), and the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2020b).

A total of 12 groundwater samples and one trip blank were submitted to Friedman & Bruya, Inc. in Seattle, Washington, for chemical analysis by NWTPH-Dx, NWTPH-Gx, EPA 6020, and EPA 8260D. Friedman & Bruya, Inc. reported results under SDG 304125.

DATA QUALITY REVIEW

Field and laboratory QC parameters for all samples met project criteria.

DATA QUALITY SUMMARY

Based on the data quality review, data are determined to be of acceptable quality for use as reported or qualified.

REFERENCES

Floyd|Snider. 2023. Time Oil Bulk Terminal Site Groundwater Monitoring Plan. January.

U.S. Environmental Protection Agency (USEPA). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* U.S. Prepared by the Office of Solid Waste and Emergency Response. EPA-530/SW-846.

_____. 2020a. *National Functional Guidelines for Organic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-540-R-20-005/OLEM 9240.0-51. November.

_____. 2020b. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-542-R-20-006/OLEM 9240.1-66. November.

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Data Validation Summary

Prepared by:	Cheronne Oreiro
Date:	February 14, 2024
Project No.:	Cantera-TOC
Sample Event(s):	Q3 2023 Quarterly Groundwater Monitoring
Sample Delivery Group(s):	304125
Sample Media:	Groundwater

A Compliance Screening (Stage 2A) data quality review was performed on total petroleum hydrocarbons, total arsenic, select volatile organic compounds, and conventional data resulting from laboratory analysis. The data were reviewed using guidance and quality control (QC) criteria documented in the Groundwater Monitoring Plan (Floyd|Snider 2023), *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA 1986), *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2020a), and the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2020b).

A total of 17 groundwater samples, 1 field duplicate sample, and 1 trip blank sample were submitted to Friedman & Bruya, Inc. in Seattle, Washington, for chemical analysis by methods NWTPH-Dx, NWTPH-Gx, EPA 6020, and EPA 8260D. Friedman & Bruya, Inc. reported results under sample delivery groups (SDGs) 306447 and 306460. Friedman & Bruya, Inc. subcontracted select sample volumes to Fremont Analytical in Seattle, Washington, for chemical analysis by methods EPA 300.0 and SM 4500-S2-F. Fremont Analytical reported results under SDG 23060503.

DATA QUALITY REVIEW

Field and laboratory QC parameters for all samples met project criteria.

DATA QUALITY SUMMARY

Based on the data quality review, data are determined to be of acceptable quality for use as reported or qualified.

REFERENCES

Floyd|Snider. 2023. Time Oil Bulk Terminal Site Groundwater Monitoring Plan. January.

U.S. Environmental Protection Agency (USEPA). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* U.S. Prepared by the Office of Solid Waste and Emergency Response. EPA-530/SW-846.

_____. 2020a. *National Functional Guidelines for Organic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-540-R-20-005/OLEM 9240.0-51. November.

_____. 2020b. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-542-R-20-006/OLEM 9240.1-66. November.

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Data Validation Summary

Prepared by: Chell Black
Date: February 14, 2024
Project No.: Cantera-TOC
Sample Event(s): 2023 Q4 Groundwater Monitoring
Sample Delivery Group(s): 310168, 310169, and 2310-150
Sample Media: Groundwater

A Compliance Screening (USEPA Stage 2A) data quality review was performed on total petroleum hydrocarbons, total arsenic, select volatile organic compounds, and dissolved gases data resulting from laboratory analysis. The data were reviewed using guidance and quality control (QC) criteria documented in the Groundwater Monitoring Plan (Floyd|Snider 2023), *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA 1986), *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2020a), and the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2020b).

A total of 10 groundwater samples, 1 field duplicate sample, and 1 trip blank sample were submitted to Friedman & Bruya, Inc. (FBI) in Seattle, Washington, for chemical analysis by NWTPH-Gx, NWTPH-Dx, EPA 6020B, and EPA 8260D. Analysis by RSK 175 was subcontracted to OnSite Environmental in Redmond, Washington. FBI reported results under sample delivery group 310168. OnSite Environmental reported results under sample delivery group 2310-150.

DATA QUALITY REVIEW

Field and laboratory QC parameters for samples met project criteria, with the exception of the surrogate recovery for the RSK 175 analysis of sample 01MW85-101023. The surrogate was outside control limits high and the detected results for the sample were qualified “J” as estimated.

DATA QUALITY SUMMARY

Based on the data quality review, data are determined to be of acceptable quality for use as reported or qualified.

REFERENCES

Floyd|Snider. 2023. *Time Oil Bulk Terminal Site Groundwater Monitoring Plan.* January.

U.S. Environmental Protection Agency (USEPA). 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.* U.S. Prepared by the Office of Solid Waste and Emergency Response. EPA-530/SW-846.

_____. 2020a. *National Functional Guidelines for Organic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-540-R-20-005/OLEM 9240.0-51. November.

_____. 2020b. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-542-R-20-006/OLEM 9240.1-66. November.

Long-Term Compliance Monitoring Annual Report
Appendix A: 2023 Groundwater Monitoring Annual Report

Time Oil Bulk Terminal

Attachment A.5
Updated Short-Term Monitoring Well Sampling and Analytical Schedule

Attachment A.5
Updated Short-Term Monitoring Well Sampling and Analytical Schedule

					Proposed Monitoring Parameters																						
					Indicator Hazardous Substances						MNA Parameters (3)																
											Primary	Secondary			2024				2025				2026				
Well ID	Water-Bearing Zone	Screened Interval (feet below TOC)	Proposed Monitoring Frequency (1)	Notes	Total Arsenic by USEPA 6020B	GRO by NWTPH-Gx	Total DRO+ORO by NWTPH-Dx	Benzene by USEPA 8260D	cVOCs (2) by USEPA 8260D	Penta by USEPA 8270D SIM	Field Parameters	Total and Dissolved Iron USEPA 6020	Ferrous Iron by Color Disc or SM3500-FE-D	Dissolved Gases by RSK-175	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Change Log (4)
Bulk Terminal Parcel Wells																											
Wells Designated for Analytical Sampling																											
01MW12	Shallow	4–19	Semiannual			X	X	X			X				IHS		IHS		IHS		IHS		IHS		IHS		
01MW19R	Shallow	10–20	Quarterly (2023–2024)/ Semiannual (2025–2026)			X	X	X			X				IHS	IHS	IHS	IHS	IHS		IHS		IHS		IHS		
01MW35	Shallow	10–20	Quarterly (2023)			X	X	X			X																No further sampling after 2023. Monitoring well results less than CULs for 4 consecutive quarters in 2023.
01MW40	Shallow	7–22	Initial Semiannual	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).		X	X	X			X				IHS		IHS										Continue monitoring per initial short-term GMP in 2024 or until redevelopment begins.
01MW49R	Intermediate	35–40	Semiannual			X	X	X			X				IHS		IHS		IHS		IHS		IHS		IHS		
01MW66	Shallow	12–22	Annual	On-property penta plume						X	X				IHS				IHS				IHS				
01MW84	Shallow	17–23	Quarterly (2023–2024)/ Semiannual (2025–2026)			X	X	X			X				IHS	IHS	IHS	IHS	IHS		IHS		IHS		IHS		
01MW87	Shallow	11–21	Contingency	Retain as contingency during performance period if IHS concentrations increase at 01MW12.		X	X	X			X																
01MW90R	Shallow	new (~5–15)	Redevelopment Semiannual	Install and monitor in place of 01MW40 after redevelopment grading.		X	X	X			X								IHS		IHS		IHS		IHS		
Wells Designated for Contingency or Water Level Monitoring Only																											
01MW100	Shallow	20–30	--	Retain for collection of additional performance data if needed (in place of 01MW17).																							Upgradient sentinel monitoring location retained in place of 01MW17.
01MW102	Shallow	10–20	--	Retain for collection of additional performance data if needed.																							
01MW104	Intermediate	28–33	Contingency	Sample if IHS concentrations increasing at 01MW49R or 01MW51.																							Current data suggest contingency well is not needed
ASKO Parcel Wells																											
Wells Designated for Analytical Sampling																											
MW03R	Perched	13–18	Semiannual		X	X	X	X	X		X				IHS		IHS		IHS		IHS		IHS		IHS		
MW05	Shallow	19–29	Initial Semiannual	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).				X	X		X	X	X	X(3)	IHS MNA		IHS										Continue monitoring per initial short-term GMP in 2024 or until redevelopment begins. Continue monitoring secondary MNA parameters in Q1 2024.
MW06	Shallow	18–28	Initial Baseline/Contingency/ Redevelopment Semiannual	Contingency sample if increasing IHSs at 01MW53, 01MW85 or MW05; sample semiannually after redevelopment grading.				X	X		X	X	X	X(3)	IHS MNA				IHS		IHS		IHS		IHS		Well is within PlumeStop barrier; monitor as-needed to assess PlumeStop performance
01MW15	Shallow	10–30	Initial Semiannual	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).					X		X				IHS		IHS										Continue monitoring per initial short-term GMP in 2024 or until redevelopment begins.
01MW45R	Shallow	new (~12–27)	Redevelopment Semiannual	Install and monitor after redevelopment		X	X	X	X		X								IHS		IHS		IHS		IHS		
01MW46	Shallow	13–28	Initial Quarterly	Monitor until redevelopment; decommission during property redevelopment (within structure footprint). Replace and continue monitoring 01MW46R after redevelopment grading if needed.				X	X		X				IHS		IHS										Continue monitoring per initial short-term GMP in 2024 or until redevelopment begins.
01MW53(R)	Shallow	16–26 (new ~17-27)	Quarterly (2023–2024)/ Semiannual (2025–2026)	Reinstall during Q1 2024 and continue monitoring.					X		X				IHS	IHS	IHS	IHS	IHS		IHS		IHS		IHS		Reinstall during Q1 2024 and continue short-term monitoring in Q1 2024.
01MW56	Shallow	16–26	Semiannual						X		X				IHS		IHS		IHS		IHS		IHS		IHS		
01MW58R	Shallow	new (~24–34)	Quarterly (2024)/ Semiannual (2025–2026)	Install and monitor in Q1 2024.					X		X				IHS	IHS	IHS	IHS	IHS		IHS		IHS		IHS		Reinstall during Q1 2024 and begin short-term monitoring in Q1 2024.

Attachment A.5
Updated Short-Term Monitoring Well Sampling and Analytical Schedule

					Proposed Monitoring Parameters																						
					Indicator Hazardous Substances						MNA Parameters (3)																
											Primary	Secondary			2024				2025				2026				
Well ID	Water-Bearing Zone	Screened Interval (feet below TOC)	Proposed Monitoring Frequency (1)	Notes	Total Arsenic by USEPA 6020B	GRO by NWTPH-Gx	Total DRO+ORO by NWTPH-Dx	Benzene by USEPA 8260D	cVOCs (2) by USEPA 8260D	Penta by USEPA 8270D SIM	Field Parameters	Total and Dissolved Iron USEPA 6020	Ferrous Iron by Color Disc or SM3500-FE-D	Dissolved Gases by RSK-175	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Change Log (4)
ASKO Parcel Wells (cont.)																											
Wells Designated for Analytical Sampling (cont.)																											
01MW60R	Shallow	new (~25–40)	Redevelopment Semiannual	Install and monitor after redevelopment grading.					X		X								IHS		IHS		IHS		IHS		
01MW85	Shallow	18–27	Quarterly (2023–2024)/ Semiannual (2025–2026)						X		X	X	X	X(3)	IHS MNA	IHS	IHS	IHS	IHS		IHS		IHS		IHS		Continue monitoring secondary MNA parameters in Q1 2024.
01MW108	Intermediate	30–35	Initial Semiannual	Monitor until redevelopment; decommission during property redevelopment (within structure footprint).					X		X				IHS		IHS										Continue monitoring per initial short-term GMP in 2024 or until redevelopment begins.
Wells Designated for Contingency or Water Level Monitoring Only																											
MW02	Shallow	18–28	Contingency	Monitor if stronger than expected westward gradients or increasing IHSs at MW06.					X		X																Current data suggest contingency well is not needed
01MW61	Shallow	22–37.5	--	Retain for collection of additional performance data if needed.																							
01MW80	Shallow	20–28	Initial Contingency	Monitor if increasing IHSs at 01MW53, 01MW85 or MW05; decommission during property redevelopment (within structure footprint).					X		X																
01MW89	Shallow	18–26	Contingency	Sample if increasing IHSs at 01MW53 or 01MW56.					X		X				IHS												Contingency sampling triggered in Q1 2024. Continued monitoring will be reassessed quarterly.
01MW106	Shallow	15–25	--	Retain for collection of water levels or additional performance data if needed.																							
01MW107	Shallow	17–27	Contingency	Monitor if increasing IHSs at 01MW53 or 01MW85.					X		X				IHS												Contingency sampling triggered in Q3 2023. Continued monitoring will be reassessed quarterly.
01MW112	Intermediate	new (~30–35)	Redevelopment Contingency	Install after redevelopment grading; sample if increasing IHSs at 01MW53 or 01MW108.					X		X																
01MW113	Shallow	new (~12–27)	Redevelopment Contingency	Install after redevelopment grading if needed; monitor if stronger than expected westward gradients or increasing IHSs at MW06.					X		X																Current data suggest contingency well is not needed.
East Waterfront Parcel Wells																											
Wells Designated for Analytical Sampling																											
02MW04R	Shallow	5–15	Quarterly (2023–2024)/ Annual (2025–2026)			X	X	X			X				IHS	IHS	IHS	IHS				IHS				IHS	
02MW07	Shallow	1.5–11.5	Quarterly (2023)/ Annual (2024–2026)		X	X	X	X			X				IHS							IHS				IHS	Reduce frequency from quarterly to annual in 2024.
02MW17	Shallow	1–11	Contingency (2023–2024)/ Annual (2025–2026)	Sample if increasing IHSs at 02MW04R or 02MW07.	X	X	X	X			X											IHS				IHS	
02MW19	Shallow	3–13	Quarterly (2023)/ Annual (2024–2026)		X	X	X	X			X				IHS							IHS				IHS	Reduce frequency from quarterly to annual in 2024.
02MW20R	Shallow	new (~1–11)	Redevelopment Contingency (2023–2024)/ Annual (2025–2026)	Install after redevelopment grading; sample if increasing IHSs at 02MW04R.	X	X	X	X			X											IHS				IHS	

Attachment A.5
Updated Short-Term Monitoring Well Sampling and Analytical Schedule

					Proposed Monitoring Parameters																						
					Indicator Hazardous Substances						MNA Parameters (3)																
											Primary	Secondary			2024				2025				2026				
Well ID	Water-Bearing Zone	Screened Interval (feet below TOC)	Proposed Monitoring Frequency (1)	Notes	Total Arsenic by USEPA 6020B	GRO by NWTPH-Gx	Total DRO+ORO by NWTPH-Dx	Benzene by USEPA 8260D	cVOCs (2) by USEPA 8260D	Penta by USEPA 8270D SIM	Field Parameters	Total and Dissolved Iron USEPA 6020	Ferrous Iron by Color Disc or SM3500-FE-D	Dissolved Gases by RSK-175	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Change Log (4)
East Waterfront Parcel Wells (cont.)																											
Wells Designated for Contingency or Water Level Monitoring Only																											
02MW16	Shallow	5–15	--	Retain for collection of additional performance data if needed.																							
02MW18	Shallow	4–14	--	Retain for collection of additional performance data if needed.																							
01MW83	Shallow	14–24	--	Retain for collection of additional performance data if needed.																							

Notes:

Blank cells are intentional.

Wells not designated for short-term monitoring are considered sentinels and may be sampled at the Property Owner's discretion or at Washington State Department of Ecology's request to obtain additional performance data, if needed. Water levels will be collected from monitoring wells designated for sampling and select other wells (01MW61, 01MW83, 01MW100, 01MW102, 01MW106, 01MW107, 02MW16, 02MW18) semiannually (Q1 and Q3).

-- Not established.

Italics Proposed well to be installed after redevelopment (if needed).

1 Wells designated for initial short-term monitoring will be sampled until grading and utility installation for property redevelopment. Wells designated for redevelopment monitoring will be installed and sampled after grading has been completed.

2 cVOCs include TCE, cis-1,2-dichloroethene, and vinyl chloride.

3 Primary MNA parameters are field measurements that will be collected during every event and include dissolved oxygen, oxidation–reduction potential, pH, specific conductance, and temperature. Secondary MNA parameters including total and dissolved iron, field-measured ferrous iron, and dissolved gases (methane, ethene, and ethane) will be analyzed during Q1 of Year 2 from select wells. Secondary MNA parameters may be analyzed as needed after 2023 to assess remedy performance.

4 Additional changes:
- The 2023 schedule was completed and removed from the table.
- Wells decommissioned in 2023 were removed from the table (01MW17, 01MW99, 01MW105, and 01MW110).
- Sentinel wells not designated for contingency use or water level monitoring were removed from the table (refer to Table A.1 for full well inventory list).
- Secondary MNA parameters discussed in Note 3 were changed from anions (nitrate, nitrite, sulfate, and sulfide) to total and dissolved iron, plus dissolved gasses, starting in 2024.

Abbreviations:

CUL	Cleanup level
cVOC	Chlorinated volatile organic compound
DRO	Diesel-range organics
GMP	Groundwater Monitoring Plan
GRO	Gasoline-range organics
IHS	Indicator hazardous substance
MNA	Monitored natural attenuation
ORO	Oil-range organics
penta	Pentachlorophenol
TCE	Trichloroethene
TOC	Top of casing
USEPA	U.S. Environmental Protection Agency