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December 17, 2024

Ms. Denise Kirkpatrick
Hazardous Materials Section Supervisor
Montana Department of Environmental Quality
Waste Management Bureau
P.O. Box 200901
Helena, MT 59620-0901

RE: AOC-16 Interim Measure 3rd Quarter 2024 Monitoring Report No. 11

Submitted via Montana File Transfer Service with Hard Copy to follow

Dear Ms. Kirkpatrick,

Please find attached Calumet Montana Refining LLC's (CMR) AOC-16 Interim Measure (IM) 3rd Quarter 2024 Monitoring Report (QMR) No. 11 for review and approval. The report documents the operations, maintenance, and monitoring activities completed for the dual phase extraction (DPE) remediation system, passive treatment trench, and light non-aqueous phase liquid (LNAPL) recovery trench between July 2024 and September 2024. In addition, this report presents an evaluation of AOC-16 IM remediation system performance during this period and discusses continued system optimization and monitoring activities.

Please contact me at your earliest convenience if you have any questions.

Sincerely,

Michael Gipson

Mike Gipson
Environmental Specialist

cc: Joe Dauner - CMR

Attachments: AOC-16 Interim Measure 3rd Quarter 2024 Monitoring Report No. 11

AOC-16 INTERIM MEASURE 3RD QUARTER 2024 MONITORING REPORT NO. 11

CALUMET MONTANA REFINING, LLC
GREAT FALLS, MONTANA

December 17, 2024

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ACRONYMNS AND ABBREVIATIONS

AOC-16	Area of Concern-16
BOD	biochemical oxygen demand
BTEX	benzene, toluene, ethylbenzene, and xylene
CMR	Calumet Montana Refining, LLC
COC	constituent of concern
DEQ-7 HHS	Montana Department of Environmental Quality-7 Human Health Standards
DO	dissolved oxygen
DPE	dual-phase extraction
EPH	extractable petroleum hydrocarbon
gpm	gallons per minute
IM	Interim Measures
in-Hg	inches of mercury
LEL	lower explosive limit
LNAPL	light non-aqueous phase liquid
µg/L	microgram per liter
MDEQ	Montana Department of Environmental Quality
mg/L	milligrams per liter
mL/min	milliliters per minute
MS/MSD	matrix spike/matrix spike duplicate
mV	millivolts
NTU	nephelometric turbidity unit
OM&M	operations, maintenance, and monitoring
ORP	oxidation reduction potential
Pace	Pace Analytical Services, LLC
PID	photoionization detector
PLC	programmable logic controller
PRT	primary recovery trench
PTT	passive treatment trench
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
QMR	Quarterly Monitoring Report
RBSL	Risk-Based Screening Levels
RCRA	Resource Conservation Recovery Act
RFI	RCRA Facility Investigation
Ramboll	Ramboll Americas Engineering Solutions, Inc.
ROI	radius of influence
SCFM	standard cubic per minute
SRCO	Self-Recuperative Catalytic Oxidizer
SVOC	semi-volatile organic compound
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbon
WWTP	wastewater treatment plant

SIGNATORY PAGE

I certify under penalty of law that this document and all attachments were prepared under my direct supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:	Kollin Schade
Name:	Kollin Schade
Title:	Plant Manager – Calumet Montana Refining, LLC
Date:	12/17/24

EXECUTIVE SUMMARY

Ramboll Americas Engineering Solutions, Inc. (Ramboll), on behalf of Calumet Montana Refining, LLC (CMR), has prepared this Area of Concern-16 (AOC-16) Interim Measure (IM) 3rd Quarter 2024 Monitoring Report (QMR) No. 11 to summarize the operations of the AOC-16 Dual Phase Extraction (DPE) system and the Passive Treatment Trench (PTT). This QMR has been prepared in accordance with Section 6.2 of the Operations Maintenance and Monitoring (OM&M) Plan for the AOC-16 IM.

During the 3rd Quarter of 2024, the DPE system operated approximately 90% of the available time. The DPE system extracted and discharged approximately 61,394 gallons of total fluids to CMR's wastewater treatment plant (WWTP). During this reporting period the DPE system also removed approximately 5.0 pounds of petroleum vapor. It also removed 0.03 pounds of volatile organic compounds (VOCs), 0.02 pounds of semi-volatile organic compounds (SVOCs), 19.5 pounds of volatile petroleum hydrocarbons (VPH), and 93.4 pounds of extractable petroleum hydrocarbons (EPH) in the form of liquid effluent. Initial mass removal rates indicate that the DPE system is accomplishing the AOC-16 IM objectives of recovering free phase Light Non-Aqueous Phase Liquid (LNAPL) mass and reducing the LNAPL within the vadose and saturated zone soil matrix.

Multiple performance metrics indicate that the mass recovery of the remediation system is reaching asymptotic levels including:

- influent vapor concentrations have dropped four to five orders of magnitude between system startup and the 3rd quarter of 2024
- The post-catalyst outlet temperature on the Self-Recuperative Catalytic Oxidizer (SRCO) which serves as a continuous relative indicator of contaminant mass with higher temperatures corresponding to relatively greater contaminant mass has seen temperatures drop from greater than 800 degrees F during the first year of operation to less than 670 degrees F in the 3rd quarter of 2024
- Sampling of the liquid effluent indicates that liquid recovery is shifting to heavier end compounds (i.e. EPH) as compared to more volatile compounds (i.e. VOCs).
- A small amount of LNAPL was observed within the knock-out tank sight glass during the 3rd quarter of 2024. Qualitatively, the amount of LNAPL observed in the sight glass is lower than in previous quarters.

Quarterly groundwater sampling was conducted at the PTT performance monitoring wells on June 6, 2024. Sampling was conducted at upgradient well MW-41S, PTT well MW-106, and downgradient compliance well MW-105. Samples collected from these monitoring wells were analyzed for petroleum constituents of concern (COCs) – VOCs, SVOCs, VPH, and EPH. Samples from PTT well MW-106 and downgradient well MW-105 was also analyzed for biodegradation parameters.

The monitoring well upgradient of the passive treatment trench (MW-41S) reported benzene concentrations exceeding the DEQ-7 Human Health Standards – Groundwater (DEQ-7 HHS) and the Risk-Based Screening Levels (RBSLs) of 5 µg/L. Benzene was detected at a concentration of 22.1 µg/L, greater than the DEQ-7 HHS and RBSL of 5 µg/L, at monitoring well MW-106 installed within the trench. Monitoring well MW-105 installed downgradient of the passive treatment trench reported benzene at 39.4 µg/L exceeding the DEQ-7 HHS and RBSL of 5 µg/L. Within the trench (MW-106), VPH and C5-C8 Aliphatic were detected between the method detection limit and the reporting limit at a concentration of 149 µg/L and 102 µg/L, respectively. The C5-C8 Aliphatics concentration was below

the RBSL of 650 µg/L. Downgradient of the PTT (MW-105), VPH was detected at a concentration of 1,610 µg/L with a C5-C8 Aliphatics concentration (adjusted) of 978 µg/L which exceeds the RBLS of 650 µg/L Concentrations of contaminants of concern at the downgradient well MW-105 appear decreasing with time with some seasonal variability.

The IM has been operational for approximately three years. Based on the performance monitoring conducted to date indicating that contaminant recovery is reaching asymptotic levels, operations, maintenance, and performance monitoring frequency has been evaluated as part of this QMR. Revisions to the operations, maintenance, and performance monitoring frequency are proposed for 2025, including operating the DPE system in a pulsed manner for a period of 6.5 weeks followed by 6.5 weeks of shutdown time followed by 13 weeks operationa/non-operational. Corresponding modifications to performance monitoring and maintenance frequency are also proposed.

OM&M of the IM will continue to document the performance of the IM's and will include semiannual performance reporting to the Montana Department of Environmental Quality (MDEQ) to ensure the IM objectives are continuing to be met. Further investigation/evaluation at the AOC-16 Truck Rack Source Area is being completed as part of the upcoming Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) activities. The results from the RFI and ongoing IM performance monitoring including during the pulsed operations will be evaluated in the Corrective Measures Study to determine if operational modifications are necessary or if a request to the MDEQ to cease operation and place the DPE system in standby mode is warranted.

1. INTRODUCTION

Ramboll Americas Engineering Solutions, Inc. (Ramboll), on behalf of Calumet Montana Refining, LLC (CMR), has prepared this Area of Concern-16 (AOC-16) Interim Measure (IM) Quarterly Monitoring Report (QMR) No. 11 for the Calumet Great Falls Montana Refining facility located at 1900 10th Street NE, Great Falls, Montana to summarize the 3rd Quarter of operations in 2024 (July 1 through September 30, 2024) for the AOC-16 IM remedy selected to address petroleum releases at AOC-16.

The CMR refinery is comprised of 82.7 acres of industrial/refinery operations and office buildings. The refinery produces gasoline, middle distillates, and asphalt for distribution in Washington, Montana, Idaho, and Alberta, Canada. AOC-16, referred to as the "Gasoline and Light Oil Loading Rack" or "truck loading rack," is located within an approximately 7.6-acre parcel to the east of the active refinery and is owned by CMR (Figure 1).

Activities were completed in accordance with the Corrective Action Order on Consent issued to Montana Refining Company, Inc. by the Montana Department of Environmental Quality (MDEQ) to govern the performance of Resource Conservation Recovery Act (RCRA) corrective action activities at the site. In 2016, petroleum related vapors were detected in an offsite residential property along 11th Street NE. The MDEQ issued an IM letter on October 11, 2016, directing CMR to address imminent threats to human health and/or the environment stemming from petroleum release near CMR's Loading Rack (MDEQ, 2016). Immediate action consisting of relocating and filling an existing sanitary sewer to prevent migration of contaminants was undertaken. Between 2016 and 2019, in coordination with the MDEQ, investigation activities were undertaken, and alternative remedies were evaluated to address the petroleum release near the Loading Rack. Ultimately, an IM remedy approach was recommended consisting of dual-phase extraction (DPE) in the existing primary recovery trench (PRT) in the Truck Rack Area and Light non-aqueous phase liquid (LNAPL) recovery and a passive treatment trench (PTT) just north of North River Road.

Construction of the AOC-16 IM remedies commenced in July 2021 and were completed in October 2021 as documented in the *AOC-16 Interim Measures AOC-16 IM Construction Documentation Report* (CMR, 2022a). Construction activities included the installation of following IM remedies:

- DPE remediation system in the Truck Rack Area, and
- LNAPL recovery trench and PTT utilizing colloidal activated carbon at an area along North River Road.

Commissioning of the AOC-16 IM was conducted from October 2021 through December 2021 and routine operations of the DPE system commenced on January 1, 2022. A 25-foot LNAPL recovery trench extension was completed between July 25, 2022, and July 29, 2022. Documentation of the extension construction activities were provided in the *AOC-16 IM Construction Documentation Report Addendum 1* (CMR, 2022b).

Corrective action remedial goals were developed as part of the AOC-16 Interim Measures Evaluation Report (CMR, 2019) to protect human health and the environment. The AOC-16 IM goals specific to each treatment area include:

- Truck Rack Area (DPE System)
  - Recover free phase LNAPL mass present in the area south of the Truck Rack to stabilize the LNAPL plume.
  - Reduce LNAPL within the vadose and saturated zone soil matrix to stabilize the dissolved phase plume.
- North River Road Area (LNAPL recovery trench and PTT)
  - Mitigate dissolved phase groundwater impacts migrating from the Truck Rack Area towards the Missouri River.

This AOC-16 IM 3rd Quarter 2024 Monitoring Report No. 11 summarizes the sampling results, operations, and performance monitoring data that were gathered for the AOC-16 IM from July 1, 2024 through September 30, 2024, and presents: 1) system runtime for the DPE System; 2) DPE system operational data; 3) identification of operational problems, the length of any shutdowns, and a summary of actions taken to rectify or prevent these problems; 4) influent vapor and liquid sampling results and estimated contaminant mass removal rates for the DPE system; and 5) groundwater concentrations of constituents of concern (COC) in the PTT point of compliance well (MW-105) and PTT well (MW-106). The activities outlined in this report were performed in accordance with the Operations, Maintenance, and Monitoring (OM&M) Plan (CMR, 2021b).

In addition, the IM's have been operational for approximately three years. Based on the performance monitoring conducted to date, operations, maintenance, and performance monitoring frequency has been evaluated as part of this QMR. Revisions to the operations, maintenance, and performance monitoring frequency are proposed for year 2025 based on the data collected to date.

2. DPE SYSTEM OPERATIONS SUMMARY

2.1 System Runtime

During the period of July 1, 2024 through September 30, 2024, the DPE system was in operation approximately 90% of the time and extracted and discharged approximately 61,394 gallons of total fluids to CMR's wastewater treatment plan (WWTP). Table 1 provides a summary of operations during this reporting period. A summary of the routine and non-routine system shutdowns is discussed below.

2.1.1 Planned Shutdowns for Routine and Corrective Maintenance

Brief shutdowns of the DPE system were performed to conduct maintenance activities, including filter replacement and level switch cleaning, monthly preventative maintenance, and inspection of equipment. The system was also shut down on August 13, 2024 to conduct semi-annual maintenance on the Self-Recuperative Catalytic Oxidizer (SRCO). The service report provided by the SRCO vendor, Catalytic Combustion is included as Appendix A indicating the SRCO system is in good condition with no detectable liquid carryover observed from the dual phase extraction system .

2.1.2 Non-Routine/Unplanned Shutdowns

A summary of the non-routine system shutdowns for this reporting period is presented below:

- On August 20, 2024, the system shut down due to a malfunctioning high level float. The float was replaced and the system was restarted within 24 hours.
- On August 24, 2024, the system shut down due to an overload fault on Blower BL2332. Troubleshooting indicated clogging/precipitation buildup. Blower BL2332 was taken out of service while Blower BL2331 continued to operate. On September 5, 2024, the system was shutdown to reinstall Blower BL2332.

2.2 System Operation and Monitoring

DPE system performance monitoring and sampling were conducted in accordance with the OM&M Plan (CMR, 2021b and CMR, 2021c) to document system operation effectiveness. It included monitoring of operations data, periodic vapor and effluent sampling to document contaminant mass recovery, monitoring well gauging, and sub-surface vacuum measurements. These parameters are discussed in the following sections.

2.2.1 DPE Influent and Effluent Sampling Results

Monitoring of contaminant mass removal is the primary metric for optimizing DPE system performance and gauging the AOC-16 IM objective of free-phase LNAPL mass recovery and LNAPL plume stabilization.

Vapor

Vapor/air extraction flow rates were continuously monitored and recorded by the system programmable logic controller (PLC) and influent vapor sampling was periodically conducted on a monthly basis in July, August and September 2024 to evaluate mass removal.

The concentrations of volatile organic compound (VOCs) in the vapor phase were measured periodically on each DPE influent line (DPE-1 through DPE-8) using a photoionization detector (PID) to measure relative vapor concentrations from each DPE well. PID measurements from the DPE wells and

SP-301 port are summarized on Figures 2A and 2B. The highest PID reading during the reporting period was recorded at DPE-8 (397.4 ppm) on August 19, 2024. All DPE wells have shown increases in concentration from the 2nd quarter of 2024 in which all PID readings were less than 100 ppm; whereas all wells range from approximately 100 ppm to 400 ppm in the 3rd quarter of 2024. However, all wells dropped from greater than 800 parts per million (ppm) upon startup in October 2021 to less than 400 ppm in the 3rd Quarter of 2024.

Vapor samples were collected in July, August and September 2024 from SP-301. The samples were submitted to Pace National Laboratory located in Mount Juliet, Tennessee. The samples were analyzed for VOCs by the United States Environmental Protection Agency (USEPA) Method TO-15. Analytical results for detected compounds from the influent vapor samples are summarized in Table 2. Laboratory reports are included in Appendix B1. Historical analytical results and mass removal are included in Appendix C.

Concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX), n-hexane, and n-heptane in influent vapor over time are shown on Figure 3. These compounds were selected to evaluate vapor influent concentration trends as their concentrations were the highest as compared to other VOCs during the start-up sampling. Concentrations during the 3rd quarter of 2024 of BTEX, n-hexane, and n-heptane are approximately four to five orders of magnitude less than the concentrations at startup in October 2021. For example, benzene concentrations decreased from 2,850,000 µg/m^3 in October 2021 to 428 µg/m^3 in September 2024. Similarly, n-hexane concentrations have decreased from 7,840,000 µg/m^3 in October 2021 to 846 µg/m^3 in September 2024. In the 3rd Quarter of 2024, n-hexane values varied between a high of 4,230 µg/m^3 in August 2024 and a low of 846 µg/m^3 in September 2024. Note that concentrations of BTEX, n-hexane, and n-heptane have generally rebounded from low concentrations (less than 20 µg/m^3 for all compounds) observed in January 2024.

Based on historical system operation, it appears that contaminant recovery is a function of both overall reductions in volatile compounds in the subsurface and whether or not each well screen is submerged during sampling. To better understand the effect of submerged well screens, gauging ports were installed at each DPE well on August 23, 2023. Since then, the DPE wells have been gauged during each monthly sampling event as shown on Table 3.

A review of this data indicates that some of the variability in contaminant recovery in the vapor phase over the operational life of the system is likely attributed to the time of sample collection. For example, during the July 2024 sampling event, the water level was below the drop tube elevation and well screens were exposed at four well locations (DPE-1, DPE-3, DPE-4, and DPE-5). During the August 2024 sampling event, fluid levels were below the drop tube elevation and screens were fully exposed at seven of the eight DPE wells (DPE-2 was the only submerged well). None of the DPE well screens were fully exposed during the September 2024 sampling event. The highest concentrations of VOCs in the vapor phase were recorded in August 2024 when seven of the eight well screens were exposed, while the lowest concentrations of VOCs in the vapor phase were recorded in September 2024 when all eight well screens were submerged. In addition to the wells being fully submerged in September, lower than optimal vacuum readings at the DPE wells were recorded in the days before sampling due to clogging of the in-line filters and DPE blower screens. The screens were subsequently cleaned, and filters replaced resulting in increased vacuum and drawdown at the DPE wells.

Note that the drop tube at DPE-2 was shortened by 1.5 feet on July 23, 2024 in an effort to increase drawdown at that location. Complete drawdown has not yet been observed; however, operations were limited immediately following the DPE shortening due to the maintenance issues related to the blowers

previously discussed. Continued optimization and flow balancing is recommended to optimize drawdown at all wells.

The combination of vapor flow rates, system runtime, and vapor VOC concentrations were used to calculate the mass of contaminants removed. During the reporting period, the DPE system removed approximately 5.0 pounds of VOCs in the vapor phase as shown on Figure 4. As noted above, influent vapor concentrations (Table 2 and Figure 3) have dropped four to five orders of magnitude between the 4th quarter of 2022 and the 3rd quarter of 2024. As seven out of the eight DPE well screens appeared to be fully exposed during August 2024 event, the reductions in contaminant recovery at that time are likely due to an overall reduction in volatile organic compound concentration and mass in the subsurface. Lesser amounts of contaminant mass removal were noted in July and September as compared to August; however, saturated well screens and non-optimal operation may have contributed to this lower mass removal amount. Continued frequent gauging of DPE fluid levels and flow balancing is recommended to continue to maximize mass removal.

The post-catalyst outlet temperature on the Self-Recuperative Catalytic Oxidizer (SRCO) unit also serves as a continuous relative indicator of contaminant mass with higher temperatures corresponding to relatively greater contaminant mass (Figure 8). Prior to January 2023 as shown in previous Quarterly Monitoring Reports, the post-catalyst process air temperature consistently exceeded 800 degrees F. During operational periods during this quarter, the SRCO post-catalyst outlet temperature remained at 650 degrees F while in operation. Even with seven of eight wells fully dewatered in August 2024, the post-catalyst process air temperature only reached a maximum value of 670 degrees F on August 18, 2024. This indicates reduced mass and/or shift from average lighter end to average heavier end hydrocarbon loading to the SRCO unit. This result corroborates the analytical data collected as noted above, reductions are likely now predominantly attributable to overall reductions in volatile compounds in the subsurface as opposed to saturated well screens and non-optimal recovery.

Influent VOC concentrations as measured through vapor VOC sampling, PID readings at individual wells, and post-catalyst outlet temperature have decreased with time. Continued flow balancing and periodic manual measurement of water level elevations in DPE wells is recommended to maximize drawdown throughout the trench to influence the residual contamination in the zone of water table fluctuation. Further operational changes, including pulsed operations are recommended moving forward as further discussed in Section 4.

Liquid

Effluent samples of groundwater were collected from the discharge side of the transfer pump in July, August, and September 2024 and submitted to the Pace National Laboratory located in Mount Juliet, Tennessee for analysis of VOCs, semi-volatile organic compounds (SVOCs), volatile petroleum hydrocarbons (VPH), and extractable petroleum hydrocarbons (EPHs). Analytical results from the effluent sampling are summarized in Table 4. Laboratory reports are included in Appendix B2. Historical analytical results and mass removal estimates are included in Appendix D.

The combination of fluid recoveries and contaminant concentrations were used to calculate the mass of contaminants removed in the dissolved phase. In the dissolved phase during the reporting period, the DPE system removed 0.03 pounds of VOCs, 0.02 pounds of SVOCs, 19.5 pounds of VPH, and 93.4 pounds of EPH. Mass recovery of all compounds were similar across each month. Concentration trends indicate that liquid recovery is shifting to heavier end compounds (i.e. EPH) as compared to more

volatile compounds (i.e. VOCs). This phenomenon also explains the low VOC recovery in the vapor phase when the well screens and drop tubes are submerged and the system is predominantly extracting liquids. In this case, the smear zone is submerged and any VOCs in the vapor phase are VOCs volatilizing from the liquid instead of VOCs present in the vadose zone. When the system is predominantly pulling liquid, all VOCs measured are coming directly from the liquid. Since the beginning of operation, the fraction of VOCs in the liquid phase have decreased.

Separate phase LNAPL recovery is not quantified. Total fluids (combined LNAPL and water) in the effluent are pumped to the refinery's on-site WWTP where oil-water separation occurs. However, visual observations of LNAPL in the DPE system knockout tank (T-23100) sight glass serve as a qualitative indicator of LNAPL recovery. Small amounts of LNAPL were observed within the knock-out tank sight glass. Qualitatively, the amount of LNAPL observed in the sight glass is lower than in previous quarters.

As shown on Figure 4, total VOC, SVOC, VPH, and EPH mass removed in the vapor and dissolved phase since DPE system startup in October 2021 and through September 30, 2024, is calculated to be approximately 2,919 pounds, 14.2 pounds, 267 pounds, and 3,018 pounds, respectively.

2.2.2 Groundwater Elevations

Monitoring wells in AOC-16 area (MW-22, MW-41S, MW-41D, MW-53, MW-57, MW-59S, MW-59D, MW-63, MW-64, MW-102, MW-103, MW-104, MW-105, and MW-106) were gauged in July, August and September 2024. The depth to water and if observed, separate-phase LNAPL thickness measurements, were recorded. These measurements are presented in Table 5. Groundwater well locations with respect to the remedy components are shown on Figure 1. Groundwater contours are provided on Figure 5A through 5C. In general, groundwater elevations throughout the 3rd quarter of 2024 were around historical averages.

2.2.3 Sub-Surface Vacuum

Sub-surface vacuum measurements were recorded monthly at three monitoring wells (MW-22 located 26 feet from DPE-3, MW-64 located 21 feet from DPE-6, MW-104 located 13 feet from DPE-3, and 22 feet from DPE-4). These measurements are shown on Figure 6. Based on the measurements, vacuum was observed at MW-104 but not MW-22 or MW-64, so the current radius of influence (ROI) is estimated to be between 13 and 21 feet. Subsurface vacuum will continue to be monitored to document the estimated zone of influence of the DPE system.

2.2.4 Overall System Performance and Optimization

This section compares the primary design parameters to the observed/measured values during the reporting period to evaluate the system performance. These parameters are discussed in detail in following sections and summarized in Table 1.

Liquid Extraction Rate

The average design flow rate for the DPE system is between 0.25 gallons per minute (gpm) during steady-state operation and 21 gpm during rainfall events. The combination of fluid recoveries and system run time was used to calculate liquid flow rate during the reporting period. The DPE system extracted fluids at an average rate of 0.55 gpm which is within the design flow rates. Average groundwater extraction rates during the reporting period were average compared to previous reporting periods.

Vapor Influent Flow Rate and Applied Vacuum

The design vapor influent flow rate and applied vacuum are 200 standard cubic per minute (SCFM) and 17 inches of mercury (in-Hg), respectively. System flow rate and system vacuum at the header during the reporting period are shown on Figure 7. The vacuum averaged 11.6 in-Hg in July, 8.6 in-Hg in August and 8.3 in-Hg in September below the design vacuum of 17 in-Hg. Flows in July 2024 averaged 84 SCFM, flows in August 2024 averaged 70 SCFM and flows in September averaged 82 SCFM.

SRCO Performance Monitoring

The SRCO has a design destruction efficiency of 99% per manufacturer's specifications. To show compliance with the air permit, the SRCO pre- and post-catalyst process air temperature is monitored. The pre-catalyst process air temperature must be greater than 650°F to ensure a destruction efficiency of 99%. The SRCO temperature monitoring results during the reporting period is shown on Figure 8. As shown on Figure 8, the pre-catalyst process air temperature was at least 650°F while the system was in operation.

3. LNAPL RECOVERY TRENCH AND PTT

3.1 LNAPL Monitoring and Passive LNAPL Recovery

The 17 LNAPL collection wells located in the LNAPL recovery trench were gauged periodically throughout this reporting period (Figure 1). Fluid levels collected from the LNAPL wells are summarized in Table 6 and on Figure 9. No measurable LNAPL or sheens were observed at any well during the reporting period.

Passive skimmers are deployed in eight of the wells – LNAPL-2, LNAPL-4, LNAPL-5, LNAPL-6, LNAPL-7, LNAPL-8, LNAPL-10, and LNAPL-11. As no measurable LNAPL was observed in the wells during the reporting period, no LNAPL was recovered via the passive skimmers.

It is recommended that LNAPL thickness be monitored on a bi-weekly (every other) basis through the 4th quarter. Measurable LNAPL thickness has not been recorded during any sampling event in 2024. Therefore, it is recommended that monitoring for LNAPL be reduced from bi-weekly to monthly in 2025. Passive recovery devices are recommended to remain in wells for the first half of 2025. If no further NAPL is recorded, removal of the passive recovery devices is suggested.

3.2 Groundwater Monitoring

The primary goal of the PTT is to mitigate dissolved phase groundwater impacts from migrating towards the Missouri River. Quarterly groundwater sampling was conducted on September 12, 2024, at upgradient well MW-41S, PTT well MW-106, and compliance well MW-105 (Figure 1).

3.2.1 Monitoring Well Sampling

The monitoring wells were sampled using low-flow techniques on September 12, 2024. During the purging of each well, field measurements were collected for water quality parameters, including dissolved oxygen (DO), pH, specific conductance, temperature, and oxidation reduction potential (ORP). The field measurements were recorded every 5 minutes during well purging. The physical and chemical field measurements collected when purging the monitoring wells are summarized in the groundwater sampling logs in Appendix E.

After all the samples were collected, they were sealed, labeled, and placed on ice, pending delivery under chain-of-custody procedures to Pace located in Mount Juliet, Tennessee. The groundwater samples were analyzed for VOCs (via USEPA Method SW8260D), SVOCs (via USEPA Method SW 8270D), MDEQ VPH (via Method MDEQ VPH), and MDEQ EPH (via Method MDEQ EPH). Samples were also analyzed for the following parameters to assess the biodegradation dynamics of the COCs: filtered and unfiltered total iron, total manganese, dissolved iron, and dissolved manganese (via USEPA Method 6020B), sulfate and nitrate (via USEPA Method 9056A), biological oxygen demand (BOD) (via USEPA Method 5210B), alkalinity (via USEPA Method 2320B), methane (via method RSK - 175), and carbon dioxide (via USEPA Method 4500-CO2).

The wells did not yield enough volume to facilitate the collection of field duplicate samples or a matrix spike/matrix spike duplicate (MS/MSD) sample. One trip blank was submitted along with each laboratory cooler for quality assurance/quality control (QA/QC) purposes. Methods and procedures for collecting, handling, and analyzing samples are provided in the Quality Assurance Project Plan (QAPP) (CMR, 2018). Treatment and disposal of purge water generated during monitoring well sampling was handled consistent with existing project procedures.

Note that groundwater samples were also collected in July 2024 at monitoring wells MW-41S and MW-105 as part of the site-wide RFI activities. Monitoring well MW-106 was not included in the site-wide monitoring event. Results are included in Table 7 and Figures 10A and 10B and included in the discussion below.

3.2.2 Groundwater Analytical Results – July and September 2024

The groundwater analytical results for detected compounds from the July 2024 and September 2024 sampling event are provided in Table 7. Previous quarterly groundwater sampling results from October 2021 through June 2024 are also provided in Table 7 for comparison purposes. Analytical compounds that met or exceeded the respective MDEQ -7 HHS (May 2017) and/or MDEQ Tier 1 Groundwater Risk-Based Screening Levels (RBSLs) are bolded and/or underlined, respectively, for reference. Laboratory reports are included in Appendix B3.

The following subsections provide a summary of the analytical parameters detected in the monitoring wells in July and September 2024 and compare those detections to the DEQ-7 HHS in groundwater and RBSLs.

VOCs

Of the VOCs detected during the July and September 2024 groundwater sampling event at AOC-16, only benzene was detected above its respective groundwater screening standard.[1]

The monitoring well upgradient of the passive treatment trench (MW-41S) reported benzene at 406 micrograms per liter (µg/L) in July and 574 µg/L exceeding the DEQ-7 HHS and RBSL of 5 µg/L. Benzene was detected from the location (MW-106) installed within the trench in September 2024 at a concentration of 22.1 µg/L exceeding the DEQ-7 HHS and RBSL. The monitoring well (MW-105) installed downgradient of the passive treatment trench reported benzene at 8.4 µg/L in July and 39.4 µg/L in September just exceeding the DEQ-7 HHS and RBSL of 5 µg/L.

SVOCs

In July 2024, 1-methylnaphthalene exceeded the RBSLs at upgradient well MW-41S. No SVOCs were detected at concentrations exceeding the DEQ-7 HHS or the RBSLs in downgradient wells MW-105 or MW-106.

VPH, and EPH

The upgradient monitoring well (MW-41S) had detectable concentrations of volatile petroleum hydrocarbons (VPH) via method MTDEQ VPH of 5,380 µg/L with a C5-C8 Aliphatic concentration (adjusted) of 846 µg/L which exceeds the RBSL of 650 µg/L in September 2024. Within the trench (MW-106), VPH and C5-C8 Aliphatics were detected between the method detection limit and reporting limit at a concentration of 149 µg/L and 102 µg/L, respectively, which are both less than the RBSL. Downgradient of the PTT (MW-105), VPH was detected at a concentration of 1,610 µg/L with a C5-C8 Aliphatics concentration (adjusted) of 978 µg/L which exceeds the RBLS of 650 µg/L.

3.2.3 Evaluation of Concentration Trends Over Time

To evaluate concentration trends over time, the concentrations of benzene, C5-C8 Aliphatics, and VPH were plotted for each of the three monitoring wells (i.e., MW41S, MW-106, and MW-105). Baseline sampling data from June 2020 through October 2021 are included on Figures 10A through 10C along

[1] All VOC results reported in this section are from USEPA Method 8260B.

with post-remediation data. This historical data was previously reported in the *2020/2021 Annual Groundwater Sampling Summary Report* (CMR, 2021a) and Construction Documentation Report (CMR, 2022a). Benzene and C5-C8 Aliphatics (adjusted) were selected as indicator compounds because they were the two compounds that exceed DEQ-7 HHSs and/or RBSLs during the baseline sampling event in October 2021. While there are no DEQ-7 HHSs and RBSLs for VPH, VPH represents a range of hydrocarbons and serves as an overall indicator of contaminant loading to the PTT.

The benzene, C5-C8 Aliphatics and VPH sampling results at upgradient well MW-41S showed the following changes between October 2021 and September 2024:

- Benzene has ranged from a maximum concentration of 1,900 µg/L in October 2021 to a minimum value of 190 µg/L in March 2023.
- VPH has remained relatively consistent with some variability between sampling events prior to this quarter with a maximum value of 9,800 µg/L in June 2022 and a minimum value of 3,100 µg/L in March 2022.
- C5-C8 Aliphatics have remained relatively consistent between sampling events with a minimum value of 392 µg/L in March 2023 and a maximum value of 1,500 µg/L in October 2021. There appears to be some seasonal variability in the C5-C8 Aliphatic concentrations with lower concentrations observed in the spring and summer months and higher concentrations observed in the fall and winter.

The benzene, C5-C8 Aliphatics and VPH sampling results at well MW-106 located in the PTT showed the following changes between October 2021 and September 2024:

- Benzene had not been detected during any sampling events until the June 2024 sampling event where benzene was detected at a concentration of 1.6 µg/L and in September 2024 at a concentration of 22.1 µg/L. Further monitoring is needed to understand the trends associated with this well.
- VPH had not been detected between October 2021 and June 2022, but was detected at concentration of 189 µg/L in August 2022, 108 µg/L in December 2022, 85.9 µg/L in June 2023, 533 µg/L in September 2023, 67.1 µg/L in December 2023, and 149 µg/ in September 2024. VPH was not detected in February 2024 or June 2024.
- C5-C8 Aliphatics had not been detected between October 2021 and June 2022, but was detected in August 2022 a concentration of 153 µg/L, in December 2022 at a concentration of 80 µg/L, in June 2023 at a concentration of 85.9 µg/L, in September 2023 at a concentration of 495 µg/L, and in December 2023 at a concentration of 67.1 µg/L, in June 2024 at a concentration of 59.3 µg/L, and in September 2024 at a concentration of 79.9 µg/L. Detected results and the detection limit remain less than the RBSL of 650 µg/L and no trend is apparent at this time.

The benzene, C5-C8 Aliphatics, and VPH sampling results at well MW-105 located downgradient of the PTT showed the following changes between October 2021 and September 2024:

- Benzene have varied from a maximum of 570 µg/L in October 2021 to a minimum 3.91 µg/L in February 2024. Trends are generally decreasing with time since the installation of the PTT with some variability between sampling events. Trends appear to indicate that concentrations are higher in spring/summer months than in winter months. A comparison of sampling results in the third quarter between sampling events indicate a maximum concentration of 570 µg/L in September 2020 prior to the installation of the PTT. Concentrations after the installation of the PTT

in the third quarter of each year have decreased from 85 µg/L in August 2022, to 85 µg/L in September 2023 to 29.4 µg/L in September 2024.

- VPH appears variable with a maximum concentration of 1,900 µg/L in October 2021 to less than detection levels in February 2024. Trends appear to indicate that concentrations are higher in spring/summer months than in winter months.
- C5-C8 Aliphatics appear variable with a maximum concentration of 1,800 µg/L in February 2021 to less than detection levels in February 2024. Trends appear to indicate that concentrations are higher in spring/summer months than in winter months.

Analytical results from groundwater samples collected from monitoring wells located up-gradient, down-gradient and from within the PTT indicate that the concentration of dissolved phase petroleum COCs decreased across the PTT initially meeting the goal of the PTT to mitigate the dissolved phase groundwater impacts from migrating from the Truck Rack to the Missouri River. Results at well MW-106 within the PTT indicates some initial rebound within the trench itself. Note that the monitoring well is installed at the halfway point of the 5-foot-wide carbon amended material meaning that there is still approximately 2.5 feet of carbon amended material available for fully adsorbing contaminants. Additionally, as noted in previous quarterly monitoring reports, available electron acceptor concentrations of nitrate and sulfate have reduced significantly in the trench indicating a slowing of the biodegradation reactions which may be contributing to the rebound. As such, it is recommended that monitoring the biodegradation indicators and groundwater quality within the PTT continue over time. If there are further indicators of significant rebound within the trench, additional measures to accelerate the rate of biodegradation may be considered. However, the timescale for consideration of these alternate measures is on the order of years.

Concentrations of COCs appear to be fluctuating with time at the down-gradient compliance point. Initial trends indicate that there is seasonable variability in concentrations at downgradient well MW-105. A review of benzene data indicates decreasing concentration trends when considered for seasonal variability.

Biodegradation Parameters

Field parameters including pH, conductivity, turbidity, ORP, and dissolved oxygen are provided in Table 8. Low dissolved oxygen (generally less than 0.5 mg/L) and low or negative ORP values serve as indicators of the presence of reducing conditions. The lower the ORP and DO, the greater the potential for a reducing and anaerobic environment. During the last sampling event at all three wells, ORP was negative and dissolved oxygen was close to zero indicating reducing conditions.

4. CONCLUSION AND RECOMMENDATIONS

During this reporting period from July 1, 2024, through September 30, 2024, the DPE system operated approximately 90% of the available time. During this reporting period, the DPE system extracted and discharged approximately 61,394 gallons of total fluids to CMR's WWTP while in operation.

DPE System Performance

Initial mass removal rates indicate that the DPE system in the Truck Rack Area is meeting the AOC-16 IM goals of recovering free phase LNAPL mass and reducing the LNAPL within the vadose and saturated zone soil matrix.

During the reporting period, the DPE system removed approximately 5.0 pounds of VOCs in the vapor phase, and 0.03 pounds of VOCs, 0.02 pounds of SVOCs, 19.5 pounds of VPH, and 93.4 pounds of EPH in the liquid phase. Total VOC, SVOC, VPH, and EPH mass removed in the vapor and dissolved phase since DPE system startup in October 2021 and through September 30, 2024, is calculated to be approximately 2,919 pounds, 14.2 pounds, 267 pounds, and 3,018 pounds, respectively. Total influent vapor VOC concentrations were approximately 4 orders of magnitude lower than during startup during this quarter. Flow rebalancing and optimization has resulted in the majority of the wells operating under dewatered conditions indicating that reductions in contaminant mass recovery are predominantly due to reduced contaminant mass present in the subsurface.

The pre-catalyst SRCO temperature remained above its minimum operating temperature setpoint of 650°F while in operation, indicating at least 99% destruction efficiency of the extracted petroleum vapors prior to being discharged to the atmosphere.

DPE System Modification Recommendations

Multiple performance metrics indicate that the mass recovery of the remediation system is reaching asymptotic levels including:

- Influent vapor concentrations have dropped four to five orders of magnitude between system startup and the 3rd quarter of 2024.
- The post-catalyst outlet temperature on the Self-Recuperative Catalytic Oxidizer (SRCO) which serves as a continuous relative indicator of contaminant mass with higher temperatures corresponding to relatively greater contaminant mass has seen temperatures drop from greater than 800 degrees F during the first year of operation to less than 670 degrees F in the 3rd quarter of 2024.
- Sampling of the liquid effluent indicates that liquid recovery is shifting to heavier end compounds (i.e. EPH) as compared to the more volatile compounds (i.e. VOCs).
- A small amount of LNAPL was observed within the knock-out tank sight glass during the 3rd quarter of 2024. Qualitatively, the amount of LNAPL observed in the sight glass is lower than in previous quarters.

System operation for the first three quarters of 2024 has exceeded 85% runtime. Consistent with the OM&M Plan, modifications to operate the system in a pulsed manner are recommended in 2025. Based on observations to date, the maximum contaminant recovery occurs when the system is fully dewatered, all water within the wells are drawn below the top of the wells screens, and the LNAPL

smear zone is exposed. Therefore, it is recommended that the pulsing be performed such that the full system (all eight DPE wells) are either fully operational or non-operational. Based on observations to date, it takes approximately one week from system start-up to reach a steady-state condition of maximum dewatering. Two periods system shutdown are proposed consisting of an initial period of 6.5 weeks of system shutdown followed by full operation for 6.5 weeks. Once this shorter pulsing is complete, a period of 13 weeks of system shutdown followed by full operation for 13 weeks is proposed. This stepped, phased approach will initially allow for monitoring during a shorter shutdown/startup period followed by a longer shutdown/startup period.

It is also recommended that the frequency of performance monitoring events be modified to monitor and track how the pulsed operations impact contaminant recovery. The recommended updated monitoring frequency is provided on Table 9 below.

Table 9: Proposed DPE System Field Monitoring Schedule

Monitoring Activity	Sampling Location	Monitoring Frequency	
		Historical Monitoring Frequency	Proposed Monitoring Frequency
Influent Vapor Monitoring with PID	Wells RW-2301 through RW-2308 at sampling ports SP-1 through SP-8	Monthly	During 6.5-week operation period: At start-up; at 3 weeks on; at 6.5 weeks on During 13 week operation perod: At startup; at 3 weeks on; at 6.5 weeks on; at 13 weeks on
Influent Vapor Monitoring with PID	Influent at sample port SP301	Monthly	During 6.5-week operation period: At start-up; at 3 weeks on; at 6 weeks on During 13 week operation perod: At startup; at 3 weeks on; at 6.5 weeks on; at 13 weeks on
Influent Vapor Monitoring with laboratory analysis of TO-15	Influent at sample port SP301	Monthly	During 6-week operation period: At start-up; at 3 weeks on; at 6 weeks on During 13 week operation perod: At startup; at 3 weeks on; at 6.5 weeks on; at 13 weeks on

Monitoring Activity	Sampling Location	Monitoring Frequency	
		Historical Monitoring Frequency	Proposed Monitoring Frequency
Liquid phase effluent sample with laboratory analysis of VOCs, SVOCs, VPH, and EPH	SP200	Monthly	During 6-week operation period: At start-up; at 3 weeks on; at 6 weeks on During 13 week operation perod: At startup; at 3 weeks on; at 6.5 weeks on; at 13 weeks on
LNAPL Thickness	MW-22, MW-41S, MW-41D, MW-53, MW-57, MW-63, MW64, MW-57, MW-59S, MW-59D, MW-102, MW103, MW-104, MW-105, and MW-106	Monthly	Monthly during both operational and non-operational periods
Fluid Levels and LNAPL Thickness	DPE wells 1 through 8	Monthly concurrent with Influent Vapor Monitoring	Monthly during non-operational periods Prior to system startup During 6.5-week operation period: At start-up; at 3 weeks on; at 6.5 weeks on During 13 week operation perod: At startup; at 3 weeks on; at 6.5 weeks on; at 13 weeks on
Subsurface Vacuum	MW-22, MW-64, and MW-104	Monthly	During 6-week operation period: At start-up; at 3 weeks on; at 6 weeks on

The proposed non-operational and monitoring schedule will be reevaluated after each cycle is completed in the fourth quarter of 2025. Based on the results of the pulsed operation and performance monitoring, if the DPE System continues to show an asymptotic mass removal rate, a request will be submitted to the MDEQ to place the DPE System in standby mode.

Given the change in proposed operations, semi-annual monitoring reports will be prepared after the completion of the 6.5 week operational period and after completion of the 13 week operational period.

Note that the frequency of preventative maintenance and inspection activities will also be modified to reflect the modifications in operational schedule. Weekly and monthly inspections will occur during the operational periods. Preventative maintenance of the system requiring shutdowns such as semi-annual and annual maintenance activities will be scheduled to occur during scheduled non-operational periods.

PTT Performance

Analytical results from groundwater samples collected from monitoring wells located up-gradient, down-gradient and from within the PTT indicate that the concentration of dissolved phase petroleum COCs decreased across the PTT meeting the goal of mitigating the dissolved phase groundwater impacts from migrating from the Truck Rack to the Missouri River. Some rebound in the PTT well MW-106 has been observed requiring further monitoring. Concentration trends are decreasing at downgradient performance monitoring well MW-105 with some seasonable variability.

Based on the observed concentration trends to date at MW-41S, PTT well MW-106 and compliance well MW-105, no modifications to the groundwater sampling frequency is proposed. Quarterly sampling for VOCs, SVOCs, VPH and EPH will continue throughout 2025. Continued semi-annual sampling for biodegradation indicator parameters is also recommended.

No measurable LNAPL beyond trace levels have been observed throughout the first three quarters of 2024 in the 17 LNAPL recovery wells. Therefore, it is recommended that gauging of the LNAPL recovery wells be reduced to once per month. If measurable LNAPL is recorded, the frequency may be modified as needed.

OM&M of the interim measures will continue to document the performance of the IM's and will include periodic performance reporting to the MDEQ to ensure the IM objectives are being met. Further investigation/evaluation of the petroleum impacts at the AOC-16 Truck Rack Area will be completed as part of the upcoming RCRA RFI activities.

5. REFERENCES

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CMR. 2021c. AOC-16 Interim Measure Self-Recuperative Catalytic Oxidizer Operations, Maintenance, and Monitoring Plan. October.

CMR. 2022a. AOC-16 IM Construction Documentation Report. March.

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United States Department of the Interior. 2001. Office of Surface Mining Reclamation and Enforcement. Technical Measures for the Investigation and Mitigation of Fugitive Methane Hazards in Areas of Coal Mining. September.

FIGURES

Figure 1: AOC-16 Site Layout

Figure 2A-B: DPE System Influent Vapor PID Readings

Figure 3: DPE System Influent Vapor Concentration Trend

Figure 4: Vapor and Liquid Effluent Mass Removal

Figure 5A-C: Groundwater Contours

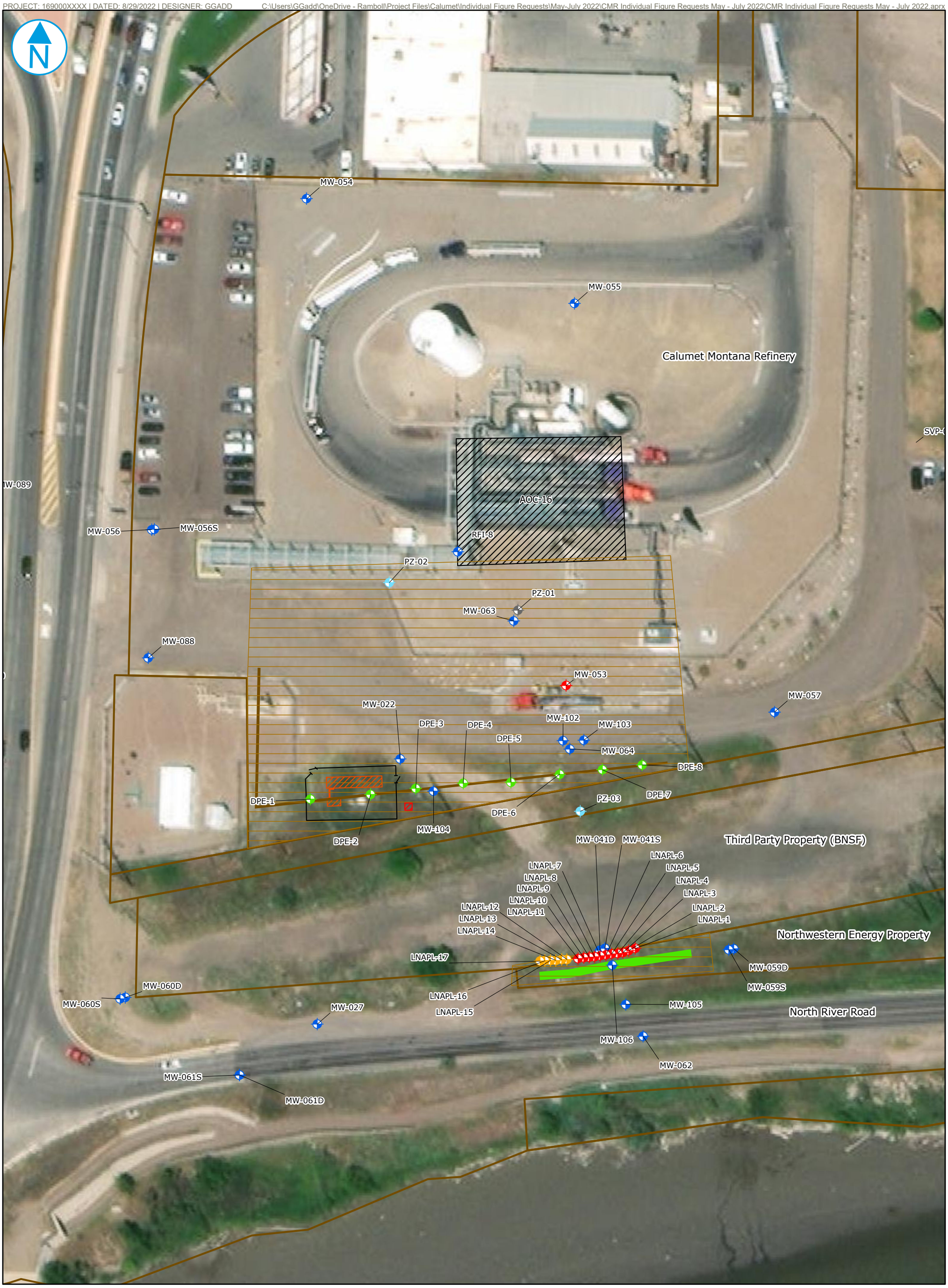
Figure 6: Subsurface Vacuum Readings

Figure 7: SRCO Operational Parameters

Figure 8: DPE System Operational Parameters

Figure 9: Maximum LNAPL Thickness

Figure 10A-C: Groundwater Concentration Trend Graphs



- LNAPL Recovery Well - Installed 2022
- LNAPL Recovery Well - Installed 2021
- DPE Recovery Well - Installed 2021
- Abandoned Well
- Piezometer
- Monitoring Well
- DPE Fence
- Property Line
- Corrective Action
- Passive Recovery Trench
- Primary Recovery Trench
- DPE - CATOX Unit
- DPE Transformer
- AOC

0 25 50 100 Feet

AOC 16 SITE LAYOUT

FIGURE 01

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Great Falls, Montana

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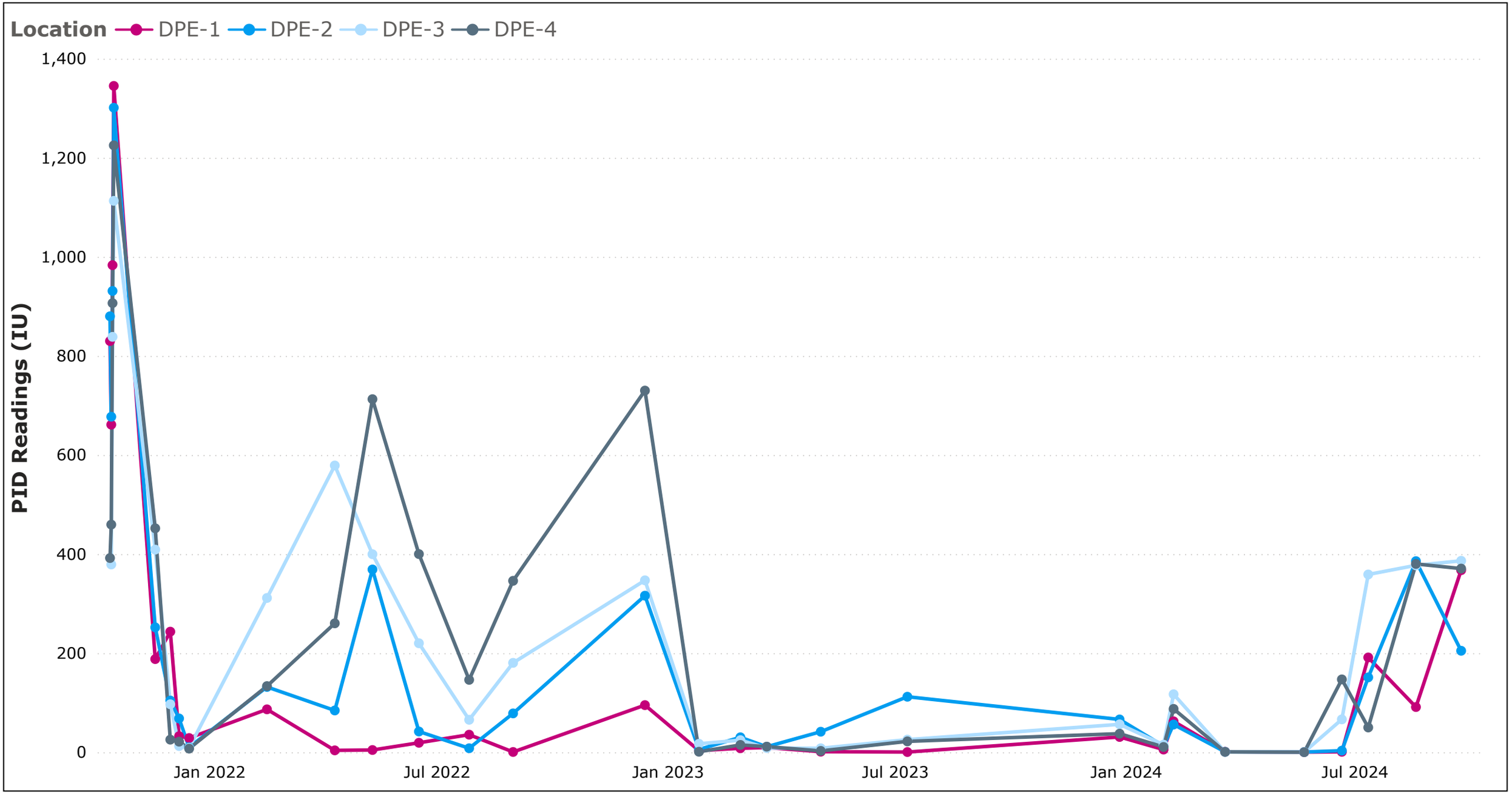
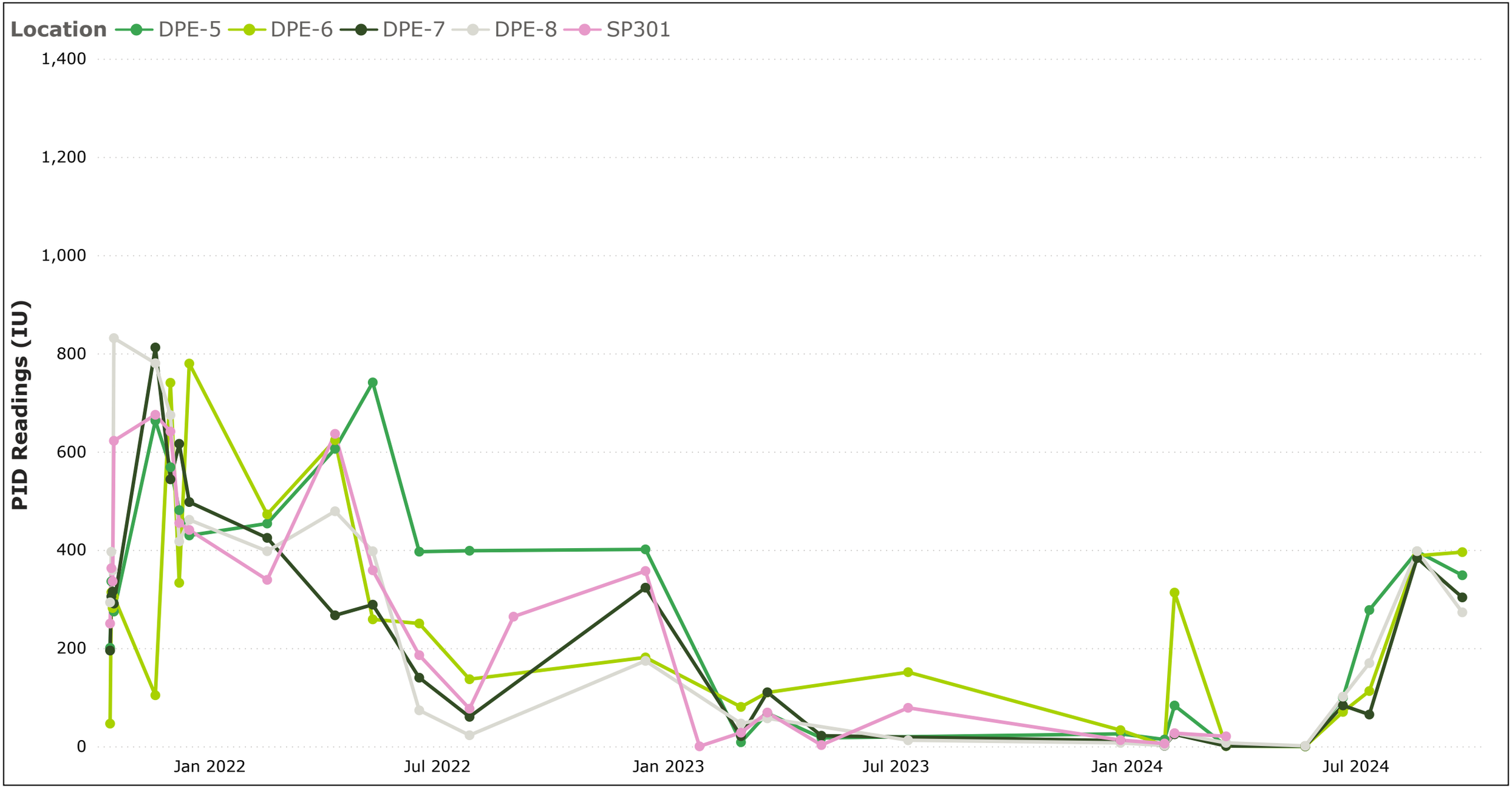
Figure 2A: DPE system Influent Vapor PID Readings (DPE-1 through DPE-4)



Notes:
IU: Instrument Units
PID: photoionization detector

Figure 2B: DPE system Influent Vapor PID Readings (DPE-5 through DPE-8 and SP-301)



Notes:
IU: Instrument Units
PID: photoionization detector

Figure 3: DPE System Influent Vapor Concentration Trend

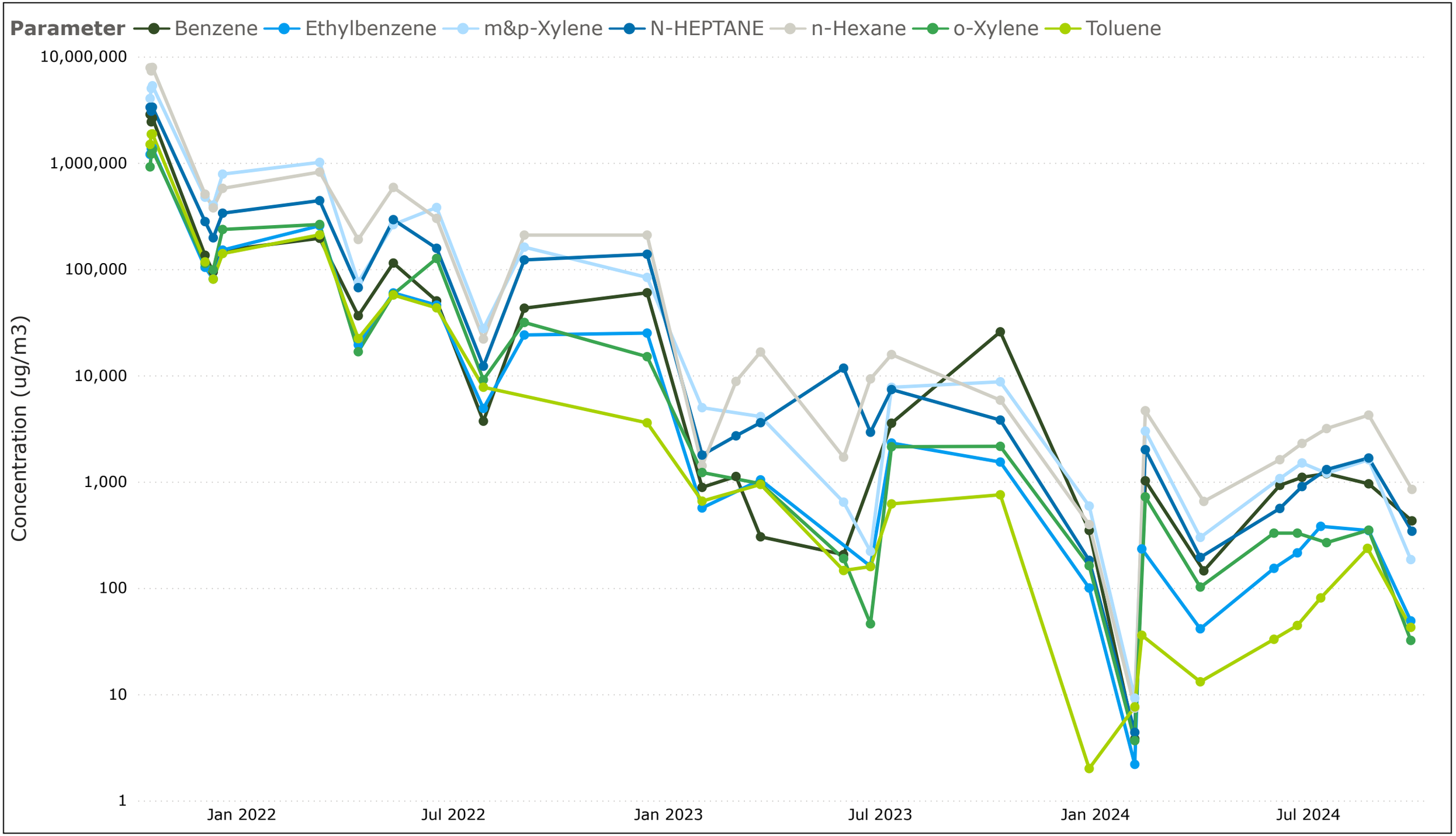
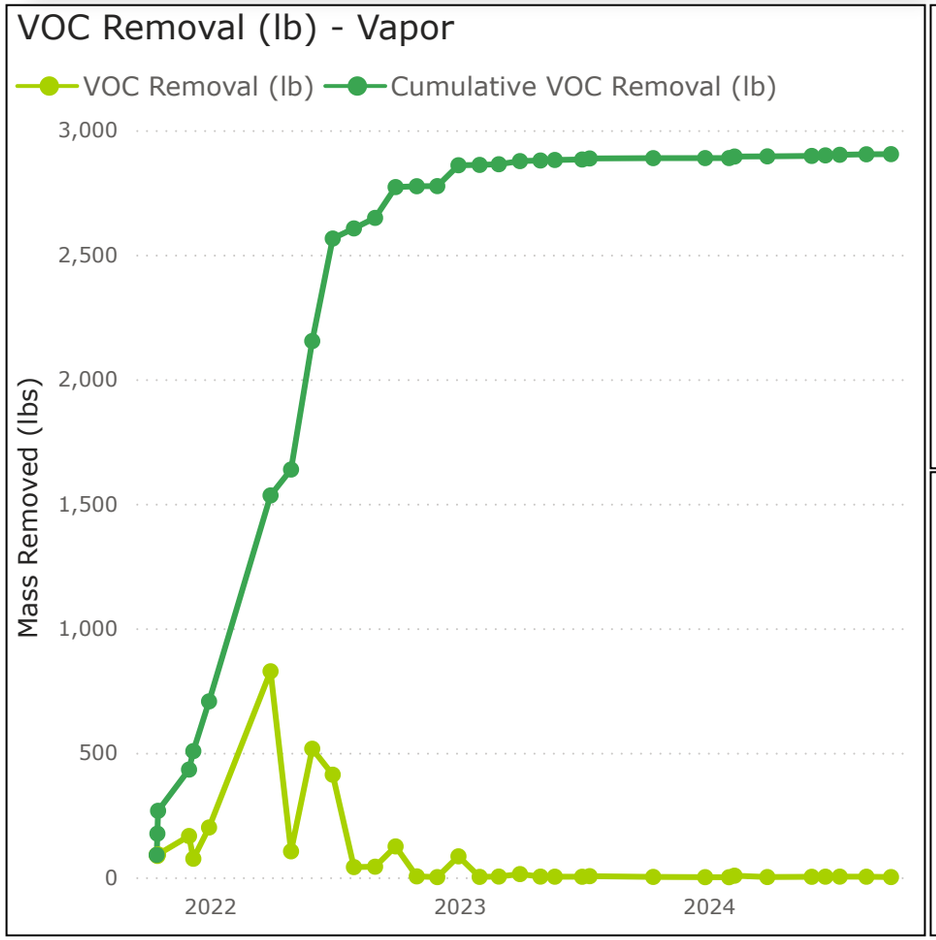
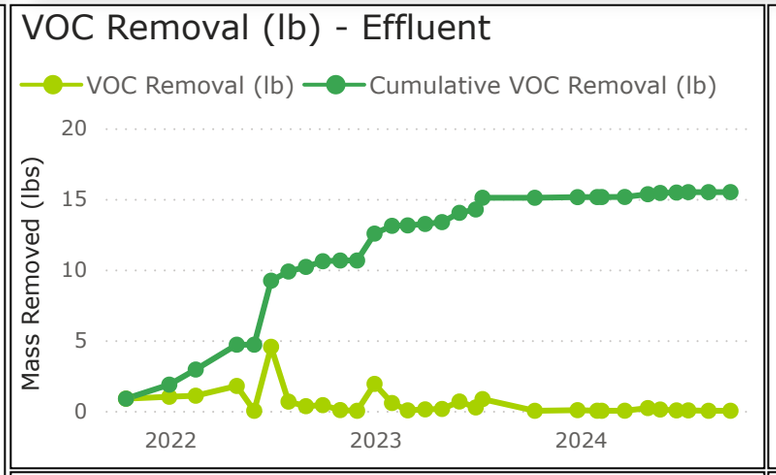


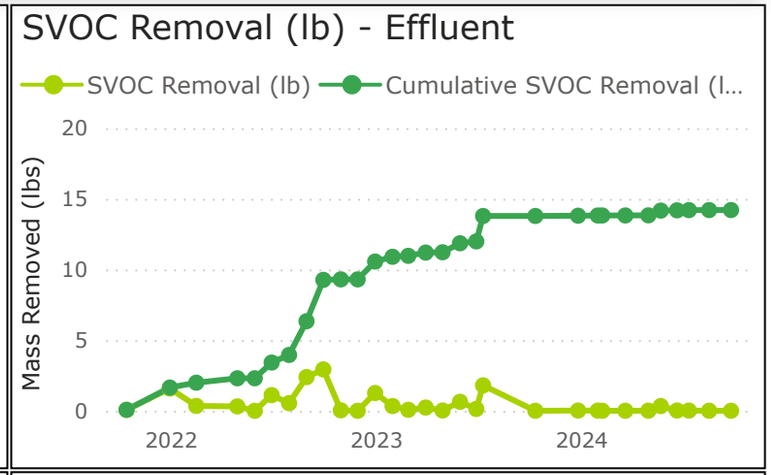
Figure 4: Vapor and Liquid Effluent Mass Removal

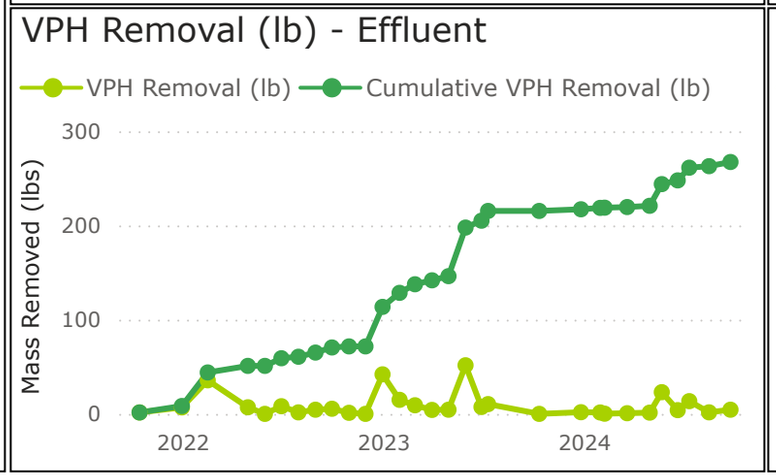
Vapor Mass Removal

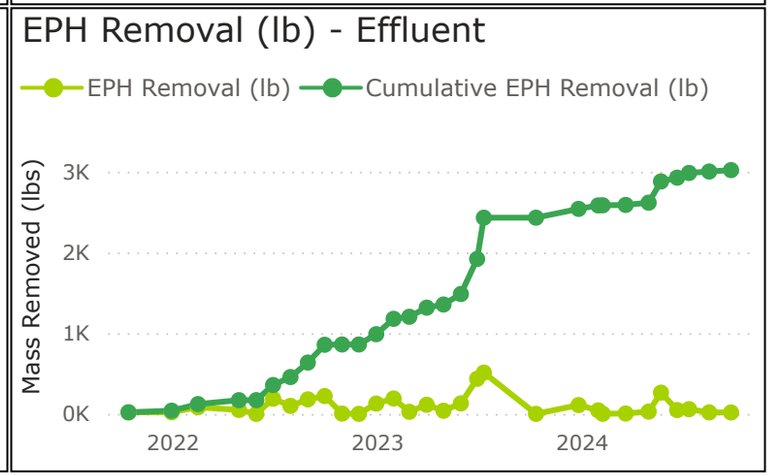


Liquid Effluent Mass Removal









Total VOCs Removed (lbs)	Total SVOCs Removed (lbs)	Total VPHs Removed (lbs)	Total EPHs Removed (lbs)
2,919	14.2	267	3,018

Notes:

- Vapor samples were collected from SP-301. The combination of vapor flow rates, system runtime, and vapor VOC concentrations were used to calculate the mass of contaminants removed.
- Liquid effluent samples were collected from the discharge side of the transfer pump (SP-200). The combination of fluid recoveries and contaminant concentrations were used to calculate the mass of contaminants removed.

Groundwater Contours (5 ft)
Flow Arrow
Monitoring Well
Recovery Well
AOC

Notes
1) Measurements collected on July 2024
2) The shallow most screen intervals at well clusters MW-41S/D and MW-59S/D were used to generate the potentiometric surface contour map (i.e. MW-41S)

0 22.5 45 Feet

GROUNDWATER CONTOURS - JULY 2024

Calumet Montana Refining, LLC
1900 10th Street Northeast
Great Falls, Montana

FIGURE 05a

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PROJECT: 1690015898 | DATED: 10/21/2024 | DESIGNER: CHURCHKE

Q3_2024_GW_Elev_Aug2024

- Flow Arrow
- Groundwater Contours (5 ft)
- Monitoring Well
- Recovery Well
- AOC

Notes

1) Measurements collected on August 2024
2) The shallow most screen intervals at well clusters MW-41S/D and MW-59S/D were used to generate the potentiometric surface contour map (i.e. MW-41S)

0 22.5 45 Feet

GROUNDWATER CONTOURS - AUGUST 2024

Calumet Montana Refining, LLC
1900 10th Street Northeast
Great Falls, Montana

FIGURE 05b

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PROJECT: 1690015898 | DATED: 10/25/2024 | DESIGNER: CHURCHKE

Flow Arrow
Groundwater Contours (5 ft)
AOC

Notes
1) Measurements collected on September 2024
2) The shallow most screen intervals at well clusters MW-41S/D and MW-59S/D were used to generate the potentiometric surface contour map (i.e. MW-41S)

0 22.5 45 Feet

GROUNDWATER CONTOURS - SEPTEMBER 2024

Calumet Montana Refining, LLC
1900 10th Street Northeast
Great Falls, Montana

FIGURE 05c

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PROJECT: 1690015898 | DATED: 10/25/2024 | DESIGNER: CHURCHKE

MW-22	
7/12/2024	0
8/22/2024	0
9/24/2024	0

MW-104	
7/12/2024	-0.011
8/22/2024	-0.05
9/24/2024	-0.01

DPE-5	
7/1/2024	-0.74
8/2/2024	-0.71
9/3/2024	-1.10

MW-64	
7/12/2024	0
8/22/2024	0
9/24/2024	0

DPE-1	
7/1/2024	-0.04
8/2/2024	-1.15
9/3/2024	-0.68

DPE-8	
7/1/2024	-0.60
8/2/2024	-0.16
9/3/2024	-0.13

DPE-4	
7/1/2024	-0.74
8/2/2024	-0.50
9/3/2024	-1.13

DPE-6	
7/1/2024	-1.12
8/2/2024	-1.11
9/3/2024	-0.76

DPE-7	
7/1/2024	-0.25
8/2/2024	-0.07
9/3/2024	-0.13

DPE-2	
7/1/2024	-2.31
8/2/2024	-1.87
9/3/2024	-1.91

DPE-3	
7/1/2024	-1.21
8/2/2024	-1.34
9/3/2024	-1.63

Piezometer

Recovery Well

Monitoring Well

Notes

1) Sub-surface vacuum readings are in inches of Mercury (in-Hg).

0 15 30 Feet

SUB-SURFACE VACUUM READINGS

Calumet Montana Refining, LLC
1900 10th Street Northeast
Great Falls, Montana

FIGURE 06

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A RAMBOLL COMPANY

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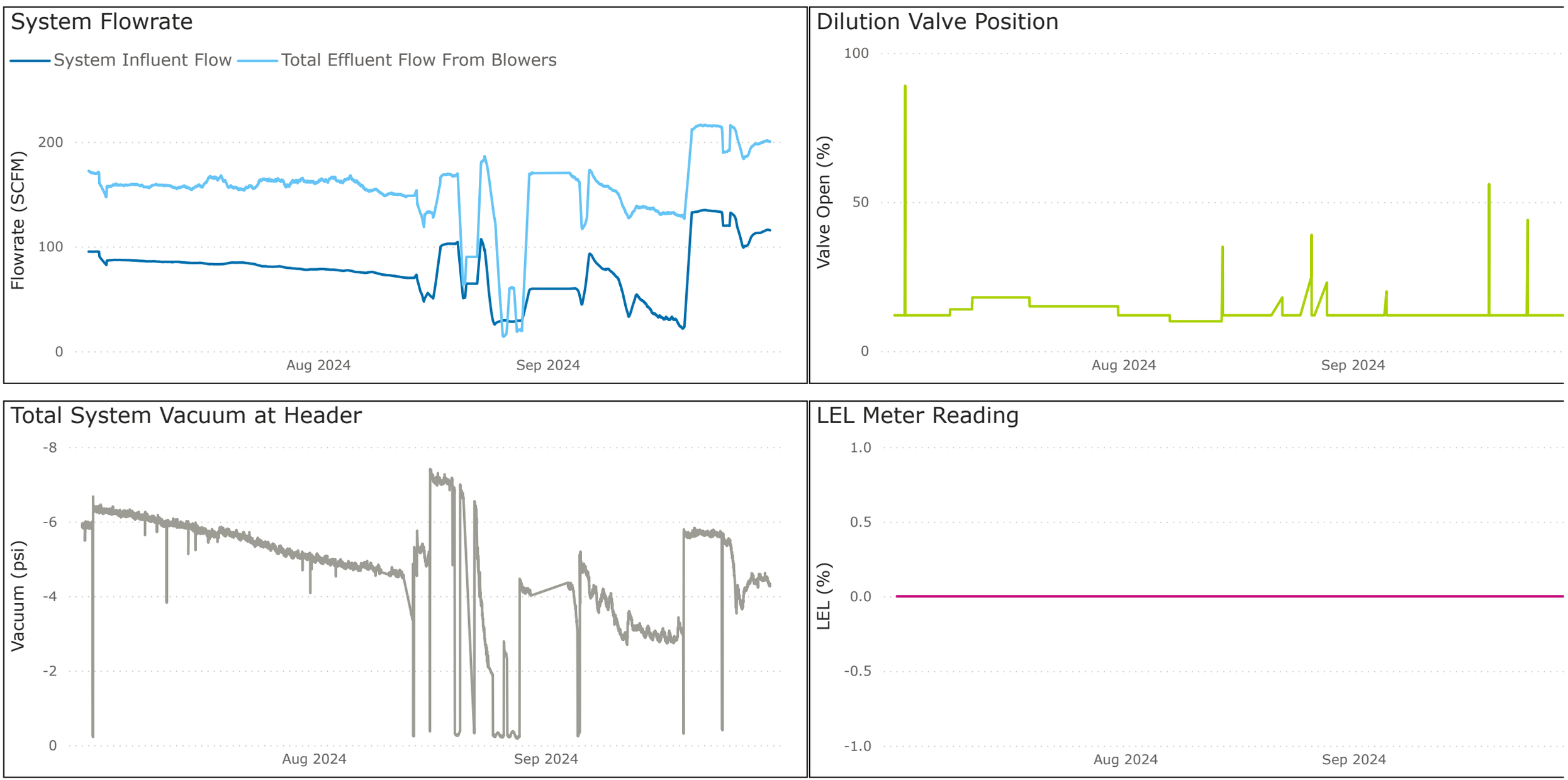
C:\Users\ChurchKE\OneDrive - Ramboll\Documents\ArcGIS\Packages\CMR - 2024 Requests_6897bfjb30\CMR - 2024 Requests.aprx\Figure 6 - Sub-surface Vacuum Readings Q3_2024

PROJECT: 169000XXXX | DATED: 11/13/2024 | DESIGNER: CHURCHKE

Figure 7: DPE System Operational Parameters

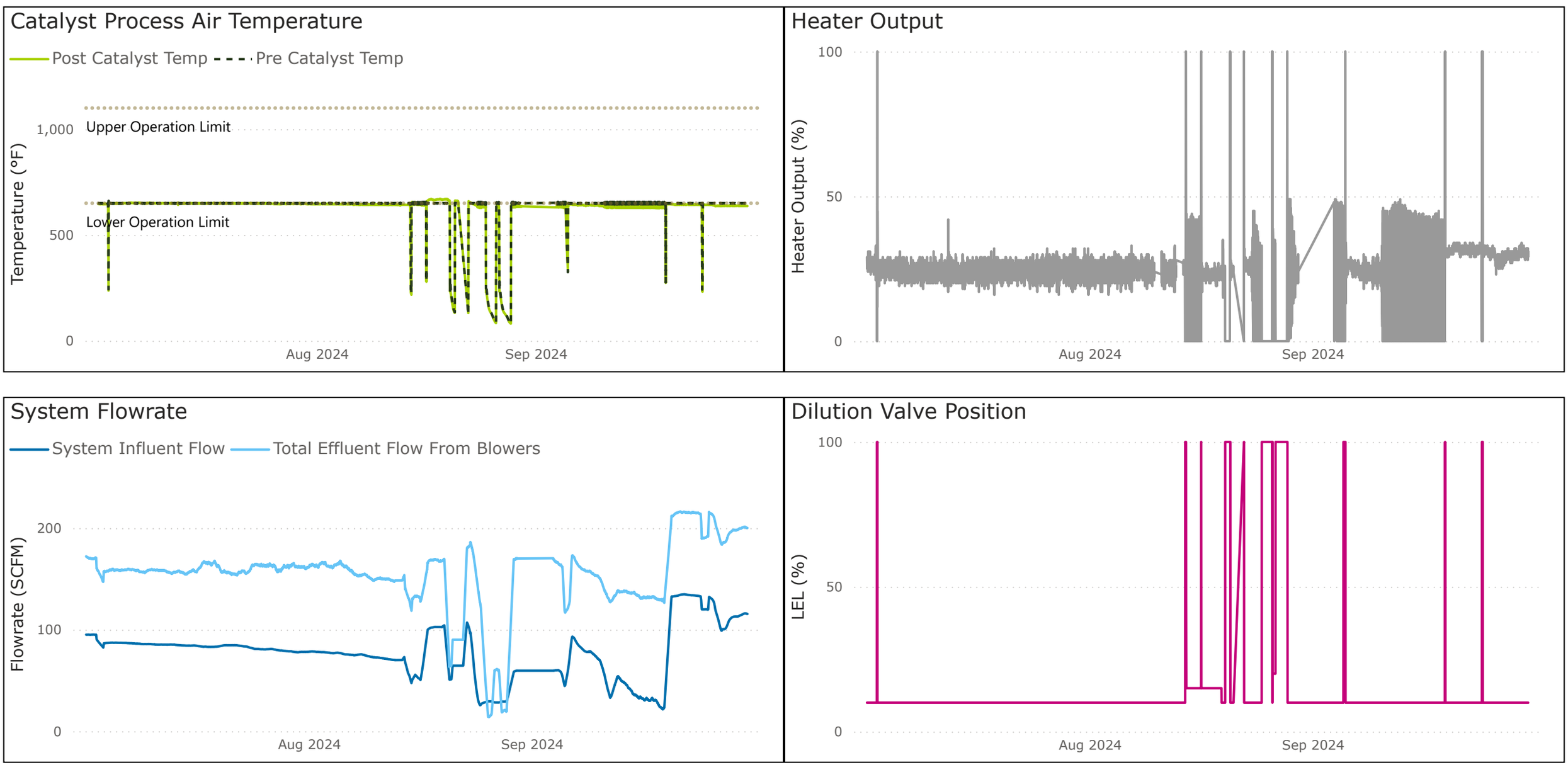


7/1/2024 9/30/202

Notes:

- System flow is from FT-23401 (prior to dilution). Total Flow from blowers is based on readings from FT-23405 and FT-2306.
- Dilution valve position represents FV23904 valve position (% open).
- Total System Vacuum is measured at PT23623.
- LEL meter readings are from AT23904 LEL meter.

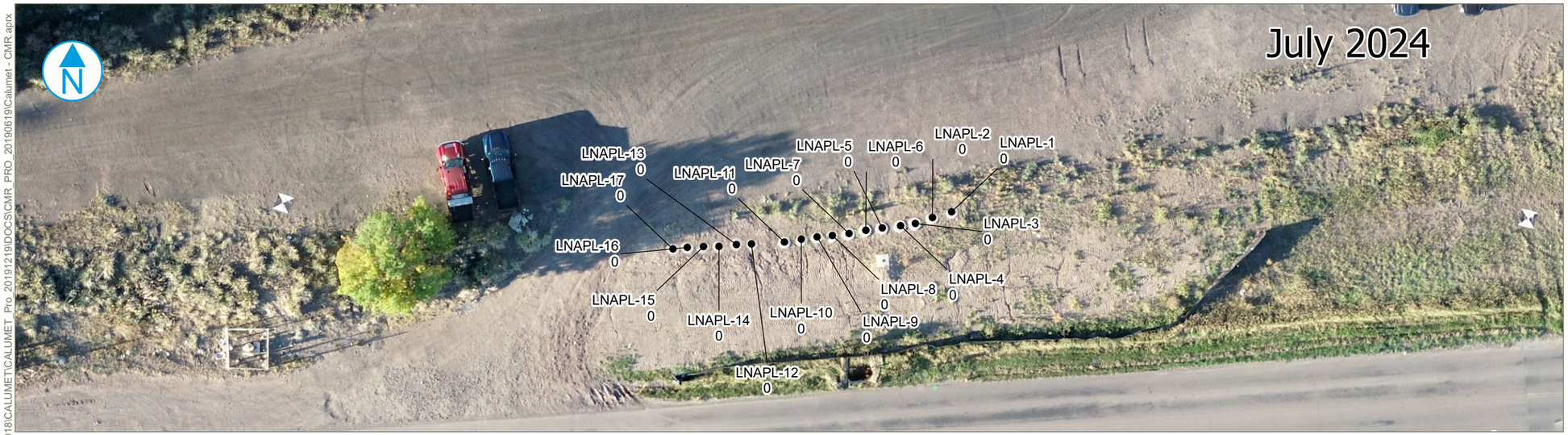
Figure 8: SRCO Operational Parameters

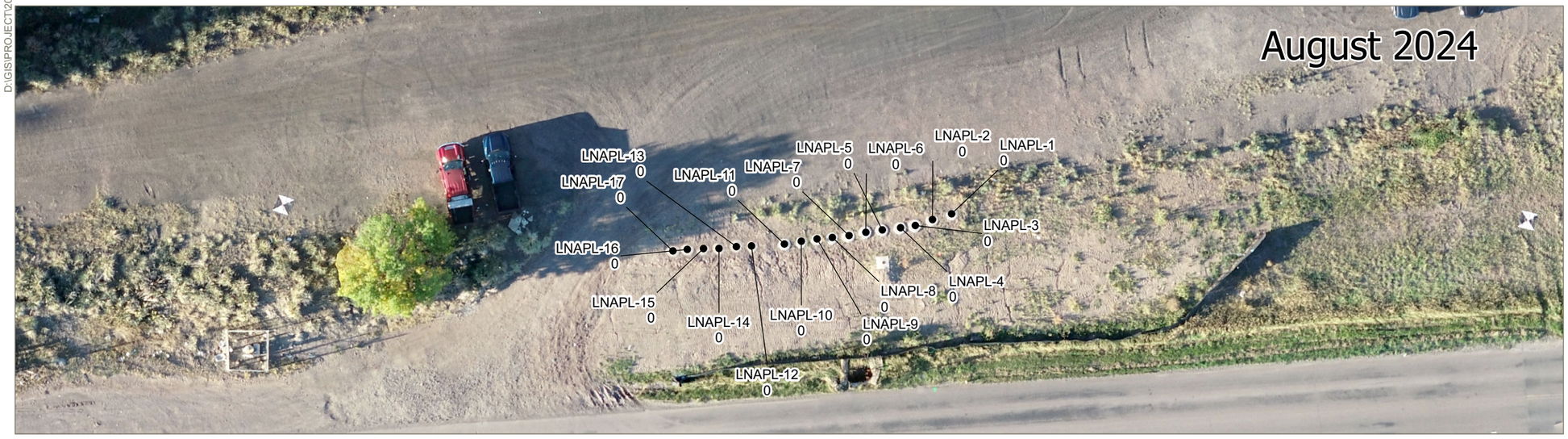


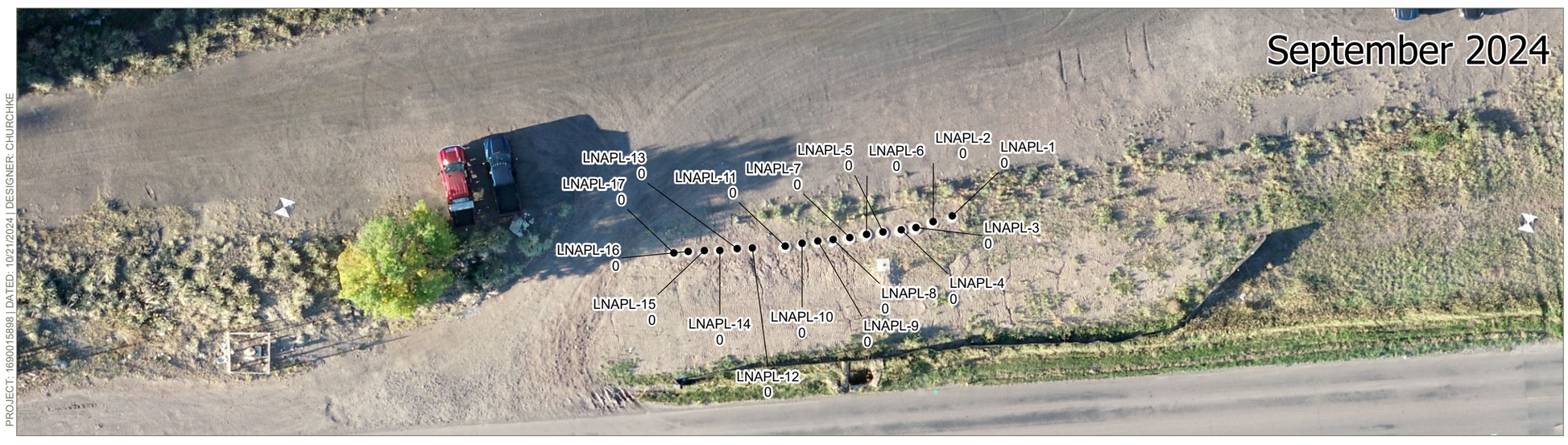
Notes:

- Post-catalyst process air temperature is based on TT-23702 reading.
- System flow is from FT-23401 (prior to dilution). Total Flow from blowers is based on readings from FT-23405 and FT-2306.
- Heater Output is based on H-2303 and H-2304 readings.
- Heater Output represents % energy supplied by CATOX to maintain catalyst temperature.
- Dilution valve position represents FV23702 valve position (% open).

7/1/2024 9/30/2024







LNAPL Thickness (ft)

- 0.0
- 0.0 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75

0 15 30 Feet

MAXIMUM LNAPL THICKNESS
LNAPL RECOVERY WELLS
Q2 2024

Calumet Montana Refining, LLC
1900 10th Street Northeast
Great Falls, Montana

FIGURE 09

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PROJECT: 1690015898 | DATED: 10/21/2024 | DESIGNER: CHURCHKE

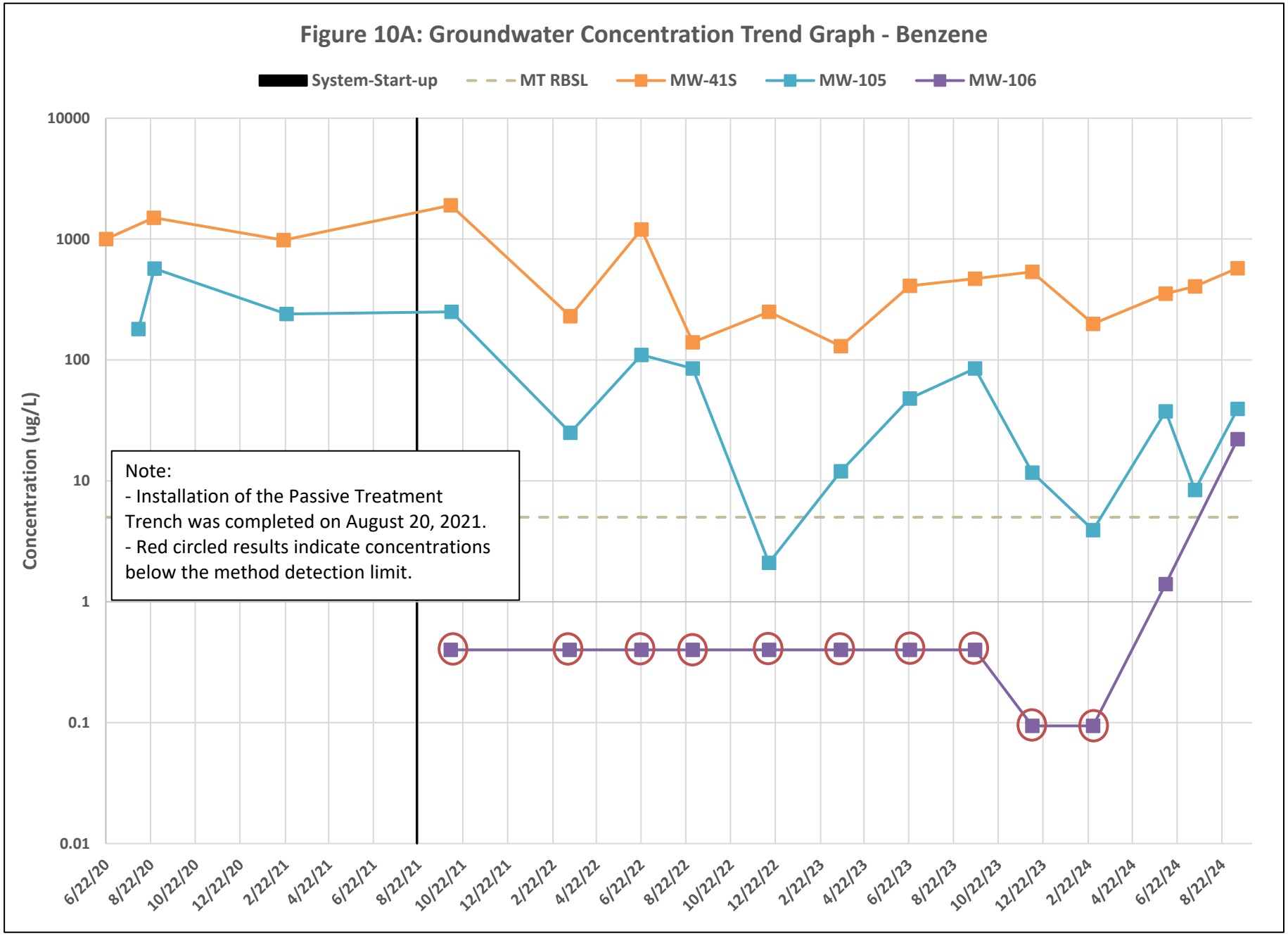
Figure 10A: Groundwater Concentration Trend Graph - Benzene
System-Start-up
MT RBSL
MW-41S
MW-105
MW-106
Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
6/22/20
8/22/20
10/22/20
12/22/20
2/22/21
4/22/21
6/22/21
8/22/21
10/22/21
12/22/21
2/22/22
4/22/22
6/22/22
8/22/22
10/22/22
12/22/22
2/22/23
4/22/23
6/22/23
8/22/23
10/22/23
12/22/23
2/22/24
4/22/24
6/22/24
8/22/24
Note:
- Installation of the Passive Treatment Trench was completed on August 20, 2021.
- Red circled results indicate concentrations below the method detection limit.

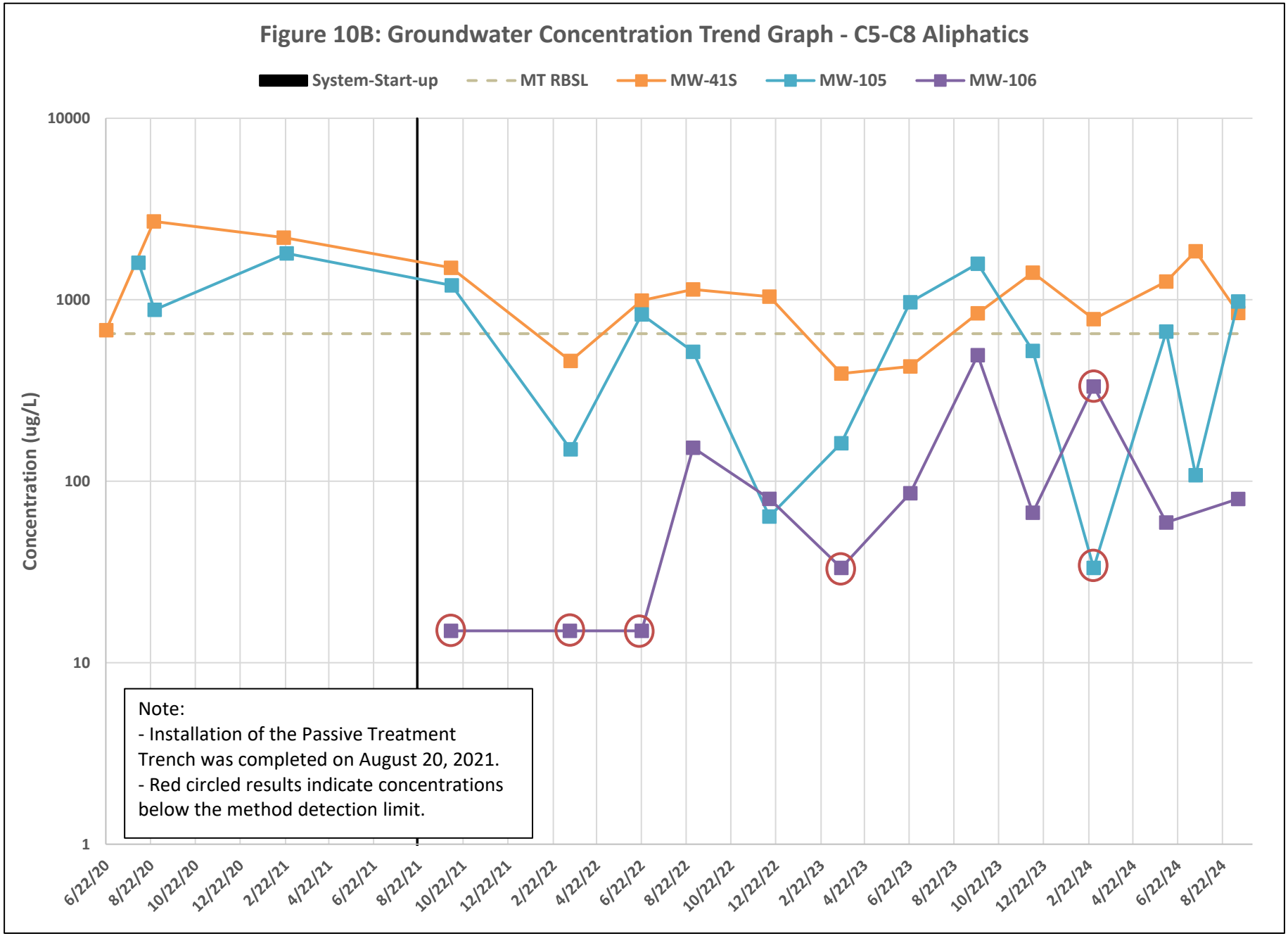
Figure 10B: Groundwater Concentration Trend Graph - C5-C8 Aliphatics
System-Start-up
MT RBSL
MW-41S
MW-105
MW-106
Concentration (ug/L)
10000
1000
100
10
1
6/22/20
8/22/20
10/22/20
12/22/20
2/22/21
4/22/21
6/22/21
8/22/21
10/22/21
12/22/21
2/22/22
4/22/22
6/22/22
8/22/22
10/22/22
12/22/22
2/22/23
4/22/23
6/22/23
8/22/23
10/22/23
12/22/23
2/22/24
4/22/24
6/22/24
8/22/24
Note:
- Installation of the Passive Treatment Trench was completed on August 20, 2021.
- Red circled results indicate concentrations below the method detection limit.

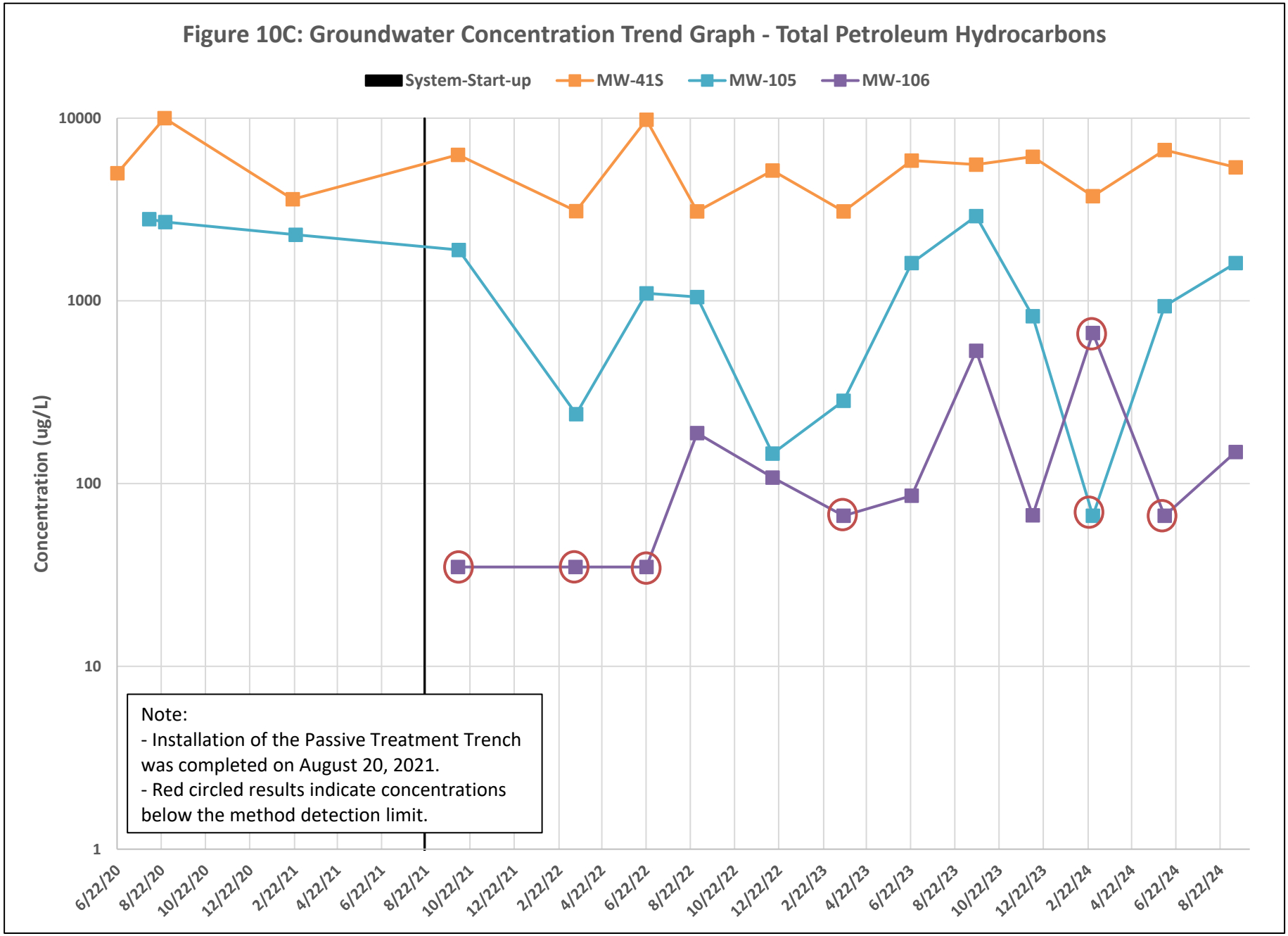
Figure 10C: Groundwater Concentration Trend Graph - Total Petroleum Hydrocarbons
System-Start-up
MW-41S
MW-105
MW-106
Concentration (ug/L)
10000
1000
100
10
1
6/22/20
8/22/20
10/22/20
12/22/20
2/22/21
4/22/21
6/22/21
8/22/21
10/22/21
12/22/21
2/22/22
4/22/22
6/22/22
8/22/22
10/22/22
12/22/22
2/22/23
4/22/23
6/22/23
8/22/23
10/22/23
12/22/23
2/22/24
4/22/24
6/22/24
8/22/24
Note:
- Installation of the Passive Treatment Trench was completed on August 20, 2021.
- Red circled results indicate concentrations below the method detection limit.

TABLES

Table 1: DPE System Operational Data

Table 2: Summary of Analytical Results and Contaminant Mass Removal – Vapor

Table 3: DPE Fluid Levels

Table 4: Summary of Analytical Results and Contaminant Mass Removal – Liquid

Table 5: Fluid Level Measurements at AOC-16 Area

Table 6: Fluid Measurements at LNAPL Wells

Table 7: Summary of Groundwater Analytical Results - Petroleum COCs

Table 8: Summary of Groundwater Analytical Results – Field Parameters

Table 1
DPE System Operational Data
Calumet Montana Refining, LLC - Great Falls, Montana

Operational Period	Percent Operational[a]	System Flowrate[b] (SCFM)	Average System Vacuum at Header[c] (in-Hg)	Liquid Extraction Rate (gpm)	Total Fluids Discharged During the Operational Period (gallons)	Total Water Discharged Since Start-up[d] (gallons)	Average Post-Catalyst Process Air Temperature When System is Operational[e] (°F)
Design Values	**--**	**200**	**17**	**0.25 to 21**	**--**	**--**	**--**
July 1 - 31, 2024	99%	84	-11.6	0.66	29,429	684,646	649
August 1 - 31, 2024	81%	70	-8.6	0.40	12,661		647
September 1 - 30, 2024	100%	82	-8.3	0.53	19,304		638
July 1 - September 30, 2024	**90%**	**79**	**-9.6**	**0.55**	**61,394**		**645**

Notes:
a. Percent operational is calculated using the system run-time hours (as logged by the system PLC) divided by the number of available operational hours in the time period.
b. System flow is from FT-23401 (prior to dilution).
c. Total System Vacuum is measured at PT23623.
d. Commissioning and start-up testing of the DPE system commenced on October 14, 2021.
e. Post-catalyst process air temperature is based on TT-23702 reading.

Abbreviations:
in-Hg = inches of mercury
NA = not applicable, system was not operational during time period
gpm = gallons per minute
scfm = standard cubic feet per minute

Table 2
Summary of Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-240711		CMR-SP301-240819		CMR-SP301-240924	
	Sample Date	7/11/2024		8/19/2024		9/24/2024	
	Average Blower Flow (scfm)[1]	84		70		82	
	Period Operational Time (hrs)[2]	740		563		690	
	Notes						
VOCs	CAS No.	Result (ug/m^3)	Mass (lb)	Result (ug/m^3)	Mass (lb)	Result (ug/m^3)	Mass (lb)
1,1,1-Trichloroethane	71-55-6	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2-Trichloroethane	79-00-5	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	2 U	0.00	2 U	0.00	2 U	0.00
1,1-Dichloroethane	75-34-3	1 U	0.00	1 U	0.00	1 U	0.00
1,1-Dichloroethene	75-35-4	1 U	0.00	1 U	0.00	1 U	0.00
1,2,4-Trichlorobenzene	120-82-1	5 U	0.00	5 U	0.00	5 U	0.00
1,2,4-Trimethylbenzene	95-63-6	274	0.06	393 U	0.06	33	0.01
1,2-Dibromoethane (EDB)	106-93-4	2 U	0.00	2 U	0.00	2 U	0.00
1,2-Dichlorobenzene	95-50-1	1 U	0.00	1 U	0.00	1 U	0.00
1,2-Dichloroethane	107-06-2	1 U	0.00	1 U	0.00	1 U	0.00
1,2-Dichloropropane	78-87-5	1 U	0.00	1 U	0.00	1 U	0.00
1,3,5-Trimethylbenzene	108-67-8	290	0.07	393 U	0.06	31	0.01
1,3-Butadiene	106-99-0	4 U	0.00	4 U	0.00	4 U	0.00
1,3-Dichlorobenzene	541-73-1	1 U	0.00	1 U	0.00	1 U	0.00
1,4-Dichlorobenzene	106-46-7	1 U	0.00	1 U	0.00	1 U	0.00
2-Butanone (MEK)	78-93-3	4 U	0.00	42	0.01	16	0.00
2-Hexanone	591-78-6	5 U	0.00	5 U	0.00	5 U	0.00
2-Propanol	67-63-0	3 U	0.00	10	0.00	19	0.00
4-Ethyltoluene	622-96-8	423	0.10	445	0.07	28	0.01
4-Methyl-2-pentanone (MIBK)	108-10-1	5 U	0.00	5 U	0.00	5 U	0.00
Acetone	67-64-1	77	0.02	24	0.00	52	0.01
Benzene	71-43-2	1,190	0.28	955	0.14	428	0.09
Benzyl chloride	100-44-7	1 U	0.00	1 U	0.00	1 U	0.00
Bromodichloromethane	75-27-4	1 U	0.00	1 U	0.00	1 U	0.00
Bromoform	75-25-2	6 U	0.00	6 U	0.00	6 U	0.00
Bromomethane	74-83-9	1 U	0.00	1 U	0.00	1 U	0.00
Carbon disulfide	75-15-0	4	0.00	7	0.00	7	0.00
Carbon tetrachloride	56-23-5	1 U	0.00	1 U	0.00	1 U	0.00
Chlorobenzene	108-90-7	1 U	0.00	1 U	0.00	1 U	0.00
Chloroethane	75-00-3	1 U	0.00	1 U	0.00	1 U	0.00
Chloroform	67-66-3	1 U	0.00	1 U	0.00	1 U	0.00
Chloromethane	74-87-3	0 U	0.00	1	0.00	1	0.00
cis-1,2-Dichloroethene	156-59-2	1 U	0.00	1 U	0.00	1 U	0.00
cis-1,3-Dichloropropene	10061-01-5	1 U	0.00	1 U	0.00	1 U	0.00
Cyclohexane	110-82-7	1,330	0.31	2,980	0.44	444	0.09
Dibromochloromethane	124-48-1	2 U	0.00	2 U	0.00	2 U	0.00
Dichlorodifluoromethane	75-71-8	3	0.00	2	0.00	2	0.00
Dichlorotetrafluoroethane	76-14-2	1 U	0.00	1 U	0.00	1 U	0.00
Ethanol	64-17-5	13	0.00	98	0.01	113	0.02
Ethyl acetate	141-78-6	-- --	--	-- --	--	-- --	--
Ethylbenzene	100-41-4	380	0.09	347 U	0.05	49	0.01
Hexachloro-1,3-butadiene	87-68-3	7 U	0.00	7 U	0.00	7 U	0.00
m&p-Xylene	179601-23-1	1,200	0.28	1,610	0.24	185	0.04
Methylene Chloride	75-09-2	1 U	0.00	1 U	0.00	1 U	0.00
Methyl-tert-butyl ether	1634-04-4	1 U	0.00	1 U	0.00	1 U	0.00
Naphthalene	91-20-3	4	0.00	3 U	0.00	3 U	0.00
n-Heptane	142-82-5	1,300	0.30	1,670	0.25	342	0.07
n-Hexane	110-54-3	3,160	0.74	4,230	0.62	846	0.18
o-Xylene	95-47-6	267	0.06	350	0.05	32	0.01
Propylene	115-07-1	12	0.00	20	0.00	2 U	0.00
Styrene	100-42-5	2 U	0.00	2 U	0.00	21	0.00
Tetrachloroethene	127-18-4	16	0.00	1 U	0.00	1 U	0.00
Tetrahydrofuran	109-99-9	1 U	0.00	1 U	0.00	1 U	0.00
Toluene	108-88-3	81	0.02	236	0.03	43	0.01
trans-1,2-Dichloroethene	156-60-5	1 U	0.00	1 U	0.00	1 U	0.00
trans-1,3-Dichloropropene	10061-02-6	1 U	0.00	1 U	0.00	1 U	0.00
Trichloroethene	79-01-6	1 U	0.00	1 U	0.00	1 U	0.00
Trichlorofluoromethane	75-69-4	2	0.00	1	0.00	1 U	0.00
Vinyl acetate	108-05-4	2 U	0.00	2 U	0.00	2 U	0.00
Vinyl chloride	75-01-4	1 U	0.00	1 U	0.00	1 U	0.00
Total VOCs	--	--	2.35	--	2.04	--	0.59
Period Total VOC Mass Removed (lbs)		2.4		2.0		0.6	
Cumulative Total VOC Mass Removed (lbs)[4]		2,896		2,897		2,897	

Notes:
1. Blower flowrate is continuously recorded by the system PLC. Average blower flowrate during the period is used for the calculations
2. Operational time represents system runtime (in hour) for the month during with the sample was taken. Runtime for the May 2024 sample includes both April 2024 and May 2024 sample as no sample was collected in April 2024 due to an unexpected transfer pump failure.
3. Historical analytical results and mass recoveries are included in Appendix B.
4. Cumulative Total VOC Mass Removed represents total mass removed since system start-up (October 2021).
U: The analyte was not detected in the sample at the estimated detection limit
VOCs : Volatile Organic Compounds
ug/m^3 : micrograms per cubic meter
Sample Calculation

$$\boldsymbol{Mass\ Removed\ (lb)} = \mathbf{340000}\ \frac{ug}{m^3} \times \mathbf{10^{-6}}\ \frac{g}{ug} \times \frac{1}{453.6}\ \frac{lb}{g} \times \mathbf{41}\ \frac{ft^3}{min} \times \mathbf{0.02832}\ \frac{m^3}{ft^3} \times \mathbf{26}\ hr \times \mathbf{60}\ \frac{min}{hr}$$

Table 3
DPE Fluid Levels
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	Installed DTB (ft BTOC)	Drop Tube Intake (ft BTOC)	Notes
DPE-1	8/24/2023	7.75	7.83	12.08	10.58	System not operational
DPE-2	8/24/2023	--	7.40	13.54	12.04	
DPE-3	8/24/2023	7.18	7.20	11.25	9.75	
DPE-4	8/24/2023	7.20	7.73	12.60	11.10	
DPE-5	8/24/2023	6.68	6.69	11.38	9.88	
DPE-6	8/24/2023	5.70	5.73	10.21	8.71	
DPE-7	8/24/2023	5.73	5.78	11.79	10.29	
DPE-8	8/24/2023	--	5.60	10.44	8.94	
DPE-1	9/20/2023	--	6.67	12.08	10.58	--
DPE-2	9/20/2023	--	7.30	13.54	12.04	--
DPE-3	9/20/2023	--	7.03	11.25	9.75	--
DPE-4	9/20/2023	--	7.14	12.60	11.10	--
DPE-5	9/20/2023	--	6.88	11.38	9.88	--
DPE-6	9/20/2023	5.72	5.75	10.21	8.71	--
DPE-7	9/20/2023	--	5.70	11.79	10.29	--
DPE-8	9/20/2023	--	5.64	10.44	8.94	--
DPE-1	3/14/2024	6.83	6.90	12.08	10.58	--
DPE-2	3/14/2024	--	7.46	13.54	12.04	--
DPE-3	3/14/2024	--	7.19	11.25	9.75	--
DPE-4	3/14/2024	7.20	7.20	12.60	11.10	--
DPE-5	3/14/2024	--	10.53	11.38	9.88	--
DPE-6	3/14/2024	--	9.39	10.21	8.71	--
DPE-7	3/14/2024	--	10.96	11.79	10.29	--
DPE-8	3/14/2024	--	8.29	10.44	8.94	--
DPE-1	4/2/2024	--	8.38	12.08	10.58	--
DPE-2	4/2/2024	--	8.82	13.54	12.04	--
DPE-6	4/2/2024	--	8.04	10.21	8.71	--
DPE-1	5/10/2024	--	11.19	12.08	10.58	--
DPE-2	5/10/2024	--	11.45	13.54	12.04	--
DPE-3	5/10/2024	--	10.44	11.25	9.75	--
DPE-4	5/10/2024	--	11.85	12.60	11.10	--
DPE-5	5/10/2024	--	10.58	11.38	9.88	--
DPE-6	5/10/2024	--	7.87	10.21	8.71	--
DPE-7	5/10/2024	--	10.53	11.79	10.29	--
DPE-8	5/10/2024	--	7.97	10.44	8.94	--
DPE-1	7/12/2024	--	11.02	12.08	10.58	--
DPE-2	7/12/2024	--	8.62	13.54	12.04	--
DPE-3	7/12/2024	--	10.22	11.25	9.75	--
DPE-4	7/12/2024	--	11.50	12.60	11.10	--
DPE-5	7/12/2024	--	10.22	11.38	9.88	--
DPE-6	7/12/2024	--	8.33	10.21	8.71	--
DPE-7	7/12/2024	--	8.60	11.79	10.29	--
DPE-8	7/12/2024	--	8.61	10.44	8.94	--
DPE-1	8/19/2024	--	11.19	12.08	10.58	--
DPE-2	8/19/2024	--	9.62	13.54	10.54	Drop Tube shorted 7/23/24
DPE-3	8/19/2024	--	10.42	11.25	9.75	--
DPE-4	8/19/2024	--	11.87	12.60	11.10	--
DPE-5	8/19/2024	--	10.53	11.38	9.88	--
DPE-6	8/19/2024	--	9.33	10.21	8.71	--
DPE-7	8/19/2024	--	9.82	11.79	10.29	--
DPE-8	8/19/2024	--	9.53	10.44	8.94	--

Table 3
DPE Fluid Levels
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	Installed DTB (ft BTOC)	Drop Tube Intake (ft BTOC)	Notes
DPE-1	9/24/2024	--	10.45	12.08	10.58	--
DPE-2	9/24/2024	--	8.43	13.54	10.54	--
DPE-3	9/24/2024	--	8.81	11.25	9.75	--
DPE-4	9/24/2024	--	--	12.60	11.10	NW Energy pipe blocking
DPE-5	9/24/2024	--	9.75	11.38	9.88	--
DPE-6	9/24/2024	--	8.17	10.21	8.71	--
DPE-7	9/24/2024	--	8.04	11.79	10.29	--
DPE-8	9/24/2024	--	8.53	10.44	8.94	--

Notes:

DTP	Depth to Product
DTW	Depth to Water
ft BTOC	Below Top of Casing
LNAPL	light non-aqueous phase liquid
NA	Reading not collected
--	LNAPL was not present

Table 3
Summary of Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240711		CMR-SP200-240816		CMR-SP200-240924	
	Sample Date	7/11/2024		8/16/2024		9/24/2024	
	Effluent Volume (L)*	111,401		47,927		73,074	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs							
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--	ND	--
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--
1,4-DIOXANE	123-91-1	--	--	--	--	--	--
2-BUTANONE	78-93-3	ND	--	ND	--	ND	--
2-HEXANONE	591-78-6	ND	--	ND	--	ND	--
4-METHYL-2-PENTANONE	108-10-1	ND	--	ND	--	ND	--
ACETONE	67-64-1	ND	--	ND	--	ND	--
BENZENE	71-43-2	11.6	0.00	2.40	0.00	5	0.00
BROMOCHLOROMETHANE	74-97-5	ND	--	ND	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--	ND	--
BROMOFORM	75-25-2	ND	--	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	--	ND	--	ND	--
CARBON DISULFIDE	75-15-0	ND	--	ND	--	ND	--
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	--	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	--	ND	--	ND	--
CHLOROFORM	67-66-3	3.5	0.00	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	--	ND	--	ND	--
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--	ND	--
CUMENE	98-82-8	2.02	0.00	ND	--	ND	--
CYCLOHEXANE	110-82-7	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--	ND	--
ETHYL BENZENE	100-41-4	9.73	0.00	ND	--	2.06	0.0003
M,P-XYLENE	179601-23-1	--	--	--	--	--	--
METHYL ACETATE	79-20-9	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	--	--	--	--	--	--
METHYLENE CHLORIDE	75-09-2	ND	--	5	0.00	ND	--
NAPHTHALENE	91-20-3	88.5	0.0217	ND	--	12.9	0.00
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--
STYRENE	100-42-5	ND	--	ND	--	ND	--
TETRACHLOROETHENE	127-18-4	ND	--	ND	--	ND	--
TOLUENE	108-88-3	ND	--	ND	--	ND	--
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	--	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	--	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	--	--	--	--	--	--
Total VOCs	--	--	**2.8E-02**	--	**7.3E-04**	--	**3.2E-03**
Period Total VOC Mass Removed (lbs)		**2.8E-02**		**7.3E-04**		**3.2E-03**	
Cumulative Total VOC Mass Removed (lbs)		**10.45**		**10.45**		**10.45**	

Table 3
Summary of Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240711		CMR-SP200-240816		CMR-SP200-240924	
	Sample Date	7/11/2024		8/16/2024		9/24/2024	
	Effluent Volume (L)*	111,401		47,927		73,074	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
SVOCs							
1,2,4,5-TETRACHLOROBENZENE	95-94-3	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	--	--	--	--	--	--
1,3-DICHLOROBENZENE	541-73-1	--	--	--	--	--	--
1,4-DICHLOROBENZENE	106-46-7	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	ND	--	ND	--	ND	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	--	ND	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	--	10.0	0.0011	8.5	0.0014
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	--	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	34	0.01	ND	--	ND	--
2-METHYLPHENOL	95-48-7	ND	--	ND	--	ND	--
2-NITROANILINE	88-74-4	ND	--	ND	--	ND	--
2-NITROPHENOL	88-75-5	ND	--	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--	ND	--
3-NITROANILINE	99-09-2	ND	--	ND	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--	ND	--
4-METHYLPHENOL	106-44-5	--	--	--	--	--	--
4-NITROANILINE	100-01-6	ND	--	ND	--	ND	--
4-NITROPHENOL	100-02-7	ND	--	ND	--	ND	--
ACENAPHTHENE	83-32-9	ND	--	ND	--	ND	--
ACENAPHTHYLENE	208-96-8	ND	--	ND	--	ND	--
ANTHRACENE	120-12-7	ND	--	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	--	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--	ND	--
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--	ND	--
CARBAZOLE	86-74-8	--	--	--	--	--	--
CHRYSENE	218-01-9	ND	--	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--	ND	--
DIBENZOFURAN	132-64-9	ND	--	ND	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--	ND	--
FLUORANTHENE	206-44-0	ND	--	ND	--	ND	--
FLUORENE	86-73-7	ND	--	ND	--	ND	--
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	--	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--	ND	--
ISOPHORONE	78-59-1	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	11.80	0.003	ND	--	ND	--
NITROBENZENE	98-95-3	ND	--	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--	ND	--
PENTACHLOROPHENOL	87-86-5	ND	--	26	0.003	ND	--
PHENANTHRENE	85-01-8	11	0.003	ND	--	3.56	0.00
PHENOL	108-95-2	ND	--	ND	--	ND	--
PYRENE	129-00-0	5	0.001	3.66	0.00	2.46	0.00
Total SVOCs	--	--	**0.015**	--	**0.00**	--	**0.00**
Period Total SVOC Mass Removed (lbs)		**1.5E-02**		**4.2E-03**		**2.3E-03**	
Cumulative Total VOC Mass Removed (lbs)		**13.82**		**13.82**		**13.83**	

Table 3
Summary of Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240711		CMR-SP200-240816		CMR-SP200-240924	
	Sample Date	7/11/2024		8/16/2024		9/24/2024	
	Effluent Volume (L)*	111,401		47,927		73,074	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH							
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM-J	52,100	12.80	38,700	4.09	23,800	3.83
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	ALIPHATIC19-36U	48,300	11.86	35,800	3.78	21,700	3.50
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	136,000	33.40	97,400	10.29	61,100	9.84
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	TPH-U	236,000	57.96	172,000	18.17	107,000	17.24
TOTAL EXTRACTABLE HYDROCARBON	TPH	236,000	57.96	172,000	18.17	107,000	17.24
Total EPHs	--	--	**58.0**	--	**18.2**	--	**17.2**
Period Total EPH Mass Removed (lbs)		**58.0**		**18.2**		**17.2**	
Cumulative Total EPH Mass Removed (lbs)		**2581.5**		**2599.6**		**2616.9**	
VPH							
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	1,020	0.25	ND	--	459	0.07
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	37,400	9.19	10,900	1.15	19,000	3.06
C5-C8 ALIPHATICS (UNADJUSTED)	C05-C08-ALIP-U	1,030	0.253	ND	--	464	0.07
C9 THROUGH C10 AROMATIC HYDROCARBONS (UNADJUSTED)	C09-C10-AROM-U	16,400	4.03	4,250	0.45	7,970	1.28
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (UNADJUSTED)	C09-C12-ALIP-U	37,500	9.21	11,000	1.16	19,000	3.06
TOTAL PETROLEUM HYDROCARBONS	VPH	54,900	13.48	15,300	1.62	27,400	4.41
Total VPHs	--	--	**13.48**	--	**1.62**	--	**4.41**
Period Total VPH Mass Removed (lbs)		**13.5**		**1.6**		**4.4**	
Cumulative Total VPH Mass Removed (lbs)		**218.6**		**220.3**		**224.7**	

Notes:
*Effluent volumes represent volume extracted during the month which the sample was taken.
1. Historical analytical results and mass recoveries are included in Appendix B.
2. Cumulative Total VOC Mass Removed represents total mass removed since system start-up (October 2021).
Sample Calculation

$$Mass\ Removed\ (lb) = 1800\ \frac{ug}{L} \times 10^{-6}\ \frac{g}{ug} \times \frac{1}{453.6}\ \frac{lb}{g} \times 21138\ L$$

Abbreviations:

EPH : Extractable Petroleum Hydrocarbon
ND : Non Detect
SVOCs : Semi-volatile Organic Compounds
ug/L : micrograms per liter
VOCs : Volatile Organic Compounds
VPH : Volatile Petroleum Hydrocarbons

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-22	9/29/2021	--	7.12	--
MW-22	10/14/2021	--	7.26	--
MW-22	1/10/2023	--	8.89	--
MW-22	5/31/2023	--	8.01	--
MW-22	6/19/2023	--	6.67	--
MW-22	7/10/2023	--	7.87	--
MW-22	8/19/2023	--	8.49	--
MW-22	9/19/2023	--	7.16	--
MW-22	2/8/2024	--	7.54	--
MW-22	3/20/2024	--	7.31	--
MW-22	4/30/2024	--	6.84	--
MW-22	5/23/2024	--	8.20	--
MW-22	6/21/2024	--	7.77	--
MW-22	7/12/2024	--	7.85	--
MW-22	8/22/2024	--	8.03	--
MW-22	9/24/2024	--	NM	--
MW-41D	8/27/2021	--	11.07	--
MW-41D	9/29/2021	--	10.83	--
MW-41D	10/15/2021	--	10.78	--
MW-41D	12/2/2021	--	10.65	--
MW-41D	1/3/2022	--	10.62	--
MW-41D	2/8/2022	--	10.70	--
MW-41D	2/8/2022	--	10.70	--
MW-41D	3/11/2022	--	10.76	--
MW-41D	4/11/2022	--	10.79	--
MW-41D	6/8/2022	--	10.95	--
MW-41D	7/27/2022	--	10.90	--
MW-41D	9/1/2022	--	10.94	--
MW-41D	1/10/2023	--	10.54	--
MW-41D	3/22/2023	--	10.60	--
MW-41D	5/31/2023	--	10.39	--
MW-41D	6/19/2023	--	10.22	--
MW-41D	7/10/2023	--	10.12	--
MW-41D	8/19/2023	--	10.52	--
MW-41D	9/19/2023	--	10.07	--
MW-41D	2/8/2024	--	10.20	--
MW-41D	3/20/2024	--	10.28	--
MW-41D	4/30/2024	--	10.20	--
MW-41D	5/23/2024	--	10.12	--
MW-41D	6/21/2024	--	10.09	--
MW-41D	7/12/2024	--	10.14	--

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-41D	8/22/2024	--	17.21	--
MW-41D	9/24/2024	--	14.23	--
MW-41S	8/27/2021	--	8.25	--
MW-41S	9/29/2021	7.85	7.89	0.04
MW-41S	10/5/2021	7.78	7.81	0.03
MW-41S	10/15/2021	--	8.06	--
MW-41S	12/2/2021	--	7.90	--
MW-41S	1/3/2022	--	7.97	--
MW-41S	2/8/2022	--	8.13	--
MW-41S	3/11/2022	--	8.18	--
MW-41S	4/11/2022	--	8.55	--
MW-41S	6/8/2022	--	7.86	--
MW-41S	7/27/2022	--	7.99	--
MW-41S	9/1/2022	--	8.16	--
MW-41S	1/10/2023	--	7.52	--
MW-41S	3/22/2023	--	7.48	--
MW-41S	5/31/2023	--	6.51	--
MW-41S	6/19/2023	--	5.74	--
MW-41S	7/10/2023	--	6.41	--
MW-41S	8/19/2023	--	7.00	--
MW-41S	9/19/2023	--	7.40	--
MW-41S	2/8/2024	--	7.54	--
MW-41S	3/20/2024	--	7.22	--
MW-41S	4/30/2024	--	6.95	--
MW-41S	5/23/2024	--	6.93	--
MW-41S	6/21/2024	--	6.77	--
MW-41S	7/12/2024	--	6.93	--
MW-41S	8/22/2024	--	7.27	--
MW-41S	9/24/2024	--	7.75	--
MW-53	9/29/2021	7.90	8.49	0.59
MW-53	10/14/2021	--	8.26	--
MW-53	11/9/2021	8.54	8.59	0.05
MW-53	12/2/2021	8.83	8.88	0.06
MW-53	1/3/2022	--	9.32	--
MW-53	2/8/2022	9.31	9.32	0.00
MW-53	2/8/2022	9.31	9.32	0.00
MW-53	3/11/2022	9.43	9.44	0.01
MW-53	4/11/2022	--	9.38	--
MW-53	6/8/2022	9.08	10.03	0.95
MW-53	6/8/2022	9.08	10.03	0.95
MW-53	7/27/2022	--	10.23	--

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-53	9/1/2022	--	9.59	--
MW-53	1/10/2023	--	8.53	--
MW-53	3/22/2023	--	9.00	--
MW-53	5/31/2023	9.36	9.41	0.05
MW-53	6/19/2023	7.99	8.10	0.11
MW-53	7/10/2023	8.50	8.52	0.02
MW-53	8/19/2023	9.20	9.22	0.02
MW-53	9/19/2023	--	7.85	--
MW-53	2/8/2024	--	8.59	--
MW-53	3/20/2024	--	8.14	--
MW-53	4/30/2024	--	7.39	--
MW-53	5/23/2024	--	7.77	--
MW-53	6/21/2024	--	7.52	--
MW-53	7/12/2024	--	7.60	--
MW-53	8/22/2024	--	8.18	--
MW-53	9/24/2024	--	NM	--
MW-57	9/29/2021	--	10.29	--
MW-57	10/14/2021	--	10.51	--
MW-57	12/2/2021	--	11.10	--
MW-57	1/3/2022	--	11.27	--
MW-57	2/8/2022	--	11.23	--
MW-57	3/11/2022	--	11.19	--
MW-57	4/11/2022	--	11.06	--
MW-57	6/8/2022	--	10.25	--
MW-57	7/27/2022	--	10.17	--
MW-57	9/1/2022	--	10.07	--
MW-57	1/10/2023	--	9.79	--
MW-57	3/22/2023	--	10.14	--
MW-57	5/31/2023	--	8.62	--
MW-57	6/19/2023	--	7.54	--
MW-57	7/10/2023	--	6.35	--
MW-57	8/19/2023	--	9.02	--
MW-57	9/19/2023	--	10.08	--
MW-57	3/20/2024	--	10.33	--
MW-57	4/30/2024	--	9.42	--
MW-57	5/23/2024	--	9.20	--
MW-57	6/21/2024	--	9.27	--
MW-57	7/12/2024	--	9.44	--
MW-57	8/22/2024	--	10.25	--
MW-57	9/24/2024	--	NM	--
MW-59D	9/29/2021	--	12.14	--

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-59D	10/14/2021	--	12.06	--
MW-59D	12/2/2021	--	12.31	--
MW-59D	2/8/2022	--	12.49	--
MW-59D	2/8/2022	--	12.49	--
MW-59D	3/11/2022	--	12.54	--
MW-59D	4/11/2022	--	12.73	--
MW-59D	6/8/2022	--	12.53	--
MW-59D	7/27/2022	--	2.59	--
MW-59D	9/1/2022	--	12.59	--
MW-59D	1/10/2023	--	12.21	--
MW-59D	3/22/2023	--	12.48	--
MW-59D	5/31/2023	--	13.08	--
MW-59D	6/19/2023	--	12.80	--
MW-59D	7/10/2023	--	12.89	--
MW-59D	8/19/2023	--	13.23	--
MW-59D	9/19/2023	--	13.00	--
MW-59D	3/20/2024	--	13.15	--
MW-59D	4/30/2024	--	13.14	--
MW-59D	5/23/2024	--	13.01	--
MW-59D	6/21/2024	--	13.14	--
MW-59D	7/12/2024	--	13.21	--
MW-59D	8/22/2024	--	11.44	--
MW-59D	9/24/2024	--	11.23	--
MW-59S	9/29/2021	--	6.23	--
MW-59S	10/14/2021	--	6.22	--
MW-59S	12/2/2021	--	6.28	--
MW-59S	2/8/2022	--	6.32	--
MW-59S	3/11/2022	--	6.31	--
MW-59S	4/11/2022	--	6.31	--
MW-59S	6/8/2022	--	6.28	--
MW-59S	7/27/2022	--	6.24	--
MW-59S	9/1/2022	--	6.22	--
MW-59S	1/10/2023	--	6.23	--
MW-59S	3/22/2023	--	6.22	--
MW-59S	5/31/2023	--	6.11	--
MW-59S	6/19/2023	--	4.97	--
MW-59S	7/10/2023	--	6.08	--
MW-59S	8/19/2023	--	6.19	--
MW-59S	9/19/2023	--	6.22	--
MW-59S	3/20/2024	--	6.23	--
MW-59S	4/30/2024	--	6.17	--

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-59S	5/23/2024	--	6.03	--
MW-59S	6/21/2024	--	6.12	--
MW-59S	7/12/2024	--	6.09	--
MW-59S	8/22/2024	--	6.18	--
MW-59S	9/24/2024	--	5.25	--
MW-63	9/29/2021	--	6.30	--
MW-63	10/14/2021	--	6.40	--
MW-63	11/4/2021	--	6.60	--
MW-63	2/8/2022	--	7.13	--
MW-63	3/11/2022	--	7.23	--
MW-63	4/11/2022	--	7.30	--
MW-63	6/8/2022	--	7.06	--
MW-63	7/27/2022	--	6.68	--
MW-63	9/1/2022	--	6.64	--
MW-63	1/10/2023	--	6.34	--
MW-63	3/22/2023	--	6.48	--
MW-63	5/31/2023	--	5.50	--
MW-63	6/19/2023	--	4.99	--
MW-63	7/10/2023	--	5.09	--
MW-63	8/19/2023	--	5.70	--
MW-63	9/19/2023	--	5.01	--
MW-63	3/20/2024	--	5.82	--
MW-63	4/30/2024	--	5.54	--
MW-63	5/23/2024	--	5.11	--
MW-63	6/21/2024	--	5.42	--
MW-63	7/12/2024	--	5.56	--
MW-63	8/22/2024	--	5.01	--
MW-63	9/24/2024	--	4.82	--
MW-64	9/29/2021	--	7.76	--
MW-64	10/14/2021	--	8.40	--
MW-64	11/4/2021	--	8.72	--
MW-64	12/2/2021	9.04	9.11	0.07
MW-64	1/3/2022	9.45	10.36	0.91
MW-64	2/8/2022	9.26	10.81	1.55
MW-64	3/11/2022	9.55	10.66	1.11
MW-64	4/11/2022	10.11	10.59	0.48
MW-64	6/8/2022	10.41	10.46	0.06
MW-64	7/27/2022	10.21	10.23	0.02
MW-64	9/1/2022	--	8.97	--
MW-64	1/10/2023	--	8.75	--
MW-64	3/20/2024	--	9.40	--

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-64	4/30/2024	--	8.00	--
MW-64	5/23/2024	--	7.81	--
MW-64	6/21/2024	--	8.54	--
MW-64	7/12/2024	--	8.49	--
MW-64	8/22/2024	--	8.52	--
MW-64	9/24/2024	--	NM	--
MW-102	9/29/2021	7.98	8.59	0.61
MW-102	10/14/2021	8.25	8.82	0.57
MW-102	11/4/2021	--	9.02	--
MW-102	12/2/2021	--	8.97	--
MW-102	1/3/2022	9.29	9.33	0.04
MW-102	2/8/2022	--	9.50	--
MW-102	2/8/2022	--	9.50	--
MW-102	3/11/2022	--	10.07	--
MW-102	4/11/2022	--	10.08	--
MW-102	6/8/2022	--	10.22	--
MW-102	7/27/2022	9.99	10.02	0.03
MW-102	9/1/2022	--	8.98	--
MW-102	1/10/2023	--	8.82	--
MW-102	3/22/2023	9.95	9.96	0.01
MW-102	5/31/2023	--	8.42	--
MW-102	6/19/2023	--	8.00	--
MW-102	7/10/2023	--	8.15	--
MW-102	8/19/2023	--	8.60	--
MW-102	9/19/2023	--	7.60	--
MW-102	3/20/2024	--	dry	--
MW-102	4/30/2024	--	dry	--
MW-102	5/23/2024	--	dry	--
MW-102	6/21/2024	--	dry	--
MW-102	7/12/2024	--	NM	--
MW-102	8/22/2024	--	dry	--
MW-102	9/24/2024	--	NM	--
MW-103	9/29/2021	--	8.04	--
MW-103	10/14/2021	--	8.35	--
MW-103	11/4/2021	--	8.77	--
MW-103	12/2/2021	--	9.32	--
MW-103	1/3/2022	--	9.66	--
MW-103	2/8/2022	--	9.61	--
MW-103	3/11/2022	--	9.87	--
MW-103	4/11/2022	--	9.87	--
MW-103	6/8/2022	--	9.79	--

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-103	7/27/2022	--	9.66	--
MW-103	9/1/2022	--	9.12	--
MW-103	1/10/2023	--	8.81	--
MW-103	3/22/2023	--	9.60	--
MW-103	5/31/2023	--	8.53	--
MW-103	6/19/2023	--	8.09	--
MW-103	7/10/2023	--	5.80	--
MW-103	8/19/2023	--	6.20	--
MW-103	9/19/2023	--	7.88	--
MW-103	3/20/2024	--	NM	--
MW-103	4/30/2024	--	NM	--
MW-103	5/23/2024	8.33	8.37	0.04
MW-103	6/21/2024	9.13	9.30	0.17
MW-103	7/12/2024	--	9.12	--
MW-103	8/22/2024	--	9.07	--
MW-103	9/24/2024	--	NM	--
MW-104	9/29/2021	6.00	6.25	0.25
MW-104	10/15/2021	6.10	6.23	0.13
MW-104	12/2/2021	6.62	6.79	0.17
MW-104	1/3/2022	6.75	7.02	0.27
MW-104	2/8/2022	6.83	7.16	0.33
MW-104	2/8/2022	6.83	7.16	0.33
MW-104	3/11/2022	7.13	7.57	0.44
MW-104	4/11/2022	7.38	7.81	0.43
MW-104	6/8/2022	7.86	7.86	0.00
MW-104	7/27/2022	--	0.00	--
MW-104	9/1/2022	7.72	7.82	0.10
MW-104	1/10/2023	--	7.31	--
MW-104	3/22/2023	--	6.89	--
MW-104	5/31/2023	--	6.61	--
MW-104	6/19/2023	--	5.79	--
MW-104	7/10/2023	--	5.80	--
MW-104	8/19/2023	--	6.22	--
MW-104	9/19/2023	--	5.96	--
MW-104	3/20/2024	--	6.13	--
MW-104	4/30/2024	5.49	5.51	0.02
MW-104	5/23/2024	--	NM	--
MW-104	6/21/2024	--	6.78	--
MW-104	7/12/2024	--	7.00	--
MW-104	8/22/2024	--	7.32	--
MW-104	9/24/2024	--	6.83	--

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-105	9/29/2021	--	5.58	--
MW-105	10/14/2021	--	8.97	--
MW-105	12/2/2021	--	6.67	--
MW-105	1/3/2022	--	5.63	--
MW-105	2/8/2022	--	5.89	--
MW-105	2/8/2022	--	5.89	--
MW-105	3/11/2022	--	5.85	--
MW-105	4/11/2022	--	8.01	--
MW-105	6/8/2022	--	6.06	--
MW-105	7/27/2022	--	6.63	--
MW-105	9/1/2022	--	4.89	--
MW-105	1/10/2023	--	7.50	--
MW-105	3/22/2023	--	5.59	--
MW-105	5/31/2023	--	5.39	--
MW-105	6/19/2023	--	2.94	--
MW-105	7/10/2023	--	8.41	--
MW-105	8/19/2023	--	8.87	--
MW-105	9/19/2023	--	5.39	--
MW-105	3/20/2024	--	7.69	--
MW-63	4/30/2024	--	5.54	--
MW-63	5/23/2024	--	5.11	--
MW-105	6/21/2024	--	0.92	--
MW-105	7/12/2024	--	1.23	--
MW-105	8/22/2024	--	6.73	--
MW-105	9/24/2024	--	6.32	--
MW-106	9/29/2021	--	6.14	--
MW-106	10/14/2021	--	5.83	--
MW-106	10/20/2021	--	5.71	--
MW-106	11/9/2021	--	5.48	--
MW-106	12/2/2021	--	5.70	--
MW-106	1/3/2022	--	6.19	--
MW-106	2/8/2022	--	5.92	--
MW-106	2/8/2022	--	5.92	--
MW-106	3/11/2022	--	5.80	--
MW-106	4/11/2022	--	5.70	--
MW-106	6/8/2022	--	5.03	--
MW-106	7/27/2022	--	5.40	--
MW-106	9/1/2022	--	5.83	--
MW-106	1/10/2023	--	4.62	--
MW-106	3/22/2023	--	4.60	--
MW-106	5/31/2023	--	3.51	--

Table 5
Fluid Level Measurements at AOC-16 Area
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)
MW-106	6/19/2023	--	2.95	--
MW-106	7/10/2023	--	4.81	--
MW-106	8/19/2023	--	4.40	--
MW-106	9/19/2023	--	4.59	--
MW-106	2/8/2024	--	4.45	--
MW-106	3/20/2024	--	4.12	--
MW-64	4/30/2024	--	8.00	--
MW-64	5/23/2024	--	7.81	--
MW-106	6/21/2024	--	3.86	--
MW-106	7/12/2024	--	4.08	--
MW-106	8/22/2024	--	4.45	--
MW-106	9/24/2024	--	4.62	--

Notes:

DTP	Depth to Product
DTW	Depth to Water
ft BTOC	Below Top of Casing
LNAPL	light non-aqueous phase liquid
NA	Reading not collected
--	LNAPL was not present

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-1	8/27/2021	--	8.23	--	--	
LNAPL-1	9/30/2021	--	6.55	--	--	
LNAPL-1	10/5/2021	--	6.44	--	--	
LNAPL-1	10/12/2021	--	6.37	--	--	
LNAPL-1	10/19/2021	--	6.31	--	--	
LNAPL-1	11/9/2021	--	6.24	--	--	Sheen
LNAPL-1	11/18/2021	--	6.30	--	--	
LNAPL-1	12/2/2021	--	6.36	--	--	
LNAPL-1	1/3/2022	--	6.50	--	--	
LNAPL-1	2/8/2022	--	6.72	--	--	
LNAPL-1	5/15/2022	--	5.90	--	--	
LNAPL-1	5/22/2022	--	5.90	--	--	
LNAPL-1	5/29/2022	--	5.90	--	--	
LNAPL-1	6/5/2022	--	5.88	--	--	
LNAPL-1	6/12/2022	--	5.90	--	--	
LNAPL-1	6/19/2022	--	6.00	--	--	
LNAPL-1	6/26/2022	--	6.00	--	--	
LNAPL-1	7/3/2022	--	5.46	--	--	
LNAPL-1	7/10/2022	--	5.56	--	--	
LNAPL-1	7/17/2022	--	5.60	--	--	
LNAPL-1	7/31/2022	--	5.92	--	--	
LNAPL-1	8/7/2022	--	6.87	--	--	
LNAPL-1	8/14/2022	7.00	7.03	0.03	--	
LNAPL-1	9/4/2022	--	6.80	--	--	
LNAPL-1	9/10/2022	6.80	6.81	0.01	--	
LNAPL-1	9/18/2022	7.35	7.37	0.02	--	
LNAPL-1	9/25/2022	6.97	7.00	0.03	--	
LNAPL-1	10/2/2022	6.58	6.83	0.25	--	
LNAPL-1	10/9/2022	6.47	6.92	0.45	--	
LNAPL-1	11/14/2022	--	6.22	--	--	
LNAPL-1	12/6/2022	--	6.10	--	--	
LNAPL-1	1/15/2023	6.58	6.83	0.25	--	
LNAPL-1	3/5/2023	--	5.98	--	--	
LNAPL-1	3/23/2023	--	5.57	--	--	
LNAPL-1	4/2/2023	5.58	5.60	0.02	--	
LNAPL-1	5/31/2023	--	4.60	--	--	
LNAPL-1	6/19/2023	--	3.95	--	--	
LNAPL-1	7/10/2023	--	4.48	--	--	
LNAPL-1	8/19/2023	--	5.19	--	--	
LNAPL-1	9/19/2023	--	5.52	--	--	
LNAPL-1	2/7/2024	--	5.55	--	--	Sheen
LNAPL-1	2/23/2024	--	5.34	--	--	
LNAPL-1	3/7/2024	--	5.20	--	--	
LNAPL-1	3/20/2024	--	5.21	--	--	Sheen
LNAPL-1	4/2/2024	--	5.33	--	--	Sheen
LNAPL-1	4/18/2024	--	4.97	--	--	
LNAPL-1	4/30/2024	--	4.91	--	--	
LNAPL-1	5/15/2024	--	4.15	--	--	
LNAPL-1	5/31/2024	--	4.55	--	--	Sheen
LNAPL-1	6/12/2024	--	4.78	--	--	Sheen
LNAPL-1	6/28/2024	--	4.78	--	--	Slight sheen
LNAPL-1	7/12/2024	--	4.82	--	--	
LNAPL-1	7/26/2024	--	5.14	--	--	
LNAPL-1	8/9/2024	--	5.39	--	--	
LNAPL-1	8/22/2024	--	5.33	--	--	
LNAPL-1	9/5/2024	--	5.68	--	--	
LNAPL-1	9/19/2024	--	5.56	--	--	
LNAPL-2	8/27/2021	--	8.18	--	--	
LNAPL-2	9/30/2021	--	6.42	--	--	
LNAPL-2	10/5/2021	--	6.30	--	--	
LNAPL-2	10/12/2021	--	6.22	--	--	
LNAPL-2	10/19/2021	--	6.15	--	--	
LNAPL-2	11/9/2021	--	6.09	--	--	Sheen
LNAPL-2	11/18/2021	--	6.15	--	--	
LNAPL-2	12/2/2021	--	6.22	--	--	
LNAPL-2	1/3/2022	--	6.35	--	--	
LNAPL-2	2/8/2022	--	6.57	--	--	
LNAPL-2	5/15/2022	--	6.00	--	--	
LNAPL-2	5/22/2022	--	5.73	--	--	
LNAPL-2	5/29/2022	--	5.75	--	--	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-2	6/5/2022	--	5.73	--	0.50	
LNAPL-2	6/12/2022	--	5.73	--	--	
LNAPL-2	6/19/2022	--	5.85	--	0.50	
LNAPL-2	6/26/2022	--	5.60	--	--	
LNAPL-2	7/3/2022	--	5.42	--	0.79	
LNAPL-2	7/10/2022	--	5.55	--	0.60	
LNAPL-2	7/17/2022	--	5.41	--	0.70	
LNAPL-2	7/31/2022	--	5.70	--	--	
LNAPL-2	8/7/2022	--	6.82	--	--	
LNAPL-2	8/14/2022	6.91	6.95	0.04	--	
LNAPL-2	9/4/2022	6.78	6.79	0.01	0.80	
LNAPL-2	9/10/2022	6.62	6.73	0.11	0.75	
LNAPL-2	9/18/2022	7.12	7.22	0.10	0.25	
LNAPL-2	9/25/2022	--	6.60	--	0.50	
LNAPL-2	10/2/2022	6.61	6.70	0.09	0.70	
LNAPL-2	10/9/2022	6.30	6.76	0.46	0.50	
LNAPL-2	11/14/2022	--	6.07	--	0.50	
LNAPL-2	12/6/2022	--	5.95	--	0.25	
LNAPL-2	2/26/2023	--	5.40	--	--	
LNAPL-2	3/5/2023	--	5.96	--	--	
LNAPL-2	3/23/2023	--	5.62	--	--	
LNAPL-2	5/31/2023	--	4.45	--	--	
LNAPL-2	6/19/2023	3.77	3.78	0.01	--	
LNAPL-2	7/10/2023	--	4.32	--	--	
LNAPL-2	8/19/2023	--	5.21	--	--	
LNAPL-2	9/19/2023	--	5.35	--	--	
LNAPL-2	2/7/2024	--	5.45	--	--	Sheen
LNAPL-2	2/23/2024	--	5.20	--	--	
LNAPL-2	3/7/2024	--	5.05	--	--	
LNAPL-2	3/20/2024	--	5.06	--	--	Sheen
LNAPL-2	4/2/2024	--	5.15	--	--	Sheen
LNAPL-2	4/18/2024	--	4.80	--	--	
LNAPL-2	4/30/2024	--	4.76	--	--	
LNAPL-2	5/15/2024	--	3.98	--	--	
LNAPL-2	5/31/2024	--	4.45	--	--	
LNAPL-2	6/12/2024	--	4.60	--	--	sheen
LNAPL-2	6/28/2024	--	4.62	--	--	
LNAPL-2	7/12/2024	--	4.68	--	--	
LNAPL-2	7/26/2024	--	4.99	--	--	
LNAPL-2	8/9/2024	--	5.18	--	--	
LNAPL-2	8/22/2024	--	5.30	--	--	
LNAPL-2	9/5/2024	--	5.54	--	--	
LNAPL-2	9/19/2024	--	5.48	--	--	
LNAPL-3	8/27/2021	--	8.11	--	--	
LNAPL-3	9/30/2021	--	6.45	--	--	
LNAPL-3	10/5/2021	--	6.31	--	--	
LNAPL-3	10/12/2021	--	6.24	--	--	
LNAPL-3	10/19/2021	--	6.18	--	--	
LNAPL-3	11/9/2021	--	6.10	--	--	
LNAPL-3	11/18/2021	--	6.17	--	--	
LNAPL-3	12/2/2021	--	6.24	--	--	
LNAPL-3	1/3/2022	--	6.38	--	--	
LNAPL-3	2/8/2022	--	6.58	--	--	
LNAPL-3	5/15/2022	--	5.76	--	--	
LNAPL-3	5/22/2022	--	5.74	--	--	
LNAPL-3	5/29/2022	--	5.80	--	--	
LNAPL-3	6/5/2022	--	5.71	--	--	
LNAPL-3	6/12/2022	--	5.78	--	--	
LNAPL-3	6/19/2022	--	5.87	--	--	
LNAPL-3	6/26/2022	--	5.45	--	--	
LNAPL-3	7/3/2022	--	5.31	--	--	
LNAPL-3	7/10/2022	--	5.40	--	--	
LNAPL-3	7/17/2022	--	5.15	--	--	
LNAPL-3	7/31/2022	--	5.80	--	--	
LNAPL-3	8/7/2022	--	6.72	--	--	
LNAPL-3	8/14/2022	6.71	6.74	0.03	--	
LNAPL-3	9/4/2022	--	6.69	--	--	
LNAPL-3	9/10/2022	--	6.67	--	--	
LNAPL-3	9/18/2022	7.42	7.45	0.03	--	
LNAPL-3	9/25/2022	6.74	6.81	0.07	--	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-3	10/2/2022	6.50	6.58	0.08	--	
LNAPL-3	10/9/2022	6.39	6.93	0.54	--	
LNAPL-3	11/14/2022	6.08	6.10	0.02	--	
LNAPL-3	12/6/2022	5.97	6.00	0.03	--	
LNAPL-3	12/11/2022	6.36	6.58	0.22	--	
LNAPL-3	12/18/2022	5.86	5.88	0.02	--	
LNAPL-3	2/26/2023	5.48	5.49	0.01	--	
LNAPL-3	3/23/2023	--	5.61	--	--	
LNAPL-3	4/2/2023	5.39	5.42	0.03	--	
LNAPL-3	5/31/2023	--	4.45	--	--	
LNAPL-3	6/19/2023	--	3.78	--	--	
LNAPL-3	7/10/2023	--	4.28	--	--	
LNAPL-3	8/19/2023	--	5.08	--	--	
LNAPL-3	9/19/2023	--	5.36	--	--	
LNAPL-3	2/7/2024	--	5.45	--	--	
LNAPL-3	2/23/2024	--	5.22	--	--	
LNAPL-3	3/7/2024	--	5.07	--	--	
LNAPL-3	3/20/2024	--	5.07	--	--	Sheen
LNAPL-3	4/2/2024	--	5.15	--	--	
LNAPL-3	4/18/2024	--	4.80	--	--	
LNAPL-3	4/30/2024	--	4.80	--	--	
LNAPL-3	5/15/2024	--	3.98	--	--	
LNAPL-3	5/31/2024	--	4.39	--	--	
LNAPL-3	6/12/2024	--	4.59	--	--	sheen
LNAPL-3	6/28/2024	--	4.66	--	--	
LNAPL-3	7/12/2024	--	4.75	--	--	
LNAPL-3	7/26/2024	--	5.03	--	--	
LNAPL-3	8/9/2024	--	5.20	--	--	
LNAPL-3	8/22/2024	--	5.31	--	--	
LNAPL-3	9/5/2024	--	5.57	--	--	
LNAPL-3	9/19/2024	--	5.48	--	--	
LNAPL-4	8/27/2021	--	8.15	--	--	
LNAPL-4	9/30/2021	--	6.46	--	--	
LNAPL-4	10/5/2021	--	6.31	--	--	
LNAPL-4	10/12/2021	--	6.24	--	--	
LNAPL-4	10/19/2021	--	6.18	--	--	
LNAPL-4	11/9/2021	--	6.11	--	--	
LNAPL-4	11/18/2021	--	6.18	--	--	
LNAPL-4	12/2/2021	--	6.25	--	--	
LNAPL-4	1/3/2022	--	6.40	--	--	
LNAPL-4	2/8/2022	--	6.59	--	--	
LNAPL-4	5/15/2022	--	6.10	--	--	
LNAPL-4	5/22/2022	--	5.74	--	--	
LNAPL-4	5/29/2022	--	5.90	--	--	
LNAPL-4	6/5/2022	--	5.85	--	1.00	
LNAPL-4	6/12/2022	--	5.90	--	0.80	
LNAPL-4	6/19/2022	5.87	5.89	0.02	0.75	
LNAPL-4	6/26/2022	--	5.55	--	--	
LNAPL-4	7/3/2022	--	5.42	--	0.79	Oil film
LNAPL-4	7/10/2022	--	5.50	--	0.70	
LNAPL-4	7/17/2022	5.45	5.48	0.03	0.50	
LNAPL-4	7/31/2022	5.80	5.82	0.02	0.80	
LNAPL-4	8/7/2022	--	6.79	--	0.70	
LNAPL-4	8/14/2022	6.81	6.85	0.04	--	
LNAPL-4	9/4/2022	6.63	6.88	0.25	0.20	
LNAPL-4	9/10/2022	6.64	6.81	0.17	--	
LNAPL-4	9/18/2022	7.48	7.52	0.04	0.10	
LNAPL-4	9/25/2022	--	6.87	--	0.50	
LNAPL-4	10/2/2022	6.70	7.05	0.35	0.70	
LNAPL-4	10/9/2022	6.36	6.69	0.33	0.75	
LNAPL-4	11/14/2022	6.08	6.27	0.19	0.75	
LNAPL-4	12/6/2022	5.96	6.03	0.07	0.50	
LNAPL-4	12/11/2022	6.43	6.66	0.23	--	
LNAPL-4	12/18/2022	5.91	5.92	0.01	--	
LNAPL-4	12/25/2022	5.96	5.99	0.03	0.50	
LNAPL-4	1/15/2023	5.80	5.82	0.02	1.00	
LNAPL-4	1/22/2023	5.88	5.92	0.04	0.60	
LNAPL-4	1/30/2023	--	5.39	--	0.60	
LNAPL-4	2/5/2023	5.62	5.71	0.09	0.50	
LNAPL-4	2/12/2023	5.49	5.51	0.02	1.00	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-4	2/18/2023	--	5.71	--	0.70	
LNAPL-4	2/26/2023	5.49	5.50	0.01	0.05	
LNAPL-4	3/5/2023	5.84	5.87	0.03	0.25	
LNAPL-4	3/12/2023	--	5.82	--	1.00	
LNAPL-4	3/19/2023	--	5.61	--	0.25	
LNAPL-4	3/23/2023	--	5.62	--	0.00	
LNAPL-4	4/2/2023	5.50	5.51	0.01	0.00	
LNAPL-4	4/30/2023	4.30	4.40	0.10	0.00	
LNAPL-4	5/31/2023	--	4.41	--	0.00	
LNAPL-4	6/19/2023	--	3.79	--	0.00	
LNAPL-4	7/10/2023	--	4.35	--	--	
LNAPL-4	8/19/2023	--	5.09	--	--	
LNAPL-4	9/19/2023	--	5.35	--	--	
LNAPL-4	2/7/2024	--	5.45	--	--	Sheen
LNAPL-4	2/23/2024	--	5.22	--	--	
LNAPL-4	3/7/2024	--	5.06	--	--	
LNAPL-4	3/20/2024	--	5.07	--	--	Sheen
LNAPL-4	4/2/2024	--	5.21	--	--	
LNAPL-4	4/18/2024	--	4.80	--	--	
LNAPL-4	4/30/2024	--	4.96	--	--	
LNAPL-4	5/15/2024	--	3.96	--	--	
LNAPL-4	5/31/2024	--	4.42	--	--	
LNAPL-4	6/12/2024	--	4.95	--	--	
LNAPL-4	6/28/2024	--	4.67	--	--	
LNAPL-4	7/12/2024	--	4.70	--	--	
LNAPL-4	7/26/2024	--	5.03	--	--	
LNAPL-4	8/9/2024	--	5.20	--	--	
LNAPL-4	8/22/2024	--	5.26	--	--	
LNAPL-4	9/5/2024	--	5.50	--	--	
LNAPL-4	9/19/2024	--	5.46	--	--	
LNAPL-5	8/27/2021	--	8.15	--	--	
LNAPL-5	9/30/2021	--	6.49	--	--	
LNAPL-5	10/5/2021	--	6.35	--	--	
LNAPL-5	10/12/2021	--	6.28	--	--	
LNAPL-5	10/19/2021	--	6.22	--	--	
LNAPL-5	11/9/2021	--	6.14	--	--	Sheen
LNAPL-5	11/18/2021	--	6.20	--	--	
LNAPL-5	12/2/2021	6.28	6.30	0.02	--	
LNAPL-5	12/15/2021	6.32	6.64	0.32	--	
LNAPL-5	1/3/2022	6.37	6.78	0.41	--	
LNAPL-5	2/8/2022	6.56	7.01	0.45	--	
LNAPL-5	3/7/2022	6.60	7.30	0.70	--	
LNAPL-5	4/11/2022	6.64	7.32	0.68	--	
LNAPL-5	5/15/2022	5.90	5.92	0.02	0.50	
LNAPL-5	5/22/2022	--	5.78	--	--	
LNAPL-5	5/29/2022	--	5.85	--	--	
LNAPL-5	6/5/2022	--	5.81	--	0.50	
LNAPL-5	6/12/2022	5.79	5.81	0.02	0.50	
LNAPL-5	6/19/2022	5.90	5.93	0.03	0.50	
LNAPL-5	6/26/2022	5.45	5.50	0.05	--	
LNAPL-5	7/3/2022	--	5.50	--	0.79	
LNAPL-5	7/10/2022	--	5.60	--	0.70	
LNAPL-5	7/17/2022	5.48	5.49	0.01	0.70	
LNAPL-5	7/31/2022	--	5.93	--	0.50	
LNAPL-5	8/7/2022	6.78	6.82	0.04	0.80	
LNAPL-5	8/14/2022	--	--	--	--	
LNAPL-5	9/4/2022	6.75	7.45	0.70	0.70	
LNAPL-5	9/10/2022	6.65	7.45	0.80	0.75	
LNAPL-5	9/18/2022	7.00	7.14	0.14	0.10	
LNAPL-5	9/25/2022	--	6.49	--	1.00	
LNAPL-5	10/2/2022	6.80	7.08	0.28	0.60	
LNAPL-5	10/9/2022	6.39	6.75	0.36	0.75	
LNAPL-5	11/14/2022	6.12	6.14	0.02	0.75	
LNAPL-5	12/6/2022	--	6.02	--	0.50	
LNAPL-5	12/25/2022	--	5.98	--	0.50	
LNAPL-5	1/15/2023	--	5.93	--		
LNAPL-5	1/22/2023	5.90	5.91	0.01	0.80	
LNAPL-5	1/30/2023	5.39	5.41	0.02	--	
LNAPL-5	2/5/2023	--	5.76	--	--	
LNAPL-5	2/12/2023	5.53	5.54	0.01	1.00	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-5	2/18/2023	5.74	5.77	0.03	0.70	
LNAPL-5	2/26/2023	5.51	5.53	0.02	--	
LNAPL-5	3/5/2023	--	5.95	--	--	
LNAPL-5	3/12/2023	5.76	5.78	0.02	--	
LNAPL-5	3/19/2023	--	5.71	--	0.25	
LNAPL-5	3/23/2023	--	5.60	--	--	
LNAPL-5	4/2/2023	--	5.48	--	--	
LNAPL-5	4/30/2023	4.20	4.30	0.10	--	
LNAPL-5	5/31/2023	--	4.41	--	--	
LNAPL-5	6/19/2023	--	3.82	--	--	
LNAPL-5	7/10/2023	--	4.32	--	--	
LNAPL-5	8/19/2023	--	5.11	--	--	
LNAPL-5	9/19/2023	--	5.42	--	--	
LNAPL-5	2/7/2024	--	5.47	--	--	Slight sheen
LNAPL-5	2/23/2024	--	5.29	--	--	
LNAPL-5	3/7/2024	--	5.11	--	--	
LNAPL-5	3/20/2024	--	5.10	--	--	Sheen
LNAPL-5	4/2/2024	--	5.22	--	--	
LNAPL-5	4/18/2024	--	4.89	--	--	
LNAPL-5	4/30/2024	--	4.81	--	--	
LNAPL-5	5/15/2024	--	4.00	--	--	
LNAPL-5	5/31/2024	--	4.40	--	--	
LNAPL-5	6/12/2024	--	4.64	--	--	
LNAPL-5	6/28/2024	--	4.59	--	--	
LNAPL-5	7/12/2024	--	4.93	--	--	
LNAPL-5	7/26/2024	--	5.04	--	--	
LNAPL-5	8/9/2024	--	5.23	--	--	
LNAPL-5	8/22/2024	--	5.34	--	--	
LNAPL-5	9/5/2024	--	5.51	--	--	
LNAPL-5	9/19/2024	--	5.52	--	--	
LNAPL-6	8/27/2021	--	8.13	--	--	
LNAPL-6	9/30/2021	--	6.61	--	--	
LNAPL-6	10/5/2021	--	6.47	--	--	
LNAPL-6	10/12/2021	--	6.40	--	--	
LNAPL-6	10/19/2021	--	6.33	--	--	
LNAPL-6	11/9/2021	--	6.27	--	--	
LNAPL-6	11/18/2021	--	6.24	--	--	
LNAPL-6	12/2/2021	--	6.41	--	--	
LNAPL-6	12/15/2021	--	6.50	--	--	
LNAPL-6	1/3/2022	--	6.56	--	--	
LNAPL-6	2/8/2022	--	6.78	--	--	
LNAPL-6	5/15/2022	5.94	5.95	0.01	--	
LNAPL-6	5/22/2022	--	5.93	--	--	
LNAPL-6	5/29/2022	--	5.75	--	--	
LNAPL-6	6/5/2022	--	5.92	--	--	
LNAPL-6	6/12/2022	--	5.93	--	--	
LNAPL-6	6/19/2022	--	6.04	--	--	
LNAPL-6	6/26/2022	5.45	5.50	0.05	--	
LNAPL-6	7/3/2022	5.46	5.48	0.02	--	
LNAPL-6	7/10/2022	--	5.61	--	--	
LNAPL-6	7/17/2022	5.60	5.61	0.01	--	
LNAPL-6	7/31/2022	--	5.92	--	--	
LNAPL-6	8/7/2022	6.89	6.91	0.02	--	
LNAPL-6	8/14/2022	6.90	6.94	0.04	0.80	
LNAPL-6	9/4/2022	6.85	6.88	0.03	--	
LNAPL-6	9/10/2022	6.85	6.89	0.04	--	
LNAPL-6	9/18/2022	--	7.38	--	--	
LNAPL-6	9/25/2022	6.92	7.00	0.08	--	
LNAPL-6	10/2/2022	6.68	6.73	0.05	--	
LNAPL-6	10/9/2022	6.53	6.85	0.32	--	
LNAPL-6	11/14/2022	--	6.25	--	--	
LNAPL-6	12/6/2022	--	6.13	--	--	
LNAPL-6	12/25/2022	--	6.13	--	--	
LNAPL-6	1/15/2023	--	5.97	--	--	
LNAPL-6	1/15/2023	--	5.97	--	--	
LNAPL-6	1/22/2023	--	5.99	--	--	
LNAPL-6	1/30/2023	--	5.45	--	--	
LNAPL-6	2/5/2023	--	5.53	--	--	
LNAPL-6	2/12/2023	--	5.75	--	--	
LNAPL-6	2/18/2023	--	5.76	--	--	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-6	2/26/2023	--	5.65	--	--	
LNAPL-6	3/5/2023	5.84	5.87	0.03	0.25	
LNAPL-6	3/19/2023	--	5.90	--	--	
LNAPL-6	3/23/2023	--	5.64	--	--	
LNAPL-6	4/2/2023	5.41	5.45	0.04	--	
LNAPL-6	4/30/2023	4.40	4.45	0.05	--	
LNAPL-6	5/31/2023	--	4.60	--	--	
LNAPL-6	6/19/2023	--	3.83	--	--	
LNAPL-6	7/10/2023	4.45	4.47	0.02	--	
LNAPL-6	8/19/2023	--	5.22	--	--	
LNAPL-6	9/19/2023	--	5.53	--	--	
LNAPL-6	2/7/2024	--	5.61	--	--	
LNAPL-6	2/23/2024	--	5.38	--	--	Sheen
LNAPL-6	3/7/2024	--	5.22	--	--	
LNAPL-6	3/20/2024	--	5.23	--	--	Sheen
LNAPL-6	4/2/2024	--	5.35	--	--	Sheen
LNAPL-6	4/18/2024	--	4.92	--	--	
LNAPL-6	4/30/2024	--	4.91	--	--	
LNAPL-6	5/15/2024	--	4.10	--	--	
LNAPL-6	5/31/2024	--	4.55	--	--	
LNAPL-6	6/12/2024	--	4.75	--	--	
LNAPL-6	6/28/2024	--	4.82	--	--	
LNAPL-6	7/12/2024	--	5.05	--	--	
LNAPL-6	7/26/2024	--	5.17	--	--	
LNAPL-6	8/9/2024	--	5.35	--	--	
LNAPL-6	8/22/2024	--	5.45	--	--	
LNAPL-6	9/5/2024	--	5.60	--	--	
LNAPL-6	9/19/2024	--	5.63	--	--	
LNAPL-7	8/27/2021	--	8.14	--	--	
LNAPL-7	9/30/2021	--	6.42	--	--	
LNAPL-7	10/5/2021	--	6.29	--	--	
LNAPL-7	10/12/2021	--	6.22	--	--	
LNAPL-7	10/19/2021	--	6.16	--	--	
LNAPL-7	11/9/2021	5.98	5.99	0.01	--	
LNAPL-7	11/18/2021	6.18	6.58	0.40	--	
LNAPL-7	12/2/2021	6.18	6.58	0.40	--	
LNAPL-7	12/15/2021	6.28	6.65	0.38	--	
LNAPL-7	1/3/2022	6.32	6.77	0.45	--	
LNAPL-7	2/8/2022	6.58	6.75	0.17	--	
LNAPL-7	3/7/2022	6.57	7.18	0.61	--	
LNAPL-7	4/11/2022	6.53	7.26	0.73	--	
LNAPL-7	5/15/2022	5.90	5.91	0.01	0.90	
LNAPL-7	5/22/2022	5.73	5.74	0.01	--	
LNAPL-7	5/29/2022	--	5.70	--	--	
LNAPL-7	6/5/2022	--	5.80	--	0.50	
LNAPL-7	6/12/2022	--	5.96	--	0.60	
LNAPL-7	6/19/2022	5.85	5.87	0.02	1.00	
LNAPL-7	6/26/2022	5.40	5.45	0.05	--	
LNAPL-7	7/3/2022	--	5.50	--	0.33	
LNAPL-7	7/10/2022	--	5.67	--	0.60	
LNAPL-7	7/17/2022	--	5.45	--	0.70	
LNAPL-7	7/31/2022	--	5.90	--	0.60	
LNAPL-7	8/7/2022	6.89	6.95	0.06	--	
LNAPL-7	8/14/2022	7.05	7.08	0.03	--	
LNAPL-7	9/4/2022	6.75	7.45	0.70	0.30	
LNAPL-7	9/10/2022	6.64	7.41	0.77	0.50	
LNAPL-7	9/18/2022	6.99	7.11	0.12	0.25	
LNAPL-7	9/25/2022	--	6.51	--	0.50	
LNAPL-7	10/2/2022	6.75	7.02	0.27	0.50	
LNAPL-7	10/9/2022	6.33	6.66	0.33	0.75	
LNAPL-7	11/14/2022	6.08	6.10	0.02	0.75	
LNAPL-7	12/6/2022	--	5.95	--	1.00	
LNAPL-7	12/25/2022	5.93	5.94	0.01	0.75	
LNAPL-7	1/15/2023	--	5.38	--	1.00	
LNAPL-7	1/22/2023	5.88	5.90	0.02	0.70	
LNAPL-7	1/30/2023	--	5.43	--	0.80	
LNAPL-7	2/12/2023	--	5.50	--	1.00	
LNAPL-7	2/18/2023	--	5.55	--	0.10	
LNAPL-7	2/26/2023	--	5.46	--	0.10	
LNAPL-7	3/5/2023	5.74	5.76	0.02	0.15	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-7	3/12/2023	--	5.92	--	1.00	
LNAPL-7	3/19/2023	--	5.52	--	0.25	
LNAPL-7	3/23/2023	--	5.63	--	--	
LNAPL-7	4/2/2023	5.43	5.45	0.02	--	
LNAPL-7	4/30/2023	4.50	4.55	0.05	--	
LNAPL-7	5/31/2023	--	4.41	--	--	
LNAPL-7	6/19/2023	--	3.72	--	--	
LNAPL-7	7/10/2023	--	4.25	--	--	
LNAPL-7	8/19/2023	--	5.10	--	--	
LNAPL-7	9/19/2023	--	5.35	--	--	
LNAPL-7	2/7/2024	--	5.40	--	--	
LNAPL-7	2/23/2024	--	5.20	--	--	Sheen
LNAPL-7	3/7/2024	--	5.02	--	--	
LNAPL-7	3/20/2024	--	5.05	--	--	Sheen
LNAPL-7	4/2/2024	--	5.16	--	--	
LNAPL-7	4/18/2024	--	4.77	--	--	
LNAPL-7	4/30/2024	--	4.73	--	--	
LNAPL-7	5/15/2024	--	3.90	--	--	
LNAPL-7	5/31/2024	--	4.34	--	--	
LNAPL-7	6/12/2024	--	4.54	--	--	
LNAPL-7	6/28/2024	--	4.61	--	--	
LNAPL-7	7/12/2024	--	4.72	--	--	
LNAPL-7	7/26/2024	--	5.02	--	--	
LNAPL-7	8/9/2024	--	5.17	--	--	
LNAPL-7	8/22/2024	--	5.31	--	--	
LNAPL-7	9/5/2024	--	5.48	--	--	
LNAPL-7	9/19/2024	--	5.44	--	--	
LNAPL-8	8/27/2021	--	8.10	--	--	
LNAPL-8	9/30/2021	--	6.30	--	--	
LNAPL-8	10/5/2021	--	6.20	--	--	
LNAPL-8	10/12/2021	--	6.11	--	--	
LNAPL-8	10/19/2021	--	6.05	--	--	
LNAPL-8	11/9/2021	5.88	5.90	0.02	--	
LNAPL-8	11/18/2021	6.08	6.43	0.35	--	
LNAPL-8	12/2/2021	6.08	6.46	0.38	--	
LNAPL-8	12/15/2021	6.18	6.55	0.37	--	
LNAPL-8	1/3/2022	6.28	6.37	0.09	--	
LNAPL-8	2/8/2022	6.50	6.59	0.09	--	
LNAPL-8	2/25/2022	6.47	6.98	0.51	--	
LNAPL-8	3/7/2022	6.45	7.10	0.65	--	
LNAPL-8	4/11/2022	6.46	7.07	0.61	--	
LNAPL-8	5/15/2022	5.82	5.83	0.01	0.60	
LNAPL-8	5/22/2022	--	5.65	--	--	
LNAPL-8	5/29/2022	5.75	5.80	0.05	--	
LNAPL-8	6/5/2022	5.75	5.76	0.01	0.25	
LNAPL-8	6/12/2022	--	5.96	--	0.80	
LNAPL-8	6/19/2022	5.77	5.80	0.03	--	
LNAPL-8	6/26/2022	--	5.40	--	--	
LNAPL-8	7/3/2022	--	5.67	--	0.79	
LNAPL-8	7/10/2022	--	5.61	--	0.40	
LNAPL-8	7/17/2022	--	5.33	--	0.30	
LNAPL-8	7/31/2022	--	5.92	--	0.80	
LNAPL-8	8/7/2022	6.84	6.88	0.04	0.10	
LNAPL-8	8/14/2022	7.21	7.25	0.04	--	
LNAPL-8	9/4/2022	6.68	7.25	0.57	--	
LNAPL-8	9/10/2022	6.38	7.17	0.79	--	
LNAPL-8	9/18/2022	--	6.98	--	--	
LNAPL-8	9/25/2022	--	6.28	--	1.00	
LNAPL-8	10/2/2022	6.69	6.96	0.27	0.80	
LNAPL-8	10/9/2022	6.24	6.57	0.33	0.50	
LNAPL-8	11/14/2022	--	6.10	--	0.75	
LNAPL-8	12/6/2022	--	5.86	--	1.00	
LNAPL-8	12/25/2022	--	5.84	--	0.50	
LNAPL-8	1/15/2023	--	5.74	--	--	
LNAPL-8	1/22/2023	5.88	5.90	0.02	0.60	
LNAPL-8	1/30/2023	--	5.40	--	--	
LNAPL-8	2/5/2023	--	5.60	--	0.50	
LNAPL-8	2/12/2023	--	5.44	--	--	
LNAPL-8	2/18/2023	--	5.43	--	0.80	
LNAPL-8	2/26/2023	5.37	5.38	0.01	--	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-8	3/5/2023	5.82	5.84	0.02	0.15	
LNAPL-8	3/12/2023	5.83	5.84	0.01	--	
LNAPL-8	3/19/2023	--	5.52	--	0.25	
LNAPL-8	3/23/2023	5.43	5.44	0.01	--	
LNAPL-8	4/2/2023	5.46	5.47	0.01	--	
LNAPL-8	4/30/2023	4.30	4.40	0.10	--	
LNAPL-8	5/31/2023	--	4.31	--	--	
LNAPL-8	6/19/2023	--	3.63	--	--	
LNAPL-8	7/10/2023	--	4.17	--	--	
LNAPL-8	8/19/2023	--	4.95	--	--	
LNAPL-8	9/19/2023	--	5.27	--	--	
LNAPL-8	2/7/2024	--	5.32	--	--	
LNAPL-8	2/23/2024	--	5.11	--	--	Sheen
LNAPL-8	3/7/2024	--	4.95	--	--	
LNAPL-8	3/20/2024	--	4.96	--	--	Sheen
LNAPL-8	4/2/2024	--	5.10	--	--	
LNAPL-8	4/18/2024	--	4.64	--	--	
LNAPL-8	4/30/2024	--	4.61	--	--	
LNAPL-8	5/15/2024	--	3.81	--	--	
LNAPL-8	5/31/2024	--	4.20	--	--	
LNAPL-8	6/12/2024	--	4.45	--	--	
LNAPL-8	6/28/2024	--	4.53	--	--	
LNAPL-8	7/12/2024	--	4.77	--	--	
LNAPL-8	7/26/2024	--	4.95	--	--	
LNAPL-8	8/9/2024	--	5.10	--	--	
LNAPL-8	8/22/2024	--	5.20	--	--	
LNAPL-8	9/5/2024	--	5.35	--	--	
LNAPL-8	9/19/2024	--	5.32	--	--	
LNAPL-9	8/27/2021	--	8.09	--	--	
LNAPL-9	9/30/2021	--	6.33	--	--	
LNAPL-9	10/5/2021	--	6.23	--	--	
LNAPL-9	10/12/2021	--	6.16	--	--	
LNAPL-9	10/19/2021	6.11	6.12	0.01	--	
LNAPL-9	10/22/2021	--	6.12	--	--	
LNAPL-9	10/25/2021	--	6.09	--	--	
LNAPL-9	10/28/2021	--	6.10	--	--	
LNAPL-9	11/4/2021	--	6.15	--	--	
LNAPL-9	11/9/2021	6.05	6.09	0.04	--	
LNAPL-9	11/18/2021	6.17	6.20	0.04	--	
LNAPL-9	12/2/2021	6.17	6.31	0.14	--	
LNAPL-9	12/15/2021	6.27	6.40	0.13	--	
LNAPL-9	1/3/2022	--	6.42	--	--	
LNAPL-9	2/8/2022	--	6.56	--	--	
LNAPL-9	5/15/2022	--	5.71	--	--	Sheen
LNAPL-9	5/22/2022	--	5.70	--	--	
LNAPL-9	5/29/2022	--	5.70	--	--	
LNAPL-9	6/5/2022	--	5.76	--	--	
LNAPL-9	6/12/2022	--	5.72	--	--	
LNAPL-9	6/19/2022	5.80	5.82	0.02	--	
LNAPL-9	6/26/2022	--	5.40	--	--	
LNAPL-9	7/3/2022	--	5.29	--	--	
LNAPL-9	7/10/2022	--	5.39	--	--	
LNAPL-9	7/17/2022	5.34	5.36	0.02	--	
LNAPL-9	7/31/2022	--	5.70	--	--	
LNAPL-9	8/7/2022	6.68	6.72	0.04	--	
LNAPL-9	8/14/2022	7.70	7.75	0.05	--	
LNAPL-9	9/4/2022	6.62	6.76	0.14	--	
LNAPL-9	9/10/2022	6.60	6.80	0.20	--	
LNAPL-9	9/18/2022	--	6.83	--	--	
LNAPL-9	9/25/2022	--	6.67	--	--	
LNAPL-9	10/2/2022	6.45	6.75	0.30	--	
LNAPL-9	10/9/2022	6.30	6.62	0.32	--	
LNAPL-9	11/14/2022	--	6.04	--	--	
LNAPL-9	12/6/2022	--	5.91	--	--	
LNAPL-9	2/5/2023	--	5.62	--	--	
LNAPL-9	2/26/2023	--	5.42	--	--	
LNAPL-9	3/5/2023	--	5.86	--	--	
LNAPL-9	3/23/2023	--	5.45	--	--	
LNAPL-9	4/2/2023	5.55	5.58	0.03	--	
LNAPL-9	5/31/2023	--	4.36	--	--	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-9	6/19/2023	--	3.66	--	--	
LNAPL-9	7/10/2023	--	3.25	--	--	
LNAPL-9	8/19/2023	--	5.00	--	--	
LNAPL-9	9/19/2023	--	5.30	--	--	
LNAPL-9	2/7/2024	--	5.37	--	--	
LNAPL-9	2/23/2024	--	5.16	--	--	
LNAPL-9	3/7/2024	--	4.98	--	--	
LNAPL-9	3/20/2024	--	4.98	--	--	
LNAPL-9	4/2/2024	--	5.12	--	--	
LNAPL-9	4/18/2024	--	4.74	--	--	
LNAPL-9	4/30/2024	--	4.69	--	--	
LNAPL-9	5/15/2024	--	3.85	--	--	
LNAPL-9	5/31/2024	--	4.30	--	--	
LNAPL-9	6/12/2024	--	4.49	--	--	
LNAPL-9	6/28/2024	--	4.57	--	--	
LNAPL-9	7/12/2024	--	4.71	--	--	
LNAPL-9	7/26/2024	--	4.85	--	--	
LNAPL-9	8/9/2024	--	5.12	--	--	
LNAPL-9	8/22/2024	--	5.25	--	--	
LNAPL-9	9/5/2024	--	5.49	--	--	
LNAPL-9	9/19/2024	--	5.40	--	--	
LNAPL-10	8/27/2021	--	8.11	--	--	
LNAPL-10	9/30/2021	6.31	6.36	0.05	--	
LNAPL-10	10/5/2021	6.14	6.59	0.45	--	
LNAPL-10	10/12/2021	6.15	6.64	0.49	--	
LNAPL-10	10/14/2021	6.05	6.49	0.44	--	
LNAPL-10	10/19/2021	6.05	6.42	0.37	--	
LNAPL-10	10/20/2021	6.04	6.22	0.18	--	
LNAPL-10	10/21/2021	6.15	6.23	0.08	--	
LNAPL-10	10/22/2021	6.09	6.18	0.09	--	
LNAPL-10	10/25/2021	6.02	6.18	0.16	--	
LNAPL-10	10/28/2021	6.05	6.28	0.23	--	
LNAPL-10	11/4/2021	5.98	6.26	0.28	--	
LNAPL-10	11/9/2021	6.04	6.35	0.31	--	
LNAPL-10	11/18/2021	6.08	6.45	0.38	--	
LNAPL-10	12/2/2021	6.09	6.62	0.53	--	
LNAPL-10	12/15/2021	6.19	6.64	0.45	--	
LNAPL-10	1/3/2022	6.24	6.75	0.51	--	
LNAPL-10	2/8/2022	6.47	7.05	0.59	--	
LNAPL-10	2/25/2022	6.43	7.33	0.90	--	
LNAPL-10	3/7/2022	6.47	7.10	0.63	--	
LNAPL-10	4/11/2022	6.52	7.19	0.67	--	
LNAPL-10	5/15/2022	5.90	5.91	0.01	1.00	
LNAPL-10	5/22/2022	5.69	5.70	0.01	--	
LNAPL-10	5/29/2022	5.62	5.65	0.03	--	
LNAPL-10	6/5/2022	--	5.89	--	1.00	
LNAPL-10	6/12/2022	6.00	6.03	0.03	0.80	
LNAPL-10	6/19/2022	5.76	6.00	0.24	0.75	
LNAPL-10	6/26/2022	--	5.35	--	--	
LNAPL-10	7/3/2022	5.45	5.48	0.03	0.79	
LNAPL-10	7/10/2022	5.62	5.63	0.01	0.60	
LNAPL-10	7/17/2022	5.37	5.39	0.02	0.70	
LNAPL-10	7/31/2022	6.00	6.01	0.01	0.80	
LNAPL-10	8/7/2022	6.91	7.15	0.24	0.60	
LNAPL-10	8/14/2022	7.61	7.80	0.19	--	
LNAPL-10	9/4/2022	6.70	7.30	0.60	0.40	
LNAPL-10	9/10/2022	6.51	7.21	0.70	0.75	
LNAPL-10	9/18/2022	7.08	7.18	0.10	0.25	
LNAPL-10	9/25/2022	--	6.34	--	0.50	
LNAPL-10	10/2/2022	6.88	7.09	0.21	0.60	
LNAPL-10	10/9/2022	6.30	6.61	0.31	0.75	
LNAPL-10	11/14/2022	--	6.10	--	0.50	
LNAPL-10	12/6/2022	--	5.96	--	1.00	
LNAPL-10	12/25/2022	--	5.90	--	0.25	
LNAPL-10	1/15/2023	--	5.72	--	1.00	
LNAPL-10	1/22/2023	--	5.94	--	0.30	
LNAPL-10	1/30/2023	--	5.44	--	0.40	
LNAPL-10	2/12/2023	5.60	5.62	0.02	1.00	
LNAPL-10	2/18/2023	--	5.47	--	0.70	
LNAPL-10	2/26/2023	5.41	5.42	0.01	0.25	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-10	3/5/2023	--	5.80	--	--	
LNAPL-10	3/12/2023	--	5.71	--	1.00	
LNAPL-10	3/19/2023	--	5.52	--	0.25	
LNAPL-10	3/23/2023	--	5.40	--	--	
LNAPL-10	5/31/2023	--	4.35	--	--	
LNAPL-10	6/19/2023	--	3.65	--	--	
LNAPL-10	7/10/2023	--	4.19	--	--	
LNAPL-10	8/19/2023	--	4.95	--	--	
LNAPL-10	9/19/2023	--	5.30	--	--	
LNAPL-10	2/7/2024	--	5.35	--	--	
LNAPL-10	2/23/2024	--	5.15	--	--	
LNAPL-10	3/7/2024	--	4.98	--	--	
LNAPL-10	3/20/2024	--	4.99	--	--	Sheen
LNAPL-10	4/2/2024	--	5.10	--	--	
LNAPL-10	4/18/2024	--	4.64	--	--	
LNAPL-10	4/30/2024	--	4.63	--	--	
LNAPL-10	5/15/2024	--	3.82	--	--	
LNAPL-10	5/31/2024	--	4.25	--	--	
LNAPL-10	6/12/2024	--	4.48	--	--	
LNAPL-10	6/28/2024	--	4.54	--	--	
LNAPL-10	7/12/2024	--	4.70	--	--	
LNAPL-10	7/26/2024	--	5.08	--	--	
LNAPL-10	8/9/2024	--	5.14	--	--	
LNAPL-10	8/22/2024	--	5.25	--	--	
LNAPL-10	9/5/2024	--	5.51	--	--	
LNAPL-10	9/19/2024	--	5.39	--	--	
LNAPL-11	8/27/2021	--	8.20	--	--	
LNAPL-11	9/30/2021	--	6.52	--	--	
LNAPL-11	10/5/2021	6.29	6.30	0.01	--	
LNAPL-11	10/12/2021	--	6.34	--	--	
LNAPL-11	10/19/2021	6.22	6.63	0.41	--	
LNAPL-11	10/20/2021	6.32	6.35	0.03	--	
LNAPL-11	10/21/2021	6.40	6.41	0.01	--	
LNAPL-11	10/22/2021	--	6.30	--	--	Sheen
LNAPL-11	10/25/2021	6.22	6.25	0.03	--	
LNAPL-11	10/28/2021	6.25	6.38	0.13	--	
LNAPL-11	11/4/2021	6.20	6.40	0.20	--	
LNAPL-11	11/9/2021	6.21	6.45	0.24	--	
LNAPL-11	11/18/2021	6.26	6.53	0.27	--	
LNAPL-11	12/2/2021	6.28	6.68	0.40	--	
LNAPL-11	12/15/2021	6.38	6.78	0.41	--	
LNAPL-11	1/3/2022	6.42	6.88	0.46	--	
LNAPL-11	2/8/2022	6.73	7.29	0.56	--	
LNAPL-11	2/25/2022	6.61	7.39	0.78	--	
LNAPL-11	3/7/2022	6.63	7.43	0.80	--	
LNAPL-11	4/11/2022	6.70	7.43	0.73	--	
LNAPL-11	5/15/2022	6.12	6.50	0.38	0.50	
LNAPL-11	5/22/2022	--	5.86	--	--	
LNAPL-11	5/29/2022	--	5.90	--	--	
LNAPL-11	6/5/2022	--	6.09	--	1.00	
LNAPL-11	6/12/2022	6.21	6.25	0.04	0.50	
LNAPL-11	6/19/2022	5.94	6.18	0.24	0.75	
LNAPL-11	6/26/2022	--	5.50	--	--	
LNAPL-11	7/3/2022	5.56	5.58	0.02	0.92	
LNAPL-11	7/10/2022	--	5.83	--	1.00	
LNAPL-11	7/17/2022	5.55	5.57	0.02	0.70	
LNAPL-11	7/31/2022	6.10	6.20	0.10	0.50	
LNAPL-11	8/7/2022	7.15	7.16	0.01	0.70	
LNAPL-11	8/14/2022	7.82	7.86	0.04	--	
LNAPL-11	9/4/2022	7.19	7.60	0.41	0.70	
LNAPL-11	9/10/2022	6.58	7.20	0.62	0.75	
LNAPL-11	9/18/2022	7.34	7.38	0.04	0.10	
LNAPL-11	9/25/2022	--	6.56	--	0.50	
LNAPL-11	10/2/2022	7.21	7.34	0.13	0.70	
LNAPL-11	10/9/2022	6.46	6.76	0.30	0.50	
LNAPL-11	11/14/2022	--	6.10	--	0.50	
LNAPL-11	12/6/2022	--	6.03	--	0.75	
LNAPL-11	12/25/2022	--	6.06	--	0.25	
LNAPL-11	1/15/2023	--	5.89	--	--	
LNAPL-11	1/22/2023	--	6.07	--	0.40	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-11	1/30/2023	5.56	5.58	0.02	0.50	
LNAPL-11	2/12/2023	5.60	5.62	0.02	1.00	
LNAPL-11	2/18/2023	5.62	5.65	0.03	0.50	
LNAPL-11	2/26/2023	5.58	5.60	0.02	--	
LNAPL-11	3/5/2023	--	5.77	--	--	
LNAPL-11	3/12/2023	--	5.83	--	--	
LNAPL-11	3/19/2023	--	5.63	--	0.25	
LNAPL-11	3/23/2023	--	5.19	--	--	
LNAPL-11	4/2/2023	5.55	5.56	0.01	--	
LNAPL-11	4/30/2023	4.30	4.35	0.05	--	
LNAPL-11	5/31/2023	--	4.51	--	--	
LNAPL-11	6/19/2023	--	3.81	--	--	
LNAPL-11	7/10/2023	--	4.34	--	--	
LNAPL-11	8/19/2023	--	5.12	--	--	
LNAPL-11	9/19/2023	--	5.50	--	--	
LNAPL-11	2/7/2024	--	5.55	--	--	
LNAPL-11	2/23/2024	--	5.30	--	--	Sheen
LNAPL-11	3/7/2024	--	5.15	--	--	
LNAPL-11	3/20/2024	--	5.18	--	--	Sheen
LNAPL-11	4/2/2024	--	5.30	--	--	
LNAPL-11	4/18/2024	--	4.82	--	--	
LNAPL-11	4/30/2024	--	5.82	--	--	
LNAPL-11	5/15/2024	--	6.82	--	--	
LNAPL-11	5/31/2024	--	7.82	--	--	
LNAPL-11	6/12/2024	--	8.82	--	--	
LNAPL-11	6/28/2024	--	9.82	--	--	
LNAPL-11	7/12/2024	--	10.82	--	--	
LNAPL-11	7/26/2024	--	11.82	--	--	
LNAPL-11	8/9/2024	--	12.82	--	--	
LNAPL-11	8/22/2024	--	13.82	--	--	
LNAPL-11	9/5/2024	--	14.82	--	--	
LNAPL-11	9/19/2024	--	15.82	--	--	
LNAPL-12	8/14/2022	--	6.92	--	--	
LNAPL-12	8/20/2022	--	6.81	--	--	
LNAPL-12	9/4/2022	--	6.71	--	--	
LNAPL-12	9/10/2022	--	6.71	--	--	
LNAPL-12	9/18/2022	--	6.95	--	--	
LNAPL-12	9/25/2022	--	6.85	--	--	
LNAPL-12	10/2/2022	--	6.64	--	--	
LNAPL-12	10/9/2022	--	6.52	--	--	
LNAPL-12	11/14/2022	--	6.12	--	--	
LNAPL-12	12/6/2022	--	6.01	--	--	
LNAPL-12	2/26/2023	--	5.59	--	--	
LNAPL-12	3/5/2023	--	5.81	--	--	
LNAPL-12	3/23/2023	--	5.67	--	--	
LNAPL-12	5/31/2023	--	4.45	--	--	
LNAPL-12	6/19/2023	--	3.75	--	--	
LNAPL-12	7/10/2023	--	4.39	--	--	
LNAPL-12	8/19/2023	--	5.14	--	--	
LNAPL-12	9/19/2023	--	5.48	--	--	
LNAPL-12	2/7/2024	--	5.53	--	--	
LNAPL-12	2/23/2024	--	5.30	--	--	
LNAPL-12	3/7/2024	--	5.17	--	--	
LNAPL-12	3/20/2024	--	5.16	--	--	Sheen
LNAPL-12	4/2/2024	--	5.30	--	--	
LNAPL-12	4/18/2024	--	4.77	--	--	
LNAPL-12	4/30/2024	--	4.84	--	--	
LNAPL-12	5/15/2024	--	3.92	--	--	
LNAPL-12	5/31/2024	--	4.38	--	--	
LNAPL-12	6/12/2024	--	4.63	--	--	
LNAPL-12	6/28/2024	--	4.71	--	--	
LNAPL-12	7/12/2024	--	4.92	--	--	
LNAPL-12	7/26/2024	--	5.05	--	--	
LNAPL-12	8/9/2024	--	5.30	--	--	
LNAPL-12	8/22/2024	--	5.43	--	--	
LNAPL-12	9/5/2024	--	5.62	--	--	
LNAPL-12	9/19/2024	--	5.52	--	--	
LNAPL-13	8/14/2022	--	6.88	--	--	
LNAPL-13	8/20/2022	--	6.82	--	--	
LNAPL-13	9/4/2022	--	6.69	--	--	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-13	9/10/2022	--	6.70	--	--	
LNAPL-13	9/18/2022	--	6.83	--	--	
LNAPL-13	9/25/2022	--	6.81	--	--	
LNAPL-13	10/2/2022	--	6.62	--	--	
LNAPL-13	10/9/2022	--	6.52	--	--	
LNAPL-13	11/14/2022	--	6.11	--	--	
LNAPL-13	12/6/2022	--	5.98	--	--	
LNAPL-13	2/26/2023	--	5.57	--	--	
LNAPL-13	3/5/2023	--	5.78	--	--	
LNAPL-13	3/23/2023	--	5.54	--	--	
LNAPL-13	5/31/2023	--	4.45	--	--	
LNAPL-13	6/19/2023	--	3.75	--	--	
LNAPL-13	7/10/2023	--	4.39	--	--	
LNAPL-13	8/19/2023	--	5.15	--	--	
LNAPL-13	9/19/2023	--	5.48	--	--	
LNAPL-13	2/7/2024	--	5.50	--	--	
LNAPL-13	2/23/2024	--	5.26	--	--	
LNAPL-13	3/7/2024	--	5.13	--	--	
LNAPL-13	3/20/2024	--	5.14	--	--	
LNAPL-13	4/2/2024	--	5.29	--	--	
LNAPL-13	4/18/2024	--	4.82	--	--	
LNAPL-13	4/30/2024	--	4.76	--	--	
LNAPL-13	5/15/2024	--	3.88	--	--	
LNAPL-13	5/31/2024	--	4.38	--	--	
LNAPL-13	6/12/2024	--	4.60	--	--	
LNAPL-13	6/28/2024	--	4.66	--	--	
LNAPL-13	7/12/2024	--	4.85	--	--	
LNAPL-13	7/26/2024	--	5.08	--	--	
LNAPL-13	8/9/2024	--	5.28	--	--	
LNAPL-13	8/22/2024	--	5.38	--	--	
LNAPL-13	9/5/2024	--	5.62	--	--	
LNAPL-13	9/19/2024	--	5.46	--	--	
LNAPL-14	8/14/2022	--	6.93	--	--	
LNAPL-14	8/20/2022	--	6.85	--	--	
LNAPL-14	9/4/2022	--	6.74	--	--	
LNAPL-14	9/10/2022	--	6.73	--	--	
LNAPL-14	9/18/2022	--	7.13	--	--	
LNAPL-14	9/25/2022	--	7.02	--	--	
LNAPL-14	10/2/2022	--	6.66	--	--	
LNAPL-14	10/9/2022	--	6.55	--	--	
LNAPL-14	11/14/2022	--	6.15	--	--	
LNAPL-14	12/6/2022	--	6.04	--	--	
LNAPL-14	2/26/2023	--	5.62	--	--	
LNAPL-14	3/5/2023	--	5.80	--	--	
LNAPL-14	3/23/2023	--	5.50	--	--	
LNAPL-14	5/31/2023	--	4.48	--	--	
LNAPL-14	6/19/2023	--	3.75	--	--	
LNAPL-14	7/10/2023	--	4.43	--	--	
LNAPL-14	8/19/2023	--	5.19	--	--	
LNAPL-14	9/19/2023	--	5.47	--	--	
LNAPL-14	2/7/2024	--	5.53	--	--	
LNAPL-14	2/23/2024	--	5.30	--	--	
LNAPL-14	3/7/2024	--	5.15	--	--	
LNAPL-14	3/20/2024	--	5.13	--	--	
LNAPL-14	4/2/2024	--	5.30	--	--	
LNAPL-14	4/18/2024	--	4.81	--	--	
LNAPL-14	4/30/2024	--	4.78	--	--	
LNAPL-14	5/15/2024	--	3.87	--	--	
LNAPL-14	5/31/2024	--	4.38	--	--	
LNAPL-14	6/12/2024	--	4.62	--	--	
LNAPL-14	6/28/2024	--	4.71	--	--	
LNAPL-14	7/12/2024	--	4.87	--	--	
LNAPL-14	7/26/2024	--	5.06	--	--	
LNAPL-14	8/9/2024	--	5.30	--	--	
LNAPL-14	8/22/2024	--	5.41	--	--	
LNAPL-14	9/5/2024	--	5.67	--	--	
LNAPL-14	9/19/2024	--	5.48	--	--	
LNAPL-15	8/14/2022	--	6.93	--	--	
LNAPL-15	8/20/2022	--	6.82	--	--	
LNAPL-15	9/4/2022	--	6.73	--	--	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-15	9/10/2022	--	6.72	--	--	
LNAPL-15	9/18/2022	--	7.24	--	--	
LNAPL-15	9/25/2022	--	6.84	--	--	
LNAPL-15	10/2/2022	--	6.65	--	--	
LNAPL-15	10/9/2022	--	6.53	--	--	
LNAPL-15	11/14/2022	--	6.14	--	--	
LNAPL-15	12/6/2022	--	5.99	--	--	
LNAPL-15	2/26/2023	--	5.60	--	--	
LNAPL-15	3/5/2023	--	5.77	--	--	
LNAPL-15	3/23/2023	--	5.49	--	--	
LNAPL-15	5/31/2023	--	4.45	--	--	
LNAPL-15	6/19/2023	--	3.73	--	--	
LNAPL-15	7/10/2023	--	4.41	--	--	
LNAPL-15	8/19/2023	--	5.22	--	--	
LNAPL-15	9/19/2023	--	5.42	--	--	
LNAPL-15	2/7/2024	--	5.52	--	--	
LNAPL-15	2/23/2024	--	5.30	--	--	
LNAPL-15	3/7/2024	--	5.13	--	--	
LNAPL-15	3/20/2024	--	5.14	--	--	
LNAPL-15	4/2/2024	--	5.25	--	--	
LNAPL-15	4/18/2024	--	4.84	--	--	
LNAPL-15	4/30/2024	--	4.78	--	--	
LNAPL-15	5/15/2024	--	3.88	--	--	
LNAPL-15	5/31/2024	--	4.32	--	--	
LNAPL-15	6/12/2024	--	4.62	--	--	
LNAPL-15	6/28/2024	--	4.37	--	--	
LNAPL-15	7/12/2024	--	4.86	--	--	
LNAPL-15	7/26/2024	--	5.03	--	--	
LNAPL-15	8/9/2024	--	5.32	--	--	
LNAPL-15	8/22/2024	--	5.41	--	--	
LNAPL-15	9/5/2024	--	5.65	--	--	
LNAPL-15	9/19/2024	--	5.47	--	--	
LNAPL-16	8/14/2022	--	6.92	--	--	
LNAPL-16	8/20/2022	--	6.83	--	--	
LNAPL-16	9/4/2022	--	6.72	--	--	
LNAPL-16	9/10/2022	--	6.72	--	--	
LNAPL-16	9/18/2022	--	6.91	--	--	
LNAPL-16	9/25/2022	--	6.83	--	--	
LNAPL-16	10/2/2022	--	6.66	--	--	
LNAPL-16	10/9/2022	--	6.52	--	--	
LNAPL-16	11/14/2022	--	6.12	--	--	
LNAPL-16	12/6/2022	--	5.97	--	--	
LNAPL-16	2/26/2023	--	5.60	--	--	
LNAPL-16	3/5/2023	--	5.82	--	--	
LNAPL-16	3/23/2023	--	5.45	--	--	
LNAPL-16	5/31/2023	--	4.47	--	--	
LNAPL-16	6/19/2023	--	3.73	--	--	
LNAPL-16	7/10/2023	--	4.40	--	--	
LNAPL-16	8/19/2023	--	5.22	--	--	
LNAPL-16	9/19/2023	--	5.44	--	--	
LNAPL-16	2/7/2024	--	5.50	--	--	
LNAPL-16	2/23/2024	--	5.27	--	--	Sheen
LNAPL-16	3/7/2024	--	5.11	--	--	
LNAPL-16	3/20/2024	--	5.12	--	--	sheen
LNAPL-16	4/2/2024	--	5.25	--	--	sheen
LNAPL-16	4/18/2024	--	4.80	--	--	
LNAPL-16	4/30/2024	--	4.75	--	--	
LNAPL-16	5/15/2024	--	3.85	--	--	
LNAPL-16	5/31/2024	--	4.42	--	--	
LNAPL-16	6/12/2024	--	4.59	--	--	
LNAPL-16	6/28/2024	--	4.67	--	--	
LNAPL-16	7/12/2024	--	4.85	--	--	
LNAPL-16	7/26/2024	--	5.05	--	--	
LNAPL-16	8/9/2024	--	5.29	--	--	
LNAPL-16	8/22/2024	--	5.41	--	--	
LNAPL-16	9/5/2024	--	5.68	--	--	
LNAPL-16	9/19/2024	--	5.46	--	--	
LNAPL-17	8/14/2022	--	6.90	--	--	
LNAPL-17	8/20/2022	--	6.79	--	--	
LNAPL-17	9/4/2022	--	6.68	--	--	

Table 6
Fluid Level Measurements at LNAPL Wells
Calumet Montana Refining, LLC - Great Falls, Montana

Location	Date	DTP (ft BTOC)	DTW (ft BTOC)	LNAPL Thickness (ft)	Fluid Recovery (gal)	Notes
LNAPL-17	9/10/2022	--	6.67	--	--	
LNAPL-17	9/18/2022	--	6.87	--	--	
LNAPL-17	9/25/2022	--	6.95	--	--	
LNAPL-17	10/2/2022	--	6.62	--	--	
LNAPL-17	10/9/2022	--	6.51	--	--	
LNAPL-17	11/14/2022	--	6.10	--	--	
LNAPL-17	12/6/2022	--	6.02	--	--	
LNAPL-17	2/26/2023	--	5.57	--	--	
LNAPL-17	3/5/2023	--	5.75	--	--	
LNAPL-17	3/23/2023	--	6.63	--	--	
LNAPL-17	5/31/2023	--	4.42	--	--	
LNAPL-17	6/19/2023	--	3.64	--	--	
LNAPL-17	7/10/2023	--	4.39	--	--	
LNAPL-17	8/19/2023	--	5.19	--	--	
LNAPL-17	9/19/2023	--	5.50	--	--	
LNAPL-17	2/7/2024	--	5.44	--	--	
LNAPL-17	2/23/2024	--	5.23	--	--	Sheen
LNAPL-17	3/7/2024	--	5.08	--	--	
LNAPL-17	3/20/2024	--	5.09	--	--	
LNAPL-17	4/2/2024	--	5.20	--	--	Sheen
LNAPL-17	4/18/2024	--	4.79	--	--	
LNAPL-17	4/30/2024	--	4.72	--	--	
LNAPL-17	5/15/2024	--	3.82	--	--	
LNAPL-17	5/31/2024	--	4.30	--	--	
LNAPL-17	6/12/2024	--	4.55	--	--	
LNAPL-17	6/28/2024	--	4.62	--	--	
LNAPL-17	7/12/2024	--	4.86	--	--	
LNAPL-17	7/26/2024	--	5.04	--	--	
LNAPL-17	8/9/2024	--	5.30	--	--	
LNAPL-17	8/22/2024	--	5.38	--	--	
LNAPL-17	9/5/2024	--	5.59	--	--	
LNAPL-17	9/19/2024	--	5.42	--	--	

Notes:

DTP	Depth to Product
DTW	Depth to Water
ft BTOC	Below Top of Casing
LNAPL	light non-aqueous phase liquid
NA	Reading not collected
--	LNAPL was not present/No LNAPL Recovery

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location Field Sample ID Lab Sample ID Sample Method Sample Date Comments	Montana DEQ-7 Human Health Standards - Groundwater	Montana DEQ Tier 1 Groundwater RBSLs	MW-041S VF24007-001 Groundwater Low Flow 6/22/2020	MW-041S VH28044-002 Groundwater Low Flow 8/26/2020	MW-041S WB24062-035 Groundwater Low Flow 2/19/2021	MW-041S WJ08015-001 Groundwater Low Flow 10/5/2021	MW-041S XC21009-002 Groundwater Low Flow 3/17/2022	MW-041S XF23073-001 Groundwater Low Flow 6/22/2022	MW-041S L1533605-03 Groundwater Low Flow 8/31/2022	MW-041S XI01059-003 Groundwater Low Flow 8/31/2022	MW-041S L1569525-03 Groundwater Low Flow 12/13/2022
VOC											
Acetone			220 (40)	U (80)	94 J (80)	U (80)	76 (20)	HU (80)	---	88 (4)	---
Benzene	5	5	**1000 (4)**	**1500 (8)**	**980 (8)**	**1900 (8)**	**230 (2)**	**1200 H (8)**	---	**140 (0.4)**	---
Bromoform	80		U (4)	U (8)	U (8)	U (8)	U (2)	HU (8)	---	U (0.4)	---
2-Butanone			89 J (20)	U (40)	U (40)	U (40)	28 J (10)	HU (40)	---	16 (2)	---
n-Butylbenzene			---	---	---	---	---	---	---	---	---
sec-Butylbenzene			---	---	---	---	---	---	---	---	---
tert-Butylbenzene			---	---	---	---	---	---	---	---	---
Carbon Disulfide			U (4)	U (8)	U (8)	U (8)	U (2)	HU (8)	---	4.2 (0.4)	---
Chloroform	70		4 J (4)	U (8)	U (8)	U (8)	U (2)	HU (8)	---	U (0.4)	---
Chloromethane	600		U (4)	U (8)	U (8)	U (8)	U (2)	HU (8)	---	U (0.4)	---
Cumene			10 (4)	11 (8)	U (8)	14 (8)	U (2)	16 H (8)	---	0.57 (0.4)	---
Cyclohexane			24 (4)	77 J (8)	97 (8)	110 (8)	15 (2)	22 H (8)	---	27 (0.4)	---
p-Cymene			---	---	---	---	---	---	---	---	---
1,1-Dichloroethane			U (4)	U (8)	U (8)	U (8)	U (2)	HU (8)	---	U (0.4)	---
cis-1,2-Dichloroethene	70		U (4)	U (8)	U (8)	U (8)	U (2)	HU (8)	---	0.48 J (0.4)	---
Ethyl Benzene	700	700	370 (4)	250 (8)	67 (8)	450 (8)	15 (2)	410 H (8)	---	21 (0.4)	---
n-Hexane			---	---	---	---	---	---	---	---	---
Iodomethane			---	---	---	---	---	---	---	---	---
4-Methyl-2-pentanone			U (20)	U (40)	U (40)	U (40)	U (10)	HU (40)	---	2.4 J (2)	---
Methylcyclohexane			11 J (4)	34 J (8)	53 J (8)	57 J (8)	9.4 J (2)	12 (8)	---	18 (0.4)	---
Methylene Chloride	5		U (4)	U (8)	U (8)	U (8)	U (2)	HU (8)	---	U (0.4)	---
Naphthalene	100	100	31 (4)	26 (8)	9.5 J (8)	35 (8)	31 (2)	77 H (8)	---	3.4 (0.4)	---
Diisopropyl ether			---	---	---	---	---	---	---	---	---
n-Propylbenzene			---	---	---	---	---	---	---	---	---
Styrene	100		U (4.1)	U (8.2)	U (8.2)	U (8.2)	U (2.1)	HU (8.2)	---	U (0.41)	---
Toluene	1000	1000	82 (4)	12 (8)	11 (8)	270 (8)	44 (2)	180 H (8)	---	11 (0.4)	---
1,1,2-Trichloroethane	3		U (4)	U (8)	U (8)	U (8)	U (2)	HU (8)	---	U (0.4)	---
1,2,3-Trimethylbenzene			---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene			---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene			---	---	---	---	---	---	---	---	---
m,p-xylene			550 (4)	370 (8)	220 (8)	640 (8)	580 (2)	2000 H (8)	---	150 (0.4)	---
ortho-xylene	10000		67 (4)	16 (8)	10 (8)	200 (8)	300 (2)	750 H (8)	---	67 (0.4)	---
Xylenes (total)	10000	10000	620 (4)	390 (8)	230 (8)	840 (8)	870 (2)	2700 H (8)	---	220 (0.4)	---
SVOC											
Acenaphthene	70	70	U (0.4)	U (0.4)	U (0.4)	U (0.2)	U (0.8)	U (2)	---	U (0.04)	---
Acenaphthylene			U (0.4)	U (0.4)	U (0.4)	U (0.2)	U (0.8)	U (2)	---	U (0.04)	---
Benzo(a)anthracene	0.5	0.5	U (0.4)	U (0.4)	U (0.4)	U (0.2)	U (0.8)	U (2)	---	U (0.04)	---
Benzo(a)pyrene	0.05	0.05	U (0.7)	U (0.7)	U (0.7)	U (0.35)	U (1.4)	U (3.5)	---	U (0.04)	---
Benzo(b)fluoranthene	0.5	0.5	U (0.4)	U (0.4)	U (0.4)	U (0.2)	U (0.8)	U (2)	---	U (0.04)	---
Benzo(g,h,i)perylene			U (0.4)	U (0.4)	U (0.4)	U (0.2)	U (0.8)	U (2)	---	U (0.04)	---
1,1-Biphenyl			---	---	---	---	---	---	---	U (0.21)	---
bis(2-Ethylhexyl)phthalate	6		**11 BJ (5)**	U (5)	U (5)	U (5)	U (40)	U (100)	---	3.8 BJ (1.5)	---
Chrysene	50	50	U (0.3)	U (0.3)	U (0.3)	U (0.15)	U (0.6)	U (1.5)	---	U (0.04)	---
Dibenzofuran			U (5)	U (5)	U (5)	U (2.5)	U (10)	U (25)	---	U (0.16)	---
Diethylphthalate	600		U (5)	U (5)	U (5)	U (2.5)	U (10)	U (25)	---	U (0.19)	---
2,4-Dimethylphenol	100		84 (4.8)	U (4.8)	24 (4.8)	U (2.4)	**160 (9.6)**	36 J (24)	---	U (0.15)	---
Di-n-butylphthalate	20		6.1 BJ (5)	U (5)	U (5)	U (2.5)	U (10)	U (25)	---	U (0.42)	---
Fluoranthene	20	20	U (1)	U (1)	U (1)	U (0.5)	U (2)	U (5)	---	U (0.04)	---
Fluorene	50	50	U (0.3)	U (0.3)	U (0.3)	0.63 BJ (0.15)	U (0.6)	2.3 J (1.5)	---	U (0.04)	---
Indeno(1,2,3-cd)pyrene	0.5	0.5	U (0.4)	U (0.4)	U (0.4)	U (0.2)	U (0.8)	U (2)	---	U (0.04)	---
1-Methylnaphthalene		11	---	---	---	---	---	---	---	0.065 J (0.04)	---
2-Methylnaphthalene		36	5.4 (0.4)	0.41 J (0.4)	0.5 J (0.4)	1.7 B (0.2)	7.7 (0.8)	33 (2)	---	0.11 J (0.04)	---
2-Methylphenol			U (2.1)	U (2.1)	U (2.1)	U (1.1)	U (4.2)	U (11)	---	U (0.21)	---
Naphthalene	100	100	24 B (0.5)	7.1 (0.5)	10 (0.5)	15 B (0.25)	18 (1)	60 (2.5)	---	U (0.04)	---
Phenanthrene			U (0.6)	U (0.6)	U (0.6)	U (0.3)	U (1.2)	U (3)	---	U (0.04)	---
Phenol	4000		53 (5)	61 (5)	34 (5)	5.6 (2.5)	15 J (10)	U (25)	---	U (0.19)	---
Pyrene	20	20	U (1)	U (1)	U (1)	U (0.5)	U (2)	U (5)	---	U (0.04)	---

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location Field Sample ID Lab Sample ID Sample Method Sample Date Comments	Montana DEQ-7 Human Health Standards - Groundwater	Montana DEQ Tier 1 Groundwater RBSLs	MW-041S VF24007-001 Groundwater Low Flow 6/22/2020	MW-041S VH28044-002 Groundwater Low Flow 8/26/2020	MW-041S WB24062-035 Groundwater Low Flow 2/19/2021	MW-041S WJ08015-001 Groundwater Low Flow 10/5/2021	MW-041S XC21009-002 Groundwater Low Flow 3/17/2022	MW-041S XF23073-001 Groundwater Low Flow 6/22/2022	MW-041S L1533605-03 Groundwater Low Flow 8/31/2022	MW-041S XI01059-003 Groundwater Low Flow 8/31/2022	MW-041S L1569525-03 Groundwater Low Flow 12/13/2022
MTDEQ VPH											
C5-C8 Aliphatic Hydrocarbons (Unadjusted)			---	---	---	---	---	---	1460 (33.3)	---	1050 (33.3)
C5-C8 Aliphatics		650	680 J (150)	2700 (300)	2200 (300)	1500 (150)	460 J (150)	990 (150)	1140 (33.3)	---	1040 (33.3)
C9-C12 Aliphatics (Unadjusted)			---	---	---	---	---	---	1200 (33.3)	---	2060 (33.3)
C9-C12 Aliphatics		1400	1700 (150)	740 J (300)	510 J (300)	370 J (150)	730 J (150)	710 J (150)	625 (33.3)	---	405 (33.3)
C5-C8 Aliphatic Hydrocarbons (Adjusted)		650	---	---	---	---	---	---	---	---	---
C9-C12 Aliphatics (Adjusted)		1400	---	---	---	---	---	---	---	---	---
Aromatic (C09-C10),Unadjusted			---	---	---	---	---	---	530 (33.3)	---	1570 (33.3)
C9-C10 Aromatics		1100	1100 (50)	2400 (100)	730 (100)	990 (50)	810 (50)	3100 (50)	---	---	---
Gasoline Range Organics (C5-C12)			---	---	---	---	---	---	---	---	---
Volatile Petroleum Hydrocarbons			---	---	---	---	---	---	---	---	---
Petroleum Hydrocarbons (Total)			5000 (350)	10000 (700)	3600 (700)	6300 (350)	3100 (350)	9800 (350)	3190 (66.7)	---	5170 (66.7)
MTDEQ EPH											
C9-C18 Aliphatic Hydrocarbons		1400	U (320)	U (100)	U (110)	---	---	990 (100)	---	---	---
C19-C36 Aliphatics (Unadjusted)		1000	---	---	---	---	---	---	---	---	UQ (200)
C19-C36 Aliphatics		1000	U (320)	U (100)	U (110)	---	---	U (100)	---	---	---
C11 through C22 Aromatic Hydrocarbons (Unadjusted)			---	---	---	---	---	---	---	---	375 JQ (200)
C11 through C22 Aromatic Hydrocarbons (Adjusted)			---	---	---	---	---	---	---	---	---
C11-C22 Aromatics		1100	U (320)	100 (100)	3200 (110)	---	---	4000 (100)	---	---	375 JQ (200)
Total Petroleum Hydrocarbons (Unadjusted)			---	---	---	---	---	---	---	---	375 JQ (200)
Total Petroleum Hydrocarbons (GC/FID)			---	---	---	---	---	---	---	---	---
Petroleum Hydrocarbons (Total)			---	---	---	---	---	---	---	---	375 JQ (200)
Petroleum Hydrocarbons (Extractable)			4300 (650)	3100 (210)	4700 (210)	---	---	5700 (2000)	5560 (500)	---	---
Extractable Petroleum Hydrocarbons (Frac)			U (320)	120 J (100)	3300 (110)	---	---	5000 B (100)	---	---	4460 Q (100)

Notes:

1 All concentrations are presented in ug/L.

2 Only compounds with at least one detection are shown.

3 Concentrations that exceed the Montana DEQ-7 Human Health Standards - Groundwater are **boldfaced**.

4 Concentrations that exceed the Montana DEQ Tier 1 Groundwater RBSLs are underlined.

Abbreviations:

U -- Not Detected.
J -- Estimated Concentration.
B -- Blank Contamination.
H -- Compound analyzed outside holding time
Q -- Sample prepared past holding time,
( ) -- Reporting Detection Limit.
--- -- Not Analyzed.

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S
Field Sample ID	XL14017-003	L1597587-03	YC22023-003	L1631460-03	YF29005-005	L1658629-03	YI21013-003	L1685777-03	L1710780-01	L1744765-01	L1757374-06
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	12/13/2022	3/21/2023	3/21/2023	6/27/2023	6/27/2023	9/20/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	7/16/2024
Comments											
VOC											
Acetone	35 J (20)	---	U (20)	---	40 H (4)	---	U (200)	23.2 J (11.3)	UJ3 (11.3)	U (11.3)	U (113)
Benzene	**250 (2)**	---	**130 (0.4)**	---	**410 (2)**	---	**470 (20)**	**535 (1.88)**	**199 (0.0941)**	**353 (2.35)**	**406 (0.941)**
Bromoform	U (2)	---	U (0.4)	---	U (2)	---	U (20)	U (0.129)	U (0.129)	U (0.129)	U (1.29)
2-Butanone	14 J (10)	---	U (2)	---	18 H (2)	---	U (100)	U (1.19)	U (1.19)	U (1.19)	U (11.9)
n-Butylbenzene	---	---	---	---	---	---	---	6.9 (0.157)	U (0.157)	U (0.157)	---
sec-Butylbenzene	---	---	---	---	---	---	---	8.12 (0.125)	0.801 (0.125)	8.79 (0.125)	---
tert-Butylbenzene	---	---	---	---	---	---	---	U (0.127)	0.149 J (0.127)	U (0.127)	---
Carbon Disulfide	U (2)	---	U (0.4)	---	U (2)	---	U (20)	0.363 J (0.0962)	U (0.0962)	0.171 J (0.0962)	U (0.962)
Chloroform	U (2)	---	U (0.4)	---	U (2)	---	U (20)	U (0.111)	U (0.111)	U (0.111)	U (1.11)
Chloromethane	U (2)	---	U (0.4)	---	U (2)	---	U (20)	U (0.96)	U (0.96)	U (0.96)	U (9.6)
Cumene	U (2)	---	0.55 (0.4)	---	5.6 (2)	---	U (20)	8.52 (0.105)	0.975 (0.105)	8.31 (0.105)	4.31 J (1.05)
Cyclohexane	33 (2)	---	18 (2)	---	17 (2)	---	45 (20)	---	---	---	22 (1.88)
p-Cymene	---	---	---	---	---	---	---	6.35 (0.12)	2.96 (0.12)	8.72 (0.12)	---
1,1-Dichloroethane	U (2)	---	U (0.4)	---	U (2)	---	U (20)	U (0.1)	U (0.1)	U (0.1)	U (1)
cis-1,2-Dichloroethene	U (2)	---	U (0.4)	---	U (2)	---	U (20)	U (0.126)	U (0.126)	U (0.126)	U (1.26)
Ethyl Benzene	50 (2)	---	16 (0.4)	---	150 (2)	---	170 (20)	191 (2.74)	21.9 (0.137)	147 (3.43)	112 (1.37)
n-Hexane	---	---	---	---	---	---	---	U (0.749)	U (0.749)	11.5 (0.749)	---
Iodomethane	---	---	---	---	---	---	---	2.19 B J (0.554)	U (0.554)	U (0.554)	---
4-Methyl-2-pentanone	U (10)	---	U (2)	---	U (10)	---	U (100)	2.78 J (0.478)	1.94 J (0.478)	2.6 J (0.478)	U (4.78)
Methylcyclohexane	34 (2)	---	12 (0.4)	---	15 J (2)	---	33 J (20)	---	---	---	17.8 (6.6)
Methylene Chloride	U (2)	---	U (0.4)	---	U (2)	---	U (20)	U (0.43)	U (0.43)	U (0.43)	U (4.3)
Naphthalene	27 (2)	---	18 (0.4)	---	35 (2)	---	30 (20)	---	28.4 (0.174)	67.8 (0.174)	---
Diisopropyl ether	---	---	---	---	---	---	---	U (0.105)	U (0.105)	U (0.105)	---
n-Propylbenzene	---	---	---	---	---	---	---	21.1 (0.0993)	2.81 (0.0993)	23.5 (0.0993)	---
Styrene	U (2.1)	---	U (0.41)	---	4.8 (2.1)	---	U (21)	U (0.118)	U (0.118)	U (0.118)	U (1.18)
Toluene	9.5 (2)	---	2.2 (0.4)	---	3.4 (2)	---	U (20)	6.45 (0.278)	1.5 (0.278)	4.04 (0.278)	U (2.78)
1,1,2-Trichloroethane	U (2)	---	U (0.4)	---	U (2)	---	U (20)	U (0.158)	U (0.158)	U (0.158)	U (1.58)
1,2,3-Trimethylbenzene	---	---	---	---	---	---	---	248 (2.08)	199 (0.104)	261 (2.6)	---
1,2,4-Trimethylbenzene	---	---	---	---	---	---	---	613 (6.44)	266 (3.22)	656 (8.05)	---
1,3,5-Trimethylbenzene	---	---	---	---	---	---	---	83.3 (0.104)	26.5 (0.104)	91.5 (0.104)	---
m,p-xylene	730 (2)	---	320 (2)	---	470 (2)	---	590 (20)	---	---	---	---
ortho-xylene	300 (2)	---	150 (2)	---	150 (2)	---	200 (20)	---	---	---	---
Xylenes (total)	1000 (2)	---	460 (2)	---	630 (2)	---	790 (20)	987 (3.48)	535 (0.174)	987 (4.35)	488 (1.74)
SVOC											
Acenaphthene	U (0.8)	---	U (0.8)	---	0.34 J (0.2)	---	0.65 J (0.2)	1.07 (0.019)	0.347 J (0.0886)	0.554 J (0.0886)	0.834 (0.019)
Acenaphthylene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	U (0.0171)	U (0.0921)	U (0.0921)	U (0.0171)
Benzo(a)anthracene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	U (0.0203)	U (0.199)	U (0.199)	U (0.0203)
Benzo(a)pyrene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	U (0.0184)	U (0.0381)	U (0.0381)	U (0.0184)
Benzo(b)fluoranthene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	U (0.0168)	U (0.13)	U (0.13)	U (0.0168)
Benzo(g,h,i)perylene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	U (0.0184)	U (0.121)	U (0.121)	U (0.0184)
1,1-Biphenyl	U (4.2)	---	U (4.2)	---	1.4 J (1.1)	---	U (1.1)	---	---	---	---
bis(2-Ethylhexyl)phthalate	U (30)	---	U (30)	---	U (7.5)	---	U (7.5)	U (0.895)	U (0.895)	U (0.895)	U (0.895)
Chrysene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	U (0.0179)	U (0.13)	U (0.13)	U (0.0179)
Dibenzofuran	U (3.2)	---	U (3.2)	---	U (0.8)	---	U (0.8)	0.55 J (0.097)	0.193 J (0.097)	U (0.097)	U (0.097)
Diethylphthalate	U (3.8)	---	U (3.8)	---	U (0.95)	---	U (0.95)	U (0.287)	U (0.287)	U (0.287)	U (0.287)
2,4-Dimethylphenol	**100 (3)**	---	60 (3)	---	8.3 (0.75)	---	75 (0.75)	15.8 (0.0636)	16 J3 (0.0636)	8.34 J (0.0636)	5.03 J (0.0636)
Di-n-butylphthalate	U (8.4)	---	U (8.4)	---	U (2.1)	---	U (2.1)	U (0.453)	U (0.453)	U (0.453)	U (0.453)
Fluoranthene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	U (0.027)	U (0.102)	U (0.102)	U (0.027)
Fluorene	U (0.8)	---	1.2 J (0.8)	---	0.67 J (0.2)	---	1.4 (0.2)	1.45 (0.0169)	0.511 J (0.0844)	0.82 J (0.0844)	1.06 (0.0169)
Indeno(1,2,3-cd)pyrene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	U (0.0158)	U (0.279)	U (0.279)	U (0.0158)
1-Methylnaphthalene	12 (0.8)	---	14 (0.8)	---	10 (0.2)	---	7.3 (0.2)	31 (0.0687)	---	---	18 (0.0687)
2-Methylnaphthalene	6.7 (0.8)	---	11 (0.8)	---	12 (0.2)	---	0.74 J (0.2)	28.4 (0.0674)	7.41 (0.117)	16.2 (0.117)	5.38 (0.0674)
2-Methylphenol	U (4.2)	---	U (4.2)	---	U (1.1)	---	U (1.1)	U (0.0929)	UJ3 (0.0929)	U (0.0929)	U (0.0929)
Naphthalene	19 (0.8)	---	11 (0.8)	---	15 (0.2)	---	6.9 (0.2)	50.6 (0.0917)	13 (0.159)	24.4 (0.159)	22.8 (0.0917)
Phenanthrene	U (0.8)	---	U (0.8)	---	0.42 J (0.2)	---	U (0.2)	0.592 (0.018)	0.257 J (0.112)	0.582 J (0.112)	0.542 (0.018)
Phenol	9.1 J (3.8)	---	U (3.8)	---	U (0.95)	---	15 (0.95)	4.95 J (4.33)	U (4.33)	4.65 J (4.33)	U (4.33)
Pyrene	U (0.8)	---	U (0.8)	---	U (0.2)	---	U (0.2)	0.0504 (0.0169)	U (0.107)	U (0.107)	U (0.0169)

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S
Field Sample ID	XL14017-003	L1597587-03	YC22023-003	L1631460-03	YF29005-005	L1658629-03	YI21013-003	L1685777-03	L1710780-01	L1744765-01	L1757374-06
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	12/13/2022	3/21/2023	3/21/2023	6/27/2023	6/27/2023	9/20/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	7/16/2024
Comments											
MTDEQ VPH											
C5-C8 Aliphatic Hydrocarbons (Unadjusted)	---	516 (33.3)	---	850 (167)	---	1310 (33.3)	---	1410 (33.3)	782 (33.3)	1260 (33.3)	1850 (33.3)
C5-C8 Aliphatics	---	392 (33.3)	---	429 J (167)	---	842 (33.3)	---	869 (33.3)	582 (33.3)	903 (33.3)	1440 (33.3)
C9-C12 Aliphatics (Unadjusted)	---	1330 (33.3)	---	3100 (167)	---	2510 (33.3)	---	3560 (33.3)	2240 (33.3)	4050 (33.3)	2760 (33.3)
C9-C12 Aliphatics	---	456 (33.3)	---	U (167)	---	844 (33.3)	---	2380 (33.3)	1680 (33.3)	2920 (33.3)	2160 (33.3)
C5-C8 Aliphatic Hydrocarbons (Adjusted)	---	---	---	---	---	---	---	---	---	903 (33.3)	---
C9-C12 Aliphatics (Adjusted)	---	---	---	---	---	---	---	---	---	2920 (33.3)	---
Aromatic (C09-C10),Unadjusted	---	1240 (167)	---	1910 (167)	---	1750 (33.3)	---	1180 (33.3)	720 (33.3)	1380 (33.3)	1940 (33.3)
C9-C10 Aromatics	---	---	---	---	---	---	---	---	---	---	---
Gasoline Range Organics (C5-C12)	---	3360 (66.7)	---	6400 (333)	---	6010 (66.7)	---	---	---	---	---
Volatile Petroleum Hydrocarbons	---	3090 (333)	---	5860 (333)	---	5570 (66.7)	---	6150 (66.7)	3740 (66.7)	6690 (66.7)	---
Petroleum Hydrocarbons (Total)	---	---	---	---	---	---	---	---	---	---	---
MTDEQ EPH											
C9-C18 Aliphatic Hydrocarbons	---	---	---	---	---	---	---	U (200)	U (200)	U (200)	---
C19-C36 Aliphatics (Unadjusted)	---	U (222)	---	U (200)	---	U (200)	---	U (200)	U (200)	U (200)	UJ (200)
C19-C36 Aliphatics	---	---	---	---	---	---	---	---	---	---	---
C11 through C22 Aromatic Hydrocarbons (Unadjusted)	---	506 J (222)	---	425 JJ3 (200)	---	397 J (200)	---	813 (200)	569 J (200)	405 J (200)	389 J (200)
C11 through C22 Aromatic Hydrocarbons (Adjusted)	---	---	---	---	---	---	---	---	---	---	---
C11-C22 Aromatics	---	506 J (222)	---	425 J (200)	---	397 J (200)	---	700 (200)	548 J (200)	363 J (200)	341 J (200)
Total Petroleum Hydrocarbons (Unadjusted)	---	506 J (222)	---	425 J (200)	---	397 J (200)	---	813 (200)	569 J (200)	405 J (200)	389 J (200)
Total Petroleum Hydrocarbons (GC/FID)	---	---	---	---	---	---	---	---	---	363 J (200)	---
Petroleum Hydrocarbons (Total)	---	506 J (222)	---	425 J (200)	---	397 J (200)	---	700 (200)	548 J (200)	363 J (200)	341 J (200)
Petroleum Hydrocarbons (Extractable)	---	5640 (111)	---	5490 (100)	---	5660 (100)	---	6840 (100)	---	---	5500 (100)
Extractable Petroleum Hydrocarbons (Frac)	---	---	---	---	---	---	---	---	---	---	---

Notes:

1 All concentrations are presented in ug/L.

2 Only compounds with at least one detection are shown.

3 Concentrations that exceed the Montana DEQ-7 Human Health Standards - Groundwater are **boldfaced**.

4 Concentrations that exceed the Montana DEQ Tier 1 Groundwater RBSLs are underlined.

Abbreviations:

U -- Not Detected.
J -- Estimated Concentration.
B -- Blank Contamination.
H -- Compound analyzed outside holding time
Q -- Sample prepared past holding time,
( ) -- Reporting Detection Limit.
--- -- Not Analyzed.

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-041S	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105
Field Sample ID	L1777686-01	VH07016-001	VH28044-018	WB25040-009	WJ08015-002	XC21009-003	XF23073-003	L1533605-01	XI01059-001	L1569525-01	XL14017-001
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	9/12/2024	8/5/2020	8/27/2020	2/23/2021	10/6/2021	3/17/2022	6/22/2022	8/31/2022	8/31/2022	12/13/2022	12/13/2022
Comments											
VOC											
Acetone	U (282)	110 (4)	43 J (40)	65 J (40)	58 H (20)	6.8 J (4)	U (4)	---	77 (4)	---	8 J (4)
Benzene	**574 (2.35)**	**180 (0.4)**	**570 (4)**	**240 (4)**	**250 H (2)**	**25 (0.4)**	**110 (0.4)**	---	**85 (0.4)**	---	2.1 (0.4)
Bromoform	U (3.22)	U (0.4)	U (4)	U (4)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)
2-Butanone	U (29.8)	15 (2)	U (20)	U (20)	17 (2)	U (2)	3 J (2)	---	U (2)	---	U (2)
n-Butylbenzene	7.25 (3.93)	---	---	---	---	---	---	---	---	---	---
sec-Butylbenzene	U (3.13)	---	---	---	---	---	---	---	---	---	---
tert-Butylbenzene	7.72 (3.18)	---	---	---	---	---	---	---	---	---	---
Carbon Disulfide	U (2.41)	0.56 (0.4)	U (4)	U (4)	HU (2)	U (0.4)	1.4 (0.4)	---	0.55 (0.4)	---	5.8 (0.4)
Chloroform	U (2.78)	U (0.4)	U (4)	U (4)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)
Chloromethane	U (24)	29 (0.4)	U (4)	U (4)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)
Cumene	5.73 (2.63)	4.6 (0.4)	5.4 (4)	5.5 (4)	2.4 (0.4)	U (0.4)	2.9 (0.4)	---	0.67 (0.4)	---	U (0.4)
Cyclohexane	---	59 (0.4)	55 J (4)	70 (4)	59 (0.4)	3 (0.4)	50 (0.4)	---	26 (0.4)	---	3.4 (0.4)
p-Cymene	6.17 (3)	---	---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	U (2.5)	U (0.4)	U (4)	U (4)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)
cis-1,2-Dichloroethene	U (3.15)	U (0.4)	U (4)	U (4)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)
Ethyl Benzene	219 (3.43)	240 (2)	320 (4)	160 (4)	150 (0.4)	20 (0.4)	200 (0.4)	---	120 (0.4)	---	7.9 (0.4)
n-Hexane	U (18.7)	---	---	---	---	---	---	---	---	---	---
Iodomethane	U (13.9)	---	---	---	---	---	---	---	---	---	---
4-Methyl-2-pentanone	U (12)	U (2)	U (20)	U (20)	U (2)	U (2)	U (2)	---	U (2)	---	U (2)
Methylcyclohexane	---	26 (0.4)	17 J (4)	37 J (4)	25 (0.4)	0.85 J (0.4)	14 (0.4)	---	8.1 (0.4)	---	0.91 J (0.4)
Methylene Chloride	U (10.7)	U (0.4)	U (4)	U (4)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)
Naphthalene	45.9 (4.35)	9.4 (0.4)	9.1 (4)	12 (4)	8.5 (0.4)	0.86 (0.4)	4.9 (0.4)	---	4.9 (0.4)	---	U (0.4)
Diisopropyl ether	U (2.63)	---	---	---	---	---	---	---	---	---	---
n-Propylbenzene	16.9 (2.48)	---	---	---	---	---	---	---	---	---	---
Styrene	U (2.95)	U (0.41)	U (4.1)	U (4.1)	U (0.41)	U (0.41)	U (0.41)	---	U (0.41)	---	U (0.41)
Toluene	U (6.95)	25 (0.4)	42 (4)	15 (4)	14 (0.4)	2 (0.4)	12 (0.4)	---	9.9 (0.4)	---	U (0.4)
1,1,2-Trichloroethane	U (3.95)	U (0.4)	U (4)	U (4)	U (0.4)	U (0.4)	U (0.4)	---	0.51 (0.4)	---	U (0.4)
1,2,3-Trimethylbenzene	207 (2.6)	---	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	500 (8.05)	---	---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	26.1 (2.6)	---	---	---	---	---	---	---	---	---	---
m,p-xylene	---	250 (2)	260 (4)	55 (4)	41 (0.4)	6.7 (0.4)	28 (0.4)	---	12 (0.4)	---	0.57 (0.4)
ortho-xylene	---	16 (0.4)	20 (4)	5.7 (4)	3.8 (0.4)	2.3 (0.4)	3.9 (0.4)	---	3.9 (0.4)	---	0.44 J (0.4)
Xylenes (total)	754 (4.35)	290 (0.4)	280 (4)	61 (4)	45 (0.4)	9 (0.4)	31 (0.4)	---	16 (0.4)	---	1 (0.4)
SVOC											
Acenaphthene	0.504 (0.0886)	---	U (0.2)	0.065 J (0.04)	U (0.4)	U (0.04)	U (0.25)	---	U (0.8)	---	U (0.2)
Acenaphthylene	U (0.0921)	---	U (0.2)	U (0.04)	U (0.4)	U (0.04)	U (0.25)	---	U (0.8)	---	U (0.2)
Benzo(a)anthracene	U (0.199)	---	U (0.2)	U (0.04)	U (0.4)	U (0.04)	U (0.25)	---	U (0.8)	---	U (0.2)
Benzo(a)pyrene	U (0.0381)	---	U (0.35)	U (0.07)	U (0.7)	U (0.07)	U (0.44)	---	U (0.8)	---	U (0.2)
Benzo(b)fluoranthene	U (0.13)	---	U (0.2)	U (0.04)	U (0.4)	U (0.04)	U (0.25)	---	U (0.8)	---	U (0.2)
Benzo(g,h,i)perylene	U (0.121)	---	U (0.2)	U (0.04)	U (0.4)	U (0.04)	U (0.25)	---	U (0.8)	---	U (0.2)
1,1-Biphenyl	---	---	---	---	---	---	---	---	U (4.2)	---	U (1.1)
bis(2-Ethylhexyl)phthalate	U (0.895)	---	U (2.5)	U (0.5)	U (20)	U (2)	U (13)	---	U (30)	---	U (7.5)
Chrysene	U (0.13)	---	U (0.15)	U (0.03)	U (0.3)	U (0.03)	U (0.19)	---	U (0.8)	---	U (0.2)
Dibenzofuran	0.31 (0.097)	---	U (2.5)	U (0.5)	U (5)	U (0.5)	U (3.1)	---	U (3.2)	---	U (0.8)
Diethylphthalate	2.61 (0.287)	---	U (2.5)	U (0.5)	U (5)	U (0.5)	U (3.1)	---	U (3.8)	---	U (0.95)
2,4-Dimethylphenol	6.19 (0.0636)	---	U (2.4)	1.1 (0.48)	U (4.8)	0.63 J (0.48)	U (3)	---	37 (3)	---	U (0.75)
Di-n-butylphthalate	0.462 (0.453)	---	U (2.5)	U (0.5)	U (5)	U (0.5)	U (3.1)	---	U (8.4)	---	U (2.1)
Fluoranthene	U (0.102)	---	U (0.5)	U (0.1)	U (1)	U (0.1)	U (0.63)	---	U (0.8)	---	U (0.2)
Fluorene	0.761 (0.0844)	---	U (0.15)	0.15 J (0.03)	U (0.3)	U (0.03)	U (0.19)	---	U (0.8)	---	U (0.2)
Indeno(1,2,3-cd)pyrene	U (0.279)	---	U (0.2)	U (0.04)	U (0.4)	U (0.04)	U (0.25)	---	U (0.8)	---	U (0.2)
1-Methylnaphthalene	---	---	---	---	---	---	---	---	1.3 J (0.8)	---	U (0.2)
2-Methylnaphthalene	15.3 (0.117)	---	0.77 J (0.2)	2.4 (0.04)	U (0.4)	U (0.04)	U (0.25)	---	1.9 J (0.8)	---	U (0.2)
2-Methylphenol	U (0.0929)	---	U (1.1)	0.24 J (0.21)	U (2.1)	U (0.21)	U (1.3)	---	U (4.2)	---	U (1.1)
Naphthalene	25.3 (0.159)	---	6.6 (0.25)	6.1 (0.05)	3.1 (0.5)	0.42 (0.05)	2.1 (0.31)	---	1.5 J (0.8)	---	U (0.2)
Phenanthrene	0.527 (0.112)	---	U (0.3)	0.088 J (0.06)	U (0.6)	U (0.06)	U (0.38)	---	U (0.8)	---	U (0.2)
Phenol	5.72 (4.33)	---	U (2.5)	3.4 (0.5)	U (5)	U (0.5)	U (3.1)	---	U (3.8)	---	U (0.95)
Pyrene	U (0.107)	---	U (0.5)	U (0.1)	U (1)	U (0.1)	U (0.63)	---	U (0.8)	---	U (0.2)

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Calumet Montana Refining; Great Falls, MT

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Field Sample ID	L1777686-01	VH07016-001	VH28044-018	WB25040-009	WJ08015-002	XC21009-003	XF23073-003	L1533605-01	XI01059-001	L1569525-01	XL14017-001
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	9/12/2024	8/5/2020	8/27/2020	2/23/2021	10/6/2021	3/17/2022	6/22/2022	8/31/2022	8/31/2022	12/13/2022	12/13/2022
Comments											
MTDEQ VPH											
C5-C8 Aliphatic Hydrocarbons (Unadjusted)	1420 (33.3)	---	---	---	---	---	---	650 (33.3)	---	63.9 J (33.3)	---
C5-C8 Aliphatics	---	1600 (15)	880 (75)	1800 (75)	1200 (75)	150 (15)	830 (15)	517 (33.3)	---	63.9 J (33.3)	---
C9-C12 Aliphatics (Unadjusted)	3040 (33.3)	---	---	---	---	---	---	240 B (33.3)	---	U (33.3)	---
C9-C12 Aliphatics	---	180 (15)	200 J (75)	210 J (75)	130 (15)	21 J (15)	37 J (15)	140 B (33.3)	---	U (33.3)	---
C5-C8 Aliphatic Hydrocarbons (Adjusted)	846 (33.3)	---	---	---	---	---	---	---	---	---	---
C9-C12 Aliphatics (Adjusted)	2070 (33.3)	---	---	---	---	---	---	---	---	---	---
Aromatic (C09-C10),Unadjusted	922 (33.3)	---	---	---	---	---	---	158 (33.3)	---	51 J (33.3)	---
C9-C10 Aromatics	---	530 (5)	650 (25)	350 (25)	300 (5)	52 (5)	150 (5)	---	---	---	---
Gasoline Range Organics (C5-C12)	---	---	---	---	---	---	---	---	---	---	---
Volatile Petroleum Hydrocarbons	5380 (66.7)	---	---	---	---	---	---	---	---	---	---
Petroleum Hydrocarbons (Total)	---	2800 (35)	2700 (180)	2300 (180)	1900 (180)	240 (35)	1100 (35)	1050 (66.7)	---	146 J (66.7)	---
MTDEQ EPH											
C9-C18 Aliphatic Hydrocarbons	314 (200)	---	U (480)	---	---	---	---	---	---	---	---
C19-C36 Aliphatics (Unadjusted)	---	---	---	---	---	---	---	---	---	---	---
C19-C36 Aliphatics	---	---	740 (480)	---	---	---	---	---	---	---	---
C11 through C22 Aromatic Hydrocarbons (Unadjusted)	453 (200)	---	---	---	---	---	---	---	---	---	---
C11 through C22 Aromatic Hydrocarbons (Adjusted)	411 (200)	---	---	---	---	---	---	---	---	---	---
C11-C22 Aromatics	---	---	U (480)	---	---	---	---	---	---	---	---
Total Petroleum Hydrocarbons (Unadjusted)	767 (200)	---	---	---	---	---	---	---	---	---	---
Total Petroleum Hydrocarbons (GC/FID)	725 (200)	---	---	---	---	---	---	---	---	---	---
Petroleum Hydrocarbons (Total)	---	---	---	---	---	---	---	---	---	---	---
Petroleum Hydrocarbons (Extractable)	---	---	1900 (950)	470 (240)	---	---	---	---	---	---	---
Extractable Petroleum Hydrocarbons (Frac)	---	---	880 J (480)	---	---	---	---	---	---	---	---

Notes:

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Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105
Field Sample ID	L1597587-01	YC22023-001	L1631460-02	YF29005-003	YF29005-002	L1658629-01	YI21013-001	L1685777-01	L1710780-02	L1744765-03	L1757374-16
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	3/21/2023	3/21/2023	6/27/2023	6/27/2023	6/28/2023	9/20/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	7/16/2024
Comments											
VOC											
Acetone	---	U (4)	---	21 H (4)	---	---	U (200)	U (11.3)	UJ3 (11.3)	U (11.3)	U (11.3)
Benzene	---	**12 (0.4)**	---	**48 (0.4)**	---	---	**85 (20)**	**11.7 (0.0941)**	3.91 (0.0941)	**37.6 (0.0941)**	**8.4 (0.0941)**
Bromoform	---	U (0.4)	---	U (0.4)	---	---	U (20)	U (0.129)	U (0.129)	U (0.129)	U (0.129)
2-Butanone	---	U (2)	---	3.2 J (2)	---	---	U (100)	U (1.19)	U (1.19)	U (1.19)	U (1.19)
n-Butylbenzene	---	---	---	---	---	---	---	0.247 J (0.157)	U (0.157)	0.569 (0.157)	---
sec-Butylbenzene	---	---	---	---	---	---	---	0.191 J (0.125)	U (0.125)	0.439 J (0.125)	---
tert-Butylbenzene	---	---	---	---	---	---	---	U (0.127)	U (0.127)	U (0.127)	---
Carbon Disulfide	---	U (0.4)	---	U (0.4)	---	---	U (20)	0.197 J (0.0962)	U (0.0962)	U (0.0962)	U (0.0962)
Chloroform	---	U (0.4)	---	U (0.4)	---	---	U (20)	U (0.111)	U (0.111)	U (0.111)	U (0.111)
Chloromethane	---	U (0.4)	---	1.5 (0.4)	---	---	U (20)	U (0.96)	U (0.96)	U (0.96)	U (0.96)
Cumene	---	U (0.4)	---	0.72 (0.4)	---	---	U (20)	1.73 (0.105)	0.184 J (0.105)	2.52 (0.105)	0.518 (0.105)
Cyclohexane	---	6.6 (0.4)	---	9.4 H (0.4)	---	---	96 (20)	---	---	---	3.68 (0.188)
p-Cymene	---	---	---	---	---	---	---	0.165 J (0.12)	U (0.12)	0.366 J (0.12)	---
1,1-Dichloroethane	---	U (0.4)	---	U (0.4)	---	---	U (20)	U (0.1)	U (0.1)	U (0.1)	U (0.1)
cis-1,2-Dichloroethene	---	U (0.4)	---	U (0.4)	---	---	U (20)	U (0.126)	U (0.126)	U (0.126)	U (0.126)
Ethyl Benzene	---	21 (0.4)	---	15 (0.4)	---	---	570 (20)	75 (0.137)	2.41 (0.137)	84.8 (0.137)	8.32 (0.137)
n-Hexane	---	---	---	---	---	---	---	1.41 J (0.749)	U (0.749)	10.4 (0.749)	---
Iodomethane	---	---	---	---	---	---	---	U (0.554)	U (0.554)	U (0.554)	---
4-Methyl-2-pentanone	---	U (2)	---	U (2)	---	---	U (100)	U (0.478)	U (0.478)	U (0.478)	U (0.478)
Methylcyclohexane	---	1.7 J (0.4)	---	3.8 J (0.4)	---	---	28 J (20)	---	---	---	1.3 (0.66)
Methylene Chloride	---	U (0.4)	---	U (0.4)	---	---	U (20)	U (0.43)	U (0.43)	U (0.43)	U (0.43)
Naphthalene	---	0.57 (0.4)	---	1.5 (0.4)	---	---	U (20)	0.374 J (0.174)	U (0.174)	3.38 (0.174)	---
Diisopropyl ether	---	---	---	---	---	---	---	U (0.105)	U (0.105)	U (0.105)	---
n-Propylbenzene	---	---	---	---	---	---	---	5.33 (0.0993)	0.397 J (0.0993)	10.7 (0.0993)	---
Styrene	---	U (0.41)	---	U (0.41)	---	---	U (21)	U (0.118)	U (0.118)	U (0.118)	U (0.118)
Toluene	---	1.5 (0.4)	---	2.2 (0.4)	---	---	20 J (20)	1.78 (0.278)	0.431 J (0.278)	3.83 (0.278)	1.05 (0.278)
1,1,2-Trichloroethane	---	U (0.4)	---	U (0.4)	---	---	U (20)	U (0.158)	U (0.158)	U (0.158)	U (0.158)
1,2,3-Trimethylbenzene	---	---	---	---	---	---	---	1.1 (0.104)	0.198 J (0.104)	2.6 (0.104)	---
1,2,4-Trimethylbenzene	---	---	---	---	---	---	---	2.33 (0.322)	0.351 J (0.322)	3.22 (0.322)	---
1,3,5-Trimethylbenzene	---	---	---	---	---	---	---	U (0.104)	0.117 J (0.104)	0.332 J (0.104)	---
m,p-xylene	---	3.6 (0.4)	---	4.7 (0.4)	---	---	U (20)	---	---	---	---
ortho-xylene	---	0.57 (0.4)	---	1.2 (0.4)	---	---	U (20)	---	---	---	---
Xylenes (total)	---	4.1 (0.4)	---	5.9 (0.4)	---	---	U (20)	2.43 (0.174)	0.59 J (0.174)	5.09 (0.174)	1.16 J (0.174)
SVOC											
Acenaphthene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	0.102 J (0.0886)	U (0.0886)	U (0.0886)	U (0.0886)
Acenaphthylene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.0921)	U (0.0921)	U (0.0921)	U (0.0921)
Benzo(a)anthracene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.199)	U (0.199)	U (0.199)	U (0.199)
Benzo(a)pyrene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.0381)	U (0.0381)	U (0.0381)	U (0.0381)
Benzo(b)fluoranthene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.13)	U (0.13)	U (0.13)	U (0.13)
Benzo(g,h,i)perylene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.121)	U (0.121)	U (0.121)	U (0.121)
1,1-Biphenyl	---	U (1.1)	---	U (1.1)	---	---	U (1.1)	---	---	---	---
bis(2-Ethylhexyl)phthalate	---	U (7.5)	---	U (7.5)	---	---	U (7.5)	U (0.895)	1.87 B J (0.895)	U (0.895)	U (0.895)
Chrysene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.13)	U (0.13)	U (0.13)	U (0.13)
Dibenzofuran	---	U (0.8)	---	U (0.8)	---	---	U (0.8)	U (0.097)	U (0.097)	U (0.097)	U (0.097)
Diethylphthalate	---	U (0.95)	---	U (0.95)	---	---	U (0.95)	0.309 J (0.287)	U (0.287)	U (0.287)	U (0.287)
2,4-Dimethylphenol	---	U (0.75)	---	U (0.75)	---	---	31 (0.75)	3.08 J (0.0636)	UJ3 (0.0636)	U (0.0636)	U (0.0636)
Di-n-butylphthalate	---	U (2.1)	---	U (2.1)	---	---	U (2.1)	U (0.453)	U (0.453)	U (0.453)	U (0.453)
Fluoranthene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.102)	U (0.102)	U (0.102)	U (0.102)
Fluorene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.0844)	U (0.0844)	U (0.0844)	U (0.0844)
Indeno(1,2,3-cd)pyrene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.279)	U (0.279)	U (0.279)	U (0.279)
1-Methylnaphthalene	---	U (0.2)	---	0.73 J (0.2)	---	---	4 (0.2)	---	---	---	---
2-Methylnaphthalene	---	U (0.2)	---	0.31 J (0.2)	---	---	0.29 J (0.2)	U (0.117)	U (0.117)	0.299 J (0.117)	U (0.117)
2-Methylphenol	---	U (1.1)	---	U (1.1)	---	---	U (1.1)	U (0.0929)	UJ3 (0.0929)	U (0.0929)	U (0.0929)
Naphthalene	---	0.23 J (0.2)	---	0.91 (0.2)	---	---	4 (0.2)	0.293 J (0.159)	0.27 J (0.159)	2.15 (0.159)	U (0.159)
Phenanthrene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.112)	U (0.112)	U (0.112)	U (0.112)
Phenol	---	U (0.95)	---	1.2 J (0.95)	---	---	3.3 J (0.95)	U (4.33)	U (4.33)	U (4.33)	U (4.33)
Pyrene	---	U (0.2)	---	U (0.2)	---	---	U (0.2)	U (0.107)	U (0.107)	U (0.107)	U (0.107)

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105
Field Sample ID	L1597587-01	YC22023-001	L1631460-02	YF29005-003	YF29005-002	L1658629-01	YI21013-001	L1685777-01	L1710780-02	L1744765-03	L1757374-16
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	3/21/2023	3/21/2023	6/27/2023	6/27/2023	6/28/2023	9/20/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	7/16/2024
Comments											
MTDEQ VPH											
C5-C8 Aliphatic Hydrocarbons (Unadjusted)	178 (33.3)	---	1050 (33.3)	---	---	1580 (33.3)	---	523 (33.3)	U (33.3)	668 (33.3)	117 (33.3)
C5-C8 Aliphatics	162 (33.3)	---	969 (33.3)	---	---	1490 (33.3)	---	510 (33.3)	U (33.3)	664 (33.3)	108 (33.3)
C9-C12 Aliphatics (Unadjusted)	106 (33.3)	---	377 (33.3)	---	---	955 (33.3)	---	231 (33.3)	U (33.3)	211 (33.3)	49.7 J (33.3)
C9-C12 Aliphatics	67.5 J (33.3)	---	117 (33.3)	---	---	396 (33.3)	---	154 (33.3)	U (33.3)	205 (33.3)	40.2 J (33.3)
C5-C8 Aliphatic Hydrocarbons (Adjusted)	---	---	---	---	---	---	---	---	---	664 (33.3)	---
C9-C12 Aliphatics (Adjusted)	---	---	---	---	---	---	---	---	---	205 (33.3)	---
Aromatic (C09-C10),Unadjusted	U (33.3)	---	185 (33.3)	---	---	375 (33.3)	---	70.6 J (33.3)	U (33.3)	56.5 J (33.3)	U (33.3)
C9-C10 Aromatics	---	---	---	---	---	---	---	---	---	---	---
Gasoline Range Organics (C5-C12)	280 (66.7)	---	1520 (66.7)	---	---	2880 (66.7)	---	---	---	---	---
Volatile Petroleum Hydrocarbons	284 (66.7)	---	1610 (66.7)	---	---	2910 (66.7)	---	825 (66.7)	U (66.7)	936 (66.7)	---
Petroleum Hydrocarbons (Total)	---	---	---	---	---	---	---	---	---	---	---
MTDEQ EPH											
C9-C18 Aliphatic Hydrocarbons	---	---	---	---	---	---	---	---	U (200)	U (200)	---
C19-C36 Aliphatics (Unadjusted)	U (200)	---	U (200)	---	---	U (200)	---	---	411 J (200)	U (200)	---
C19-C36 Aliphatics	---	---	---	---	---	---	---	---	---	---	---
C11 through C22 Aromatic Hydrocarbons (Unadjusted)	U (200)	---	UJ3 (200)	---	---	U (200)	---	---	U (200)	U (200)	---
C11 through C22 Aromatic Hydrocarbons (Adjusted)	---	---	---	---	---	---	---	---	---	---	---
C11-C22 Aromatics	U (200)	---	U (200)	---	---	U (200)	---	---	U (200)	U (200)	---
Total Petroleum Hydrocarbons (Unadjusted)	U (200)	---	U (200)	---	---	U (200)	---	---	411 J (200)	U (200)	---
Total Petroleum Hydrocarbons (GC/FID)	---	---	---	---	---	---	---	---	---	U (200)	---
Petroleum Hydrocarbons (Total)	U (200)	---	U (200)	---	---	U (200)	---	---	411 J (200)	U (200)	---
Petroleum Hydrocarbons (Extractable)	374 (100)	---	638 (100)	---	---	843 (100)	---	---	---	---	332 (100)
Extractable Petroleum Hydrocarbons (Frac)	---	---	---	---	---	---	---	---	---	---	---

Notes:

1 All concentrations are presented in ug/L.

2 Only compounds with at least one detection are shown.

3 Concentrations that exceed the Montana DEQ-7 Human Health Standards - Groundwater are **boldfaced**.

4 Concentrations that exceed the Montana DEQ Tier 1 Groundwater RBSLs are underlined.

Abbreviations:

U -- Not Detected.
J -- Estimated Concentration.
B -- Blank Contamination.
H -- Compound analyzed outside holding time
Q -- Sample prepared past holding time,
( ) -- Reporting Detection Limit.
--- -- Not Analyzed.

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-105	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106
Field Sample ID	L1777686-03	WJ08009-001	XC21009-001	XF23073-002	L1533605-02	XI01059-002	L1569525-02	XL14017-002	XL14017-004	L1597587-02	YC22023-002
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	9/12/2024	10/5/2021	3/16/2022	6/22/2022	8/31/2022	8/31/2022	12/13/2022	12/13/2022	12/13/2022	3/21/2023	3/21/2023
Comments									Field Duplicate		
VOC											
Acetone	U (11.3)	6.9 J (4)	U (4)	U (4)	---	U (4)	---	14 (4)	12 (4)	---	U (4)
Benzene	**39.4 (0.0941)**	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
Bromoform	U (0.129)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	0.96 (0.4)	U (0.4)	---	U (0.4)
2-Butanone	U (1.19)	U (2)	U (2)	U (2)	---	U (2)	---	U (2)	U (2)	---	U (2)
n-Butylbenzene	U (0.157)	---	---	---	---	---	---	---	---	---	---
sec-Butylbenzene	0.733 (0.125)	---	---	---	---	---	---	---	---	---	---
tert-Butylbenzene	U (0.127)	---	---	---	---	---	---	---	---	---	---
Carbon Disulfide	U (0.0962)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	4.2 (0.4)	3.2 (0.4)	---	U (0.4)
Chloroform	U (0.111)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
Chloromethane	U (0.96)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
Cumene	7.53 (0.105)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
Cyclohexane	---	U (0.4)	U (0.4)	U (0.4)	---	7.2 (0.4)	---	2.8 (0.4)	2.6 (0.4)	---	U (0.4)
p-Cymene	1 (0.12)	---	---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	0.873 (0.1)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
cis-1,2-Dichloroethene	U (0.126)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
Ethyl Benzene	406 (1.37)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
n-Hexane	U (0.749)	---	---	---	---	---	---	---	---	---	---
Iodomethane	U (0.554)	---	---	---	---	---	---	---	---	---	---
4-Methyl-2-pentanone	0.811 (0.478)	U (2)	U (2)	U (2)	---	U (2)	---	U (2)	U (2)	---	U (2)
Methylcyclohexane	---	U (0.4)	U (0.4)	U (0.4)	---	1.7 J (0.4)	---	1 J (0.4)	1.1 J (0.4)	---	U (0.4)
Methylene Chloride	U (0.43)	0.47 J (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	0.49 J (0.4)	---	U (0.4)
Naphthalene	2.18 (0.174)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
Diisopropyl ether	U (0.105)	---	---	---	---	---	---	---	---	---	---
n-Propylbenzene	29.7 (0.0993)	---	---	---	---	---	---	---	---	---	---
Styrene	U (0.118)	U (0.41)	U (0.41)	U (0.41)	---	U (0.41)	---	U (0.41)	U (0.41)	---	U (0.41)
Toluene	8 (0.278)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
1,1,2-Trichloroethane	0.223 (0.158)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
1,2,3-Trimethylbenzene	5.19 (0.104)	---	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	4.9 (0.322)	---	---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	0.198 (0.104)	---	---	---	---	---	---	---	---	---	---
m,p-xylene	---	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
ortho-xylene	---	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
Xylenes (total)	9.85 (0.174)	U (0.4)	U (0.4)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.4)	---	U (0.4)
SVOC											
Acenaphthene	U (0.0886)	U (0.04)	U (0.04)	U (0.2)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Acenaphthylene	U (0.0921)	U (0.04)	U (0.04)	U (0.2)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Benzo(a)anthracene	U (0.199)	U (0.04)	0.084 J (0.04)	U (0.2)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Benzo(a)pyrene	U (0.0381)	U (0.07)	**0.17 J (0.07)**	U (0.35)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Benzo(b)fluoranthene	U (0.13)	U (0.04)	0.2 (0.04)	U (0.2)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Benzo(g,h,i)perylene	U (0.121)	U (0.04)	0.12 J (0.04)	U (0.2)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
1,1-Biphenyl	---	---	---	---	---	U (0.21)	---	U (1.1)	---	---	U (1.1)
bis(2-Ethylhexyl)phthalate	U (0.895)	U (1)	U (2)	U (10)	---	2 BJ (1.5)	---	U (7.5)	---	---	U (7.5)
Chrysene	U (0.13)	U (0.03)	0.042 J (0.03)	U (0.15)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Dibenzofuran	U (0.097)	U (0.5)	U (0.5)	U (2.5)	---	U (0.16)	---	U (0.8)	---	---	U (0.8)
Diethylphthalate	U (0.287)	U (0.5)	U (0.5)	U (2.5)	---	0.21 J (0.19)	---	U (0.95)	---	---	U (0.95)
2,4-Dimethylphenol	U (0.0636)	U (0.48)	U (0.48)	U (2.4)	---	U (0.15)	---	U (0.75)	---	---	U (0.75)
Di-n-butylphthalate	U (0.453)	U (0.5)	U (0.5)	U (2.5)	---	U (0.42)	---	U (2.1)	---	---	U (2.1)
Fluoranthene	U (0.102)	U (0.1)	0.16 J (0.1)	U (0.5)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Fluorene	U (0.0844)	U (0.03)	U (0.03)	U (0.15)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Indeno(1,2,3-cd)pyrene	U (0.279)	U (0.04)	0.15 J (0.04)	U (0.2)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
1-Methylnaphthalene	---	---	---	---	---	0.061 J (0.04)	---	U (0.2)	---	---	U (0.2)
2-Methylnaphthalene	0.278 (0.117)	0.044 BJ (0.04)	U (0.04)	U (0.2)	---	0.1 J (0.04)	---	U (0.2)	---	---	U (0.2)
2-Methylphenol	U (0.0929)	U (0.21)	U (0.21)	U (1.1)	---	U (0.21)	---	U (1.1)	---	---	U (1.1)
Naphthalene	1.75 (0.159)	U (0.05)	U (0.05)	U (0.25)	---	0.045 J (0.04)	---	U (0.2)	---	---	U (0.2)
Phenanthrene	U (0.112)	U (0.06)	U (0.06)	U (0.3)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)
Phenol	U (4.33)	U (0.5)	U (0.5)	U (2.5)	---	U (0.19)	---	U (0.95)	---	---	U (0.95)
Pyrene	U (0.107)	U (0.1)	U (0.1)	U (0.5)	---	U (0.04)	---	U (0.2)	---	---	U (0.2)

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-105	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106
Field Sample ID	L1777686-03	WJ08009-001	XC21009-001	XF23073-002	L1533605-02	XI01059-002	L1569525-02	XL14017-002	XL14017-004	L1597587-02	YC22023-002
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	9/12/2024	10/5/2021	3/16/2022	6/22/2022	8/31/2022	8/31/2022	12/13/2022	12/13/2022	12/13/2022	3/21/2023	3/21/2023
Comments									Field Duplicate		
MTDEQ VPH											
C5-C8 Aliphatic Hydrocarbons (Unadjusted)	986 (33.3)	---	---	---	153 (33.3)	---	80 J (33.3)	---	---	U (33.3)	---
C5-C8 Aliphatics	---	U (15)	U (15)	U (15)	153 (33.3)	---	80 J (33.3)	---	---	U (33.3)	---
C9-C12 Aliphatics (Unadjusted)	513 (33.3)	---	---	---	36 B J (33.3)	---	U (33.3)	---	---	U (33.3)	---
C9-C12 Aliphatics	---	U (15)	U (15)	U (15)	36 B J (33.3)	---	U (33.3)	---	---	U (33.3)	---
C5-C8 Aliphatic Hydrocarbons (Adjusted)	978 (33.3)	---	---	---	---	---	---	---	---	---	---
C9-C12 Aliphatics (Adjusted)	97.2 (33.3)	---	---	---	---	---	---	---	---	---	---
Aromatic (C09-C10),Unadjusted	106 (33.3)	---	---	---	U (33.3)	---	U (33.3)	---	---	U (33.3)	---
C9-C10 Aromatics	---	U (5)	U (5)	U (5)	---	---	---	---	---	---	---
Gasoline Range Organics (C5-C12)	---	---	---	---	---	---	---	---	---	U (66.7)	---
Volatile Petroleum Hydrocarbons	1610 (66.7)	---	---	---	---	---	---	---	---	U (66.7)	---
Petroleum Hydrocarbons (Total)	---	U (35)	U (35)	U (35)	189 J (66.7)	---	108 J (66.7)	---	---	---	---
MTDEQ EPH											
C9-C18 Aliphatic Hydrocarbons	U (200)	---	---	U (100)	---	---	---	---	---	---	---
C19-C36 Aliphatics (Unadjusted)	---	---	---	---	---	---	UQ (200)	---	---	U (222)	---
C19-C36 Aliphatics	---	---	---	U (100)	---	---	---	---	---	---	---
C11 through C22 Aromatic Hydrocarbons (Unadjusted)	U (200)	---	---	---	---	---	UQ (200)	---	---	U (222)	---
C11 through C22 Aromatic Hydrocarbons (Adjusted)	U (200)	---	---	---	---	---	---	---	---	---	---
C11-C22 Aromatics	---	---	---	U (100)	---	---	UQ (200)	---	---	U (222)	---
Total Petroleum Hydrocarbons (Unadjusted)	U (200)	---	---	---	---	---	UQ (200)	---	---	U (222)	---
Total Petroleum Hydrocarbons (GC/FID)	U (200)	---	---	---	---	---	---	---	---	---	---
Petroleum Hydrocarbons (Total)	---	---	---	---	---	---	UQ (200)	---	---	U (222)	---
Petroleum Hydrocarbons (Extractable)	---	U (200)	U (200)	U (200)	U (100)	---	---	---	---	U (111)	---
Extractable Petroleum Hydrocarbons (Frac)	---	---	---	U (100)	---	---	UQ (100)	---	---	---	---

Notes:

1 All concentrations are presented in ug/L.

2 Only compounds with at least one detection are shown.

3 Concentrations that exceed the Montana DEQ-7 Human Health Standards - Groundwater are **boldfaced**.

4 Concentrations that exceed the Montana DEQ Tier 1 Groundwater RBSLs are underlined.

Abbreviations:

U -- Not Detected.
J -- Estimated Concentration.
B -- Blank Contamination.
H -- Compound analyzed outside holding time
Q -- Sample prepared past holding time,
( ) -- Reporting Detection Limit.
--- -- Not Analyzed.

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106
Field Sample ID	YC22023-004	L1631460-01	YF29005-001	L1658629-02	YI21013-002	L1685777-02	L1710780-03	L1744765-04	L1777686-02
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	3/21/2023	6/28/2023	6/28/2023	9/20/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	9/12/2024
Comments	Field Duplicate								
VOC									
Acetone	U (4)	---	U (4)	---	13 (4)	U (11.3)	UJ3 (11.3)	U (11.3)	U (11.3)
Benzene	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.0941)	U (0.0941)	1.4 (0.0941)	**22.1 (0.0941)**
Bromoform	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.129)	U (0.129)	U (0.129)	U (0.129)
2-Butanone	U (2)	---	U (2)	---	U (2)	U (1.19)	U (1.19)	U (1.19)	U (1.19)
n-Butylbenzene	---	---	---	---	---	U (0.157)	U (0.157)	U (0.157)	U (0.157)
sec-Butylbenzene	---	---	---	---	---	U (0.125)	U (0.125)	U (0.125)	U (0.125)
tert-Butylbenzene	---	---	---	---	---	U (0.127)	U (0.127)	U (0.127)	U (0.127)
Carbon Disulfide	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.0962)	U (0.0962)	U (0.0962)	U (0.0962)
Chloroform	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.111)	U (0.111)	U (0.111)	U (0.111)
Chloromethane	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.96)	U (0.96)	U (0.96)	U (0.96)
Cumene	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.105)	U (0.105)	U (0.105)	U (0.105)
Cyclohexane	U (0.4)	---	U (0.4)	---	1.7 (0.4)	---	---	---	---
p-Cymene	---	---	---	---	---	U (0.12)	U (0.12)	U (0.12)	U (0.12)
1,1-Dichloroethane	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.1)	U (0.1)	U (0.1)	U (0.1)
cis-1,2-Dichloroethene	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.126)	U (0.126)	U (0.126)	U (0.126)
Ethyl Benzene	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.137)	U (0.137)	U (0.137)	U (0.137)
n-Hexane	---	---	---	---	---	U (0.749)	U (0.749)	U (0.749)	U (0.749)
Iodomethane	---	---	---	---	---	2.23 B J (0.554)	U (0.554)	U (0.554)	U (0.554)
4-Methyl-2-pentanone	U (2)	---	U (2)	---	3.8 J (2)	3.21 J (0.478)	3.27 J (0.478)	1.79 J (0.478)	0.509 (0.478)
Methylcyclohexane	U (0.4)	---	U (0.4)	---	0.5 J (0.4)	---	---	---	---
Methylene Chloride	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.43)	U (0.43)	U (0.43)	U (0.43)
Naphthalene	U (0.4)	---	U (0.4)	---	U (0.4)	---	U (0.174)	0.354 J (0.174)	U (0.174)
Diisopropyl ether	---	---	---	---	---	U (0.105)	U (0.105)	U (0.105)	0.205 (0.105)
n-Propylbenzene	---	---	---	---	---	U (0.0993)	U (0.0993)	U (0.0993)	U (0.0993)
Styrene	U (0.41)	---	U (0.41)	---	U (0.41)	U (0.118)	U (0.118)	U (0.118)	U (0.118)
Toluene	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.278)	U (0.278)	U (0.278)	U (0.278)
1,1,2-Trichloroethane	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.158)	U (0.158)	U (0.158)	U (0.158)
1,2,3-Trimethylbenzene	---	---	---	---	---	U (0.104)	U (0.104)	U (0.104)	U (0.104)
1,2,4-Trimethylbenzene	---	---	---	---	---	U (0.322)	U (0.322)	U (0.322)	U (0.322)
1,3,5-Trimethylbenzene	---	---	---	---	---	U (0.104)	U (0.104)	U (0.104)	U (0.104)
m,p-xylene	U (0.4)	---	U (0.4)	---	U (0.4)	---	---	---	---
ortho-xylene	U (0.4)	---	U (0.4)	---	U (0.4)	---	---	---	---
Xylenes (total)	U (0.4)	---	U (0.4)	---	U (0.4)	U (0.174)	U (0.174)	U (0.174)	U (0.174)
SVOC									
Acenaphthene	---	---	U (0.2)	---	U (0.2)	U (0.019)	U (0.0886)	U (0.0886)	U (0.0886)
Acenaphthylene	---	---	U (0.2)	---	U (0.2)	0.133 (0.0171)	U (0.0921)	U (0.0921)	U (0.0921)
Benzo(a)anthracene	---	---	U (0.2)	---	U (0.2)	U (0.0203)	U (0.199)	U (0.199)	U (0.199)
Benzo(a)pyrene	---	---	U (0.2)	---	U (0.2)	U (0.0184)	U (0.0381)	U (0.0381)	U (0.0381)
Benzo(b)fluoranthene	---	---	U (0.2)	---	U (0.2)	U (0.0168)	U (0.13)	U (0.13)	U (0.13)
Benzo(g,h,i)perylene	---	---	U (0.2)	---	U (0.2)	U (0.0184)	U (0.121)	U (0.121)	U (0.121)
1,1-Biphenyl	---	---	U (1.1)	---	U (1.1)	---	---	---	---
bis(2-Ethylhexyl)phthalate	---	---	U (7.5)	---	U (7.5)	U (0.895)	1.87 B J (0.895)	U (0.895)	U (0.895)
Chrysene	---	---	U (0.2)	---	U (0.2)	U (0.0179)	U (0.13)	U (0.13)	U (0.13)
Dibenzofuran	---	---	U (0.8)	---	U (0.8)	U (0.097)	U (0.097)	U (0.097)	U (0.097)
Diethylphthalate	---	---	U (0.95)	---	U (0.95)	U (0.287)	U (0.287)	U (0.287)	U (0.287)
2,4-Dimethylphenol	---	---	U (0.75)	---	U (0.75)	U (0.0636)	UJ3 (0.0636)	U (0.0636)	U (0.0636)
Di-n-butylphthalate	---	---	U (2.1)	---	U (2.1)	U (0.453)	U (0.453)	U (0.453)	U (0.453)
Fluoranthene	---	---	U (0.2)	---	U (0.2)	U (0.027)	U (0.102)	U (0.102)	U (0.102)
Fluorene	---	---	U (0.2)	---	U (0.2)	U (0.0169)	U (0.0844)	U (0.0844)	U (0.0844)
Indeno(1,2,3-cd)pyrene	---	---	U (0.2)	---	U (0.2)	U (0.0158)	U (0.279)	U (0.279)	U (0.279)
1-Methylnaphthalene	---	---	U (0.2)	---	U (0.2)	U (0.0687)	---	---	---
2-Methylnaphthalene	---	---	U (0.2)	---	U (0.2)	0.0866 J (0.0674)	U (0.117)	U (0.117)	U (0.117)
2-Methylphenol	---	---	U (1.1)	---	U (1.1)	U (0.0929)	UJ3 (0.0929)	U (0.0929)	U (0.0929)
Naphthalene	---	---	U (0.2)	---	U (0.2)	0.129 J (0.0917)	U (0.159)	U (0.159)	0.177 (0.159)
Phenanthrene	---	---	U (0.2)	---	U (0.2)	U (0.018)	U (0.112)	U (0.112)	U (0.112)
Phenol	---	---	U (0.95)	---	U (0.95)	U (4.33)	U (4.33)	7.72 J (4.33)	U (4.33)
Pyrene	---	---	U (0.2)	---	U (0.2)	U (0.0169)	U (0.107)	U (0.107)	U (0.107)

TABLE 7
Summary of Groundwater Analytical Results - Petroleum COCs
Calumet Montana Refining; Great Falls, MT

Location	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106
Field Sample ID	YC22023-004	L1631460-01	YF29005-001	L1658629-02	YI21013-002	L1685777-02	L1710780-03	L1744765-04	L1777686-02
Lab Sample ID	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	3/21/2023	6/28/2023	6/28/2023	9/20/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	9/12/2024
Comments	Field Duplicate								
MTDEQ VPH									
C5-C8 Aliphatic Hydrocarbons (Unadjusted)	---	85.9 J (33.3)	---	495 (33.3)	---	67.1 J (33.3)	U (333)	59.3 J (33.3)	102 (33.3)
C5-C8 Aliphatics	---	85.9 J (33.3)	---	495 (33.3)	---	67.1 J (33.3)	U (333)	59.3 J (33.3)	---
C9-C12 Aliphatics (Unadjusted)	---	U (33.3)	---	U (33.3)	---	U (33.3)	U (333)	U (33.3)	47 (33.3)
C9-C12 Aliphatics	---	U (33.3)	---	U (33.3)	---	U (33.3)	U (333)	U (33.3)	---
C5-C8 Aliphatic Hydrocarbons (Adjusted)	---	---	---	---	---	---	---	59.3 J (33.3)	79.9 (33.3)
C9-C12 Aliphatics (Adjusted)	---	---	---	---	---	---	---	U (33.3)	47 (33.3)
Aromatic (C09-C10),Unadjusted	---	U (33.3)	---	38.4 J (33.3)	---	U (33.3)	U (333)	U (33.3)	U (33.3)
C9-C10 Aromatics	---	---	---	---	---	---	---	---	---
Gasoline Range Organics (C5-C12)	---	108 J (66.7)	---	533 (66.7)	---	---	---	---	---
Volatile Petroleum Hydrocarbons	---	85.9 J (66.7)	---	533 (66.7)	---	67.1 J (66.7)	U (667)	U (66.7)	149 (66.7)
Petroleum Hydrocarbons (Total)	---	---	---	---	---	---	---	---	---
MTDEQ EPH									
C9-C18 Aliphatic Hydrocarbons	---	---	---	---	---	U (200)	U (200)	U (200)	U (200)
C19-C36 Aliphatics (Unadjusted)	---	U (200)	---	U (200)	---	U (200)	U (200)	U (200)	---
C19-C36 Aliphatics	---	---	---	---	---	---	---	---	---
C11 through C22 Aromatic Hydrocarbons (Unadjusted)	---	UJ3 (200)	---	U (200)	---	U (200)	U (200)	U (200)	U (200)
C11 through C22 Aromatic Hydrocarbons (Adjusted)	---	---	---	---	---	---	---	---	U (200)
C11-C22 Aromatics	---	U (200)	---	U (200)	---	U (200)	U (200)	U (200)	---
Total Petroleum Hydrocarbons (Unadjusted)	---	U (200)	---	U (200)	---	U (200)	U (200)	U (200)	U (200)
Total Petroleum Hydrocarbons (GC/FID)	---	---	---	---	---	---	---	U (200)	U (200)
Petroleum Hydrocarbons (Total)	---	U (200)	---	U (200)	---	U (200)	U (200)	U (200)	---
Petroleum Hydrocarbons (Extractable)	---	1650 (100)	---	17000 (100)	---	5630 (100)	---	---	---
Extractable Petroleum Hydrocarbons (Frac)	---	---	---	---	---	---	---	---	---

Notes:

1 All concentrations are presented in ug/L.

2 Only compounds with at least one detection are shown.

3 Concentrations that exceed the Montana DEQ-7 Human Health Standards - Groundwater are **boldfaced**.

4 Concentrations that exceed the Montana DEQ Tier 1 Groundwater RBSLs are <u>underlined</u>.

Abbreviations:

U -- Not Detected.
J -- Estimated Concentration.
B -- Blank Contamination.
H -- Compound analyzed outside holding time
Q -- Sample prepared past holding time,
( ) -- Reporting Detection Limit.
--- -- Not Analyzed.

Table 5
Summary of Groundwater Analytical Results - Field Parameters
Calumet Montana Refining, LLC - Great Falls, Montana

Location	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S	MW-041S
Field Sample ID	CMR-MW41S-211005	CMR-MW141S-220317	MW41S-GW-220622	CMR-MW41S-220831	CMR-MW-41S-221213	CMR-MW-41S-230321	CMR-MW-41S-230627	CMR-MW-41S-092023	CMR-MW-41S-231207	CMR-MW-41S-240228	CMR-MW-41S-240606	CMR-MW-41S-240912
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	10/5/2021	3/17/2022	6/22/2022	8/31/2022	12/13/2022	3/21/2023	6/27/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	9/12/2024
FIELD PARAMETERS												
Specific Conductivity (Field Analysis)	1.26	0.00	1.40	1.40	1.76	1.22	0.00	1.38	1.33	0.92	1.18	1.37
Dissolved Oxygen	0.00	5.65	2.99	0.00	8.56	0.76	8.16	0.00	0.00	0.13	1.55	0.46
Oxidation Reduction Potential	-93	-40	-123	-127	-139	-149	-26	-147	-78	-93.2	152.2	-110.7
pH (Field Analysis)	7.22	5.32	7	6.34	7.17	7.24	6.22	7.18	7.99	6.97	7.1	6.85
Turbidity (Field Parameters)	0.8	221.0	55	1.7	78.0	19.0	664.0	26	0	---	---	---

Location	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105
Field Sample ID	CMR-MW105S-211006	CMR-MW105-220317	MW105-GW-220622	CMR-MW105-220831	CMR-MW-105-221213	CMR-MW-105-230321	CMR-MW-105-230627	CMR-MW-105-092023	CMR-MW-105-231207	CMR-MW-105-240228	CMR-MW-105-240606	CMR-MW-105-240912
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	10/6/2021	3/17/2022	6/22/2022	8/31/2022	12/13/2022	3/21/2023	6/27/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	9/12/2024
FIELD PARAMETERS												
Specific Conductivity (Field Analysis)	1.99	1.98	2.16	2.19	2.25	2.16	0.00	---	2.06	1.58	1.96	1.57
Dissolved Oxygen	0.00	0.00	1.81	0.00	0.00	4.20	8.25	6.31	0.00	2.84	0.6	0.69
Oxidation Reduction Potential	-107	-81	-113	-53	49	121	144	98	-44	96.7	-78.3	-27.5
pH (Field Analysis)	7.57	7.36	7.31	6.10	7.14	7.32	6.30	7.12	7.91	6.93	7.19	7.18
Turbidity (Field Parameters)	2.7	0	12.9	0	139	0	369	---	0	---	---	---

Location	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106
Field Sample ID	CMR-MW106-	CMR-MW106-	MW106-GW-220622	CMR-MW106-	CMR-MW-106-221213	CMR-MW-106-230321	CMR-MW-106-230628	CMR-MW-106-092023	CMR-MW-106-231207	CMR-MW-106-240228	CMR-MW-106-240606	CMR-MW-106-240912
Sample Method	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
Sample Date	10/5/2021	3/16/2022	6/22/2022	8/31/2022	12/13/2022	3/21/2023	6/28/2023	9/20/2023	12/7/2023	2/28/2024	6/6/2024	9/12/2024
FIELD PARAMETERS												
Specific Conductivity (Field Analysis)	6.91	2.01	2.35	2.28	2.29	2.09	0.00	2.18	2.23	1.37	1.64	1.7
Dissolved Oxygen	0.00	0.02	0.85	0.00	8.16	2.90	9.03	0.00	0.00	0.41	1.00	0.1
Oxidation Reduction Potential	13	14	17	34	31	39	47	-127	-79	-96.2	-117.6	-118.5
pH (Field Analysis)	8.07	7.50	7.27	6.57	7.54	7.23	6.74	7.35	7.82	6.92	7.2	7.07
Turbidity (Field Parameters)	3.1	0	101	423	90	0	519	159	0	---	---	---

Abbreviations:
NTU -- Nephelometric Turbidity unit,
mg/L -- milligram per liter
mS/cm -- millisiemens per centimeter
mV -- millivolt

APPENDIX A

SRCO ANNUAL INSPECTION REPORT

Air Corrections Service Report Form

CATALYTIC COMBUSTION
EMISSION TECHNOLOGIES

CUSTOMER INFORMATION		*END USER INFORMATION*	
CUSTOMER:	Calumet Refinery	END USER:	
ADDRESS:	600 Smelter Ave. Great Falls, MT	ADDRESS:	
PHONE:	425-419-8736	PHONE:	
CONTACT:	Mike Gipson	CONTACT:	
SERVICE DATE:	8/13/2024		

CUSTOMERS SERVICE REQUEST:	Annual Inspection					
Service Trip WO #:	WO216355					
SERVICE TYPE:	COMMISSIONING	☐	INSPECTION	☒	REPAIR	☐
SYSTEM TYPE:	RTO/THERM OX	☐	CAT OX	☒	FLARE/COMBUSTOR	☐
BILLING:	PAID	☒	WARRANTY	☐	OTHER*	☐
IF OTHER, EXPLAIN:						

Completed annual inspection checklist. See attached

The system is in good condition. PI0406 is not reading correctly and should be replaced. (attached below)

This is the first inspection after the catalyst was replaced. Extra attention was made when inspecting the catalyst and reactor. The catalyst appears to be in good condition, no plugging, and packing is all in very good condition.

There appears to be no or non-detectable liquid carryover from the SVE system. The flame arrestor was clean and dry. The heat exchange was clean and dry. These would be the first areas to come incontact if liquid carryover was present.

Mike stated he would like the checklist to be updated to show Calument's P&ID tags. A General Arrangement drawing was created to show maintenance personnel the locations for each item.

IS SERVICE COMPLETED?	YES	☒	NO	☐

IF NO, WHAT ADDITIONAL SERVICE AND/OR PARTS ARE REQUIRED:
RECOMMENDATIONS:

Will VandeBerg/ Cory Buss	08/13/2024
SERVICE TECHNICIAN	REPORT SUBMISSION DATE

Appendix A: Serial Numbers

SERIAL NUMBERS		
MASTER SYSTEM S/N	WO158688	
COMPONENT DESCRIPTION	**CURRENT COMPONENT S/N**	**REPLACEMENT COMPONENT S/N**
PROGRAMMING		
Controls Program and Revision	WO158688 PLC R00	
HMI Program and Revision	WO158688 HMI R00	
Electrical Schematic and Revision	WO158688 Electrical Schematics RevA ASBUILT	

PI0406 – Malfunctioned Gauge

Electric SRCO PM Checklist

CATALYTIC COMBUSTION
EMISSION TECHNOLOGIES

System	SRCO 500E	Serial Number	WO158688

E=Electrical S=Safety G=General I=Instrumentation X=OK NA= Not Applicable

	Item Checked	OK	Overall Condition				New / Repaired	Needs Repair
	PERFORM LOCK OUT TAG OUT ON ALL ENERGY SOURCES							
G	**Pictures taken Internal/ External (if Allowed)**	X						
G	**Visual Inspection of Oxidizer** ✓ Hot Spots ✓ Wear ✓ Damage ✓ Stack Supports	X						
I	**Verify Zero'd**							
	✓ FI0406 – FI23416	X						
	✓ PI0406 – PI23216		Broken					X
I	**Verify Setpoint**							
	✓ DPS0406 – DPS23616 - 0.12" w.c.	X						
	✓ DPS0600 – DPS23600 - 12" w.c.	X						
I	**Verify Zero and Span on Dilution actuator M0402 – MV23702**	X						
I	**Verify Thermocouple Calibration**		**Tested**		**Reading**			
	✓ TE0601 – TE23701	X	222	**°F**	223	**°F**		
	✓ TE0602 – TE23702	X	206	**°F**	206	**°F**		
I	**Verify High Inlet Temp Controller TAH0601 – TAH23701 – 950F**	X						
I	**Verify High Exit Temp Controller TAH0602 – TSH23702 – 1150F**	X						
I	**Document Catalyst dP**							
	✓ Differential Pressure	X	1.7		**Inches W.C.**			
	✓ Fan Speed	X	50		**%**			
I	**Inspect Flow Element FE0406 – FE23416**	X						
I	**Calibrate Pressure Transmitter PIT0404**	X						
G	**Inspect Isolation Actuator M0401**	X						
G	**Inspect Process Motor and Fan**							
	✓ M0404 – BL2340	X						
	✓ F0404 – BL2340	X						
	✓ Check for unusual noises and vibrations	X						
	✓ Grease Motor if applicable	X						
G	**Inspect Flex Joint XJ0406**	X						
G	**Remove and Clean Flame Arrestor XFA0406**	X						
G	**Inspect Heat Exchanger HE0405 – E2305**	X						
G	**Inspect Reactor Chamber**							
	✓ Catalyst Condition	X						
	✓ Reactor Structure	X						
G	**Drain Instrument Tubing Drip Legs**	X						
G	**Clean any debris from dilution air intake XIF0401 – FL2301**	X						

Electric SRCO PM Checklist

CATALYTIC COMBUSTION
EMISSION TECHNOLOGIES

System	SRCO 500E	Serial Number	WO158688

E=Electrical S=Safety G=General I=Instrumentation X=OK NA= Not Applicable

	Item Checked	OK	Overall Condition			New / Repaired	Needs Repair
G	**Verify Integrity of Electrical Panel Door Seals**	X					
G	**Inspect all conduit and fasteners for tightness**	X					
S	**Test E-Stop**	X					
E	**Inspect Heater Connection EH0501/2 – EH2303/4**	X					
E	**Test Control Panel Disconnect and Handle Mechanism for Proper Operation**	X					
E	**Clean Control Panel Fan and Filter, verify operation of fan**	X					
E	**Exercise All Control Panel Circuit Breakers**	X					
E	**Inspect All Electrical Components, Wiring, and Connections**	X					
E	**Verify Process Motor Voltages and Current Draws**						
			Speed %	**Volts V**	**Amps A**		
	✓ Process Blower M0404/BL2340	X	100	488	7.2		
E	**Verify Heater Voltage and Current Draws**		**Output%**	**Volts V**	**Amps A**		
	✓ Heater EH0501/EH2303	X	99	480	29.2		
	✓ Heater EH0502/EH2304	X	99	480	29.0		
E	**Verify Heater Resistance**		**L1-L2 Ω**	**L2-L3Ω**	**L1-L3 Ω**		
	✓ Heater EH501/EH2303	X	~20	~20	~20		
	✓ Heater EH502/EH2303	X	~20	~20	~20		
E	**Verify 120VAC Control Power**		**1 – 2 Volts V**				
	✓ AC Control Power	X	128				
E	**Verify 24VDC Control Power**		**24V – 0V V**				
	✓ DC Control Power	X	24				
S	**Test Customers Interlocks for Safety Shutdown**	X					
S	**Test Air Flow Switch for Safety Shutdown**	X					
E	**Verify VFD Parameters**						
	✓ VFD0404	X					
S	**Verify Logic Sequence**	X					
S	**Test High Exit Temp Shutdown Alarm**	X					
S	**Test High Inlet Temp Shutdown Alarm**	X					
E	**Verify Heater PID Setpoints and Document**		**SP °F**	**P**	**I**	**D**	
		X	650	35	22	0.01	
E	**Test Dilution Air PID Setpoints and Document**		**SP °F**	**P**	**I**	**D**	
		X	950	5.0	2.0	0.20	
E	**Test Pressure PID Setpoints and Document**		**SP "wc**	**P**	**I**	**D**	
		X	4.0	2.0	0.5	0.02	
S	**Test Process Valve Proof of Closer Switch**	X					
S	**Test Dilution Valve Proof of Open Switch**	X					

Completed By:	Date:
Will VandeBerg	8/13/2024

APPENDIX B
LABORATORY ANALYTICAL REPORTS

B1: Dual-Phase Extraction Vapor Analytical Results

B2: Dual-Phase Extraction Effluent Liquid Analytical Results

B3: Passive Treatment Trench Groundwater Analytical Results

APPENDIX B
LABORATORY ANALYTICAL REPORTS

B1: Dual-Phase Extraction Vapor Analytical Results

B2: Dual-Phase Extraction Effluent Liquid Analytical Results

B3: Passive Treatment Trench Groundwater Analytical Results

APPENDIX B1

DUAL-PHASE EXTRACTION VAPOR ANALYTICAL RESULTS

Pace Project Numbers:

L1755866, L1769204, L1781508

ANALYTICAL REPORT

July 22, 2024

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

Ramboll US Consulting, Inc. - Denver

Sample Delivery Group:	L1755866
Samples Received:	07/12/2024
Project Number:	
Description:	Monthyl GW Calumet - Great Falls, MT
Report To:	Abby Small 1999 Broadway Suite 2225 Denver, CO 80202

Entire Report Reviewed By:

Kelly Mercer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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CMR-SP301-240711 L1755866-01 Air

Collected by	Collected date/time	Received date/time
	07/11/24 10:05	07/12/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG2321901	1	07/12/24 22:07	07/12/24 22:07	GH	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG2323800	20	07/17/24 03:05	07/17/24 03:05	MNP	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG2325513	100	07/18/24 14:54	07/18/24 14:54	GH	Mt. Juliet, TN

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

Kelly Mercer
Project Manager

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	1.25	2.97	32.2	76.5		1	WG2321901
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND	J4	1	WG2321901
Benzene	71-43-2	78.10	4.00	12.8	372	1190		20	WG2323800
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG2321901
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG2321901
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG2321901
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG2321901
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG2321901
Carbon disulfide	75-15-0	76.10	0.400	1.24	1.25	3.89		1	WG2321901
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG2321901
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG2321901
Chloroethane	75-00-3	64.50	0.200	0.528	ND	ND		1	WG2321901
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG2321901
Chloromethane	74-87-3	50.50	0.200	0.413	ND	ND		1	WG2321901
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG2321901
Cyclohexane	110-82-7	84.20	4.00	13.8	387	1330		20	WG2323800
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG2321901
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG2321901
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG2321901
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG2321901
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND		1	WG2321901
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG2321901
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG2321901
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG2321901
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG2321901
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	ND	ND		1	WG2321901
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG2321901
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG2321901
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG2321901
1,4-Dioxane	123-91-1	88.10	0.630	2.27	ND	ND		1	WG2321901
Ethanol	64-17-5	46.10	2.50	4.71	7.12	13.4		1	WG2321901
Ethylbenzene	100-41-4	106	0.200	0.867	87.7	380		1	WG2321901
4-Ethyltoluene	622-96-8	120	0.200	0.982	86.2	423		1	WG2321901
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	0.323	1.82		1	WG2321901
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.628	3.11		1	WG2321901
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG2321901
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG2321901
Heptane	142-82-5	100	4.00	16.4	318	1300		20	WG2323800
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG2321901
n-Hexane	110-54-3	86.20	12.6	44.4	896	3160		20	WG2323800
Isopropylbenzene	98-82-8	120.20	0.200	0.983	4.84	23.8		1	WG2321901
Methylene Chloride	75-09-2	84.90	0.200	0.694	ND	ND		1	WG2321901
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG2321901
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	ND	ND		1	WG2321901
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG2321901
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG2321901
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG2321901
Naphthalene	91-20-3	128	0.630	3.30	0.838	4.39		1	WG2321901
2-Propanol	67-63-0	60.10	1.25	3.07	ND	ND		1	WG2321901
Propene	115-07-1	42.10	1.25	2.15	6.96	12.0		1	WG2321901
Styrene	100-42-5	104	0.400	1.70	ND	ND		1	WG2321901
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG2321901
Tetrachloroethylene	127-18-4	166	0.200	1.36	2.40	16.3		1	WG2321901
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	ND	ND		1	WG2321901
Toluene	108-88-3	92.10	0.500	1.88	21.4	80.6		1	WG2321901
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG2321901

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG2321901
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG2321901
Trichloroethylene	79-01-6	131	0.200	1.07	ND	ND		1	WG2321901
1,2,4-Trimethylbenzene	95-63-6	120	4.00	19.6	55.8	274		20	WG2323800
1,3,5-Trimethylbenzene	108-67-8	120	4.00	19.6	59.1	290		20	WG2323800
2,2,4-Trimethylpentane	540-84-1	114.22	20.0	93.4	3040	14200		100	WG2325513
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG2321901
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG2321901
Vinyl acetate	108-05-4	86.10	0.630	2.22	ND	ND		1	WG2321901
Xylenes, Total	1330-20-7	106.16	12.0	52.1	338	1470		20	WG2323800
m&p-Xylene	179601-23-1	106	8.00	34.7	276	1200		20	WG2323800
o-Xylene	95-47-6	106	4.00	17.3	61.6	267		20	WG2323800
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*181*		J1		WG2321901
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*101*				WG2323800
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*93.6*				WG2325513

Sample Narrative:

L1755866-01 WG2321901: Surrogate failure due to matrix interference

Method Blank (MB)

(MB) R4093092-3 07/12/24 10:23

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Acetone	U		0.584	1.25
Allyl chloride	U		0.114	0.200
Benzyl Chloride	U		0.0598	0.200
Bromodichloromethane	U		0.0702	0.200
Bromoform	U		0.0732	0.600
Bromomethane	U		0.0982	0.200
1,3-Butadiene	U		0.104	2.00
Carbon disulfide	U		0.102	0.400
Carbon tetrachloride	U		0.0732	0.200
Chlorobenzene	U		0.0832	0.200
Chloroethane	U		0.0996	0.200
Chloroform	U		0.0717	0.200
Chloromethane	U		0.103	0.200
2-Chlorotoluene	U		0.0828	0.200
Dibromochloromethane	U		0.0727	0.200
1,2-Dibromoethane	U		0.0721	0.200
1,2-Dichlorobenzene	U		0.128	0.200
1,3-Dichlorobenzene	U		0.182	0.200
1,4-Dichlorobenzene	U		0.0557	0.200
1,2-Dichloroethane	U		0.0700	0.200
1,1-Dichloroethane	U		0.0723	0.200
1,1-Dichloroethene	U		0.0762	0.200
cis-1,2-Dichloroethene	U		0.0784	0.200
trans-1,2-Dichloroethene	U		0.0673	0.200
1,2-Dichloropropane	U		0.0760	0.200
cis-1,3-Dichloropropene	U		0.0689	0.200
trans-1,3-Dichloropropene	U		0.0728	0.200
1,4-Dioxane	0.0859	J	0.0833	0.630
Ethanol	U		0.265	2.50
Ethylbenzene	U		0.0835	0.200
4-Ethyltoluene	U		0.0783	0.200
Trichlorofluoromethane	U		0.0819	0.200
Dichlorodifluoromethane	U		0.137	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0793	0.200
1,2-Dichlorotetrafluoroethane	U		0.0890	0.200
Hexachloro-1,3-butadiene	U		0.105	0.630
Isopropylbenzene	U		0.0777	0.200
Methylene Chloride	U		0.0979	0.200
Methyl Butyl Ketone	U		0.133	1.25
2-Butanone (MEK)	U		0.0814	1.25

Method Blank (MB)

(MB) R4093092-3 07/12/24 10:23

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
4-Methyl-2-pentanone (MIBK)	U		0.0765	1.25
Methyl methacrylate	U		0.0876	0.200
MTBE	U		0.0647	0.200
Naphthalene	U		0.350	0.630
2-Propanol	U		0.264	1.25
Propene	0.108	J	0.0932	1.25
Styrene	U		0.0788	0.400
1,1,2,2-Tetrachloroethane	U		0.0743	0.200
Tetrachloroethylene	U		0.0814	0.200
Tetrahydrofuran	U		0.0734	0.200
Toluene	U		0.0870	0.500
1,2,4-Trichlorobenzene	U		0.148	0.630
1,1,1-Trichloroethane	U		0.0736	0.200
1,1,2-Trichloroethane	U		0.0775	0.200
Trichloroethylene	U		0.0680	0.200
Vinyl chloride	U		0.0949	0.200
Vinyl Bromide	U		0.0852	0.200
Vinyl acetate	U		0.116	0.630
(S) 1,4-Bromofluorobenzene	*89.8*			*60.0-140*

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

(LCS) R4093092-1 07/12/24 09:05 • (LCSD) R4093092-2 07/12/24 09:45

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	3.75	4.25	4.33	113	115	70.0-130			1.86	25
Allyl chloride	3.75	5.54	5.32	148	142	70.0-130	J4	J4	4.05	25
Benzyl Chloride	3.75	4.54	4.48	121	119	70.0-152			1.33	25
Bromodichloromethane	3.75	4.67	4.62	125	123	70.0-130			1.08	25
Bromoform	3.75	4.31	4.24	115	113	70.0-130			1.64	25
Bromomethane	3.75	4.66	4.63	124	123	70.0-130			0.646	25
1,3-Butadiene	3.75	4.31	4.43	115	118	70.0-130			2.75	25
Carbon disulfide	7.50	9.07	8.97	121	120	70.0-130			1.11	25
Carbon tetrachloride	3.75	4.68	4.63	125	123	70.0-130			1.07	25
Chlorobenzene	3.75	4.47	4.41	119	118	70.0-130			1.35	25
Chloroethane	3.75	4.72	4.59	126	122	70.0-130			2.79	25
Chloroform	3.75	4.72	4.69	126	125	70.0-130			0.638	25
Chloromethane	3.75	4.45	4.61	119	123	70.0-130			3.53	25
2-Chlorotoluene	3.75	4.38	4.31	117	115	70.0-130			1.61	25

QUALITY CONTROL SUMMARY

L1755866-01

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

(LCS) R4093092-1 07/12/24 09:05 • (LCSD) R4093092-2 07/12/24 09:45

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Dibromochloromethane	3.75	4.56	4.44	122	118	70.0-130			2.67	25
1,2-Dibromoethane	3.75	4.38	4.24	117	113	70.0-130			3.25	25
1,2-Dichlorobenzene	3.75	4.46	4.31	119	115	70.0-130			3.42	25
1,3-Dichlorobenzene	3.75	4.39	4.31	117	115	70.0-130			1.84	25
1,4-Dichlorobenzene	3.75	4.42	4.36	118	116	70.0-130			1.37	25
1,2-Dichloroethane	3.75	4.63	4.53	123	121	70.0-130			2.18	25
1,1-Dichloroethane	3.75	4.79	4.77	128	127	70.0-130			0.418	25
1,1-Dichloroethene	3.75	4.67	4.54	125	121	70.0-130			2.82	25
cis-1,2-Dichloroethene	3.75	4.61	4.46	123	119	70.0-130			3.31	25
trans-1,2-Dichloroethene	3.75	4.59	4.51	122	120	70.0-130			1.76	25
1,2-Dichloropropane	3.75	4.70	4.72	125	126	70.0-130			0.425	25
cis-1,3-Dichloropropene	3.75	4.32	4.23	115	113	70.0-130			2.11	25
trans-1,3-Dichloropropene	3.75	4.07	3.96	109	106	70.0-130			2.74	25
1,4-Dioxane	3.75	4.27	4.20	114	112	70.0-140			1.65	25
Ethanol	3.75	3.86	3.73	103	99.5	55.0-148			3.43	25
Ethylbenzene	3.75	4.54	4.42	121	118	70.0-130			2.68	25
4-Ethyltoluene	3.75	4.33	4.46	115	119	70.0-130			2.96	25
Trichlorofluoromethane	3.75	4.66	4.69	124	125	70.0-130			0.642	25
Dichlorodifluoromethane	3.75	4.75	4.71	127	126	64.0-139			0.846	25
1,1,2-Trichlorotrifluoroethane	3.75	4.74	4.72	126	126	70.0-130			0.423	25
1,2-Dichlorotetrafluoroethane	3.75	4.69	4.65	125	124	70.0-130			0.857	25
Hexachloro-1,3-butadiene	3.75	4.26	4.20	114	112	70.0-151			1.42	25
Isopropylbenzene	3.75	4.55	4.54	121	121	70.0-130			0.220	25
Methylene Chloride	3.75	4.73	4.70	126	125	70.0-130			0.636	25
Methyl Butyl Ketone	3.75	4.42	4.31	118	115	70.0-149			2.52	25
2-Butanone (MEK)	3.75	4.53	4.59	121	122	70.0-130			1.32	25
4-Methyl-2-pentanone (MIBK)	3.75	4.51	4.43	120	118	70.0-139			1.79	25
Methyl methacrylate	3.75	4.33	4.16	115	111	70.0-130			4.00	25
MTBE	3.75	4.58	4.47	122	119	70.0-130			2.43	25
Naphthalene	3.75	3.99	3.95	106	105	70.0-159			1.01	25
2-Propanol	3.75	4.41	4.45	118	119	70.0-139			0.903	25
Propene	3.75	4.45	4.40	119	117	64.0-144			1.13	25
Styrene	7.50	8.78	8.81	117	117	70.0-130			0.341	25
1,1,2,2-Tetrachloroethane	3.75	4.41	4.51	118	120	70.0-130			2.24	25
Tetrachloroethylene	3.75	4.61	4.54	123	121	70.0-130			1.53	25
Tetrahydrofuran	3.75	4.61	4.63	123	123	70.0-137			0.433	25
Toluene	3.75	4.55	4.50	121	120	70.0-130			1.10	25
1,2,4-Trichlorobenzene	3.75	3.90	3.83	104	102	70.0-160			1.81	25
1,1,1-Trichloroethane	3.75	4.80	4.70	128	125	70.0-130			2.11	25
1,1,2-Trichloroethane	3.75	4.58	4.49	122	120	70.0-130			1.98	25

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

(LCS) R4093092-1 07/12/24 09:05 • (LCSD) R4093092-2 07/12/24 09:45

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Trichloroethylene	3.75	4.54	4.42	121	118	70.0-130			2.68	25
Vinyl chloride	3.75	4.69	4.65	125	124	70.0-130			0.857	25
Vinyl Bromide	3.75	4.66	4.54	124	121	70.0-130			2.61	25
Vinyl acetate	3.75	4.33	4.25	115	113	70.0-130			1.86	25
(S) 1,4-Bromofluorobenzene				*99.0*	*98.5*	*60.0-140*				

Method Blank (MB)

(MB) R4094374-3 07/16/24 10:21

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Benzene	U		0.0715	0.200
Cyclohexane	U		0.0753	0.200
Heptane	U		0.104	0.200
n-Hexane	U		0.206	0.630
1,2,4-Trimethylbenzene	U		0.0764	0.200
1,3,5-Trimethylbenzene	U		0.0779	0.200
Xylenes, Total	U		0.135	0.600
m&p-Xylene	U		0.135	0.400
o-Xylene	U		0.0828	0.200
(S) 1,4-Bromofluorobenzene	*95.7*			*60.0-140*

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

(LCS) R4094374-1 07/16/24 08:59 • (LCSD) R4094374-2 07/16/24 09:41

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	3.75	3.78	3.80	101	101	70.0-130			0.528	25
Cyclohexane	3.75	3.76	3.83	100	102	70.0-130			1.84	25
Heptane	3.75	3.67	3.75	97.9	100	70.0-130			2.16	25
n-Hexane	3.75	3.70	3.75	98.7	100	70.0-130			1.34	25
1,2,4-Trimethylbenzene	3.75	3.80	3.86	101	103	70.0-130			1.57	25
1,3,5-Trimethylbenzene	3.75	3.83	3.88	102	103	70.0-130			1.30	25
Xylenes, Total	11.3	11.3	11.5	100	102	70.0-130			1.75	25
m&p-Xylene	7.50	7.59	7.70	101	103	70.0-130			1.44	25
o-Xylene	3.75	3.74	3.79	99.7	101	70.0-130			1.33	25
(S) 1,4-Bromofluorobenzene				*97.3*	*97.2*	*60.0-140*				

Method Blank (MB)

(MB) R4095466-3 07/18/24 10:00

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
2,2,4-Trimethylpentane	U		0.133	0.200
(S) 1,4-Bromofluorobenzene	*90.3*			*60.0-140*

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

(LCS) R4095466-1 07/18/24 08:50 • (LCSD) R4095466-2 07/18/24 09:30

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2,2,4-Trimethylpentane	3.75	4.25	4.49	113	120	70.0-130			5.49	25
(S) 1,4-Bromofluorobenzene				*103*	*102*	*60.0-140*				

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

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J4	The associated batch QC was outside the established quality control range for accuracy.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Pace® Location Requested (City/State):

Air CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Scan QR code for instructions

M099

Company Name: **Ramboll US Consulting, Inc. - Denver**

Contact/Report To: **Abby Small**

Street Address: **1999 Broadway Suite 2225 Denver, CO 80202**

Phone #: **303-382-5474**

E-Mail: **asmall@ramboll.com;rdeshpande@ramboll.com;eleister@ramboll.com;twvss@ramboll.com**

City, State Zip:

Cc E-Mail:

Customer Project #:

Invoice to:

Project Name: **Monthyl GW Calumet - Great Falls, MT**

Invoice E-Mail:

Site Collection Info/Facility ID (as applicable): **ENVIRONCO-CALU MONTH**

Purchase Order # (if applicable):

Quote #:

Time Zone Collected: [ ] AK [ ] PT [✓] MT [ ] CT [ ] ET

State origin of sample(s): Great Falls, MT

Data Deliverables:

[ ] Level II [ ] Level III [ ] Level IV

[ ] EQUIS

[ ] Other_____

Regulatory Program (CAA, RCRA, etc.) as applicable:

Rush (Pre-approval required): 2 Day 3 day 5 day Other_____

Date Results Requested:

Permit # as applicable:

Units for Reporting: ug/m³ PPBV mg/m³ PPMV

Field Information

Analyses Requested: TO-15 Summa

TM 6/26/24

Proj. Manager: **841 - Kelly Mercer**

AcctNum / Client ID: **ENVIRONCO**

Table #:

Profile / Template: **T245957**

Prelog / Bottle Ord. ID: **P1079696**

Lab Use Only

* Matrix Codes (Insert in Matrix box below): Ambient (A), Indoor (I), Soil Vapor (SV), Other (O)

Customer Sample ID	Matrix *	Summa Canister ID	Flow Controller ID	Begin Collection Date	Begin Collection Time	End Collection Date	End Collection Time	Canister Pressure / Vacuum Start Pressure / Vacuum (in Hg)	Canister Pressure / Vacuum End Pressure / Vacuum (in Hg)	PUF / FILTER Duration (minutes)	PUF / FILTER Flow Rate m³/min or L/min	PUF / FILTER Total Volume Sampled m³ or L	TO-15 Summa				Sample Comment
CMR-SP301-240711	O	14479	01427	7/11/24	1000	7/11/24	1005	26	2	5:43	.17	1	✓				L1755 866-1

Sample Receipt Checklist

COC Seal Present/Intact: [✓] Y__N

COC Signed/Accurate: [✓] Y__N

Bottles arrive intact: [✓] Y__N

Correct bottles used: [✓] Y__N

Size: [✓] Airs ___1L ___6L ___1.4L

Tage Color: G___ M [✓] P___ B___

Tubing ___ Shunt ___

Unused: ___

T/P#: ___

Customer Remarks / Special Conditions / Possible Hazards:

Collected By:

Printed Name:

Signature:

Additional Instructions from Pace®:

Coolers: Thermometer ID: Correction Factor (°C): Obs. Temp. (°C): AMB Corrected Temp. (°C):

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
AMB/RD. [signature]	7/11/24 1100		
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature) Elijah Nelson	Date/Time: 7/12 0900

Tracking Number: 7241 0721 3441

Delivered by: In- Person Courier FedEX UPS Other

Page: ____ of: ____

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace® Terms and Conditions found at https://www.pacelabs.com/resource-library/resource/pace-terms-and-conditions/

ANALYTICAL REPORT

August 22, 2024

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

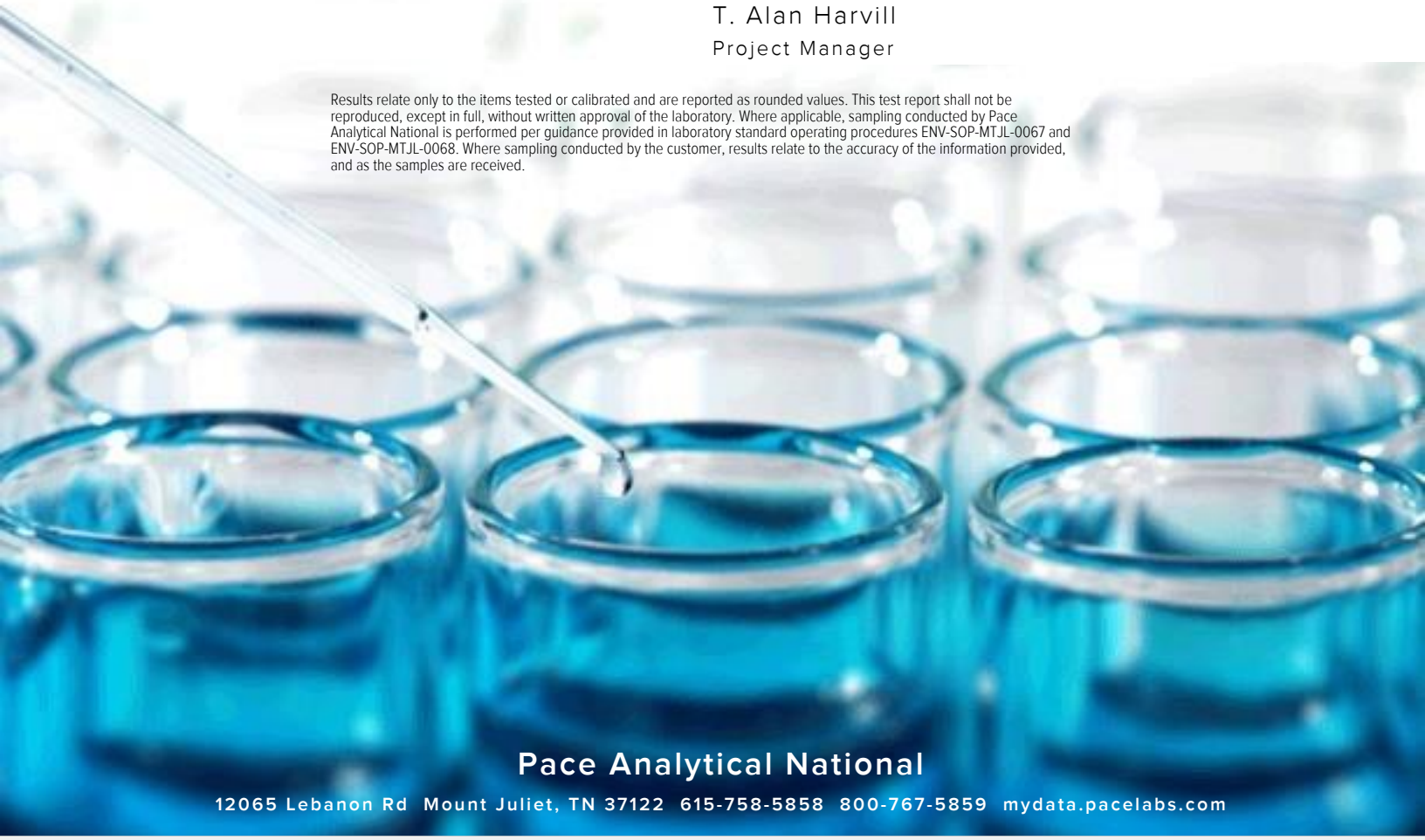
Ramboll US Consulting, Inc. - Denver

Sample Delivery Group:	L1769204
Samples Received:	08/20/2024
Project Number:	
Description:	Monthyl GW Calumet - Great Falls, MT
Report To:	Abby Small 1999 Broadway Suite 2225 Denver, CO 80202

Entire Report Reviewed By:

T. Alan Harvill
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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CMR-SP301-240819 L1769204-01 Air

Collected by	Collected date/time	Received date/time
Kyle A. Groves	08/19/24 13:21	08/20/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG2346568	1	08/21/24 01:07	08/21/24 01:07	MNP	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG2347458	400	08/22/24 01:15	08/22/24 01:15	DAH	Mt. Juliet, TN

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

T. Alan Harvill
Project Manager

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	1.25	2.97	10.2	24.2		1	WG2346568
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND		1	WG2346568
Benzene	71-43-2	78.10	80.0	256	299	955		400	WG2347458
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG2346568
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG2346568
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG2346568
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG2346568
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG2346568
Carbon disulfide	75-15-0	76.10	0.400	1.24	2.13	6.63		1	WG2346568
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG2346568
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG2346568
Chloroethane	75-00-3	64.50	0.200	0.528	ND	ND		1	WG2346568
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG2346568
Chloromethane	74-87-3	50.50	0.200	0.413	0.351	0.725		1	WG2346568
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG2346568
Cyclohexane	110-82-7	84.20	80.0	276	866	2980		400	WG2347458
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG2346568
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG2346568
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG2346568
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG2346568
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND		1	WG2346568
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG2346568
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG2346568
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG2346568
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG2346568
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	ND	ND		1	WG2346568
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG2346568
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG2346568
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG2346568
1,4-Dioxane	123-91-1	88.10	0.630	2.27	ND	ND		1	WG2346568
Ethanol	64-17-5	46.10	2.50	4.71	52.0	98.0		1	WG2346568
Ethylbenzene	100-41-4	106	80.0	347	ND	ND		400	WG2347458
4-Ethyltoluene	622-96-8	120	0.200	0.982	90.6	445		1	WG2346568
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	0.200	1.12		1	WG2346568
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.405	2.00		1	WG2346568
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG2346568
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG2346568
Heptane	142-82-5	100	80.0	327	409	1670		400	WG2347458
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG2346568
n-Hexane	110-54-3	86.20	252	888	1200	4230		400	WG2347458
Isopropylbenzene	98-82-8	120.20	0.200	0.983	6.34	31.2		1	WG2346568
Methylene Chloride	75-09-2	84.90	0.200	0.694	ND	ND		1	WG2346568
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG2346568
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	14.1	41.6		1	WG2346568
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG2346568
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG2346568
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG2346568
Naphthalene	91-20-3	128	0.630	3.30	ND	ND		1	WG2346568
2-Propanol	67-63-0	60.10	1.25	3.07	4.24	10.4		1	WG2346568
Propene	115-07-1	42.10	1.25	2.15	11.5	19.8		1	WG2346568
Styrene	100-42-5	104	0.400	1.70	ND	ND		1	WG2346568
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG2346568
Tetrachloroethylene	127-18-4	166	0.200	1.36	ND	ND		1	WG2346568
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	ND	ND		1	WG2346568
Toluene	108-88-3	92.10	0.500	1.88	62.7	236		1	WG2346568
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG2346568

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG2346568
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG2346568
Trichloroethylene	79-01-6	131	0.200	1.07	ND	ND		1	WG2346568
1,2,4-Trimethylbenzene	95-63-6	120	80.0	393	ND	ND		400	WG2347458
1,3,5-Trimethylbenzene	108-67-8	120	80.0	393	ND	ND		400	WG2347458
2,2,4-Trimethylpentane	540-84-1	114.22	80.0	374	4390	20500		400	WG2347458
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG2346568
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG2346568
Vinyl acetate	108-05-4	86.10	0.630	2.22	ND	ND		1	WG2346568
Xylenes, Total	1330-20-7	106.16	240	1040	452	1960		400	WG2347458
m&p-Xylene	179601-23-1	106	160	694	371	1610		400	WG2347458
o-Xylene	95-47-6	106	80.0	347	80.7	350		400	WG2347458
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*345*		J1		WG2346568
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*98.2*				WG2347458

Sample Narrative:

L1769204-01 WG2346568: Surrogate failure due to matrix interference

Method Blank (MB)

(MB) R4109261-2 08/20/24 09:55

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Acetone	U		0.584	1.25
Allyl chloride	U		0.114	0.200
Benzyl Chloride	U		0.0598	0.200
Bromodichloromethane	U		0.0702	0.200
Bromoform	U		0.0732	0.600
Bromomethane	U		0.0982	0.200
1,3-Butadiene	U		0.104	2.00
Carbon disulfide	U		0.102	0.400
Carbon tetrachloride	U		0.0732	0.200
Chlorobenzene	U		0.0832	0.200
Chloroethane	U		0.0996	0.200
Chloroform	U		0.0717	0.200
Chloromethane	U		0.103	0.200
2-Chlorotoluene	U		0.0828	0.200
Dibromochloromethane	U		0.0727	0.200
1,2-Dibromoethane	U		0.0721	0.200
1,2-Dichlorobenzene	U		0.128	0.200
1,3-Dichlorobenzene	U		0.182	0.200
1,4-Dichlorobenzene	U		0.0557	0.200
1,2-Dichloroethane	U		0.0700	0.200
1,1-Dichloroethane	U		0.0723	0.200
1,1-Dichloroethene	U		0.0762	0.200
cis-1,2-Dichloroethene	U		0.0784	0.200
trans-1,2-Dichloroethene	U		0.0673	0.200
1,2-Dichloropropane	U		0.0760	0.200
cis-1,3-Dichloropropene	U		0.0689	0.200
trans-1,3-Dichloropropene	U		0.0728	0.200
1,4-Dioxane	U		0.0833	0.630
Ethanol	U		0.265	2.50
4-Ethyltoluene	U		0.0783	0.200
Trichlorofluoromethane	U		0.0819	0.200
Dichlorodifluoromethane	U		0.137	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0793	0.200
1,2-Dichlorotetrafluoroethane	U		0.0890	0.200
Hexachloro-1,3-butadiene	U		0.105	0.630
Isopropylbenzene	U		0.0777	0.200
Methylene Chloride	U		0.0979	0.200
Methyl Butyl Ketone	U		0.133	1.25
2-Butanone (MEK)	U		0.0814	1.25
4-Methyl-2-pentanone (MIBK)	U		0.0765	1.25

Method Blank (MB)

(MB) R4109261-2 08/20/24 09:55

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Methyl methacrylate	U		0.0876	0.200
MTBE	U		0.0647	0.200
Naphthalene	U		0.350	0.630
2-Propanol	U		0.264	1.25
Propene	U		0.0932	1.25
Styrene	U		0.0788	0.400
1,1,2,2-Tetrachloroethane	U		0.0743	0.200
Tetrachloroethylene	U		0.0814	0.200
Tetrahydrofuran	U		0.0734	0.200
Toluene	U		0.0870	0.500
1,2,4-Trichlorobenzene	U		0.148	0.630
1,1,1-Trichloroethane	U		0.0736	0.200
1,1,2-Trichloroethane	U		0.0775	0.200
Trichloroethylene	U		0.0680	0.200
Vinyl chloride	U		0.0949	0.200
Vinyl Bromide	U		0.0852	0.200
Vinyl acetate	U		0.116	0.630
(S) 1,4-Bromofluorobenzene	*100*			*60.0-140*

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

(LCS) R4109261-1 08/20/24 09:25 • (LCSD) R4109261-3 08/20/24 12:13

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	3.75	4.33	4.41	115	118	70.0-130			1.83	25
Allyl chloride	3.75	4.06	4.08	108	109	70.0-130			0.491	25
Benzyl Chloride	3.75	3.61	3.95	96.3	105	70.0-152			8.99	25
Bromodichloromethane	3.75	3.93	3.92	105	105	70.0-130			0.255	25
Bromoform	3.75	3.82	4.03	102	107	70.0-130			5.35	25
Bromomethane	3.75	4.18	4.28	111	114	70.0-130			2.36	25
1,3-Butadiene	3.75	4.07	4.28	109	114	70.0-130			5.03	25
Carbon disulfide	7.50	8.11	8.42	108	112	70.0-130			3.75	25
Carbon tetrachloride	3.75	3.93	4.10	105	109	70.0-130			4.23	25
Chlorobenzene	3.75	4.21	4.20	112	112	70.0-130			0.238	25
Chloroethane	3.75	4.33	4.25	115	113	70.0-130			1.86	25
Chloroform	3.75	3.97	4.09	106	109	70.0-130			2.98	25
Chloromethane	3.75	4.14	4.40	110	117	70.0-130			6.09	25
2-Chlorotoluene	3.75	4.05	4.45	108	119	70.0-130			9.41	25
Dibromochloromethane	3.75	4.04	3.91	108	104	70.0-130			3.27	25

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

(LCS) R4109261-1 08/20/24 09:25 • (LCSD) R4109261-3 08/20/24 12:13

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,2-Dibromoethane	3.75	4.12	4.21	110	112	70.0-130			2.16	25
1,2-Dichlorobenzene	3.75	3.87	4.32	103	115	70.0-130			11.0	25
1,3-Dichlorobenzene	3.75	3.87	4.44	103	118	70.0-130			13.7	25
1,4-Dichlorobenzene	3.75	3.87	4.33	103	115	70.0-130			11.2	25
1,2-Dichloroethane	3.75	3.83	3.86	102	103	70.0-130			0.780	25
1,1-Dichloroethane	3.75	4.07	4.26	109	114	70.0-130			4.56	25
1,1-Dichloroethene	3.75	4.19	4.26	112	114	70.0-130			1.66	25
cis-1,2-Dichloroethene	3.75	4.02	4.15	107	111	70.0-130			3.18	25
trans-1,2-Dichloroethene	3.75	4.08	4.11	109	110	70.0-130			0.733	25
1,2-Dichloropropane	3.75	3.91	3.93	104	105	70.0-130			0.510	25
cis-1,3-Dichloropropene	3.75	3.94	4.55	105	121	70.0-130			14.4	25
trans-1,3-Dichloropropene	3.75	4.24	4.25	113	113	70.0-130			0.236	25
1,4-Dioxane	3.75	4.31	4.45	115	119	70.0-140			3.20	25
Ethanol	3.75	4.21	4.51	112	120	55.0-148			6.88	25
4-Ethyltoluene	3.75	4.03	4.53	107	121	70.0-130			11.7	25
Trichlorofluoromethane	3.75	4.11	4.11	110	110	70.0-130			0.000	25
Dichlorodifluoromethane	3.75	3.99	4.19	106	112	64.0-139			4.89	25
1,1,2-Trichlorotrifluoroethane	3.75	4.08	4.17	109	111	70.0-130			2.18	25
1,2-Dichlorotetrafluoroethane	3.75	4.19	4.26	112	114	70.0-130			1.66	25
Hexachloro-1,3-butadiene	3.75	3.63	4.11	96.8	110	70.0-151			12.4	25
Isopropylbenzene	3.75	3.92	4.27	105	114	70.0-130			8.55	25
Methylene Chloride	3.75	3.82	3.97	102	106	70.0-130			3.85	25
Methyl Butyl Ketone	3.75	4.24	4.24	113	113	70.0-149			0.000	25
2-Butanone (MEK)	3.75	4.47	4.35	119	116	70.0-130			2.72	25
4-Methyl-2-pentanone (MIBK)	3.75	3.95	4.05	105	108	70.0-139			2.50	25
Methyl methacrylate	3.75	4.19	4.33	112	115	70.0-130			3.29	25
MTBE	3.75	4.18	4.28	111	114	70.0-130			2.36	25
Naphthalene	3.75	4.08	4.57	109	122	70.0-159			11.3	25
2-Propanol	3.75	3.99	4.29	106	114	70.0-139			7.25	25
Propene	3.75	4.40	4.46	117	119	64.0-144			1.35	25
Styrene	7.50	8.19	8.90	109	119	70.0-130			8.31	25
1,1,2,2-Tetrachloroethane	3.75	3.80	4.23	101	113	70.0-130			10.7	25
Tetrachloroethylene	3.75	4.23	4.25	113	113	70.0-130			0.472	25
Tetrahydrofuran	3.75	4.14	4.16	110	111	70.0-137			0.482	25
Toluene	3.75	4.37	4.40	117	117	70.0-130			0.684	25
1,2,4-Trichlorobenzene	3.75	3.90	4.39	104	117	70.0-160			11.8	25
1,1,1-Trichloroethane	3.75	3.96	4.02	106	107	70.0-130			1.50	25
1,1,2-Trichloroethane	3.75	3.98	4.13	106	110	70.0-130			3.70	25
Trichloroethylene	3.75	4.13	4.11	110	110	70.0-130			0.485	25
Vinyl chloride	3.75	4.26	4.38	114	117	70.0-130			2.78	25

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

(LCS) R4109261-1 08/20/24 09:25 • (LCSD) R4109261-3 08/20/24 12:13

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Vinyl Bromide	3.75	4.33	4.43	115	118	70.0-130			2.28	25
Vinyl acetate	3.75	3.97	3.58	106	95.5	70.0-130			10.3	25
(S) 1,4-Bromofluorobenzene				*104*	*99.8*	*60.0-140*				

QUALITY CONTROL SUMMARY

L1769204-01

Method Blank (MB)

(MB) R4110075-3 08/21/24 16:51

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Benzene	U		0.0715	0.200
Cyclohexane	U		0.0753	0.200
Ethylbenzene	U		0.0835	0.200
Heptane	U		0.104	0.200
n-Hexane	U		0.206	0.630
1,2,4-Trimethylbenzene	U		0.0764	0.200
1,3,5-Trimethylbenzene	U		0.0779	0.200
2,2,4-Trimethylpentane	U		0.133	0.200
Xylenes, Total	U		0.135	0.600
m&p-Xylene	U		0.135	0.400
o-Xylene	U		0.0828	0.200
(S) 1,4-Bromofluorobenzene	*99.2*		*60.0-140*	

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

(LCS) R4110075-1 08/21/24 15:25 • (LCSD) R4110075-2 08/21/24 16:09

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	3.75	3.27	3.38	87.2	90.1	70.0-130			3.31	25
Cyclohexane	3.75	3.29	3.28	87.7	87.5	70.0-130			0.304	25
Ethylbenzene	3.75	3.19	3.29	85.1	87.7	70.0-130			3.09	25
Heptane	3.75	3.14	3.28	83.7	87.5	70.0-130			4.36	25
n-Hexane	3.75	3.21	3.19	85.6	85.1	70.0-130			0.625	25
1,2,4-Trimethylbenzene	3.75	3.20	3.33	85.3	88.8	70.0-130			3.98	25
1,3,5-Trimethylbenzene	3.75	3.37	3.37	89.9	89.9	70.0-130			0.000	25
2,2,4-Trimethylpentane	3.75	3.17	3.13	84.5	83.5	70.0-130			1.27	25
Xylenes, Total	11.3	9.57	9.76	84.7	86.4	70.0-130			1.97	25
m&p-Xylene	7.50	6.44	6.57	85.9	87.6	70.0-130			2.00	25
o-Xylene	3.75	3.13	3.19	83.5	85.1	70.0-130			1.90	25
(S) 1,4-Bromofluorobenzene				*97.4*	*101*	*60.0-140*				

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

M226

Pace® Location Requested (City/State):

Air CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Sample Receipt Checklist
COC Seal Present/Intact: Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Unused:
Airs
Size: 1L 6L 1.4L
Tage Color: G W P B
Tubing Shunt
T/P#:

Company Name: Ramboll US Consulting, Inc. - Denver

Street Address: 1999 Broadway Suite 2225
Denver, CO 80202

City, State Zip:

Customer Project #:

Project Name: Monthyl GW Calumet - Great Falls, MT

Site Collection Info/Facility ID (as applicable): ENVIRONCO-CALU MONTH

Time Zone Collected: [ ] AK [ ] PT [ ] MT [ ] CT [ ] ET

Contact/Report To: Abby Small

Phone #: 303-382-5474

E-Mail: asmall@ramboll.com;rdeshpande@ramboll.com;eleister@ramboll.com;twvss@ramboll.com

Cc E-Mail:

Invoice to:

Invoice E-Mail:

Purchase Order # (if applicable):

Quote #:

State origin of sample(s):

Data Deliverables:
[ ] Level II [ ] Level III [ ] Level IV
[ ] EQUIS
[ ] Other

Regulatory Program (CAA, RCRA, etc.) as applicable:

Rush (Pre-approval required): 2 Day 3 day 5 day Other

Date Results Requested:

Permit # as applicable:

Units for Reporting: ug/m³ PPBV mg/m³ PPMV

Field Information

Analyses Requested

Proj. Manager: 841 - Kelly Mercer

AcctNum / Client ID: ENVIRONCO

Table #:

Profile / Template: T245957

Prelog / Bottle Ord. ID: P1085869

Lab Use Only

* Matrix Codes (Insert in Matrix box below): Ambient (A), Indoor (I), Soil Vapor (SV), Other (O)

Customer Sample ID	Matrix *	Summa Canister ID	Flow Controller ID	Begin Collection Date	Begin Collection Time	End Collection Date	End Collection Time	Canister Pressure / Vacuum: Start Pressure / Vacuum (in Hg)	Canister Pressure / Vacuum: End Pressure / Vacuum (in Hg)	PUF / FILTER: Duration (minutes)	PUF / FILTER: Flow Rate m³/min or L/min	PUF / FILTER: Total Volume Sampled m³ or L	TO-15 Summa				Sample Comment
CMR-SP301-240819		12487	015696	08/19	1314	08/19	1321	26	2	7	0.14	1L					-01

Customer Remarks / Special Conditions / Possible Hazards:

Collected By:
Printed Name: Kyle Groves
Signature:

Additional Instructions from Pace®:

Coolers: Thermometer ID: Correction Factor (°C): Obs. Temp. (°C): Corrected Temp. (°C):

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Tracking Number:
	08/19/24 1500	Eaton Organ	8/20/24 0900	
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Delivered by: In- Person Courier FedEX UPS Other
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Page: ____ of: ____

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace® Terms and Conditions found at https://www.pacelabs.com/resource-library/resource/pace-terms-and-conditions/

ANALYTICAL REPORT

October 03, 2024

Ramboll US Consulting, Inc. - Denver

Sample Delivery Group:	L1781508
Samples Received:	09/25/2024
Project Number:	
Description:	Monthyl GW Calumet - Great Falls, MT
Report To:	Abby Small 1999 Broadway Suite 2225 Denver, CO 80202

Entire Report Reviewed By:

Kelly Mercer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National

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CMR-SP301-240924 L1781508-01 Air

Collected by	Collected date/time	Received date/time
Kyle A. Groves	09/24/24 10:30	09/25/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG2371253	1	09/27/24 12:40	09/27/24 12:40	DAH	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG2371860	10	09/28/24 16:25	09/28/24 16:25	MNP	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG2373401	20	10/01/24 20:15	10/01/24 20:15	MNP	Mt. Juliet, TN

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

Kelly Mercer
Project Manager

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	1.25	2.97	21.9	52.0		1	WG2371253
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND		1	WG2371253
Benzene	71-43-2	78.10	2.00	6.39	134	428		10	WG2371860
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG2371253
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG2371253
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG2371253
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG2371253
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG2371253
Carbon disulfide	75-15-0	76.10	0.400	1.24	2.15	6.69		1	WG2371253
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG2371253
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG2371253
Chloroethane	75-00-3	64.50	0.200	0.528	ND	ND		1	WG2371253
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG2371253
Chloromethane	74-87-3	50.50	0.200	0.413	0.487	1.01		1	WG2371253
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG2371253
Cyclohexane	110-82-7	84.20	2.00	6.89	129	444		10	WG2371860
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG2371253
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG2371253
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG2371253
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG2371253
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND		1	WG2371253
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG2371253
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG2371253
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG2371253
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG2371253
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	ND	ND		1	WG2371253
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG2371253
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG2371253
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG2371253
1,4-Dioxane	123-91-1	88.10	0.630	2.27	ND	ND		1	WG2371253
Ethanol	64-17-5	46.10	2.50	4.71	60.0	113		1	WG2371253
Ethylbenzene	100-41-4	106	0.200	0.867	11.3	49.0		1	WG2371253
4-Ethyltoluene	622-96-8	120	0.200	0.982	5.64	27.7		1	WG2371253
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	ND	ND		1	WG2371253
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.406	2.01		1	WG2371253
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG2371253
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG2371253
Heptane	142-82-5	100	2.00	8.18	83.5	342		10	WG2371860
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG2371253
n-Hexane	110-54-3	86.20	6.30	22.2	240	846		10	WG2371860
Isopropylbenzene	98-82-8	120.20	0.200	0.983	ND	ND		1	WG2371253
Methylene Chloride	75-09-2	84.90	0.200	0.694	ND	ND		1	WG2371253
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG2371253
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	5.48	16.2		1	WG2371253
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG2371253
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG2371253
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG2371253
Naphthalene	91-20-3	128	0.630	3.30	ND	ND		1	WG2371253
2-Propanol	67-63-0	60.10	1.25	3.07	7.72	19.0		1	WG2371253
Propene	115-07-1	42.10	1.25	2.15	ND	ND		1	WG2371253
Styrene	100-42-5	104	0.400	1.70	4.83	20.5		1	WG2371253
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG2371253
Tetrachloroethylene	127-18-4	166	0.200	1.36	ND	ND		1	WG2371253
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	ND	ND		1	WG2371253
Toluene	108-88-3	92.10	0.500	1.88	11.3	42.6		1	WG2371253
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG2371253

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG2371253
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG2371253
Trichloroethylene	79-01-6	131	0.200	1.07	ND	ND		1	WG2371253
1,2,4-Trimethylbenzene	95-63-6	120	0.200	0.982	6.80	33.4		1	WG2371253
1,3,5-Trimethylbenzene	108-67-8	120	0.200	0.982	6.35	31.2		1	WG2371253
2,2,4-Trimethylpentane	540-84-1	114.22	4.00	18.7	1150	5370		20	WG2373401
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG2371253
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG2371253
Vinyl acetate	108-05-4	86.10	0.630	2.22	ND	ND		1	WG2371253
Xylenes, Total	1330-20-7	106.16	0.600	2.61	50.0	217		1	WG2371253
m&p-Xylene	179601-23-1	106	0.400	1.73	42.6	185		1	WG2371253
o-Xylene	95-47-6	106	0.200	0.867	7.40	32.1		1	WG2371253
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*103*				WG2371253
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*104*				WG2371860
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*87.6*				WG2373401

Method Blank (MB)

(MB) R4125712-3 09/27/24 11:20

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Acetone	U		0.584	1.25
Allyl chloride	U		0.114	0.200
Benzyl Chloride	U		0.0598	0.200
Bromodichloromethane	U		0.0702	0.200
Bromoform	U		0.0732	0.600
Bromomethane	U		0.0982	0.200
1,3-Butadiene	U		0.104	2.00
Carbon disulfide	U		0.102	0.400
Carbon tetrachloride	U		0.0732	0.200
Chlorobenzene	U		0.0832	0.200
Chloroethane	U		0.0996	0.200
Chloroform	U		0.0717	0.200
Chloromethane	U		0.103	0.200
2-Chlorotoluene	U		0.0828	0.200
Dibromochloromethane	U		0.0727	0.200
1,2-Dibromoethane	U		0.0721	0.200
1,2-Dichlorobenzene	U		0.128	0.200
1,3-Dichlorobenzene	U		0.182	0.200
1,4-Dichlorobenzene	U		0.0557	0.200
1,2-Dichloroethane	U		0.0700	0.200
1,1-Dichloroethane	U		0.0723	0.200
1,1-Dichloroethene	U		0.0762	0.200
cis-1,2-Dichloroethene	U		0.0784	0.200
trans-1,2-Dichloroethene	U		0.0673	0.200
1,2-Dichloropropane	U		0.0760	0.200
cis-1,3-Dichloropropene	U		0.0689	0.200
trans-1,3-Dichloropropene	U		0.0728	0.200
1,4-Dioxane	U		0.0833	0.630
Ethanol	U		0.265	2.50
Ethylbenzene	U		0.0835	0.200
4-Ethyltoluene	U		0.0783	0.200
Trichlorofluoromethane	U		0.0819	0.200
Dichlorodifluoromethane	U		0.137	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0793	0.200
1,2-Dichlorotetrafluoroethane	U		0.0890	0.200
Hexachloro-1,3-butadiene	U		0.105	0.630
Isopropylbenzene	U		0.0777	0.200
Methylene Chloride	U		0.0979	0.200
Methyl Butyl Ketone	U		0.133	1.25
2-Butanone (MEK)	U		0.0814	1.25

Method Blank (MB)

(MB) R4125712-3 09/27/24 11:20

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
4-Methyl-2-pentanone (MIBK)	U		0.0765	1.25
Methyl methacrylate	U		0.0876	0.200
MTBE	U		0.0647	0.200
Naphthalene	U		0.350	0.630
2-Propanol	U		0.264	1.25
Propene	U		0.0932	1.25
Styrene	U		0.0788	0.400
1,1,2,2-Tetrachloroethane	U		0.0743	0.200
Tetrachloroethylene	U		0.0814	0.200
Tetrahydrofuran	U		0.0734	0.200
Toluene	U		0.0870	0.500
1,2,4-Trichlorobenzene	U		0.148	0.630
1,1,1-Trichloroethane	U		0.0736	0.200
1,1,2-Trichloroethane	U		0.0775	0.200
Trichloroethylene	U		0.0680	0.200
1,2,4-Trimethylbenzene	U		0.0764	0.200
1,3,5-Trimethylbenzene	U		0.0779	0.200
Vinyl chloride	U		0.0949	0.200
Vinyl Bromide	U		0.0852	0.200
Vinyl acetate	U		0.116	0.630
Xylenes, Total	U		0.135	0.600
m&p-Xylene	U		0.135	0.400
o-Xylene	U		0.0828	0.200
(S) 1,4-Bromofluorobenzene	*95.0*			*60.0-140*

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

(LCS) R4125712-1 09/27/24 08:59 • (LCSD) R4125712-2 09/27/24 09:38

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	3.75	3.67	3.70	97.9	98.7	70.0-130			0.814	25
Allyl chloride	3.75	4.06	4.09	108	109	70.0-130			0.736	25
Benzyl Chloride	3.75	4.44	4.40	118	117	70.0-152			0.905	25
Bromodichloromethane	3.75	4.17	4.16	111	111	70.0-130			0.240	25
Bromoform	3.75	4.49	4.43	120	118	70.0-130			1.35	25
Bromomethane	3.75	3.88	3.97	103	106	70.0-130			2.29	25
1,3-Butadiene	3.75	3.63	3.68	96.8	98.1	70.0-130			1.37	25
Carbon disulfide	7.50	8.33	8.32	111	111	70.0-130			0.120	25
Carbon tetrachloride	3.75	4.31	4.31	115	115	70.0-130			0.000	25

QUALITY CONTROL SUMMARY

L1781508-01

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

(LCS) R4125712-1 09/27/24 08:59 • (LCSD) R4125712-2 09/27/24 09:38

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chlorobenzene	3.75	4.38	4.34	117	116	70.0-130			0.917	25
Chloroethane	3.75	3.90	4.04	104	108	70.0-130			3.53	25
Chloroform	3.75	4.06	4.07	108	109	70.0-130			0.246	25
Chloromethane	3.75	3.71	3.73	98.9	99.5	70.0-130			0.538	25
2-Chlorotoluene	3.75	4.42	4.37	118	117	70.0-130			1.14	25
Dibromochloromethane	3.75	4.39	4.36	117	116	70.0-130			0.686	25
1,2-Dibromoethane	3.75	4.28	4.27	114	114	70.0-130			0.234	25
1,2-Dichlorobenzene	3.75	4.45	4.42	119	118	70.0-130			0.676	25
1,3-Dichlorobenzene	3.75	4.53	4.48	121	119	70.0-130			1.11	25
1,4-Dichlorobenzene	3.75	4.51	4.48	120	119	70.0-130			0.667	25
1,2-Dichloroethane	3.75	3.94	3.96	105	106	70.0-130			0.506	25
1,1-Dichloroethane	3.75	3.97	3.98	106	106	70.0-130			0.252	25
1,1-Dichloroethene	3.75	3.93	3.91	105	104	70.0-130			0.510	25
cis-1,2-Dichloroethene	3.75	4.07	4.12	109	110	70.0-130			1.22	25
trans-1,2-Dichloroethene	3.75	3.95	3.93	105	105	70.0-130			0.508	25
1,2-Dichloropropane	3.75	4.01	4.00	107	107	70.0-130			0.250	25
cis-1,3-Dichloropropene	3.75	4.20	4.15	112	111	70.0-130			1.20	25
trans-1,3-Dichloropropene	3.75	4.06	4.07	108	109	70.0-130			0.246	25
1,4-Dioxane	3.75	4.11	4.14	110	110	70.0-140			0.727	25
Ethanol	3.75	3.71	3.67	98.9	97.9	55.0-148			1.08	25
Ethylbenzene	3.75	4.37	4.37	117	117	70.0-130			0.000	25
4-Ethyltoluene	3.75	4.44	4.39	118	117	70.0-130			1.13	25
Trichlorofluoromethane	3.75	4.14	4.15	110	111	70.0-130			0.241	25
Dichlorodifluoromethane	3.75	3.61	3.65	96.3	97.3	64.0-139			1.10	25
1,1,2-Trichlorotrifluoroethane	3.75	4.22	4.18	113	111	70.0-130			0.952	25
1,2-Dichlorotetrafluoroethane	3.75	4.10	4.07	109	109	70.0-130			0.734	25
Hexachloro-1,3-butadiene	3.75	4.80	4.74	128	126	70.0-151			1.26	25
Isopropylbenzene	3.75	4.45	4.39	119	117	70.0-130			1.36	25
Methylene Chloride	3.75	3.67	3.66	97.9	97.6	70.0-130			0.273	25
Methyl Butyl Ketone	3.75	3.87	3.86	103	103	70.0-149			0.259	25
2-Butanone (MEK)	3.75	4.02	4.04	107	108	70.0-130			0.496	25
4-Methyl-2-pentanone (MIBK)	3.75	3.96	4.00	106	107	70.0-139			1.01	25
Methyl methacrylate	3.75	3.96	4.00	106	107	70.0-130			1.01	25
MTBE	3.75	4.14	4.15	110	111	70.0-130			0.241	25
Naphthalene	3.75	4.69	4.69	125	125	70.0-159			0.000	25
2-Propanol	3.75	3.89	3.85	104	103	70.0-139			1.03	25
Propene	3.75	3.54	3.58	94.4	95.5	64.0-144			1.12	25
Styrene	7.50	9.25	9.13	123	122	70.0-130			1.31	25
1,1,2,2-Tetrachloroethane	3.75	4.15	4.13	111	110	70.0-130			0.483	25
Tetrachloroethylene	3.75	4.60	4.62	123	123	70.0-130			0.434	25

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

(LCS) R4125712-1 09/27/24 08:59 • (LCSD) R4125712-2 09/27/24 09:38

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Tetrahydrofuran	3.75	3.84	3.87	102	103	70.0-137			0.778	25
Toluene	3.75	4.36	4.30	116	115	70.0-130			1.39	25
1,2,4-Trichlorobenzene	3.75	4.74	4.68	126	125	70.0-160			1.27	25
1,1,1-Trichloroethane	3.75	4.23	4.21	113	112	70.0-130			0.474	25
1,1,2-Trichloroethane	3.75	4.24	4.26	113	114	70.0-130			0.471	25
Trichloroethylene	3.75	4.26	4.22	114	113	70.0-130			0.943	25
1,2,4-Trimethylbenzene	3.75	4.44	4.41	118	118	70.0-130			0.678	25
1,3,5-Trimethylbenzene	3.75	4.51	4.50	120	120	70.0-130			0.222	25
Vinyl chloride	3.75	3.71	3.78	98.9	101	70.0-130			1.87	25
Vinyl Bromide	3.75	4.17	4.18	111	111	70.0-130			0.240	25
Vinyl acetate	3.75	3.84	3.98	102	106	70.0-130			3.58	25
Xylenes, Total	11.3	13.5	13.3	119	118	70.0-130			1.49	25
m&p-Xylene	7.50	9.00	8.94	120	119	70.0-130			0.669	25
o-Xylene	3.75	4.46	4.38	119	117	70.0-130			1.81	25
(S) 1,4-Bromofluorobenzene				*95.0*	*94.5*	*60.0-140*				

Method Blank (MB)

(MB) R4126685-3 09/28/24 13:35

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Benzene	U		0.0715	0.200
Cyclohexane	U		0.0753	0.200
Heptane	U		0.104	0.200
n-Hexane	U		0.206	0.630
(S) 1,4-Bromofluorobenzene	*101*			*60.0-140*

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

(LCS) R4126685-1 09/28/24 11:05 • (LCSD) R4126685-2 09/28/24 13:08

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	3.75	4.07	3.97	109	106	70.0-130			2.49	25
Cyclohexane	3.75	3.92	4.03	105	107	70.0-130			2.77	25
Heptane	3.75	4.00	3.97	107	106	70.0-130			0.753	25
n-Hexane	3.75	4.02	4.15	107	111	70.0-130			3.18	25
(S) 1,4-Bromofluorobenzene				*102*	*103*	*60.0-140*				

Method Blank (MB)

(MB) R4126776-1 10/01/24 09:54

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
2,2,4-Trimethylpentane	U		0.133	0.200
(S) 1,4-Bromofluorobenzene	*86.0*			*60.0-140*

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

(LCS) R4126776-2 10/01/24 11:31 • (LCSD) R4126776-3 10/01/24 12:10

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2,2,4-Trimethylpentane	3.75	3.25	3.21	86.7	85.6	70.0-130			1.24	25
(S) 1,4-Bromofluorobenzene				*91.0*	*91.6*	*60.0-140*				

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

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

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Pace® Location Requested (City/State):

Air CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

4072 9188 6779

Sample Receipt Checklist
COC Seal Present/Intact: Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Unused:
Airs
Size: 1L 6L 1.4L
Tage Color: G W P B
Tubing Shunt
T/B#:

Company Name: Ramboll US Consulting, Inc. - Denver

Street Address: 1999 Broadway Suite 2225
Denver, CO 80202

City, State Zip:

Customer Project #:

Project Name: Monthyl GW Calumet - Great Falls, MT

Site Collection Info/Facility ID (as applicable): ENVIRONCO-CALU MONTH

Time Zone Collected: [ ] AK [ ] PT [✓] MT [ ] CT [ ] ET

Contact/Report To: Abby Small

Phone #: 303-382-5474

E-Mail: asmall@ramboll.com;rdeshpande@ramboll.com;eleister@ramboll.com;twvss@ramboll.com

Cc E-Mail:

Invoice to:

Invoice E-Mail:

Purchase Order # (if applicable):

Quote #:

State origin of sample(s):

Field Information

Analyses Requested

7W 8/29

Proj. Manager: 841 - Kelly Mercer

AcctNum / Client ID: ENVIRONCO

Lab Use Only

Table: M177

Profile / Template: T245957

Prelog / Bottle Ord. ID: P1092400

Data Deliverables:
[ ] Level II [ ] Level III [ ] Level IV
[ ] EQUIS
[ ] Other_____

Regulatory Program (CAA, RCRA, etc.) as applicable:

Rush (Pre-approval required): 2 Day 3 day 5 day Other_____

Date Results Requested:

Permit # as applicable:

Units for Reporting: ug/m³ PPBV mg/m³ PPMV

* Matrix Codes (Insert in Matrix box below): Ambient (A), Indoor (I), Soil Vapor (SV), Other (O)

Customer Sample ID	Matrix *	Summa Canister ID	Flow Controller ID	Begin Collection Date	Begin Collection Time	End Collection Date	End Collection Time	Canister Pressure / Vacuum Start Pressure / Vacuum (in Hg)	Canister Pressure / Vacuum End Pressure / Vacuum (in Hg)	PUF / FILTER Duration (minutes)	PUF / FILTER Flow Rate m³/min or L/min	PUF / FILTER Total Volume Sampled m³ or L	TO-15 Summa				Sample Comment
CMR-SP301-240924		012864	009436	09/24	10 21	09/24	10 30	26	2	9	.11	1L	✓				L1781508 -01

Customer Remarks / Special Conditions / Possible Hazards:

Collected By:
Printed Name: Kyle Graves
Signature:

Additional Instructions from Pace®:

Coolers: Thermometer ID: Correction Factor (°C): Obs. Temp. (°C): Corrected Temp. (°C):

Tracking Number:

Delivered by: In- Person Courier FedEX UPS Other

Page:____ of:____

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
	09/24/24 1145	Eurofins Orgn	9/25/24 0900
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace® Terms and Conditions found at https://www.pacelabs.com/resource-library/resource/pace-terms-and-conditions/

APPENDIX B2

DUAL-PHASE EXTRACTION EFFLUENT LIQUID ANALYTICAL RESULTS

Pace Project Numbers:

L1756272, L1768940, L1781830

ANALYTICAL REPORT

July 26, 2024

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

Ramboll US Consulting, Inc. - Denver

Sample Delivery Group:	L1756272
Samples Received:	07/12/2024
Project Number:	
Description:	CMR Great Falls - 2023 RFI Soil Sampling
Site:	GREAT FALLS, MT
Report To:	Abby Small 1999 Broadway Suite 2225 Denver, CO 80202

Entire Report Reviewed By:

Kelly Mercer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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Cn: Case Narrative 4

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CMR-SP200-240711 L1756272-01 GW

Collected by	Collected date/time	Received date/time
Kyle A. Groves	07/11/24 08:30	07/12/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2326447	10	07/21/24 00:54	07/21/24 00:54	CDD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2324610	10	07/17/24 16:04	07/17/24 16:04	DYW	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2326555	20	07/19/24 03:24	07/23/24 13:52	DMG	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2326555	40	07/19/24 03:24	07/24/24 14:51	DMG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2323523	20	07/17/24 08:26	07/18/24 23:37	ALM	Mt. Juliet, TN

TRIP BLANK L1756272-02 GW

Collected by	Collected date/time	Received date/time
Kyle A. Groves	07/11/24 00:00	07/12/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2326447	1	07/20/24 16:19	07/20/24 16:19	CDD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2324610	1	07/17/24 09:58	07/17/24 09:58	DYW	Mt. Juliet, TN

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

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

Kelly Mercer
Project Manager

Project Narrative

Due to multiple preparation procedures, calculated analytes are not reported in the quality control samples for EPH and VPH Methods.

Sample Delivery Group (SDG) Narrative

Analyzed from headspace vial.

Lab Sample ID	Project Sample ID	Method
L1756272-02	TRIP BLANK	MTDEQ VPH

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	1030		333	1000	10	07/21/2024 00:54	WG2326447
Unadjusted C9-C12 Aliphatics	37500		333	1000	10	07/21/2024 00:54	WG2326447
Unadjusted C9-C10 Aromatics	16400		333	1000	10	07/21/2024 00:54	WG2326447
Adjusted C5-C8 Aliphatics	1020		333	1000	10	07/21/2024 00:54	WG2326447
Adjusted C9-C12 Aliphatics	37400		333	1000	10	07/21/2024 00:54	WG2326447
Total VPH	54900		667	2000	10	07/21/2024 00:54	WG2326447
(S) 2,5-Dibromotoluene(FID)	*106*			*70.0-130*		*07/21/2024 00:54*	WG2326447
(S) 2,5-Dibromotoluene(PID)	*71.3*			*70.0-130*		*07/21/2024 00:54*	WG2326447

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U		113	250	10	07/17/2024 16:04	WG2324610
Acrylonitrile	U		6.71	50.0	10	07/17/2024 16:04	WG2324610
Benzene	11.6		0.941	5.00	10	07/17/2024 16:04	WG2324610
Bromobenzene	U		1.18	5.00	10	07/17/2024 16:04	WG2324610
Bromodichloromethane	U		1.36	5.00	10	07/17/2024 16:04	WG2324610
Bromochloromethane	U		1.28	5.00	10	07/17/2024 16:04	WG2324610
Bromoform	U		1.29	5.00	10	07/17/2024 16:04	WG2324610
Bromomethane	U		6.05	25.0	10	07/17/2024 16:04	WG2324610
n-Butylbenzene	U		1.57	5.00	10	07/17/2024 16:04	WG2324610
sec-Butylbenzene	8.28		1.25	5.00	10	07/17/2024 16:04	WG2324610
tert-Butylbenzene	U		1.27	5.00	10	07/17/2024 16:04	WG2324610
Carbon disulfide	U		0.962	5.00	10	07/17/2024 16:04	WG2324610
Carbon tetrachloride	U		1.28	5.00	10	07/17/2024 16:04	WG2324610
Chlorobenzene	U		1.17	5.00	10	07/17/2024 16:04	WG2324610
Chlorodibromomethane	U		1.40	5.00	10	07/17/2024 16:04	WG2324610
Chloroethane	U		1.92	25.0	10	07/17/2024 16:04	WG2324610
2-Chloroethyl vinyl ether	U		5.75	500	10	07/17/2024 16:04	WG2324610
Chloroform	3.50	B J	1.11	5.00	10	07/17/2024 16:04	WG2324610
Chloromethane	U		9.60	12.5	10	07/17/2024 16:04	WG2324610
2-Chlorotoluene	U		1.06	5.00	10	07/17/2024 16:04	WG2324610
4-Chlorotoluene	U		1.14	5.00	10	07/17/2024 16:04	WG2324610
1,2-Dibromo-3-Chloropropane	U		2.76	25.0	10	07/17/2024 16:04	WG2324610
1,2-Dibromoethane	U		1.26	5.00	10	07/17/2024 16:04	WG2324610
Dibromomethane	U		1.22	5.00	10	07/17/2024 16:04	WG2324610
1,2-Dichlorobenzene	U		1.07	5.00	10	07/17/2024 16:04	WG2324610
1,3-Dichlorobenzene	U		2.99	5.00	10	07/17/2024 16:04	WG2324610
1,4-Dichlorobenzene	U		1.20	5.00	10	07/17/2024 16:04	WG2324610
Dichlorodifluoromethane	U		3.74	25.0	10	07/17/2024 16:04	WG2324610
1,1-Dichloroethane	U		1.00	5.00	10	07/17/2024 16:04	WG2324610
1,2-Dichloroethane	U		0.819	5.00	10	07/17/2024 16:04	WG2324610
1,1-Dichloroethene	U		1.88	5.00	10	07/17/2024 16:04	WG2324610
cis-1,2-Dichloroethene	U		1.26	5.00	10	07/17/2024 16:04	WG2324610
trans-1,2-Dichloroethene	U		1.49	5.00	10	07/17/2024 16:04	WG2324610
1,2-Dichloropropane	U		1.49	5.00	10	07/17/2024 16:04	WG2324610
1,1-Dichloropropene	U		1.42	5.00	10	07/17/2024 16:04	WG2324610
1,3-Dichloropropane	U		1.09	10.0	10	07/17/2024 16:04	WG2324610
cis-1,3-Dichloropropene	U		1.11	5.00	10	07/17/2024 16:04	WG2324610
trans-1,3-Dichloropropene	U		1.18	5.00	10	07/17/2024 16:04	WG2324610
trans-1,4-Dichloro-2-butene	U		4.67	50.0	10	07/17/2024 16:04	WG2324610
2,2-Dichloropropane	U		1.61	5.00	10	07/17/2024 16:04	WG2324610
Di-isopropyl ether	U		1.05	5.00	10	07/17/2024 16:04	WG2324610
Ethylbenzene	9.73		1.37	5.00	10	07/17/2024 16:04	WG2324610
Hexachloro-1,3-butadiene	U		3.37	10.0	10	07/17/2024 16:04	WG2324610

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Hexanone	U		7.87	50.0	10	07/17/2024 16:04	WG2324610
n-Hexane	U		7.49	50.0	10	07/17/2024 16:04	WG2324610
Iodomethane	U		5.54	50.0	10	07/17/2024 16:04	WG2324610
Isopropylbenzene	2.02	J	1.05	5.00	10	07/17/2024 16:04	WG2324610
p-Isopropyltoluene	U		1.20	5.00	10	07/17/2024 16:04	WG2324610
2-Butanone (MEK)	U		11.9	50.0	10	07/17/2024 16:04	WG2324610
Methylene Chloride	U		4.30	25.0	10	07/17/2024 16:04	WG2324610
4-Methyl-2-pentanone (MIBK)	U		4.78	50.0	10	07/17/2024 16:04	WG2324610
Methyl tert-butyl ether	U		1.01	5.00	10	07/17/2024 16:04	WG2324610
Naphthalene	88.5		1.74	25.0	10	07/17/2024 16:04	WG2324610
n-Propylbenzene	5.20		0.993	5.00	10	07/17/2024 16:04	WG2324610
Styrene	U		1.18	5.00	10	07/17/2024 16:04	WG2324610
1,1,1,2-Tetrachloroethane	U		1.47	5.00	10	07/17/2024 16:04	WG2324610
1,1,2,2-Tetrachloroethane	U		1.33	5.00	10	07/17/2024 16:04	WG2324610
1,1,2-Trichlorotrifluoroethane	U		1.80	5.00	10	07/17/2024 16:04	WG2324610
Tetrachloroethene	U		3.00	5.00	10	07/17/2024 16:04	WG2324610
Toluene	U		2.78	5.00	10	07/17/2024 16:04	WG2324610
1,2,3-Trichlorobenzene	U		1.64	5.00	10	07/17/2024 16:04	WG2324610
1,2,4-Trichlorobenzene	U		4.81	10.0	10	07/17/2024 16:04	WG2324610
1,1,1-Trichloroethane	U		1.49	5.00	10	07/17/2024 16:04	WG2324610
1,1,2-Trichloroethane	U		1.58	5.00	10	07/17/2024 16:04	WG2324610
Trichloroethene	U		1.90	5.00	10	07/17/2024 16:04	WG2324610
Trichlorofluoromethane	U		1.60	25.0	10	07/17/2024 16:04	WG2324610
1,2,3-Trichloropropane	U		2.37	25.0	10	07/17/2024 16:04	WG2324610
1,2,4-Trimethylbenzene	217		3.22	5.00	10	07/17/2024 16:04	WG2324610
1,2,3-Trimethylbenzene	237		1.04	5.00	10	07/17/2024 16:04	WG2324610
1,3,5-Trimethylbenzene	163		1.04	5.00	10	07/17/2024 16:04	WG2324610
Vinyl acetate	U		6.92	50.0	10	07/17/2024 16:04	WG2324610
Vinyl chloride	U		2.34	5.00	10	07/17/2024 16:04	WG2324610
Xylenes, Total	119		1.74	15.0	10	07/17/2024 16:04	WG2324610
(S) Toluene-d8	*104*			*80.0-120*		*07/17/2024 16:04*	WG2324610
(S) 4-Bromofluorobenzene	*119*			*77.0-126*		*07/17/2024 16:04*	WG2324610
(S) 1,2-Dichloroethane-d4	*101*			*70.0-130*		*07/17/2024 16:04*	WG2324610

TPH by Method MTDEQ EPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C9-C18 Aliphatics	136000		8000	24000	40	07/24/2024 14:51	WG2326555
Unadjusted C19-C36 Aliphatics	48300		8000	24000	40	07/24/2024 14:51	WG2326555
Unadjusted C11-C22 Aromatics	52100		4000	12000	20	07/23/2024 13:52	WG2326555
Unadjusted Total Petroleum Hydrocarbons	236000		8000	24000	40	07/24/2024 14:51	WG2326555
Adjusted C11-C22 Aromatics	52100		4000	12000	20	07/23/2024 13:52	WG2326555
Adjusted Total Petroleum Hydrocarbons	236000		8000	24000	40	07/24/2024 14:51	WG2326555
(S) o-Terphenyl	*0.000*	J7		*40.0-140*		*07/23/2024 13:52*	WG2326555
(S) 1-Chloro-octadecane	*0.000*	J7		*40.0-140*		*07/24/2024 14:51*	WG2326555
(S) 2-Fluorobiphenyl	*0.000*	J7		*40.0-140*		*07/23/2024 13:52*	WG2326555
(S) 2-Bromonaphthalene	*0.000*	J7		*40.0-140*		*07/23/2024 13:52*	WG2326555

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		1.77	20.0	20	07/18/2024 23:37	WG2323523
Acenaphthylene	U		1.84	20.0	20	07/18/2024 23:37	WG2323523
Anthracene	U		1.61	20.0	20	07/18/2024 23:37	WG2323523
Benzidine	U	J3 J4	74.8	200	20	07/18/2024 23:37	WG2323523
Benzo(a)anthracene	U		3.98	20.0	20	07/18/2024 23:37	WG2323523
Benzo(b)fluoranthene	U		2.60	20.0	20	07/18/2024 23:37	WG2323523
Benzo(k)fluoranthene	U		2.40	20.0	20	07/18/2024 23:37	WG2323523
Benzo(g,h,i)perylene	U		2.42	20.0	20	07/18/2024 23:37	WG2323523
Benzo(a)pyrene	U		0.762	20.0	20	07/18/2024 23:37	WG2323523
Bis(2-chlorethoxy)methane	U		2.32	200	20	07/18/2024 23:37	WG2323523
Bis(2-chloroethyl)ether	U		2.74	200	20	07/18/2024 23:37	WG2323523
2,2-Oxybis(1-Chloropropane)	U		4.20	200	20	07/18/2024 23:37	WG2323523
4-Bromophenyl-phenylether	U		1.75	200	20	07/18/2024 23:37	WG2323523
2-Chloronaphthalene	U		1.30	20.0	20	07/18/2024 23:37	WG2323523
4-Chlorophenyl-phenylether	U		1.85	200	20	07/18/2024 23:37	WG2323523
Chrysene	U		2.60	20.0	20	07/18/2024 23:37	WG2323523
Dibenz(a,h)anthracene	U		1.29	20.0	20	07/18/2024 23:37	WG2323523
3,3-Dichlorobenzidine	U		4.24	200	20	07/18/2024 23:37	WG2323523
2,4-Dinitrotoluene	U		1.97	200	20	07/18/2024 23:37	WG2323523
2,6-Dinitrotoluene	U		5.00	200	20	07/18/2024 23:37	WG2323523
Fluoranthene	U		2.04	20.0	20	07/18/2024 23:37	WG2323523
Fluorene	U		1.69	20.0	20	07/18/2024 23:37	WG2323523
Hexachlorobenzene	U		1.51	20.0	20	07/18/2024 23:37	WG2323523
Hexachloro-1,3-butadiene	U		1.94	200	20	07/18/2024 23:37	WG2323523
Hexachlorocyclopentadiene	U		1.20	200	20	07/18/2024 23:37	WG2323523
Hexachloroethane	U		2.54	200	20	07/18/2024 23:37	WG2323523
Indeno(1,2,3-cd)pyrene	U		5.58	20.0	20	07/18/2024 23:37	WG2323523
Isophorone	U		2.86	200	20	07/18/2024 23:37	WG2323523
Naphthalene	11.8	J	3.18	20.0	20	07/18/2024 23:37	WG2323523
Nitrobenzene	U		5.94	200	20	07/18/2024 23:37	WG2323523
n-Nitrosodimethylamine	U		20.0	200	20	07/18/2024 23:37	WG2323523
n-Nitrosodiphenylamine	U		47.4	200	20	07/18/2024 23:37	WG2323523
n-Nitrosodi-n-propylamine	U		5.22	200	20	07/18/2024 23:37	WG2323523
Phenanthrene	11.2	J	2.24	20.0	20	07/18/2024 23:37	WG2323523
Benzylbutyl phthalate	U		15.3	60.0	20	07/18/2024 23:37	WG2323523
Bis(2-Ethylhexyl)phthalate	U		17.9	60.0	20	07/18/2024 23:37	WG2323523
Di-n-butyl phthalate	U		9.06	60.0	20	07/18/2024 23:37	WG2323523
Diethyl phthalate	U		5.74	60.0	20	07/18/2024 23:37	WG2323523
Dimethyl phthalate	U		5.20	60.0	20	07/18/2024 23:37	WG2323523
Di-n-octyl phthalate	U		18.6	60.0	20	07/18/2024 23:37	WG2323523
Pyrene	4.54	J	2.14	20.0	20	07/18/2024 23:37	WG2323523
1,2,4-Trichlorobenzene	U		1.40	200	20	07/18/2024 23:37	WG2323523
Aniline	U	J3	33.0	200	20	07/18/2024 23:37	WG2323523
1,2-Diphenylhydrazine	U	N2	2.10	200	20	07/18/2024 23:37	WG2323523
Benzyl alcohol	U		11.3	200	20	07/18/2024 23:37	WG2323523
4-Chloroaniline	U		4.68	200	20	07/18/2024 23:37	WG2323523
4-Chloro-3-methylphenol	U		2.62	200	20	07/18/2024 23:37	WG2323523
2-Chlorophenol	U		2.66	200	20	07/18/2024 23:37	WG2323523
Dibenzofuran	U		1.94	200	20	07/18/2024 23:37	WG2323523
2,4-Dichlorophenol	U		2.04	200	20	07/18/2024 23:37	WG2323523
2,4-Dimethylphenol	U		1.27	200	20	07/18/2024 23:37	WG2323523
4,6-Dinitro-2-methylphenol	U		22.4	200	20	07/18/2024 23:37	WG2323523
2,4-Dinitrophenol	U		119	200	20	07/18/2024 23:37	WG2323523
2-Methylnaphthalene	33.9		2.34	20.0	20	07/18/2024 23:37	WG2323523
2-Methylphenol	U		1.86	200	20	07/18/2024 23:37	WG2323523
3&4-Methyl Phenol	U		3.36	200	20	07/18/2024 23:37	WG2323523

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Nitroaniline	U		2.04	200	20	07/18/2024 23:37	WG2323523
3-Nitroaniline	U		1.74	200	20	07/18/2024 23:37	WG2323523
4-Nitroaniline	U		1.82	200	20	07/18/2024 23:37	WG2323523
2-Nitrophenol	U		2.34	200	20	07/18/2024 23:37	WG2323523
4-Nitrophenol	U		2.86	200	20	07/18/2024 23:37	WG2323523
Pentachlorophenol	U		6.26	200	20	07/18/2024 23:37	WG2323523
Phenol	U		86.6	200	20	07/18/2024 23:37	WG2323523
Pyridine	U	J3 J4	12.5	200	20	07/18/2024 23:37	WG2323523
2,4,6-Trichlorophenol	U		2.00	200	20	07/18/2024 23:37	WG2323523
Acetophenone	U		4.16	200	20	07/18/2024 23:37	WG2323523
2-Acetylaminofluorene	U		5.06	200	20	07/18/2024 23:37	WG2323523
4-Aminobiphenyl	U		9.22	200	20	07/18/2024 23:37	WG2323523
Chlorobenzilate	U		76.8	1000	20	07/18/2024 23:37	WG2323523
Diallate	U		10.5	200	20	07/18/2024 23:37	WG2323523
2,6-Dichlorophenol	U		2.04	200	20	07/18/2024 23:37	WG2323523
Dimethoate	U		101	1000	20	07/18/2024 23:37	WG2323523
P-(Dimethylamino) Azobenzene	U		73.8	200	20	07/18/2024 23:37	WG2323523
Dimethylbenz (A) Anthracene	U		34.2	200	20	07/18/2024 23:37	WG2323523
3,3-Dimethylbenzidine	U		67.8	200	20	07/18/2024 23:37	WG2323523
a,a-Dimethylphenethylamine	U	J4	62.6	1000	20	07/18/2024 23:37	WG2323523
1,3-Dinitrobenzene	U		7.18	200	20	07/18/2024 23:37	WG2323523
Diphenylamine	U		47.4	200	20	07/18/2024 23:37	WG2323523
Dinoseb	U		160	1000	20	07/18/2024 23:37	WG2323523
Disulfoton	U		5.34	200	20	07/18/2024 23:37	WG2323523
Ethyl methanesulfonate	U		6.52	200	20	07/18/2024 23:37	WG2323523
Ethyl Parathion	U		7.58	200	20	07/18/2024 23:37	WG2323523
Famphur	U		78.4	400	20	07/18/2024 23:37	WG2323523
Hexachloropropene	U		2.98	1000	20	07/18/2024 23:37	WG2323523
Hexachlorophene	U		28.8	1000	20	07/18/2024 23:37	WG2323523
Isodrin	U		82.2	200	20	07/18/2024 23:37	WG2323523
Isosafrole	U		77.6	200	20	07/18/2024 23:37	WG2323523
Kepone	U	J4	53.2	400	20	07/18/2024 23:37	WG2323523
Methapyrilene	U	J4	200	1000	20	07/18/2024 23:37	WG2323523
3-Methylcholanthrene	U		3.28	200	20	07/18/2024 23:37	WG2323523
Methyl methanesulfonate	U		68.0	1000	20	07/18/2024 23:37	WG2323523
Methyl parathion	U		4.26	200	20	07/18/2024 23:37	WG2323523
1,4-Naphthoquinone	U	J4	111	1000	20	07/18/2024 23:37	WG2323523
1-Naphthylamine	U		5.78	200	20	07/18/2024 23:37	WG2323523
2-Naphthylamine	U		89.6	200	20	07/18/2024 23:37	WG2323523
5-Nitro-o-toluidine	U		39.8	200	20	07/18/2024 23:37	WG2323523
4-Nitroquinoline 1-oxide	U		40.6	200	20	07/18/2024 23:37	WG2323523
n-Nitrosodiethylamine	U		71.4	200	20	07/18/2024 23:37	WG2323523
n-Nitrosodi-n-butylamine	U		78.2	200	20	07/18/2024 23:37	WG2323523
n-Nitrosomethylethylamine	U		65.0	200	20	07/18/2024 23:37	WG2323523
n-Nitrosomorpholine	U		65.0	200	20	07/18/2024 23:37	WG2323523
n-Nitrosopiperidine	U		74.4	200	20	07/18/2024 23:37	WG2323523
n-Nitrosopyrrolidine	U		67.8	200	20	07/18/2024 23:37	WG2323523
Pentachlorobenzene	U		83.0	200	20	07/18/2024 23:37	WG2323523
Pentachloroethane	U		56.6	1000	20	07/18/2024 23:37	WG2323523
Pentachloronitrobenzene	U		83.0	200	20	07/18/2024 23:37	WG2323523
Phenacetin	U		93.2	200	20	07/18/2024 23:37	WG2323523
p-Phenylenediamine	U	J4	7740	138000	20	07/18/2024 23:37	WG2323523
Phorate	U		97.2	1000	20	07/18/2024 23:37	WG2323523
2-Picoline	U	J4	137	1000	20	07/18/2024 23:37	WG2323523
Pronamide	U		84.2	200	20	07/18/2024 23:37	WG2323523
Safrole	U		73.6	200	20	07/18/2024 23:37	WG2323523

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfotep	U		79.8	1000	20	07/18/2024 23:37	WG2323523
1,2,4,5-Tetrachlorobenzene	U		1.29	200	20	07/18/2024 23:37	WG2323523
2,3,4,6-Tetrachlorophenol	U		4.62	200	20	07/18/2024 23:37	WG2323523
Thionazin	U		81.4	200	20	07/18/2024 23:37	WG2323523
o-Toluidine	U		70.6	200	20	07/18/2024 23:37	WG2323523
2,4,5-Trichlorophenol	U		2.18	200	20	07/18/2024 23:37	WG2323523
O,O,O-Triethyl Phosphorothioate	U		58.6	200	20	07/18/2024 23:37	WG2323523
1,3,5-Trinitrobenzene	U		26.4	200	20	07/18/2024 23:37	WG2323523
(S) 2-Fluorophenol	*17.6*	J7		*10.0-120*		*07/18/2024 23:37*	WG2323523
(S) Phenol-d5	*0.000*	J7		*10.0-120*		*07/18/2024 23:37*	WG2323523
(S) Nitrobenzene-d5	*0.000*	J7		*10.0-127*		*07/18/2024 23:37*	WG2323523
(S) 2-Fluorobiphenyl	*54.4*	J7		*10.0-130*		*07/18/2024 23:37*	WG2323523
(S) 2,4,6-Tribromophenol	*52.6*	J7		*10.0-155*		*07/18/2024 23:37*	WG2323523
(S) p-Terphenyl-d14	*48.0*	J7		*10.0-128*		*07/18/2024 23:37*	WG2323523

Sample Narrative:

L1756272-01 WG2323523: Surrogate failure & dilution due to matrix interference

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	U		33.3	100	1	07/20/2024 16:19	WG2326447
Unadjusted C9-C12 Aliphatics	U		33.3	100	1	07/20/2024 16:19	WG2326447
Unadjusted C9-C10 Aromatics	U		33.3	100	1	07/20/2024 16:19	WG2326447
Adjusted C5-C8 Aliphatics	U		33.3	100	1	07/20/2024 16:19	WG2326447
Adjusted C9-C12 Aliphatics	U		33.3	100	1	07/20/2024 16:19	WG2326447
Total VPH	U		66.7	200	1	07/20/2024 16:19	WG2326447
(S) 2,5-Dibromotoluene(FID)	*102*			*70.0-130*		*07/20/2024 16:19*	WG2326447
(S) 2,5-Dibromotoluene(PID)	*108*			*70.0-130*		*07/20/2024 16:19*	WG2326447

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U		11.3	25.0	1	07/17/2024 09:58	WG2324610
Acrylonitrile	U		0.671	5.00	1	07/17/2024 09:58	WG2324610
Benzene	U		0.0941	0.500	1	07/17/2024 09:58	WG2324610
Bromobenzene	U		0.118	0.500	1	07/17/2024 09:58	WG2324610
Bromodichloromethane	U		0.136	0.500	1	07/17/2024 09:58	WG2324610
Bromochloromethane	U		0.128	0.500	1	07/17/2024 09:58	WG2324610
Bromoform	U		0.129	0.500	1	07/17/2024 09:58	WG2324610
Bromomethane	U		0.605	2.50	1	07/17/2024 09:58	WG2324610
n-Butylbenzene	U		0.157	0.500	1	07/17/2024 09:58	WG2324610
sec-Butylbenzene	U		0.125	0.500	1	07/17/2024 09:58	WG2324610
tert-Butylbenzene	U		0.127	0.500	1	07/17/2024 09:58	WG2324610
Carbon disulfide	U		0.0962	0.500	1	07/17/2024 09:58	WG2324610
Carbon tetrachloride	U		0.128	0.500	1	07/17/2024 09:58	WG2324610
Chlorobenzene	U		0.117	0.500	1	07/17/2024 09:58	WG2324610
Chlorodibromomethane	U		0.140	0.500	1	07/17/2024 09:58	WG2324610
Chloroethane	U		0.192	2.50	1	07/17/2024 09:58	WG2324610
2-Chloroethyl vinyl ether	U		0.575	50.0	1	07/17/2024 09:58	WG2324610
Chloroform	U		0.111	0.500	1	07/17/2024 09:58	WG2324610
Chloromethane	U		0.960	1.25	1	07/17/2024 09:58	WG2324610
2-Chlorotoluene	U		0.106	0.500	1	07/17/2024 09:58	WG2324610
4-Chlorotoluene	U		0.114	0.500	1	07/17/2024 09:58	WG2324610
1,2-Dibromo-3-Chloropropane	U		0.276	2.50	1	07/17/2024 09:58	WG2324610
1,2-Dibromoethane	U		0.126	0.500	1	07/17/2024 09:58	WG2324610
Dibromomethane	U		0.122	0.500	1	07/17/2024 09:58	WG2324610
1,2-Dichlorobenzene	U		0.107	0.500	1	07/17/2024 09:58	WG2324610
1,3-Dichlorobenzene	U		0.299	0.500	1	07/17/2024 09:58	WG2324610
1,4-Dichlorobenzene	U		0.120	0.500	1	07/17/2024 09:58	WG2324610
Dichlorodifluoromethane	U		0.374	2.50	1	07/17/2024 09:58	WG2324610
1,1-Dichloroethane	U		0.100	0.500	1	07/17/2024 09:58	WG2324610
1,2-Dichloroethane	U		0.0819	0.500	1	07/17/2024 09:58	WG2324610
1,1-Dichloroethene	U		0.188	0.500	1	07/17/2024 09:58	WG2324610
cis-1,2-Dichloroethene	U		0.126	0.500	1	07/17/2024 09:58	WG2324610
trans-1,2-Dichloroethene	U		0.149	0.500	1	07/17/2024 09:58	WG2324610
1,2-Dichloropropane	U		0.149	0.500	1	07/17/2024 09:58	WG2324610
1,1-Dichloropropene	U		0.142	0.500	1	07/17/2024 09:58	WG2324610
1,3-Dichloropropane	U		0.109	1.00	1	07/17/2024 09:58	WG2324610
cis-1,3-Dichloropropene	U		0.111	0.500	1	07/17/2024 09:58	WG2324610
trans-1,3-Dichloropropene	U		0.118	0.500	1	07/17/2024 09:58	WG2324610
trans-1,4-Dichloro-2-butene	U		0.467	5.00	1	07/17/2024 09:58	WG2324610
2,2-Dichloropropane	U		0.161	0.500	1	07/17/2024 09:58	WG2324610
Di-isopropyl ether	U		0.105	0.500	1	07/17/2024 09:58	WG2324610
Ethylbenzene	U		0.137	0.500	1	07/17/2024 09:58	WG2324610
Hexachloro-1,3-butadiene	U		0.337	1.00	1	07/17/2024 09:58	WG2324610

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Hexanone	U		0.787	5.00	1	07/17/2024 09:58	WG2324610
n-Hexane	U		0.749	5.00	1	07/17/2024 09:58	WG2324610
Iodomethane	U		0.554	5.00	1	07/17/2024 09:58	WG2324610
Isopropylbenzene	U		0.105	0.500	1	07/17/2024 09:58	WG2324610
p-Isopropyltoluene	U		0.120	0.500	1	07/17/2024 09:58	WG2324610
2-Butanone (MEK)	U		1.19	5.00	1	07/17/2024 09:58	WG2324610
Methylene Chloride	U		0.430	2.50	1	07/17/2024 09:58	WG2324610
4-Methyl-2-pentanone (MIBK)	U		0.478	5.00	1	07/17/2024 09:58	WG2324610
Methyl tert-butyl ether	U		0.101	0.500	1	07/17/2024 09:58	WG2324610
Naphthalene	U		0.174	2.50	1	07/17/2024 09:58	WG2324610
n-Propylbenzene	U		0.0993	0.500	1	07/17/2024 09:58	WG2324610
Styrene	U		0.118	0.500	1	07/17/2024 09:58	WG2324610
1,1,1,2-Tetrachloroethane	U		0.147	0.500	1	07/17/2024 09:58	WG2324610
1,1,2,2-Tetrachloroethane	U		0.133	0.500	1	07/17/2024 09:58	WG2324610
1,1,2-Trichlorotrifluoroethane	U		0.180	0.500	1	07/17/2024 09:58	WG2324610
Tetrachloroethene	U		0.300	0.500	1	07/17/2024 09:58	WG2324610
Toluene	U		0.278	0.500	1	07/17/2024 09:58	WG2324610
1,2,3-Trichlorobenzene	U		0.164	0.500	1	07/17/2024 09:58	WG2324610
1,2,4-Trichlorobenzene	U		0.481	1.00	1	07/17/2024 09:58	WG2324610
1,1,1-Trichloroethane	U		0.149	0.500	1	07/17/2024 09:58	WG2324610
1,1,2-Trichloroethane	U		0.158	0.500	1	07/17/2024 09:58	WG2324610
Trichloroethene	U		0.190	0.500	1	07/17/2024 09:58	WG2324610
Trichlorofluoromethane	U		0.160	2.50	1	07/17/2024 09:58	WG2324610
1,2,3-Trichloropropane	U		0.237	2.50	1	07/17/2024 09:58	WG2324610
1,2,4-Trimethylbenzene	U		0.322	0.500	1	07/17/2024 09:58	WG2324610
1,2,3-Trimethylbenzene	U		0.104	0.500	1	07/17/2024 09:58	WG2324610
1,3,5-Trimethylbenzene	U		0.104	0.500	1	07/17/2024 09:58	WG2324610
Vinyl acetate	U		0.692	5.00	1	07/17/2024 09:58	WG2324610
Vinyl chloride	U		0.234	0.500	1	07/17/2024 09:58	WG2324610
Xylenes, Total	U		0.174	1.50	1	07/17/2024 09:58	WG2324610
(S) Toluene-d8	*106*			*80.0-120*		*07/17/2024 09:58*	WG2324610
(S) 4-Bromofluorobenzene	*97.5*			*77.0-126*		*07/17/2024 09:58*	WG2324610
(S) 1,2-Dichloroethane-d4	*106*			*70.0-130*		*07/17/2024 09:58*	WG2324610

Method Blank (MB)

(MB) R4097378-3 07/20/24 12:37

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C5-C8 Aliphatics	U		33.3	100
Unadjusted C9-C12 Aliphatics	U		33.3	100
Unadjusted C9-C10 Aromatics	U		33.3	100
Adjusted C5-C8 Aliphatics	U		33.3	100
Adjusted C9-C12 Aliphatics	U		33.3	100
Total VPH	U		66.7	200
(S) 2,5-Dibromotoluene(FID)	*100*			*70.0-130*
(S) 2,5-Dibromotoluene(PID)	*107*			*70.0-130*

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

(LCS) R4097378-1 07/20/24 10:10 • (LCSD) R4097378-2 07/20/24 10:47

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C5-C8 Aliphatics	1200	1010	1000	84.2	83.3	70.0-130			0.995	50
Unadjusted C9-C12 Aliphatics	1400	1380	1340	98.6	95.7	70.0-130			2.94	50
Unadjusted C9-C10 Aromatics	200	209	210	104	105	70.0-130			0.477	50
Total VPH	2800	2600	2550	92.9	91.1	70.0-130			1.94	50
(S) 2,5-Dibromotoluene(FID)				*106*	*100*	*70.0-130*				
(S) 2,5-Dibromotoluene(PID)				*109*	*106*	*70.0-130*				

Method Blank (MB)

(MB) R4096789-2 07/17/24 08:17

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	25.0
Acrylonitrile	U		0.671	5.00
Benzene	U		0.0941	0.500
Bromobenzene	U		0.118	0.500
Bromodichloromethane	U		0.136	0.500
Bromochloromethane	U		0.128	0.500
Bromoform	U		0.129	0.500
Bromomethane	U		0.605	2.50
n-Butylbenzene	U		0.157	0.500
sec-Butylbenzene	U		0.125	0.500
tert-Butylbenzene	U		0.127	0.500
Carbon disulfide	U		0.0962	0.500
Carbon tetrachloride	U		0.128	0.500
Chlorobenzene	U		0.117	0.500
Chlorodibromomethane	U		0.140	0.500
Chloroethane	U		0.192	2.50
2-Chloroethyl vinyl ether	U		0.575	50.0
Chloroform	0.443	J	0.111	0.500
Chloromethane	U		0.960	1.25
2-Chlorotoluene	U		0.106	0.500
4-Chlorotoluene	U		0.114	0.500
1,2-Dibromo-3-Chloropropane	U		0.276	2.50
1,2-Dibromoethane	U		0.126	0.500
Dibromomethane	U		0.122	0.500
1,2-Dichlorobenzene	U		0.107	0.500
1,3-Dichlorobenzene	U		0.299	0.500
1,4-Dichlorobenzene	U		0.120	0.500
Dichlorodifluoromethane	U		0.374	2.50
1,1-Dichloroethane	U		0.100	0.500
1,2-Dichloroethane	U		0.0819	0.500
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.126	0.500
trans-1,2-Dichloroethene	U		0.149	0.500
1,2-Dichloropropane	U		0.149	0.500
1,1-Dichloropropene	U		0.142	0.500
1,3-Dichloropropane	U		0.109	1.00
cis-1,3-Dichloropropene	U		0.111	0.500
trans-1,3-Dichloropropene	U		0.118	0.500
trans-1,4-Dichloro-2-butene	U		0.467	5.00
2,2-Dichloropropane	U		0.161	0.500

Method Blank (MB)

(MB) R4096789-2 07/17/24 08:17

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Di-isopropyl ether	U		0.105	0.500
Ethylbenzene	U		0.137	0.500
Hexachloro-1,3-butadiene	U		0.337	1.00
2-Hexanone	U		0.787	5.00
n-Hexane	U		0.749	5.00
Iodomethane	U		0.554	5.00
Isopropylbenzene	U		0.105	0.500
p-Isopropyltoluene	U		0.120	0.500
2-Butanone (MEK)	U		1.19	5.00
Methylene Chloride	U		0.430	2.50
4-Methyl-2-pentanone (MIBK)	U		0.478	5.00
Methyl tert-butyl ether	U		0.101	0.500
Naphthalene	U		0.174	2.50
n-Propylbenzene	U		0.0993	0.500
Styrene	U		0.118	0.500
1,1,1,2-Tetrachloroethane	U		0.147	0.500
1,1,2,2-Tetrachloroethane	U		0.133	0.500
1,1,2-Trichlorotrifluoroethane	U		0.180	0.500
Tetrachloroethene	U		0.300	0.500
Toluene	U		0.278	0.500
1,2,3-Trichlorobenzene	U		0.164	0.500
1,2,4-Trichlorobenzene	U		0.481	1.00
1,1,1-Trichloroethane	U		0.149	0.500
1,1,2-Trichloroethane	U		0.158	0.500
Trichloroethene	U		0.190	0.500
Trichlorofluoromethane	U		0.160	2.50
1,2,3-Trichloropropane	U		0.237	2.50
1,2,4-Trimethylbenzene	U		0.322	0.500
1,2,3-Trimethylbenzene	U		0.104	0.500
1,3,5-Trimethylbenzene	U		0.104	0.500
Vinyl acetate	U		0.692	5.00
Vinyl chloride	U		0.234	0.500
Xylenes, Total	U		0.174	1.50
(S) Toluene-d8	*108*			*80.0-120*
(S) 4-Bromofluorobenzene	*94.6*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R4096789-1 07/17/24 07:37

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	25.0	19.8	79.2	19.0-160	J
Acrylonitrile	25.0	21.4	85.6	55.0-149	
Benzene	5.00	4.24	84.8	70.0-123	
Bromobenzene	5.00	4.31	86.2	73.0-121	
Bromodichloromethane	5.00	4.51	90.2	75.0-120	
Bromochloromethane	5.00	5.28	106	76.0-122	
Bromoform	5.00	4.40	88.0	68.0-132	
Bromomethane	5.00	3.42	68.4	10.0-160	
n-Butylbenzene	5.00	4.26	85.2	73.0-125	
sec-Butylbenzene	5.00	4.23	84.6	75.0-125	
tert-Butylbenzene	5.00	4.22	84.4	76.0-124	
Carbon disulfide	5.00	3.96	79.2	61.0-128	
Carbon tetrachloride	5.00	4.79	95.8	68.0-126	
Chlorobenzene	5.00	4.52	90.4	80.0-121	
Chlorodibromomethane	5.00	4.63	92.6	77.0-125	
Chloroethane	5.00	5.23	105	47.0-150	
2-Chloroethyl vinyl ether	25.0	19.6	78.4	51.0-160	J
Chloroform	5.00	4.74	94.8	73.0-120	
Chloromethane	5.00	4.27	85.4	41.0-142	
2-Chlorotoluene	5.00	4.29	85.8	76.0-123	
4-Chlorotoluene	5.00	4.08	81.6	75.0-122	
1,2-Dibromo-3-Chloropropane	5.00	3.73	74.6	58.0-134	
1,2-Dibromoethane	5.00	4.39	87.8	80.0-122	
Dibromomethane	5.00	4.32	86.4	80.0-120	
1,2-Dichlorobenzene	5.00	4.36	87.2	79.0-121	
1,3-Dichlorobenzene	5.00	4.42	88.4	79.0-120	
1,4-Dichlorobenzene	5.00	4.37	87.4	79.0-120	
Dichlorodifluoromethane	5.00	5.36	107	51.0-149	
1,1-Dichloroethane	5.00	4.22	84.4	70.0-126	
1,2-Dichloroethane	5.00	4.58	91.6	70.0-128	
1,1-Dichloroethene	5.00	4.12	82.4	71.0-124	
cis-1,2-Dichloroethene	5.00	4.43	88.6	73.0-120	
trans-1,2-Dichloroethene	5.00	4.50	90.0	73.0-120	
1,2-Dichloropropane	5.00	4.17	83.4	77.0-125	
1,1-Dichloropropene	5.00	4.22	84.4	74.0-126	
1,3-Dichloropropane	5.00	4.56	91.2	80.0-120	
cis-1,3-Dichloropropene	5.00	4.19	83.8	80.0-123	
trans-1,3-Dichloropropene	5.00	4.49	89.8	78.0-124	
trans-1,4-Dichloro-2-butene	5.00	3.82	76.4	33.0-144	J
2,2-Dichloropropane	5.00	4.45	89.0	58.0-130	

Laboratory Control Sample (LCS)

(LCS) R4096789-1 07/17/24 07:37

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Di-isopropyl ether	5.00	4.13	82.6	58.0-138	
Ethylbenzene	5.00	4.47	89.4	79.0-123	
Hexachloro-1,3-butadiene	5.00	4.43	88.6	54.0-138	
2-Hexanone	25.0	19.9	79.6	67.0-149	
n-Hexane	5.00	4.09	81.8	57.0-133	J
Iodomethane	25.0	16.9	67.6	33.0-147	
Isopropylbenzene	5.00	4.39	87.8	76.0-127	
p-Isopropyltoluene	5.00	4.33	86.6	76.0-125	
2-Butanone (MEK)	25.0	19.5	78.0	44.0-160	
Methylene Chloride	5.00	4.18	83.6	67.0-120	
4-Methyl-2-pentanone (MIBK)	25.0	22.3	89.2	68.0-142	
Methyl tert-butyl ether	5.00	4.46	89.2	68.0-125	
Naphthalene	5.00	3.41	68.2	54.0-135	
n-Propylbenzene	5.00	4.18	83.6	77.0-124	
Styrene	5.00	4.29	85.8	73.0-130	
1,1,1,2-Tetrachloroethane	5.00	4.54	90.8	75.0-125	
1,1,2,2-Tetrachloroethane	5.00	3.92	78.4	65.0-130	
1,1,2-Trichlorotrifluoroethane	5.00	4.26	85.2	69.0-132	
Tetrachloroethene	5.00	4.93	98.6	72.0-132	
Toluene	5.00	4.32	86.4	79.0-120	
1,2,3-Trichlorobenzene	5.00	4.15	83.0	50.0-138	
1,2,4-Trichlorobenzene	5.00	4.31	86.2	57.0-137	
1,1,1-Trichloroethane	5.00	4.43	88.6	73.0-124	
1,1,2-Trichloroethane	5.00	4.49	89.8	80.0-120	
Trichloroethene	5.00	4.54	90.8	78.0-124	
Trichlorofluoromethane	5.00	5.30	106	59.0-147	
1,2,3-Trichloropropane	5.00	4.51	90.2	73.0-130	
1,2,4-Trimethylbenzene	5.00	4.23	84.6	76.0-121	
1,2,3-Trimethylbenzene	5.00	4.32	86.4	77.0-120	
1,3,5-Trimethylbenzene	5.00	4.36	87.2	76.0-122	
Vinyl acetate	25.0	19.2	76.8	11.0-160	
Vinyl chloride	5.00	4.71	94.2	67.0-131	
Xylenes, Total	15.0	13.4	89.3	79.0-123	
(S) Toluene-d8			*101*	*80.0-120*	
(S) 4-Bromofluorobenzene			*95.4*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*106*	*70.0-130*	

Method Blank (MB)

(MB) R4097355-1 07/23/24 10:24

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C11-C22 Aromatics	U		200	600
(S) o-Terphenyl	*83.0*			*40.0-140*
(S) 2-Fluorobiphenyl	*94.0*			*40.0-140*
(S) 2-Bromonaphthalene	*97.9*			*40.0-140*

Method Blank (MB)

(MB) R4098205-1 07/24/24 08:51

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C9-C18 Aliphatics	U		200	600
Unadjusted C19-C36 Aliphatics	U		200	600
(S) 1-Chloro-octadecane	*74.1*			*40.0-140*

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

(LCS) R4097355-2 07/23/24 10:47 • (LCSD) R4097355-3 07/23/24 11:10

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C11-C22 Aromatics	1700	1520	1600	89.4	94.1	40.0-140			5.13	25
(S) o-Terphenyl				*87.6*	*90.4*	*40.0-140*				
(S) 2-Fluorobiphenyl				*96.3*	*96.3*	*40.0-140*				
(S) 2-Bromonaphthalene				*102*	*101*	*40.0-140*				

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

(LCS) R4098205-2 07/24/24 09:15 • (LCSD) R4098205-3 07/24/24 09:39

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C9-C18 Aliphatics	600	460	466	76.7	77.7	40.0-140	J	J	1.30	25
Unadjusted C19-C36 Aliphatics	800	815	836	102	104	40.0-140			2.54	25
(S) 1-Chloro-octadecane				*78.9*	*79.4*	*40.0-140*				

L1757131-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1757131-01 07/24/24 10:27 • (MS) R4098205-4 07/24/24 10:51 • (MSD) R4098205-5 07/24/24 11:15

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Unadjusted C9-C18 Aliphatics	570	U	605	517	84.6	69.5	1	40.0-140		J	15.7	50
Unadjusted C19-C36 Aliphatics	760	U	742	721	92.3	90.0	1	40.0-140			2.87	50
(S) 1-Chloro-octadecane					*63.7*	*49.7*		*40.0-140*				

Method Blank (MB)

(MB) R4095914-4 07/18/24 17:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.0886	1.00
Acenaphthylene	U		0.0921	1.00
Anthracene	U		0.0804	1.00
Benzidine	U		3.74	10.0
Benzo(a)anthracene	U		0.199	1.00
Benzo(b)fluoranthene	U		0.130	1.00
Benzo(k)fluoranthene	U		0.120	1.00
Benzo(g,h,i)perylene	U		0.121	1.00
Benzo(a)pyrene	U		0.0381	1.00
Bis(2-chlorethoxy)methane	U		0.116	10.0
Bis(2-chloroethyl)ether	U		0.137	10.0
2,2-Oxybis(1-Chloropropane)	U		0.210	10.0
4-Bromophenyl-phenylether	U		0.0877	10.0
2-Chloronaphthalene	U		0.0648	1.00
4-Chlorophenyl-phenylether	U		0.0926	10.0
Chrysene	U		0.130	1.00
Dibenz(a,h)anthracene	U		0.0644	1.00
3,3-Dichlorobenzidine	U		0.212	10.0
2,4-Dinitrotoluene	U		0.0983	10.0
2,6-Dinitrotoluene	U		0.250	10.0
Fluoranthene	U		0.102	1.00
Fluorene	U		0.0844	1.00
Hexachlorobenzene	U		0.0755	1.00
Hexachloro-1,3-butadiene	U		0.0968	10.0
Hexachlorocyclopentadiene	U		0.0598	10.0
Hexachloroethane	U		0.127	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.143	10.0
Naphthalene	U		0.159	1.00
Nitrobenzene	U		0.297	10.0
n-Nitrosodimethylamine	U		0.998	10.0
n-Nitrosodiphenylamine	U		2.37	10.0
n-Nitrosodi-n-propylamine	U		0.261	10.0
Phenanthrene	U		0.112	1.00
Benzylbutyl phthalate	U		0.765	3.00
Bis(2-Ethylhexyl)phthalate	U		0.895	3.00
Di-n-butyl phthalate	U		0.453	3.00
Diethyl phthalate	U		0.287	3.00
Dimethyl phthalate	U		0.260	3.00
Di-n-octyl phthalate	U		0.932	3.00

Method Blank (MB)

(MB) R4095914-4 07/18/24 17:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyrene	U		0.107	1.00
1,2,4-Trichlorobenzene	U		0.0698	10.0
Aniline	U		1.65	10.0
1,2-Diphenylhydrazine	U	N2	0.105	10.0
Benzyl alcohol	U		0.563	10.0
4-Chloroaniline	U		0.234	10.0
4-Chloro-3-methylphenol	U		0.131	10.0
2-Chlorophenol	U		0.133	10.0
Dibenzofuran	U		0.0970	10.0
2,4-Dichlorophenol	U		0.102	10.0
2,4-Dimethylphenol	U		0.0636	10.0
4,6-Dinitro-2-methylphenol	U		1.12	10.0
2,4-Dinitrophenol	U		5.93	10.0
2-Methylnaphthalene	U		0.117	1.00
2-Methylphenol	U		0.0929	10.0
3&4-Methyl Phenol	U		0.168	10.0
2-Nitroaniline	U		0.102	10.0
3-Nitroaniline	U		0.0869	10.0
4-Nitroaniline	U		0.0910	10.0
2-Nitrophenol	U		0.117	10.0
4-Nitrophenol	U		0.143	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		4.33	10.0
Pyridine	U		0.627	10.0
2,4,6-Trichlorophenol	U		0.100	10.0
Acetophenone	U		0.208	10.0
Diphenylamine	U		2.37	10.0
1,2,4,5-Tetrachlorobenzene	U		0.0647	10.0
2,3,4,6-Tetrachlorophenol	U		0.231	10.0
2,4,5-Trichlorophenol	U		0.109	10.0
(S) 2-Fluorophenol	*32.4*			*10.0-120*
(S) Phenol-d5	*22.6*			*10.0-120*
(S) Nitrobenzene-d5	*54.6*			*10.0-127*
(S) 2-Fluorobiphenyl	*55.1*			*10.0-130*
(S) 2,4,6-Tribromophenol	*58.5*			*10.0-155*
(S) p-Terphenyl-d14	*69.3*			*10.0-128*

Method Blank (MB)

(MB) R4095914-4 07/18/24 17:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
2-Acetylaminofluorene	U		0.253	10.0
4-Aminobiphenyl	U		0.461	10.0
Chlorobenzilate	U		3.84	50.0
Diallate	U		0.524	10.0
2,6-Dichlorophenol	U		0.102	10.0
Dimethoate	U		5.05	50.0
P-(Dimethylamino) Azobenzene	U		3.69	10.0
Dimethylbenz (A) Anthracene	U		1.71	10.0
3,3-Dimethylbenzidine	U		3.39	10.0
a,a-Dimethylphenethylamine	U		3.13	50.0
1,3-Dinitrobenzene	U		0.359	10.0
Dinoseb	U		8.01	50.0
Disulfoton	U		0.267	10.0
Ethyl methanesulfonate	U		0.326	10.0
Ethyl Parathion	U		0.379	10.0
Famphur	U		3.92	20.0
Hexachloropropene	U		0.149	50.0
Hexachlorophene	U		1.44	50.0
Isodrin	U		4.11	10.0
Isosafrole	U		3.88	10.0
Kepone	U		2.66	20.0
Methapyrilene	U		10.0	50.0
3-Methylcholanthrene	U		0.164	10.0
Methyl methanesulfonate	U		3.40	50.0
Methyl parathion	U		0.213	10.0
1,4-Naphthoquinone	U		5.56	50.0
1-Naphthylamine	U		0.289	10.0
2-Naphthylamine	U		4.48	10.0
5-Nitro-o-toluidine	U		1.99	10.0
4-Nitroquinoline 1-oxide	U		2.03	10.0
n-Nitrosodiethylamine	U		3.57	10.0
n-Nitrosodi-n-butylamine	U		3.91	10.0
n-Nitrosomethylethylamine	U		3.25	10.0
n-Nitrosomorpholine	U		3.25	10.0
n-Nitrosopiperidine	U		3.72	10.0
n-Nitrosopyrrolidine	U		3.39	10.0
Pentachlorobenzene	U		4.15	10.0
Pentachloroethane	U		2.83	50.0
Pentachloronitrobenzene	U		4.15	10.0
Phenacetin	U		4.66	10.0

Method Blank (MB)

(MB) R4095914-4 07/18/24 17:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
p-Phenylenediamine	U		387	6900
Phorate	U		4.86	50.0
2-Picoline	U		6.83	50.0
Pronamide	U		4.21	10.0
Safrole	U		3.68	10.0
Sulfotep	U		3.99	50.0
Thionazin	U		4.07	10.0
o-Toluidine	U		3.53	10.0
O,O,O-Triethyl Phosphorothioate	U		2.93	10.0
1,3,5-Trinitrobenzene	U		1.32	10.0

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

(LCS) R4095914-1 07/18/24 16:09 • (LCSD) R4095914-2 07/18/24 16:30

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	31.9	31.2	63.8	62.4	41.0-120			2.22	22
Acenaphthylene	50.0	33.6	33.0	67.2	66.0	43.0-120			1.80	22
Anthracene	50.0	32.5	33.3	65.0	66.6	45.0-120			2.43	20
Benzidine	100	5.67	8.53	5.67	8.53	10.0-120	J J4	J J3 J4	40.3	36
Benzo(a)anthracene	50.0	36.5	33.9	73.0	67.8	47.0-120			7.39	20
Benzo(b)fluoranthene	50.0	34.9	32.9	69.8	65.8	46.0-120			5.90	20
Benzo(k)fluoranthene	50.0	35.6	33.5	71.2	67.0	46.0-120			6.08	21
Benzo(g,h,i)perylene	50.0	31.0	29.7	62.0	59.4	48.0-121			4.28	20
Benzo(a)pyrene	50.0	32.6	30.6	65.2	61.2	47.0-120			6.33	20
Bis(2-chlorethoxy)methane	50.0	30.2	28.7	60.4	57.4	33.0-120			5.09	24
Bis(2-chloroethyl)ether	50.0	32.6	31.5	65.2	63.0	23.0-120			3.43	33
2,2-Oxybis(1-Chloropropane)	50.0	31.9	30.9	63.8	61.8	28.0-120			3.18	31
4-Bromophenyl-phenylether	50.0	35.7	35.3	71.4	70.6	45.0-120			1.13	20
2-Chloronaphthalene	50.0	29.8	28.7	59.6	57.4	37.0-120			3.76	25
4-Chlorophenyl-phenylether	50.0	34.1	33.0	68.2	66.0	44.0-120			3.28	20
Chrysene	50.0	34.0	31.6	68.0	63.2	48.0-120			7.32	20
Dibenz(a,h)anthracene	50.0	30.2	29.4	60.4	58.8	47.0-120			2.68	20
3,3-Dichlorobenzidine	100	71.1	65.0	71.1	65.0	44.0-120			8.96	20
2,4-Dinitrotoluene	50.0	38.1	37.8	76.2	75.6	49.0-124			0.791	20
2,6-Dinitrotoluene	50.0	36.3	34.9	72.6	69.8	46.0-120			3.93	21
Fluoranthene	50.0	35.0	34.9	70.0	69.8	51.0-120			0.286	20
Fluorene	50.0	34.5	33.7	69.0	67.4	47.0-120			2.35	20
Hexachlorobenzene	50.0	37.2	36.0	74.4	72.0	44.0-120			3.28	20

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

(LCS) R4095914-1 07/18/24 16:09 • (LCSD) R4095914-2 07/18/24 16:30

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hexachloro-1,3-butadiene	50.0	24.4	24.1	48.8	48.2	19.0-120			1.24	32
Hexachlorocyclopentadiene	50.0	19.5	20.0	39.0	40.0	15.0-120			2.53	31
Hexachloroethane	50.0	29.0	27.9	58.0	55.8	15.0-120			3.87	37
Indeno(1,2,3-cd)pyrene	50.0	29.2	28.7	58.4	57.4	49.0-122			1.73	20
Isophorone	50.0	29.4	28.4	58.8	56.8	36.0-120			3.46	23
Naphthalene	50.0	29.7	28.6	59.4	57.2	27.0-120			3.77	27
Nitrobenzene	50.0	26.3	25.3	52.6	50.6	27.0-120			3.88	29
n-Nitrosodimethylamine	50.0	21.0	20.9	42.0	41.8	10.0-120			0.477	40
n-Nitrosodiphenylamine	50.0	33.7	33.0	67.4	66.0	47.0-120			2.10	20
n-Nitrosodi-n-propylamine	50.0	34.5	32.4	69.0	64.8	31.0-120			6.28	28
Phenanthrene	50.0	33.4	32.1	66.8	64.2	46.0-120			3.97	20
Benzylbutyl phthalate	50.0	38.5	35.8	77.0	71.6	43.0-121			7.27	20
Bis(2-Ethylhexyl)phthalate	50.0	33.5	31.3	67.0	62.6	43.0-122			6.79	20
Di-n-butyl phthalate	50.0	38.8	40.7	77.6	81.4	49.0-121			4.78	20
Diethyl phthalate	50.0	37.1	36.4	74.2	72.8	48.0-122			1.90	20
Dimethyl phthalate	50.0	34.8	33.8	69.6	67.6	48.0-120			2.92	20
Di-n-octyl phthalate	50.0	37.1	35.0	74.2	70.0	42.0-125			5.83	20
Pyrene	50.0	33.4	30.4	66.8	60.8	47.0-120			9.40	20
1,2,4-Trichlorobenzene	50.0	26.5	25.6	53.0	51.2	24.0-120			3.45	29
Aniline	50.0	12.1	19.8	24.2	39.6	13.0-120		J3	48.3	31
1,2-Diphenylhydrazine	50.0	35.3	34.4	70.6	68.8	41.0-126	N2	N2	2.58	20
Benzyl alcohol	50.0	24.8	24.0	49.6	48.0	25.0-120			3.28	26
4-Chloroaniline	50.0	24.9	26.5	49.8	53.0	25.0-120			6.23	25
4-Chloro-3-methylphenol	50.0	29.6	27.9	59.2	55.8	40.0-120			5.91	21
2-Chlorophenol	50.0	28.3	26.5	56.6	53.0	25.0-120			6.57	35
Dibenzofuran	50.0	32.7	32.1	65.4	64.2	44.0-120			1.85	22
2,4-Dichlorophenol	50.0	28.0	27.2	56.0	54.4	36.0-120			2.90	26
2,4-Dimethylphenol	50.0	31.1	29.9	62.2	59.8	33.0-120			3.93	26
4,6-Dinitro-2-methylphenol	50.0	42.1	41.6	84.2	83.2	38.0-138			1.19	25
2,4-Dinitrophenol	50.0	43.3	41.4	86.6	82.8	10.0-120			4.49	39
2-Methylnaphthalene	50.0	30.5	29.1	61.0	58.2	33.0-120			4.70	25
2-Methylphenol	50.0	26.2	24.5	52.4	49.0	28.0-120			6.71	29
3&4-Methyl Phenol	50.0	29.1	27.4	58.2	54.8	31.0-120			6.02	30
2-Nitroaniline	50.0	39.1	38.8	78.2	77.6	43.0-120			0.770	22
3-Nitroaniline	50.0	37.4	37.3	74.8	74.6	38.0-120			0.268	21
4-Nitroaniline	50.0	38.1	37.9	76.2	75.8	18.0-160			0.526	21
2-Nitrophenol	50.0	32.1	30.8	64.2	61.6	31.0-120			4.13	29
4-Nitrophenol	50.0	16.5	16.3	33.0	32.6	10.0-120			1.22	33
Pentachlorophenol	50.0	31.4	30.5	62.8	61.0	23.0-120			2.91	25
Phenol	50.0	13.3	12.9	26.6	25.8	10.0-120			3.05	36

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

(LCS) R4095914-1 07/18/24 16:09 • (LCSD) R4095914-2 07/18/24 16:30

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Pyridine	50.0	3.88	6.95	7.76	13.9	10.0-120	J J4	J J3	56.7	38
2,4,6-Trichlorophenol	50.0	31.5	31.3	63.0	62.6	42.0-120			0.637	23
Acetophenone	50.0	33.4	31.7	66.8	63.4	29.0-120			5.22	28
Diphenylamine	50.0	33.7	33.0	67.4	66.0	35.0-120			2.10	20
1,2,4,5-Tetrachlorobenzene	50.0	31.2	30.1	62.4	60.2	31.0-121			3.59	27
2,3,4,6-Tetrachlorophenol	50.0	37.5	35.5	75.0	71.0	42.0-132			5.48	22
2,4,5-Trichlorophenol	50.0	35.0	33.5	70.0	67.0	44.0-120			4.38	22
(S) 2-Fluorophenol				*38.0*	*37.1*	*10.0-120*				
(S) Phenol-d5				*27.4*	*27.6*	*10.0-120*				
(S) Nitrobenzene-d5				*57.4*	*56.2*	*10.0-127*				
(S) 2-Fluorobiphenyl				*62.7*	*61.9*	*10.0-130*				
(S) 2,4,6-Tribromophenol				*90.0*	*88.5*	*10.0-155*				
(S) p-Terphenyl-d14				*75.0*	*69.7*	*10.0-128*				

Laboratory Control Sample (LCS)

(LCS) R4095914-3 07/18/24 16:51

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
2-Acetylaminofluorene	50.0	36.2	72.4	32.0-120	
4-Aminobiphenyl	50.0	21.4	42.8	20.0-120	
Chlorobenzilate	50.0	43.2	86.4	29.0-128	J
Diallate	50.0	36.4	72.8	30.0-120	
2,6-Dichlorophenol	50.0	33.6	67.2	19.0-136	
Dimethoate	50.0	35.4	70.8	11.0-134	J
P-(Dimethylamino) Azobenzene	50.0	37.9	75.8	27.0-120	
Dimethylbenz (A) Anthracene	50.0	35.8	71.6	14.0-124	
3,3-Dimethylbenzidine	50.0	7.71	15.4	13.0-120	J
a,a-Dimethylphenethylamine	50.0	0.000	0.000	10.0-129	J4
1,3-Dinitrobenzene	50.0	40.1	80.2	34.0-120	
Diphenylamine	50.0	35.5	71.0	35.0-120	
Dinoseb	50.0	41.5	83.0	39.0-120	J
Disulfoton	50.0	36.4	72.8	32.0-120	
Ethyl methanesulfonate	50.0	34.6	69.2	10.0-120	
Ethyl Parathion	50.0	43.1	86.2	46.0-130	
Famphur	50.0	36.6	73.2	32.0-120	
Hexachloropropene	50.0	15.8	31.6	10.0-120	J
Hexachlorophene	100	14.3	14.3	10.0-120	J
Isodrin	50.0	38.3	76.6	22.0-157	

Laboratory Control Sample (LCS)

(LCS) R4095914-3 07/18/24 16:51

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Isosafrole	50.0	35.6	71.2	25.0-133	
Kepone	50.0	64.8	130	10.0-120	J4
Methapyrilene	50.0	2.37	4.74	10.0-120	J J4
3-Methylcholanthrene	50.0	38.0	76.0	30.0-160	
Methyl methanesulfonate	50.0	24.0	48.0	10.0-120	J
Methyl parathion	50.0	46.8	93.6	42.0-120	
1,4-Naphthoquinone	50.0	1.38	2.76	50.0-150	J J4
1-Naphthylamine	50.0	25.8	51.6	19.0-120	
2-Naphthylamine	50.0	13.6	27.2	10.0-120	
5-Nitro-o-toluidine	50.0	41.6	83.2	34.0-120	
4-Nitroquinoline 1-oxide	50.0	28.1	56.2	10.0-159	
n-Nitrosodiethylamine	50.0	33.2	66.4	10.0-120	
n-Nitrosodi-n-butylamine	50.0	38.1	76.2	13.0-143	
n-Nitrosomethylethylamine	50.0	28.4	56.8	10.0-120	
n-Nitrosomorpholine	50.0	36.8	73.6	10.0-120	
n-Nitrosopiperidine	50.0	38.0	76.0	10.0-160	
n-Nitrosopyrrolidine	50.0	36.9	73.8	10.0-124	
Pentachlorobenzene	50.0	34.0	68.0	25.0-120	
Pentachloroethane	50.0	30.0	60.0	10.0-120	J
Pentachloronitrobenzene	50.0	39.7	79.4	34.0-132	
Phenacetin	50.0	43.5	87.0	34.0-127	
p-Phenylenediamine	50.0	0.000	0.000	50.0-150	J4
Phorate	50.0	35.1	70.2	13.0-160	J
2-Picoline	50.0	3.75	7.50	10.0-120	J J4
Pronamide	50.0	40.4	80.8	38.0-130	
Safrole	50.0	33.2	66.4	21.0-120	
Sulfotep	50.0	38.8	77.6	52.0-120	J
Thionazin	50.0	41.4	82.8	38.0-121	
o-Toluidine	50.0	25.9	51.8	10.0-120	
O,O,O-Triethyl Phosphorothioate	50.0	32.2	64.4	11.0-135	
1,3,5-Trinitrobenzene	50.0	65.0	130	37.0-147	

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
N2	Analyte reported using a calibration and validation based on Azobenzene (CAS 103-33-3). 1,2-Diphenylhydrazine decomposes into Azobenzene during the analysis.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

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Denver, CO 80202

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Email To: asmall@ramboll.com;rdeshpande@ramboll.com

Project Description: CMR Great Falls - 2023 RFI Soil Sampling

City/State Collected: Great Falls, MT

Please Circle: PT MT CT ET

Phone: 303-382-5474

Client Project #

Lab Project #: ENVIRONCO-CALU MONTH

Collected by (print): Kyle Groves

Site/Facility ID #: GREAT FALLS, MT

P.O. #

Collected by (signature): [signature]

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace® PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 175672
C067

Acctnum: ENVIRONCO
Template: T245953
Prelogin: P1079695
PM: 841 - Kelly Mercer
PB: 6.4.24 BK
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270AP9 100ml Amb NoPres	SVEPHMT 1L-Amb-Add HCl	V8260LL 40mlAmb-HCl	V8260LL 40mlAmb-HCl-Blk	VPHMT 40mlAmb HCl	VPHMT 40mlAmb-HCl-Blk	Pres Chk	Remarks	Sample # (lab only)
CMR-SP200-240711	grab	GW	–	7/11/24	0830	9	/	/	/	/	/	/			-01
TRIP BLANK		GW													-02

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier _____

Tracking # 7217 2111 6080

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
[signature]	7/11/24	1100		✓	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: ~~6.0~~ °C 2.0 to 3.2 = 2.4 Bottles Received: 9	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/12/24 Time: 0900	Hold: Condition: NCF / OK
			alexa mitchen		

ANALYTICAL REPORT

September 04, 2024

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

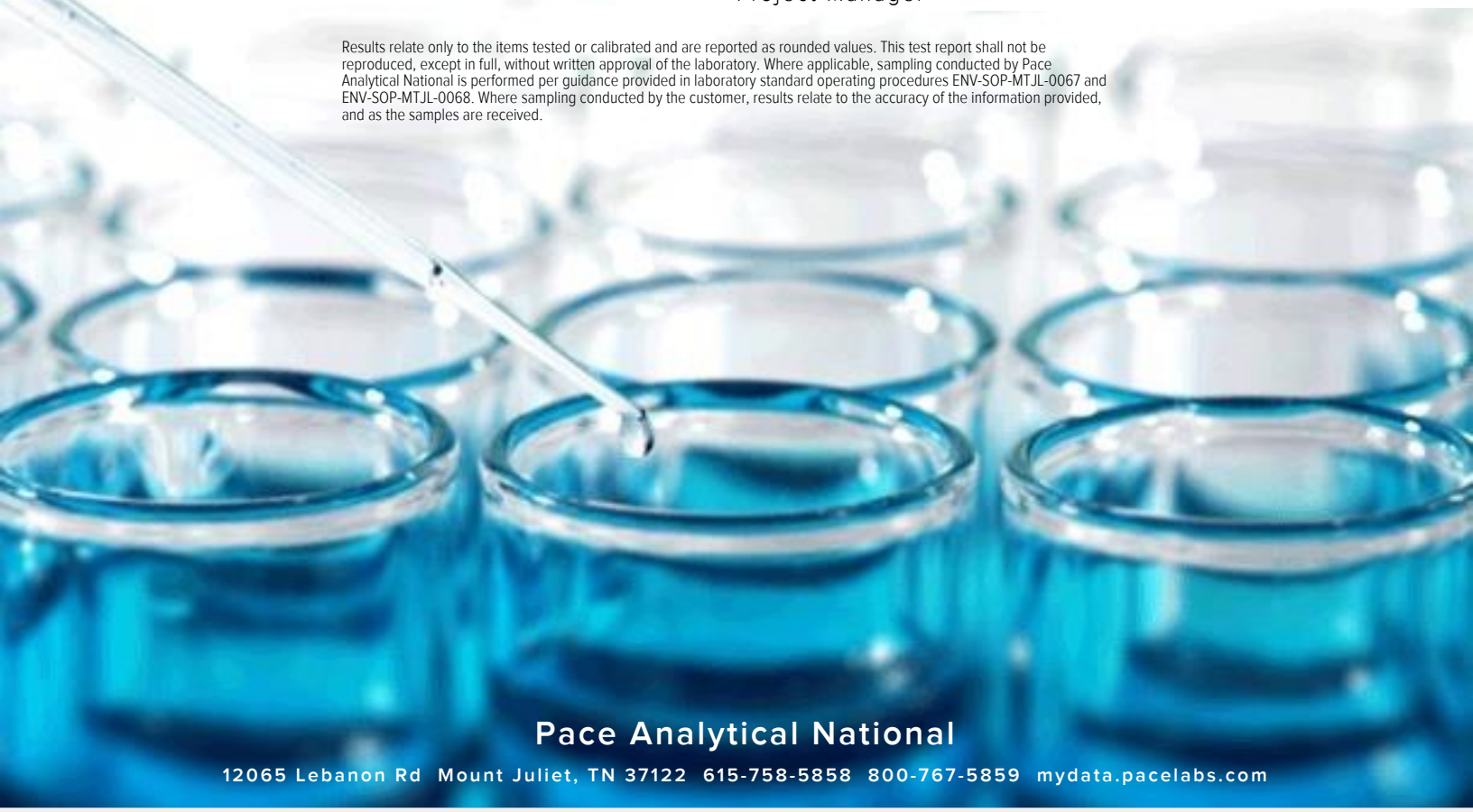
Ramboll US Consulting, Inc. - Denver

Sample Delivery Group:	L1768940
Samples Received:	08/17/2024
Project Number:	
Description:	CMR Great Falls - 2023 RFI Soil Sampling
Site:	GREAT FALLS, MT
Report To:	Abby Small 1999 Broadway Suite 2225 Denver, CO 80202

Entire Report Reviewed By:

Kelly Mercer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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CMR-SP200-240816 L1768940-01 GW

Collected by: Kyle A. Groves | Collected date/time: 08/16/24 14:00 | Received date/time: 08/17/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2348461	10	08/23/24 04:29	08/23/24 04:29	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2350239	10	08/26/24 04:19	08/26/24 04:19	JCP	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2352067	10	08/28/24 16:00	08/28/24 16:00	ACG	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2348862	10	08/22/24 20:34	08/26/24 13:22	JDG	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2348862	50	08/22/24 20:34	08/26/24 13:22	JDG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2348906	20	08/23/24 06:40	08/24/24 07:52	ALM	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2348906	20	08/23/24 06:40	08/30/24 20:41	ALM	Mt. Juliet, TN

TRIP BLANK L1768940-02 GW

Collected by: Kyle A. Groves | Collected date/time: 08/16/24 00:00 | Received date/time: 08/17/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2348461	1	08/22/24 21:43	08/22/24 21:43	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2350239	1	08/25/24 22:03	08/25/24 22:03	JCP	Mt. Juliet, TN

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

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

Kelly Mercer
Project Manager

Project Narrative

Due to multiple preparation procedures, calculated analytes are not reported in the quality control samples for EPH and VPH Methods.

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	U		333	1000	10	08/23/2024 04:29	WG2348461
Unadjusted C9-C12 Aliphatics	11000		333	1000	10	08/23/2024 04:29	WG2348461
Unadjusted C9-C10 Aromatics	4250		333	1000	10	08/23/2024 04:29	WG2348461
Adjusted C5-C8 Aliphatics	U		333	1000	10	08/23/2024 04:29	WG2348461
Adjusted C9-C12 Aliphatics	10900		333	1000	10	08/23/2024 04:29	WG2348461
Total VPH	15300		667	2000	10	08/23/2024 04:29	WG2348461
(S) 2,5-Dibromotoluene(FID)	*121*			*70.0-130*		*08/23/2024 04:29*	WG2348461
(S) 2,5-Dibromotoluene(PID)	*71.9*			*70.0-130*		*08/23/2024 04:29*	WG2348461

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U	J4	113	250	10	08/26/2024 04:19	WG2350239
Acrylonitrile	U		6.71	50.0	10	08/26/2024 04:19	WG2350239
Benzene	2.40	J	0.941	5.00	10	08/28/2024 16:00	WG2352067
Bromobenzene	U		1.18	5.00	10	08/26/2024 04:19	WG2350239
Bromodichloromethane	U		1.36	5.00	10	08/26/2024 04:19	WG2350239
Bromochloromethane	U		1.28	5.00	10	08/26/2024 04:19	WG2350239
Bromoform	U		1.29	5.00	10	08/26/2024 04:19	WG2350239
Bromomethane	U		6.05	25.0	10	08/26/2024 04:19	WG2350239
n-Butylbenzene	U		1.57	5.00	10	08/26/2024 04:19	WG2350239
sec-Butylbenzene	U		1.25	5.00	10	08/26/2024 04:19	WG2350239
tert-Butylbenzene	U		1.27	5.00	10	08/26/2024 04:19	WG2350239
Carbon disulfide	U		0.962	5.00	10	08/26/2024 04:19	WG2350239
Carbon tetrachloride	U		1.28	5.00	10	08/26/2024 04:19	WG2350239
Chlorobenzene	U		1.17	5.00	10	08/26/2024 04:19	WG2350239
Chlorodibromomethane	U		1.40	5.00	10	08/26/2024 04:19	WG2350239
Chloroethane	U		1.92	25.0	10	08/26/2024 04:19	WG2350239
2-Chloroethyl vinyl ether	U		5.75	500	10	08/26/2024 04:19	WG2350239
Chloroform	U		1.11	5.00	10	08/26/2024 04:19	WG2350239
Chloromethane	U		9.60	12.5	10	08/26/2024 04:19	WG2350239
2-Chlorotoluene	U		1.06	5.00	10	08/26/2024 04:19	WG2350239
4-Chlorotoluene	U		1.14	5.00	10	08/26/2024 04:19	WG2350239
1,2-Dibromo-3-Chloropropane	U		2.76	25.0	10	08/26/2024 04:19	WG2350239
1,2-Dibromoethane	U		1.26	5.00	10	08/26/2024 04:19	WG2350239
Dibromomethane	U		1.22	5.00	10	08/26/2024 04:19	WG2350239
1,2-Dichlorobenzene	U		1.07	5.00	10	08/26/2024 04:19	WG2350239
1,3-Dichlorobenzene	U		2.99	5.00	10	08/26/2024 04:19	WG2350239
1,4-Dichlorobenzene	U		1.20	5.00	10	08/26/2024 04:19	WG2350239
Dichlorodifluoromethane	U		3.74	25.0	10	08/26/2024 04:19	WG2350239
1,1-Dichloroethane	U		1.00	5.00	10	08/26/2024 04:19	WG2350239
1,2-Dichloroethane	U		0.819	5.00	10	08/26/2024 04:19	WG2350239
1,1-Dichloroethene	U		1.88	5.00	10	08/26/2024 04:19	WG2350239
cis-1,2-Dichloroethene	U		1.26	5.00	10	08/26/2024 04:19	WG2350239
trans-1,2-Dichloroethene	U		1.49	5.00	10	08/26/2024 04:19	WG2350239
1,2-Dichloropropane	U		1.49	5.00	10	08/26/2024 04:19	WG2350239
1,1-Dichloropropene	U		1.42	5.00	10	08/26/2024 04:19	WG2350239
1,3-Dichloropropane	U		1.09	10.0	10	08/26/2024 04:19	WG2350239
cis-1,3-Dichloropropene	U		1.11	5.00	10	08/26/2024 04:19	WG2350239
trans-1,3-Dichloropropene	U		1.18	5.00	10	08/26/2024 04:19	WG2350239
trans-1,4-Dichloro-2-butene	U		4.67	50.0	10	08/26/2024 04:19	WG2350239
2,2-Dichloropropane	U		1.61	5.00	10	08/26/2024 04:19	WG2350239
Di-isopropyl ether	U		1.05	5.00	10	08/26/2024 04:19	WG2350239
Ethylbenzene	U		1.37	5.00	10	08/26/2024 04:19	WG2350239
Hexachloro-1,3-butadiene	U		3.37	10.0	10	08/26/2024 04:19	WG2350239

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Hexanone	U		7.87	50.0	10	08/26/2024 04:19	WG2350239
n-Hexane	U		7.49	50.0	10	08/26/2024 04:19	WG2350239
Iodomethane	U		5.54	50.0	10	08/26/2024 04:19	WG2350239
Isopropylbenzene	U		1.05	5.00	10	08/26/2024 04:19	WG2350239
p-Isopropyltoluene	U		1.20	5.00	10	08/26/2024 04:19	WG2350239
2-Butanone (MEK)	U		11.9	50.0	10	08/26/2024 04:19	WG2350239
Methylene Chloride	4.50	J	4.30	25.0	10	08/26/2024 04:19	WG2350239
4-Methyl-2-pentanone (MIBK)	U		4.78	50.0	10	08/26/2024 04:19	WG2350239
Methyl tert-butyl ether	U		1.01	5.00	10	08/26/2024 04:19	WG2350239
Naphthalene	U		1.74	25.0	10	08/26/2024 04:19	WG2350239
n-Propylbenzene	U		0.993	5.00	10	08/26/2024 04:19	WG2350239
Styrene	U		1.18	5.00	10	08/26/2024 04:19	WG2350239
1,1,1,2-Tetrachloroethane	U		1.47	5.00	10	08/26/2024 04:19	WG2350239
1,1,2,2-Tetrachloroethane	U		1.33	5.00	10	08/26/2024 04:19	WG2350239
1,1,2-Trichlorotrifluoroethane	U		1.80	5.00	10	08/26/2024 04:19	WG2350239
Tetrachloroethene	U		3.00	5.00	10	08/26/2024 04:19	WG2350239
Toluene	U		2.78	5.00	10	08/26/2024 04:19	WG2350239
1,2,3-Trichlorobenzene	U		1.64	5.00	10	08/26/2024 04:19	WG2350239
1,2,4-Trichlorobenzene	U		4.81	10.0	10	08/26/2024 04:19	WG2350239
1,1,1-Trichloroethane	U		1.49	5.00	10	08/26/2024 04:19	WG2350239
1,1,2-Trichloroethane	U		1.58	5.00	10	08/26/2024 04:19	WG2350239
Trichloroethene	U		1.90	5.00	10	08/26/2024 04:19	WG2350239
Trichlorofluoromethane	U		1.60	25.0	10	08/26/2024 04:19	WG2350239
1,2,3-Trichloropropane	U		2.37	25.0	10	08/26/2024 04:19	WG2350239
1,2,4-Trimethylbenzene	16.7		3.22	5.00	10	08/26/2024 04:19	WG2350239
1,2,3-Trimethylbenzene	26.2		1.04	5.00	10	08/26/2024 04:19	WG2350239
1,3,5-Trimethylbenzene	19.8		1.04	5.00	10	08/26/2024 04:19	WG2350239
Vinyl acetate	U		6.92	50.0	10	08/26/2024 04:19	WG2350239
Vinyl chloride	U		2.34	5.00	10	08/26/2024 04:19	WG2350239
Xylenes, Total	12.2	J	1.74	15.0	10	08/26/2024 04:19	WG2350239
(S) Toluene-d8	*101*			*80.0-120*		*08/26/2024 04:19*	WG2350239
(S) Toluene-d8	*97.9*			*80.0-120*		*08/28/2024 16:00*	WG2352067
(S) 4-Bromofluorobenzene	*107*			*77.0-126*		*08/26/2024 04:19*	WG2350239
(S) 4-Bromofluorobenzene	*108*			*77.0-126*		*08/28/2024 16:00*	WG2352067
(S) 1,2-Dichloroethane-d4	*94.6*			*70.0-130*		*08/26/2024 04:19*	WG2350239
(S) 1,2-Dichloroethane-d4	*115*			*70.0-130*		*08/28/2024 16:00*	WG2352067

Sample Narrative:

L1768940-01 WG2350239, WG2352067: Lowest possible dilution due to sample foaming.

L1768940-01 WG2350239, WG2352067: Dilution due to foam.

TPH by Method MTDEQ EPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C9-C18 Aliphatics	97400		10000	30000	50	08/26/2024 13:22	WG2348862
Unadjusted C19-C36 Aliphatics	35800		10000	30000	50	08/26/2024 13:22	WG2348862
Unadjusted C11-C22 Aromatics	38700		2000	6000	10	08/26/2024 13:22	WG2348862
Unadjusted Total Petroleum Hydrocarbons	172000		2000	6000	10	08/26/2024 13:22	WG2348862
Adjusted C11-C22 Aromatics	38700		2000	6000	10	08/26/2024 13:22	WG2348862
Adjusted Total Petroleum Hydrocarbons	172000		2000	6000	10	08/26/2024 13:22	WG2348862
(S) o-Terphenyl	*85.8*			*40.0-140*		*08/26/2024 13:22*	WG2348862
(S) 1-Chloro-octadecane	*0.000*	J7		*40.0-140*		*08/26/2024 13:22*	WG2348862
(S) 2-Fluorobiphenyl	*220*	J1		*40.0-140*		*08/26/2024 13:22*	WG2348862
(S) 2-Bromonaphthalene	*0.000*	J2		*40.0-140*		*08/26/2024 13:22*	WG2348862

TPH by Method MTDEQ EPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch

Sample Narrative:

L1768940-01 WG2348862: Surrogate failure due to matrix interference

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		1.77	20.0	20	08/24/2024 07:52	WG2348906
Acenaphthylene	U		1.84	20.0	20	08/24/2024 07:52	WG2348906
Anthracene	U		1.61	20.0	20	08/24/2024 07:52	WG2348906
Benzidine	U	J4	74.8	200	20	08/24/2024 07:52	WG2348906
Benzo(a)anthracene	U		3.98	20.0	20	08/24/2024 07:52	WG2348906
Benzo(b)fluoranthene	U		2.60	20.0	20	08/24/2024 07:52	WG2348906
Benzo(k)fluoranthene	U		2.40	20.0	20	08/24/2024 07:52	WG2348906
Benzo(g,h,i)perylene	U		2.42	20.0	20	08/24/2024 07:52	WG2348906
Benzo(a)pyrene	U		0.762	20.0	20	08/24/2024 07:52	WG2348906
Bis(2-chlorethoxy)methane	U		2.32	200	20	08/24/2024 07:52	WG2348906
Bis(2-chloroethyl)ether	U		2.74	200	20	08/24/2024 07:52	WG2348906
2,2-Oxybis(1-Chloropropane)	U		4.20	200	20	08/24/2024 07:52	WG2348906
4-Bromophenyl-phenylether	U		1.75	200	20	08/24/2024 07:52	WG2348906
2-Chloronaphthalene	U		1.30	20.0	20	08/24/2024 07:52	WG2348906
4-Chlorophenyl-phenylether	U		1.85	200	20	08/24/2024 07:52	WG2348906
Chrysene	U		2.60	20.0	20	08/24/2024 07:52	WG2348906
Dibenz(a,h)anthracene	U		1.29	20.0	20	08/24/2024 07:52	WG2348906
3,3-Dichlorobenzidine	U		4.24	200	20	08/24/2024 07:52	WG2348906
2,4-Dinitrotoluene	U		1.97	200	20	08/24/2024 07:52	WG2348906
2,6-Dinitrotoluene	U		5.00	200	20	08/24/2024 07:52	WG2348906
Fluoranthene	U		2.04	20.0	20	08/24/2024 07:52	WG2348906
Fluorene	U		1.69	20.0	20	08/24/2024 07:52	WG2348906
Hexachlorobenzene	U		1.51	20.0	20	08/24/2024 07:52	WG2348906
Hexachloro-1,3-butadiene	U		1.94	200	20	08/24/2024 07:52	WG2348906
Hexachlorocyclopentadiene	U		1.20	200	20	08/24/2024 07:52	WG2348906
Hexachloroethane	U		2.54	200	20	08/24/2024 07:52	WG2348906
Indeno(1,2,3-cd)pyrene	U		5.58	20.0	20	08/24/2024 07:52	WG2348906
Isophorone	U		2.86	200	20	08/24/2024 07:52	WG2348906
Naphthalene	U		3.18	20.0	20	08/24/2024 07:52	WG2348906
Nitrobenzene	U		5.94	200	20	08/24/2024 07:52	WG2348906
n-Nitrosodimethylamine	U		20.0	200	20	08/24/2024 07:52	WG2348906
n-Nitrosodiphenylamine	U		47.4	200	20	08/24/2024 07:52	WG2348906
n-Nitrosodi-n-propylamine	U		5.22	200	20	08/24/2024 07:52	WG2348906
Phenanthrene	U		2.24	20.0	20	08/24/2024 07:52	WG2348906
Benzylbutyl phthalate	U		15.3	60.0	20	08/24/2024 07:52	WG2348906
Bis(2-Ethylhexyl)phthalate	U		17.9	60.0	20	08/24/2024 07:52	WG2348906
Di-n-butyl phthalate	U		9.06	60.0	20	08/24/2024 07:52	WG2348906
Diethyl phthalate	U		5.74	60.0	20	08/24/2024 07:52	WG2348906
Dimethyl phthalate	U		5.20	60.0	20	08/24/2024 07:52	WG2348906
Di-n-octyl phthalate	U		18.6	60.0	20	08/24/2024 07:52	WG2348906
Pyrene	3.66	J	2.14	20.0	20	08/24/2024 07:52	WG2348906
1,2,4-Trichlorobenzene	U		1.40	200	20	08/24/2024 07:52	WG2348906
Aniline	U		33.0	200	20	08/24/2024 07:52	WG2348906
1,2-Diphenylhydrazine	U	N2	2.10	200	20	08/24/2024 07:52	WG2348906
Benzyl alcohol	U		11.3	200	20	08/24/2024 07:52	WG2348906
4-Chloroaniline	U		4.68	200	20	08/24/2024 07:52	WG2348906
4-Chloro-3-methylphenol	U		2.62	200	20	08/24/2024 07:52	WG2348906
2-Chlorophenol	U		2.66	200	20	08/24/2024 07:52	WG2348906
Dibenzofuran	U		1.94	200	20	08/24/2024 07:52	WG2348906

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2,4-Dichlorophenol	U		2.04	200	20	08/24/2024 07:52	WG2348906
2,4-Dimethylphenol	9.97	J	1.27	200	20	08/24/2024 07:52	WG2348906
4,6-Dinitro-2-methylphenol	U		22.4	200	20	08/24/2024 07:52	WG2348906
2,4-Dinitrophenol	U	J4	119	200	20	08/24/2024 07:52	WG2348906
2-Methylnaphthalene	U		2.34	20.0	20	08/24/2024 07:52	WG2348906
2-Methylphenol	U		1.86	200	20	08/24/2024 07:52	WG2348906
3&4-Methyl Phenol	U		3.36	200	20	08/24/2024 07:52	WG2348906
2-Nitroaniline	U		2.04	200	20	08/24/2024 07:52	WG2348906
3-Nitroaniline	U		1.74	200	20	08/24/2024 07:52	WG2348906
4-Nitroaniline	U		1.82	200	20	08/24/2024 07:52	WG2348906
2-Nitrophenol	U		2.34	200	20	08/24/2024 07:52	WG2348906
4-Nitrophenol	U		2.86	200	20	08/24/2024 07:52	WG2348906
Pentachlorophenol	26.1	J	6.26	200	20	08/24/2024 07:52	WG2348906
Phenol	U		86.6	200	20	08/24/2024 07:52	WG2348906
Pyridine	U		12.5	200	20	08/24/2024 07:52	WG2348906
2,4,6-Trichlorophenol	U		2.00	200	20	08/24/2024 07:52	WG2348906
Acetophenone	U		4.16	200	20	08/24/2024 07:52	WG2348906
2-Acetylaminofluorene	U		5.06	200	20	08/30/2024 20:41	WG2348906
4-Aminobiphenyl	U		9.22	200	20	08/30/2024 20:41	WG2348906
Chlorobenzilate	U		76.8	1000	20	08/30/2024 20:41	WG2348906
Diallate	U		10.5	200	20	08/30/2024 20:41	WG2348906
2,6-Dichlorophenol	U		2.04	200	20	08/30/2024 20:41	WG2348906
Dimethoate	U		101	1000	20	08/30/2024 20:41	WG2348906
P-(Dimethylamino) Azobenzene	U		73.8	200	20	08/30/2024 20:41	WG2348906
Dimethylbenz (A) Anthracene	U		34.2	200	20	08/30/2024 20:41	WG2348906
3,3-Dimethylbenzidine	U		67.8	200	20	08/30/2024 20:41	WG2348906
a,a-Dimethylphenethylamine	U	J4	62.6	1000	20	08/30/2024 20:41	WG2348906
1,3-Dinitrobenzene	U		7.18	200	20	08/30/2024 20:41	WG2348906
Diphenylamine	U		47.4	200	20	08/24/2024 07:52	WG2348906
Dinoseb	U		160	1000	20	08/30/2024 20:41	WG2348906
Disulfoton	U		5.34	200	20	08/30/2024 20:41	WG2348906
Ethyl methanesulfonate	U		6.52	200	20	08/30/2024 20:41	WG2348906
Ethyl Parathion	U		7.58	200	20	08/30/2024 20:41	WG2348906
Famphur	U	C6	78.4	400	20	08/30/2024 20:41	WG2348906
Hexachloropropene	U		2.98	1000	20	08/30/2024 20:41	WG2348906
Hexachlorophene	U		28.8	1000	20	08/30/2024 20:41	WG2348906
Isodrin	U		82.2	200	20	08/30/2024 20:41	WG2348906
Isosafrole	U		77.6	200	20	08/30/2024 20:41	WG2348906
Kepone	U	C6 J4	53.2	400	20	08/30/2024 20:41	WG2348906
Methapyrilene	U		200	1000	20	08/30/2024 20:41	WG2348906
3-Methylcholanthrene	U		3.28	200	20	08/30/2024 20:41	WG2348906
Methyl methanesulfonate	U		68.0	1000	20	08/30/2024 20:41	WG2348906
Methyl parathion	U		4.26	200	20	08/30/2024 20:41	WG2348906
1,4-Naphthoquinone	U	J4	111	1000	20	08/30/2024 20:41	WG2348906
1-Naphthylamine	U		5.78	200	20	08/30/2024 20:41	WG2348906
2-Naphthylamine	U		89.6	200	20	08/30/2024 20:41	WG2348906
5-Nitro-o-toluidine	U		39.8	200	20	08/30/2024 20:41	WG2348906
4-Nitroquinoline 1-oxide	U		40.6	200	20	08/30/2024 20:41	WG2348906
n-Nitrosodiethylamine	U		71.4	200	20	08/30/2024 20:41	WG2348906
n-Nitrosodi-n-butylamine	U		78.2	200	20	08/30/2024 20:41	WG2348906
n-Nitrosomethylethylamine	U		65.0	200	20	08/30/2024 20:41	WG2348906
n-Nitrosomorpholine	U		65.0	200	20	08/30/2024 20:41	WG2348906
n-Nitrosopiperidine	U		74.4	200	20	08/30/2024 20:41	WG2348906
n-Nitrosopyrrolidine	U		67.8	200	20	08/30/2024 20:41	WG2348906
Pentachlorobenzene	U		83.0	200	20	08/30/2024 20:41	WG2348906
Pentachloroethane	U		56.6	1000	20	08/30/2024 20:41	WG2348906

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Pentachloronitrobenzene	U		83.0	200	20	08/30/2024 20:41	WG2348906
Phenacetin	U		93.2	200	20	08/30/2024 20:41	WG2348906
p-Phenylenediamine	U	J4	7740	138000	20	08/30/2024 20:41	WG2348906
Phorate	U		97.2	1000	20	08/30/2024 20:41	WG2348906
2-Picoline	U		137	1000	20	08/30/2024 20:41	WG2348906
Pronamide	U		84.2	200	20	08/30/2024 20:41	WG2348906
Safrole	U		73.6	200	20	08/30/2024 20:41	WG2348906
Sulfotep	U		79.8	1000	20	08/30/2024 20:41	WG2348906
1,2,4,5-Tetrachlorobenzene	U		1.29	200	20	08/24/2024 07:52	WG2348906
2,3,4,6-Tetrachlorophenol	U		4.62	200	20	08/24/2024 07:52	WG2348906
Thionazin	U		81.4	200	20	08/30/2024 20:41	WG2348906
o-Toluidine	U		70.6	200	20	08/30/2024 20:41	WG2348906
2,4,5-Trichlorophenol	U		2.18	200	20	08/24/2024 07:52	WG2348906
O,O,O-Triethyl Phosphorothioate	U		58.6	200	20	08/30/2024 20:41	WG2348906
1,3,5-Trinitrobenzene	U		26.4	200	20	08/30/2024 20:41	WG2348906
(S) 2-Fluorophenol	*25.1*	J7		*10.0-120*		*08/24/2024 07:52*	WG2348906
(S) Phenol-d5	*22.0*	J7		*10.0-120*		*08/24/2024 07:52*	WG2348906
(S) Nitrobenzene-d5	*0.000*	J7		*10.0-127*		*08/24/2024 07:52*	WG2348906
(S) 2-Fluorobiphenyl	*69.3*	J7		*10.0-130*		*08/24/2024 07:52*	WG2348906
(S) 2,4,6-Tribromophenol	*81.3*	J7		*10.0-155*		*08/24/2024 07:52*	WG2348906
(S) p-Terphenyl-d14	*73.4*	J7		*10.0-128*		*08/24/2024 07:52*	WG2348906

Sample Narrative:

L1768940-01 WG2348906: Dilution and surrogate failure due to matrix interference.

L1768940-01 WG2348906: Dilution due to matrix.

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	U		33.3	100	1	08/22/2024 21:43	WG2348461
Unadjusted C9-C12 Aliphatics	U		33.3	100	1	08/22/2024 21:43	WG2348461
Unadjusted C9-C10 Aromatics	U		33.3	100	1	08/22/2024 21:43	WG2348461
Adjusted C5-C8 Aliphatics	U		33.3	100	1	08/22/2024 21:43	WG2348461
Adjusted C9-C12 Aliphatics	U		33.3	100	1	08/22/2024 21:43	WG2348461
Total VPH	U		66.7	200	1	08/22/2024 21:43	WG2348461
(S) 2,5-Dibromotoluene(FID)	*94.5*			*70.0-130*		*08/22/2024 21:43*	WG2348461
(S) 2,5-Dibromotoluene(PID)	*96.9*			*70.0-130*		*08/22/2024 21:43*	WG2348461

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U	J4	11.3	25.0	1	08/25/2024 22:03	WG2350239
Acrylonitrile	U		0.671	5.00	1	08/25/2024 22:03	WG2350239
Benzene	U		0.0941	0.500	1	08/25/2024 22:03	WG2350239
Bromobenzene	U		0.118	0.500	1	08/25/2024 22:03	WG2350239
Bromodichloromethane	U		0.136	0.500	1	08/25/2024 22:03	WG2350239
Bromochloromethane	U		0.128	0.500	1	08/25/2024 22:03	WG2350239
Bromoform	U		0.129	0.500	1	08/25/2024 22:03	WG2350239
Bromomethane	U		0.605	2.50	1	08/25/2024 22:03	WG2350239
n-Butylbenzene	U		0.157	0.500	1	08/25/2024 22:03	WG2350239
sec-Butylbenzene	U		0.125	0.500	1	08/25/2024 22:03	WG2350239
tert-Butylbenzene	U		0.127	0.500	1	08/25/2024 22:03	WG2350239
Carbon disulfide	U		0.0962	0.500	1	08/25/2024 22:03	WG2350239
Carbon tetrachloride	U		0.128	0.500	1	08/25/2024 22:03	WG2350239
Chlorobenzene	U		0.117	0.500	1	08/25/2024 22:03	WG2350239
Chlorodibromomethane	U		0.140	0.500	1	08/25/2024 22:03	WG2350239
Chloroethane	U		0.192	2.50	1	08/25/2024 22:03	WG2350239
2-Chloroethyl vinyl ether	U		0.575	50.0	1	08/25/2024 22:03	WG2350239
Chloroform	U		0.111	0.500	1	08/25/2024 22:03	WG2350239
Chloromethane	U		0.960	1.25	1	08/25/2024 22:03	WG2350239
2-Chlorotoluene	U		0.106	0.500	1	08/25/2024 22:03	WG2350239
4-Chlorotoluene	U		0.114	0.500	1	08/25/2024 22:03	WG2350239
1,2-Dibromo-3-Chloropropane	U		0.276	2.50	1	08/25/2024 22:03	WG2350239
1,2-Dibromoethane	U		0.126	0.500	1	08/25/2024 22:03	WG2350239
Dibromomethane	U		0.122	0.500	1	08/25/2024 22:03	WG2350239
1,2-Dichlorobenzene	U		0.107	0.500	1	08/25/2024 22:03	WG2350239
1,3-Dichlorobenzene	U		0.299	0.500	1	08/25/2024 22:03	WG2350239
1,4-Dichlorobenzene	U		0.120	0.500	1	08/25/2024 22:03	WG2350239
Dichlorodifluoromethane	U		0.374	2.50	1	08/25/2024 22:03	WG2350239
1,1-Dichloroethane	U		0.100	0.500	1	08/25/2024 22:03	WG2350239
1,2-Dichloroethane	U		0.0819	0.500	1	08/25/2024 22:03	WG2350239
1,1-Dichloroethene	U		0.188	0.500	1	08/25/2024 22:03	WG2350239
cis-1,2-Dichloroethene	U		0.126	0.500	1	08/25/2024 22:03	WG2350239
trans-1,2-Dichloroethene	U		0.149	0.500	1	08/25/2024 22:03	WG2350239
1,2-Dichloropropane	U		0.149	0.500	1	08/25/2024 22:03	WG2350239
1,1-Dichloropropene	U		0.142	0.500	1	08/25/2024 22:03	WG2350239
1,3-Dichloropropane	U		0.109	1.00	1	08/25/2024 22:03	WG2350239
cis-1,3-Dichloropropene	U		0.111	0.500	1	08/25/2024 22:03	WG2350239
trans-1,3-Dichloropropene	U		0.118	0.500	1	08/25/2024 22:03	WG2350239
trans-1,4-Dichloro-2-butene	U		0.467	5.00	1	08/25/2024 22:03	WG2350239
2,2-Dichloropropane	U		0.161	0.500	1	08/25/2024 22:03	WG2350239
Di-isopropyl ether	U		0.105	0.500	1	08/25/2024 22:03	WG2350239
Ethylbenzene	U		0.137	0.500	1	08/25/2024 22:03	WG2350239
Hexachloro-1,3-butadiene	U		0.337	1.00	1	08/25/2024 22:03	WG2350239

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Hexanone	U		0.787	5.00	1	08/25/2024 22:03	WG2350239
n-Hexane	U		0.749	5.00	1	08/25/2024 22:03	WG2350239
Iodomethane	U		0.554	5.00	1	08/25/2024 22:03	WG2350239
Isopropylbenzene	U		0.105	0.500	1	08/25/2024 22:03	WG2350239
p-Isopropyltoluene	U		0.120	0.500	1	08/25/2024 22:03	WG2350239
2-Butanone (MEK)	U		1.19	5.00	1	08/25/2024 22:03	WG2350239
Methylene Chloride	U		0.430	2.50	1	08/25/2024 22:03	WG2350239
4-Methyl-2-pentanone (MIBK)	U		0.478	5.00	1	08/25/2024 22:03	WG2350239
Methyl tert-butyl ether	U		0.101	0.500	1	08/25/2024 22:03	WG2350239
Naphthalene	0.309	B J	0.174	2.50	1	08/25/2024 22:03	WG2350239
n-Propylbenzene	U		0.0993	0.500	1	08/25/2024 22:03	WG2350239
Styrene	U		0.118	0.500	1	08/25/2024 22:03	WG2350239
1,1,1,2-Tetrachloroethane	U		0.147	0.500	1	08/25/2024 22:03	WG2350239
1,1,2,2-Tetrachloroethane	U		0.133	0.500	1	08/25/2024 22:03	WG2350239
1,1,2-Trichlorotrifluoroethane	U		0.180	0.500	1	08/25/2024 22:03	WG2350239
Tetrachloroethene	U		0.300	0.500	1	08/25/2024 22:03	WG2350239
Toluene	U		0.278	0.500	1	08/25/2024 22:03	WG2350239
1,2,3-Trichlorobenzene	U		0.164	0.500	1	08/25/2024 22:03	WG2350239
1,2,4-Trichlorobenzene	U		0.481	1.00	1	08/25/2024 22:03	WG2350239
1,1,1-Trichloroethane	U		0.149	0.500	1	08/25/2024 22:03	WG2350239
1,1,2-Trichloroethane	U		0.158	0.500	1	08/25/2024 22:03	WG2350239
Trichloroethene	U		0.190	0.500	1	08/25/2024 22:03	WG2350239
Trichlorofluoromethane	U		0.160	2.50	1	08/25/2024 22:03	WG2350239
1,2,3-Trichloropropane	U		0.237	2.50	1	08/25/2024 22:03	WG2350239
1,2,4-Trimethylbenzene	U		0.322	0.500	1	08/25/2024 22:03	WG2350239
1,2,3-Trimethylbenzene	U		0.104	0.500	1	08/25/2024 22:03	WG2350239
1,3,5-Trimethylbenzene	U		0.104	0.500	1	08/25/2024 22:03	WG2350239
Vinyl acetate	U		0.692	5.00	1	08/25/2024 22:03	WG2350239
Vinyl chloride	U		0.234	0.500	1	08/25/2024 22:03	WG2350239
Xylenes, Total	U		0.174	1.50	1	08/25/2024 22:03	WG2350239
(S) Toluene-d8	*104*			*80.0-120*		*08/25/2024 22:03*	WG2350239
(S) 4-Bromofluorobenzene	*98.3*			*77.0-126*		*08/25/2024 22:03*	WG2350239
(S) 1,2-Dichloroethane-d4	*94.1*			*70.0-130*		*08/25/2024 22:03*	WG2350239

Method Blank (MB)

(MB) R4111255-3 08/22/24 12:59

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C5-C8 Aliphatics	U		33.3	100
Unadjusted C9-C12 Aliphatics	U		33.3	100
Unadjusted C9-C10 Aromatics	U		33.3	100
Adjusted C5-C8 Aliphatics	U		33.3	100
Adjusted C9-C12 Aliphatics	U		33.3	100
Total VPH	U		66.7	200
(S) 2,5-Dibromotoluene(FID)	*94.7*			*70.0-130*
(S) 2,5-Dibromotoluene(PID)	*97.9*			*70.0-130*

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

(LCS) R4111255-1 08/22/24 10:31 • (LCSD) R4111255-2 08/22/24 11:08

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C5-C8 Aliphatics	1200	1260	1200	105	100	70.0-130			4.88	50
Unadjusted C9-C12 Aliphatics	1400	1480	1370	106	97.9	70.0-130			7.72	50
Unadjusted C9-C10 Aromatics	200	222	204	111	102	70.0-130			8.45	50
Total VPH	2800	2960	2770	106	98.9	70.0-130			6.63	50
(S) 2,5-Dibromotoluene(FID)				*95.8*	*96.0*	*70.0-130*				
(S) 2,5-Dibromotoluene(PID)				*99.3*	*99.7*	*70.0-130*				

Method Blank (MB)

(MB) R4112110-3 08/25/24 21:06

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	25.0
Acrylonitrile	U		0.671	5.00
Benzene	U		0.0941	0.500
Bromobenzene	U		0.118	0.500
Bromodichloromethane	U		0.136	0.500
Bromochloromethane	U		0.128	0.500
Bromoform	U		0.129	0.500
Bromomethane	U		0.605	2.50
n-Butylbenzene	U		0.157	0.500
sec-Butylbenzene	U		0.125	0.500
tert-Butylbenzene	U		0.127	0.500
Carbon disulfide	U		0.0962	0.500
Carbon tetrachloride	U		0.128	0.500
Chlorobenzene	U		0.117	0.500
Chlorodibromomethane	U		0.140	0.500
Chloroethane	U		0.192	2.50
2-Chloroethyl vinyl ether	U		0.575	50.0
Chloroform	U		0.111	0.500
Chloromethane	U		0.960	1.25
2-Chlorotoluene	U		0.106	0.500
4-Chlorotoluene	U		0.114	0.500
1,2-Dibromo-3-Chloropropane	U		0.276	2.50
1,2-Dibromoethane	U		0.126	0.500
Dibromomethane	U		0.122	0.500
1,2-Dichlorobenzene	U		0.107	0.500
1,3-Dichlorobenzene	U		0.299	0.500
1,4-Dichlorobenzene	U		0.120	0.500
Dichlorodifluoromethane	U		0.374	2.50
1,1-Dichloroethane	U		0.100	0.500
1,2-Dichloroethane	U		0.0819	0.500
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.126	0.500
trans-1,2-Dichloroethene	U		0.149	0.500
1,2-Dichloropropane	U		0.149	0.500
1,1-Dichloropropene	U		0.142	0.500
1,3-Dichloropropane	U		0.109	1.00
cis-1,3-Dichloropropene	U		0.111	0.500
trans-1,3-Dichloropropene	U		0.118	0.500
trans-1,4-Dichloro-2-butene	U		0.467	5.00
2,2-Dichloropropane	U		0.161	0.500

Method Blank (MB)

(MB) R4112110-3 08/25/24 21:06

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Di-isopropyl ether	U		0.105	0.500
Ethylbenzene	U		0.137	0.500
Hexachloro-1,3-butadiene	U		0.337	1.00
2-Hexanone	U		0.787	5.00
n-Hexane	U		0.749	5.00
Iodomethane	U		0.554	5.00
Isopropylbenzene	U		0.105	0.500
p-Isopropyltoluene	U		0.120	0.500
2-Butanone (MEK)	U		1.19	5.00
Methylene Chloride	U		0.430	2.50
4-Methyl-2-pentanone (MIBK)	U		0.478	5.00
Methyl tert-butyl ether	U		0.101	0.500
Naphthalene	0.418	J	0.174	2.50
n-Propylbenzene	U		0.0993	0.500
Styrene	U		0.118	0.500
1,1,1,2-Tetrachloroethane	U		0.147	0.500
1,1,2,2-Tetrachloroethane	U		0.133	0.500
1,1,2-Trichlorotrifluoroethane	U		0.180	0.500
Tetrachloroethene	U		0.300	0.500
Toluene	U		0.278	0.500
1,2,3-Trichlorobenzene	U		0.164	0.500
1,2,4-Trichlorobenzene	U		0.481	1.00
1,1,1-Trichloroethane	U		0.149	0.500
1,1,2-Trichloroethane	U		0.158	0.500
Trichloroethene	U		0.190	0.500
Trichlorofluoromethane	U		0.160	2.50
1,2,3-Trichloropropane	U		0.237	2.50
1,2,4-Trimethylbenzene	U		0.322	0.500
1,2,3-Trimethylbenzene	U		0.104	0.500
1,3,5-Trimethylbenzene	U		0.104	0.500
Vinyl acetate	U		0.692	5.00
Vinyl chloride	U		0.234	0.500
Xylenes, Total	U		0.174	1.50
(S) Toluene-d8	*104*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.4*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*93.8*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R4112110-1 08/25/24 20:03

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	25.0	50.2	201	19.0-160	J4
Acrylonitrile	25.0	23.5	94.0	55.0-149	
Benzene	5.00	4.21	84.2	70.0-123	
Bromobenzene	5.00	4.03	80.6	73.0-121	
Bromodichloromethane	5.00	4.35	87.0	75.0-120	
Bromochloromethane	5.00	5.06	101	76.0-122	
Bromoform	5.00	4.44	88.8	68.0-132	
Bromomethane	5.00	3.73	74.6	10.0-160	
n-Butylbenzene	5.00	4.46	89.2	73.0-125	
sec-Butylbenzene	5.00	4.54	90.8	75.0-125	
tert-Butylbenzene	5.00	4.63	92.6	76.0-124	
Carbon disulfide	5.00	3.54	70.8	61.0-128	
Carbon tetrachloride	5.00	4.39	87.8	68.0-126	
Chlorobenzene	5.00	4.77	95.4	80.0-121	
Chlorodibromomethane	5.00	4.96	99.2	77.0-125	
Chloroethane	5.00	4.55	91.0	47.0-150	
2-Chloroethyl vinyl ether	25.0	23.8	95.2	51.0-160	J
Chloroform	5.00	4.44	88.8	73.0-120	
Chloromethane	5.00	5.88	118	41.0-142	
2-Chlorotoluene	5.00	4.29	85.8	76.0-123	
4-Chlorotoluene	5.00	4.33	86.6	75.0-122	
1,2-Dibromo-3-Chloropropane	5.00	3.93	78.6	58.0-134	
1,2-Dibromoethane	5.00	4.72	94.4	80.0-122	
Dibromomethane	5.00	4.83	96.6	80.0-120	
1,2-Dichlorobenzene	5.00	4.85	97.0	79.0-121	
1,3-Dichlorobenzene	5.00	4.64	92.8	79.0-120	
1,4-Dichlorobenzene	5.00	4.69	93.8	79.0-120	
Dichlorodifluoromethane	5.00	5.44	109	51.0-149	
1,1-Dichloroethane	5.00	4.56	91.2	70.0-126	
1,2-Dichloroethane	5.00	4.59	91.8	70.0-128	
1,1-Dichloroethene	5.00	4.52	90.4	71.0-124	
cis-1,2-Dichloroethene	5.00	4.41	88.2	73.0-120	
trans-1,2-Dichloroethene	5.00	4.17	83.4	73.0-120	
1,2-Dichloropropane	5.00	4.92	98.4	77.0-125	
1,1-Dichloropropene	5.00	4.02	80.4	74.0-126	
1,3-Dichloropropane	5.00	4.73	94.6	80.0-120	
cis-1,3-Dichloropropene	5.00	4.18	83.6	80.0-123	
trans-1,3-Dichloropropene	5.00	4.09	81.8	78.0-124	
trans-1,4-Dichloro-2-butene	5.00	2.64	52.8	33.0-144	J
2,2-Dichloropropane	5.00	3.56	71.2	58.0-130	

Laboratory Control Sample (LCS)

(LCS) R4112110-1 08/25/24 20:03

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Di-isopropyl ether	5.00	5.45	109	58.0-138	
Ethylbenzene	5.00	4.42	88.4	79.0-123	
Hexachloro-1,3-butadiene	5.00	4.10	82.0	54.0-138	
2-Hexanone	25.0	25.6	102	67.0-149	
n-Hexane	5.00	4.63	92.6	57.0-133	J
Iodomethane	25.0	21.9	87.6	33.0-147	
Isopropylbenzene	5.00	4.59	91.8	76.0-127	
p-Isopropyltoluene	5.00	4.57	91.4	76.0-125	
2-Butanone (MEK)	25.0	31.9	128	44.0-160	
Methylene Chloride	5.00	4.45	89.0	67.0-120	
4-Methyl-2-pentanone (MIBK)	25.0	27.5	110	68.0-142	
Methyl tert-butyl ether	5.00	4.22	84.4	68.0-125	
Naphthalene	5.00	4.01	80.2	54.0-135	
n-Propylbenzene	5.00	4.38	87.6	77.0-124	
Styrene	5.00	4.33	86.6	73.0-130	
1,1,1,2-Tetrachloroethane	5.00	4.99	99.8	75.0-125	
1,1,2,2-Tetrachloroethane	5.00	4.07	81.4	65.0-130	
1,1,2-Trichlorotrifluoroethane	5.00	4.64	92.8	69.0-132	
Tetrachloroethene	5.00	4.62	92.4	72.0-132	
Toluene	5.00	4.57	91.4	79.0-120	
1,2,3-Trichlorobenzene	5.00	4.66	93.2	50.0-138	
1,2,4-Trichlorobenzene	5.00	4.55	91.0	57.0-137	
1,1,1-Trichloroethane	5.00	4.25	85.0	73.0-124	
1,1,2-Trichloroethane	5.00	4.99	99.8	80.0-120	
Trichloroethene	5.00	4.98	99.6	78.0-124	
Trichlorofluoromethane	5.00	3.97	79.4	59.0-147	
1,2,3-Trichloropropane	5.00	4.47	89.4	73.0-130	
1,2,4-Trimethylbenzene	5.00	4.33	86.6	76.0-121	
1,2,3-Trimethylbenzene	5.00	4.44	88.8	77.0-120	
1,3,5-Trimethylbenzene	5.00	4.34	86.8	76.0-122	
Vinyl acetate	25.0	13.3	53.2	11.0-160	
Vinyl chloride	5.00	4.82	96.4	67.0-131	
Xylenes, Total	15.0	13.3	88.7	79.0-123	
(S) Toluene-d8			*105*	*80.0-120*	
(S) 4-Bromofluorobenzene			*102*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*95.9*	*70.0-130*	

QUALITY CONTROL SUMMARY

L1768940-01

Method Blank (MB)

(MB) R4113544-3 08/28/24 10:47

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Benzene	U		0.0941	0.500
(S) Toluene-d8	*100*			*80.0-120*
(S) 4-Bromofluorobenzene	*91.4*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*115*			*70.0-130*

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

(LCS) R4113544-1 08/28/24 09:46 • (LCSD) R4113544-4 08/28/24 11:45

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	5.00	5.07	4.87	101	97.4	70.0-123			4.02	20
(S) Toluene-d8				*95.4*	*96.7*	*80.0-120*				
(S) 4-Bromofluorobenzene				*94.1*	*95.4*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*110*	*115*	*70.0-130*				

Method Blank (MB)

(MB) R4111658-1 08/26/24 09:17

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C9-C18 Aliphatics	U		200	600
Unadjusted C19-C36 Aliphatics	U		200	600
(S) 1-Chloro-octadecane	*83.1*			*40.0-140*

Method Blank (MB)

(MB) R4111658-1 08/26/24 09:17

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C11-C22 Aromatics	U		200	600
(S) o-Terphenyl	*81.9*			*40.0-140*
(S) 2-Fluorobiphenyl	*90.3*			*40.0-140*
(S) 2-Bromonaphthalene	*90.3*			*40.0-140*

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

(LCS) R4111658-2 08/26/24 09:38 • (LCSD) R4111658-3 08/26/24 10:00

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C9-C18 Aliphatics	600	433	407	72.2	67.8	40.0-140	J	J	6.19	25
Unadjusted C19-C36 Aliphatics	800	867	887	108	111	40.0-140			2.28	25
(S) 1-Chloro-octadecane				*80.2*	*85.0*	*40.0-140*				

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

(LCS) R4111658-2 08/26/24 09:38 • (LCSD) R4111658-3 08/26/24 10:00

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C11-C22 Aromatics	1700	1450	1430	85.3	84.1	40.0-140			1.39	25
(S) o-Terphenyl				*83.1*	*80.4*	*40.0-140*				
(S) 2-Fluorobiphenyl				*91.9*	*89.6*	*40.0-140*				
(S) 2-Bromonaphthalene				*91.9*	*89.6*	*40.0-140*				

Method Blank (MB)

(MB) R4112226-2 08/24/24 00:27

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.0886	1.00
Acenaphthylene	U		0.0921	1.00
Anthracene	U		0.0804	1.00
Benzidine	U		3.74	10.0
Benzo(a)anthracene	U		0.199	1.00
Benzo(b)fluoranthene	U		0.130	1.00
Benzo(k)fluoranthene	U		0.120	1.00
Benzo(g,h,i)perylene	U		0.121	1.00
Benzo(a)pyrene	U		0.0381	1.00
Bis(2-chlorethoxy)methane	U		0.116	10.0
Bis(2-chloroethyl)ether	U		0.137	10.0
2,2-Oxybis(1-Chloropropane)	U		0.210	10.0
4-Bromophenyl-phenylether	U		0.0877	10.0
2-Chloronaphthalene	U		0.0648	1.00
4-Chlorophenyl-phenylether	U		0.0926	10.0
Chrysene	U		0.130	1.00
Dibenz(a,h)anthracene	U		0.0644	1.00
3,3-Dichlorobenzidine	U		0.212	10.0
2,4-Dinitrotoluene	U		0.0983	10.0
2,6-Dinitrotoluene	U		0.250	10.0
Fluoranthene	U		0.102	1.00
Fluorene	U		0.0844	1.00
Hexachlorobenzene	U		0.0755	1.00
Hexachloro-1,3-butadiene	U		0.0968	10.0
Hexachlorocyclopentadiene	U		0.0598	10.0
Hexachloroethane	U		0.127	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.143	10.0
Naphthalene	U		0.159	1.00
Nitrobenzene	U		0.297	10.0
n-Nitrosodimethylamine	U		0.998	10.0
n-Nitrosodiphenylamine	U		2.37	10.0
n-Nitrosodi-n-propylamine	U		0.261	10.0
Phenanthrene	U		0.112	1.00
Benzylbutyl phthalate	U		0.765	3.00
Bis(2-Ethylhexyl)phthalate	U		0.895	3.00
Di-n-butyl phthalate	U		0.453	3.00
Diethyl phthalate	U		0.287	3.00
Dimethyl phthalate	U		0.260	3.00
Di-n-octyl phthalate	U		0.932	3.00

Method Blank (MB)

(MB) R4112226-2 08/24/24 00:27

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyrene	U		0.107	1.00
1,2,4-Trichlorobenzene	U		0.0698	10.0
Aniline	U		1.65	10.0
1,2-Diphenylhydrazine	U	N2	0.105	10.0
Benzyl alcohol	U		0.563	10.0
4-Chloroaniline	U		0.234	10.0
4-Chloro-3-methylphenol	U		0.131	10.0
2-Chlorophenol	U		0.133	10.0
Dibenzofuran	U		0.0970	10.0
2,4-Dichlorophenol	U		0.102	10.0
2,4-Dimethylphenol	U		0.0636	10.0
4,6-Dinitro-2-methylphenol	U		1.12	10.0
2,4-Dinitrophenol	U		5.93	10.0
2-Methylnaphthalene	U		0.117	1.00
2-Methylphenol	U		0.0929	10.0
3&4-Methyl Phenol	U		0.168	10.0
2-Nitroaniline	U		0.102	10.0
3-Nitroaniline	U		0.0869	10.0
4-Nitroaniline	U		0.0910	10.0
2-Nitrophenol	U		0.117	10.0
4-Nitrophenol	U		0.143	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		4.33	10.0
Pyridine	U		0.627	10.0
2,4,6-Trichlorophenol	U		0.100	10.0
Acetophenone	U		0.208	10.0
Diphenylamine	U		2.37	10.0
1,2,4,5-Tetrachlorobenzene	U		0.0647	10.0
2,3,4,6-Tetrachlorophenol	U		0.231	10.0
2,4,5-Trichlorophenol	U		0.109	10.0
(S) 2-Fluorophenol	*30.7*			*10.0-120*
(S) Phenol-d5	*19.6*			*10.0-120*
(S) Nitrobenzene-d5	*67.8*			*10.0-127*
(S) 2-Fluorobiphenyl	*68.4*			*10.0-130*
(S) 2,4,6-Tribromophenol	*82.0*			*10.0-155*
(S) p-Terphenyl-d14	*86.1*			*10.0-128*

Method Blank (MB)

(MB) R4113369-1 08/28/24 11:23

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.0886	1.00
Acenaphthylene	U		0.0921	1.00
Anthracene	U		0.0804	1.00
Benzidine	U		3.74	10.0
Benzo(a)anthracene	U		0.199	1.00
Benzo(b)fluoranthene	U		0.130	1.00
Benzo(k)fluoranthene	U		0.120	1.00
Benzo(g,h,i)perylene	U		0.121	1.00
Benzo(a)pyrene	U		0.0381	1.00
Bis(2-chlorethoxy)methane	U		0.116	10.0
Bis(2-chloroethyl)ether	U		0.137	10.0
2,2-Oxybis(1-Chloropropane)	U		0.210	10.0
4-Bromophenyl-phenylether	U		0.0877	10.0
2-Chloronaphthalene	U		0.0648	1.00
4-Chlorophenyl-phenylether	U		0.0926	10.0
Chrysene	U		0.130	1.00
Dibenz(a,h)anthracene	U		0.0644	1.00
3,3-Dichlorobenzidine	U		0.212	10.0
2,4-Dinitrotoluene	U		0.0983	10.0
2,6-Dinitrotoluene	U		0.250	10.0
Fluoranthene	U		0.102	1.00
Fluorene	U		0.0844	1.00
Hexachlorobenzene	U		0.0755	1.00
Hexachloro-1,3-butadiene	U		0.0968	10.0
Hexachlorocyclopentadiene	U		0.0598	10.0
Hexachloroethane	U		0.127	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.143	10.0
Naphthalene	U		0.159	1.00
Nitrobenzene	U		0.297	10.0
n-Nitrosodimethylamine	U		0.998	10.0
n-Nitrosodiphenylamine	U		2.37	10.0
n-Nitrosodi-n-propylamine	U		0.261	10.0
Phenanthrene	U		0.112	1.00
Benzylbutyl phthalate	U		0.765	3.00
Bis(2-Ethylhexyl)phthalate	U		0.895	3.00
Di-n-butyl phthalate	U		0.453	3.00
Diethyl phthalate	U		0.287	3.00
Dimethyl phthalate	U		0.260	3.00
Di-n-octyl phthalate	U		0.932	3.00

Method Blank (MB)

(MB) R4113369-1 08/28/24 11:23

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyrene	U		0.107	1.00
1,2,4-Trichlorobenzene	U		0.0698	10.0
Aniline	U		1.65	10.0
1,2-Diphenylhydrazine	U	N2	0.105	10.0
Benzyl alcohol	U		0.563	10.0
4-Chloroaniline	U		0.234	10.0
4-Chloro-3-methylphenol	U		0.131	10.0
2-Chlorophenol	U		0.133	10.0
Dibenzofuran	U		0.0970	10.0
2,4-Dichlorophenol	U		0.102	10.0
2,4-Dimethylphenol	U		0.0636	10.0
4,6-Dinitro-2-methylphenol	U		1.12	10.0
2,4-Dinitrophenol	U		5.93	10.0
2-Methylnaphthalene	U		0.117	1.00
2-Methylphenol	U		0.0929	10.0
3&4-Methyl Phenol	U		0.168	10.0
2-Nitroaniline	U		0.102	10.0
3-Nitroaniline	U		0.0869	10.0
4-Nitroaniline	U		0.0910	10.0
2-Nitrophenol	U		0.117	10.0
4-Nitrophenol	U		0.143	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		4.33	10.0
Pyridine	U		0.627	10.0
2,4,6-Trichlorophenol	U		0.100	10.0
Acetophenone	U		0.208	10.0
Diphenylamine	U		2.37	10.0
1,2,4,5-Tetrachlorobenzene	U		0.0647	10.0
2,3,4,6-Tetrachlorophenol	U		0.231	10.0
2,4,5-Trichlorophenol	U		0.109	10.0
(S) 2-Fluorophenol	*28.6*			*10.0-120*
(S) Phenol-d5	*18.4*			*10.0-120*
(S) Nitrobenzene-d5	*56.6*			*10.0-127*
(S) 2-Fluorobiphenyl	*67.3*			*10.0-130*
(S) 2,4,6-Tribromophenol	*70.0*			*10.0-155*
(S) p-Terphenyl-d14	*89.6*			*10.0-128*

Method Blank (MB)

(MB) R4114963-2 08/30/24 14:33

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
2-Acetylaminofluorene	U		0.253	10.0
4-Aminobiphenyl	U		0.461	10.0
Chlorobenzilate	U		3.84	50.0
Diallate	U		0.524	10.0
2,6-Dichlorophenol	U		0.102	10.0
Dimethoate	U		5.05	50.0
P-(Dimethylamino) Azobenzene	U		3.69	10.0
Dimethylbenz (A) Anthracene	U		1.71	10.0
3,3-Dimethylbenzidine	U		3.39	10.0
a,a-Dimethylphenethylamine	U		3.13	50.0
1,3-Dinitrobenzene	U		0.359	10.0
Diphenylamine	U		2.37	10.0
Dinoseb	U		8.01	50.0
Disulfoton	U		0.267	10.0
Ethyl methanesulfonate	U		0.326	10.0
Ethyl Parathion	U		0.379	10.0
Famphur	U		3.92	20.0
Hexachloropropene	U		0.149	50.0
Hexachlorophene	U		1.44	50.0
Isodrin	U		4.11	10.0
Isosafrole	U		3.88	10.0
Kepone	U		2.66	20.0
Methapyrilene	U		10.0	50.0
3-Methylcholanthrene	U		0.164	10.0
Methyl methanesulfonate	U		3.40	50.0
Methyl parathion	U		0.213	10.0
1,4-Naphthoquinone	U		5.56	50.0
1-Naphthylamine	U		0.289	10.0
2-Naphthylamine	U		4.48	10.0
5-Nitro-o-toluidine	U		1.99	10.0
4-Nitroquinoline 1-oxide	U		2.03	10.0
n-Nitrosodiethylamine	U		3.57	10.0
n-Nitrosodi-n-butylamine	U		3.91	10.0
n-Nitrosomethylethylamine	U		3.25	10.0
n-Nitrosomorpholine	U		3.25	10.0
n-Nitrosopiperidine	U		3.72	10.0
n-Nitrosopyrrolidine	U		3.39	10.0
Pentachlorobenzene	U		4.15	10.0
Pentachloroethane	U		2.83	50.0
Pentachloronitrobenzene	U		4.15	10.0

Method Blank (MB)

(MB) R4114963-2 08/30/24 14:33

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Phenacetin	U		4.66	10.0
p-Phenylenediamine	U		387	6900
Phorate	U		4.86	50.0
2-Picoline	U		6.83	50.0
Pronamide	U		4.21	10.0
Safrole	U		3.68	10.0
Sulfotep	U		3.99	50.0
Thionazin	U		4.07	10.0
o-Toluidine	U		3.53	10.0
O,O,O-Triethyl Phosphorothioate	U		2.93	10.0
1,3,5-Trinitrobenzene	U		1.32	10.0

Laboratory Control Sample (LCS)

(LCS) R4112226-1 08/24/24 00:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acenaphthene	50.0	42.1	84.2	41.0-120	
Acenaphthylene	50.0	45.0	90.0	43.0-120	
Anthracene	50.0	43.7	87.4	45.0-120	
Benzidine	100	1.75	1.75	10.0-120	J J4
Benzo(a)anthracene	50.0	44.4	88.8	47.0-120	
Benzo(b)fluoranthene	50.0	44.0	88.0	46.0-120	
Benzo(k)fluoranthene	50.0	43.9	87.8	46.0-120	
Benzo(g,h,i)perylene	50.0	42.7	85.4	48.0-121	
Benzo(a)pyrene	50.0	44.7	89.4	47.0-120	
Bis(2-chlorethoxy)methane	50.0	43.2	86.4	33.0-120	
Bis(2-chloroethyl)ether	50.0	45.0	90.0	23.0-120	
2,2-Oxybis(1-Chloropropane)	50.0	38.0	76.0	28.0-120	
4-Bromophenyl-phenylether	50.0	46.9	93.8	45.0-120	
2-Chloronaphthalene	50.0	40.1	80.2	37.0-120	
4-Chlorophenyl-phenylether	50.0	49.5	99.0	44.0-120	
Chrysene	50.0	41.9	83.8	48.0-120	
Dibenz(a,h)anthracene	50.0	43.3	86.6	47.0-120	
3,3-Dichlorobenzidine	100	83.5	83.5	44.0-120	
2,4-Dinitrotoluene	50.0	55.2	110	49.0-124	
2,6-Dinitrotoluene	50.0	50.5	101	46.0-120	
Fluoranthene	50.0	48.2	96.4	51.0-120	
Fluorene	50.0	47.1	94.2	47.0-120	

Laboratory Control Sample (LCS)

(LCS) R4112226-1 08/24/24 00:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Hexachlorobenzene	50.0	43.3	86.6	44.0-120	
Hexachloro-1,3-butadiene	50.0	39.5	79.0	19.0-120	
Hexachlorocyclopentadiene	50.0	36.8	73.6	15.0-120	
Hexachloroethane	50.0	37.2	74.4	15.0-120	
Indeno(1,2,3-cd)pyrene	50.0	41.5	83.0	49.0-122	
Isophorone	50.0	45.5	91.0	36.0-120	
Naphthalene	50.0	38.1	76.2	27.0-120	
Nitrobenzene	50.0	44.0	88.0	27.0-120	
n-Nitrosodimethylamine	50.0	27.9	55.8	10.0-120	
n-Nitrosodiphenylamine	50.0	42.4	84.8	47.0-120	
n-Nitrosodi-n-propylamine	50.0	51.0	102	31.0-120	
Phenanthrene	50.0	42.1	84.2	46.0-120	
Benzylbutyl phthalate	50.0	43.1	86.2	43.0-121	
Bis(2-Ethylhexyl)phthalate	50.0	41.5	83.0	43.0-122	
Di-n-butyl phthalate	50.0	48.0	96.0	49.0-121	
Diethyl phthalate	50.0	49.3	98.6	48.0-122	
Dimethyl phthalate	50.0	46.2	92.4	48.0-120	
Di-n-octyl phthalate	50.0	42.6	85.2	42.0-125	
Pyrene	50.0	41.4	82.8	47.0-120	
1,2,4-Trichlorobenzene	50.0	37.4	74.8	24.0-120	
Aniline	50.0	23.8	47.6	13.0-120	
1,2-Diphenylhydrazine	50.0	51.5	103	41.0-126	N2
Benzyl alcohol	50.0	31.9	63.8	25.0-120	
4-Chloroaniline	50.0	38.7	77.4	25.0-120	
4-Chloro-3-methylphenol	50.0	43.3	86.6	40.0-120	
2-Chlorophenol	50.0	35.6	71.2	25.0-120	
Dibenzofuran	50.0	44.0	88.0	44.0-120	
2,4-Dichlorophenol	50.0	39.8	79.6	36.0-120	
2,4-Dimethylphenol	50.0	49.7	99.4	33.0-120	
4,6-Dinitro-2-methylphenol	50.0	63.6	127	38.0-138	
2,4-Dinitrophenol	50.0	68.9	138	10.0-120	J4
2-Methylnaphthalene	50.0	40.5	81.0	33.0-120	
2-Methylphenol	50.0	31.9	63.8	28.0-120	
3&4-Methyl Phenol	50.0	32.7	65.4	31.0-120	
2-Nitroaniline	50.0	50.8	102	43.0-120	
3-Nitroaniline	50.0	44.9	89.8	38.0-120	
4-Nitroaniline	50.0	47.7	95.4	18.0-160	
2-Nitrophenol	50.0	44.1	88.2	31.0-120	
4-Nitrophenol	50.0	15.2	30.4	10.0-120	
Pentachlorophenol	50.0	40.5	81.0	23.0-120	

Laboratory Control Sample (LCS)

(LCS) R4112226-1 08/24/24 00:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Phenol	50.0	14.8	29.6	10.0-120	
Pyridine	50.0	12.9	25.8	10.0-120	
2,4,6-Trichlorophenol	50.0	43.4	86.8	42.0-120	
Acetophenone	50.0	41.0	82.0	29.0-120	
Diphenylamine	50.0	42.4	84.8	35.0-120	
1,2,4,5-Tetrachlorobenzene	50.0	46.9	93.8	31.0-121	
2,3,4,6-Tetrachlorophenol	50.0	55.0	110	42.0-132	
2,4,5-Trichlorophenol	50.0	50.3	101	44.0-120	
(S) 2-Fluorophenol			*38.2*	*10.0-120*	
(S) Phenol-d5			*24.0*	*10.0-120*	
(S) Nitrobenzene-d5			*76.9*	*10.0-127*	
(S) 2-Fluorobiphenyl			*79.2*	*10.0-130*	
(S) 2,4,6-Tribromophenol			*89.5*	*10.0-155*	
(S) p-Terphenyl-d14			*79.6*	*10.0-128*	

Laboratory Control Sample (LCS)

(LCS) R4114963-1 08/30/24 14:11

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
2-Acetylaminofluorene	50.0	52.9	106	32.0-120	
4-Aminobiphenyl	50.0	29.1	58.2	20.0-120	
Chlorobenzilate	50.0	51.1	102	29.0-128	
Diallate	50.0	45.1	90.2	30.0-120	
2,6-Dichlorophenol	50.0	40.0	80.0	19.0-136	
Dimethoate	50.0	48.1	96.2	11.0-134	J
P-(Dimethylamino) Azobenzene	50.0	45.4	90.8	27.0-120	
Dimethylbenz (A) Anthracene	50.0	37.8	75.6	14.0-124	
3,3-Dimethylbenzidine	50.0	9.16	18.3	13.0-120	J
a,a-Dimethylphenethylamine	50.0	0.000	0.000	10.0-129	J4
1,3-Dinitrobenzene	50.0	49.7	99.4	34.0-120	
Diphenylamine	50.0	50.7	101	35.0-120	
Dinoseb	50.0	50.6	101	39.0-120	
Disulfoton	50.0	49.1	98.2	32.0-120	
Ethyl methanesulfonate	50.0	40.2	80.4	10.0-120	
Ethyl Parathion	50.0	60.1	120	46.0-130	
Famphur	50.0	49.4	98.8	32.0-120	
Hexachloropropene	50.0	31.0	62.0	10.0-120	J
Hexachlorophene	100	28.8	28.8	10.0-120	J

Laboratory Control Sample (LCS)

(LCS) R4114963-1 08/30/24 14:11

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Isodrin	50.0	43.7	87.4	22.0-157	
Isosafrole	50.0	44.6	89.2	25.0-133	
Kepone	50.0	67.4	135	10.0-120	J4
Methapyrilene	50.0	6.56	13.1	10.0-120	J
3-Methylcholanthrene	50.0	55.8	112	30.0-160	
Methyl methanesulfonate	50.0	30.8	61.6	10.0-120	J
Methyl parathion	50.0	58.9	118	42.0-120	
1,4-Naphthoquinone	50.0	1.04	2.08	50.0-150	J J4
1-Naphthylamine	50.0	29.2	58.4	19.0-120	
2-Naphthylamine	50.0	31.1	62.2	10.0-120	
5-Nitro-o-toluidine	50.0	56.0	112	34.0-120	
4-Nitroquinoline 1-oxide	50.0	33.7	67.4	10.0-159	
n-Nitrosodiethylamine	50.0	41.6	83.2	10.0-120	
n-Nitrosodi-n-butylamine	50.0	50.5	101	13.0-143	
n-Nitrosomethylethylamine	50.0	35.3	70.6	10.0-120	
n-Nitrosomorpholine	50.0	40.9	81.8	10.0-120	
n-Nitrosopiperidine	50.0	51.5	103	10.0-160	
n-Nitrosopyrrolidine	50.0	40.1	80.2	10.0-124	
Pentachlorobenzene	50.0	46.5	93.0	25.0-120	
Pentachloroethane	50.0	38.8	77.6	10.0-120	J
Pentachloronitrobenzene	50.0	50.8	102	34.0-132	
Phenacetin	50.0	50.5	101	34.0-127	
p-Phenylenediamine	50.0	0.000	0.000	50.0-150	J4
Phorate	50.0	45.0	90.0	13.0-160	J
2-Picoline	50.0	23.9	47.8	10.0-120	J
Pronamide	50.0	53.2	106	38.0-130	
Safrole	50.0	41.6	83.2	21.0-120	
Sulfotep	50.0	48.9	97.8	52.0-120	J
Thionazin	50.0	51.2	102	38.0-121	
o-Toluidine	50.0	35.9	71.8	10.0-120	
O,O,O-Triethyl Phosphorothioate	50.0	39.8	79.6	11.0-135	
1,3,5-Trinitrobenzene	50.0	61.4	123	37.0-147	

L1769469-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1769469-06 08/24/24 05:25 • (MS) R4112226-3 08/24/24 05:46 • (MSD) R4112226-4 08/24/24 06:07

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	0.0979	36.6	41.3	73.0	82.4	1	28.0-120			12.1	25
Acenaphthylene	50.0	U	38.9	44.4	77.8	88.8	1	31.0-121			13.2	25
Anthracene	50.0	U	38.7	42.9	77.4	85.8	1	36.0-120			10.3	23
Benzidine	100	U	U	U	0.000	0.000	1	10.0-120	J6	J6	0.000	37
Benzo(a)anthracene	50.0	U	40.1	45.3	80.2	90.6	1	39.0-120			12.2	23
Benzo(b)fluoranthene	50.0	U	38.7	44.5	77.4	89.0	1	37.0-120			13.9	23
Benzo(k)fluoranthene	50.0	U	38.4	44.9	76.8	89.8	1	37.0-120			15.6	26
Benzo(g,h,i)perylene	50.0	U	36.8	42.1	73.6	84.2	1	37.0-123			13.4	25
Benzo(a)pyrene	50.0	U	38.9	45.0	77.8	90.0	1	37.0-120			14.5	24
Bis(2-chlorethoxy)methane	50.0	U	37.2	42.9	74.4	85.8	1	17.0-120			14.2	31
Bis(2-chloroethyl)ether	50.0	U	38.5	45.4	77.0	90.8	1	14.0-120			16.4	33
2,2-Oxybis(1-Chloropropane)	50.0	U	32.1	38.9	64.2	77.8	1	18.0-120			19.2	34
4-Bromophenyl-phenylether	50.0	U	42.3	47.8	84.6	95.6	1	37.0-120			12.2	24
2-Chloronaphthalene	50.0	U	35.2	39.4	70.4	78.8	1	29.0-120			11.3	28
4-Chlorophenyl-phenylether	50.0	U	43.1	48.7	86.2	97.4	1	36.0-120			12.2	23
Chrysene	50.0	U	37.7	42.5	75.4	85.0	1	38.0-120			12.0	23
Dibenz(a,h)anthracene	50.0	U	37.0	42.3	74.0	84.6	1	36.0-121			13.4	24
3,3-Dichlorobenzidine	100	U	27.7	28.8	27.7	28.8	1	10.0-134			3.89	30
2,4-Dinitrotoluene	50.0	U	49.1	54.3	98.2	109	1	39.0-125			10.1	25
2,6-Dinitrotoluene	50.0	U	43.4	47.8	86.8	95.6	1	36.0-120			9.65	27
Fluoranthene	50.0	U	42.2	47.8	84.4	95.6	1	41.0-121			12.4	22
Fluorene	50.0	0.450	40.6	46.4	80.3	91.9	1	37.0-120			13.3	24
Hexachlorobenzene	50.0	U	37.9	43.0	75.8	86.0	1	35.0-122			12.6	24
Hexachloro-1,3-butadiene	50.0	U	33.1	39.5	66.2	79.0	1	12.0-120			17.6	34
Hexachlorocyclopentadiene	50.0	U	35.0	40.9	70.0	81.8	1	10.0-120			15.5	33
Hexachloroethane	50.0	U	44.5	49.9	89.0	99.8	1	10.0-120			11.4	40
Indeno(1,2,3-cd)pyrene	50.0	U	35.8	40.9	71.6	81.8	1	38.0-125			13.3	24
Isophorone	50.0	U	39.2	45.3	78.4	90.6	1	21.0-120			14.4	27
Naphthalene	50.0	U	33.4	39.9	66.8	79.8	1	10.0-120			17.7	31
Nitrobenzene	50.0	U	39.5	45.4	79.0	90.8	1	12.0-120			13.9	30
n-Nitrosodimethylamine	50.0	U	25.5	28.7	51.0	57.4	1	10.0-120			11.8	40
n-Nitrosodiphenylamine	50.0	U	36.7	42.3	73.4	84.6	1	37.0-120			14.2	24
n-Nitrosodi-n-propylamine	50.0	U	43.4	51.4	86.8	103	1	16.0-120			16.9	30
Phenanthrene	50.0	U	37.3	42.0	74.6	84.0	1	33.0-120			11.9	22
Benzylbutyl phthalate	50.0	U	39.4	44.7	78.8	89.4	1	34.0-126			12.6	24
Bis(2-Ethylhexyl)phthalate	50.0	U	37.3	42.5	74.6	85.0	1	33.0-126			13.0	25
Di-n-butyl phthalate	50.0	U	41.9	48.7	83.8	97.4	1	35.0-128			15.0	23
Diethyl phthalate	50.0	U	42.9	47.7	85.8	95.4	1	39.0-125			10.6	24
Dimethyl phthalate	50.0	U	40.1	45.4	80.2	90.8	1	37.0-120			12.4	24
Di-n-octyl phthalate	50.0	U	38.7	43.9	77.4	87.8	1	25.0-135			12.6	26

L1769469-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1769469-06 08/24/24 05:25 • (MS) R4112226-3 08/24/24 05:46 • (MSD) R4112226-4 08/24/24 06:07

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Pyrene	50.0	U	37.7	42.8	75.4	85.6	1	39.0-120			12.7	22
1,2,4-Trichlorobenzene	50.0	U	32.2	37.7	64.4	75.4	1	15.0-120			15.7	31
Aniline	50.0	U	14.1	14.6	28.2	29.2	1	10.0-120			3.48	39
1,2-Diphenylhydrazine	50.0	U	44.5	56.6	89.0	113	1	28.0-129	N2	N2	23.9	25
Benzyl alcohol	50.0	U	28.0	34.4	56.0	68.8	1	14.0-120			20.5	38
4-Chloroaniline	50.0	U	17.6	24.7	35.2	49.4	1	10.0-120		J3	33.6	31
4-Chloro-3-methylphenol	50.0	U	35.1	42.9	70.2	85.8	1	26.0-120			20.0	27
2-Chlorophenol	50.0	U	29.4	35.8	58.8	71.6	1	18.0-120			19.6	34
Dibenzofuran	50.0	U	38.8	43.0	77.6	86.0	1	32.0-120			10.3	26
2,4-Dichlorophenol	50.0	U	33.7	41.0	67.4	82.0	1	19.0-120			19.5	27
2,4-Dimethylphenol	50.0	0.305	43.5	51.4	86.4	102	1	15.0-120			16.6	28
4,6-Dinitro-2-methylphenol	50.0	U	56.6	64.5	113	129	1	10.0-144			13.0	39
2,4-Dinitrophenol	50.0	U	65.5	76.2	131	152	1	10.0-120	J5	J5	15.1	40
2-Methylnaphthalene	50.0	U	34.5	41.0	69.0	82.0	1	17.0-120			17.2	28
2-Methylphenol	50.0	U	26.8	31.6	53.6	63.2	1	10.0-120			16.4	30
3&4-Methyl Phenol	50.0	U	28.4	33.8	56.8	67.6	1	10.0-120			17.4	36
2-Nitroaniline	50.0	U	44.9	51.3	89.8	103	1	33.0-120			13.3	27
3-Nitroaniline	50.0	U	31.7	38.5	63.4	77.0	1	20.0-120			19.4	27
4-Nitroaniline	50.0	U	32.6	38.1	65.2	76.2	1	10.0-160			15.6	26
2-Nitrophenol	50.0	U	37.2	45.7	74.4	91.4	1	20.0-120			20.5	30
4-Nitrophenol	50.0	U	18.2	17.6	36.4	35.2	1	10.0-120			3.35	40
Pentachlorophenol	50.0	U	44.4	51.0	88.8	102	1	10.0-128			13.8	37
Phenol	50.0	U	14.8	17.5	29.6	35.0	1	10.0-120			16.7	40
Pyridine	50.0	U	8.57	9.01	17.1	18.0	1	10.0-120	J	J	5.01	37
2,4,6-Trichlorophenol	50.0	U	37.5	43.6	75.0	87.2	1	26.0-120			15.0	31
Acetophenone	50.0	U	39.4	46.8	78.8	93.6	1	20.0-120			17.2	35
Diphenylamine	50.0	U	36.7	42.3	73.4	84.6	1	35.0-120			14.2	30
1,2,4,5-Tetrachlorobenzene	50.0	U	39.6	47.1	79.2	94.2	1	19.0-122			17.3	32
2,3,4,6-Tetrachlorophenol	50.0	U	47.6	55.2	95.2	110	1	17.0-142			14.8	34
2,4,5-Trichlorophenol	50.0	U	43.5	51.2	87.0	102	1	33.0-120			16.3	31
(S) 2-Fluorophenol					*33.2*	*39.7*		*10.0-120*				
(S) Phenol-d5					*22.6*	*26.6*		*10.0-120*				
(S) Nitrobenzene-d5					*71.1*	*82.7*		*10.0-127*				
(S) 2-Fluorobiphenyl					*69.6*	*80.3*		*10.0-130*				
(S) 2,4,6-Tribromophenol					*82.5*	*95.0*		*10.0-155*				
(S) p-Terphenyl-d14					*76.1*	*85.9*		*10.0-128*				

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
C6	The initial calibration verification standard (SSCV) associated with this data responded low.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
N2	Analyte reported using a calibration and validation based on Azobenzene (CAS 103-33-3). 1,2-Diphenylhydrazine decomposes into Azobenzene during the analysis.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Ramboll US Consulting, Inc. - Denver
1999 Broadway Suite 2225
Denver, CO 80202

Billing Information:
Troy Wyss
PO Box 4229
Indianapolis, IN 46242

Pres Chk

Report to: **Abby Small**

Email To: asmall@ramboll.com;rdeshpande@ramboll.com

Project Description: CMR Great Falls - 2023 RFI Soil Sampling

City/State Collected: Great Falls, MT

Please Circle: PT MT CT ET

Phone: **303-382-5474**

Client Project #

Lab Project # **ENVIRONCO-CALU MONTH**

Collected by (print): Kyle Groves

Site/Facility ID # **GREAT FALLS, MT**

P.O. #

Collected by (signature):

Quote #

Immediately Packed on Ice N ____ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 1768940
A063
T

Acctnum: **ENVIRONCO**
Template: **T245953**
Prelogin: **P1085868**
PM: **841 - Kelly Mercer**
PB: SK 7/6/24
Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270AP9 100ml Amb NoPres	SVEPHMT 1L-Amb-Add HCl	V8260LL 40mlAmb-HCl	V8260LL 40mlAmb-HCl-Blk	VPHMT 40mlAmb HCl	VPHMT 40mlAmb-HCl-Blk	Remarks	Sample # (lab only)
CMR-SP200-240816	grab	GW	–	8/16/24	1400	9	✓	✓	✓	✓	✓	✓		-01
TRIP BLANK		GW												-02

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier _____

Tracking # 7210 2117 6091

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
[signature]	8/16/24	1530		2

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
				4.8 + .3 = 5.1

Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date:	Time:
			[signature]	8-17-24	9:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

ANALYTICAL REPORT

October 10, 2024

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

Ramboll US Consulting, Inc. - Denver

Sample Delivery Group:	L1781830
Samples Received:	09/25/2024
Project Number:	
Description:	CMR Great Falls - 2023 RFI Soil Sampling
Site:	GREAT FALLS, MT
Report To:	Abby Small 1999 Broadway Suite 2225 Denver, CO 80202

Entire Report Reviewed By:

Kelly Mercer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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CMR-SP200-240924 L1781830-01 GW

Collected by	Collected date/time	Received date/time
Kyle Groves	09/24/24 09:45	09/25/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2374711	10	10/03/24 22:08	10/03/24 22:08	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2376151	10	10/04/24 19:58	10/04/24 19:58	DWR	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2371311	15	09/26/24 10:57	10/01/24 15:11	DMG	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2371311	30	09/26/24 10:57	10/01/24 15:11	DMG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2370147	20	09/26/24 08:03	10/01/24 20:43	AMS	Mt. Juliet, TN

TRIP BLANK L1781830-02 GW

Collected by	Collected date/time	Received date/time
Kyle Groves	09/24/24 00:00	09/25/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2373663	1	10/01/24 23:39	10/01/24 23:39	NCD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2376151	1	10/04/24 16:20	10/04/24 16:20	DWR	Mt. Juliet, TN

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

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

Kelly Mercer
Project Manager

Project Narrative

Due to multiple preparation procedures, calculated analytes are not reported in the quality control samples for EPH and VPH Methods.

Sample Delivery Group (SDG) Narrative

The following analysis were performed from an unpreserved, insufficiently or inadequately preserved sample.

Lab Sample ID	Project Sample ID	Method
L1781830-01	CMR-SP200-240924	MTDEQ EPH

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	464	J	333	1000	10	10/03/2024 22:08	WG2374711
Unadjusted C9-C12 Aliphatics	19000		333	1000	10	10/03/2024 22:08	WG2374711
Unadjusted C9-C10 Aromatics	7970		333	1000	10	10/03/2024 22:08	WG2374711
Adjusted C5-C8 Aliphatics	459	J	333	1000	10	10/03/2024 22:08	WG2374711
Adjusted C9-C12 Aliphatics	19000		333	1000	10	10/03/2024 22:08	WG2374711
Total VPH	27400		667	2000	10	10/03/2024 22:08	WG2374711
(S) 2,5-Dibromotoluene(FID)	*53.4*	J2		*70.0-130*		*10/03/2024 22:08*	WG2374711
(S) 2,5-Dibromotoluene(PID)	*54.8*	J2		*70.0-130*		*10/03/2024 22:08*	WG2374711

Sample Narrative:

L1781830-01 WG2374711: Surrogate failure due to matrix interference

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U		113	250	10	10/04/2024 19:58	WG2376151
Acrylonitrile	U		6.71	50.0	10	10/04/2024 19:58	WG2376151
Benzene	4.61	J	0.941	5.00	10	10/04/2024 19:58	WG2376151
Bromobenzene	U		1.18	5.00	10	10/04/2024 19:58	WG2376151
Bromodichloromethane	U		1.36	5.00	10	10/04/2024 19:58	WG2376151
Bromochloromethane	U		1.28	5.00	10	10/04/2024 19:58	WG2376151
Bromoform	U		1.29	5.00	10	10/04/2024 19:58	WG2376151
Bromomethane	U		6.05	25.0	10	10/04/2024 19:58	WG2376151
n-Butylbenzene	7.91		1.57	5.00	10	10/04/2024 19:58	WG2376151
sec-Butylbenzene	2.05	J	1.25	5.00	10	10/04/2024 19:58	WG2376151
tert-Butylbenzene	U		1.27	5.00	10	10/04/2024 19:58	WG2376151
Carbon disulfide	U		0.962	5.00	10	10/04/2024 19:58	WG2376151
Carbon tetrachloride	U		1.28	5.00	10	10/04/2024 19:58	WG2376151
Chlorobenzene	U		1.17	5.00	10	10/04/2024 19:58	WG2376151
Chlorodibromomethane	U		1.40	5.00	10	10/04/2024 19:58	WG2376151
Chloroethane	U		1.92	25.0	10	10/04/2024 19:58	WG2376151
2-Chloroethyl vinyl ether	U		5.75	500	10	10/04/2024 19:58	WG2376151
Chloroform	U		1.11	5.00	10	10/04/2024 19:58	WG2376151
Chloromethane	U		9.60	12.5	10	10/04/2024 19:58	WG2376151
2-Chlorotoluene	U		1.06	5.00	10	10/04/2024 19:58	WG2376151
4-Chlorotoluene	U		1.14	5.00	10	10/04/2024 19:58	WG2376151
1,2-Dibromo-3-Chloropropane	U		2.76	25.0	10	10/04/2024 19:58	WG2376151
1,2-Dibromoethane	U		1.26	5.00	10	10/04/2024 19:58	WG2376151
Dibromomethane	U		1.22	5.00	10	10/04/2024 19:58	WG2376151
1,2-Dichlorobenzene	U		1.07	5.00	10	10/04/2024 19:58	WG2376151
1,3-Dichlorobenzene	U		2.99	5.00	10	10/04/2024 19:58	WG2376151
1,4-Dichlorobenzene	U		1.20	5.00	10	10/04/2024 19:58	WG2376151
Dichlorodifluoromethane	U		3.74	25.0	10	10/04/2024 19:58	WG2376151
1,1-Dichloroethane	U		1.00	5.00	10	10/04/2024 19:58	WG2376151
1,2-Dichloroethane	U		0.819	5.00	10	10/04/2024 19:58	WG2376151
1,1-Dichloroethene	U		1.88	5.00	10	10/04/2024 19:58	WG2376151
cis-1,2-Dichloroethene	U		1.26	5.00	10	10/04/2024 19:58	WG2376151
trans-1,2-Dichloroethene	U		1.49	5.00	10	10/04/2024 19:58	WG2376151
1,2-Dichloropropane	U		1.49	5.00	10	10/04/2024 19:58	WG2376151
1,1-Dichloropropene	U		1.42	5.00	10	10/04/2024 19:58	WG2376151
1,3-Dichloropropane	U		1.09	10.0	10	10/04/2024 19:58	WG2376151
cis-1,3-Dichloropropene	U		1.11	5.00	10	10/04/2024 19:58	WG2376151
trans-1,3-Dichloropropene	U		1.18	5.00	10	10/04/2024 19:58	WG2376151
trans-1,4-Dichloro-2-butene	U		4.67	50.0	10	10/04/2024 19:58	WG2376151
2,2-Dichloropropane	U		1.61	5.00	10	10/04/2024 19:58	WG2376151

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Di-isopropyl ether	U		1.05	5.00	10	10/04/2024 19:58	WG2376151
Ethylbenzene	2.06	J	1.37	5.00	10	10/04/2024 19:58	WG2376151
Hexachloro-1,3-butadiene	U		3.37	10.0	10	10/04/2024 19:58	WG2376151
2-Hexanone	U		7.87	50.0	10	10/04/2024 19:58	WG2376151
n-Hexane	U		7.49	50.0	10	10/04/2024 19:58	WG2376151
Iodomethane	U		5.54	50.0	10	10/04/2024 19:58	WG2376151
Isopropylbenzene	U		1.05	5.00	10	10/04/2024 19:58	WG2376151
p-Isopropyltoluene	1.42	J	1.20	5.00	10	10/04/2024 19:58	WG2376151
2-Butanone (MEK)	U		11.9	50.0	10	10/04/2024 19:58	WG2376151
Methylene Chloride	U		4.30	25.0	10	10/04/2024 19:58	WG2376151
4-Methyl-2-pentanone (MIBK)	U		4.78	50.0	10	10/04/2024 19:58	WG2376151
Methyl tert-butyl ether	U		1.01	5.00	10	10/04/2024 19:58	WG2376151
Naphthalene	12.9	B J	1.74	25.0	10	10/04/2024 19:58	WG2376151
n-Propylbenzene	U		0.993	5.00	10	10/04/2024 19:58	WG2376151
Styrene	U		1.18	5.00	10	10/04/2024 19:58	WG2376151
1,1,1,2-Tetrachloroethane	U		1.47	5.00	10	10/04/2024 19:58	WG2376151
1,1,2,2-Tetrachloroethane	U		1.33	5.00	10	10/04/2024 19:58	WG2376151
1,1,2-Trichlorotrifluoroethane	U		1.80	5.00	10	10/04/2024 19:58	WG2376151
Tetrachloroethene	U		3.00	5.00	10	10/04/2024 19:58	WG2376151
Toluene	U		2.78	5.00	10	10/04/2024 19:58	WG2376151
1,2,3-Trichlorobenzene	U		1.64	5.00	10	10/04/2024 19:58	WG2376151
1,2,4-Trichlorobenzene	U		4.81	10.0	10	10/04/2024 19:58	WG2376151
1,1,1-Trichloroethane	U		1.49	5.00	10	10/04/2024 19:58	WG2376151
1,1,2-Trichloroethane	U		1.58	5.00	10	10/04/2024 19:58	WG2376151
Trichloroethene	U		1.90	5.00	10	10/04/2024 19:58	WG2376151
Trichlorofluoromethane	U		1.60	25.0	10	10/04/2024 19:58	WG2376151
1,2,3-Trichloropropane	U		2.37	25.0	10	10/04/2024 19:58	WG2376151
1,2,4-Trimethylbenzene	21.8		3.22	5.00	10	10/04/2024 19:58	WG2376151
1,2,3-Trimethylbenzene	24.8		1.04	5.00	10	10/04/2024 19:58	WG2376151
1,3,5-Trimethylbenzene	14.8		1.04	5.00	10	10/04/2024 19:58	WG2376151
Vinyl acetate	U		6.92	50.0	10	10/04/2024 19:58	WG2376151
Vinyl chloride	U		2.34	5.00	10	10/04/2024 19:58	WG2376151
Xylenes, Total	15.8		1.74	15.0	10	10/04/2024 19:58	WG2376151
(S) Toluene-d8	*103*			*80.0-120*		*10/04/2024 19:58*	WG2376151
(S) 4-Bromofluorobenzene	*105*			*77.0-126*		*10/04/2024 19:58*	WG2376151
(S) 1,2-Dichloroethane-d4	*105*			*70.0-130*		*10/04/2024 19:58*	WG2376151

Sample Narrative:

L1781830-01 WG2376151: Non-target compounds too high to run at a lower dilution.

TPH by Method MTDEQ EPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C9-C18 Aliphatics	61100		6000	18000	30	10/01/2024 15:11	WG2371311
Unadjusted C19-C36 Aliphatics	21700		6000	18000	30	10/01/2024 15:11	WG2371311
Unadjusted C11-C22 Aromatics	23800		3000	9000	15	10/01/2024 15:11	WG2371311
Unadjusted Total Petroleum Hydrocarbons	107000		3000	9000	15	10/01/2024 15:11	WG2371311
Adjusted C11-C22 Aromatics	23800		3000	9000	15	10/01/2024 15:11	WG2371311
Adjusted Total Petroleum Hydrocarbons	107000		3000	9000	15	10/01/2024 15:11	WG2371311
(S) o-Terphenyl	*0.000*	J2		*40.0-140*		*10/01/2024 15:11*	WG2371311
(S) 1-Chloro-octadecane	*0.000*	J7		*40.0-140*		*10/01/2024 15:11*	WG2371311
(S) 2-Fluorobiphenyl	*0.000*	J2		*40.0-140*		*10/01/2024 15:11*	WG2371311
(S) 2-Bromonaphthalene	*0.000*	J2		*40.0-140*		*10/01/2024 15:11*	WG2371311

TPH by Method MTDEQ EPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch

Sample Narrative:

L1781830-01 WG2371311: Surrogate failure due to matrix interference

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		1.77	20.0	20	10/01/2024 20:43	WG2370147
Acenaphthylene	U		1.84	20.0	20	10/01/2024 20:43	WG2370147
Anthracene	U		1.61	20.0	20	10/01/2024 20:43	WG2370147
Benzidine	U	J3 J4	74.8	200	20	10/01/2024 20:43	WG2370147
Benzo(a)anthracene	U		3.98	20.0	20	10/01/2024 20:43	WG2370147
Benzo(b)fluoranthene	U		2.60	20.0	20	10/01/2024 20:43	WG2370147
Benzo(k)fluoranthene	U		2.40	20.0	20	10/01/2024 20:43	WG2370147
Benzo(g,h,i)perylene	U		2.42	20.0	20	10/01/2024 20:43	WG2370147
Benzo(a)pyrene	U		0.762	20.0	20	10/01/2024 20:43	WG2370147
Bis(2-chlorethoxy)methane	U		2.32	200	20	10/01/2024 20:43	WG2370147
Bis(2-chloroethyl)ether	U		2.74	200	20	10/01/2024 20:43	WG2370147
2,2-Oxybis(1-Chloropropane)	U		4.20	200	20	10/01/2024 20:43	WG2370147
4-Bromophenyl-phenylether	U		1.75	200	20	10/01/2024 20:43	WG2370147
2-Chloronaphthalene	U		1.30	20.0	20	10/01/2024 20:43	WG2370147
4-Chlorophenyl-phenylether	U		1.85	200	20	10/01/2024 20:43	WG2370147
Chrysene	U		2.60	20.0	20	10/01/2024 20:43	WG2370147
Dibenz(a,h)anthracene	U		1.29	20.0	20	10/01/2024 20:43	WG2370147
3,3-Dichlorobenzidine	U		4.24	200	20	10/01/2024 20:43	WG2370147
2,4-Dinitrotoluene	U		1.97	200	20	10/01/2024 20:43	WG2370147
2,6-Dinitrotoluene	U		5.00	200	20	10/01/2024 20:43	WG2370147
Fluoranthene	U		2.04	20.0	20	10/01/2024 20:43	WG2370147
Fluorene	U		1.69	20.0	20	10/01/2024 20:43	WG2370147
Hexachlorobenzene	U		1.51	20.0	20	10/01/2024 20:43	WG2370147
Hexachloro-1,3-butadiene	U		1.94	200	20	10/01/2024 20:43	WG2370147
Hexachlorocyclopentadiene	U		1.20	200	20	10/01/2024 20:43	WG2370147
Hexachloroethane	U		2.54	200	20	10/01/2024 20:43	WG2370147
Indeno(1,2,3-cd)pyrene	U		5.58	20.0	20	10/01/2024 20:43	WG2370147
Isophorone	U		2.86	200	20	10/01/2024 20:43	WG2370147
Naphthalene	U		3.18	20.0	20	10/01/2024 20:43	WG2370147
Nitrobenzene	U		5.94	200	20	10/01/2024 20:43	WG2370147
n-Nitrosodimethylamine	U		20.0	200	20	10/01/2024 20:43	WG2370147
n-Nitrosodiphenylamine	U		47.4	200	20	10/01/2024 20:43	WG2370147
n-Nitrosodi-n-propylamine	U		5.22	200	20	10/01/2024 20:43	WG2370147
Phenanthrene	3.56	J	2.24	20.0	20	10/01/2024 20:43	WG2370147
Benzylbutyl phthalate	U		15.3	60.0	20	10/01/2024 20:43	WG2370147
Bis(2-Ethylhexyl)phthalate	U		17.9	60.0	20	10/01/2024 20:43	WG2370147
Di-n-butyl phthalate	U		9.06	60.0	20	10/01/2024 20:43	WG2370147
Diethyl phthalate	U		5.74	60.0	20	10/01/2024 20:43	WG2370147
Dimethyl phthalate	U		5.20	60.0	20	10/01/2024 20:43	WG2370147
Di-n-octyl phthalate	U		18.6	60.0	20	10/01/2024 20:43	WG2370147
Pyrene	2.46	J	2.14	20.0	20	10/01/2024 20:43	WG2370147
1,2,4-Trichlorobenzene	U		1.40	200	20	10/01/2024 20:43	WG2370147
Aniline	U	J3	33.0	200	20	10/01/2024 20:43	WG2370147
1,2-Diphenylhydrazine	U	N2	2.10	200	20	10/01/2024 20:43	WG2370147
Benzyl alcohol	U		11.3	200	20	10/01/2024 20:43	WG2370147
4-Chloroaniline	U		4.68	200	20	10/01/2024 20:43	WG2370147
4-Chloro-3-methylphenol	U		2.62	200	20	10/01/2024 20:43	WG2370147
2-Chlorophenol	U		2.66	200	20	10/01/2024 20:43	WG2370147
Dibenzofuran	U		1.94	200	20	10/01/2024 20:43	WG2370147
2,4-Dichlorophenol	U		2.04	200	20	10/01/2024 20:43	WG2370147

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2,4-Dimethylphenol	8.54	J	1.27	200	20	10/01/2024 20:43	WG2370147
4,6-Dinitro-2-methylphenol	U		22.4	200	20	10/01/2024 20:43	WG2370147
2,4-Dinitrophenol	U		119	200	20	10/01/2024 20:43	WG2370147
2-Methylnaphthalene	U		2.34	20.0	20	10/01/2024 20:43	WG2370147
2-Methylphenol	U		1.86	200	20	10/01/2024 20:43	WG2370147
3&4-Methyl Phenol	U		3.36	200	20	10/01/2024 20:43	WG2370147
2-Nitroaniline	U		2.04	200	20	10/01/2024 20:43	WG2370147
3-Nitroaniline	U		1.74	200	20	10/01/2024 20:43	WG2370147
4-Nitroaniline	U		1.82	200	20	10/01/2024 20:43	WG2370147
2-Nitrophenol	U		2.34	200	20	10/01/2024 20:43	WG2370147
4-Nitrophenol	U		2.86	200	20	10/01/2024 20:43	WG2370147
Pentachlorophenol	U		6.26	200	20	10/01/2024 20:43	WG2370147
Phenol	U		86.6	200	20	10/01/2024 20:43	WG2370147
Pyridine	U	J3	12.5	200	20	10/01/2024 20:43	WG2370147
2,4,6-Trichlorophenol	U		2.00	200	20	10/01/2024 20:43	WG2370147
Acetophenone	U		4.16	200	20	10/01/2024 20:43	WG2370147
2-Acetylaminofluorene	U		5.06	200	20	10/01/2024 20:43	WG2370147
4-Aminobiphenyl	U		9.22	200	20	10/01/2024 20:43	WG2370147
Chlorobenzilate	U		76.8	1000	20	10/01/2024 20:43	WG2370147
Diallate	U		10.5	200	20	10/01/2024 20:43	WG2370147
2,6-Dichlorophenol	U		2.04	200	20	10/01/2024 20:43	WG2370147
Dimethoate	U		101	1000	20	10/01/2024 20:43	WG2370147
P-(Dimethylamino) Azobenzene	U		73.8	200	20	10/01/2024 20:43	WG2370147
Dimethylbenz (A) Anthracene	U		34.2	200	20	10/01/2024 20:43	WG2370147
3,3-Dimethylbenzidine	U		67.8	200	20	10/01/2024 20:43	WG2370147
a,a-Dimethylphenethylamine	U		62.6	1000	20	10/01/2024 20:43	WG2370147
1,3-Dinitrobenzene	U		7.18	200	20	10/01/2024 20:43	WG2370147
Diphenylamine	U		47.4	200	20	10/01/2024 20:43	WG2370147
Dinoseb	U		160	1000	20	10/01/2024 20:43	WG2370147
Disulfoton	U		5.34	200	20	10/01/2024 20:43	WG2370147
Ethyl methanesulfonate	U		6.52	200	20	10/01/2024 20:43	WG2370147
Ethyl Parathion	U		7.58	200	20	10/01/2024 20:43	WG2370147
Famphur	U		78.4	400	20	10/01/2024 20:43	WG2370147
Hexachloropropene	U		2.98	1000	20	10/01/2024 20:43	WG2370147
Hexachlorophene	U		28.8	1000	20	10/01/2024 20:43	WG2370147
Isodrin	U		82.2	200	20	10/01/2024 20:43	WG2370147
Isosafrole	U		77.6	200	20	10/01/2024 20:43	WG2370147
Kepone	U		53.2	400	20	10/01/2024 20:43	WG2370147
Methapyrilene	U		200	1000	20	10/01/2024 20:43	WG2370147
3-Methylcholanthrene	U		3.28	200	20	10/01/2024 20:43	WG2370147
Methyl methanesulfonate	U		68.0	1000	20	10/01/2024 20:43	WG2370147
Methyl parathion	U		4.26	200	20	10/01/2024 20:43	WG2370147
1,4-Naphthoquinone	U		111	1000	20	10/01/2024 20:43	WG2370147
1-Naphthylamine	U		5.78	200	20	10/01/2024 20:43	WG2370147
2-Naphthylamine	U		89.6	200	20	10/01/2024 20:43	WG2370147
5-Nitro-o-toluidine	U		39.8	200	20	10/01/2024 20:43	WG2370147
4-Nitroquinoline 1-oxide	U		40.6	200	20	10/01/2024 20:43	WG2370147
n-Nitrosodiethylamine	U		71.4	200	20	10/01/2024 20:43	WG2370147
n-Nitrosodi-n-butylamine	U		78.2	200	20	10/01/2024 20:43	WG2370147
n-Nitrosomethylethylamine	U		65.0	200	20	10/01/2024 20:43	WG2370147
n-Nitrosomorpholine	U		65.0	200	20	10/01/2024 20:43	WG2370147
n-Nitrosopiperidine	U		74.4	200	20	10/01/2024 20:43	WG2370147
n-Nitrosopyrrolidine	U		67.8	200	20	10/01/2024 20:43	WG2370147
Pentachlorobenzene	U		83.0	200	20	10/01/2024 20:43	WG2370147
Pentachloroethane	U		56.6	1000	20	10/01/2024 20:43	WG2370147
Pentachloronitrobenzene	U		83.0	200	20	10/01/2024 20:43	WG2370147

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Phenacetin	U		93.2	200	20	10/01/2024 20:43	WG2370147
p-Phenylenediamine	U		7740	138000	20	10/01/2024 20:43	WG2370147
Phorate	U		97.2	1000	20	10/01/2024 20:43	WG2370147
2-Picoline	U		137	1000	20	10/01/2024 20:43	WG2370147
Pronamide	U		84.2	200	20	10/01/2024 20:43	WG2370147
Safrole	U		73.6	200	20	10/01/2024 20:43	WG2370147
Sulfotep	U		79.8	1000	20	10/01/2024 20:43	WG2370147
1,2,4,5-Tetrachlorobenzene	U		1.29	200	20	10/01/2024 20:43	WG2370147
2,3,4,6-Tetrachlorophenol	U		4.62	200	20	10/01/2024 20:43	WG2370147
Thionazin	U		81.4	200	20	10/01/2024 20:43	WG2370147
o-Toluidine	U		70.6	200	20	10/01/2024 20:43	WG2370147
2,4,5-Trichlorophenol	U		2.18	200	20	10/01/2024 20:43	WG2370147
O,O,O-Triethyl Phosphorothioate	U		58.6	200	20	10/01/2024 20:43	WG2370147
1,3,5-Trinitrobenzene	U		26.4	200	20	10/01/2024 20:43	WG2370147
(S) 2-Fluorophenol	*22.8*	J7		*10.0-120*		*10/01/2024 20:43*	WG2370147
(S) Phenol-d5	*23.1*	J7		*10.0-120*		*10/01/2024 20:43*	WG2370147
(S) Nitrobenzene-d5	*0.000*	J7		*10.0-127*		*10/01/2024 20:43*	WG2370147
(S) 2-Fluorobiphenyl	*51.9*	J7		*10.0-130*		*10/01/2024 20:43*	WG2370147
(S) 2,4,6-Tribromophenol	*56.0*	J7		*10.0-155*		*10/01/2024 20:43*	WG2370147
(S) p-Terphenyl-d14	*59.0*	J7		*10.0-128*		*10/01/2024 20:43*	WG2370147

Sample Narrative:

L1781830-01 WG2370147: Dilution due to matrix.

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	U		33.3	100	1	10/01/2024 23:39	WG2373663
Unadjusted C9-C12 Aliphatics	U		33.3	100	1	10/01/2024 23:39	WG2373663
Unadjusted C9-C10 Aromatics	U		33.3	100	1	10/01/2024 23:39	WG2373663
Adjusted C5-C8 Aliphatics	U		33.3	100	1	10/01/2024 23:39	WG2373663
Adjusted C9-C12 Aliphatics	U		33.3	100	1	10/01/2024 23:39	WG2373663
Total VPH	U		66.7	200	1	10/01/2024 23:39	WG2373663
(S) 2,5-Dibromotoluene(FID)	*87.7*			*70.0-130*		*10/01/2024 23:39*	WG2373663
(S) 2,5-Dibromotoluene(PID)	*78.2*			*70.0-130*		*10/01/2024 23:39*	WG2373663

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	16.4	J	11.3	25.0	1	10/04/2024 16:20	WG2376151
Acrylonitrile	1.63	J	0.671	5.00	1	10/04/2024 16:20	WG2376151
Benzene	U		0.0941	0.500	1	10/04/2024 16:20	WG2376151
Bromobenzene	U		0.118	0.500	1	10/04/2024 16:20	WG2376151
Bromodichloromethane	U		0.136	0.500	1	10/04/2024 16:20	WG2376151
Bromochloromethane	U		0.128	0.500	1	10/04/2024 16:20	WG2376151
Bromoform	U		0.129	0.500	1	10/04/2024 16:20	WG2376151
Bromomethane	U		0.605	2.50	1	10/04/2024 16:20	WG2376151
n-Butylbenzene	U		0.157	0.500	1	10/04/2024 16:20	WG2376151
sec-Butylbenzene	U		0.125	0.500	1	10/04/2024 16:20	WG2376151
tert-Butylbenzene	U		0.127	0.500	1	10/04/2024 16:20	WG2376151
Carbon disulfide	0.124	J	0.0962	0.500	1	10/04/2024 16:20	WG2376151
Carbon tetrachloride	U		0.128	0.500	1	10/04/2024 16:20	WG2376151
Chlorobenzene	U		0.117	0.500	1	10/04/2024 16:20	WG2376151
Chlorodibromomethane	U		0.140	0.500	1	10/04/2024 16:20	WG2376151
Chloroethane	U		0.192	2.50	1	10/04/2024 16:20	WG2376151
2-Chloroethyl vinyl ether	U		0.575	50.0	1	10/04/2024 16:20	WG2376151
Chloroform	U		0.111	0.500	1	10/04/2024 16:20	WG2376151
Chloromethane	U		0.960	1.25	1	10/04/2024 16:20	WG2376151
2-Chlorotoluene	U		0.106	0.500	1	10/04/2024 16:20	WG2376151
4-Chlorotoluene	U		0.114	0.500	1	10/04/2024 16:20	WG2376151
1,2-Dibromo-3-Chloropropane	U		0.276	2.50	1	10/04/2024 16:20	WG2376151
1,2-Dibromoethane	U		0.126	0.500	1	10/04/2024 16:20	WG2376151
Dibromomethane	U		0.122	0.500	1	10/04/2024 16:20	WG2376151
1,2-Dichlorobenzene	U		0.107	0.500	1	10/04/2024 16:20	WG2376151
1,3-Dichlorobenzene	U		0.299	0.500	1	10/04/2024 16:20	WG2376151
1,4-Dichlorobenzene	U		0.120	0.500	1	10/04/2024 16:20	WG2376151
Dichlorodifluoromethane	U		0.374	2.50	1	10/04/2024 16:20	WG2376151
1,1-Dichloroethane	U		0.100	0.500	1	10/04/2024 16:20	WG2376151
1,2-Dichloroethane	U		0.0819	0.500	1	10/04/2024 16:20	WG2376151
1,1-Dichloroethene	U		0.188	0.500	1	10/04/2024 16:20	WG2376151
cis-1,2-Dichloroethene	U		0.126	0.500	1	10/04/2024 16:20	WG2376151
trans-1,2-Dichloroethene	U		0.149	0.500	1	10/04/2024 16:20	WG2376151
1,2-Dichloropropane	U		0.149	0.500	1	10/04/2024 16:20	WG2376151
1,1-Dichloropropene	U		0.142	0.500	1	10/04/2024 16:20	WG2376151
1,3-Dichloropropane	U		0.109	1.00	1	10/04/2024 16:20	WG2376151
cis-1,3-Dichloropropene	U		0.111	0.500	1	10/04/2024 16:20	WG2376151
trans-1,3-Dichloropropene	U		0.118	0.500	1	10/04/2024 16:20	WG2376151
trans-1,4-Dichloro-2-butene	U		0.467	5.00	1	10/04/2024 16:20	WG2376151
2,2-Dichloropropane	U		0.161	0.500	1	10/04/2024 16:20	WG2376151
Di-isopropyl ether	U		0.105	0.500	1	10/04/2024 16:20	WG2376151
Ethylbenzene	U		0.137	0.500	1	10/04/2024 16:20	WG2376151
Hexachloro-1,3-butadiene	U		0.337	1.00	1	10/04/2024 16:20	WG2376151

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Hexanone	U		0.787	5.00	1	10/04/2024 16:20	WG2376151
n-Hexane	U		0.749	5.00	1	10/04/2024 16:20	WG2376151
Iodomethane	U		0.554	5.00	1	10/04/2024 16:20	WG2376151
Isopropylbenzene	U		0.105	0.500	1	10/04/2024 16:20	WG2376151
p-Isopropyltoluene	U		0.120	0.500	1	10/04/2024 16:20	WG2376151
2-Butanone (MEK)	U		1.19	5.00	1	10/04/2024 16:20	WG2376151
Methylene Chloride	U		0.430	2.50	1	10/04/2024 16:20	WG2376151
4-Methyl-2-pentanone (MIBK)	U		0.478	5.00	1	10/04/2024 16:20	WG2376151
Methyl tert-butyl ether	U		0.101	0.500	1	10/04/2024 16:20	WG2376151
Naphthalene	0.426	B J	0.174	2.50	1	10/04/2024 16:20	WG2376151
n-Propylbenzene	U		0.0993	0.500	1	10/04/2024 16:20	WG2376151
Styrene	U		0.118	0.500	1	10/04/2024 16:20	WG2376151
1,1,1,2-Tetrachloroethane	U		0.147	0.500	1	10/04/2024 16:20	WG2376151
1,1,2,2-Tetrachloroethane	U		0.133	0.500	1	10/04/2024 16:20	WG2376151
1,1,2-Trichlorotrifluoroethane	U		0.180	0.500	1	10/04/2024 16:20	WG2376151
Tetrachloroethene	U		0.300	0.500	1	10/04/2024 16:20	WG2376151
Toluene	U		0.278	0.500	1	10/04/2024 16:20	WG2376151
1,2,3-Trichlorobenzene	U		0.164	0.500	1	10/04/2024 16:20	WG2376151
1,2,4-Trichlorobenzene	U		0.481	1.00	1	10/04/2024 16:20	WG2376151
1,1,1-Trichloroethane	U		0.149	0.500	1	10/04/2024 16:20	WG2376151
1,1,2-Trichloroethane	U		0.158	0.500	1	10/04/2024 16:20	WG2376151
Trichloroethene	U		0.190	0.500	1	10/04/2024 16:20	WG2376151
Trichlorofluoromethane	U		0.160	2.50	1	10/04/2024 16:20	WG2376151
1,2,3-Trichloropropane	U		0.237	2.50	1	10/04/2024 16:20	WG2376151
1,2,4-Trimethylbenzene	U		0.322	0.500	1	10/04/2024 16:20	WG2376151
1,2,3-Trimethylbenzene	U		0.104	0.500	1	10/04/2024 16:20	WG2376151
1,3,5-Trimethylbenzene	U		0.104	0.500	1	10/04/2024 16:20	WG2376151
Vinyl acetate	U		0.692	5.00	1	10/04/2024 16:20	WG2376151
Vinyl chloride	U		0.234	0.500	1	10/04/2024 16:20	WG2376151
Xylenes, Total	U		0.174	1.50	1	10/04/2024 16:20	WG2376151
(S) Toluene-d8	*102*			*80.0-120*		*10/04/2024 16:20*	WG2376151
(S) 4-Bromofluorobenzene	*104*			*77.0-126*		*10/04/2024 16:20*	WG2376151
(S) 1,2-Dichloroethane-d4	*109*			*70.0-130*		*10/04/2024 16:20*	WG2376151

Method Blank (MB)

(MB) R4127675-2 10/01/24 23:02

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C5-C8 Aliphatics	U		33.3	100
Unadjusted C9-C12 Aliphatics	U		33.3	100
Unadjusted C9-C10 Aromatics	U		33.3	100
Adjusted C5-C8 Aliphatics	U		33.3	100
Adjusted C9-C12 Aliphatics	U		33.3	100
Total VPH	U		66.7	200
(S) 2,5-Dibromotoluene(FID)	*91.0*			*70.0-130*
(S) 2,5-Dibromotoluene(PID)	*80.8*			*70.0-130*

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

(LCS) R4127675-1 10/01/24 20:34 • (LCSD) R4127675-3 10/02/24 12:34

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C5-C8 Aliphatics	1200	1400	1370	117	114	70.0-130			2.17	50
Unadjusted C9-C12 Aliphatics	1400	1810	1760	129	126	70.0-130			2.80	50
Unadjusted C9-C10 Aromatics	200	235	228	117	114	70.0-130			3.02	50
Total VPH	2800	3450	3360	123	120	70.0-130			2.64	50
(S) 2,5-Dibromotoluene(FID)				*111*	*91.1*	*70.0-130*				
(S) 2,5-Dibromotoluene(PID)				*99.3*	*81.6*	*70.0-130*				

Method Blank (MB)

(MB) R4128435-3 10/03/24 13:04

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C5-C8 Aliphatics	U		33.3	100
Unadjusted C9-C12 Aliphatics	U		33.3	100
Unadjusted C9-C10 Aromatics	U		33.3	100
Adjusted C5-C8 Aliphatics	U		33.3	100
Adjusted C9-C12 Aliphatics	U		33.3	100
Total VPH	U		66.7	200
(S) 2,5-Dibromotoluene(FID)	*93.8*			*70.0-130*
(S) 2,5-Dibromotoluene(PID)	*93.5*			*70.0-130*

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

(LCS) R4128435-1 10/03/24 10:44 • (LCSD) R4128435-2 10/03/24 11:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C5-C8 Aliphatics	1200	1220	1220	102	102	70.0-130			0.000	50
Unadjusted C9-C12 Aliphatics	1400	1580	1580	113	113	70.0-130			0.000	50
Unadjusted C9-C10 Aromatics	200	207	208	104	104	70.0-130			0.482	50
Total VPH	2800	3010	3010	108	108	70.0-130			0.000	50
(S) 2,5-Dibromotoluene(FID)				*99.3*	*94.9*	*70.0-130*				
(S) 2,5-Dibromotoluene(PID)				*98.2*	*92.3*	*70.0-130*				

Method Blank (MB)

(MB) R4130544-3 10/04/24 13:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	25.0
Acrylonitrile	U		0.671	5.00
Benzene	U		0.0941	0.500
Bromobenzene	U		0.118	0.500
Bromodichloromethane	U		0.136	0.500
Bromochloromethane	U		0.128	0.500
Bromoform	U		0.129	0.500
Bromomethane	U		0.605	2.50
n-Butylbenzene	U		0.157	0.500
sec-Butylbenzene	U		0.125	0.500
tert-Butylbenzene	U		0.127	0.500
Carbon disulfide	U		0.0962	0.500
Carbon tetrachloride	U		0.128	0.500
Chlorobenzene	U		0.117	0.500
Chlorodibromomethane	U		0.140	0.500
Chloroethane	U		0.192	2.50
2-Chloroethyl vinyl ether	U		0.575	50.0
Chloroform	U		0.111	0.500
Chloromethane	U		0.960	1.25
2-Chlorotoluene	U		0.106	0.500
4-Chlorotoluene	U		0.114	0.500
1,2-Dibromo-3-Chloropropane	U		0.276	2.50
1,2-Dibromoethane	U		0.126	0.500
Dibromomethane	U		0.122	0.500
1,2-Dichlorobenzene	U		0.107	0.500
1,3-Dichlorobenzene	U		0.299	0.500
1,4-Dichlorobenzene	U		0.120	0.500
Dichlorodifluoromethane	U		0.374	2.50
1,1-Dichloroethane	U		0.100	0.500
1,2-Dichloroethane	U		0.0819	0.500
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.126	0.500
trans-1,2-Dichloroethene	U		0.149	0.500
1,2-Dichloropropane	U		0.149	0.500
1,1-Dichloropropene	U		0.142	0.500
1,3-Dichloropropane	U		0.109	1.00
cis-1,3-Dichloropropene	U		0.111	0.500
trans-1,3-Dichloropropene	U		0.118	0.500
trans-1,4-Dichloro-2-butene	U		0.467	5.00
2,2-Dichloropropane	U		0.161	0.500

Method Blank (MB)

(MB) R4130544-3 10/04/24 13:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Di-isopropyl ether	U		0.105	0.500
Ethylbenzene	U		0.137	0.500
Hexachloro-1,3-butadiene	U		0.337	1.00
2-Hexanone	U		0.787	5.00
n-Hexane	U		0.749	5.00
Iodomethane	U		0.554	5.00
Isopropylbenzene	U		0.105	0.500
p-Isopropyltoluene	U		0.120	0.500
2-Butanone (MEK)	U		1.19	5.00
Methylene Chloride	U		0.430	2.50
4-Methyl-2-pentanone (MIBK)	U		0.478	5.00
Methyl tert-butyl ether	U		0.101	0.500
Naphthalene	0.431	J	0.174	2.50
n-Propylbenzene	U		0.0993	0.500
Styrene	U		0.118	0.500
1,1,1,2-Tetrachloroethane	U		0.147	0.500
1,1,2,2-Tetrachloroethane	U		0.133	0.500
1,1,2-Trichlorotrifluoroethane	U		0.180	0.500
Tetrachloroethene	U		0.300	0.500
Toluene	U		0.278	0.500
1,2,3-Trichlorobenzene	U		0.164	0.500
1,2,4-Trichlorobenzene	U		0.481	1.00
1,1,1-Trichloroethane	U		0.149	0.500
1,1,2-Trichloroethane	U		0.158	0.500
Trichloroethene	U		0.190	0.500
Trichlorofluoromethane	U		0.160	2.50
1,2,3-Trichloropropane	U		0.237	2.50
1,2,4-Trimethylbenzene	U		0.322	0.500
1,2,3-Trimethylbenzene	U		0.104	0.500
1,3,5-Trimethylbenzene	U		0.104	0.500
Vinyl acetate	U		0.692	5.00
Vinyl chloride	U		0.234	0.500
Xylenes, Total	U		0.174	1.50
(S) Toluene-d8	*102*			*80.0-120*
(S) 4-Bromofluorobenzene	*101*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*

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

(LCS) R4130544-1 10/04/24 12:14 • (LCSD) R4130544-2 10/04/24 12:34

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	13.1	12.9	52.4	51.6	19.0-160	J	J	1.54	27
Acrylonitrile	25.0	14.3	15.1	57.2	60.4	55.0-149			5.44	20
Benzene	5.00	4.65	4.55	93.0	91.0	70.0-123			2.17	20
Bromobenzene	5.00	4.93	4.73	98.6	94.6	73.0-121			4.14	20
Bromodichloromethane	5.00	4.55	4.48	91.0	89.6	75.0-120			1.55	20
Bromochloromethane	5.00	4.34	4.46	86.8	89.2	76.0-122			2.73	20
Bromoform	5.00	4.14	4.17	82.8	83.4	68.0-132			0.722	20
Bromomethane	5.00	5.19	5.53	104	111	10.0-160			6.34	25
n-Butylbenzene	5.00	4.87	4.85	97.4	97.0	73.0-125			0.412	20
sec-Butylbenzene	5.00	4.90	4.80	98.0	96.0	75.0-125			2.06	20
tert-Butylbenzene	5.00	5.01	4.92	100	98.4	76.0-124			1.81	20
Carbon disulfide	5.00	4.08	4.03	81.6	80.6	61.0-128			1.23	20
Carbon tetrachloride	5.00	4.68	4.38	93.6	87.6	68.0-126			6.62	20
Chlorobenzene	5.00	4.92	4.86	98.4	97.2	80.0-121			1.23	20
Chlorodibromomethane	5.00	4.67	4.51	93.4	90.2	77.0-125			3.49	20
Chloroethane	5.00	4.93	4.90	98.6	98.0	47.0-150			0.610	20
2-Chloroethyl vinyl ether	25.0	25.2	24.6	101	98.4	51.0-160	J	J	2.41	20
Chloroform	5.00	4.51	4.59	90.2	91.8	73.0-120			1.76	20
Chloromethane	5.00	5.00	4.92	100	98.4	41.0-142			1.61	20
2-Chlorotoluene	5.00	4.88	4.51	97.6	90.2	76.0-123			7.88	20
4-Chlorotoluene	5.00	4.98	4.69	99.6	93.8	75.0-122			6.00	20
1,2-Dibromo-3-Chloropropane	5.00	3.55	3.21	71.0	64.2	58.0-134			10.1	20
1,2-Dibromoethane	5.00	4.78	4.75	95.6	95.0	80.0-122			0.630	20
Dibromomethane	5.00	4.56	4.56	91.2	91.2	80.0-120			0.000	20
1,2-Dichlorobenzene	5.00	4.80	4.62	96.0	92.4	79.0-121			3.82	20
1,3-Dichlorobenzene	5.00	4.82	4.77	96.4	95.4	79.0-120			1.04	20
1,4-Dichlorobenzene	5.00	4.83	4.61	96.6	92.2	79.0-120			4.66	20
Dichlorodifluoromethane	5.00	5.33	5.42	107	108	51.0-149			1.67	20
1,1-Dichloroethane	5.00	4.62	4.70	92.4	94.0	70.0-126			1.72	20
1,2-Dichloroethane	5.00	4.10	4.25	82.0	85.0	70.0-128			3.59	20
1,1-Dichloroethene	5.00	4.84	4.81	96.8	96.2	71.0-124			0.622	20
cis-1,2-Dichloroethene	5.00	4.66	4.58	93.2	91.6	73.0-120			1.73	20
trans-1,2-Dichloroethene	5.00	4.33	4.42	86.6	88.4	73.0-120			2.06	20
1,2-Dichloropropane	5.00	4.65	4.50	93.0	90.0	77.0-125			3.28	20
1,1-Dichloropropene	5.00	4.91	4.75	98.2	95.0	74.0-126			3.31	20
1,3-Dichloropropane	5.00	5.04	4.68	101	93.6	80.0-120			7.41	20
cis-1,3-Dichloropropene	5.00	4.83	4.77	96.6	95.4	80.0-123			1.25	20
trans-1,3-Dichloropropene	5.00	4.96	5.00	99.2	100	78.0-124			0.803	20
trans-1,4-Dichloro-2-butene	5.00	5.01	4.64	100	92.8	33.0-144		J	7.67	20
2,2-Dichloropropane	5.00	5.15	4.73	103	94.6	58.0-130			8.50	20

QUALITY CONTROL SUMMARY

L1781830-01,02

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

(LCS) R4130544-1 10/04/24 12:14 • (LCSD) R4130544-2 10/04/24 12:34

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Di-isopropyl ether	5.00	4.67	4.45	93.4	89.0	58.0-138			4.82	20
Ethylbenzene	5.00	5.00	4.90	100	98.0	79.0-123			2.02	20
Hexachloro-1,3-butadiene	5.00	4.93	4.89	98.6	97.8	54.0-138			0.815	20
2-Hexanone	25.0	24.0	23.5	96.0	94.0	67.0-149			2.11	20
n-Hexane	5.00	4.57	4.38	91.4	87.6	57.0-133	J	J	4.25	20
Iodomethane	25.0	24.1	22.8	96.4	91.2	33.0-147			5.54	26
Isopropylbenzene	5.00	4.90	4.84	98.0	96.8	76.0-127			1.23	20
p-Isopropyltoluene	5.00	4.93	4.73	98.6	94.6	76.0-125			4.14	20
2-Butanone (MEK)	25.0	22.5	21.6	90.0	86.4	44.0-160			4.08	20
Methylene Chloride	5.00	4.55	4.43	91.0	88.6	67.0-120			2.67	20
4-Methyl-2-pentanone (MIBK)	25.0	24.5	23.9	98.0	95.6	68.0-142			2.48	20
Methyl tert-butyl ether	5.00	4.17	4.06	83.4	81.2	68.0-125			2.67	20
Naphthalene	5.00	3.71	3.73	74.2	74.6	54.0-135			0.538	20
n-Propylbenzene	5.00	4.87	4.69	97.4	93.8	77.0-124			3.77	20
Styrene	5.00	4.87	4.94	97.4	98.8	73.0-130			1.43	20
1,1,1,2-Tetrachloroethane	5.00	4.48	4.49	89.6	89.8	75.0-125			0.223	20
1,1,2,2-Tetrachloroethane	5.00	4.55	4.46	91.0	89.2	65.0-130			2.00	20
1,1,2-Trichlorotrifluoroethane	5.00	5.19	5.31	104	106	69.0-132			2.29	20
Tetrachloroethene	5.00	4.99	4.86	99.8	97.2	72.0-132			2.64	20
Toluene	5.00	4.73	4.69	94.6	93.8	79.0-120			0.849	20
1,2,3-Trichlorobenzene	5.00	3.85	3.99	77.0	79.8	50.0-138			3.57	20
1,2,4-Trichlorobenzene	5.00	4.37	4.55	87.4	91.0	57.0-137			4.04	20
1,1,1-Trichloroethane	5.00	4.68	4.34	93.6	86.8	73.0-124			7.54	20
1,1,2-Trichloroethane	5.00	4.82	4.85	96.4	97.0	80.0-120			0.620	20
Trichloroethene	5.00	4.65	4.52	93.0	90.4	78.0-124			2.84	20
Trichlorofluoromethane	5.00	5.48	5.61	110	112	59.0-147			2.34	20
1,2,3-Trichloropropane	5.00	4.84	4.61	96.8	92.2	73.0-130			4.87	20
1,2,4-Trimethylbenzene	5.00	5.03	4.60	101	92.0	76.0-121			8.93	20
1,2,3-Trimethylbenzene	5.00	4.70	4.54	94.0	90.8	77.0-120			3.46	20
1,3,5-Trimethylbenzene	5.00	4.80	4.60	96.0	92.0	76.0-122			4.26	20
Vinyl acetate	25.0	28.8	28.2	115	113	11.0-160			2.11	20
Vinyl chloride	5.00	4.32	5.04	86.4	101	67.0-131			15.4	20
Xylenes, Total	15.0	15.0	14.8	100	98.7	79.0-123			1.34	20
(S) Toluene-d8				*106*	*105*	*80.0-120*				
(S) 4-Bromofluorobenzene				*106*	*107*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*98.5*	*97.5*	*70.0-130*				

Method Blank (MB)

(MB) R4126021-1 09/27/24 19:48

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C9-C18 Aliphatics	U		200	600
Unadjusted C19-C36 Aliphatics	U		200	600
(S) 1-Chloro-octadecane	*69.9*			*40.0-140*

Method Blank (MB)

(MB) R4126021-4 09/27/24 21:00

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C11-C22 Aromatics	U		200	600
(S) o-Terphenyl	*83.4*			*40.0-140*
(S) 2-Fluorobiphenyl	*90.9*			*40.0-140*
(S) 2-Bromonaphthalene	*87.4*			*40.0-140*

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

(LCS) R4126021-2 09/27/24 20:12 • (LCSD) R4126021-3 09/27/24 20:36

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C9-C18 Aliphatics	600	294	346	49.0	57.7	40.0-140	J	J	16.2	25
Unadjusted C19-C36 Aliphatics	800	649	786	81.1	98.3	40.0-140			19.1	25
(S) 1-Chloro-octadecane				*60.9*	*74.6*	*40.0-140*				

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

(LCS) R4126021-5 09/27/24 21:24 • (LCSD) R4126021-6 09/27/24 21:48

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C11-C22 Aromatics	1700	1500	1530	88.2	90.0	40.0-140			1.98	25
(S) o-Terphenyl				*85.2*	*86.3*	*40.0-140*				
(S) 2-Fluorobiphenyl				*90.9*	*93.1*	*40.0-140*				
(S) 2-Bromonaphthalene				*88.9*	*91.0*	*40.0-140*				

L1781000-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1781000-01 09/28/24 02:36 • (MS) R4126021-7 09/28/24 03:00 • (MSD) R4126021-8 09/28/24 03:24

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Unadjusted C9-C18 Aliphatics	570	U	300	316	44.3	47.1	1	40.0-140	J	J	5.19	50
Unadjusted C19-C36 Aliphatics	760	U	607	604	76.8	76.4	1	40.0-140			0.495	50
(S) 1-Chloro-octadecane					*29.9*	*27.2*		*40.0-140*	J2	J2		

L1781000-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1781000-01 09/30/24 10:45 • (MS) R4130275-1 09/30/24 11:09 • (MSD) R4130275-2 09/30/24 11:33

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Unadjusted C11-C22 Aromatics	1620	855	2130	2120	78.7	78.1	1	40.0-140			0.471	50
(S) o-Terphenyl					*71.6*	*68.0*		*40.0-140*				
(S) 2-Fluorobiphenyl					*101*	*102*		*40.0-140*				
(S) 2-Bromonaphthalene					*99.7*	*100*		*40.0-140*				

Method Blank (MB)

(MB) R4126247-3 09/27/24 01:08

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.0886	1.00
Acenaphthylene	U		0.0921	1.00
Anthracene	U		0.0804	1.00
Benzidine	U		3.74	10.0
Benzo(a)anthracene	U		0.199	1.00
Benzo(b)fluoranthene	U		0.130	1.00
Benzo(k)fluoranthene	U		0.120	1.00
Benzo(g,h,i)perylene	U		0.121	1.00
Benzo(a)pyrene	U		0.0381	1.00
Bis(2-chlorethoxy)methane	U		0.116	10.0
Bis(2-chloroethyl)ether	U		0.137	10.0
2,2-Oxybis(1-Chloropropane)	U		0.210	10.0
4-Bromophenyl-phenylether	U		0.0877	10.0
2-Chloronaphthalene	U		0.0648	1.00
4-Chlorophenyl-phenylether	U		0.0926	10.0
Chrysene	U		0.130	1.00
Dibenz(a,h)anthracene	U		0.0644	1.00
3,3-Dichlorobenzidine	U		0.212	10.0
2,4-Dinitrotoluene	U		0.0983	10.0
2,6-Dinitrotoluene	U		0.250	10.0
Fluoranthene	U		0.102	1.00
Fluorene	U		0.0844	1.00
Hexachlorobenzene	U		0.0755	1.00
Hexachloro-1,3-butadiene	U		0.0968	10.0
Hexachlorocyclopentadiene	U		0.0598	10.0
Hexachloroethane	U		0.127	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.143	10.0
Naphthalene	U		0.159	1.00
Nitrobenzene	U		0.297	10.0
n-Nitrosodimethylamine	U		0.998	10.0
n-Nitrosodiphenylamine	U		2.37	10.0
n-Nitrosodi-n-propylamine	U		0.261	10.0
Phenanthrene	U		0.112	1.00
Benzylbutyl phthalate	U		0.765	3.00
Bis(2-Ethylhexyl)phthalate	U		0.895	3.00
Di-n-butyl phthalate	U		0.453	3.00
Diethyl phthalate	U		0.287	3.00
Dimethyl phthalate	U		0.260	3.00
Di-n-octyl phthalate	U		0.932	3.00

Method Blank (MB)

(MB) R4126247-3 09/27/24 01:08

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyrene	U		0.107	1.00
1,2,4-Trichlorobenzene	U		0.0698	10.0
Aniline	U		1.65	10.0
1,2-Diphenylhydrazine	U	N2	0.105	10.0
Benzyl alcohol	U		0.563	10.0
4-Chloroaniline	U		0.234	10.0
4-Chloro-3-methylphenol	U		0.131	10.0
2-Chlorophenol	U		0.133	10.0
Dibenzofuran	U		0.0970	10.0
2,4-Dichlorophenol	U		0.102	10.0
2,4-Dimethylphenol	U		0.0636	10.0
4,6-Dinitro-2-methylphenol	U		1.12	10.0
2,4-Dinitrophenol	U		5.93	10.0
2-Methylnaphthalene	U		0.117	1.00
2-Methylphenol	U		0.0929	10.0
3&4-Methyl Phenol	U		0.168	10.0
2-Nitroaniline	U		0.102	10.0
3-Nitroaniline	U		0.0869	10.0
4-Nitroaniline	U		0.0910	10.0
2-Nitrophenol	U		0.117	10.0
4-Nitrophenol	U		0.143	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		4.33	10.0
Pyridine	U		0.627	10.0
2,4,6-Trichlorophenol	U		0.100	10.0
Acetophenone	U		0.208	10.0
Diphenylamine	U		2.37	10.0
1,2,4,5-Tetrachlorobenzene	U		0.0647	10.0
2,3,4,6-Tetrachlorophenol	U		0.231	10.0
2,4,5-Trichlorophenol	U		0.109	10.0
(S) 2-Fluorophenol	*40.4*			*10.0-120*
(S) Phenol-d5	*28.6*			*10.0-120*
(S) Nitrobenzene-d5	*57.0*			*10.0-127*
(S) 2-Fluorobiphenyl	*61.1*			*10.0-130*
(S) 2,4,6-Tribromophenol	*84.0*			*10.0-155*
(S) p-Terphenyl-d14	*93.6*			*10.0-128*

Method Blank (MB)

(MB) R4129505-2 10/04/24 22:00

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
2-Acetylaminofluorene	U		0.253	10.0
4-Aminobiphenyl	U		0.461	10.0
Chlorobenzilate	U		3.84	50.0
Diallate	U		0.524	10.0
2,6-Dichlorophenol	U		0.102	10.0
Dimethoate	U		5.05	50.0
P-(Dimethylamino) Azobenzene	U		3.69	10.0
Dimethylbenz (A) Anthracene	U		1.71	10.0
3,3-Dimethylbenzidine	U		3.39	10.0
a,a-Dimethylphenethylamine	U		3.13	50.0
1,3-Dinitrobenzene	U		0.359	10.0
Diphenylamine	U		2.37	10.0
Dinoseb	U		8.01	50.0
Disulfoton	U		0.267	10.0
Ethyl methanesulfonate	U		0.326	10.0
Ethyl Parathion	U		0.379	10.0
Famphur	U		3.92	20.0
Hexachloropropene	U		0.149	50.0
Hexachlorophene	U		1.44	50.0
Isodrin	U		4.11	10.0
Isosafrole	U		3.88	10.0
Kepone	U		2.66	20.0
Methapyrilene	U		10.0	50.0
3-Methylcholanthrene	U		0.164	10.0
Methyl methanesulfonate	U		3.40	50.0
Methyl parathion	U		0.213	10.0
1,4-Naphthoquinone	U		5.56	50.0
1-Naphthylamine	U		0.289	10.0
2-Naphthylamine	U		4.48	10.0
5-Nitro-o-toluidine	U		1.99	10.0
4-Nitroquinoline 1-oxide	U		2.03	10.0
n-Nitrosodiethylamine	U		3.57	10.0
n-Nitrosodi-n-butylamine	U		3.91	10.0
n-Nitrosomethylethylamine	U		3.25	10.0
n-Nitrosomorpholine	U		3.25	10.0
n-Nitrosopiperidine	U		3.72	10.0
n-Nitrosopyrrolidine	U		3.39	10.0
Pentachlorobenzene	U		4.15	10.0
Pentachloroethane	U		2.83	50.0
Pentachloronitrobenzene	U		4.15	10.0

Method Blank (MB)

(MB) R4129505-2 10/04/24 22:00

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Phenacetin	U		4.66	10.0
p-Phenylenediamine	U		387	6900
Phorate	U		4.86	50.0
2-Picoline	U		6.83	50.0
Pronamide	U		4.21	10.0
Safrole	U		3.68	10.0
Sulfotep	U		3.99	50.0
Thionazin	U		4.07	10.0
o-Toluidine	U		3.53	10.0
O,O,O-Triethyl Phosphorothioate	U		2.93	10.0
1,3,5-Trinitrobenzene	U		1.32	10.0

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

(LCS) R4126247-1 09/27/24 00:26 • (LCSD) R4126247-2 09/27/24 00:47

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	34.4	35.6	68.8	71.2	41.0-120			3.43	22
Acenaphthylene	50.0	33.6	33.4	67.2	66.8	43.0-120			0.597	22
Anthracene	50.0	41.6	41.2	83.2	82.4	45.0-120			0.966	20
Benzidine	100	0.000	4.89	0.000	4.89	10.0-120	J4	J J3 J4	200	36
Benzo(a)anthracene	50.0	44.6	45.3	89.2	90.6	47.0-120			1.56	20
Benzo(b)fluoranthene	50.0	44.8	44.0	89.6	88.0	46.0-120			1.80	20
Benzo(k)fluoranthene	50.0	43.3	44.9	86.6	89.8	46.0-120			3.63	21
Benzo(g,h,i)perylene	50.0	42.1	42.5	84.2	85.0	48.0-121			0.946	20
Benzo(a)pyrene	50.0	40.6	42.0	81.2	84.0	47.0-120			3.39	20
Bis(2-chlorethoxy)methane	50.0	29.9	30.5	59.8	61.0	33.0-120			1.99	24
Bis(2-chloroethyl)ether	50.0	32.1	34.1	64.2	68.2	23.0-120			6.04	33
2,2-Oxybis(1-Chloropropane)	50.0	29.5	30.4	59.0	60.8	28.0-120			3.01	31
4-Bromophenyl-phenylether	50.0	45.9	46.0	91.8	92.0	45.0-120			0.218	20
2-Chloronaphthalene	50.0	29.9	30.6	59.8	61.2	37.0-120			2.31	25
4-Chlorophenyl-phenylether	50.0	41.7	41.9	83.4	83.8	44.0-120			0.478	20
Chrysene	50.0	43.8	44.3	87.6	88.6	48.0-120			1.14	20
Dibenz(a,h)anthracene	50.0	47.6	48.1	95.2	96.2	47.0-120			1.04	20
3,3-Dichlorobenzidine	100	72.0	83.6	72.0	83.6	44.0-120			14.9	20
2,4-Dinitrotoluene	50.0	55.2	54.8	110	110	49.0-124			0.727	20
2,6-Dinitrotoluene	50.0	47.5	48.9	95.0	97.8	46.0-120			2.90	21
Fluoranthene	50.0	48.3	47.1	96.6	94.2	51.0-120			2.52	20
Fluorene	50.0	39.9	39.4	79.8	78.8	47.0-120			1.26	20

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

(LCS) R4126247-1 09/27/24 00:26 • (LCSD) R4126247-2 09/27/24 00:47

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hexachlorobenzene	50.0	46.6	46.1	93.2	92.2	44.0-120			1.08	20
Hexachloro-1,3-butadiene	50.0	26.9	27.7	53.8	55.4	19.0-120			2.93	32
Hexachlorocyclopentadiene	50.0	13.5	14.4	27.0	28.8	15.0-120			6.45	31
Hexachloroethane	50.0	25.4	26.1	50.8	52.2	15.0-120			2.72	37
Indeno(1,2,3-cd)pyrene	50.0	41.9	43.4	83.8	86.8	49.0-122			3.52	20
Isophorone	50.0	32.7	33.3	65.4	66.6	36.0-120			1.82	23
Naphthalene	50.0	25.9	26.7	51.8	53.4	27.0-120			3.04	27
Nitrobenzene	50.0	28.1	28.5	56.2	57.0	27.0-120			1.41	29
n-Nitrosodimethylamine	50.0	12.7	14.0	25.4	28.0	10.0-120			9.74	40
n-Nitrosodiphenylamine	50.0	39.6	40.2	79.2	80.4	47.0-120			1.50	20
n-Nitrosodi-n-propylamine	50.0	34.3	35.3	68.6	70.6	31.0-120			2.87	28
Phenanthrene	50.0	41.8	41.0	83.6	82.0	46.0-120			1.93	20
Benzylbutyl phthalate	50.0	44.1	44.5	88.2	89.0	43.0-121			0.903	20
Bis(2-Ethylhexyl)phthalate	50.0	40.6	40.7	81.2	81.4	43.0-122			0.246	20
Di-n-butyl phthalate	50.0	48.2	45.9	96.4	91.8	49.0-121			4.89	20
Diethyl phthalate	50.0	48.0	48.5	96.0	97.0	48.0-122			1.04	20
Dimethyl phthalate	50.0	46.3	46.0	92.6	92.0	48.0-120			0.650	20
Di-n-octyl phthalate	50.0	41.7	41.4	83.4	82.8	42.0-125			0.722	20
Pyrene	50.0	40.9	42.4	81.8	84.8	47.0-120			3.60	20
1,2,4-Trichlorobenzene	50.0	26.4	27.5	52.8	55.0	24.0-120			4.08	29
Aniline	50.0	15.1	26.3	30.2	52.6	13.0-120		J3	54.1	31
1,2-Diphenylhydrazine	50.0	40.9	40.7	81.8	81.4	41.0-126	N2	N2	0.490	20
Benzyl alcohol	50.0	25.4	28.3	50.8	56.6	25.0-120			10.8	26
4-Chloroaniline	50.0	24.1	29.0	48.2	58.0	25.0-120			18.5	25
4-Chloro-3-methylphenol	50.0	39.2	41.5	78.4	83.0	40.0-120			5.70	21
2-Chlorophenol	50.0	28.4	31.3	56.8	62.6	25.0-120			9.72	35
Dibenzofuran	50.0	37.4	37.8	74.8	75.6	44.0-120			1.06	22
2,4-Dichlorophenol	50.0	32.2	33.4	64.4	66.8	36.0-120			3.66	26
2,4-Dimethylphenol	50.0	30.7	32.8	61.4	65.6	33.0-120			6.61	26
4,6-Dinitro-2-methylphenol	50.0	57.3	57.0	115	114	38.0-138			0.525	25
2,4-Dinitrophenol	50.0	55.8	57.3	112	115	10.0-120			2.65	39
2-Methylnaphthalene	50.0	30.6	31.4	61.2	62.8	33.0-120			2.58	25
2-Methylphenol	50.0	28.0	31.5	56.0	63.0	28.0-120			11.8	29
3&4-Methyl Phenol	50.0	30.3	33.8	60.6	67.6	31.0-120			10.9	30
2-Nitroaniline	50.0	46.4	47.9	92.8	95.8	43.0-120			3.18	22
3-Nitroaniline	50.0	41.2	44.5	82.4	89.0	38.0-120			7.70	21
4-Nitroaniline	50.0	49.1	50.5	98.2	101	18.0-160			2.81	21
2-Nitrophenol	50.0	34.0	34.9	68.0	69.8	31.0-120			2.61	29
4-Nitrophenol	50.0	21.5	23.8	43.0	47.6	10.0-120			10.2	33
Pentachlorophenol	50.0	44.0	43.7	88.0	87.4	23.0-120			0.684	25

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

(LCS) R4126247-1 09/27/24 00:26 • (LCSD) R4126247-2 09/27/24 00:47

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Phenol	50.0	13.5	15.7	27.0	31.4	10.0-120			15.1	36
Pyridine	50.0	5.83	11.7	11.7	23.4	10.0-120	J	J3	67.0	38
2,4,6-Trichlorophenol	50.0	37.5	39.2	75.0	78.4	42.0-120			4.43	23
Acetophenone	50.0	30.9	31.9	61.8	63.8	29.0-120			3.18	28
Diphenylamine	50.0	39.6	40.2	79.2	80.4	35.0-120			1.50	20
1,2,4,5-Tetrachlorobenzene	50.0	33.4	34.4	66.8	68.8	31.0-121			2.95	27
2,3,4,6-Tetrachlorophenol	50.0	55.0	55.9	110	112	42.0-132			1.62	22
2,4,5-Trichlorophenol	50.0	43.9	45.7	87.8	91.4	44.0-120			4.02	22
(S) 2-Fluorophenol				*39.6*	*45.9*	*10.0-120*				
(S) Phenol-d5				*27.3*	*31.5*	*10.0-120*				
(S) Nitrobenzene-d5				*51.8*	*52.3*	*10.0-127*				
(S) 2-Fluorobiphenyl				*68.8*	*68.3*	*10.0-130*				
(S) 2,4,6-Tribromophenol				*113*	*112*	*10.0-155*				
(S) p-Terphenyl-d14				*93.0*	*91.6*	*10.0-128*				

Laboratory Control Sample (LCS)

(LCS) R4129505-1 10/04/24 21:39

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
2-Acetylaminofluorene	50.0	52.9	106	32.0-120	
4-Aminobiphenyl	50.0	17.8	35.6	20.0-120	
Chlorobenzilate	50.0	47.1	94.2	29.0-128	J
Diallate	50.0	43.3	86.6	30.0-120	
2,6-Dichlorophenol	50.0	30.4	60.8	19.0-136	
Dimethoate	50.0	47.9	95.8	11.0-134	J
P-(Dimethylamino) Azobenzene	50.0	45.6	91.2	27.0-120	
Dimethylbenz (A) Anthracene	50.0	23.9	47.8	14.0-124	
3,3-Dimethylbenzidine	50.0	0.818	1.64	13.0-120	J J4
a,a-Dimethylphenethylamine	50.0	0.000	0.000	10.0-129	J4
1,3-Dinitrobenzene	50.0	43.1	86.2	34.0-120	
Diphenylamine	50.0	39.6	79.2	35.0-120	
Dinoseb	50.0	49.4	98.8	39.0-120	J
Disulfoton	50.0	37.6	75.2	32.0-120	
Ethyl methanesulfonate	50.0	29.5	59.0	10.0-120	
Ethyl Parathion	50.0	50.3	101	46.0-130	
Famphur	50.0	48.1	96.2	32.0-120	
Hexachloropropene	50.0	11.8	23.6	10.0-120	J
Hexachlorophene	100	43.6	43.6	10.0-120	J

Laboratory Control Sample (LCS)

(LCS) R4129505-1 10/04/24 21:39

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Isodrin	50.0	36.1	72.2	22.0-157	
Isosafrole	50.0	34.1	68.2	25.0-133	
Kepone	50.0	45.6	91.2	10.0-120	
Methapyrilene	50.0	1.12	2.24	10.0-120	J J4
3-Methylcholanthrene	50.0	40.3	80.6	30.0-160	
Methyl methanesulfonate	50.0	21.1	42.2	10.0-120	J
Methyl parathion	50.0	55.6	111	42.0-120	
1,4-Naphthoquinone	50.0	2.61	5.22	50.0-150	J J4
1-Naphthylamine	50.0	15.9	31.8	19.0-120	
2-Naphthylamine	50.0	9.90	19.8	10.0-120	J
5-Nitro-o-toluidine	50.0	45.6	91.2	34.0-120	
4-Nitroquinoline 1-oxide	50.0	45.2	90.4	10.0-159	
n-Nitrosodiethylamine	50.0	29.3	58.6	10.0-120	
n-Nitrosodi-n-butylamine	50.0	36.3	72.6	13.0-143	
n-Nitrosomethylethylamine	50.0	27.6	55.2	10.0-120	
n-Nitrosomorpholine	50.0	29.7	59.4	10.0-120	
n-Nitrosopiperidine	50.0	31.8	63.6	10.0-160	
n-Nitrosopyrrolidine	50.0	32.1	64.2	10.0-124	
Pentachlorobenzene	50.0	31.2	62.4	25.0-120	
Pentachloroethane	50.0	26.8	53.6	10.0-120	J
Pentachloronitrobenzene	50.0	46.0	92.0	34.0-132	
Phenacetin	50.0	51.5	103	34.0-127	
p-Phenylenediamine	50.0	0.000	0.000	50.0-150	J4
Phorate	50.0	42.5	85.0	13.0-160	J
2-Picoline	50.0	3.20	6.40	10.0-120	J J4
Pronamide	50.0	48.9	97.8	38.0-130	
Safrole	50.0	28.2	56.4	21.0-120	
Sulfotep	50.0	43.0	86.0	52.0-120	J
Thionazin	50.0	42.6	85.2	38.0-121	
o-Toluidine	50.0	17.1	34.2	10.0-120	
O,O,O-Triethyl Phosphorothioate	50.0	29.1	58.2	11.0-135	
1,3,5-Trinitrobenzene	50.0	53.6	107	37.0-147	

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

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
N2	Analyte reported using a calibration and validation based on Azobenzene (CAS 103-33-3). 1,2-Diphenylhydrazine decomposes into Azobenzene during the analysis.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Ramboll US Consulting, Inc. - Denver
1999 Broadway Suite 2225
Denver, CO 80202

Billing Information:
Troy Wyss
PO Box 4229
Indianapolis, IN 46242

Pres Chk

Report to: Abby Small

Email To: asmall@ramboll.com;rdeshpande@ramboll.com

Project Description: CMR Great Falls - 2023 RFI Soil Sampling

City/State Collected: Great Falls, MT

Please Circle: PT MT CT ET

Phone: 303-382-5474

Client Project #

Lab Project #: ENVIRONCO-CALU MONTH

Collected by (print): Kyle Graves

Site/Facility ID #: GREAT FALLS, MT

P.O. #

Collected by (signature): [signature]

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace — PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1781830
B043

Acctnum: ENVIRONCO
Template: T245953
Prelogin: P1092399
PM: 841 - Kelly Mercer
PB: NG 8/13/24
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270AP9 100ml Amb NoPres	SVEPHMT 1L-Amb-Add HCl	V8260LL 40mlAmb-HCl	V8260LL 40mlAmb-HCl-Blk	VPHMT 40mlAmb HCl	VPHMT 40mlAmb-HCl-Blk	Remarks	Sample # (lab only)
CMR-SP200-240924	grab	GW	–	09/24/24	0945	9	✓	✓	✓	✓	✓	✓		-01
TRIP BLANK		GW												-02

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier _____

Tracking # 7315 3193 1358

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
[signature]	09/24/24	0945		✓

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: MSA 4°C Bottles Received:
				5.6+.3=5.9 9

Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date:	Time:
			Alexa Mitchen	9/25/24	0900

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

APPENDIX A3

PASSIVE TREATMENT TRENCH GROUNDWATER ANALYTICAL RESULTS

Pace Project Number:

L1777686

ANALYTICAL REPORT

October 02, 2024

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

Ramboll US Consulting, Inc. - Denver

Sample Delivery Group:	L1777686
Samples Received:	09/13/2024
Project Number:	
Description:	CMR Great Falls - 2023 RFI Soil Sampling
Site:	GREAT FALLS, MT
Report To:	Abby Small 1999 Broadway Suite 2225 Denver, CO 80202

Entire Report Reviewed By:

Kelly Mercer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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CMR-MW-41S-240912 L1777686-01 GW

Collected by: Kyle Groves | Collected date/time: 09/12/24 10:07 | Received date/time: 09/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2365307	1	09/19/24 07:24	09/19/24 07:24	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2365825	25	09/19/24 20:14	09/19/24 20:14	JBE	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2363448	1	09/16/24 07:40	09/17/24 17:32	DMG	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2363448	1	09/16/24 07:40	09/17/24 17:32	JDJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2364882	1	09/19/24 20:18	09/23/24 11:36	DSH	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2364882	1	09/19/24 20:18	09/27/24 16:15	JRM	Mt. Juliet, TN

CMR-MW-106-240912 L1777686-02 GW

Collected by: Kyle Groves | Collected date/time: 09/12/24 10:54 | Received date/time: 09/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2365307	1	09/19/24 07:59	09/19/24 07:59	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2365956	1	09/19/24 17:14	09/19/24 17:14	WHS	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2363448	1	09/16/24 07:40	09/17/24 18:36	DMG	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2363448	1	09/16/24 07:40	09/17/24 18:36	JDJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2364882	1	09/19/24 20:18	09/23/24 11:58	DSH	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2364882	1	09/19/24 20:18	09/27/24 16:37	JRM	Mt. Juliet, TN

CMR-MW-105-240912 L1777686-03 GW

Collected by: Kyle Groves | Collected date/time: 09/12/24 13:27 | Received date/time: 09/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG2365307	1	09/19/24 08:34	09/19/24 08:34	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2365956	1	09/19/24 17:33	09/19/24 17:33	WHS	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2370830	10	09/26/24 20:47	09/26/24 20:47	DYW	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2363448	1	09/16/24 07:40	09/17/24 18:57	DMG	Mt. Juliet, TN
TPH by Method MTDEQ EPH	WG2363448	1	09/16/24 07:40	09/17/24 18:57	JDJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2364882	1	09/19/24 20:18	09/23/24 12:20	DSH	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG2364882	1	09/19/24 20:18	09/27/24 16:58	JRM	Mt. Juliet, TN

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

Kelly Mercer
Project Manager

Project Narrative

Due to multiple preparation procedures, calculated analytes are not reported in the quality control samples for EPH and VPH Methods.

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	1420		33.3	100	1	09/19/2024 07:24	WG2365307
Unadjusted C9-C12 Aliphatics	3040		33.3	100	1	09/19/2024 07:24	WG2365307
Unadjusted C9-C10 Aromatics	922		33.3	100	1	09/19/2024 07:24	WG2365307
Adjusted C5-C8 Aliphatics	846		33.3	100	1	09/19/2024 07:24	WG2365307
Adjusted C9-C12 Aliphatics	2070		33.3	100	1	09/19/2024 07:24	WG2365307
Total VPH	5380		66.7	200	1	09/19/2024 07:24	WG2365307
(S) 2,5-Dibromotoluene(FID)	*105*			*70.0-130*		*09/19/2024 07:24*	WG2365307
(S) 2,5-Dibromotoluene(PID)	*100*			*70.0-130*		*09/19/2024 07:24*	WG2365307

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U		282	625	25	09/19/2024 20:14	WG2365825
Acrylonitrile	U		16.8	125	25	09/19/2024 20:14	WG2365825
Benzene	574		2.35	12.5	25	09/19/2024 20:14	WG2365825
Bromobenzene	U		2.95	12.5	25	09/19/2024 20:14	WG2365825
Bromodichloromethane	U		3.40	12.5	25	09/19/2024 20:14	WG2365825
Bromochloromethane	U		3.20	12.5	25	09/19/2024 20:14	WG2365825
Bromoform	U		3.22	12.5	25	09/19/2024 20:14	WG2365825
Bromomethane	U		15.1	62.5	25	09/19/2024 20:14	WG2365825
n-Butylbenzene	7.25	J	3.93	12.5	25	09/19/2024 20:14	WG2365825
sec-Butylbenzene	U		3.13	12.5	25	09/19/2024 20:14	WG2365825
tert-Butylbenzene	7.72	B J	3.18	12.5	25	09/19/2024 20:14	WG2365825
Carbon disulfide	U		2.41	12.5	25	09/19/2024 20:14	WG2365825
Carbon tetrachloride	U		3.20	12.5	25	09/19/2024 20:14	WG2365825
Chlorobenzene	U		2.93	12.5	25	09/19/2024 20:14	WG2365825
Chlorodibromomethane	U		3.50	12.5	25	09/19/2024 20:14	WG2365825
Chloroethane	U		4.80	62.5	25	09/19/2024 20:14	WG2365825
2-Chloroethyl vinyl ether	U		14.4	1250	25	09/19/2024 20:14	WG2365825
Chloroform	U		2.78	12.5	25	09/19/2024 20:14	WG2365825
Chloromethane	U		24.0	31.3	25	09/19/2024 20:14	WG2365825
2-Chlorotoluene	U		2.65	12.5	25	09/19/2024 20:14	WG2365825
4-Chlorotoluene	U		2.85	12.5	25	09/19/2024 20:14	WG2365825
1,2-Dibromo-3-Chloropropane	U		6.90	62.5	25	09/19/2024 20:14	WG2365825
1,2-Dibromoethane	U		3.15	12.5	25	09/19/2024 20:14	WG2365825
Dibromomethane	U		3.05	12.5	25	09/19/2024 20:14	WG2365825
1,2-Dichlorobenzene	U		2.68	12.5	25	09/19/2024 20:14	WG2365825
1,3-Dichlorobenzene	U		7.48	12.5	25	09/19/2024 20:14	WG2365825
1,4-Dichlorobenzene	U		3.00	12.5	25	09/19/2024 20:14	WG2365825
Dichlorodifluoromethane	U		9.35	62.5	25	09/19/2024 20:14	WG2365825
1,1-Dichloroethane	U		2.50	12.5	25	09/19/2024 20:14	WG2365825
1,2-Dichloroethane	U		2.05	12.5	25	09/19/2024 20:14	WG2365825
1,1-Dichloroethene	U		4.70	12.5	25	09/19/2024 20:14	WG2365825
cis-1,2-Dichloroethene	U		3.15	12.5	25	09/19/2024 20:14	WG2365825
trans-1,2-Dichloroethene	U		3.73	12.5	25	09/19/2024 20:14	WG2365825
1,2-Dichloropropane	U		3.73	12.5	25	09/19/2024 20:14	WG2365825
1,1-Dichloropropene	U		3.55	12.5	25	09/19/2024 20:14	WG2365825
1,3-Dichloropropane	U		2.73	25.0	25	09/19/2024 20:14	WG2365825
cis-1,3-Dichloropropene	U		2.78	12.5	25	09/19/2024 20:14	WG2365825
trans-1,3-Dichloropropene	U		2.95	12.5	25	09/19/2024 20:14	WG2365825
trans-1,4-Dichloro-2-butene	U	J3	11.7	125	25	09/19/2024 20:14	WG2365825
2,2-Dichloropropane	U		4.03	12.5	25	09/19/2024 20:14	WG2365825
Di-isopropyl ether	U		2.63	12.5	25	09/19/2024 20:14	WG2365825
Ethylbenzene	219		3.43	12.5	25	09/19/2024 20:14	WG2365825
Hexachloro-1,3-butadiene	U		8.43	25.0	25	09/19/2024 20:14	WG2365825

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Hexanone	U		19.7	125	25	09/19/2024 20:14	WG2365825
n-Hexane	U		18.7	125	25	09/19/2024 20:14	WG2365825
Iodomethane	U		13.9	125	25	09/19/2024 20:14	WG2365825
Isopropylbenzene	5.73	J	2.63	12.5	25	09/19/2024 20:14	WG2365825
p-Isopropyltoluene	6.17	J	3.00	12.5	25	09/19/2024 20:14	WG2365825
2-Butanone (MEK)	U		29.8	125	25	09/19/2024 20:14	WG2365825
Methylene Chloride	U		10.7	62.5	25	09/19/2024 20:14	WG2365825
4-Methyl-2-pentanone (MIBK)	U		12.0	125	25	09/19/2024 20:14	WG2365825
Methyl tert-butyl ether	U		2.53	12.5	25	09/19/2024 20:14	WG2365825
Naphthalene	45.9	J	4.35	62.5	25	09/19/2024 20:14	WG2365825
n-Propylbenzene	16.9		2.48	12.5	25	09/19/2024 20:14	WG2365825
Styrene	U		2.95	12.5	25	09/19/2024 20:14	WG2365825
1,1,1,2-Tetrachloroethane	U		3.68	12.5	25	09/19/2024 20:14	WG2365825
1,1,2,2-Tetrachloroethane	U		3.33	12.5	25	09/19/2024 20:14	WG2365825
1,1,2-Trichlorotrifluoroethane	U		4.50	12.5	25	09/19/2024 20:14	WG2365825
Tetrachloroethene	U		7.50	12.5	25	09/19/2024 20:14	WG2365825
Toluene	U		6.95	12.5	25	09/19/2024 20:14	WG2365825
1,2,3-Trichlorobenzene	U		4.10	12.5	25	09/19/2024 20:14	WG2365825
1,2,4-Trichlorobenzene	U		12.0	25.0	25	09/19/2024 20:14	WG2365825
1,1,1-Trichloroethane	U		3.73	12.5	25	09/19/2024 20:14	WG2365825
1,1,2-Trichloroethane	U		3.95	12.5	25	09/19/2024 20:14	WG2365825
Trichloroethene	U		4.75	12.5	25	09/19/2024 20:14	WG2365825
Trichlorofluoromethane	U		4.00	62.5	25	09/19/2024 20:14	WG2365825
1,2,3-Trichloropropane	U	J3	5.93	62.5	25	09/19/2024 20:14	WG2365825
1,2,4-Trimethylbenzene	500		8.05	12.5	25	09/19/2024 20:14	WG2365825
1,2,3-Trimethylbenzene	207		2.60	12.5	25	09/19/2024 20:14	WG2365825
1,3,5-Trimethylbenzene	26.1		2.60	12.5	25	09/19/2024 20:14	WG2365825
Vinyl acetate	U		17.3	125	25	09/19/2024 20:14	WG2365825
Vinyl chloride	U		5.85	12.5	25	09/19/2024 20:14	WG2365825
Xylenes, Total	754		4.35	37.5	25	09/19/2024 20:14	WG2365825
(S) Toluene-d8	*95.4*			*80.0-120*		*09/19/2024 20:14*	WG2365825
(S) 4-Bromofluorobenzene	*97.6*			*77.0-126*		*09/19/2024 20:14*	WG2365825
(S) 1,2-Dichloroethane-d4	*94.3*			*70.0-130*		*09/19/2024 20:14*	WG2365825

TPH by Method MTDEQ EPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C9-C18 Aliphatics	314	J	200	600	1	09/17/2024 17:32	WG2363448
Unadjusted C19-C36 Aliphatics	U		200	600	1	09/17/2024 17:32	WG2363448
Unadjusted C11-C22 Aromatics	453	J	200	600	1	09/17/2024 17:32	WG2363448
Unadjusted Total Petroleum Hydrocarbons	767		200	600	1	09/17/2024 17:32	WG2363448
Adjusted C11-C22 Aromatics	411	J	200	600	1	09/17/2024 17:32	WG2363448
Adjusted Total Petroleum Hydrocarbons	725		200	600	1	09/17/2024 17:32	WG2363448
(S) o-Terphenyl	*61.8*			*40.0-140*		*09/17/2024 17:32*	WG2363448
(S) 1-Chloro-octadecane	*40.4*			*40.0-140*		*09/17/2024 17:32*	WG2363448
(S) 2-Fluorobiphenyl	*85.4*			*40.0-140*		*09/17/2024 17:32*	WG2363448
(S) 2-Bromonaphthalene	*82.8*			*40.0-140*		*09/17/2024 17:32*	WG2363448

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	0.504	J	0.0886	1.00	1	09/23/2024 11:36	WG2364882
Acenaphthylene	U		0.0921	1.00	1	09/23/2024 11:36	WG2364882
Anthracene	U		0.0804	1.00	1	09/23/2024 11:36	WG2364882
Benzidine	U	J3 J4	3.74	10.0	1	09/23/2024 11:36	WG2364882
Benzo(a)anthracene	U		0.199	1.00	1	09/23/2024 11:36	WG2364882
Benzo(b)fluoranthene	U		0.130	1.00	1	09/23/2024 11:36	WG2364882
Benzo(k)fluoranthene	U		0.120	1.00	1	09/23/2024 11:36	WG2364882
Benzo(g,h,i)perylene	U		0.121	1.00	1	09/23/2024 11:36	WG2364882
Benzo(a)pyrene	U		0.0381	1.00	1	09/23/2024 11:36	WG2364882
Bis(2-chlorethoxy)methane	U		0.116	10.0	1	09/23/2024 11:36	WG2364882
Bis(2-chloroethyl)ether	U		0.137	10.0	1	09/23/2024 11:36	WG2364882
2,2-Oxybis(1-Chloropropane)	U		0.210	10.0	1	09/23/2024 11:36	WG2364882
4-Bromophenyl-phenylether	U		0.0877	10.0	1	09/23/2024 11:36	WG2364882
2-Chloronaphthalene	U		0.0648	1.00	1	09/23/2024 11:36	WG2364882
4-Chlorophenyl-phenylether	U		0.0926	10.0	1	09/23/2024 11:36	WG2364882
Chrysene	U		0.130	1.00	1	09/23/2024 11:36	WG2364882
Dibenz(a,h)anthracene	U		0.0644	1.00	1	09/23/2024 11:36	WG2364882
3,3-Dichlorobenzidine	U		0.212	10.0	1	09/23/2024 11:36	WG2364882
2,4-Dinitrotoluene	U		0.0983	10.0	1	09/23/2024 11:36	WG2364882
2,6-Dinitrotoluene	U		0.250	10.0	1	09/23/2024 11:36	WG2364882
Fluoranthene	U		0.102	1.00	1	09/23/2024 11:36	WG2364882
Fluorene	0.761	J	0.0844	1.00	1	09/23/2024 11:36	WG2364882
Hexachlorobenzene	U		0.0755	1.00	1	09/23/2024 11:36	WG2364882
Hexachloro-1,3-butadiene	U		0.0968	10.0	1	09/23/2024 11:36	WG2364882
Hexachlorocyclopentadiene	U		0.0598	10.0	1	09/23/2024 11:36	WG2364882
Hexachloroethane	U		0.127	10.0	1	09/23/2024 11:36	WG2364882
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	09/23/2024 11:36	WG2364882
Isophorone	U		0.143	10.0	1	09/23/2024 11:36	WG2364882
Naphthalene	25.3		0.159	1.00	1	09/23/2024 11:36	WG2364882
Nitrobenzene	U		0.297	10.0	1	09/23/2024 11:36	WG2364882
n-Nitrosodimethylamine	U		0.998	10.0	1	09/23/2024 11:36	WG2364882
n-Nitrosodiphenylamine	U		2.37	10.0	1	09/23/2024 11:36	WG2364882
n-Nitrosodi-n-propylamine	U		0.261	10.0	1	09/23/2024 11:36	WG2364882
Phenanthrene	0.527	J	0.112	1.00	1	09/23/2024 11:36	WG2364882
Benzylbutyl phthalate	U		0.765	3.00	1	09/23/2024 11:36	WG2364882
Bis(2-Ethylhexyl)phthalate	U		0.895	3.00	1	09/23/2024 11:36	WG2364882
Di-n-butyl phthalate	0.462	J J3	0.453	3.00	1	09/23/2024 11:36	WG2364882
Diethyl phthalate	2.61	J	0.287	3.00	1	09/23/2024 11:36	WG2364882
Dimethyl phthalate	U		0.260	3.00	1	09/23/2024 11:36	WG2364882
Di-n-octyl phthalate	U		0.932	3.00	1	09/23/2024 11:36	WG2364882
Pyrene	U		0.107	1.00	1	09/23/2024 11:36	WG2364882
1,2,4-Trichlorobenzene	U		0.0698	10.0	1	09/23/2024 11:36	WG2364882
Aniline	U	J4	1.65	10.0	1	09/23/2024 11:36	WG2364882
1,2-Diphenylhydrazine	U	N2	0.105	10.0	1	09/23/2024 11:36	WG2364882
Benzyl alcohol	U		0.563	10.0	1	09/23/2024 11:36	WG2364882
4-Chloroaniline	U		0.234	10.0	1	09/23/2024 11:36	WG2364882
4-Chloro-3-methylphenol	U		0.131	10.0	1	09/23/2024 11:36	WG2364882
2-Chlorophenol	U		0.133	10.0	1	09/23/2024 11:36	WG2364882
Dibenzofuran	0.310	J	0.0970	10.0	1	09/23/2024 11:36	WG2364882
2,4-Dichlorophenol	U		0.102	10.0	1	09/23/2024 11:36	WG2364882
2,4-Dimethylphenol	6.19	J	0.0636	10.0	1	09/23/2024 11:36	WG2364882
4,6-Dinitro-2-methylphenol	U		1.12	10.0	1	09/23/2024 11:36	WG2364882
2,4-Dinitrophenol	U		5.93	10.0	1	09/23/2024 11:36	WG2364882
2-Methylnaphthalene	15.3		0.117	1.00	1	09/23/2024 11:36	WG2364882
2-Methylphenol	U		0.0929	10.0	1	09/23/2024 11:36	WG2364882
3&4-Methyl Phenol	U		0.168	10.0	1	09/23/2024 11:36	WG2364882

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Nitroaniline	U		0.102	10.0	1	09/23/2024 11:36	WG2364882
3-Nitroaniline	U		0.0869	10.0	1	09/23/2024 11:36	WG2364882
4-Nitroaniline	U		0.0910	10.0	1	09/23/2024 11:36	WG2364882
2-Nitrophenol	U		0.117	10.0	1	09/23/2024 11:36	WG2364882
4-Nitrophenol	U		0.143	10.0	1	09/23/2024 11:36	WG2364882
Pentachlorophenol	U		0.313	10.0	1	09/23/2024 11:36	WG2364882
Phenol	5.72	J	4.33	10.0	1	09/23/2024 11:36	WG2364882
Pyridine	U	J3 J4	0.627	10.0	1	09/23/2024 11:36	WG2364882
2,4,6-Trichlorophenol	U		0.100	10.0	1	09/23/2024 11:36	WG2364882
Acetophenone	U		0.208	10.0	1	09/23/2024 11:36	WG2364882
2-Acetylaminofluorene	U		0.253	10.0	1	09/27/2024 16:15	WG2364882
4-Aminobiphenyl	U		0.461	10.0	1	09/27/2024 16:15	WG2364882
Chlorobenzilate	U		3.84	50.0	1	09/27/2024 16:15	WG2364882
Diallate	U		0.524	10.0	1	09/27/2024 16:15	WG2364882
2,6-Dichlorophenol	U		0.102	10.0	1	09/27/2024 16:15	WG2364882
Dimethoate	U		5.05	50.0	1	09/27/2024 16:15	WG2364882
P-(Dimethylamino) Azobenzene	U		3.69	10.0	1	09/27/2024 16:15	WG2364882
Dimethylbenz (A) Anthracene	U		1.71	10.0	1	09/27/2024 16:15	WG2364882
3,3-Dimethylbenzidine	U		3.39	10.0	1	09/27/2024 16:15	WG2364882
a,a-Dimethylphenethylamine	U	J4	3.13	50.0	1	09/27/2024 16:15	WG2364882
1,3-Dinitrobenzene	U		0.359	10.0	1	09/27/2024 16:15	WG2364882
Diphenylamine	U		2.37	10.0	1	09/23/2024 11:36	WG2364882
Dinoseb	U		8.01	50.0	1	09/27/2024 16:15	WG2364882
Disulfoton	U		0.267	10.0	1	09/27/2024 16:15	WG2364882
Ethyl methanesulfonate	U		0.326	10.0	1	09/27/2024 16:15	WG2364882
Ethyl Parathion	U		0.379	10.0	1	09/27/2024 16:15	WG2364882
Famphur	U	C6	3.92	20.0	1	09/27/2024 16:15	WG2364882
Hexachloropropene	U		0.149	50.0	1	09/27/2024 16:15	WG2364882
Hexachlorophene	U	J4	1.44	50.0	1	09/27/2024 16:15	WG2364882
Isodrin	U		4.11	10.0	1	09/27/2024 16:15	WG2364882
Isosafrole	U		3.88	10.0	1	09/27/2024 16:15	WG2364882
Kepone	U	C6	2.66	20.0	1	09/27/2024 16:15	WG2364882
Methapyrilene	U	J4	10.0	50.0	1	09/27/2024 16:15	WG2364882
3-Methylcholanthrene	U		0.164	10.0	1	09/27/2024 16:15	WG2364882
Methyl methanesulfonate	U		3.40	50.0	1	09/27/2024 16:15	WG2364882
Methyl parathion	U		0.213	10.0	1	09/27/2024 16:15	WG2364882
1,4-Naphthoquinone	U	J4	5.56	50.0	1	09/27/2024 16:15	WG2364882
1-Naphthylamine	U		0.289	10.0	1	09/27/2024 16:15	WG2364882
2-Naphthylamine	U		4.48	10.0	1	09/27/2024 16:15	WG2364882
5-Nitro-o-toluidine	U		1.99	10.0	1	09/27/2024 16:15	WG2364882
4-Nitroquinoline 1-oxide	U		2.03	10.0	1	09/27/2024 16:15	WG2364882
n-Nitrosodiethylamine	U		3.57	10.0	1	09/27/2024 16:15	WG2364882
n-Nitrosodi-n-butylamine	U		3.91	10.0	1	09/27/2024 16:15	WG2364882
n-Nitrosomethylethylamine	U		3.25	10.0	1	09/27/2024 16:15	WG2364882
n-Nitrosomorpholine	U		3.25	10.0	1	09/27/2024 16:15	WG2364882
n-Nitrosopiperidine	U		3.72	10.0	1	09/27/2024 16:15	WG2364882
n-Nitrosopyrrolidine	U		3.39	10.0	1	09/27/2024 16:15	WG2364882
Pentachlorobenzene	U		4.15	10.0	1	09/27/2024 16:15	WG2364882
Pentachloroethane	U		2.83	50.0	1	09/27/2024 16:15	WG2364882
Pentachloronitrobenzene	U		4.15	10.0	1	09/27/2024 16:15	WG2364882
Phenacetin	U		4.66	10.0	1	09/27/2024 16:15	WG2364882
p-Phenylenediamine	U	J4	387	6900	1	09/27/2024 16:15	WG2364882
Phorate	U		4.86	50.0	1	09/27/2024 16:15	WG2364882
2-Picoline	U	J4	6.83	50.0	1	09/27/2024 16:15	WG2364882
Pronamide	U		4.21	10.0	1	09/27/2024 16:15	WG2364882
Safrole	U		3.68	10.0	1	09/27/2024 16:15	WG2364882

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfotep	U		3.99	50.0	1	09/27/2024 16:15	WG2364882
1,2,4,5-Tetrachlorobenzene	U		0.0647	10.0	1	09/23/2024 11:36	WG2364882
2,3,4,6-Tetrachlorophenol	U		0.231	10.0	1	09/23/2024 11:36	WG2364882
Thionazin	U		4.07	10.0	1	09/27/2024 16:15	WG2364882
o-Toluidine	U		3.53	10.0	1	09/27/2024 16:15	WG2364882
2,4,5-Trichlorophenol	U		0.109	10.0	1	09/23/2024 11:36	WG2364882
O,O,O-Triethyl Phosphorothioate	U		2.93	10.0	1	09/27/2024 16:15	WG2364882
1,3,5-Trinitrobenzene	U		1.32	10.0	1	09/27/2024 16:15	WG2364882
(S) 2-Fluorophenol	*22.1*			*10.0-120*		*09/23/2024 11:36*	WG2364882
(S) Phenol-d5	*18.4*			*10.0-120*		*09/23/2024 11:36*	WG2364882
(S) Nitrobenzene-d5	*55.4*			*10.0-127*		*09/23/2024 11:36*	WG2364882
(S) 2-Fluorobiphenyl	*48.2*			*10.0-130*		*09/23/2024 11:36*	WG2364882
(S) 2,4,6-Tribromophenol	*61.5*			*10.0-155*		*09/23/2024 11:36*	WG2364882
(S) p-Terphenyl-d14	*39.6*			*10.0-128*		*09/23/2024 11:36*	WG2364882

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	102		33.3	100	1	09/19/2024 07:59	WG2365307
Unadjusted C9-C12 Aliphatics	47.0	J	33.3	100	1	09/19/2024 07:59	WG2365307
Unadjusted C9-C10 Aromatics	U		33.3	100	1	09/19/2024 07:59	WG2365307
Adjusted C5-C8 Aliphatics	79.9		33.3	100	1	09/19/2024 07:59	WG2365307
Adjusted C9-C12 Aliphatics	47.0	J	33.3	100	1	09/19/2024 07:59	WG2365307
Total VPH	149	J	66.7	200	1	09/19/2024 07:59	WG2365307
(S) 2,5-Dibromotoluene(FID)	*99.8*			*70.0-130*		*09/19/2024 07:59*	WG2365307
(S) 2,5-Dibromotoluene(PID)	*94.4*			*70.0-130*		*09/19/2024 07:59*	WG2365307

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U	J4	11.3	25.0	1	09/19/2024 17:14	WG2365956
Acrylonitrile	U	J3	0.671	5.00	1	09/19/2024 17:14	WG2365956
Benzene	22.1		0.0941	0.500	1	09/19/2024 17:14	WG2365956
Bromobenzene	U		0.118	0.500	1	09/19/2024 17:14	WG2365956
Bromodichloromethane	U		0.136	0.500	1	09/19/2024 17:14	WG2365956
Bromochloromethane	U		0.128	0.500	1	09/19/2024 17:14	WG2365956
Bromoform	U		0.129	0.500	1	09/19/2024 17:14	WG2365956
Bromomethane	U		0.605	2.50	1	09/19/2024 17:14	WG2365956
n-Butylbenzene	U		0.157	0.500	1	09/19/2024 17:14	WG2365956
sec-Butylbenzene	U		0.125	0.500	1	09/19/2024 17:14	WG2365956
tert-Butylbenzene	U		0.127	0.500	1	09/19/2024 17:14	WG2365956
Carbon disulfide	U		0.0962	0.500	1	09/19/2024 17:14	WG2365956
Carbon tetrachloride	U		0.128	0.500	1	09/19/2024 17:14	WG2365956
Chlorobenzene	U		0.117	0.500	1	09/19/2024 17:14	WG2365956
Chlorodibromomethane	U		0.140	0.500	1	09/19/2024 17:14	WG2365956
Chloroethane	U		0.192	2.50	1	09/19/2024 17:14	WG2365956
2-Chloroethyl vinyl ether	U		0.575	50.0	1	09/19/2024 17:14	WG2365956
Chloroform	U		0.111	0.500	1	09/19/2024 17:14	WG2365956
Chloromethane	U		0.960	1.25	1	09/19/2024 17:14	WG2365956
2-Chlorotoluene	U		0.106	0.500	1	09/19/2024 17:14	WG2365956
4-Chlorotoluene	U		0.114	0.500	1	09/19/2024 17:14	WG2365956
1,2-Dibromo-3-Chloropropane	U		0.276	2.50	1	09/19/2024 17:14	WG2365956
1,2-Dibromoethane	U		0.126	0.500	1	09/19/2024 17:14	WG2365956
Dibromomethane	U		0.122	0.500	1	09/19/2024 17:14	WG2365956
1,2-Dichlorobenzene	U		0.107	0.500	1	09/19/2024 17:14	WG2365956
1,3-Dichlorobenzene	U		0.299	0.500	1	09/19/2024 17:14	WG2365956
1,4-Dichlorobenzene	U		0.120	0.500	1	09/19/2024 17:14	WG2365956
Dichlorodifluoromethane	U		0.374	2.50	1	09/19/2024 17:14	WG2365956
1,1-Dichloroethane	U		0.100	0.500	1	09/19/2024 17:14	WG2365956
1,2-Dichloroethane	U		0.0819	0.500	1	09/19/2024 17:14	WG2365956
1,1-Dichloroethene	U		0.188	0.500	1	09/19/2024 17:14	WG2365956
cis-1,2-Dichloroethene	U		0.126	0.500	1	09/19/2024 17:14	WG2365956
trans-1,2-Dichloroethene	U		0.149	0.500	1	09/19/2024 17:14	WG2365956
1,2-Dichloropropane	U		0.149	0.500	1	09/19/2024 17:14	WG2365956
1,1-Dichloropropene	U		0.142	0.500	1	09/19/2024 17:14	WG2365956
1,3-Dichloropropane	U		0.109	1.00	1	09/19/2024 17:14	WG2365956
cis-1,3-Dichloropropene	U		0.111	0.500	1	09/19/2024 17:14	WG2365956
trans-1,3-Dichloropropene	U		0.118	0.500	1	09/19/2024 17:14	WG2365956
trans-1,4-Dichloro-2-butene	U		0.467	5.00	1	09/19/2024 17:14	WG2365956
2,2-Dichloropropane	U		0.161	0.500	1	09/19/2024 17:14	WG2365956
Di-isopropyl ether	0.205	J	0.105	0.500	1	09/19/2024 17:14	WG2365956
Ethylbenzene	U		0.137	0.500	1	09/19/2024 17:14	WG2365956
Hexachloro-1,3-butadiene	U		0.337	1.00	1	09/19/2024 17:14	WG2365956

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Hexanone	U		0.787	5.00	1	09/19/2024 17:14	WG2365956
n-Hexane	U		0.749	5.00	1	09/19/2024 17:14	WG2365956
Iodomethane	U		0.554	5.00	1	09/19/2024 17:14	WG2365956
Isopropylbenzene	U		0.105	0.500	1	09/19/2024 17:14	WG2365956
p-Isopropyltoluene	U		0.120	0.500	1	09/19/2024 17:14	WG2365956
2-Butanone (MEK)	U		1.19	5.00	1	09/19/2024 17:14	WG2365956
Methylene Chloride	U		0.430	2.50	1	09/19/2024 17:14	WG2365956
4-Methyl-2-pentanone (MIBK)	0.509	J	0.478	5.00	1	09/19/2024 17:14	WG2365956
Methyl tert-butyl ether	U		0.101	0.500	1	09/19/2024 17:14	WG2365956
Naphthalene	U		0.174	2.50	1	09/19/2024 17:14	WG2365956
n-Propylbenzene	U		0.0993	0.500	1	09/19/2024 17:14	WG2365956
Styrene	U		0.118	0.500	1	09/19/2024 17:14	WG2365956
1,1,1,2-Tetrachloroethane	U		0.147	0.500	1	09/19/2024 17:14	WG2365956
1,1,2,2-Tetrachloroethane	U		0.133	0.500	1	09/19/2024 17:14	WG2365956
1,1,2-Trichlorotrifluoroethane	U	J3 J4	0.180	0.500	1	09/19/2024 17:14	WG2365956
Tetrachloroethene	U		0.300	0.500	1	09/19/2024 17:14	WG2365956
Toluene	U		0.278	0.500	1	09/19/2024 17:14	WG2365956
1,2,3-Trichlorobenzene	U		0.164	0.500	1	09/19/2024 17:14	WG2365956
1,2,4-Trichlorobenzene	U		0.481	1.00	1	09/19/2024 17:14	WG2365956
1,1,1-Trichloroethane	U		0.149	0.500	1	09/19/2024 17:14	WG2365956
1,1,2-Trichloroethane	U		0.158	0.500	1	09/19/2024 17:14	WG2365956
Trichloroethene	U		0.190	0.500	1	09/19/2024 17:14	WG2365956
Trichlorofluoromethane	U		0.160	2.50	1	09/19/2024 17:14	WG2365956
1,2,3-Trichloropropane	U		0.237	2.50	1	09/19/2024 17:14	WG2365956
1,2,4-Trimethylbenzene	U		0.322	0.500	1	09/19/2024 17:14	WG2365956
1,2,3-Trimethylbenzene	U		0.104	0.500	1	09/19/2024 17:14	WG2365956
1,3,5-Trimethylbenzene	U		0.104	0.500	1	09/19/2024 17:14	WG2365956
Vinyl acetate	U		0.692	5.00	1	09/19/2024 17:14	WG2365956
Vinyl chloride	U		0.234	0.500	1	09/19/2024 17:14	WG2365956
Xylenes, Total	U		0.174	1.50	1	09/19/2024 17:14	WG2365956
(S) Toluene-d8	*95.0*			*80.0-120*		*09/19/2024 17:14*	WG2365956
(S) 4-Bromofluorobenzene	*102*			*77.0-126*		*09/19/2024 17:14*	WG2365956
(S) 1,2-Dichloroethane-d4	*97.5*			*70.0-130*		*09/19/2024 17:14*	WG2365956

TPH by Method MTDEQ EPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C9-C18 Aliphatics	U		200	600	1	09/17/2024 18:36	WG2363448
Unadjusted C19-C36 Aliphatics	U		200	600	1	09/17/2024 18:36	WG2363448
Unadjusted C11-C22 Aromatics	U		200	600	1	09/17/2024 18:36	WG2363448
Unadjusted Total Petroleum Hydrocarbons	U		200	600	1	09/17/2024 18:36	WG2363448
Adjusted C11-C22 Aromatics	U		200	600	1	09/17/2024 18:36	WG2363448
Adjusted Total Petroleum Hydrocarbons	U		200	600	1	09/17/2024 18:36	WG2363448
(S) o-Terphenyl	*73.9*			*40.0-140*		*09/17/2024 18:36*	WG2363448
(S) 1-Chloro-octadecane	*40.6*			*40.0-140*		*09/17/2024 18:36*	WG2363448
(S) 2-Fluorobiphenyl	*94.5*			*40.0-140*		*09/17/2024 18:36*	WG2363448
(S) 2-Bromonaphthalene	*93.6*			*40.0-140*		*09/17/2024 18:36*	WG2363448

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.0886	1.00	1	09/23/2024 11:58	WG2364882
Acenaphthylene	U		0.0921	1.00	1	09/23/2024 11:58	WG2364882
Anthracene	U		0.0804	1.00	1	09/23/2024 11:58	WG2364882
Benzidine	U	J3 J4	3.74	10.0	1	09/23/2024 11:58	WG2364882
Benzo(a)anthracene	U		0.199	1.00	1	09/23/2024 11:58	WG2364882
Benzo(b)fluoranthene	U		0.130	1.00	1	09/23/2024 11:58	WG2364882
Benzo(k)fluoranthene	U		0.120	1.00	1	09/23/2024 11:58	WG2364882
Benzo(g,h,i)perylene	U		0.121	1.00	1	09/23/2024 11:58	WG2364882
Benzo(a)pyrene	U		0.0381	1.00	1	09/23/2024 11:58	WG2364882
Bis(2-chlorethoxy)methane	U		0.116	10.0	1	09/23/2024 11:58	WG2364882
Bis(2-chloroethyl)ether	U		0.137	10.0	1	09/23/2024 11:58	WG2364882
2,2-Oxybis(1-Chloropropane)	U		0.210	10.0	1	09/23/2024 11:58	WG2364882
4-Bromophenyl-phenylether	U		0.0877	10.0	1	09/23/2024 11:58	WG2364882
2-Chloronaphthalene	U		0.0648	1.00	1	09/23/2024 11:58	WG2364882
4-Chlorophenyl-phenylether	U		0.0926	10.0	1	09/23/2024 11:58	WG2364882
Chrysene	U		0.130	1.00	1	09/23/2024 11:58	WG2364882
Dibenz(a,h)anthracene	U		0.0644	1.00	1	09/23/2024 11:58	WG2364882
3,3-Dichlorobenzidine	U		0.212	10.0	1	09/23/2024 11:58	WG2364882
2,4-Dinitrotoluene	U		0.0983	10.0	1	09/23/2024 11:58	WG2364882
2,6-Dinitrotoluene	U		0.250	10.0	1	09/23/2024 11:58	WG2364882
Fluoranthene	U		0.102	1.00	1	09/23/2024 11:58	WG2364882
Fluorene	U		0.0844	1.00	1	09/23/2024 11:58	WG2364882
Hexachlorobenzene	U		0.0755	1.00	1	09/23/2024 11:58	WG2364882
Hexachloro-1,3-butadiene	U		0.0968	10.0	1	09/23/2024 11:58	WG2364882
Hexachlorocyclopentadiene	U		0.0598	10.0	1	09/23/2024 11:58	WG2364882
Hexachloroethane	U		0.127	10.0	1	09/23/2024 11:58	WG2364882
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	09/23/2024 11:58	WG2364882
Isophorone	U		0.143	10.0	1	09/23/2024 11:58	WG2364882
Naphthalene	0.177	J	0.159	1.00	1	09/23/2024 11:58	WG2364882
Nitrobenzene	U		0.297	10.0	1	09/23/2024 11:58	WG2364882
n-Nitrosodimethylamine	U		0.998	10.0	1	09/23/2024 11:58	WG2364882
n-Nitrosodiphenylamine	U		2.37	10.0	1	09/23/2024 11:58	WG2364882
n-Nitrosodi-n-propylamine	U		0.261	10.0	1	09/23/2024 11:58	WG2364882
Phenanthrene	U		0.112	1.00	1	09/23/2024 11:58	WG2364882
Benzylbutyl phthalate	U		0.765	3.00	1	09/23/2024 11:58	WG2364882
Bis(2-Ethylhexyl)phthalate	U		0.895	3.00	1	09/23/2024 11:58	WG2364882
Di-n-butyl phthalate	U	J3	0.453	3.00	1	09/23/2024 11:58	WG2364882
Diethyl phthalate	U		0.287	3.00	1	09/23/2024 11:58	WG2364882
Dimethyl phthalate	U		0.260	3.00	1	09/23/2024 11:58	WG2364882
Di-n-octyl phthalate	U		0.932	3.00	1	09/23/2024 11:58	WG2364882
Pyrene	U		0.107	1.00	1	09/23/2024 11:58	WG2364882
1,2,4-Trichlorobenzene	U		0.0698	10.0	1	09/23/2024 11:58	WG2364882
Aniline	U	J4	1.65	10.0	1	09/23/2024 11:58	WG2364882
1,2-Diphenylhydrazine	U	N2	0.105	10.0	1	09/23/2024 11:58	WG2364882
Benzyl alcohol	U		0.563	10.0	1	09/23/2024 11:58	WG2364882
4-Chloroaniline	U		0.234	10.0	1	09/23/2024 11:58	WG2364882
4-Chloro-3-methylphenol	U		0.131	10.0	1	09/23/2024 11:58	WG2364882
2-Chlorophenol	U		0.133	10.0	1	09/23/2024 11:58	WG2364882
Dibenzofuran	U		0.0970	10.0	1	09/23/2024 11:58	WG2364882
2,4-Dichlorophenol	U		0.102	10.0	1	09/23/2024 11:58	WG2364882
2,4-Dimethylphenol	U		0.0636	10.0	1	09/23/2024 11:58	WG2364882
4,6-Dinitro-2-methylphenol	U		1.12	10.0	1	09/23/2024 11:58	WG2364882
2,4-Dinitrophenol	U		5.93	10.0	1	09/23/2024 11:58	WG2364882
2-Methylnaphthalene	U		0.117	1.00	1	09/23/2024 11:58	WG2364882
2-Methylphenol	U		0.0929	10.0	1	09/23/2024 11:58	WG2364882
3&4-Methyl Phenol	U		0.168	10.0	1	09/23/2024 11:58	WG2364882

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Nitroaniline	U		0.102	10.0	1	09/23/2024 11:58	WG2364882
3-Nitroaniline	U		0.0869	10.0	1	09/23/2024 11:58	WG2364882
4-Nitroaniline	U		0.0910	10.0	1	09/23/2024 11:58	WG2364882
2-Nitrophenol	U		0.117	10.0	1	09/23/2024 11:58	WG2364882
4-Nitrophenol	U		0.143	10.0	1	09/23/2024 11:58	WG2364882
Pentachlorophenol	U		0.313	10.0	1	09/23/2024 11:58	WG2364882
Phenol	U		4.33	10.0	1	09/23/2024 11:58	WG2364882
Pyridine	U	J3 J4	0.627	10.0	1	09/23/2024 11:58	WG2364882
2,4,6-Trichlorophenol	U		0.100	10.0	1	09/23/2024 11:58	WG2364882
Acetophenone	U		0.208	10.0	1	09/23/2024 11:58	WG2364882
2-Acetylaminofluorene	U		0.253	10.0	1	09/27/2024 16:37	WG2364882
4-Aminobiphenyl	U		0.461	10.0	1	09/27/2024 16:37	WG2364882
Chlorobenzilate	U		3.84	50.0	1	09/27/2024 16:37	WG2364882
Diallate	U		0.524	10.0	1	09/27/2024 16:37	WG2364882
2,6-Dichlorophenol	U		0.102	10.0	1	09/27/2024 16:37	WG2364882
Dimethoate	U		5.05	50.0	1	09/27/2024 16:37	WG2364882
P-(Dimethylamino) Azobenzene	U		3.69	10.0	1	09/27/2024 16:37	WG2364882
Dimethylbenz (A) Anthracene	U		1.71	10.0	1	09/27/2024 16:37	WG2364882
3,3-Dimethylbenzidine	U		3.39	10.0	1	09/27/2024 16:37	WG2364882
a,a-Dimethylphenethylamine	U	J4	3.13	50.0	1	09/27/2024 16:37	WG2364882
1,3-Dinitrobenzene	U		0.359	10.0	1	09/27/2024 16:37	WG2364882
Diphenylamine	U		2.37	10.0	1	09/23/2024 11:58	WG2364882
Dinoseb	U		8.01	50.0	1	09/27/2024 16:37	WG2364882
Disulfoton	U		0.267	10.0	1	09/27/2024 16:37	WG2364882
Ethyl methanesulfonate	U		0.326	10.0	1	09/27/2024 16:37	WG2364882
Ethyl Parathion	U		0.379	10.0	1	09/27/2024 16:37	WG2364882
Famphur	U	C6	3.92	20.0	1	09/27/2024 16:37	WG2364882
Hexachloropropene	U		0.149	50.0	1	09/27/2024 16:37	WG2364882
Hexachlorophene	U	J4	1.44	50.0	1	09/27/2024 16:37	WG2364882
Isodrin	U		4.11	10.0	1	09/27/2024 16:37	WG2364882
Isosafrole	U		3.88	10.0	1	09/27/2024 16:37	WG2364882
Kepone	U	C6	2.66	20.0	1	09/27/2024 16:37	WG2364882
Methapyrilene	U	J4	10.0	50.0	1	09/27/2024 16:37	WG2364882
3-Methylcholanthrene	U		0.164	10.0	1	09/27/2024 16:37	WG2364882
Methyl methanesulfonate	U		3.40	50.0	1	09/27/2024 16:37	WG2364882
Methyl parathion	U		0.213	10.0	1	09/27/2024 16:37	WG2364882
1,4-Naphthoquinone	U	J4	5.56	50.0	1	09/27/2024 16:37	WG2364882
1-Naphthylamine	U		0.289	10.0	1	09/27/2024 16:37	WG2364882
2-Naphthylamine	U		4.48	10.0	1	09/27/2024 16:37	WG2364882
5-Nitro-o-toluidine	U		1.99	10.0	1	09/27/2024 16:37	WG2364882
4-Nitroquinoline 1-oxide	U		2.03	10.0	1	09/27/2024 16:37	WG2364882
n-Nitrosodiethylamine	U		3.57	10.0	1	09/27/2024 16:37	WG2364882
n-Nitrosodi-n-butylamine	U		3.91	10.0	1	09/27/2024 16:37	WG2364882
n-Nitrosomethylethylamine	U		3.25	10.0	1	09/27/2024 16:37	WG2364882
n-Nitrosomorpholine	U		3.25	10.0	1	09/27/2024 16:37	WG2364882
n-Nitrosopiperidine	U		3.72	10.0	1	09/27/2024 16:37	WG2364882
n-Nitrosopyrrolidine	U		3.39	10.0	1	09/27/2024 16:37	WG2364882
Pentachlorobenzene	U		4.15	10.0	1	09/27/2024 16:37	WG2364882
Pentachloroethane	U		2.83	50.0	1	09/27/2024 16:37	WG2364882
Pentachloronitrobenzene	U		4.15	10.0	1	09/27/2024 16:37	WG2364882
Phenacetin	U		4.66	10.0	1	09/27/2024 16:37	WG2364882
p-Phenylenediamine	U	J4	387	6900	1	09/27/2024 16:37	WG2364882
Phorate	U		4.86	50.0	1	09/27/2024 16:37	WG2364882
2-Picoline	U	J4	6.83	50.0	1	09/27/2024 16:37	WG2364882
Pronamide	U		4.21	10.0	1	09/27/2024 16:37	WG2364882
Safrole	U		3.68	10.0	1	09/27/2024 16:37	WG2364882

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfotep	U		3.99	50.0	1	09/27/2024 16:37	WG2364882
1,2,4,5-Tetrachlorobenzene	U		0.0647	10.0	1	09/23/2024 11:58	WG2364882
2,3,4,6-Tetrachlorophenol	U		0.231	10.0	1	09/23/2024 11:58	WG2364882
Thionazin	U		4.07	10.0	1	09/27/2024 16:37	WG2364882
o-Toluidine	U		3.53	10.0	1	09/27/2024 16:37	WG2364882
2,4,5-Trichlorophenol	U		0.109	10.0	1	09/23/2024 11:58	WG2364882
O,O,O-Triethyl Phosphorothioate	U		2.93	10.0	1	09/27/2024 16:37	WG2364882
1,3,5-Trinitrobenzene	U		1.32	10.0	1	09/27/2024 16:37	WG2364882
(S) 2-Fluorophenol	*28.6*			*10.0-120*		*09/23/2024 11:58*	WG2364882
(S) Phenol-d5	*23.5*			*10.0-120*		*09/23/2024 11:58*	WG2364882
(S) Nitrobenzene-d5	*64.0*			*10.0-127*		*09/23/2024 11:58*	WG2364882
(S) 2-Fluorobiphenyl	*67.1*			*10.0-130*		*09/23/2024 11:58*	WG2364882
(S) 2,4,6-Tribromophenol	*104*			*10.0-155*		*09/23/2024 11:58*	WG2364882
(S) p-Terphenyl-d14	*65.7*			*10.0-128*		*09/23/2024 11:58*	WG2364882

Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C5-C8 Aliphatics	986		33.3	100	1	09/19/2024 08:34	WG2365307
Unadjusted C9-C12 Aliphatics	513		33.3	100	1	09/19/2024 08:34	WG2365307
Unadjusted C9-C10 Aromatics	106		33.3	100	1	09/19/2024 08:34	WG2365307
Adjusted C5-C8 Aliphatics	978		33.3	100	1	09/19/2024 08:34	WG2365307
Adjusted C9-C12 Aliphatics	97.2		33.3	100	1	09/19/2024 08:34	WG2365307
Total VPH	1610		66.7	200	1	09/19/2024 08:34	WG2365307
(S) 2,5-Dibromotoluene(FID)	*97.9*			*70.0-130*		*09/19/2024 08:34*	WG2365307
(S) 2,5-Dibromotoluene(PID)	*94.6*			*70.0-130*		*09/19/2024 08:34*	WG2365307

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U	J4	11.3	25.0	1	09/19/2024 17:33	WG2365956
Acrylonitrile	U	J3	0.671	5.00	1	09/19/2024 17:33	WG2365956
Benzene	39.4		0.0941	0.500	1	09/19/2024 17:33	WG2365956
Bromobenzene	U		0.118	0.500	1	09/19/2024 17:33	WG2365956
Bromodichloromethane	U		0.136	0.500	1	09/19/2024 17:33	WG2365956
Bromochloromethane	U		0.128	0.500	1	09/19/2024 17:33	WG2365956
Bromoform	U		0.129	0.500	1	09/19/2024 17:33	WG2365956
Bromomethane	U		0.605	2.50	1	09/19/2024 17:33	WG2365956
n-Butylbenzene	U		0.157	0.500	1	09/19/2024 17:33	WG2365956
sec-Butylbenzene	0.733		0.125	0.500	1	09/19/2024 17:33	WG2365956
tert-Butylbenzene	U		0.127	0.500	1	09/19/2024 17:33	WG2365956
Carbon disulfide	U		0.0962	0.500	1	09/19/2024 17:33	WG2365956
Carbon tetrachloride	U		0.128	0.500	1	09/19/2024 17:33	WG2365956
Chlorobenzene	U		0.117	0.500	1	09/19/2024 17:33	WG2365956
Chlorodibromomethane	U		0.140	0.500	1	09/19/2024 17:33	WG2365956
Chloroethane	U		0.192	2.50	1	09/19/2024 17:33	WG2365956
2-Chloroethyl vinyl ether	U		0.575	50.0	1	09/19/2024 17:33	WG2365956
Chloroform	U		0.111	0.500	1	09/19/2024 17:33	WG2365956
Chloromethane	U		0.960	1.25	1	09/19/2024 17:33	WG2365956
2-Chlorotoluene	U		0.106	0.500	1	09/19/2024 17:33	WG2365956
4-Chlorotoluene	U		0.114	0.500	1	09/19/2024 17:33	WG2365956
1,2-Dibromo-3-Chloropropane	U		0.276	2.50	1	09/19/2024 17:33	WG2365956
1,2-Dibromoethane	U		0.126	0.500	1	09/19/2024 17:33	WG2365956
Dibromomethane	U		0.122	0.500	1	09/19/2024 17:33	WG2365956
1,2-Dichlorobenzene	U		0.107	0.500	1	09/19/2024 17:33	WG2365956
1,3-Dichlorobenzene	U		0.299	0.500	1	09/19/2024 17:33	WG2365956
1,4-Dichlorobenzene	U		0.120	0.500	1	09/19/2024 17:33	WG2365956
Dichlorodifluoromethane	U		0.374	2.50	1	09/19/2024 17:33	WG2365956
1,1-Dichloroethane	0.873		0.100	0.500	1	09/19/2024 17:33	WG2365956
1,2-Dichloroethane	U		0.0819	0.500	1	09/19/2024 17:33	WG2365956
1,1-Dichloroethene	U		0.188	0.500	1	09/19/2024 17:33	WG2365956
cis-1,2-Dichloroethene	U		0.126	0.500	1	09/19/2024 17:33	WG2365956
trans-1,2-Dichloroethene	U		0.149	0.500	1	09/19/2024 17:33	WG2365956
1,2-Dichloropropane	U		0.149	0.500	1	09/19/2024 17:33	WG2365956
1,1-Dichloropropene	U		0.142	0.500	1	09/19/2024 17:33	WG2365956
1,3-Dichloropropane	U		0.109	1.00	1	09/19/2024 17:33	WG2365956
cis-1,3-Dichloropropene	U		0.111	0.500	1	09/19/2024 17:33	WG2365956
trans-1,3-Dichloropropene	U		0.118	0.500	1	09/19/2024 17:33	WG2365956
trans-1,4-Dichloro-2-butene	U		0.467	5.00	1	09/19/2024 17:33	WG2365956
2,2-Dichloropropane	U		0.161	0.500	1	09/19/2024 17:33	WG2365956
Di-isopropyl ether	U		0.105	0.500	1	09/19/2024 17:33	WG2365956
Ethylbenzene	406		1.37	5.00	10	09/26/2024 20:47	WG2370830
Hexachloro-1,3-butadiene	U		0.337	1.00	1	09/19/2024 17:33	WG2365956

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

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Hexanone	U		0.787	5.00	1	09/19/2024 17:33	WG2365956
n-Hexane	U		0.749	5.00	1	09/19/2024 17:33	WG2365956
Iodomethane	U		0.554	5.00	1	09/19/2024 17:33	WG2365956
Isopropylbenzene	7.53		0.105	0.500	1	09/19/2024 17:33	WG2365956
p-Isopropyltoluene	1.00		0.120	0.500	1	09/19/2024 17:33	WG2365956
2-Butanone (MEK)	U		1.19	5.00	1	09/19/2024 17:33	WG2365956
Methylene Chloride	U		0.430	2.50	1	09/19/2024 17:33	WG2365956
4-Methyl-2-pentanone (MIBK)	0.811	J	0.478	5.00	1	09/19/2024 17:33	WG2365956
Methyl tert-butyl ether	U		0.101	0.500	1	09/19/2024 17:33	WG2365956
Naphthalene	2.18	J	0.174	2.50	1	09/19/2024 17:33	WG2365956
n-Propylbenzene	29.7		0.0993	0.500	1	09/19/2024 17:33	WG2365956
Styrene	U		0.118	0.500	1	09/19/2024 17:33	WG2365956
1,1,1,2-Tetrachloroethane	U		0.147	0.500	1	09/19/2024 17:33	WG2365956
1,1,2,2-Tetrachloroethane	U		0.133	0.500	1	09/19/2024 17:33	WG2365956
1,1,2-Trichlorotrifluoroethane	U	J3 J4	0.180	0.500	1	09/19/2024 17:33	WG2365956
Tetrachloroethene	U		0.300	0.500	1	09/19/2024 17:33	WG2365956
Toluene	8.00		0.278	0.500	1	09/19/2024 17:33	WG2365956
1,2,3-Trichlorobenzene	U		0.164	0.500	1	09/19/2024 17:33	WG2365956
1,2,4-Trichlorobenzene	U		0.481	1.00	1	09/19/2024 17:33	WG2365956
1,1,1-Trichloroethane	U		0.149	0.500	1	09/19/2024 17:33	WG2365956
1,1,2-Trichloroethane	0.223	J	0.158	0.500	1	09/19/2024 17:33	WG2365956
Trichloroethene	U		0.190	0.500	1	09/19/2024 17:33	WG2365956
Trichlorofluoromethane	U		0.160	2.50	1	09/19/2024 17:33	WG2365956
1,2,3-Trichloropropane	U		0.237	2.50	1	09/19/2024 17:33	WG2365956
1,2,4-Trimethylbenzene	4.90		0.322	0.500	1	09/19/2024 17:33	WG2365956
1,2,3-Trimethylbenzene	5.19		0.104	0.500	1	09/19/2024 17:33	WG2365956
1,3,5-Trimethylbenzene	0.198	J	0.104	0.500	1	09/19/2024 17:33	WG2365956
Vinyl acetate	U		0.692	5.00	1	09/19/2024 17:33	WG2365956
Vinyl chloride	U		0.234	0.500	1	09/19/2024 17:33	WG2365956
Xylenes, Total	9.85		0.174	1.50	1	09/19/2024 17:33	WG2365956
(S) Toluene-d8	*94.3*			*80.0-120*		*09/19/2024 17:33*	WG2365956
(S) Toluene-d8	*99.6*			*80.0-120*		*09/26/2024 20:47*	WG2370830
(S) 4-Bromofluorobenzene	*104*			*77.0-126*		*09/19/2024 17:33*	WG2365956
(S) 4-Bromofluorobenzene	*91.0*			*77.0-126*		*09/26/2024 20:47*	WG2370830
(S) 1,2-Dichloroethane-d4	*95.1*			*70.0-130*		*09/19/2024 17:33*	WG2365956
(S) 1,2-Dichloroethane-d4	*99.7*			*70.0-130*		*09/26/2024 20:47*	WG2370830

TPH by Method MTDEQ EPH

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Unadjusted C9-C18 Aliphatics	U		200	600	1	09/17/2024 18:57	WG2363448
Unadjusted C19-C36 Aliphatics	U		200	600	1	09/17/2024 18:57	WG2363448
Unadjusted C11-C22 Aromatics	U		200	600	1	09/17/2024 18:57	WG2363448
Unadjusted Total Petroleum Hydrocarbons	U		200	600	1	09/17/2024 18:57	WG2363448
Adjusted C11-C22 Aromatics	U		200	600	1	09/17/2024 18:57	WG2363448
Adjusted Total Petroleum Hydrocarbons	U		200	600	1	09/17/2024 18:57	WG2363448
(S) o-Terphenyl	*52.9*			*40.0-140*		*09/17/2024 18:57*	WG2363448
(S) 1-Chloro-octadecane	*28.6*	J2		*40.0-140*		*09/17/2024 18:57*	WG2363448
(S) 2-Fluorobiphenyl	*76.6*			*40.0-140*		*09/17/2024 18:57*	WG2363448
(S) 2-Bromonaphthalene	*75.7*			*40.0-140*		*09/17/2024 18:57*	WG2363448

Sample Narrative:

L1777686-03 WG2363448: Surrogate failure due to matrix interference during extraction procedure.

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.0886	1.00	1	09/23/2024 12:20	WG2364882
Acenaphthylene	U		0.0921	1.00	1	09/23/2024 12:20	WG2364882
Anthracene	U		0.0804	1.00	1	09/23/2024 12:20	WG2364882
Benzidine	U	J3 J4	3.74	10.0	1	09/23/2024 12:20	WG2364882
Benzo(a)anthracene	U		0.199	1.00	1	09/23/2024 12:20	WG2364882
Benzo(b)fluoranthene	U		0.130	1.00	1	09/23/2024 12:20	WG2364882
Benzo(k)fluoranthene	U		0.120	1.00	1	09/23/2024 12:20	WG2364882
Benzo(g,h,i)perylene	U		0.121	1.00	1	09/23/2024 12:20	WG2364882
Benzo(a)pyrene	U		0.0381	1.00	1	09/23/2024 12:20	WG2364882
Bis(2-chlorethoxy)methane	U		0.116	10.0	1	09/23/2024 12:20	WG2364882
Bis(2-chloroethyl)ether	U		0.137	10.0	1	09/23/2024 12:20	WG2364882
2,2-Oxybis(1-Chloropropane)	U		0.210	10.0	1	09/23/2024 12:20	WG2364882
4-Bromophenyl-phenylether	U		0.0877	10.0	1	09/23/2024 12:20	WG2364882
2-Chloronaphthalene	U		0.0648	1.00	1	09/23/2024 12:20	WG2364882
4-Chlorophenyl-phenylether	U		0.0926	10.0	1	09/23/2024 12:20	WG2364882
Chrysene	U		0.130	1.00	1	09/23/2024 12:20	WG2364882
Dibenz(a,h)anthracene	U		0.0644	1.00	1	09/23/2024 12:20	WG2364882
3,3-Dichlorobenzidine	U		0.212	10.0	1	09/23/2024 12:20	WG2364882
2,4-Dinitrotoluene	U		0.0983	10.0	1	09/23/2024 12:20	WG2364882
2,6-Dinitrotoluene	U		0.250	10.0	1	09/23/2024 12:20	WG2364882
Fluoranthene	U		0.102	1.00	1	09/23/2024 12:20	WG2364882
Fluorene	U		0.0844	1.00	1	09/23/2024 12:20	WG2364882
Hexachlorobenzene	U		0.0755	1.00	1	09/23/2024 12:20	WG2364882
Hexachloro-1,3-butadiene	U		0.0968	10.0	1	09/23/2024 12:20	WG2364882
Hexachlorocyclopentadiene	U		0.0598	10.0	1	09/23/2024 12:20	WG2364882
Hexachloroethane	U		0.127	10.0	1	09/23/2024 12:20	WG2364882
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	09/23/2024 12:20	WG2364882
Isophorone	U		0.143	10.0	1	09/23/2024 12:20	WG2364882
Naphthalene	1.75		0.159	1.00	1	09/23/2024 12:20	WG2364882
Nitrobenzene	U		0.297	10.0	1	09/23/2024 12:20	WG2364882
n-Nitrosodimethylamine	U		0.998	10.0	1	09/23/2024 12:20	WG2364882
n-Nitrosodiphenylamine	U		2.37	10.0	1	09/23/2024 12:20	WG2364882
n-Nitrosodi-n-propylamine	U		0.261	10.0	1	09/23/2024 12:20	WG2364882
Phenanthrene	U		0.112	1.00	1	09/23/2024 12:20	WG2364882
Benzylbutyl phthalate	U		0.765	3.00	1	09/23/2024 12:20	WG2364882
Bis(2-Ethylhexyl)phthalate	U		0.895	3.00	1	09/23/2024 12:20	WG2364882
Di-n-butyl phthalate	U	J3	0.453	3.00	1	09/23/2024 12:20	WG2364882
Diethyl phthalate	U		0.287	3.00	1	09/23/2024 12:20	WG2364882
Dimethyl phthalate	U		0.260	3.00	1	09/23/2024 12:20	WG2364882
Di-n-octyl phthalate	U		0.932	3.00	1	09/23/2024 12:20	WG2364882
Pyrene	U		0.107	1.00	1	09/23/2024 12:20	WG2364882
1,2,4-Trichlorobenzene	U		0.0698	10.0	1	09/23/2024 12:20	WG2364882
Aniline	U	J4	1.65	10.0	1	09/23/2024 12:20	WG2364882
1,2-Diphenylhydrazine	U	N2	0.105	10.0	1	09/23/2024 12:20	WG2364882
Benzyl alcohol	U		0.563	10.0	1	09/23/2024 12:20	WG2364882
4-Chloroaniline	U		0.234	10.0	1	09/23/2024 12:20	WG2364882
4-Chloro-3-methylphenol	U		0.131	10.0	1	09/23/2024 12:20	WG2364882
2-Chlorophenol	U		0.133	10.0	1	09/23/2024 12:20	WG2364882
Dibenzofuran	U		0.0970	10.0	1	09/23/2024 12:20	WG2364882
2,4-Dichlorophenol	U		0.102	10.0	1	09/23/2024 12:20	WG2364882
2,4-Dimethylphenol	U		0.0636	10.0	1	09/23/2024 12:20	WG2364882
4,6-Dinitro-2-methylphenol	U		1.12	10.0	1	09/23/2024 12:20	WG2364882
2,4-Dinitrophenol	U		5.93	10.0	1	09/23/2024 12:20	WG2364882
2-Methylnaphthalene	0.278	J	0.117	1.00	1	09/23/2024 12:20	WG2364882
2-Methylphenol	U		0.0929	10.0	1	09/23/2024 12:20	WG2364882
3&4-Methyl Phenol	U		0.168	10.0	1	09/23/2024 12:20	WG2364882

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
2-Nitroaniline	U		0.102	10.0	1	09/23/2024 12:20	WG2364882
3-Nitroaniline	U		0.0869	10.0	1	09/23/2024 12:20	WG2364882
4-Nitroaniline	U		0.0910	10.0	1	09/23/2024 12:20	WG2364882
2-Nitrophenol	U		0.117	10.0	1	09/23/2024 12:20	WG2364882
4-Nitrophenol	U		0.143	10.0	1	09/23/2024 12:20	WG2364882
Pentachlorophenol	U		0.313	10.0	1	09/23/2024 12:20	WG2364882
Phenol	U		4.33	10.0	1	09/23/2024 12:20	WG2364882
Pyridine	U	J3 J4	0.627	10.0	1	09/23/2024 12:20	WG2364882
2,4,6-Trichlorophenol	U		0.100	10.0	1	09/23/2024 12:20	WG2364882
Acetophenone	U		0.208	10.0	1	09/23/2024 12:20	WG2364882
2-Acetylaminofluorene	U		0.253	10.0	1	09/27/2024 16:58	WG2364882
4-Aminobiphenyl	U		0.461	10.0	1	09/27/2024 16:58	WG2364882
Chlorobenzilate	U		3.84	50.0	1	09/27/2024 16:58	WG2364882
Diallate	U		0.524	10.0	1	09/27/2024 16:58	WG2364882
2,6-Dichlorophenol	U		0.102	10.0	1	09/27/2024 16:58	WG2364882
Dimethoate	U		5.05	50.0	1	09/27/2024 16:58	WG2364882
P-(Dimethylamino) Azobenzene	U		3.69	10.0	1	09/27/2024 16:58	WG2364882
Dimethylbenz (A) Anthracene	U		1.71	10.0	1	09/27/2024 16:58	WG2364882
3,3-Dimethylbenzidine	U		3.39	10.0	1	09/27/2024 16:58	WG2364882
a,a-Dimethylphenethylamine	U	J4	3.13	50.0	1	09/27/2024 16:58	WG2364882
1,3-Dinitrobenzene	U		0.359	10.0	1	09/27/2024 16:58	WG2364882
Diphenylamine	U		2.37	10.0	1	09/23/2024 12:20	WG2364882
Dinoseb	U		8.01	50.0	1	09/27/2024 16:58	WG2364882
Disulfoton	U		0.267	10.0	1	09/27/2024 16:58	WG2364882
Ethyl methanesulfonate	U		0.326	10.0	1	09/27/2024 16:58	WG2364882
Ethyl Parathion	U		0.379	10.0	1	09/27/2024 16:58	WG2364882
Famphur	U	C6	3.92	20.0	1	09/27/2024 16:58	WG2364882
Hexachloropropene	U		0.149	50.0	1	09/27/2024 16:58	WG2364882
Hexachlorophene	U	J4	1.44	50.0	1	09/27/2024 16:58	WG2364882
Isodrin	U		4.11	10.0	1	09/27/2024 16:58	WG2364882
Isosafrole	U		3.88	10.0	1	09/27/2024 16:58	WG2364882
Kepone	U	C6	2.66	20.0	1	09/27/2024 16:58	WG2364882
Methapyrilene	U	J4	10.0	50.0	1	09/27/2024 16:58	WG2364882
3-Methylcholanthrene	U		0.164	10.0	1	09/27/2024 16:58	WG2364882
Methyl methanesulfonate	U		3.40	50.0	1	09/27/2024 16:58	WG2364882
Methyl parathion	U		0.213	10.0	1	09/27/2024 16:58	WG2364882
1,4-Naphthoquinone	U	J4	5.56	50.0	1	09/27/2024 16:58	WG2364882
1-Naphthylamine	U		0.289	10.0	1	09/27/2024 16:58	WG2364882
2-Naphthylamine	U		4.48	10.0	1	09/27/2024 16:58	WG2364882
5-Nitro-o-toluidine	U		1.99	10.0	1	09/27/2024 16:58	WG2364882
4-Nitroquinoline 1-oxide	U		2.03	10.0	1	09/27/2024 16:58	WG2364882
n-Nitrosodiethylamine	U		3.57	10.0	1	09/27/2024 16:58	WG2364882
n-Nitrosodi-n-butylamine	U		3.91	10.0	1	09/27/2024 16:58	WG2364882
n-Nitrosomethylethylamine	U		3.25	10.0	1	09/27/2024 16:58	WG2364882
n-Nitrosomorpholine	U		3.25	10.0	1	09/27/2024 16:58	WG2364882
n-Nitrosopiperidine	U		3.72	10.0	1	09/27/2024 16:58	WG2364882
n-Nitrosopyrrolidine	U		3.39	10.0	1	09/27/2024 16:58	WG2364882
Pentachlorobenzene	U		4.15	10.0	1	09/27/2024 16:58	WG2364882
Pentachloroethane	U		2.83	50.0	1	09/27/2024 16:58	WG2364882
Pentachloronitrobenzene	U		4.15	10.0	1	09/27/2024 16:58	WG2364882
Phenacetin	U		4.66	10.0	1	09/27/2024 16:58	WG2364882
p-Phenylenediamine	U	J4	387	6900	1	09/27/2024 16:58	WG2364882
Phorate	U		4.86	50.0	1	09/27/2024 16:58	WG2364882
2-Picoline	U	J4	6.83	50.0	1	09/27/2024 16:58	WG2364882
Pronamide	U		4.21	10.0	1	09/27/2024 16:58	WG2364882
Safrole	U		3.68	10.0	1	09/27/2024 16:58	WG2364882

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfotep	U		3.99	50.0	1	09/27/2024 16:58	WG2364882
1,2,4,5-Tetrachlorobenzene	U		0.0647	10.0	1	09/23/2024 12:20	WG2364882
2,3,4,6-Tetrachlorophenol	U		0.231	10.0	1	09/23/2024 12:20	WG2364882
Thionazin	U		4.07	10.0	1	09/27/2024 16:58	WG2364882
o-Toluidine	U		3.53	10.0	1	09/27/2024 16:58	WG2364882
2,4,5-Trichlorophenol	U		0.109	10.0	1	09/23/2024 12:20	WG2364882
O,O,O-Triethyl Phosphorothioate	U		2.93	10.0	1	09/27/2024 16:58	WG2364882
1,3,5-Trinitrobenzene	U		1.32	10.0	1	09/27/2024 16:58	WG2364882
(S) 2-Fluorophenol	*26.8*			*10.0-120*		*09/23/2024 12:20*	WG2364882
(S) Phenol-d5	*19.2*			*10.0-120*		*09/23/2024 12:20*	WG2364882
(S) Nitrobenzene-d5	*61.5*			*10.0-127*		*09/23/2024 12:20*	WG2364882
(S) 2-Fluorobiphenyl	*68.9*			*10.0-130*		*09/23/2024 12:20*	WG2364882
(S) 2,4,6-Tribromophenol	*88.5*			*10.0-155*		*09/23/2024 12:20*	WG2364882
(S) p-Terphenyl-d14	*62.1*			*10.0-128*		*09/23/2024 12:20*	WG2364882

Method Blank (MB)

(MB) R4122038-3 09/19/24 05:40

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C5-C8 Aliphatics	U		33.3	100
Unadjusted C9-C12 Aliphatics	U		33.3	100
Unadjusted C9-C10 Aromatics	U		33.3	100
Adjusted C5-C8 Aliphatics	U		33.3	100
Adjusted C9-C12 Aliphatics	U		33.3	100
Total VPH	U		66.7	200
(S) 2,5-Dibromotoluene(FID)	*101*			*70.0-130*
(S) 2,5-Dibromotoluene(PID)	*99.9*			*70.0-130*

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

(LCS) R4122038-1 09/19/24 03:21 • (LCSD) R4122038-2 09/19/24 03:56

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C5-C8 Aliphatics	1200	1060	1050	88.3	87.5	70.0-130			0.948	50
Unadjusted C9-C12 Aliphatics	1400	1080	1080	77.1	77.1	70.0-130			0.000	50
Unadjusted C9-C10 Aromatics	200	168	168	84.0	84.0	70.0-130			0.000	50
Total VPH	2800	2310	2300	82.5	82.1	70.0-130			0.434	50
(S) 2,5-Dibromotoluene(FID)				*96.8*	*95.0*	*70.0-130*				
(S) 2,5-Dibromotoluene(PID)				*94.4*	*92.2*	*70.0-130*				

Method Blank (MB)

(MB) R4124239-3 09/19/24 11:08

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	25.0
Acrylonitrile	U		0.671	5.00
Benzene	U		0.0941	0.500
Bromobenzene	U		0.118	0.500
Bromodichloromethane	U		0.136	0.500
Bromochloromethane	U		0.128	0.500
Bromoform	U		0.129	0.500
Bromomethane	U		0.605	2.50
n-Butylbenzene	U		0.157	0.500
sec-Butylbenzene	U		0.125	0.500
tert-Butylbenzene	0.350	J	0.127	0.500
Carbon disulfide	U		0.0962	0.500
Carbon tetrachloride	U		0.128	0.500
Chlorobenzene	U		0.117	0.500
Chlorodibromomethane	U		0.140	0.500
Chloroethane	U		0.192	2.50
2-Chloroethyl vinyl ether	U		0.575	50.0
Chloroform	U		0.111	0.500
Chloromethane	U		0.960	1.25
2-Chlorotoluene	U		0.106	0.500
4-Chlorotoluene	U		0.114	0.500
1,2-Dibromo-3-Chloropropane	U		0.276	2.50
1,2-Dibromoethane	U		0.126	0.500
Dibromomethane	U		0.122	0.500
1,2-Dichlorobenzene	U		0.107	0.500
1,3-Dichlorobenzene	U		0.299	0.500
1,4-Dichlorobenzene	U		0.120	0.500
Dichlorodifluoromethane	U		0.374	2.50
1,1-Dichloroethane	U		0.100	0.500
1,2-Dichloroethane	U		0.0819	0.500
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.126	0.500
trans-1,2-Dichloroethene	U		0.149	0.500
1,2-Dichloropropane	U		0.149	0.500
1,1-Dichloropropene	U		0.142	0.500
1,3-Dichloropropane	U		0.109	1.00
cis-1,3-Dichloropropene	U		0.111	0.500
trans-1,3-Dichloropropene	U		0.118	0.500
trans-1,4-Dichloro-2-butene	U		0.467	5.00
2,2-Dichloropropane	U		0.161	0.500

Method Blank (MB)

(MB) R4124239-3 09/19/24 11:08

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Di-isopropyl ether	U		0.105	0.500
Ethylbenzene	U		0.137	0.500
Hexachloro-1,3-butadiene	0.389	J	0.337	1.00
2-Hexanone	U		0.787	5.00
n-Hexane	U		0.749	5.00
Iodomethane	U		0.554	5.00
Isopropylbenzene	U		0.105	0.500
p-Isopropyltoluene	U		0.120	0.500
2-Butanone (MEK)	U		1.19	5.00
Methylene Chloride	U		0.430	2.50
4-Methyl-2-pentanone (MIBK)	U		0.478	5.00
Methyl tert-butyl ether	U		0.101	0.500
Naphthalene	U		0.174	2.50
n-Propylbenzene	U		0.0993	0.500
Styrene	U		0.118	0.500
1,1,1,2-Tetrachloroethane	U		0.147	0.500
1,1,2,2-Tetrachloroethane	U		0.133	0.500
1,1,2-Trichlorotrifluoroethane	U		0.180	0.500
Tetrachloroethene	U		0.300	0.500
Toluene	U		0.278	0.500
1,2,3-Trichlorobenzene	0.361	J	0.164	0.500
1,2,4-Trichlorobenzene	U		0.481	1.00
1,1,1-Trichloroethane	U		0.149	0.500
1,1,2-Trichloroethane	U		0.158	0.500
Trichloroethene	U		0.190	0.500
Trichlorofluoromethane	U		0.160	2.50
1,2,3-Trichloropropane	U		0.237	2.50
1,2,4-Trimethylbenzene	U		0.322	0.500
1,2,3-Trimethylbenzene	U		0.104	0.500
1,3,5-Trimethylbenzene	U		0.104	0.500
Vinyl acetate	U		0.692	5.00
Vinyl chloride	U		0.234	0.500
Xylenes, Total	U		0.174	1.50
(S) Toluene-d8	*102*			*80.0-120*
(S) 4-Bromofluorobenzene	*93.6*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*85.3*			*70.0-130*

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

(LCS) R4124239-1 09/19/24 10:02 • (LCSD) R4124239-2 09/19/24 10:24

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	21.5	21.2	86.0	84.8	19.0-160	J	J	1.41	27
Acrylonitrile	25.0	22.5	20.7	90.0	82.8	55.0-149			8.33	20
Benzene	5.00	4.99	4.87	99.8	97.4	70.0-123			2.43	20
Bromobenzene	5.00	5.28	5.18	106	104	73.0-121			1.91	20
Bromodichloromethane	5.00	4.91	4.90	98.2	98.0	75.0-120			0.204	20
Bromochloromethane	5.00	4.76	4.55	95.2	91.0	76.0-122			4.51	20
Bromoform	5.00	4.19	4.61	83.8	92.2	68.0-132			9.55	20
Bromomethane	5.00	4.06	3.55	81.2	71.0	10.0-160			13.4	25
n-Butylbenzene	5.00	4.91	4.79	98.2	95.8	73.0-125			2.47	20
sec-Butylbenzene	5.00	4.25	4.51	85.0	90.2	75.0-125			5.94	20
tert-Butylbenzene	5.00	3.94	4.35	78.8	87.0	76.0-124			9.89	20
Carbon disulfide	5.00	4.70	4.51	94.0	90.2	61.0-128			4.13	20
Carbon tetrachloride	5.00	4.79	4.73	95.8	94.6	68.0-126			1.26	20
Chlorobenzene	5.00	4.68	5.02	93.6	100	80.0-121			7.01	20
Chlorodibromomethane	5.00	4.53	4.91	90.6	98.2	77.0-125			8.05	20
Chloroethane	5.00	4.81	4.49	96.2	89.8	47.0-150			6.88	20
2-Chloroethyl vinyl ether	25.0	23.4	22.9	93.6	91.6	51.0-160	J	J	2.16	20
Chloroform	5.00	4.68	4.69	93.6	93.8	73.0-120			0.213	20
Chloromethane	5.00	4.47	4.25	89.4	85.0	41.0-142			5.05	20
2-Chlorotoluene	5.00	4.78	4.62	95.6	92.4	76.0-123			3.40	20
4-Chlorotoluene	5.00	4.68	4.54	93.6	90.8	75.0-122			3.04	20
1,2-Dibromo-3-Chloropropane	5.00	4.37	4.73	87.4	94.6	58.0-134			7.91	20
1,2-Dibromoethane	5.00	5.10	4.85	102	97.0	80.0-122			5.03	20
Dibromomethane	5.00	4.79	4.90	95.8	98.0	80.0-120			2.27	20
1,2-Dichlorobenzene	5.00	4.69	4.92	93.8	98.4	79.0-121			4.79	20
1,3-Dichlorobenzene	5.00	4.81	5.01	96.2	100	79.0-120			4.07	20
1,4-Dichlorobenzene	5.00	4.68	4.99	93.6	99.8	79.0-120			6.41	20
Dichlorodifluoromethane	5.00	4.30	3.95	86.0	79.0	51.0-149			8.48	20
1,1-Dichloroethane	5.00	5.05	4.86	101	97.2	70.0-126			3.83	20
1,2-Dichloroethane	5.00	4.64	4.58	92.8	91.6	70.0-128			1.30	20
1,1-Dichloroethene	5.00	4.60	4.68	92.0	93.6	71.0-124			1.72	20
cis-1,2-Dichloroethene	5.00	4.79	4.82	95.8	96.4	73.0-120			0.624	20
trans-1,2-Dichloroethene	5.00	4.91	4.75	98.2	95.0	73.0-120			3.31	20
1,2-Dichloropropane	5.00	5.08	4.96	102	99.2	77.0-125			2.39	20
1,1-Dichloropropene	5.00	5.26	5.26	105	105	74.0-126			0.000	20
1,3-Dichloropropane	5.00	4.78	5.26	95.6	105	80.0-120			9.56	20
cis-1,3-Dichloropropene	5.00	4.94	4.73	98.8	94.6	80.0-123			4.34	20
trans-1,3-Dichloropropene	5.00	4.85	5.17	97.0	103	78.0-124			6.39	20
trans-1,4-Dichloro-2-butene	5.00	4.14	3.02	82.8	60.4	33.0-144	J	J J3	31.3	20
2,2-Dichloropropane	5.00	4.32	4.14	86.4	82.8	58.0-130			4.26	20

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

(LCS) R4124239-1 09/19/24 10:02 • (LCSD) R4124239-2 09/19/24 10:24

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Di-isopropyl ether	5.00	4.93	4.97	98.6	99.4	58.0-138			0.808	20
Ethylbenzene	5.00	4.91	4.68	98.2	93.6	79.0-123			4.80	20
Hexachloro-1,3-butadiene	5.00	3.89	4.26	77.8	85.2	54.0-138			9.08	20
2-Hexanone	25.0	23.9	26.7	95.6	107	67.0-149			11.1	20
n-Hexane	5.00	4.53	3.86	90.6	77.2	57.0-133	J	J	16.0	20
Iodomethane	25.0	23.4	22.3	93.6	89.2	33.0-147			4.81	26
Isopropylbenzene	5.00	4.43	4.51	88.6	90.2	76.0-127			1.79	20
p-Isopropyltoluene	5.00	4.72	4.83	94.4	96.6	76.0-125			2.30	20
2-Butanone (MEK)	25.0	25.6	23.9	102	95.6	44.0-160			6.87	20
Methylene Chloride	5.00	4.81	4.63	96.2	92.6	67.0-120			3.81	20
4-Methyl-2-pentanone (MIBK)	25.0	22.8	23.2	91.2	92.8	68.0-142			1.74	20
Methyl tert-butyl ether	5.00	4.38	4.32	87.6	86.4	68.0-125			1.38	20
Naphthalene	5.00	4.35	4.58	87.0	91.6	54.0-135			5.15	20
n-Propylbenzene	5.00	4.85	4.68	97.0	93.6	77.0-124			3.57	20
Styrene	5.00	4.73	5.10	94.6	102	73.0-130			7.53	20
1,1,1,2-Tetrachloroethane	5.00	4.35	4.65	87.0	93.0	75.0-125			6.67	20
1,1,2,2-Tetrachloroethane	5.00	4.92	4.73	98.4	94.6	65.0-130			3.94	20
1,1,2-Trichlorotrifluoroethane	5.00	4.35	4.33	87.0	86.6	69.0-132			0.461	20
Tetrachloroethene	5.00	4.97	5.02	99.4	100	72.0-132			1.00	20
Toluene	5.00	4.56	4.93	91.2	98.6	79.0-120			7.80	20
1,2,3-Trichlorobenzene	5.00	4.13	4.82	82.6	96.4	50.0-138			15.4	20
1,2,4-Trichlorobenzene	5.00	4.35	5.03	87.0	101	57.0-137			14.5	20
1,1,1-Trichloroethane	5.00	4.66	4.40	93.2	88.0	73.0-124			5.74	20
1,1,2-Trichloroethane	5.00	4.85	5.20	97.0	104	80.0-120			6.97	20
Trichloroethene	5.00	4.74	4.71	94.8	94.2	78.0-124			0.635	20
Trichlorofluoromethane	5.00	4.56	4.77	91.2	95.4	59.0-147			4.50	20
1,2,3-Trichloropropane	5.00	4.18	5.26	83.6	105	73.0-130		J3	22.9	20
1,2,4-Trimethylbenzene	5.00	4.46	4.51	89.2	90.2	76.0-121			1.11	20
1,2,3-Trimethylbenzene	5.00	4.55	4.94	91.0	98.8	77.0-120			8.22	20
1,3,5-Trimethylbenzene	5.00	4.58	4.63	91.6	92.6	76.0-122			1.09	20
Vinyl acetate	25.0	29.2	28.0	117	112	11.0-160			4.20	20
Vinyl chloride	5.00	4.46	4.40	89.2	88.0	67.0-131			1.35	20
Xylenes, Total	15.0	14.2	14.6	94.7	97.3	79.0-123			2.78	20
(S) Toluene-d8				*92.1*	*97.4*	*80.0-120*				
(S) 4-Bromofluorobenzene				*92.1*	*92.6*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*90.5*	*87.8*	*70.0-130*				

L1777635-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1777635-02 09/19/24 13:19 • (MS) R4124239-4 09/19/24 20:36 • (MSD) R4124239-5 09/19/24 20:58

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	U	21.7	29.4	86.8	118	1	10.0-160	J		30.1	35
Acrylonitrile	25.0	U	22.9	26.4	91.6	106	1	21.0-160			14.2	32
Benzene	5.00	U	3.71	4.26	74.2	85.2	1	17.0-158			13.8	27
Bromobenzene	5.00	U	4.82	4.84	96.4	96.8	1	30.0-149			0.414	28
Bromodichloromethane	5.00	U	4.73	5.40	94.6	108	1	31.0-150			13.2	27
Bromochloromethane	5.00	U	4.01	4.55	80.2	91.0	1	38.0-142			12.6	26
Bromoform	5.00	U	5.03	5.29	101	106	1	29.0-150			5.04	29
Bromomethane	5.00	U	2.26	2.69	45.2	53.8	1	10.0-160	J		17.4	38
n-Butylbenzene	5.00	U	4.54	4.98	90.8	99.6	1	31.0-150			9.24	30
sec-Butylbenzene	5.00	U	4.23	4.96	84.6	99.2	1	33.0-155			15.9	29
tert-Butylbenzene	5.00	0.336	3.58	4.29	64.9	79.1	1	34.0-153			18.0	28
Carbon disulfide	5.00	U	1.33	1.57	26.6	31.4	1	10.0-156			16.6	28
Carbon tetrachloride	5.00	U	3.77	4.74	75.4	94.8	1	23.0-159			22.8	28
Chlorobenzene	5.00	U	4.17	4.53	83.4	90.6	1	33.0-152			8.28	27
Chlorodibromomethane	5.00	U	4.60	5.17	92.0	103	1	37.0-149			11.7	27
Chloroethane	5.00	U	3.07	3.43	61.4	68.6	1	10.0-160			11.1	30
2-Chloroethyl vinyl ether	25.0	U	U	U	0.000	0.000	1	10.0-160	J6	J6	0.000	31
Chloroform	5.00	0.164	4.26	4.99	81.9	96.5	1	29.0-154			15.8	28
Chloromethane	5.00	U	3.15	3.87	63.0	77.4	1	10.0-160			20.5	29
2-Chlorotoluene	5.00	U	4.34	4.23	86.8	84.6	1	32.0-153			2.57	28
4-Chlorotoluene	5.00	U	3.39	3.78	67.8	75.6	1	32.0-150			10.9	28
1,2-Dibromo-3-Chloropropane	5.00	U	5.18	5.26	104	105	1	22.0-151			1.53	34
1,2-Dibromoethane	5.00	U	4.36	4.81	87.2	96.2	1	34.0-147			9.81	27
Dibromomethane	5.00	U	4.39	4.63	87.8	92.6	1	30.0-151			5.32	27
1,2-Dichlorobenzene	5.00	U	5.27	5.13	105	103	1	34.0-149			2.69	28
1,3-Dichlorobenzene	5.00	U	4.54	4.92	90.8	98.4	1	36.0-146			8.03	27
1,4-Dichlorobenzene	5.00	U	4.89	4.75	97.8	95.0	1	35.0-142			2.90	27
Dichlorodifluoromethane	5.00	U	4.21	4.66	84.2	93.2	1	10.0-160			10.1	29
1,1-Dichloroethane	5.00	U	3.89	4.93	77.8	98.6	1	25.0-158			23.6	27
1,2-Dichloroethane	5.00	U	4.29	4.66	85.8	93.2	1	29.0-151			8.27	27
1,1-Dichloroethene	5.00	0.534	3.59	4.22	61.1	73.7	1	11.0-160			16.1	29
cis-1,2-Dichloroethene	5.00	U	3.98	4.28	79.6	85.6	1	10.0-160			7.26	27
trans-1,2-Dichloroethene	5.00	U	2.86	3.37	57.2	67.4	1	17.0-153			16.4	27
1,2-Dichloropropane	5.00	U	4.48	4.69	89.6	93.8	1	30.0-156			4.58	27
1,1-Dichloropropene	5.00	U	3.27	4.04	65.4	80.8	1	25.0-158			21.1	27
1,3-Dichloropropane	5.00	U	4.59	5.08	91.8	102	1	38.0-147			10.1	27
cis-1,3-Dichloropropene	5.00	U	4.05	4.31	81.0	86.2	1	34.0-149			6.22	28
trans-1,3-Dichloropropene	5.00	U	4.63	4.75	92.6	95.0	1	32.0-149			2.56	28
trans-1,4-Dichloro-2-butene	5.00	U	4.47	5.80	89.4	116	1	10.0-157	J		25.9	37
2,2-Dichloropropane	5.00	U	3.22	4.18	64.4	83.6	1	24.0-152			25.9	29

L1777635-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1777635-02 09/19/24 13:19 • (MS) R4124239-4 09/19/24 20:36 • (MSD) R4124239-5 09/19/24 20:58

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Di-isopropyl ether	5.00	U	4.86	5.22	97.2	104	1	21.0-160			7.14	28
Ethylbenzene	5.00	U	3.95	4.30	79.0	86.0	1	30.0-155			8.48	27
Hexachloro-1,3-butadiene	5.00	U	3.91	4.40	78.2	88.0	1	20.0-154			11.8	34
2-Hexanone	25.0	U	26.4	29.0	106	116	1	21.0-160			9.39	29
n-Hexane	5.00	U	2.40	2.64	48.0	52.8	1	10.0-153	J	J	9.52	28
Iodomethane	25.0	U	15.5	19.0	62.0	76.0	1	10.0-160			20.3	40
Isopropylbenzene	5.00	U	3.75	4.50	75.0	90.0	1	28.0-157			18.2	27
p-Isopropyltoluene	5.00	U	4.31	5.09	86.2	102	1	30.0-154			16.6	29
2-Butanone (MEK)	25.0	U	24.4	28.0	97.6	112	1	10.0-160			13.7	32
Methylene Chloride	5.00	U	2.83	3.54	56.6	70.8	1	23.0-144			22.3	28
4-Methyl-2-pentanone (MIBK)	25.0	U	26.1	28.5	104	114	1	29.0-160			8.79	29
Methyl tert-butyl ether	5.00	0.318	4.65	4.93	86.6	92.2	1	28.0-150			5.85	29
Naphthalene	5.00	U	4.84	5.53	96.8	111	1	12.0-156			13.3	35
n-Propylbenzene	5.00	U	4.26	4.50	85.2	90.0	1	31.0-154			5.48	28
Styrene	5.00	U	4.48	4.63	89.6	92.6	1	33.0-155			3.29	28
1,1,1,2-Tetrachloroethane	5.00	U	4.35	4.89	87.0	97.8	1	36.0-151			11.7	29
1,1,2,2-Tetrachloroethane	5.00	U	5.39	5.22	108	104	1	33.0-150			3.20	28
1,1,2-Trichlorotrifluoroethane	5.00	U	3.51	3.92	70.2	78.4	1	23.0-160			11.0	30
Tetrachloroethene	5.00	3.64	6.64	8.21	60.0	91.4	1	10.0-160			21.1	27
Toluene	5.00	U	3.43	4.19	68.6	83.8	1	26.0-154			19.9	28
1,2,3-Trichlorobenzene	5.00	U	4.17	5.49	83.4	110	1	17.0-150			27.3	36
1,2,4-Trichlorobenzene	5.00	U	4.46	4.95	89.2	99.0	1	24.0-150			10.4	33
1,1,1-Trichloroethane	5.00	U	3.72	4.60	74.4	92.0	1	23.0-160			21.2	28
1,1,2-Trichloroethane	5.00	U	4.55	5.27	91.0	105	1	35.0-147			14.7	27
Trichloroethene	5.00	0.468	3.98	4.91	70.2	88.8	1	10.0-160			20.9	25
Trichlorofluoromethane	5.00	U	3.74	4.50	74.8	90.0	1	17.0-160			18.4	31
1,2,3-Trichloropropane	5.00	U	5.37	5.43	107	109	1	34.0-151			1.11	29
1,2,4-Trimethylbenzene	5.00	U	4.71	4.67	94.2	93.4	1	26.0-154			0.853	27
1,2,3-Trimethylbenzene	5.00	U	4.41	4.61	88.2	92.2	1	32.0-149			4.43	28
1,3,5-Trimethylbenzene	5.00	U	3.85	4.24	77.0	84.8	1	28.0-153			9.64	27
Vinyl acetate	25.0	U	29.3	31.2	117	125	1	12.0-160			6.28	31
Vinyl chloride	5.00	U	2.95	3.55	59.0	71.0	1	10.0-160			18.5	27
Xylenes, Total	15.0	0.184	12.0	14.4	78.8	94.8	1	29.0-154			18.2	28
(S) Toluene-d8					*94.3*	*95.4*		*80.0-120*				
(S) 4-Bromofluorobenzene					*98.6*	*95.3*		*77.0-126*				
(S) 1,2-Dichloroethane-d4					*96.4*	*97.5*		*70.0-130*				

Method Blank (MB)

(MB) R4125032-3 09/19/24 14:04

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	25.0
Acrylonitrile	U		0.671	5.00
Benzene	U		0.0941	0.500
Bromobenzene	U		0.118	0.500
Bromodichloromethane	U		0.136	0.500
Bromochloromethane	U		0.128	0.500
Bromoform	U		0.129	0.500
Bromomethane	U		0.605	2.50
n-Butylbenzene	U		0.157	0.500
sec-Butylbenzene	U		0.125	0.500
tert-Butylbenzene	U		0.127	0.500
Carbon disulfide	U		0.0962	0.500
Carbon tetrachloride	U		0.128	0.500
Chlorobenzene	U		0.117	0.500
Chlorodibromomethane	U		0.140	0.500
Chloroethane	U		0.192	2.50
2-Chloroethyl vinyl ether	U		0.575	50.0
Chloroform	U		0.111	0.500
Chloromethane	U		0.960	1.25
2-Chlorotoluene	U		0.106	0.500
4-Chlorotoluene	U		0.114	0.500
1,2-Dibromo-3-Chloropropane	U		0.276	2.50
1,2-Dibromoethane	U		0.126	0.500
Dibromomethane	U		0.122	0.500
1,2-Dichlorobenzene	U		0.107	0.500
1,3-Dichlorobenzene	U		0.299	0.500
1,4-Dichlorobenzene	U		0.120	0.500
Dichlorodifluoromethane	U		0.374	2.50
1,1-Dichloroethane	U		0.100	0.500
1,2-Dichloroethane	U		0.0819	0.500
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.126	0.500
trans-1,2-Dichloroethene	U		0.149	0.500
1,2-Dichloropropane	U		0.149	0.500
1,1-Dichloropropene	U		0.142	0.500
1,3-Dichloropropane	U		0.109	1.00
cis-1,3-Dichloropropene	U		0.111	0.500
trans-1,3-Dichloropropene	U		0.118	0.500
trans-1,4-Dichloro-2-butene	U		0.467	5.00
2,2-Dichloropropane	U		0.161	0.500

Method Blank (MB)

(MB) R4125032-3 09/19/24 14:04

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Di-isopropyl ether	U		0.105	0.500
Ethylbenzene	U		0.137	0.500
Hexachloro-1,3-butadiene	U		0.337	1.00
2-Hexanone	U		0.787	5.00
n-Hexane	U		0.749	5.00
Iodomethane	U		0.554	5.00
Isopropylbenzene	U		0.105	0.500
p-Isopropyltoluene	U		0.120	0.500
2-Butanone (MEK)	U		1.19	5.00
Methylene Chloride	U		0.430	2.50
4-Methyl-2-pentanone (MIBK)	U		0.478	5.00
Methyl tert-butyl ether	U		0.101	0.500
Naphthalene	U		0.174	2.50
n-Propylbenzene	U		0.0993	0.500
Styrene	U		0.118	0.500
1,1,1,2-Tetrachloroethane	U		0.147	0.500
1,1,2,2-Tetrachloroethane	U		0.133	0.500
1,1,2-Trichlorotrifluoroethane	U		0.180	0.500
Tetrachloroethene	U		0.300	0.500
Toluene	U		0.278	0.500
1,2,3-Trichlorobenzene	U		0.164	0.500
1,2,4-Trichlorobenzene	U		0.481	1.00
1,1,1-Trichloroethane	U		0.149	0.500
1,1,2-Trichloroethane	U		0.158	0.500
Trichloroethene	U		0.190	0.500
Trichlorofluoromethane	U		0.160	2.50
1,2,3-Trichloropropane	U		0.237	2.50
1,2,4-Trimethylbenzene	U		0.322	0.500
1,2,3-Trimethylbenzene	U		0.104	0.500
1,3,5-Trimethylbenzene	U		0.104	0.500
Vinyl acetate	U		0.692	5.00
Vinyl chloride	U		0.234	0.500
Xylenes, Total	U		0.174	1.50
(S) Toluene-d8	*94.7*			*80.0-120*
(S) 4-Bromofluorobenzene	*102*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*95.5*			*70.0-130*

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

(LCS) R4125032-1 09/19/24 12:48 • (LCSD) R4125032-2 09/19/24 13:07

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	25.0	47.7	44.8	191	179	19.0-160	J4	J4	6.27	27
Acrylonitrile	25.0	25.5	35.2	102	141	55.0-149		J3	32.0	20
Benzene	5.00	5.13	4.92	103	98.4	70.0-123			4.18	20
Bromobenzene	5.00	4.86	4.77	97.2	95.4	73.0-121			1.87	20
Bromodichloromethane	5.00	5.02	4.93	100	98.6	75.0-120			1.81	20
Bromochloromethane	5.00	5.52	5.57	110	111	76.0-122			0.902	20
Bromoform	5.00	4.71	4.67	94.2	93.4	68.0-132			0.853	20
Bromomethane	5.00	5.79	5.04	116	101	10.0-160			13.9	25
n-Butylbenzene	5.00	5.35	5.09	107	102	73.0-125			4.98	20
sec-Butylbenzene	5.00	5.13	4.91	103	98.2	75.0-125			4.38	20
tert-Butylbenzene	5.00	5.03	4.80	101	96.0	76.0-124			4.68	20
Carbon disulfide	5.00	4.09	4.06	81.8	81.2	61.0-128			0.736	20
Carbon tetrachloride	5.00	5.01	4.59	100	91.8	68.0-126			8.75	20
Chlorobenzene	5.00	5.18	4.98	104	99.6	80.0-121			3.94	20
Chlorodibromomethane	5.00	4.94	4.83	98.8	96.6	77.0-125			2.25	20
Chloroethane	5.00	5.66	5.38	113	108	47.0-150			5.07	20
2-Chloroethyl vinyl ether	25.0	28.4	27.3	114	109	51.0-160	J	J	3.95	20
Chloroform	5.00	5.20	5.11	104	102	73.0-120			1.75	20
Chloromethane	5.00	4.88	4.75	97.6	95.0	41.0-142			2.70	20
2-Chlorotoluene	5.00	5.07	4.89	101	97.8	76.0-123			3.61	20
4-Chlorotoluene	5.00	5.00	4.76	100	95.2	75.0-122			4.92	20
1,2-Dibromo-3-Chloropropane	5.00	4.75	4.99	95.0	99.8	58.0-134			4.93	20
1,2-Dibromoethane	5.00	5.10	5.01	102	100	80.0-122			1.78	20
Dibromomethane	5.00	5.32	5.29	106	106	80.0-120			0.566	20
1,2-Dichlorobenzene	5.00	5.05	5.01	101	100	79.0-121			0.795	20
1,3-Dichlorobenzene	5.00	5.10	4.76	102	95.2	79.0-120			6.90	20
1,4-Dichlorobenzene	5.00	4.86	4.70	97.2	94.0	79.0-120			3.35	20
Dichlorodifluoromethane	5.00	4.95	4.75	99.0	95.0	51.0-149			4.12	20
1,1-Dichloroethane	5.00	5.64	5.48	113	110	70.0-126			2.88	20
1,2-Dichloroethane	5.00	5.04	4.94	101	98.8	70.0-128			2.00	20
1,1-Dichloroethene	5.00	4.77	4.32	95.4	86.4	71.0-124			9.90	20
cis-1,2-Dichloroethene	5.00	5.07	4.97	101	99.4	73.0-120			1.99	20
trans-1,2-Dichloroethene	5.00	5.17	4.94	103	98.8	73.0-120			4.55	20
1,2-Dichloropropane	5.00	5.75	5.43	115	109	77.0-125			5.72	20
1,1-Dichloropropene	5.00	5.42	5.10	108	102	74.0-126			6.08	20
1,3-Dichloropropane	5.00	5.06	4.80	101	96.0	80.0-120			5.27	20
cis-1,3-Dichloropropene	5.00	5.40	5.12	108	102	80.0-123			5.32	20
trans-1,3-Dichloropropene	5.00	5.02	4.88	100	97.6	78.0-124			2.83	20
trans-1,4-Dichloro-2-butene	5.00	5.59	5.99	112	120	33.0-144			6.91	20
2,2-Dichloropropane	5.00	4.79	4.58	95.8	91.6	58.0-130			4.48	20

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

(LCS) R4125032-1 09/19/24 12:48 • (LCSD) R4125032-2 09/19/24 13:07

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Di-isopropyl ether	5.00	6.51	6.23	130	125	58.0-138			4.40	20
Ethylbenzene	5.00	5.08	4.83	102	96.6	79.0-123			5.05	20
Hexachloro-1,3-butadiene	5.00	6.35	5.98	127	120	54.0-138			6.00	20
2-Hexanone	25.0	29.9	29.6	120	118	67.0-149			1.01	20
n-Hexane	5.00	6.05	5.89	121	118	57.0-133			2.68	20
Iodomethane	25.0	20.0	19.8	80.0	79.2	33.0-147			1.01	26
Isopropylbenzene	5.00	5.68	5.27	114	105	76.0-127			7.49	20
p-Isopropyltoluene	5.00	5.35	5.21	107	104	76.0-125			2.65	20
2-Butanone (MEK)	25.0	34.1	35.5	136	142	44.0-160			4.02	20
Methylene Chloride	5.00	4.37	4.92	87.4	98.4	67.0-120			11.8	20
4-Methyl-2-pentanone (MIBK)	25.0	27.0	26.7	108	107	68.0-142			1.12	20
Methyl tert-butyl ether	5.00	5.23	5.26	105	105	68.0-125			0.572	20
Naphthalene	5.00	4.91	5.07	98.2	101	54.0-135			3.21	20
n-Propylbenzene	5.00	5.01	4.79	100	95.8	77.0-124			4.49	20
Styrene	5.00	4.87	4.55	97.4	91.0	73.0-130			6.79	20
1,1,1,2-Tetrachloroethane	5.00	4.80	4.83	96.0	96.6	75.0-125			0.623	20
1,1,2,2-Tetrachloroethane	5.00	4.26	4.13	85.2	82.6	65.0-130			3.10	20
1,1,2-Trichlorotrifluoroethane	5.00	3.08	1.86	61.6	37.2	69.0-132	J4	J3 J4	49.4	20
Tetrachloroethene	5.00	5.45	5.18	109	104	72.0-132			5.08	20
Toluene	5.00	5.01	4.68	100	93.6	79.0-120			6.81	20
1,2,3-Trichlorobenzene	5.00	5.32	5.45	106	109	50.0-138			2.41	20
1,2,4-Trichlorobenzene	5.00	5.27	5.23	105	105	57.0-137			0.762	20
1,1,1-Trichloroethane	5.00	4.89	4.59	97.8	91.8	73.0-124			6.33	20
1,1,2-Trichloroethane	5.00	4.74	4.72	94.8	94.4	80.0-120			0.423	20
Trichloroethene	5.00	5.87	5.48	117	110	78.0-124			6.87	20
Trichlorofluoromethane	5.00	5.54	5.00	111	100	59.0-147			10.2	20
1,2,3-Trichloropropane	5.00	4.73	4.81	94.6	96.2	73.0-130			1.68	20
1,2,4-Trimethylbenzene	5.00	5.23	4.93	105	98.6	76.0-121			5.91	20
1,2,3-Trimethylbenzene	5.00	5.09	4.83	102	96.6	77.0-120			5.24	20
1,3,5-Trimethylbenzene	5.00	5.16	4.89	103	97.8	76.0-122			5.37	20
Vinyl acetate	25.0	22.9	23.2	91.6	92.8	11.0-160			1.30	20
Vinyl chloride	5.00	5.51	5.00	110	100	67.0-131			9.71	20
Xylenes, Total	15.0	15.6	14.7	104	98.0	79.0-123			5.94	20
(S) Toluene-d8				*93.1*	*95.1*	*80.0-120*				
(S) 4-Bromofluorobenzene				*99.2*	*100*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*96.1*	*95.5*	*70.0-130*				

Method Blank (MB)

(MB) R4125230-3 09/26/24 20:07

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Ethylbenzene	U		0.137	0.500
(S) Toluene-d8	*101*			*80.0-120*
(S) 4-Bromofluorobenzene	*89.5*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*

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

(LCS) R4125230-1 09/26/24 19:06 • (LCSD) R4125230-2 09/26/24 19:26

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylbenzene	5.00	5.05	4.82	101	96.4	79.0-123			4.66	20
(S) Toluene-d8				*101*	*99.2*	*80.0-120*				
(S) 4-Bromofluorobenzene				*91.6*	*91.1*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*99.5*	*102*	*70.0-130*				

Method Blank (MB)

(MB) R4121030-1 09/17/24 12:28

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C11-C22 Aromatics	U		200	600
(S) o-Terphenyl	*56.6*			*40.0-140*
(S) 2-Fluorobiphenyl	*69.8*			*40.0-140*
(S) 2-Bromonaphthalene	*68.5*			*40.0-140*

Method Blank (MB)

(MB) R4121030-1 09/17/24 12:28

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Unadjusted C9-C18 Aliphatics	U		200	600
Unadjusted C19-C36 Aliphatics	U		200	600
(S) 1-Chloro-octadecane	*57.5*			*40.0-140*

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

(LCS) R4121030-2 09/17/24 12:49 • (LCSD) R4121030-3 09/17/24 13:11

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C11-C22 Aromatics	1700	1150	1200	67.6	70.6	40.0-140			4.26	25
(S) o-Terphenyl				*70.9*	*72.5*	*40.0-140*				
(S) 2-Fluorobiphenyl				*81.3*	*80.2*	*40.0-140*				
(S) 2-Bromonaphthalene				*80.4*	*79.4*	*40.0-140*				

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

(LCS) R4121030-2 09/17/24 12:49 • (LCSD) R4121030-3 09/17/24 13:11

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Unadjusted C9-C18 Aliphatics	600	305	332	50.8	55.3	40.0-140	J	J	8.48	25
Unadjusted C19-C36 Aliphatics	800	638	699	79.8	87.4	40.0-140			9.12	25
(S) 1-Chloro-octadecane				*65.4*	*72.1*	*40.0-140*				

L1775225-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1775225-01 09/17/24 15:21 • (MS) R4121030-4 09/17/24 15:43 • (MSD) R4121030-5 09/17/24 16:05

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Unadjusted C9-C18 Aliphatics	561	U	378	357	59.6	55.9	1	40.0-140	J	J	5.71	50
Unadjusted C19-C36 Aliphatics	748	U	634	588	80.6	74.4	1	40.0-140		J	7.53	50
(S) 1-Chloro-octadecane					*48.1*	*45.2*		*40.0-140*				

Sample Narrative:

OS: Duplicate Analysis performed due to QC failure. Results confirm; reporting in hold data.

Method Blank (MB)

(MB) R4124011-3 09/23/24 10:53

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.0886	1.00
Acenaphthylene	U		0.0921	1.00
Anthracene	U		0.0804	1.00
Benzidine	U		3.74	10.0
Benzo(a)anthracene	U		0.199	1.00
Benzo(b)fluoranthene	U		0.130	1.00
Benzo(k)fluoranthene	U		0.120	1.00
Benzo(g,h,i)perylene	U		0.121	1.00
Benzo(a)pyrene	U		0.0381	1.00
Bis(2-chlorethoxy)methane	U		0.116	10.0
Bis(2-chloroethyl)ether	U		0.137	10.0
2,2-Oxybis(1-Chloropropane)	U		0.210	10.0
4-Bromophenyl-phenylether	U		0.0877	10.0
2-Chloronaphthalene	U		0.0648	1.00
4-Chlorophenyl-phenylether	U		0.0926	10.0
Chrysene	U		0.130	1.00
Dibenz(a,h)anthracene	U		0.0644	1.00
3,3-Dichlorobenzidine	U		0.212	10.0
2,4-Dinitrotoluene	U		0.0983	10.0
2,6-Dinitrotoluene	U		0.250	10.0
Fluoranthene	U		0.102	1.00
Fluorene	U		0.0844	1.00
Hexachlorobenzene	U		0.0755	1.00
Hexachloro-1,3-butadiene	U		0.0968	10.0
Hexachlorocyclopentadiene	U		0.0598	10.0
Hexachloroethane	U		0.127	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.143	10.0
Naphthalene	U		0.159	1.00
Nitrobenzene	U		0.297	10.0
n-Nitrosodimethylamine	U		0.998	10.0
n-Nitrosodiphenylamine	U		2.37	10.0
n-Nitrosodi-n-propylamine	U		0.261	10.0
Phenanthrene	U		0.112	1.00
Benzylbutyl phthalate	U		0.765	3.00
Bis(2-Ethylhexyl)phthalate	U		0.895	3.00
Di-n-butyl phthalate	U		0.453	3.00
Diethyl phthalate	U		0.287	3.00
Dimethyl phthalate	U		0.260	3.00
Di-n-octyl phthalate	U		0.932	3.00

Method Blank (MB)

(MB) R4124011-3 09/23/24 10:53

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyrene	U		0.107	1.00
1,2,4-Trichlorobenzene	U		0.0698	10.0
Aniline	U		1.65	10.0
1,2-Diphenylhydrazine	U	N2	0.105	10.0
Benzyl alcohol	U		0.563	10.0
4-Chloroaniline	U		0.234	10.0
4-Chloro-3-methylphenol	U		0.131	10.0
2-Chlorophenol	U		0.133	10.0
Dibenzofuran	U		0.0970	10.0
2,4-Dichlorophenol	U		0.102	10.0
2,4-Dimethylphenol	U		0.0636	10.0
4,6-Dinitro-2-methylphenol	U		1.12	10.0
2,4-Dinitrophenol	U		5.93	10.0
2-Methylnaphthalene	U		0.117	1.00
2-Methylphenol	U		0.0929	10.0
3&4-Methyl Phenol	U		0.168	10.0
2-Nitroaniline	U		0.102	10.0
3-Nitroaniline	U		0.0869	10.0
4-Nitroaniline	U		0.0910	10.0
2-Nitrophenol	U		0.117	10.0
4-Nitrophenol	U		0.143	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		4.33	10.0
Pyridine	U		0.627	10.0
2,4,6-Trichlorophenol	U		0.100	10.0
Acetophenone	U		0.208	10.0
Diphenylamine	U		2.37	10.0
1,2,4,5-Tetrachlorobenzene	U		0.0647	10.0
2,3,4,6-Tetrachlorophenol	U		0.231	10.0
2,4,5-Trichlorophenol	U		0.109	10.0
(S) 2-Fluorophenol	*33.5*			*10.0-120*
(S) Phenol-d5	*25.3*			*10.0-120*
(S) Nitrobenzene-d5	*60.9*			*10.0-127*
(S) 2-Fluorobiphenyl	*73.5*			*10.0-130*
(S) 2,4,6-Tribromophenol	*91.5*			*10.0-155*
(S) p-Terphenyl-d14	*91.2*			*10.0-128*

Method Blank (MB)

(MB) R4126472-2 09/27/24 10:33

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
2-Acetylaminofluorene	U		0.253	10.0
4-Aminobiphenyl	U		0.461	10.0
Chlorobenzilate	U		3.84	50.0
Diallate	U		0.524	10.0
2,6-Dichlorophenol	U		0.102	10.0
Dimethoate	U		5.05	50.0
P-(Dimethylamino) Azobenzene	U		3.69	10.0
Dimethylbenz (A) Anthracene	U		1.71	10.0
3,3-Dimethylbenzidine	U		3.39	10.0
a,a-Dimethylphenethylamine	U		3.13	50.0
1,3-Dinitrobenzene	U		0.359	10.0
Diphenylamine	U		2.37	10.0
Dinoseb	U		8.01	50.0
Disulfoton	U		0.267	10.0
Ethyl methanesulfonate	U		0.326	10.0
Ethyl Parathion	U		0.379	10.0
Famphur	U		3.92	20.0
Hexachloropropene	U		0.149	50.0
Hexachlorophene	U		1.44	50.0
Isodrin	U		4.11	10.0
Isosafrole	U		3.88	10.0
Kepone	U		2.66	20.0
Methapyrilene	U		10.0	50.0
3-Methylcholanthrene	U		0.164	10.0
Methyl methanesulfonate	U		3.40	50.0
Methyl parathion	U		0.213	10.0
1,4-Naphthoquinone	U		5.56	50.0
1-Naphthylamine	U		0.289	10.0
2-Naphthylamine	U		4.48	10.0
5-Nitro-o-toluidine	U		1.99	10.0
4-Nitroquinoline 1-oxide	U		2.03	10.0
n-Nitrosodiethylamine	U		3.57	10.0
n-Nitrosodi-n-butylamine	U		3.91	10.0
n-Nitrosomethylethylamine	U		3.25	10.0
n-Nitrosomorpholine	U		3.25	10.0
n-Nitrosopiperidine	U		3.72	10.0
n-Nitrosopyrrolidine	U		3.39	10.0
Pentachlorobenzene	U		4.15	10.0
Pentachloroethane	U		2.83	50.0
Pentachloronitrobenzene	U		4.15	10.0

Method Blank (MB)

(MB) R4126472-2 09/27/24 10:33

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Phenacetin	U		4.66	10.0
p-Phenylenediamine	U		387	6900
Phorate	U		4.86	50.0
2-Picoline	U		6.83	50.0
Pronamide	U		4.21	10.0
Safrole	U		3.68	10.0
Sulfotep	U		3.99	50.0
Thionazin	U		4.07	10.0
o-Toluidine	U		3.53	10.0
O,O,O-Triethyl Phosphorothioate	U		2.93	10.0
1,3,5-Trinitrobenzene	U		1.32	10.0

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

(LCS) R4124011-1 09/23/24 10:09 • (LCSD) R4124011-2 09/23/24 10:31

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	37.7	34.1	75.4	68.2	41.0-120			10.0	22
Acenaphthylene	50.0	37.3	34.3	74.6	68.6	43.0-120			8.38	22
Anthracene	50.0	40.8	35.1	81.6	70.2	45.0-120			15.0	20
Benzidine	100	0.922	1.45	0.922	1.45	10.0-120	J J4	J J3 J4	44.5	36
Benzo(a)anthracene	50.0	44.6	39.0	89.2	78.0	47.0-120			13.4	20
Benzo(b)fluoranthene	50.0	44.1	39.9	88.2	79.8	46.0-120			10.0	20
Benzo(k)fluoranthene	50.0	42.4	38.7	84.8	77.4	46.0-120			9.12	21
Benzo(g,h,i)perylene	50.0	40.5	35.9	81.0	71.8	48.0-121			12.0	20
Benzo(a)pyrene	50.0	44.5	40.1	89.0	80.2	47.0-120			10.4	20
Bis(2-chlorethoxy)methane	50.0	34.0	32.3	68.0	64.6	33.0-120			5.13	24
Bis(2-chloroethyl)ether	50.0	35.9	34.1	71.8	68.2	23.0-120			5.14	33
2,2-Oxybis(1-Chloropropane)	50.0	34.1	32.3	68.2	64.6	28.0-120			5.42	31
4-Bromophenyl-phenylether	50.0	47.3	41.7	94.6	83.4	45.0-120			12.6	20
2-Chloronaphthalene	50.0	36.4	33.3	72.8	66.6	37.0-120			8.90	25
4-Chlorophenyl-phenylether	50.0	41.1	36.2	82.2	72.4	44.0-120			12.7	20
Chrysene	50.0	42.9	38.3	85.8	76.6	48.0-120			11.3	20
Dibenz(a,h)anthracene	50.0	45.8	40.7	91.6	81.4	47.0-120			11.8	20
3,3-Dichlorobenzidine	100	76.8	74.0	76.8	74.0	44.0-120			3.71	20
2,4-Dinitrotoluene	50.0	48.4	43.7	96.8	87.4	49.0-124			10.2	20
2,6-Dinitrotoluene	50.0	45.9	41.3	91.8	82.6	46.0-120			10.6	21
Fluoranthene	50.0	44.3	36.9	88.6	73.8	51.0-120			18.2	20
Fluorene	50.0	38.9	34.0	77.8	68.0	47.0-120			13.4	20

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

(LCS) R4124011-1 09/23/24 10:09 • (LCSD) R4124011-2 09/23/24 10:31

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hexachlorobenzene	50.0	47.3	43.2	94.6	86.4	44.0-120			9.06	20
Hexachloro-1,3-butadiene	50.0	35.1	28.3	70.2	56.6	19.0-120			21.5	32
Hexachlorocyclopentadiene	50.0	22.2	19.2	44.4	38.4	15.0-120			14.5	31
Hexachloroethane	50.0	32.5	26.2	65.0	52.4	15.0-120			21.5	37
Indeno(1,2,3-cd)pyrene	50.0	42.4	37.7	84.8	75.4	49.0-122			11.7	20
Isophorone	50.0	33.2	31.7	66.4	63.4	36.0-120			4.62	23
Naphthalene	50.0	31.3	29.0	62.6	58.0	27.0-120			7.63	27
Nitrobenzene	50.0	32.8	31.1	65.6	62.2	27.0-120			5.32	29
n-Nitrosodimethylamine	50.0	19.1	15.9	38.2	31.8	10.0-120			18.3	40
n-Nitrosodiphenylamine	50.0	43.1	37.9	86.2	75.8	47.0-120			12.8	20
n-Nitrosodi-n-propylamine	50.0	35.2	34.5	70.4	69.0	31.0-120			2.01	28
Phenanthrene	50.0	41.5	35.3	83.0	70.6	46.0-120			16.1	20
Benzylbutyl phthalate	50.0	44.8	37.2	89.6	74.4	43.0-121			18.5	20
Bis(2-Ethylhexyl)phthalate	50.0	39.7	36.0	79.4	72.0	43.0-122			9.78	20
Di-n-butyl phthalate	50.0	43.7	35.3	87.4	70.6	49.0-121		J3	21.3	20
Diethyl phthalate	50.0	42.3	35.8	84.6	71.6	48.0-122			16.6	20
Dimethyl phthalate	50.0	42.4	38.6	84.8	77.2	48.0-120			9.38	20
Di-n-octyl phthalate	50.0	42.2	37.5	84.4	75.0	42.0-125			11.8	20
Pyrene	50.0	42.9	36.6	85.8	73.2	47.0-120			15.8	20
1,2,4-Trichlorobenzene	50.0	33.1	29.0	66.2	58.0	24.0-120			13.2	29
Aniline	50.0	6.30	7.80	12.6	15.6	13.0-120	J J4	J	21.3	31
1,2-Diphenylhydrazine	50.0	36.9	31.7	73.8	63.4	41.0-126	N2	N2	15.2	20
Benzyl alcohol	50.0	29.8	26.4	59.6	52.8	25.0-120			12.1	26
4-Chloroaniline	50.0	18.4	18.6	36.8	37.2	25.0-120			1.08	25
4-Chloro-3-methylphenol	50.0	32.2	31.4	64.4	62.8	40.0-120			2.52	21
2-Chlorophenol	50.0	28.5	27.1	57.0	54.2	25.0-120			5.04	35
Dibenzofuran	50.0	39.3	35.1	78.6	70.2	44.0-120			11.3	22
2,4-Dichlorophenol	50.0	33.2	32.0	66.4	64.0	36.0-120			3.68	26
2,4-Dimethylphenol	50.0	28.3	29.6	56.6	59.2	33.0-120			4.49	26
4,6-Dinitro-2-methylphenol	50.0	55.6	50.3	111	101	38.0-138			10.0	25
2,4-Dinitrophenol	50.0	50.4	46.5	101	93.0	10.0-120			8.05	39
2-Methylnaphthalene	50.0	35.5	32.2	71.0	64.4	33.0-120			9.75	25
2-Methylphenol	50.0	26.4	25.3	52.8	50.6	28.0-120			4.26	29
3&4-Methyl Phenol	50.0	27.8	26.9	55.6	53.8	31.0-120			3.29	30
2-Nitroaniline	50.0	46.5	43.9	93.0	87.8	43.0-120			5.75	22
3-Nitroaniline	50.0	36.0	34.5	72.0	69.0	38.0-120			4.26	21
4-Nitroaniline	50.0	39.6	36.6	79.2	73.2	18.0-160			7.87	21
2-Nitrophenol	50.0	39.4	37.7	78.8	75.4	31.0-120			4.41	29
4-Nitrophenol	50.0	18.6	16.4	37.2	32.8	10.0-120			12.6	33
Pentachlorophenol	50.0	46.8	38.4	93.6	76.8	23.0-120			19.7	25

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

(LCS) R4124011-1 09/23/24 10:09 • (LCSD) R4124011-2 09/23/24 10:31

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Phenol	50.0	16.1	14.4	32.2	28.8	10.0-120			11.1	36
Pyridine	50.0	2.32	4.37	4.64	8.74	10.0-120	J J4	J J3 J4	61.3	38
2,4,6-Trichlorophenol	50.0	41.3	38.9	82.6	77.8	42.0-120			5.99	23
Acetophenone	50.0	33.9	32.6	67.8	65.2	29.0-120			3.91	28
Diphenylamine	50.0	43.1	37.9	86.2	75.8	35.0-120			12.8	20
1,2,4,5-Tetrachlorobenzene	50.0	39.4	35.0	78.8	70.0	31.0-121			11.8	27
2,3,4,6-Tetrachlorophenol	50.0	50.7	45.8	101	91.6	42.0-132			10.2	22
2,4,5-Trichlorophenol	50.0	43.7	40.8	87.4	81.6	44.0-120			6.86	22
(S) 2-Fluorophenol				*39.4*	*35.4*	*10.0-120*				
(S) Phenol-d5				*29.3*	*26.6*	*10.0-120*				
(S) Nitrobenzene-d5				*54.5*	*51.4*	*10.0-127*				
(S) 2-Fluorobiphenyl				*74.0*	*65.9*	*10.0-130*				
(S) 2,4,6-Tribromophenol				*106*	*94.0*	*10.0-155*				
(S) p-Terphenyl-d14				*85.6*	*76.3*	*10.0-128*				

Laboratory Control Sample (LCS)

(LCS) R4126472-1 09/27/24 10:12

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
2-Acetylaminofluorene	50.0	52.0	104	32.0-120	
4-Aminobiphenyl	50.0	34.4	68.8	20.0-120	
Chlorobenzilate	50.0	53.9	108	29.0-128	
Diallate	50.0	43.3	86.6	30.0-120	
2,6-Dichlorophenol	50.0	31.7	63.4	19.0-136	
Dimethoate	50.0	40.2	80.4	11.0-134	J
P-(Dimethylamino) Azobenzene	50.0	52.2	104	27.0-120	
Dimethylbenz (A) Anthracene	50.0	42.5	85.0	14.0-124	
3,3-Dimethylbenzidine	50.0	10.3	20.6	13.0-120	
a,a-Dimethylphenethylamine	50.0	0.0186	0.0372	10.0-129	J J4
1,3-Dinitrobenzene	50.0	44.7	89.4	34.0-120	
Diphenylamine	50.0	43.5	87.0	35.0-120	
Dinoseb	50.0	42.8	85.6	39.0-120	J
Disulfoton	50.0	46.9	93.8	32.0-120	
Ethyl methanesulfonate	50.0	31.6	63.2	10.0-120	
Ethyl Parathion	50.0	55.9	112	46.0-130	
Famphur	50.0	52.0	104	32.0-120	
Hexachloropropene	50.0	20.7	41.4	10.0-120	J
Hexachlorophene	100	0.000	0.000	10.0-120	J4

Laboratory Control Sample (LCS)

(LCS) R4126472-1 09/27/24 10:12

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Isodrin	50.0	43.2	86.4	22.0-157	
Isosafrole	50.0	37.9	75.8	25.0-133	
Kepone	50.0	29.6	59.2	10.0-120	
Methapyrilene	50.0	4.44	8.88	10.0-120	J J4
3-Methylcholanthrene	50.0	55.6	111	30.0-160	
Methyl methanesulfonate	50.0	23.8	47.6	10.0-120	J
Methyl parathion	50.0	54.9	110	42.0-120	
1,4-Naphthoquinone	50.0	2.74	5.48	50.0-150	J J4
1-Naphthylamine	50.0	31.2	62.4	19.0-120	
2-Naphthylamine	50.0	18.4	36.8	10.0-120	
5-Nitro-o-toluidine	50.0	48.0	96.0	34.0-120	
4-Nitroquinoline 1-oxide	50.0	19.5	39.0	10.0-159	
n-Nitrosodiethylamine	50.0	34.1	68.2	10.0-120	
n-Nitrosodi-n-butylamine	50.0	42.5	85.0	13.0-143	
n-Nitrosomethylethylamine	50.0	28.9	57.8	10.0-120	
n-Nitrosomorpholine	50.0	32.6	65.2	10.0-120	
n-Nitrosopiperidine	50.0	44.9	89.8	10.0-160	
n-Nitrosopyrrolidine	50.0	33.6	67.2	10.0-124	
Pentachlorobenzene	50.0	35.9	71.8	25.0-120	
Pentachloroethane	50.0	29.5	59.0	10.0-120	J
Pentachloronitrobenzene	50.0	43.7	87.4	34.0-132	
Phenacetin	50.0	42.8	85.6	34.0-127	
p-Phenylenediamine	50.0	0.000	0.000	50.0-150	J4
Phorate	50.0	65.3	131	13.0-160	
2-Picoline	50.0	4.25	8.50	10.0-120	J J4
Pronamide	50.0	47.0	94.0	38.0-130	
Safrole	50.0	35.1	70.2	21.0-120	
Sulfotep	50.0	46.1	92.2	52.0-120	J
Thionazin	50.0	50.4	101	38.0-121	
o-Toluidine	50.0	23.1	46.2	10.0-120	
O,O,O-Triethyl Phosphorothioate	50.0	34.6	69.2	11.0-135	
1,3,5-Trinitrobenzene	50.0	59.9	120	37.0-147	

Guide to Reading and Understanding Your Laboratory Report

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

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
C6	The initial calibration verification standard (SSCV) associated with this data responded low.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
N2	Analyte reported using a calibration and validation based on Azobenzene (CAS 103-33-3). 1,2-Diphenylhydrazine decomposes into Azobenzene during the analysis.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Ramboll US Consulting, Inc. - Denver
1999 Broadway Suite 2225
Denver, CO 80202

Billing Information:
Troy Wyss
PO Box 4229
Indianapolis, IN 46242

Report to:
Abby Small

Email To:
asmall@ramboll.com;rdeshpande@ramboll.com

Project Description:
CMR Great Falls - 2023 RFI Soil Sampling

City/State Collected: Great Falls MT

Please Circle: PT MT CT ET

Phone: **303-382-5474**

Client Project #

Lab Project #
ENVIRONCO-CALUMET GW

Collected by (print): Kyle Graves

Site/Facility ID #
GREAT FALLS, MT

P.O. #

Collected by (signature):

Immediately Packed on Ice N ____ Y ✓

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1774684
Table # G117
Acctnum: **ENVIRONCO**
Template: **T259364**
Prelogin: **P1097884**
PM: **841 - Kelly Mercer**
PB: 8-30-24
Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270AP9 100ml Amb NoPres	SVEPHMT 1L-Amb-Add HCl	V8260LL 40mlAmb-HCl	VPHMT 40mlAmb HCl						Remarks	Sample # (lab only)
CMR-MW-415-240912	grab	GW	-	9/12/24	1007	10	✓	✓	✓	✓							-01
CMR-MW-106-240912	grab	GW	-	9/12/24	1054	10	✓	✓	✓	✓							-02
CMR-MW-105-240912	grab	GW	-	9/12/24	1327	10	✓	✓	✓	✓							-03
		GW															

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 4041 0479 0138

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓ Y __N
COC Signed/Accurate: ✓ Y __N
Bottles arrive intact: ✓ Y __N
Correct bottles used: ✓ Y __N
Sufficient volume sent: ✓ Y __N
If Applicable
VOA Zero Headspace: ✓ Y __N
Preservation Correct/Checked: ✓ Y __N
RAD Screen <0.5 mR/hr: ✓ Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
[signature]	9/12/24	1445		1
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
				TH9 0.1+0.3=0.4 30
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:
			[signature]	09/13/2024 0900

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

APPENDIX C

HISTORICAL ANALYTICAL RESULTS AND CONTAMINANT MASS REMOVAL - VAPOR

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-211015		CMR-SP301-211016		CMR-SP301-211017	
	Sample Date	10/15/2021		10/16/2021		10/17/2021	
	Blower Flow (scfm)	41		41		41	
	Period Operational Time (hrs)	26		24		24	
	Notes						
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**
1,1,1-Trichloroethane	71-55-6	18,100 U	0.00	18,600 U	0.00	19,600 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	22,800 U	0.00	23,400 U	0.00	24,700 U	0.00
1,1,2-Trichloroethane	79-00-5	9,040 U	0.00	9,290 U	0.00	9,800 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	25,400 U	0.00	26,100 U	0.00	27,600 U	0.00
1,1-Dichloroethane	75-34-3	13,400 U	0.00	13,800 U	0.00	14,500 U	0.00
1,1-Dichloroethene	75-35-4	13,100 U	0.00	13,500 U	0.00	14,200 U	0.00
1,2,4-Trichlorobenzene	120-82-1	123,000 U	0.00	126,000 U	0.00	133,000 U	0.00
1,2,4-Trimethylbenzene	95-63-6	340,000	1.36	471,000	1.73	562,000	2.07
1,2-Dibromoethane (EDB)	106-93-4	12,700 U	0.00	13,100 U	0.00	13,800 U	0.00
1,2-Dichlorobenzene	95-50-1	49,800 U	0.00	51,200 U	0.00	54,100 U	0.00
1,2-Dichloroethane	107-06-2	13,400 U	0.00	13,800 U	0.00	14,500 U	0.00
1,2-Dichloropropane	78-87-5	15,300 U	0.00	15,700 U	0.00	16,600 U	0.00
1,3,5-Trimethylbenzene	108-67-8	179,000	0.71	225,000	0.83	272,000	1.00
1,3-Butadiene	106-99-0	7,330 U	0.00	7,530 U	0.00	7,950 U	0.00
1,3-Dichlorobenzene	541-73-1	49,800 U	0.00	51,200 U	0.00	54,100 U	0.00
1,4-Dichlorobenzene	106-46-7	49,800 U	0.00	51,200 U	0.00	54,100 U	0.00
2-Butanone (MEK)	78-93-3	48,800 U	0.00	50,200 U	0.00	53,000 U	0.00
2-Hexanone	591-78-6	67,700 U	0.00	69,600 U	0.00	73,500 U	0.00
2-Propanol	67-63-0	40,700 U	0.00	41,900 U	0.00	44,200 U	0.00
4-Ethyltoluene	622-96-8	171,000	0.68	222,000	0.82	257,000	0.95
4-Methyl-2-pentanone (MIBK)	108-10-1	88,300	0.35	81,400	0.30	84,900	0.31
Acetone	67-64-1	98,300 U	0.00	101,000 U	0.00	107,000 U	0.00
Benzene	71-43-2	2,850,000 E	11.36	2,430,000 E	8.94	2,640,000 E	9.71
Benzyl chloride	100-44-7	42,800 U	0.00	44,000 U	0.00	46,500 U	0.00
Bromodichloromethane	75-27-4	22,100 U	0.00	22,800 U	0.00	24,000 U	0.00
Bromoform	75-25-2	85,500 U	0.00	87,900 U	0.00	92,700 U	0.00
Bromomethane	74-83-9	12,800 U	0.00	13,200 U	0.00	13,900 U	0.00
Carbon disulfide	75-15-0	10,300 U	0.00	10,600 U	0.00	11,200 U	0.00
Carbon tetrachloride	56-23-5	20,800 U	0.00	21,400 U	0.00	22,600 U	0.00
Chlorobenzene	108-90-7	15,200 U	0.00	15,700 U	0.00	16,500 U	0.00
Chloroethane	75-00-3	8,730 U	0.00	8,970 U	0.00	9,470 U	0.00
Chloroform	67-66-3	8,080 U	0.00	8,300 U	0.00	8,760 U	0.00
Chloromethane	74-87-3	6,840 U	0.00	7,030 U	0.00	7,420 U	0.00
cis-1,2-Dichloroethene	156-59-2	13,100 U	0.00	13,500 U	0.00	14,200 U	0.00
cis-1,3-Dichloropropene	10061-01-5	37,600 U	0.00	38,700 U	0.00	40,800 U	0.00
Cyclohexane	110-82-7	28,500 U	0.00	29,300 U	0.00	30,900 U	0.00
Dibromochloromethane	124-48-1	28,200 U	0.00	29,000 U	0.00	30,600 U	0.00
Dichlorodifluoromethane	75-71-8	16,400 U	0.00	16,900 U	0.00	17,800 U	0.00
Dichlorotetrafluoroethane	76-14-2	23,100 U	0.00	23,800 U	0.00	25,100 U	0.00
Ethanol	64-17-5	31,300 U	0.00	32,100 U	0.00	33,900 U	0.00
Ethyl acetate	141-78-6	11,900 U	0.00	12,300 U	0.00	12,900 U	0.00
Ethylbenzene	100-41-4	1,200,000	4.78	1,360,000	5.00	1,380,000	5.08
Hexachloro-1,3-butadiene	87-68-3	88,200 U	0.00	90,700 U	0.00	95,700 U	0.00
m&p-Xylene	179601-23-1	4,030,000	16.06	5,010,000	18.43	5,310,000	19.54
Methylene Chloride	75-09-2	57,500 U	0.00	59,100 U	0.00	62,400 U	0.00
Methyl-tert-butyl ether	1634-04-4	59,600 U	0.00	61,300 U	0.00	64,700 U	0.00
Naphthalene	91-20-3	43,300 U	0.00	44,500 U	0.00	47,000 U	0.00
n-Heptane	142-82-5	3,330,000 E	13.27	3,060,000 E	11.26	3,340,000 E	12.29
n-Hexane	110-54-3	7,840,000 E	31.25	7,320,000 E	26.93	7,900,000 E	29.07
o-Xylene	95-47-6	916,000	3.65	1,210,000	4.45	1,320,000	4.86
Propylene	115-07-1	14,200 U	0.00	14,600 U	0.00	15,500 U	0.00
Styrene	100-42-5	14,100 U	0.00	14,500 U	0.00	15,300 U	0.00
Tetrachloroethene	127-18-4	11,200 U	0.00	11,500 U	0.00	12,200 U	0.00
Tetrahydrofuran	109-99-9	9,770 U	0.00	10,000 U	0.00	10,600 U	0.00
Toluene	108-88-3	1,490,000	5.94	1,860,000	6.84	1,870,000	6.88
trans-1,2-Dichloroethene	156-60-5	13,100 U	0.00	13,500 U	0.00	14,200 U	0.00
trans-1,3-Dichloropropene	10061-02-6	37,600 U	0.00	38,700 U	0.00	40,800 U	0.00
Trichloroethene	79-01-6	17,800 U	0.00	18,300 U	0.00	19,300 U	0.00
Trichlorofluoromethane	75-69-4	18,600 U	0.00	19,100 U	0.00	20,100 U	0.00
Vinyl acetate	108-05-4	11,700 U	0.00	12,000 U	0.00	12,600 U	0.00
Vinyl chloride	75-01-4	4,230 U	0.00	4,350 U	0.00	4,590 U	0.00
Total VOCs	--	--	89.42	--	85.54	--	91.74
Period Total VOC Mass Removed (lbs)		**89.4**		**85.5**		**91.7**	
Cumulative Total VOC Mass Removed (lbs)		**89**		**175**		**267**	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-2		CMR-SP301-211201		CMR-SP301-211208	
	Sample Date	11/19/2021		12/1/2021		12/8/2021	
	Blower Flow (scfm)	41		56		65	
	Period Operational Time (hrs)	--		283		144	
	Notes						
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**
1,1,1-Trichloroethane	71-55-6	158 R	0.00	9,290 U	0.00	9,800 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	199 R	0.00	11,700 U	0.00	12,400 U	0.00
1,1,2-Trichloroethane	79-00-5	79 R	0.00	4,650 U	0.00	4,900 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	222 R	0.00	13,100 U	0.00	13,800 U	0.00
1,1-Dichloroethane	75-34-3	117 R	0.00	6,890 U	0.00	7,270 U	0.00
1,1-Dichloroethene	75-35-4	115 R	0.00	6,750 U	0.00	7,120 U	0.00
1,2,4-Trichlorobenzene	120-82-1	1,070 R	0.00	63,100 U	0.00	66,600 U	0.00
1,2,4-Trimethylbenzene	95-63-6	7,720 R	0.00	49,600	2.95	50,300	1.76
1,2-Dibromoethane (EDB)	106-93-4	111 R	0.00	6,540 U	0.00	6,900 U	0.00
1,2-Dichlorobenzene	95-50-1	435 R	0.00	25,600 U	0.00	27,000 U	0.00
1,2-Dichloroethane	107-06-2	117 R	0.00	6,890 U	0.00	7,270 U	0.00
1,2-Dichloropropane	78-87-5	134 R	0.00	7,860 U	0.00	8,290 U	0.00
1,3,5-Trimethylbenzene	108-67-8	3,310 R	0.00	27,100	1.61	27,900	0.98
1,3-Butadiene	106-99-0	64 R	0.00	3,770 U	0.00	3,970 U	0.00
1,3-Dichlorobenzene	541-73-1	435 R	0.00	25,600 U	0.00	27,000 U	0.00
1,4-Dichlorobenzene	106-46-7	435 R	0.00	25,600 U	0.00	27,000 U	0.00
2-Butanone (MEK)	78-93-3	427 R	0.00	25,100 U	0.00	26,500 U	0.00
2-Hexanone	591-78-6	592 R	0.00	34,800 U	0.00	36,700 U	0.00
2-Propanol	67-63-0	356 R	0.00	20,900 U	0.00	22,100 U	0.00
4-Ethyltoluene	622-96-8	1,180 R	0.00	26,600	1.58	26,700	0.93
4-Methyl-2-pentanone (MIBK)	108-10-1	592 R	0.00	34,800 U	0.00	36,700 U	0.00
Acetone	67-64-1	859 R	0.00	50,600 U	0.00	53,300 U	0.00
Benzene	71-43-2	51 R	0.00	135,000	8.04	94,100	3.29
Benzyl chloride	100-44-7	374 R	0.00	22,000 U	0.00	23,200 U	0.00
Bromodichloromethane	75-27-4	193 R	0.00	11,400 U	0.00	12,000 U	0.00
Bromoform	75-25-2	747 R	0.00	43,900 U	0.00	46,400 U	0.00
Bromomethane	74-83-9	112 R	0.00	6,600 U	0.00	6,970 U	0.00
Carbon disulfide	75-15-0	90 R	0.00	5,300 U	0.00	5,590 U	0.00
Carbon tetrachloride	56-23-5	182 R	0.00	10,700 U	0.00	11,300 U	0.00
Chlorobenzene	108-90-7	133 R	0.00	7,840 U	0.00	8,270 U	0.00
Chloroethane	75-00-3	76 R	0.00	11,200 U	0.00	11,800 U	0.00
Chloroform	67-66-3	71 R	0.00	4,150 U	0.00	4,380 U	0.00
Chloromethane	74-87-3	60 R	0.00	3,520 U	0.00	3,710 U	0.00
cis-1,2-Dichloroethene	156-59-2	115 R	0.00	6,750 U	0.00	7,120 U	0.00
cis-1,3-Dichloropropene	10061-01-5	328 R	0.00	19,300 U	0.00	20,400 U	0.00
Cyclohexane	110-82-7	3,940 R	0.00	945,000	56.27	687,000	24.03
Dibromochloromethane	124-48-1	246 R	0.00	14,500 U	0.00	15,300 U	0.00
Dichlorodifluoromethane	75-71-8	144 R	0.00	8,450 U	0.00	8,920 U	0.00
Dichlorotetrafluoroethane	76-14-2	202 R	0.00	11,900 U	0.00	12,500 U	0.00
Ethanol	64-17-5	273 R	0.00	16,100 U	0.00	17,000 U	0.00
Ethyl acetate	141-78-6	104 R	0.00	6,140 U	0.00	6,470 U	0.00
Ethylbenzene	100-41-4	1,520 R	0.00	104,000	6.19	80,800	2.83
Hexachloro-1,3-butadiene	87-68-3	771 R	0.00	45,400 U	0.00	47,900 U	0.00
m&p-Xylene	179601-23-1	7,210 R	0.00	475,000	28.28	401,000	14.02
Methylene Chloride	75-09-2	502 R	0.00	29,600 U	0.00	31,200 U	0.00
Methyl-tert-butyl ether	1634-04-4	520 R	0.00	30,600 U	0.00	32,300 U	0.00
Naphthalene	91-20-3	378 R	0.00	44,600 U	0.00	47,100 U	0.00
n-Heptane	142-82-5	847 R	0.00	280,000	16.67	197,000	6.89
n-Hexane	110-54-3	274 R	0.00	507,000	30.19	377,000	13.19
o-Xylene	95-47-6	4,140 R	0.00	113,000	6.73	98,400	3.44
Propylene	115-07-1	124 R	0.00	7,320 U	0.00	7,730 U	0.00
Styrene	100-42-5	308 R	0.00	7,250 U	0.00	7,650 U	0.00
Tetrachloroethene	127-18-4	98 R	0.00	5,770 U	0.00	6,090 U	0.00
Tetrahydrofuran	109-99-9	85 R	0.00	5,020 U	0.00	5,300 U	0.00
Toluene	108-88-3	352 R	0.00	117,000	6.97	80,500	2.82
trans-1,2-Dichloroethene	156-60-5	115 R	0.00	6,750 U	0.00	7,120 U	0.00
trans-1,3-Dichloropropene	10061-02-6	328 R	0.00	19,300 U	0.00	20,400 U	0.00
Trichloroethene	79-01-6	78 R	0.00	4,570 U	0.00	4,820 U	0.00
Trichlorofluoromethane	75-69-4	162 R	0.00	9,540 U	0.00	10,100 U	0.00
Vinyl acetate	108-05-4	102 R	0.00	5,990 U	0.00	6,320 U	0.00
Vinyl chloride	75-01-4	37 R	0.00	4,350 U	0.00	4,590 U	0.00
Total VOCs	--	--	0.00	--	165.48	--	74.17
Period Total VOC Mass Removed (lbs)		**0.0**		**165.5**		**74.2**	
Cumulative Total VOC Mass Removed (lbs)		**267**		**432**		**506**	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-211216		CMR-SP301-220216		CMR-SP301-110309	
	Sample Date	12/31/2021		2/16/2022		3/9/2022	
	Blower Flow (scfm)	61		66		70	
	Period Operational Time (hrs)	334		--		949	
	Notes						
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**
1,1,1-Trichloroethane	71-55-6	46,400 U	0.00	3 R	0.00	12,300 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	23,400 U	0.00	4 R	0.00	15,500 U	0.00
1,1,2-Trichloroethane	79-00-5	46,400 U	0.00	2 R	0.00	6,160 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	26,100 U	0.00	4 R	0.00	17,300 U	0.00
1,1-Dichloroethane	75-34-3	13,800 U	0.00	2 R	0.00	9,130 U	0.00
1,1-Dichloroethene	75-35-4	13,500 U	0.00	2 R	0.00	8,940 U	0.00
1,2,4-Trichlorobenzene	120-82-1	253,000 U	0.00	41 R	0.00	167,000 U	0.00
1,2,4-Trimethylbenzene	95-63-6	121,000	9.22	378 R	0.00	50,700	12.63
1,2-Dibromoethane (EDB)	106-93-4	26,200 U	0.00	2 R	0.00	8,670 U	0.00
1,2-Dichlorobenzene	95-50-1	51,200 U	0.00	8 R	0.00	34,000 U	0.00
1,2-Dichloroethane	107-06-2	13,800 U	0.00	2 R	0.00	9,130 U	0.00
1,2-Dichloropropane	78-87-5	39,300 U	0.00	3 R	0.00	10,400 U	0.00
1,3,5-Trimethylbenzene	108-67-8	75,900	5.79	218 R	0.00	43,300	10.79
1,3-Butadiene	106-99-0	7,530 U	0.00	1 R	0.00	4,990 U	0.00
1,3-Dichlorobenzene	541-73-1	51,200 U	0.00	8 R	0.00	34,000 U	0.00
1,4-Dichlorobenzene	106-46-7	102,000 U	0.00	8 R	0.00	34,000 U	0.00
2-Butanone (MEK)	78-93-3	50,200 U	0.00	16 R	0.00	33,300 U	0.00
2-Hexanone	591-78-6	69,600 U	0.00	11 R	0.00	46,200 U	0.00
2-Propanol	67-63-0	41,900 U	0.00	7 R	0.00	27,700 U	0.00
4-Ethyltoluene	622-96-8	51,900	3.96	41 R	0.00	32,200	8.02
4-Methyl-2-pentanone (MIBK)	108-10-1	69,600 U	0.00	11 R	0.00	46,200 U	0.00
Acetone	67-64-1	101,000 U	0.00	37 R	0.00	67,000 U	0.00
Benzene	71-43-2	150,000	11.44	4 R	0.00	195,000	48.57
Benzyl chloride	100-44-7	88,100 U	0.00	7 R	0.00	29,200 U	0.00
Bromodichloromethane	75-27-4	22,800 U	0.00	4 R	0.00	15,100 U	0.00
Bromoform	75-25-2	176,000 U	0.00	14 R	0.00	58,300 U	0.00
Bromomethane	74-83-9	13,200 U	0.00	2 R	0.00	8,760 U	0.00
Carbon disulfide	75-15-0	10,600 U	0.00	2 R	0.00	7,020 U	0.00
Carbon tetrachloride	56-23-5	21,400 U	0.00	4 R	0.00	14,200 U	0.00
Chlorobenzene	108-90-7	15,700 U	0.00	3 R	0.00	10,400 U	0.00
Chloroethane	75-00-3	8,970 U	0.00	2 R	0.00	5,950 U	0.00
Chloroform	67-66-3	8,300 U	0.00	1 R	0.00	5,500 U	0.00
Chloromethane	74-87-3	17,600 U	0.00	1 R	0.00	4,660 U	0.00
cis-1,2-Dichloroethene	156-59-2	13,500 U	0.00	2 R	0.00	8,940 U	0.00
cis-1,3-Dichloropropene	10061-01-5	38,700 U	0.00	6 R	0.00	25,600 U	0.00
Cyclohexane	110-82-7	29,300 U	0.00	5 R	0.00	19,400 U	0.00
Dibromochloromethane	124-48-1	29,000 U	0.00	5 R	0.00	19,200 U	0.00
Dichlorodifluoromethane	75-71-8	16,900 U	0.00	3 R	0.00	11,200 U	0.00
Dichlorotetrafluoroethane	76-14-2	23,800 U	0.00	4 R	0.00	15,800 U	0.00
Ethanol	64-17-5	32,100 U	0.00	8 R	0.00	21,300 U	0.00
Ethyl acetate	141-78-6	12,300 U	0.00	2 R	0.00	8,130 U	0.00
Ethylbenzene	100-41-4	151,000	11.51	29 R	0.00	256,000	63.76
Hexachloro-1,3-butadiene	87-68-3	90,700 U	0.00	15 R	0.00	60,100 U	0.00
m&p-Xylene	179601-23-1	783,000	59.70	186 R	0.00	1,010,000	251.57
Methylene Chloride	75-09-2	59,100 U	0.00	10 R	0.00	39,200 U	0.00
Methyl-tert-butyl ether	1634-04-4	61,300 U	0.00	10 R	0.00	40,600 U	0.00
Naphthalene	91-20-3	44,500 U	0.00	15 R	0.00	29,500 U	0.00
n-Heptane	142-82-5	336,000	25.62	19 R	0.00	441,000	109.84
n-Hexane	110-54-3	575,000	43.84	12 R	0.00	819,000	204.00
o-Xylene	95-47-6	236,000	17.99	148 R	0.00	263,000	65.51
Propylene	115-07-1	14,600 U	0.00	2 R	0.00	9,710 U	0.00
Styrene	100-42-5	14,500 U	0.00	6 R	0.00	9,610 U	0.00
Tetrachloroethene	127-18-4	11,500 U	0.00	2 R	0.00	7,650 U	0.00
Tetrahydrofuran	109-99-9	10,000 U	0.00	132 R	0.00	6,660 U	0.00
Toluene	108-88-3	140,000	10.67	13 R	0.00	210,000	52.31
trans-1,2-Dichloroethene	156-60-5	33,700 U	0.00	2 R	0.00	8,940 U	0.00
trans-1,3-Dichloropropene	10061-02-6	38,700 U	0.00	6 R	0.00	25,600 U	0.00
Trichloroethene	79-01-6	18,300 U	0.00	2 R	0.00	6,060 U	0.00
Trichlorofluoromethane	75-69-4	19,100 U	0.00	3 R	0.00	12,700 U	0.00
Vinyl acetate	108-05-4	12,000 U	0.00	2 R	0.00	7,950 U	0.00
Vinyl chloride	75-01-4	21,700 U	0.00	1 R	0.00	2,890 U	0.00
Total VOCs	--	--	199.73	--	0.00	--	826.99
Period Total VOC Mass Removed (lbs)		**199.7**		**0.0**		**827.0**	
Cumulative Total VOC Mass Removed (lbs)		**706**		**706**		**1,533**	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-2022411		CMR-SP301-220511		CMR-SP301-220617	
	Sample Date	4/11/2022		5/11/2022		6/17/2022	
	Blower Flow (scfm)	102		128		172	
	Period Operational Time (hrs)	632		742		517	
	Notes						
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**
1,1,1-Trichloroethane	71-55-6	1,680 U	0.00	6,520 U	0.00	13,000 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	2,120 U	0.00	8,230 U	0.00	16,500 U	0.00
1,1,2-Trichloroethane	79-00-5	842 U	0.00	3,260 U	0.00	6,520 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	2,370 U	0.00	9,170 U	0.00	18,300 U	0.00
1,1-Dichloroethane	75-34-3	1,250 U	0.00	4,840 U	0.00	9,670 U	0.00
1,1-Dichloroethene	75-35-4	1,220 U	0.00	4,740 U	0.00	9,470 U	0.00
1,2,4-Trichlorobenzene	120-82-1	11,400 U	0.00	44,300 U	0.00	88,600 U	0.00
1,2,4-Trimethylbenzene	95-63-6	2,310	0.56	9,770	3.48	68,600	22.79
1,2-Dibromoethane (EDB)	106-93-4	1,180 U	0.00	4,590 U	0.00	9,180 U	0.00
1,2-Dichlorobenzene	95-50-1	4,640 U	0.00	18,000 U	0.00	36,000 U	0.00
1,2-Dichloroethane	107-06-2	1,250 U	0.00	4,840 U	0.00	9,670 U	0.00
1,2-Dichloropropane	78-87-5	1,420 U	0.00	5,520 U	0.00	11,000 U	0.00
1,3,5-Trimethylbenzene	108-67-8	2,090	0.50	10,000	3.56	55,200	18.34
1,3-Butadiene	106-99-0	683 U	0.00	2,640 U	0.00	5,290 U	0.00
1,3-Dichlorobenzene	541-73-1	4,640 U	0.00	18,000 U	0.00	36,000 U	0.00
1,4-Dichlorobenzene	106-46-7	4,640 U	0.00	18,000 U	0.00	36,000 U	0.00
2-Butanone (MEK)	78-93-3	4,550 U	0.00	17,600 U	0.00	35,300 U	0.00
2-Hexanone	591-78-6	6,310 U	0.00	24,400 U	0.00	48,900 U	0.00
2-Propanol	67-63-0	3,790 U	0.00	14,700 U	0.00	29,400 U	0.00
4-Ethyltoluene	622-96-8	3,790 U	0.00	14,700 U	0.00	29,400 U	0.00
4-Methyl-2-pentanone (MIBK)	108-10-1	6,310 U	0.00	24,400 U	0.00	48,900 U	0.00
Acetone	67-64-1	9,160 U	0.00	35,500 U	0.00	71,000 U	0.00
Benzene	71-43-2	36,400	8.77	114,000	40.58	50,200	16.68
Benzyl chloride	100-44-7	3,990 U	0.00	15,500 U	0.00	30,900 U	0.00
Bromodichloromethane	75-27-4	2,060 U	0.00	7,990 U	0.00	16,000 U	0.00
Bromoform	75-25-2	7,960 U	0.00	30,800 U	0.00	61,700 U	0.00
Bromomethane	74-83-9	1,200 U	0.00	4,640 U	0.00	9,270 U	0.00
Carbon disulfide	75-15-0	960 U	0.00	3,720 U	0.00	7,440 U	0.00
Carbon tetrachloride	56-23-5	1,940 U	0.00	7,520 U	0.00	15,000 U	0.00
Chlorobenzene	108-90-7	1,420 U	0.00	5,500 U	0.00	11,000 U	0.00
Chloroethane	75-00-3	813 U	0.00	7,880 U	0.00	6,300 U	0.00
Chloroform	67-66-3	752 U	0.00	2,910 U	0.00	5,830 U	0.00
Chloromethane	74-87-3	637 U	0.00	2,470 U	0.00	4,940 U	0.00
cis-1,2-Dichloroethene	156-59-2	1,220 U	0.00	4,740 U	0.00	9,470 U	0.00
cis-1,3-Dichloropropene	10061-01-5	3,500 U	0.00	13,600 U	0.00	27,100 U	0.00
Cyclohexane	110-82-7	2,650 U	0.00	10,300 U	0.00	20,600 U	0.00
Dibromochloromethane	124-48-1	2,620 U	0.00	10,200 U	0.00	20,300 U	0.00
Dichlorodifluoromethane	75-71-8	1,530 U	0.00	5,930 U	0.00	11,900 U	0.00
Dichlorotetrafluoroethane	76-14-2	2,150 U	0.00	8,340 U	0.00	16,700 U	0.00
Ethanol	64-17-5	2,910 U	0.00	11,300 U	0.00	22,600 U	0.00
Ethyl acetate	141-78-6	1,110 U	0.00	4,310 U	0.00	8,610 U	0.00
Ethylbenzene	100-41-4	19,400	4.68	59,700	21.25	45,800	15.22
Hexachloro-1,3-butadiene	87-68-3	8,220 U	0.00	31,800 U	0.00	63,700 U	0.00
m&p-Xylene	179601-23-1	75,500	18.20	262,000	93.25	380,000	126.25
Methylene Chloride	75-09-2	5,350 U	0.00	20,700 U	0.00	41,500 U	0.00
Methyl-tert-butyl ether	1634-04-4	5,550 U	0.00	21,500 U	0.00	43,000 U	0.00
Naphthalene	91-20-3	4,030 U	0.00	15,600 U	0.00	31,300 U	0.00
n-Heptane	142-82-5	66,900	16.12	292,000	103.93	157,000	52.16
n-Hexane	110-54-3	190,000	45.79	587,000	208.93	300,000	99.67
o-Xylene	95-47-6	16,700	4.02	58,000	20.64	126,000	41.86
Propylene	115-07-1	1,330 U	0.00	5,140 U	0.00	10,300 U	0.00
Styrene	100-42-5	1,310 U	0.00	5,090 U	0.00	10,200 U	0.00
Tetrachloroethene	127-18-4	1,050 U	0.00	4,050 U	0.00	13,000	4.32
Tetrahydrofuran	109-99-9	910 U	0.00	3,530 U	0.00	7,050 U	0.00
Toluene	108-88-3	22,200	5.35	57,000	20.29	43,200	14.35
trans-1,2-Dichloroethene	156-60-5	1,220 U	0.00	4,740 U	0.00	9,470 U	0.00
trans-1,3-Dichloropropene	10061-02-6	3,500 U	0.00	13,600 U	0.00	27,100 U	0.00
Trichloroethene	79-01-6	828 U	0.00	3,210 U	0.00	6,420 U	0.00
Trichlorofluoromethane	75-69-4	1,730 U	0.00	6,700 U	0.00	13,400 U	0.00
Vinyl acetate	108-05-4	1,090 U	0.00	4,210 U	0.00	8,410 U	0.00
Vinyl chloride	75-01-4	394 U	0.00	3,060 U	0.00	3,060 U	0.00
Total VOCs	--	--	103.99	--	515.90	--	411.66
Period Total VOC Mass Removed (lbs)		**104.0**		**515.9**		**411.7**	
Cumulative Total VOC Mass Removed (lbs)		**1,637**		**2,153**		**2,565**	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-220727		CMR-SP301-083122		CMR-SP301-083122	
	Sample Date	7/27/2022		8/31/2022		9/30/2022[4]	
	Blower Flow (scfm)	155		37		76	
	Period Operational Time (hrs)	715		506		720	
	Notes						
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**
1,1,1-Trichloroethane	71-55-6	1,490 U	0.00	10,700 U	0.00	10,700 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	1,880 U	0.00	13,500 U	0.00	13,500 U	0.00
1,1,2-Trichloroethane	79-00-5	746 U	0.00	5,370 U	0.00	5,370 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	2,100 U	0.00	15,100 U	0.00	15,100 U	0.00
1,1-Dichloroethane	75-34-3	1,110 U	0.00	7,960 U	0.00	7,960 U	0.00
1,1-Dichloroethene	75-35-4	1,080 U	0.00	7,800 U	0.00	7,800 U	0.00
1,2,4-Trichlorobenzene	120-82-1	10,100 U	0.00	73,000 U	0.00	73,000 U	0.00
1,2,4-Trimethylbenzene	95-63-6	3,710	1.54	9,670 U	0.00	9,670 U	0.00
1,2-Dibromoethane (EDB)	106-93-4	1,050 U	0.00	7,560 U	0.00	7,560 U	0.00
1,2-Dichlorobenzene	95-50-1	4,110 U	0.00	29,600 U	0.00	29,600 U	0.00
1,2-Dichloroethane	107-06-2	1,110 U	0.00	7,960 U	0.00	7,960 U	0.00
1,2-Dichloropropane	78-87-5	1,260 U	0.00	9,090 U	0.00	9,090 U	0.00
1,3,5-Trimethylbenzene	108-67-8	2,610	1.08	10,100	0.71	10,100	2.08
1,3-Butadiene	106-99-0	605 U	0.00	4,350 U	0.00	4,350 U	0.00
1,3-Dichlorobenzene	541-73-1	4,110 U	0.00	29,600 U	0.00	29,600 U	0.00
1,4-Dichlorobenzene	106-46-7	4,110 U	0.00	29,600 U	0.00	29,600 U	0.00
2-Butanone (MEK)	78-93-3	4,030 U	0.00	29,000 U	0.00	29,000 U	0.00
2-Hexanone	591-78-6	5,590 U	0.00	40,300 U	0.00	40,300 U	0.00
2-Propanol	67-63-0	3,360 U	0.00	24,200 U	0.00	24,200 U	0.00
4-Ethyltoluene	622-96-8	3,360 U	0.00	24,200 U	0.00	24,200 U	0.00
4-Methyl-2-pentanone (MIBK)	108-10-1	5,590 U	0.00	40,300 U	0.00	40,300 U	0.00
Acetone	67-64-1	8,120 U	0.00	58,400 U	0.00	58,400 U	0.00
Benzene	71-43-2	3,710	1.54	42,900	3.02	42,900	8.84
Benzyl chloride	100-44-7	3,530 U	0.00	25,400 U	0.00	25,400 U	0.00
Bromodichloromethane	75-27-4	1,830 U	0.00	13,200 U	0.00	13,200 U	0.00
Bromoform	75-25-2	7,060 U	0.00	50,800 U	0.00	50,800 U	0.00
Bromomethane	74-83-9	1,060 U	0.00	7,630 U	0.00	7,630 U	0.00
Carbon disulfide	75-15-0	851 U	0.00	6,130 U	0.00	6,130 U	0.00
Carbon tetrachloride	56-23-5	1,720 U	0.00	12,400 U	0.00	12,400 U	0.00
Chlorobenzene	108-90-7	1,260 U	0.00	9,060 U	0.00	9,060 U	0.00
Chloroethane	75-00-3	720 U	0.00	5,190 U	0.00	5,190 U	0.00
Chloroform	67-66-3	667 U	0.00	4,800 U	0.00	4,800 U	0.00
Chloromethane	74-87-3	564 U	0.00	4,060 U	0.00	4,060 U	0.00
cis-1,2-Dichloroethene	156-59-2	1,080 U	0.00	7,800 U	0.00	7,800 U	0.00
cis-1,3-Dichloropropene	10061-01-5	3,100 U	0.00	22,400 U	0.00	22,400 U	0.00
Cyclohexane	110-82-7	2,350 U	0.00	16,900 U	0.00	16,900 U	0.00
Dibromochloromethane	124-48-1	2,330 U	0.00	16,700 U	0.00	16,700 U	0.00
Dichlorodifluoromethane	75-71-8	1,360 U	0.00	9,770 U	0.00	9,770 U	0.00
Dichlorotetrafluoroethane	76-14-2	1,910 U	0.00	13,700 U	0.00	13,700 U	0.00
Ethanol	64-17-5	2,580 U	0.00	18,600 U	0.00	18,600 U	0.00
Ethyl acetate	141-78-6	985 U	0.00	7,090 U	0.00	7,090 U	0.00
Ethylbenzene	100-41-4	4,890	2.03	24,000	1.69	24,000	4.94
Hexachloro-1,3-butadiene	87-68-3	7,280 U	0.00	52,400 U	0.00	52,400 U	0.00
m&p-Xylene	179601-23-1	27,600	11.44	161,000	11.33	161,000	33.17
Methylene Chloride	75-09-2	4,740 U	0.00	34,200 U	0.00	34,200 U	0.00
Methyl-tert-butyl ether	1634-04-4	4,920 U	0.00	35,400 U	0.00	35,400 U	0.00
Naphthalene	91-20-3	4,490	1.86	25,700 U	0.00	25,700 U	0.00
n-Heptane	142-82-5	12,200	5.06	122,000	8.58	122,000	25.14
n-Hexane	110-54-3	22,000	9.12	209,000	14.70	209,000	43.06
o-Xylene	95-47-6	9,100	3.77	31,500	2.22	31,500	6.49
Propylene	115-07-1	1,180 U	0.00	8,470 U	0.00	8,470 U	0.00
Styrene	100-42-5	1,160 U	0.00	8,380 U	0.00	8,380 U	0.00
Tetrachloroethene	127-18-4	926 U	0.00	6,670 U	0.00	6,670 U	0.00
Tetrahydrofuran	109-99-9	806 U	0.00	5,810 U	0.00	5,810 U	0.00
Toluene	108-88-3	7,740	3.21	7,410 U	0.00	7,410 U	0.00
trans-1,2-Dichloroethene	156-60-5	1,080 U	0.00	7,800 U	0.00	7,800 U	0.00
trans-1,3-Dichloropropene	10061-02-6	3,100 U	0.00	22,400 U	0.00	22,400 U	0.00
Trichloroethene	79-01-6	734 U	0.00	5,280 U	0.00	5,280 U	0.00
Trichlorofluoromethane	75-69-4	1,530 U	0.00	11,000 U	0.00	11,000 U	0.00
Vinyl acetate	108-05-4	2,400 U	0.00	17,300 U	0.00	17,300 U	0.00
Vinyl chloride	75-01-4	349 U	0.00	2,520 U	0.00	2,520 U	0.00
Total VOCs	--	--	40.64	--	42.25	--	123.72
Period Total VOC Mass Removed (lbs)		**40.6**		**42.2**		**123.7**	
Cumulative Total VOC Mass Removed (lbs)		**2,605**		**2,648**		**2,771**	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301		SP301
	Ramboll Sample ID	CMR-SP301-221214		CMR-SP301-221214		CMR-SP301-221214		CMR-DS3-221214
	Sample Date	10/31/2022		11/30/2022		12/14/2022		12/14/2022
	Blower Flow (scfm)	22		11		88		--
	Period Operational Time (hrs)	75		20		469		--
	Notes							Field Duplicate
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**
1,1,1-Trichloroethane	71-55-6	4,310 U	0.00	4,310 U	0.00	4,310 U	0.00	2,810 U
1,1,2,2-Tetrachloroethane	79-34-5	5,430 U	0.00	5,430 U	0.00	5,430 U	0.00	3,550 U
1,1,2-Trichloroethane	79-00-5	2,150 U	0.00	2,150 U	0.00	2,150 U	0.00	1,410 U
1,1,2-Trichlorotrifluoroethane	76-13-1	6,050 U	0.00	6,050 U	0.00	6,050 U	0.00	3,960 U
1,1-Dichloroethane	75-34-3	3,190 U	0.00	3,190 U	0.00	3,190 U	0.00	2,090 U
1,1-Dichloroethene	75-35-4	3,130 U	0.00	3,130 U	0.00	3,130 U	0.00	2,040 U
1,2,4-Trichlorobenzene	120-82-1	29,200 U	0.00	29,200 U	0.00	29,200 U	0.00	19,100 U
1,2,4-Trimethylbenzene	95-63-6	5,870	0.04	5,870	0.00	5,870	0.90	3,400
1,2-Dibromoethane (EDB)	106-93-4	3,030 U	0.00	3,030 U	0.00	3,030 U	0.00	1,980 U
1,2-Dichlorobenzene	95-50-1	11,900 U	0.00	11,900 U	0.00	11,900 U	0.00	7,760 U
1,2-Dichloroethane	107-06-2	3,190 U	0.00	3,190 U	0.00	3,190 U	0.00	2,090 U
1,2-Dichloropropane	78-87-5	3,640 U	0.00	3,640 U	0.00	3,640 U	0.00	2,380 U
1,3,5-Trimethylbenzene	108-67-8	5,060	0.03	5,060	0.00	5,060	0.78	3,240
1,3-Butadiene	106-99-0	1,750 U	0.00	1,750 U	0.00	1,750 U	0.00	1,140 U
1,3-Dichlorobenzene	541-73-1	11,900 U	0.00	11,900 U	0.00	11,900 U	0.00	7,760 U
1,4-Dichlorobenzene	106-46-7	11,900 U	0.00	11,900 U	0.00	11,900 U	0.00	7,760 U
2-Butanone (MEK)	78-93-3	11,600 U	0.00	11,600 U	0.00	11,600 U	0.00	7,610 U
2-Hexanone	591-78-6	16,100 U	0.00	16,100 U	0.00	16,100 U	0.00	10,500 U
2-Propanol	67-63-0	9,700 U	0.00	9,700 U	0.00	9,700 U	0.00	6,340 U
4-Ethyltoluene	622-96-8	9,700 U	0.00	9,700 U	0.00	9,700 U	0.00	6,340 U
4-Methyl-2-pentanone (MIBK)	108-10-1	16,100 U	0.00	16,100 U	0.00	16,100 U	0.00	10,500 U
Acetone	67-64-1	23,400 U	0.00	23,400 U	0.00	23,400 U	0.00	15,300 U
Benzene	71-43-2	59,900	0.37	59,900	0.05	59,900	9.21	49,100
Benzyl chloride	100-44-7	10,200 U	0.00	10,200 U	0.00	10,200 U	0.00	6,670 U
Bromodichloromethane	75-27-4	5,270 U	0.00	5,270 U	0.00	5,270 U	0.00	3,450 U
Bromoform	75-25-2	20,400 U	0.00	20,400 U	0.00	20,400 U	0.00	13,300 U
Bromomethane	74-83-9	3,060 U	0.00	3,060 U	0.00	3,060 U	0.00	2,000 U
Carbon disulfide	75-15-0	2,460 U	0.00	2,460 U	0.00	2,460 U	0.00	1,610 U
Carbon tetrachloride	56-23-5	4,960 U	0.00	4,960 U	0.00	4,960 U	0.00	3,250 U
Chlorobenzene	108-90-7	3,630 U	0.00	3,630 U	0.00	3,630 U	0.00	2,370 U
Chloroethane	75-00-3	2,080 U	0.00	2,080 U	0.00	2,080 U	0.00	1,360 U
Chloroform	67-66-3	1,920 U	0.00	1,920 U	0.00	1,920 U	0.00	1,260 U
Chloromethane	74-87-3	1,630 U	0.00	1,630 U	0.00	1,630 U	0.00	1,070 U
cis-1,2-Dichloroethene	156-59-2	3,130 U	0.00	3,130 U	0.00	3,130 U	0.00	2,040 U
cis-1,3-Dichloropropene	10061-01-5	8,960 U	0.00	8,960 U	0.00	8,960 U	0.00	5,860 U
Cyclohexane	110-82-7	6,790 U	0.00	6,790 U	0.00	6,790 U	0.00	4,440 U
Dibromochloromethane	124-48-1	6,710 U	0.00	6,710 U	0.00	6,710 U	0.00	4,390 U
Dichlorodifluoromethane	75-71-8	3,920 U	0.00	3,920 U	0.00	3,920 U	0.00	2,560 U
Dichlorotetrafluoroethane	76-14-2	5,510 U	0.00	5,510 U	0.00	5,510 U	0.00	3,600 U
Ethanol	64-17-5	7,450 U	0.00	7,450 U	0.00	7,450 U	0.00	4,870 U
Ethyl acetate	141-78-6	2,840 U	0.00	2,840 U	0.00	2,840 U	0.00	1,860 U
Ethylbenzene	100-41-4	25,000	0.16	25,000	0.02	25,000	3.85	22,400
Hexachloro-1,3-butadiene	87-68-3	21,000 U	0.00	21,000 U	0.00	21,000 U	0.00	13,700 U
m&p-Xylene	179601-23-1	83,500	0.52	83,500	0.07	83,500	12.84	73,500
Methylene Chloride	75-09-2	13,700 U	0.00	13,700 U	0.00	13,700 U	0.00	8,950 U
Methyl-tert-butyl ether	1634-04-4	14,200 U	0.00	14,200 U	0.00	14,200 U	0.00	9,280 U
Naphthalene	91-20-3	10,300 U	0.00	10,300 U	0.00	10,300 U	0.00	6,750 U
n-Heptane	142-82-5	138,000	0.86	138,000	0.11	138,000	21.23	115,000
n-Hexane	110-54-3	209,000	1.30	209,000	0.17	209,000	32.15	169,000
o-Xylene	95-47-6	15,000	0.09	15,000	0.01	15,000	2.31	13,400
Propylene	115-07-1	3,390 U	0.00	3,390 U	0.00	3,390 U	0.00	2,220 U
Styrene	100-42-5	3,360 U	0.00	3,360 U	0.00	3,360 U	0.00	2,200 U
Tetrachloroethene	127-18-4	2,670 U	0.00	2,670 U	0.00	2,670 U	0.00	1,750 U
Tetrahydrofuran	109-99-9	2,330 U	0.00	2,330 U	0.00	2,330 U	0.00	1,520 U
Toluene	108-88-3	3,580	0.02	3,580	0.00	3,580	0.55	3,140
trans-1,2-Dichloroethene	156-60-5	3,130 U	0.00	3,130 U	0.00	3,130 U	0.00	2,040 U
trans-1,3-Dichloropropene	10061-02-6	8,960 U	0.00	8,960 U	0.00	8,960 U	0.00	5,860 U
Trichloroethene	79-01-6	2,120 U	0.00	2,120 U	0.00	2,120 U	0.00	1,380 U
Trichlorofluoromethane	75-69-4	4,420 U	0.00	4,420 U	0.00	4,420 U	0.00	2,890 U
Vinyl acetate	108-05-4	2,780 U	0.00	2,780 U	0.00	2,780 U	0.00	1,820 U
Vinyl chloride	75-01-4	1,010 U	0.00	1,010 U	0.00	1,010 U	0.00	659 U
Total VOCs	--	--	3.40	--	0.45	--	83.81	--
Period Total VOC Mass Removed (lbs)		**3.4**		**0.4**		**83.8**		**--**
Cumulative Total VOC Mass Removed (lbs)		**2.775**		**2.775**		**2.859**		**--**

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-230130		CMR-SP301-230228		CMR-SP301-230321	
	Sample Date	1/30/2023		2/28/2023		3/21/2023	
	Blower Flow (scfm)	44		105		147	
	Period Operational Time (hrs)	703		534		734	
	Notes						
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**
1,1,1-Trichloroethane	71-55-6	78 U	0.00	1,340 U	0.00	1 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	99 U	0.00	1,690 U	0.00	1 U	0.00
1,1,2-Trichloroethane	79-00-5	39 U	0.00	671 U	0.00	1 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	110 U	0.00	1,890 U	0.00	2 U	0.00
1,1-Dichloroethane	75-34-3	58 U	0.00	996 U	0.00	1 U	0.00
1,1-Dichloroethene	75-35-4	57 U	0.00	975 U	0.00	1 U	0.00
1,2,4-Trichlorobenzene	120-82-1	532 U	0.00	9,120 U	0.00	5 U	0.00
1,2,4-Trimethylbenzene	95-63-6	114	0.01	1,210 U	0.00	491 U	0.00
1,2-Dibromoethane (EDB)	106-93-4	55 U	0.00	945 U	0.00	2 U	0.00
1,2-Dichlorobenzene	95-50-1	216 U	0.00	3,700 U	0.00	1 U	0.00
1,2-Dichloroethane	107-06-2	58 U	0.00	996 U	0.00	1 U	0.00
1,2-Dichloropropane	78-87-5	66 U	0.00	1,140 U	0.00	1 U	0.00
1,3,5-Trimethylbenzene	108-67-8	144	0.02	1,210 U	0.00	388	0.16
1,3-Butadiene	106-99-0	32 U	0.00	544 U	0.00	4 U	0.00
1,3-Dichlorobenzene	541-73-1	216 U	0.00	3,700 U	0.00	1 U	0.00
1,4-Dichlorobenzene	106-46-7	216 U	0.00	3,700 U	0.00	1 U	0.00
2-Butanone (MEK)	78-93-3	212 U	0.00	3,630 U	0.00	4 U	0.00
2-Hexanone	591-78-6	293 U	0.00	5,030 U	0.00	5 U	0.00
2-Propanol	67-63-0	176 U	0.00	3,020 U	0.00	7	0.00
4-Ethyltoluene	622-96-8	176 U	0.00	3,020 U	0.00	205	0.08
4-Methyl-2-pentanone (MIBK)	108-10-1	293 U	0.00	5,030 U	0.00	5 U	0.00
Acetone	67-64-1	426 U	0.00	7,310 U	0.00	33	0.01
Benzene	71-43-2	884	0.10	1,120	0.24	303	0.12
Benzyl chloride	100-44-7	185 U	0.00	3,180 U	0.00	1 U	0.00
Bromodichloromethane	75-27-4	96 U	0.00	1,650 U	0.00	1 U	0.00
Bromoform	75-25-2	370 U	0.00	6,350 U	0.00	6 U	0.00
Bromomethane	74-83-9	56 U	0.00	954 U	0.00	1 U	0.00
Carbon disulfide	75-15-0	45 U	0.00	766 U	0.00	12	0.00
Carbon tetrachloride	56-23-5	90 U	0.00	1,550 U	0.00	1 U	0.00
Chlorobenzene	108-90-7	66 U	0.00	1,130 U	0.00	1 U	0.00
Chloroethane	75-00-3	38 U	0.00	648 U	0.00	1 U	0.00
Chloroform	67-66-3	35 U	0.00	600 U	0.00	1 U	0.00
Chloromethane	74-87-3	30 U	0.00	508 U	0.00	0 U	0.00
cis-1,2-Dichloroethene	156-59-2	57 U	0.00	975 U	0.00	1 U	0.00
cis-1,3-Dichloropropene	10061-01-5	163 U	0.00	2,790 U	0.00	1 U	0.00
Cyclohexane	110-82-7	123 U	0.00	2,120 U	0.00	8,020	3.24
Dibromochloromethane	124-48-1	122 U	0.00	2,090 U	0.00	2 U	0.00
Dichlorodifluoromethane	75-71-8	71 U	0.00	1,220 U	0.00	2	0.00
Dichlorotetrafluoroethane	76-14-2	100 U	0.00	1,720 U	0.00	1 U	0.00
Ethanol	64-17-5	212	0.02	2,320 U	0.00	35	0.01
Ethyl acetate	141-78-6	52 U	0.00	887 U	0.00	-- --	--
Ethylbenzene	100-41-4	566	0.07	1,070 U	0.00	1,040	0.42
Hexachloro-1,3-butadiene	87-68-3	382 U	0.00	6,560 U	0.00	7 U	0.00
m&p-Xylene	179601-23-1	4,970	0.57	2,140 U	0.00	-- --	--
Methylene Chloride	75-09-2	249 U	0.00	4,270 U	0.00	1 U	0.00
Methyl-tert-butyl ether	1634-04-4	258 U	0.00	4,430 U	0.00	1 U	0.00
Naphthalene	91-20-3	188 U	0.00	3,220 U	0.00	3 U	0.00
n-Heptane	142-82-5	1,780	0.21	2,700	0.57	3,590	1.45
n-Hexane	110-54-3	1,410	0.16	8,780	1.85	16,600	6.70
o-Xylene	95-47-6	1,220	0.14	1,070 U	0.00	958	0.39
Propylene	115-07-1	62 U	0.00	1,060 U	0.00	2 U	0.00
Styrene	100-42-5	61 U	0.00	1,050 U	0.00	1 U	0.00
Tetrachloroethene	127-18-4	49 U	0.00	833 U	0.00	1 U	0.00
Tetrahydrofuran	109-99-9	42 U	0.00	726 U	0.00	1 U	0.00
Toluene	108-88-3	656	0.08	927 U	0.00	942 U	0.00
trans-1,2-Dichloroethene	156-60-5	57 U	0.00	975 U	0.00	1 U	0.00
trans-1,3-Dichloropropene	10061-02-6	163 U	0.00	2,790 U	0.00	1 U	0.00
Trichloroethene	79-01-6	39 U	0.00	660 U	0.00	1 U	0.00
Trichlorofluoromethane	75-69-4	80 U	0.00	1,380 U	0.00	1 U	0.00
Vinyl acetate	108-05-4	51 U	0.00	866 U	0.00	1 U	0.00
Vinyl chloride	75-01-4	18 U	0.00	314 U	0.00	1 U	0.00
Total VOCs	--	--	1.38	--	2.65	--	12.59
Period Total VOC Mass Removed (lbs)		**1.4**		**2.7**		**12.6**	
Cumulative Total VOC Mass Removed (lbs)		**2,860**		**2,863**		**2,876**	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-230531		CMR-SP301-230531		CMR-SP301-290623	
	Sample Date	4/30/2023		5/31/2023		6/29/2023	
	Blower Flow (scfm)	81		75		70	
	Period Operational Time (hrs)	533		510		449	
	Notes						
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**
1,1,1-Trichloroethane	71-55-6	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	275 U	0.00	275 U	0.00	1 U	0.00
1,1,2-Trichloroethane	79-00-5	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	2 U	0.00	2 U	0.00	2 U	0.00
1,1-Dichloroethane	75-34-3	1 U	0.00	1 U	0.00	1 U	0.00
1,1-Dichloroethene	75-35-4	1 U	0.00	1 U	0.00	1 U	0.00
1,2,4-Trichlorobenzene	120-82-1	933 U	0.00	933 U	0.00	5 U	0.00
1,2,4-Trimethylbenzene	95-63-6	196 U	0.00	196 U	0.00	4	0.00
1,2-Dibromoethane (EDB)	106-93-4	2 U	0.00	2 U	0.00	2 U	0.00
1,2-Dichlorobenzene	95-50-1	240 U	0.00	240 U	0.00	1 U	0.00
1,2-Dichloroethane	107-06-2	1 U	0.00	1 U	0.00	1 U	0.00
1,2-Dichloropropane	78-87-5	1 U	0.00	1 U	0.00	1 U	0.00
1,3,5-Trimethylbenzene	108-67-8	196 U	0.00	196 U	0.00	2	0.00
1,3-Butadiene	106-99-0	4 U	0.00	4 U	0.00	4 U	0.00
1,3-Dichlorobenzene	541-73-1	240 U	0.00	240 U	0.00	1 U	0.00
1,4-Dichlorobenzene	106-46-7	240 U	0.00	240 U	0.00	1 U	0.00
2-Butanone (MEK)	78-93-3	22	0.00	22	0.00	4 U	0.00
2-Hexanone	591-78-6	5 U	0.00	5 U	0.00	5 U	0.00
2-Propanol	67-63-0	13	0.00	13	0.00	3 U	0.00
4-Ethyltoluene	622-96-8	196 U	0.00	196 U	0.00	1 U	0.00
4-Methyl-2-pentanone (MIBK)	108-10-1	5 U	0.00	5 U	0.00	5 U	0.00
Acetone	67-64-1	3 U	0.00	3 U	0.00	3 U	0.00
Benzene	71-43-2	206	0.03	206	0.03	1 U	0.00
Benzyl chloride	100-44-7	208 U	0.00	208 U	0.00	1 U	0.00
Bromodichloromethane	75-27-4	1 U	0.00	1 U	0.00	1 U	0.00
Bromoform	75-25-2	1,240 U	0.00	1,240 U	0.00	6 U	0.00
Bromomethane	74-83-9	1 U	0.00	1 U	0.00	1 U	0.00
Carbon disulfide	75-15-0	6	0.00	6	0.00	1 U	0.00
Carbon tetrachloride	56-23-5	1 U	0.00	1 U	0.00	1 U	0.00
Chlorobenzene	108-90-7	1 U	0.00	1 U	0.00	1 U	0.00
Chloroethane	75-00-3	1 U	0.00	1 U	0.00	1 U	0.00
Chloroform	67-66-3	1 U	0.00	1 U	0.00	1 U	0.00
Chloromethane	74-87-3	0 U	0.00	0 U	0.00	1	0.00
cis-1,2-Dichloroethene	156-59-2	1 U	0.00	1 U	0.00	1 U	0.00
cis-1,3-Dichloropropene	10061-01-5	1 U	0.00	1 U	0.00	1 U	0.00
Cyclohexane	110-82-7	278	0.05	278	0.04	3,120	0.37
Dibromochloromethane	124-48-1	2 U	0.00	2 U	0.00	2 U	0.00
Dichlorodifluoromethane	75-71-8	3	0.00	3	0.00	2	0.00
Dichlorotetrafluoroethane	76-14-2	1 U	0.00	1 U	0.00	1 U	0.00
Ethanol	64-17-5	60	0.01	60	0.01	13	0.00
Ethyl acetate	141-78-6	-- --	--	-- --	--	-- --	--
Ethylbenzene	100-41-4	173 U	0.00	173 U	0.00	160	0.02
Hexachloro-1,3-butadiene	87-68-3	1,350 U	0.00	1,350 U	0.00	7 U	0.00
m&p-Xylene	179601-23-1	642	0.10	642	0.09	221	0.03
Methylene Chloride	75-09-2	1 U	0.00	1 U	0.00	1 U	0.00
Methyl-tert-butyl ether	1634-04-4	1 U	0.00	1 U	0.00	1 U	0.00
Naphthalene	91-20-3	660 U	0.00	660 U	0.00	3 U	0.00
n-Heptane	142-82-5	11,700	1.90	11,700	1.67	2,920	0.34
n-Hexane	110-54-3	1,700	0.28	1,700	0.24	9,270	1.09
o-Xylene	95-47-6	189	0.03	189	0.03	46	0.01
Propylene	115-07-1	27	0.00	27	0.00	15	0.00
Styrene	100-42-5	170 U	0.00	170 U	0.00	1 U	0.00
Tetrachloroethene	127-18-4	4	0.00	4	0.00	1 U	0.00
Tetrahydrofuran	109-99-9	1 U	0.00	1 U	0.00	1 U	0.00
Toluene	108-88-3	146	0.02	146	0.02	159	0.02
trans-1,2-Dichloroethene	156-60-5	1 U	0.00	1 U	0.00	1 U	0.00
trans-1,3-Dichloropropene	10061-02-6	1 U	0.00	1 U	0.00	1 U	0.00
Trichloroethene	79-01-6	1 U	0.00	1 U	0.00	1 U	0.00
Trichlorofluoromethane	75-69-4	1	0.00	1	0.00	1	0.00
Vinyl acetate	108-05-4	1 U	0.00	1 U	0.00	1 U	0.00
Vinyl chloride	75-01-4	1 U	0.00	1 U	0.00	1 U	0.00
Total VOCs	--	--	2.43	--	2.14	--	1.87
Period Total VOC Mass Removed (lbs)		**2.4**		**2.1**		**1.9**	
Cumulative Total VOC Mass Removed (lbs)		**2,878**		**2,880**		**2,882**	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-110723		CMR-SB-301-101223		CMR-SP301-122723	
	Sample Date	7/11/2023		10/12/2023		12/27/2023	
	Blower Flow (scfm)	78		26		41	
	Period Operational Time (hrs)	310		238		595	
	Notes						
VOCs	CAS No.	Result (ug/m^3)	Mass (lb)	Result (ug/m^3)	Mass (lb)	Result (ug/m^3)	Mass (lb)
1,1,1-Trichloroethane	71-55-6	22 U	0.00	1 U	0.00	1 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	28 U	0.00	550 U	0.00	1 U	0.00
1,1,2-Trichloroethane	79-00-5	22 U	0.00	1 U	0.00	1 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	31 U	0.00	2	0.00	2 U	0.00
1,1-Dichloroethane	75-34-3	16 U	0.00	1 U	0.00	1 U	0.00
1,1-Dichloroethene	75-35-4	16 U	0.00	1 U	0.00	1 U	0.00
1,2,4-Trichlorobenzene	120-82-1	93 U	0.00	1,870 U	0.00	5 U	0.00
1,2,4-Trimethylbenzene	95-63-6	638	0.06	795	0.02	59	0.01
1,2-Dibromoethane (EDB)	106-93-4	31 U	0.00	2 U	0.00	2 U	0.00
1,2-Dichlorobenzene	95-50-1	24 U	0.00	481 U	0.00	1 U	0.00
1,2-Dichloroethane	107-06-2	16 U	0.00	18	0.00	1 U	0.00
1,2-Dichloropropane	78-87-5	19 U	0.00	1 U	0.00	1 U	0.00
1,3,5-Trimethylbenzene	108-67-8	408	0.04	712	0.02	75	0.01
1,3-Butadiene	106-99-0	89 U	0.00	4 U	0.00	4 U	0.00
1,3-Dichlorobenzene	541-73-1	24 U	0.00	481 U	0.00	1 U	0.00
1,4-Dichlorobenzene	106-46-7	24 U	0.00	481 U	0.00	1 U	0.00
2-Butanone (MEK)	78-93-3	74 U	0.00	81	0.00	11	0.00
2-Hexanone	591-78-6	102 U	0.00	5 U	0.00	5 U	0.00
2-Propanol	67-63-0	62 U	0.00	17	0.00	10	0.00
4-Ethyltoluene	622-96-8	287	0.03	445	0.01	27	0.00
4-Methyl-2-pentanone (MIBK)	108-10-1	102 U	0.00	5 U	0.00	5 U	0.00
Acetone	67-64-1	59 U	0.00	3 U	0.00	3 U	0.00
Benzene	71-43-2	3,550	0.32	25,700	0.59	348	0.03
Benzyl chloride	100-44-7	21 U	0.00	416 U	0.00	1 U	0.00
Bromodichloromethane	75-27-4	27 U	0.00	1 U	0.00	1 U	0.00
Bromoform	75-25-2	124 U	0.00	2,480 U	0.00	6 U	0.00
Bromomethane	74-83-9	16 U	0.00	1 U	0.00	1 U	0.00
Carbon disulfide	75-15-0	12 U	0.00	28	0.00	2	0.00
Carbon tetrachloride	56-23-5	25 U	0.00	1 U	0.00	1 U	0.00
Chlorobenzene	108-90-7	19 U	0.00	287	0.01	1 U	0.00
Chloroethane	75-00-3	11 U	0.00	2	0.00	1 U	0.00
Chloroform	67-66-3	20 U	0.00	1 U	0.00	1 U	0.00
Chloromethane	74-87-3	8 U	0.00	9	0.00	0 U	0.00
cis-1,2-Dichloroethene	156-59-2	16 U	0.00	1 U	0.00	1 U	0.00
cis-1,3-Dichloropropene	10061-01-5	18 U	0.00	1 U	0.00	1 U	0.00
Cyclohexane	110-82-7	6,100	0.55	3,550	0.08	479	0.04
Dibromochloromethane	124-48-1	34 U	0.00	2 U	0.00	2 U	0.00
Dichlorodifluoromethane	75-71-8	20 U	0.00	2	0.00	2	0.00
Dichlorotetrafluoroethane	76-14-2	28 U	0.00	1 U	0.00	1 U	0.00
Ethanol	64-17-5	94 U	0.00	42	0.00	43	0.00
Ethyl acetate	141-78-6	-- --	--	-- --	--	-- --	--
Ethylbenzene	100-41-4	2,310	0.21	1,530	0.04	100	0.01
Hexachloro-1,3-butadiene	87-68-3	135 U	0.00	2,690 U	0.00	7 U	0.00
m&p-Xylene	179601-23-1	7,720	0.70	8,710	0.20	590	0.05
Methylene Chloride	75-09-2	14 U	0.00	1 U	0.00	1 U	0.00
Methyl-tert-butyl ether	1634-04-4	14 U	0.00	1 U	0.00	1 U	0.00
Naphthalene	91-20-3	66 U	0.00	1,320 U	0.00	3 U	0.00
n-Heptane	142-82-5	7,360	0.66	3,800	0.09	182	0.02
n-Hexane	110-54-3	15,700	1.42	5,850	0.13	395	0.04
o-Xylene	95-47-6	2,130	0.19	2,150	0.05	162	0.01
Propylene	115-07-1	43 U	0.00	122	0.00	2 U	0.00
Styrene	100-42-5	17 U	0.00	340 U	0.00	1 U	0.00
Tetrachloroethene	127-18-4	27 U	0.00	1 U	0.00	1 U	0.00
Tetrahydrofuran	109-99-9	12 U	0.00	1 U	0.00	1 U	0.00
Toluene	108-88-3	618	0.06	753 U	0.00	2 U	0.00
trans-1,2-Dichloroethene	156-60-5	16 U	0.00	1 U	0.00	9	0.00
trans-1,3-Dichloropropene	10061-02-6	18 U	0.00	1 U	0.00	1 U	0.00
Trichloroethene	79-01-6	21 U	0.00	1 U	0.00	1 U	0.00
Trichlorofluoromethane	75-69-4	23 U	0.00	1	0.00	1	0.00
Vinyl acetate	108-05-4	14 U	0.00	2 U	0.00	2 U	0.00
Vinyl chloride	75-01-4	10 U	0.00	1 U	0.00	1 U	0.00
Total VOCs	--	--	4.22	--	1.24	--	0.23
Period Total VOC Mass Removed (lbs)		4.2		1.2		0.2	
Cumulative Total VOC Mass Removed (lbs)		2,886		2,887		2,888	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-013124		CMR-SP301-240208		CMR-SP301-240327	
	Sample Date	1/31/2024		2/8/2024		3/27/2024	
	Blower Flow (scfm)	46		143		116	
	Period Operational Time (hrs)	558		689		739	
	Notes						
VOCs	**CAS No.**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**	**Result (ug/m^3)**	**Mass (lb)**
1,1,1-Trichloroethane	71-55-6	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2-Trichloroethane	79-00-5	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	2 U	0.00	2 U	0.00	2 U	0.00
1,1-Dichloroethane	75-34-3	1 U	0.00	1 U	0.00	1 U	0.00
1,1-Dichloroethene	75-35-4	1 U	0.00	1 U	0.00	1 U	0.00
1,2,4-Trichlorobenzene	120-82-1	5 U	0.00	5 U	0.00	5 U	0.00
1,2,4-Trimethylbenzene	95-63-6	2	0.00	810	0.30	100	0.03
1,2-Dibromoethane (EDB)	106-93-4	2 U	0.00	2 U	0.00	2 U	0.00
1,2-Dichlorobenzene	95-50-1	1 U	0.00	1 U	0.00	1 U	0.00
1,2-Dichloroethane	107-06-2	1 U	0.00	1 U	0.00	1 U	0.00
1,2-Dichloropropane	78-87-5	1 U	0.00	1 U	0.00	1 U	0.00
1,3,5-Trimethylbenzene	108-67-8	1 U	0.00	785	0.29	204	0.07
1,3-Butadiene	106-99-0	4 U	0.00	4 U	0.00	4 U	0.00
1,3-Dichlorobenzene	541-73-1	1 U	0.00	1 U	0.00	1 U	0.00
1,4-Dichlorobenzene	106-46-7	1 U	0.00	1 U	0.00	1 U	0.00
2-Butanone (MEK)	78-93-3	4 U	0.00	4 U	0.00	4 U	0.00
2-Hexanone	591-78-6	5 U	0.00	5 U	0.00	5 U	0.00
2-Propanol	67-63-0	3	0.00	5	0.00	3 U	0.00
4-Ethyltoluene	622-96-8	2	0.00	227	0.08	33	0.01
4-Methyl-2-pentanone (MIBK)	108-10-1	6	0.00	5 U	0.00	5 U	0.00
Acetone	67-64-1	17	0.00	10	0.00	3 U	0.00
Benzene	71-43-2	4	0.00	1,020	0.38	145	0.05
Benzyl chloride	100-44-7	1 U	0.00	1 U	0.00	1 U	0.00
Bromodichloromethane	75-27-4	1 U	0.00	1 U	0.00	1 U	0.00
Bromoform	75-25-2	6 U	0.00	6 U	0.00	6 U	0.00
Bromomethane	74-83-9	1 U	0.00	1 U	0.00	1 U	0.00
Carbon disulfide	75-15-0	1 U	0.00	2	0.00	3	0.00
Carbon tetrachloride	56-23-5	1 U	0.00	1 U	0.00	1 U	0.00
Chlorobenzene	108-90-7	1 U	0.00	1 U	0.00	1 U	0.00
Chloroethane	75-00-3	1 U	0.00	1 U	0.00	1 U	0.00
Chloroform	67-66-3	1 U	0.00	1 U	0.00	1 U	0.00
Chloromethane	74-87-3	1	0.00	0 U	0.00	0	0.00
cis-1,2-Dichloroethene	156-59-2	1 U	0.00	1 U	0.00	1 U	0.00
cis-1,3-Dichloropropene	10061-01-5	1 U	0.00	1 U	0.00	1 U	0.00
Cyclohexane	110-82-7	2	0.00	3,260	1.20	396	0.13
Dibromochloromethane	124-48-1	2 U	0.00	2 U	0.00	2 U	0.00
Dichlorodifluoromethane	75-71-8	2	0.00	1	0.00	2	0.00
Dichlorotetrafluoroethane	76-14-2	1 U	0.00	1 U	0.00	1 U	0.00
Ethanol	64-17-5	17	0.00	8 B	0.00	13	0.00
Ethyl acetate	141-78-6	-- --	--	-- --	--	-- --	--
Ethylbenzene	100-41-4	2	0.00	233	0.09	41	0.01
Hexachloro-1,3-butadiene	87-68-3	7 U	0.00	7 U	0.00	7 U	0.00
m&p-Xylene	179601-23-1	9	0.00	2,990	1.10	299	0.10
Methylene Chloride	75-09-2	1 U	0.00	1 U	0.00	1 U	0.00
Methyl-tert-butyl ether	1634-04-4	1 U	0.00	1 U	0.00	1 U	0.00
Naphthalene	91-20-3	3 U	0.00	3 U	0.00	3 U	0.00
n-Heptane	142-82-5	4	0.00	2,000	0.74	194	0.06
n-Hexane	110-54-3	7	0.00	4,650	1.72	652	0.21
o-Xylene	95-47-6	4	0.00	720	0.27	102	0.03
Propylene	115-07-1	2 U	0.00	10	0.00	7	0.00
Styrene	100-42-5	1 U	0.00	1 U	0.00	1 U	0.00
Tetrachloroethene	127-18-4	1 U	0.00	1 U	0.00	1 U	0.00
Tetrahydrofuran	109-99-9	1 U	0.00	1 U	0.00	1 U	0.00
Toluene	108-88-3	8	0.00	36	0.01	13	0.00
trans-1,2-Dichloroethene	156-60-5	1 U	0.00	1 U	0.00	1 U	0.00
trans-1,3-Dichloropropene	10061-02-6	1 U	0.00	2	0.00	1 U	0.00
Trichloroethene	79-01-6	1 U	0.00	1 U	0.00	1 U	0.00
Trichlorofluoromethane	75-69-4	1	0.00	1 U	0.00	1	0.00
Vinyl acetate	108-05-4	2 U	0.00	2 U	0.00	2 U	0.00
Vinyl chloride	75-01-4	1 U	0.00	1 U	0.00	1 U	0.00
Total VOCs	--	--	0.02	--	6.22	--	0.73
Period Total VOC Mass Removed (lbs)		**0.0**		**6.2**		**0.7**	
Cumulative Total VOC Mass Removed (lbs)		**2,888**		**2,894**		**2,895**	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301	
	Ramboll Sample ID	CMR-SP301-240531		CMR-SP301-240620	
	Sample Date	5/31/2024		6/20/2024	
	Blower Flow (scfm)	66		100	
	Period Operational Time (hrs)	1018		714	
	Notes				
VOCs	CAS No.	Result (ug/m^3)	Mass (lb)	Result (ug/m^3)	Mass (lb)
1,1,1-Trichloroethane	71-55-6	1 U	0.00	1 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	1 U	0.00	1 U	0.00
1,1,2-Trichloroethane	79-00-5	1 U	0.00	1 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	2 U	0.00	2 U	0.00
1,1-Dichloroethane	75-34-3	1 U	0.00	1 U	0.00
1,1-Dichloroethene	75-35-4	1 U	0.00	1 U	0.00
1,2,4-Trichlorobenzene	120-82-1	5 U	0.00	5 U	0.00
1,2,4-Trimethylbenzene	95-63-6	325	0.08	157	0.04
1,2-Dibromoethane (EDB)	106-93-4	2 U	0.00	2 U	0.00
1,2-Dichlorobenzene	95-50-1	1 U	0.00	1 U	0.00
1,2-Dichloroethane	107-06-2	1 U	0.00	1 U	0.00
1,2-Dichloropropane	78-87-5	1 U	0.00	1 U	0.00
1,3,5-Trimethylbenzene	108-67-8	318	0.08	200	0.05
1,3-Butadiene	106-99-0	4 U	0.00	4 U	0.00
1,3-Dichlorobenzene	541-73-1	1 U	0.00	1 U	0.00
1,4-Dichlorobenzene	106-46-7	1 U	0.00	1 U	0.00
2-Butanone (MEK)	78-93-3	5	0.00	4 U	0.00
2-Hexanone	591-78-6	5 U	0.00	5 U	0.00
2-Propanol	67-63-0	3 U	0.00	3 U	0.00
4-Ethyltoluene	622-96-8	91	0.02	195	0.05
4-Methyl-2-pentanone (MIBK)	108-10-1	5 U	0.00	5 U	0.00
Acetone	67-64-1	14	0.00	23	0.01
Benzene	71-43-2	923	0.23	1,100	0.29
Benzyl chloride	100-44-7	1 U	0.00	1 U	0.00
Bromodichloromethane	75-27-4	1 U	0.00	1 U	0.00
Bromoform	75-25-2	6 U	0.00	6 U	0.00
Bromomethane	74-83-9	1 U	0.00	1 U	0.00
Carbon disulfide	75-15-0	1	0.00	1 U	0.00
Carbon tetrachloride	56-23-5	1 U	0.00	1 U	0.00
Chlorobenzene	108-90-7	1 U	0.00	1 U	0.00
Chloroethane	75-00-3	1 U	0.00	1 U	0.00
Chloroform	67-66-3	1 U	0.00	1 U	0.00
Chloromethane	74-87-3	1	0.00	0 U	0.00
cis-1,2-Dichloroethene	156-59-2	1 U	0.00	1 U	0.00
cis-1,3-Dichloropropene	10061-01-5	1 U	0.00	1 U	0.00
Cyclohexane	110-82-7	1,210	0.30	1,230	0.33
Dibromochloromethane	124-48-1	2 U	0.00	2 U	0.00
Dichlorodifluoromethane	75-71-8	2	0.00	3	0.00
Dichlorotetrafluoroethane	76-14-2	1 U	0.00	1 U	0.00
Ethanol	64-17-5	9	0.00	5 U	0.00
Ethyl acetate	141-78-6	-- --	--	-- --	--
Ethylbenzene	100-41-4	153	0.04	214	0.06
Hexachloro-1,3-butadiene	87-68-3	7 U	0.00	7 U	0.00
m&p-Xylene	179601-23-1	1,070	0.27	1,500	0.40
Methylene Chloride	75-09-2	1 U	0.00	1 U	0.00
Methyl-tert-butyl ether	1634-04-4	1 U	0.00	1 U	0.00
Naphthalene	91-20-3	3 U	0.00	3 U	0.00
n-Heptane	142-82-5	560	0.14	900	0.24
n-Hexane	110-54-3	1,610	0.41	2,290	0.61
o-Xylene	95-47-6	328	0.08	328	0.09
Propylene	115-07-1	9	0.00	2 U	0.00
Styrene	100-42-5	2 U	0.00	2 U	0.00
Tetrachloroethene	127-18-4	1 U	0.00	1 U	0.00
Tetrahydrofuran	109-99-9	1 U	0.00	1 U	0.00
Toluene	108-88-3	33	0.01	44	0.01
trans-1,2-Dichloroethene	156-60-5	1 U	0.00	1 U	0.00
trans-1,3-Dichloropropene	10061-02-6	1 U	0.00	1 U	0.00
Trichloroethene	79-01-6	1 U	0.00	1 U	0.00
Trichlorofluoromethane	75-69-4	1	0.00	1 U	0.00
Vinyl acetate	108-05-4	2 U	0.00	2 U	0.00
Vinyl chloride	75-01-4	1 U	0.00	1 U	0.00
Total VOCs	--	--	1.70	--	2.20
Period Total VOC Mass Removed (lbs)		1.7		2.2	
Cumulative Total VOC Mass Removed (lbs)		2,896		2,899	

Appendix C
Historical Analytical Results and Contaminant Mass Removal - Vapor
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP301		SP301		SP301	
	Ramboll Sample ID	CMR-SP301-240711		CMR-SP301-240819		CMR-SP301-240924	
	Sample Date	7/11/2024		8/19/2024		9/24/2024	
	Blower Flow (scfm)	84		70		82	
	Period Operational Time (hrs)	740		563		690	
	Notes						
VOCs	CAS No.	Result (ug/m^3)	Mass (lb)	Result (ug/m^3)	Mass (lb)	Result (ug/m^3)	Mass (lb)
1,1,1-Trichloroethane	71-55-6	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2,2-Tetrachloroethane	79-34-5	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2-Trichloroethane	79-00-5	1 U	0.00	1 U	0.00	1 U	0.00
1,1,2-Trichlorotrifluoroethane	76-13-1	2 U	0.00	2 U	0.00	2 U	0.00
1,1-Dichloroethane	75-34-3	1 U	0.00	1 U	0.00	1 U	0.00
1,1-Dichloroethene	75-35-4	1 U	0.00	1 U	0.00	1 U	0.00
1,2,4-Trichlorobenzene	120-82-1	5 U	0.00	5 U	0.00	5 U	0.00
1,2,4-Trimethylbenzene	95-63-6	274	0.06	393 U	0.06	33	0.01
1,2-Dibromoethane (EDB)	106-93-4	2 U	0.00	2 U	0.00	2 U	0.00
1,2-Dichlorobenzene	95-50-1	1 U	0.00	1 U	0.00	1 U	0.00
1,2-Dichloroethane	107-06-2	1 U	0.00	1 U	0.00	1 U	0.00
1,2-Dichloropropane	78-87-5	1 U	0.00	1 U	0.00	1 U	0.00
1,3,5-Trimethylbenzene	108-67-8	290	0.07	393 U	0.06	31	0.01
1,3-Butadiene	106-99-0	4 U	0.00	4 U	0.00	4 U	0.00
1,3-Dichlorobenzene	541-73-1	1 U	0.00	1 U	0.00	1 U	0.00
1,4-Dichlorobenzene	106-46-7	1 U	0.00	1 U	0.00	1 U	0.00
2-Butanone (MEK)	78-93-3	4 U	0.00	42	0.01	16	0.00
2-Hexanone	591-78-6	5 U	0.00	5 U	0.00	5 U	0.00
2-Propanol	67-63-0	3 U	0.00	10	0.00	19	0.00
4-Ethyltoluene	622-96-8	423	0.10	445	0.07	28	0.01
4-Methyl-2-pentanone (MIBK)	108-10-1	5 U	0.00	5 U	0.00	5 U	0.00
Acetone	67-64-1	77	0.02	24	0.00	52	0.01
Benzene	71-43-2	1,190	0.28	955	0.14	428	0.09
Benzyl chloride	100-44-7	1 U	0.00	1 U	0.00	1 U	0.00
Bromodichloromethane	75-27-4	1 U	0.00	1 U	0.00	1 U	0.00
Bromoform	75-25-2	6 U	0.00	6 U	0.00	6 U	0.00
Bromomethane	74-83-9	1 U	0.00	1 U	0.00	1 U	0.00
Carbon disulfide	75-15-0	4	0.00	7	0.00	7	0.00
Carbon tetrachloride	56-23-5	1 U	0.00	1 U	0.00	1 U	0.00
Chlorobenzene	108-90-7	1 U	0.00	1 U	0.00	1 U	0.00
Chloroethane	75-00-3	1 U	0.00	1 U	0.00	1 U	0.00
Chloroform	67-66-3	1 U	0.00	1 U	0.00	1 U	0.00
Chloromethane	74-87-3	0 U	0.00	1	0.00	1	0.00
cis-1,2-Dichloroethene	156-59-2	1 U	0.00	1 U	0.00	1 U	0.00
cis-1,3-Dichloropropene	10061-01-5	1 U	0.00	1 U	0.00	1 U	0.00
Cyclohexane	110-82-7	1,330	0.31	2,980	0.44	444	0.09
Dibromochloromethane	124-48-1	2 U	0.00	2 U	0.00	2 U	0.00
Dichlorodifluoromethane	75-71-8	3	0.00	2	0.00	2	0.00
Dichlorotetrafluoroethane	76-14-2	1 U	0.00	1 U	0.00	1 U	0.00
Ethanol	64-17-5	13	0.00	98	0.01	113	0.02
Ethyl acetate	141-78-6	-- --	--	-- --	--	-- --	--
Ethylbenzene	100-41-4	380	0.09	347 U	0.05	49	0.01
Hexachloro-1,3-butadiene	87-68-3	7 U	0.00	7 U	0.00	7 U	0.00
m&p-Xylene	179601-23-1	1,200	0.28	1,610	0.24	185	0.04
Methylene Chloride	75-09-2	1 U	0.00	1 U	0.00	1 U	0.00
Methyl-tert-butyl ether	1634-04-4	1 U	0.00	1 U	0.00	1 U	0.00
Naphthalene	91-20-3	4	0.00	3 U	0.00	3 U	0.00
n-Heptane	142-82-5	1,300	0.30	1,670	0.25	342	0.07
n-Hexane	110-54-3	3,160	0.74	4,230	0.62	846	0.18
o-Xylene	95-47-6	267	0.06	350	0.05	32	0.01
Propylene	115-07-1	12	0.00	20	0.00	2 U	0.00
Styrene	100-42-5	2 U	0.00	2 U	0.00	21	0.00
Tetrachloroethene	127-18-4	16	0.00	1 U	0.00	1 U	0.00
Tetrahydrofuran	109-99-9	1 U	0.00	1 U	0.00	1 U	0.00
Toluene	108-88-3	81	0.02	236	0.03	43	0.01
trans-1,2-Dichloroethene	156-60-5	1 U	0.00	1 U	0.00	1 U	0.00
trans-1,3-Dichloropropene	10061-02-6	1 U	0.00	1 U	0.00	1 U	0.00
Trichloroethene	79-01-6	1 U	0.00	1 U	0.00	1 U	0.00
Trichlorofluoromethane	75-69-4	2	0.00	1	0.00	1 U	0.00
Vinyl acetate	108-05-4	2 U	0.00	2 U	0.00	2 U	0.00
Vinyl chloride	75-01-4	1 U	0.00	1 U	0.00	1 U	0.00
Total VOCs	--	--	2.35	--	2.04	--	0.59
Period Total VOC Mass Removed (lbs)		2.4		2.0		0.6	
Cumulative Total VOC Mass Removed (lbs)		2,901		2,903		2,903	

1. Blower flowrate is continuously recorded by the system PLC. Average blower flowrate during the period is used for the calculations
2. Operational time during system start-up and comissioning (October, 2021 through December 2021) is the number of hours the system operated between each sampling event. Opertational time during the standard system opration (beginning January 2022) represents system runtime (in hour) for the month during with the sample was taken.
3. Results from November 19, 2021 and February 16, 2022 appear anomalously low as PID readings from these two events were consistent with PID readings from the other sampling events. Therfore, these results were rejected.
4. Sample was not collected during September 2022, therefore results from August 2022 were used for mass removal calculations.
5. Sample was not collected during October 2022 and November 2022, therefore results from December 2022 were used for mass removal calculations.
6. Sample collected for April 2023 was received by the lab outside the allowable vacuum range so sample was not analyzed; therefore results from May 2023 were used for mass removal calculations.
7. Samples were not collected in August and September 2023 due to system shutdown.
8. Samples were not collected in November 2023 due to system shutdown.

E: Analyte concentration exceeded the calibration range. The reported result is estimated.
R: Result rejected.
U: The analyte was not detected in the sample at the estimated detection limit.
B: The analyte was found in the associated blank as well as in the sample.
VOCs : Volatile Organic Compounds
ug/m^3 : micrograms per cubic meter
Sample Calculation

$$\boldsymbol{Mass\ Removed\ (lb) = 340000\ \frac{ug}{m^3} \times 10^{-6}\ \frac{g}{ug} \times \frac{1}{453.6}\ \frac{lb}{g} \times 41\ \frac{ft^3}{min} \times 0.02832\ \frac{m^3}{ft^3} \times 26\ hr \times 60\ \frac{min}{hr}}$$

APPENDIX D

HISTORICAL ANALYTICAL RESULTS AND CONTAMINANT MASS REMOVAL - LIQUID

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-211015		CMR-SP200-211208		CMR-SP200-220216		CMR-SP200-220411	
	Sample Date	10/15/2021		12/8/2021		2/16/2022		4/11/2022	
	Effluent Volume (L)*	21,138		43,176		80,754		137,543	
	Notes								
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs									
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--	ND	--	ND	--
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--	ND	--
1,4-DIOXANE	123-91-1	ND	--	ND	--	ND	--	ND	--
2-BUTANONE	78-93-3	ND	--	ND	--	ND	--	ND	--
2-HEXANONE	591-78-6	ND	--	ND	--	ND	--	ND	--
4-METHYL-2-PENTANONE	108-10-1	ND	--	ND	--	ND	--	ND	--
ACETONE	67-64-1	ND	--	ND	--	ND	--	ND	--
BENZENE	71-43-2	2300	0.11	350	0.0333	420	0.0748	540	0.1637
BROMOCHLOROMETHANE	74-97-5	ND	--	ND	--	ND	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--	ND	--	ND	--
BROMOFORM	75-25-2	ND	--	ND	--	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	--	ND	--	ND	--	ND	--
CARBON DISULFIDE	75-15-0	ND	--	ND	--	ND	--	ND	--
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	--	ND	--	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	--	ND	--	ND	--	ND	--
CHLOROFORM	67-66-3	ND	--	ND	--	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	--	ND	--	ND	--	ND	--
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	79	0.01	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--	ND	--	ND	--
CUMENE	98-82-8	ND	--	130	0.0124	ND	--	ND	--
CYCLOHEXANE	110-82-7	160	0.01	72	0.01	ND	--	ND	--
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--	ND	--	ND	--
ETHYL BENZENE	100-41-4	1100	0.05	730	0.0695	450	0.0801	590	0.1789
M,P-XYLENE	179601-23-1	5100	0.24	5400	0.51	3200	0.57	3200	0.97
METHYL ACETATE	79-20-9	ND	--	ND	--	ND	--	ND	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	71	0.00	43	0.00	ND	--	ND	--
METHYLENE CHLORIDE	75-09-2	ND	--	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	290	0.01	1500	0.1428	460	0.0819	510	0.1546
ORTHO-XYLENE	95-47-6	1400	0.07	1800	0.17	1100	0.20	960	0.29
STYRENE	100-42-5	ND	--	ND	--	ND	--	ND	--
TETRACHLOROETHENE	127-18-4	ND	--	ND	--	ND	--	ND	--
TOLUENE	108-88-3	1500	0.07	330	0.03	370	0.07	ND	--
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	--	ND	--	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	--	ND	--	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	6500	0.30	--	--	--	--	--	--
Total VOCs	--	--	**0.86**	--	**0.993**	--	**1.068**	--	**1.759**
Period Total VOC Mass Removed (lbs)		**0.9**		**0.993**		**1.068**		**1.759**	
Cumulative Total VOC Mass Removed (lbs)		**0.9**		**1.85**		**2.92**		**4.68**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-211015		CMR-SP200-211208		CMR-SP200-220216		CMR-SP200-220411	
	Sample Date	10/15/2021		12/8/2021		2/16/2022		4/11/2022	
	Effluent Volume (L)*	21,138		43,176		80,754		137,543	
	Notes								
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
SVOCs									
1,2,4,5-TETRACHLOROBENZENE	95-94-3	ND	--	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--	ND	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	ND	--	ND	--	ND	--	ND	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	--	ND	--	ND	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	--	ND	--	590	0.1050	270	0.0819
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	--	ND	--	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	710	0.03	9,700	0.9233	710	0.1264	340	0.1031
2-METHYLPHENOL	95-48-7	ND	--	ND	--	ND	--	ND	--
2-NITROANILINE	88-74-4	ND	--	ND	--	ND	--	ND	--
2-NITROPHENOL	88-75-5	ND	--	ND	--	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--	ND	--	ND	--
3-NITROANILINE	99-09-2	ND	--	ND	--	ND	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--	ND	--	ND	--
4-METHYLPHENOL	106-44-5	ND	--	ND	--	ND	--	ND	--
4-NITROANILINE	100-01-6	ND	--	ND	--	ND	--	ND	--
4-NITROPHENOL	100-02-7	ND	--	ND	--	ND	--	ND	--
ACENAPHTHENE	83-32-9	ND	--	ND	--	14	0.0025	ND	--
ACENAPHTHYLENE	208-96-8	38	0.00	ND	--	ND	--	ND	--
ANTHRACENE	120-12-7	ND	--	ND	--	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	--	ND	--	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--	ND	--	ND	--
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--	ND	--	ND	--
CARBAZOLE	86-74-8	ND	--	ND	--	ND	--	ND	--
CHRYSENE	218-01-9	ND	--	ND	--	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--	ND	--	ND	--
DIBENZOFURAN	132-64-9	ND	--	ND	--	ND	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--	ND	--	ND	--
FLUORANTHENE	206-44-0	ND	--	ND	--	ND	--	ND	--
FLUORENE	86-73-7	30	0.00	360	0.0343	ND	--	13	0.0039
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	--	ND	--	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--	ND	--	ND	--
ISOPHORONE	78-59-1	ND	--	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	610	0.03	5,800	0.5521	560	0.0997	330	0.1001
NITROBENZENE	98-95-3	ND	--	ND	--	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--	ND	--	ND	--
PENTACHLOROPHENOL	87-86-5	ND	--	ND	--	ND	--	ND	--
PHENANTHRENE	85-01-8	48	0.00	610	0.0581	53	0.0094	22	0.0067
PHENOL	108-95-2	ND	--	ND	--	ND	--	47	0.01
PYRENE	129-00-0	12	0.00	110	0.0105	7	0.0013	3	0.0010
Total SVOCs	--	--	**0.07**	--	**1.58**	--	**0.34**	--	**0.31**
Period Total SVOC Mass Removed (lbs)		**0.1**		**1.6**		**0.3**		**0.3**	
Cumulative Total VOC Mass Removed (lbs)		**0.1**		**1.6**		**2.0**		**2.3**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-211015		CMR-SP200-211208		CMR-SP200-220216		CMR-SP200-220411	
	Sample Date	10/15/2021		12/8/2021		2/16/2022		4/11/2022	
	Effluent Volume (L)*	21,138		43,176		80,754		137,543	
	Notes								
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH									
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	89,000	4.15	32,000	3.05	81,000	14.42	56,000	16.98
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	50,000	2.33	28,000	2.67	55,000	9.79	17,000	5.15
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	190,000	8.85	130,000	12.37	320,000	56.97	87,000	26.38
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	330,000	15.38	--	--	460,000	81.89	160,000	48.52
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	410,000	19.11	210,000	19.99	460,000	81.89	160,000	48.52
Total EPHs	--	--	**19.11**	--	**19.99**	--	**81.89**	--	**48.52**
Period Total EPH Mass Removed (lbs)		**19.1**		**20.0**		**81.9**		**48.5**	
Cumulative Total EPH Mass Removed (lbs)		**19.1**		**39.1**		**121.0**		**169.5**	
VPH									
BENZENE	71-43-2	1,800	0.08	230	0.02	480	0.09	430	0.13
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	3,900	0.18	2,600	0.25	12,000	2.14	1,500	0.45
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	9,300	0.43	40,000	3.81	88,000	15.67	9,400	2.85
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	9,400	0.44	26,000	2.47	130,000	23.14	6,800	2.06
ETHYL BENZENE	100-41-4	990	0.05	650	0.06	1,200	0.21	600	0.18
M,P-XYLENE	179601-23-1	4,100	0.19	4,100	0.39	5,900	1.05	3,200	0.97
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	510	0.02	2,300	0.22	5,200	0.93	470	0.14
ORTHO-XYLENE	95-47-6	1,300	0.06	1,700	0.16	2,200	0.39	1,000	0.30
TOLUENE	108-88-3	1,100	0.05	300	0.03	530	0.09	300	0.09
TOTAL PETROLEUM HYDROCARBONS	TPH	32,000	1.49	72,000	6.85	200,000	35.61	23,000	6.97
Total VPHs	--	--	**1.49**	--	**6.85**	--	**35.61**	--	**6.97**
Period Total VPH Mass Removed (lbs)		**1.5**		**6.9**		**35.6**		**7.0**	
Cumulative Total VPH Mass Removed (lbs)		**1.5**		**8.3**		**44.0**		**50.9**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200			SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-220517			CMR-SP200-220617		CMR-SP200-220727		CMR-SP200-220830	
	Sample Date	5/17/2022			6/17/2022		7/27/2022		8/30/2022	
	Effluent Volume (L)*	0			126,978		76,011		31,926	
	Notes									
Analyte	**CAS No.**	**Result (ug/L)**		**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs										
1,1,1-TRICHLOROETHANE	71-55-6	ND	R	--	ND	--	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	R	--	ND	--	ND	--	ND	--
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	R	--	ND	--	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	R	--	ND	--	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	R	--	ND	--	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	R	--	ND	--	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	R	--	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	R	--	ND	--	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	R	--	ND	--	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	R	--	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	R	--	ND	--	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	R	--	ND	--	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	R	--	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	R	--	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	R	--	ND	--	ND	--	ND	--
1,4-DIOXANE	123-91-1	ND	R	--	ND	--	ND	--	ND	--
2-BUTANONE	78-93-3	ND	R	--	ND	--	ND	--	26	0.00
2-HEXANONE	591-78-6	ND	R	--	ND	--	ND	--	ND	--
4-METHYL-2-PENTANONE	108-10-1	ND	R	--	ND	--	ND	--	ND	--
ACETONE	67-64-1	ND	R	--	100	0.03	ND	--	91	0.01
BENZENE	71-43-2	310	R	--	120	0.0336	19	0.0032	94	0.0066
BROMOCHLOROMETHANE	74-97-5	ND	R	--	ND	--	ND	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	R	--	ND	--	ND	--	ND	--
BROMOFORM	75-25-2	ND	R	--	ND	--	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	R	--	ND	--	ND	--	ND	--
CARBON DISULFIDE	75-15-0	ND	R	--	ND	--	ND	--	ND	--
CARBON TETRACHLORIDE	56-23-5	ND	R	--	ND	--	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	R	--	ND	--	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	R	--	ND	--	ND	--	0.46	0.00
CHLOROFORM	67-66-3	ND	R	--	ND	--	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	R	--	ND	--	ND	--	0.42	0.00
CIS-1,2-DICHLOROETHENE	156-59-2	ND	R	--	ND	--	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	R	--	ND	--	ND	--	ND	--
CUMENE	98-82-8	ND	R	--	99	0.0277	22	0.0037	58	0.0041
CYCLOHEXANE	110-82-7	ND	R	--	320	0.09	49	0.01	170	0.01
DIBROMOCHLOROMETHANE	124-48-1	ND	R	--	ND	--	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	R	--	ND	--	ND	--	ND	--
ETHYL BENZENE	100-41-4	340	R	--	660	0.1848	95	0.0159	330	0.0232
M,P-XYLENE	179601-23-1	2600	R	--	8200	2.30	1900	0.32	2500	0.18
METHYL ACETATE	79-20-9	ND	R	--	ND	--	ND	--	ND	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	R	--	ND	--	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	ND	R	--	340	0.10	50	0.01	220	0.02
METHYLENE CHLORIDE	75-09-2	ND	R	--	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	280	R	--	3200	0.8958	960	0.1609	350	0.0246
ORTHO-XYLENE	95-47-6	800	R	--	2900	0.81	740	0.12	780	0.05
STYRENE	100-42-5	ND	R	--	ND	--	ND	--	ND	--
TETRACHLOROETHENE	127-18-4	ND	R	--	ND	--	ND	--	ND	--
TOLUENE	108-88-3	170	R	--	240	0.07	34	0.01	24	0.00
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	R	--	ND	--	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	R	--	ND	--	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	R	--	ND	--	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	R	--	ND	--	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	R	--	ND	--	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	--	R	--	--	--	--	--	--	--
Total VOCs	--	--		**0.00**	--	**4.529**	--	**0.648**	--	**0.327**
Period Total VOC Mass Removed (lbs)		**0.0**			**4.529**		**0.648**		**0.327**	
Cumulative Total VOC Mass Removed (lbs)		**4.7**			**4.53**		**5.18**		**5.50**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200			SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-220517			CMR-SP200-220617		CMR-SP200-220727		CMR-SP200-220830	
	Sample Date	5/17/2022			6/17/2022		7/27/2022		8/30/2022	
	Effluent Volume (L)*	0			126,978		76,011		31,926	
	Notes									
Analyte	CAS No.	Result (ug/L)		Mass (lb)	Result (ug/L)	Mass (lb)	Result (ug/L)	Mass (lb)	Result (ug/L)	Mass (lb)
SVOCs										
1,2,4,5-TETRACHLOROBENZENE	95-94-3	ND	R	--	ND	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	R	--	ND	--	--	--	--	--
1,2-DICHLOROBENZENE	95-50-1	ND	R	--	ND	--	--	--	--	--
1,3-DICHLOROBENZENE	541-73-1	ND	R	--	ND	--	--	--	--	--
1,4-DICHLOROBENZENE	106-46-7	ND	R	--	ND	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	R	--	ND	--	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	ND	R	--	ND	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	R	--	ND	--	ND	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	R	--	ND	--	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	R	--	ND	--	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	R	--	ND	--	ND	--	ND	--
2,4-DINITROPHENOL	51-28-5	ND	R	--	ND	--	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	R	--	ND	--	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	R	--	ND	--	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	R	--	ND	--	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	R	--	ND	--	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	20,000	R	--	2,400	0.6718	2,000	0.3351	21,000	1.4781
2-METHYLPHENOL	95-48-7	ND	R	--	ND	--	ND	--	ND	--
2-NITROANILINE	88-74-4	ND	R	--	ND	--	ND	--	ND	--
2-NITROPHENOL	88-75-5	ND	R	--	ND	--	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	R	--	ND	--	ND	--	ND	--
3-NITROANILINE	99-09-2	ND	R	--	ND	--	ND	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	R	--	ND	--	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	R	--	ND	--	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	R	--	ND	--	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	R	--	ND	--	ND	--	ND	--
4-METHYLPHENOL	106-44-5	ND	R	--	ND	--	ND	--	ND	--
4-NITROANILINE	100-01-6	ND	R	--	ND	--	ND	--	ND	--
4-NITROPHENOL	100-02-7	ND	R	--	ND	--	ND	--	ND	--
ACENAPHTHENE	83-32-9	380	R	--	93	0.0260	ND	--	ND	--
ACENAPHTHYLENE	208-96-8	ND	R	--	ND	--	ND	--	ND	--
ANTHRACENE	120-12-7	ND	R	--	ND	--	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	R	--	ND	--	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	R	--	ND	--	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	R	--	ND	--	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	R	--	ND	--	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	R	--	ND	--	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	R	--	ND	--	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	R	--	ND	--	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	R	--	ND	--	ND	--	ND	--
BUTYLBENZYLPHTHALATE	85-68-7	ND	R	--	ND	--	ND	--	ND	--
CARBAZOLE	86-74-8	ND	R	--	ND	--	ND	--	ND	--
CHRYSENE	218-01-9	ND	R	--	ND	--	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	R	--	ND	--	ND	--	ND	--
DIBENZOFURAN	132-64-9	ND	R	--	ND	--	ND	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	R	--	ND	--	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	R	--	ND	--	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	R	--	ND	--	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	R	--	ND	--	ND	--	ND	--
FLUORANTHENE	206-44-0	ND	R	--	ND	--	ND	--	ND	--
FLUORENE	86-73-7	910	R	--	130	0.0364	110	0.0184	1,100	0.0774
HEXACHLOROBENZENE	118-74-1	ND	R	--	ND	--	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	R	--	ND	--	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	R	--	ND	--	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	R	--	ND	--	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	R	--	ND	--	ND	--	ND	--
ISOPHORONE	78-59-1	ND	R	--	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	12,000	R	--	1,100	0.3079	830	0.1391	9,800	0.6898
NITROBENZENE	98-95-3	ND	R	--	ND	--	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	R	--	ND	--	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	R	--	ND	--	ND	--	ND	--
PENTACHLOROPHENOL	87-86-5	ND	R	--	ND	--	ND	--	ND	--
PHENANTHRENE	85-01-8	1,500	R	--	250	0.0700	230	0.0385	2,000	0.1408
PHENOL	108-95-2	ND	R	--	ND	--	ND	--	ND	--
PYRENE	129-00-0	230	R	--	ND	--	44	0.0074	ND	--
Total SVOCs	--	--		**0.00**	--	**1.11**	--	**0.54**	--	**2.39**
Period Total SVOC Mass Removed (lbs)		**0.0**			**1.1**		**0.5**		**2.4**	
Cumulative Total VOC Mass Removed (lbs)		**2.3**			**3.4**		**4.0**		**6.3**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-220517		CMR-SP200-220617		CMR-SP200-220727		CMR-SP200-220830	
	Sample Date	5/17/2022		6/17/2022		7/27/2022		8/30/2022	
	Effluent Volume (L)*	0		126,978		76,011		31,926	
	Notes								
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH									
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	740,000 R	--	530,000	148.36	120,000	20.11	--	--
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	660,000 R	--	37,000	10.36	80,000	13.41	--	--
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	3,700,000 R	--	240,000	67.18	340,000	56.97	--	--
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	5,100,000 R	--	810,000	226.75	540,000	90.49	--	--
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	5,900,000 R	--	670,000	187.56	590,000	98.87	2,550,000	179.48
Total EPHs	--	--	**0.00**	--	**187.56**	--	**98.87**	--	**179.48**
Period Total EPH Mass Removed (lbs)		**0.0**		**187.6**		**98.9**		**179.5**	
Cumulative Total EPH Mass Removed (lbs)		**169.5**		**357.1**		**455.9**		**635.4**	
VPH									
BENZENE	71-43-2	330 R	--	58	0.02	ND	--	--	--
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	2,600 R	--	1,300	0.36	ND	--	2,860	0.20
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	29,000 R	--	20,000	5.60	5,700	0.96	--	--
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	28,000 R	--	8,600	2.41	4,300	0.72	29,500	2.08
ETHYL BENZENE	100-41-4	510 R	--	110	0.03	ND	--	--	--
M,P-XYLENE	179601-23-1	3,200 R	--	1,300	0.36	310	0.05	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND R	--	ND	--	ND	--	--	--
NAPHTHALENE	91-20-3	1,600 R	--	1,300	0.36	550	0.09	--	--
ORTHO-XYLENE	95-47-6	1,100 R	--	550	0.15	160	0.03	--	--
TOLUENE	108-88-3	180 R	--	52	0.01	ND	--	--	--
TOTAL PETROLEUM HYDROCARBONS	TPH	56,000 R	--	29,000	8.12	9,500	1.59	62,800	4.42
Total VPHs	--	--	**0.00**	--	**8.12**	--	**1.59**	--	**4.42**
Period Total VPH Mass Removed (lbs)		**0.0**		**8.1**		**1.6**		**4.4**	
Cumulative Total VPH Mass Removed (lbs)		**50.9**		**59.0**		**60.6**		**65.1**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200		SP200
	Ramboll Sample ID	CMR-SP200-220830		CMR-SP200-221214		CMR-SP200-221214		CMR-SP200-221214		CMR-DS2-
	Sample Date	9/30/2022		10/31/2022		11/30/2022		12/14/2022		12/14/2022
	Effluent Volume (L)*	39,179		4,319		17		159,877		--
	Notes									Field Duplicate
Analyte	CAS No.	Result (ug/L)	Mass (lb)	Result (ug/L)	Mass (lb)	Result (ug/L)	Mass (lb)	Result (ug/L)	Mass (lb)	Result (ug/L)
VOCs										
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--	ND	--	ND	--	ND
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--	ND	--	ND	--	ND
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--	ND	--	ND	--	ND
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--	ND	--	ND	--	ND
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--	ND	--	ND	--	ND
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--	ND	--	ND	--	ND
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--	ND	--	ND	--	ND
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--	ND	--	ND
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--	ND	--	ND	--	ND
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--	ND	--	ND	--	ND
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--	ND	--	ND
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--	ND	--	ND	--	ND
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--	ND	--	ND	--	ND
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--	ND	--	ND
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--	ND	--	ND
1,4-DIOXANE	123-91-1	ND	--	ND	--	ND	--	ND	--	ND
2-BUTANONE	78-93-3	26	0.00	ND	--	ND	--	ND	--	ND
2-HEXANONE	591-78-6	ND	--	ND	--	ND	--	ND	--	ND
4-METHYL-2-PENTANONE	108-10-1	ND	--	ND	--	ND	--	ND	--	ND
ACETONE	67-64-1	91	0.01	ND	--	ND	--	ND	--	ND
BENZENE	71-43-2	94	0.0081	200	0.0019	200	0.0000	200	0.0705	180
BROMOCHLOROMETHANE	74-97-5	ND	--	ND	--	ND	--	ND	--	ND
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--	ND	--	ND	--	ND
BROMOFORM	75-25-2	ND	--	ND	--	ND	--	ND	--	ND
BROMOMETHANE	74-83-9	ND	--	ND	--	ND	--	ND	--	ND
CARBON DISULFIDE	75-15-0	ND	--	ND	--	ND	--	ND	--	ND
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--	ND	--	ND	--	ND
CHLOROBENZENE	108-90-7	ND	--	ND	--	ND	--	ND	--	ND
CHLOROETHANE	75-00-3	0.46	0.00	ND	--	ND	--	ND	--	ND
CHLOROFORM	67-66-3	ND	--	ND	--	ND	--	ND	--	ND
CHLOROMETHANE	74-87-3	0.42	0.00	ND	--	ND	--	ND	--	ND
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	ND	--	ND	--	ND	--	ND
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--	ND	--	ND	--	ND
CUMENE	98-82-8	58	0.0050	81	0.0008	81	0.0000	81	0.0285	21
CYCLOHEXANE	110-82-7	170	0.01	190	0.00	190	0.00	190	0.07	53
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--	ND	--	ND	--	ND
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--	ND	--	ND	--	ND
ETHYL BENZENE	100-41-4	330	0.0285	490	0.0047	490	0.0000	490	0.1727	210
M,P-XYLENE	179601-23-1	2500	0.22	2700	0.03	2700	0.00	2700	0.95	1000
METHYL ACETATE	79-20-9	ND	--	ND	--	ND	--	ND	--	ND
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--	ND	--	ND
METHYLCYCLOHEXANE	108-87-2	220	0.02	240	0.00	240	0.00	240	0.08	52
METHYLENE CHLORIDE	75-09-2	ND	--	ND	--	ND	--	ND	--	ND
NAPHTHALENE	91-20-3	350	0.0302	890	0.0085	890	0.0000	890	0.3137	270
ORTHO-XYLENE	95-47-6	780	0.07	590	0.01	590	0.00	590	0.21	250
STYRENE	100-42-5	ND	--	ND	--	ND	--	ND	--	ND
TETRACHLOROETHENE	127-18-4	ND	--	ND	--	ND	--	ND	--	ND
TOLUENE	108-88-3	24	0.00	22	0.00	22	0.00	22	0.01	ND
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--	ND	--	ND	--	ND
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--	ND	--	ND	--	ND
TRICHLOROETHENE	79-01-6	ND	--	ND	--	ND	--	ND	--	ND
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--	ND	--	ND	--	ND
VINYL CHLORIDE	75-01-4	ND	--	ND	--	ND	--	ND	--	ND
XYLENES (TOTAL)	1330-20-7	--	--	--	--	--	--	--	--	--
Total VOCs	--	--	0.401	--	0.051	--	0.000	--	1.904	--
Period Total VOC Mass Removed (lbs)		0.401		0.051		0.000		1.904		--
Cumulative Total VOC Mass Removed (lbs)		5.91		5.96		5.96		7.86		--

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200		SP200
	Ramboll Sample ID	CMR-SP200-220830		CMR-SP200-221214		CMR-SP200-221214		CMR-SP200-221214		CMR-DS2-
	Sample Date	9/30/2022		10/31/2022		11/30/2022		12/14/2022		12/14/2022
	Effluent Volume (L)*	39,179		4,319		17		159,877		--
	Notes									Field Duplicate
Analyte	CAS No.	Result (ug/L)	Mass (lb)	Result (ug/L)	Mass (lb)	Result (ug/L)	Mass (lb)	Result (ug/L)	Mass (lb)	Result (ug/L)
SVOCs										
1,2,4,5-TETRACHLOROBENZENE	95-94-3	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	120-82-1	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	95-50-1	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	541-73-1	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	106-46-7	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--	ND	--	ND	--	ND
2,3,4,6-TETRACHLOROPHENOL	58-90-2	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	--	ND	--	ND	--	ND	--	ND
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--	ND	--	ND	--	ND
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--	ND	--	ND	--	ND
2,4-DIMETHYLPHENOL	105-67-9	ND	--	ND	--	ND	--	ND	--	ND
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--	ND	--	ND	--	ND
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--	ND	--	ND	--	ND
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--	ND	--	ND	--	ND
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--	ND	--	ND	--	ND
2-CHLOROPHENOL	95-57-8	ND	--	ND	--	ND	--	ND	--	ND
2-METHYLNAPHTHALENE	91-57-6	21,000	1.8138	2,000	0.0190	2,000	0.0001	2,000	0.7049	2,000
2-METHYLPHENOL	95-48-7	ND	--	ND	--	ND	--	ND	--	ND
2-NITROANILINE	88-74-4	ND	--	ND	--	ND	--	ND	--	ND
2-NITROPHENOL	88-75-5	ND	--	ND	--	ND	--	ND	--	ND
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--	ND	--	ND	--	ND
3-NITROANILINE	99-09-2	ND	--	ND	--	ND	--	ND	--	ND
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--	ND	--	ND	--	ND
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--	ND	--	ND	--	ND
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--	ND	--	ND	--	ND
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--	ND	--	ND	--	ND
4-METHYLPHENOL	106-44-5	ND	--	ND	--	ND	--	ND	--	ND
4-NITROANILINE	100-01-6	ND	--	ND	--	ND	--	ND	--	ND
4-NITROPHENOL	100-02-7	ND	--	ND	--	ND	--	ND	--	ND
ACENAPHTHENE	83-32-9	ND	--	51	0.0005	51	0.0000	51	0.0180	ND
ACENAPHTHYLENE	208-96-8	ND	--	ND	--	ND	--	ND	--	ND
ANTHRACENE	120-12-7	ND	--	ND	--	ND	--	ND	--	ND
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--	ND	--	ND	--	ND
BENZO(A)PYRENE	50-32-8	ND	--	ND	--	ND	--	ND	--	ND
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--	ND	--	ND	--	ND
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--	ND	--	ND	--	ND
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--	ND	--	ND	--	ND
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--	ND	--	ND	--	ND
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--	ND	--	ND	--	ND
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--	ND	--	ND	--	ND
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--	ND	--	ND	--	ND
CARBAZOLE	86-74-8	ND	--	ND	--	ND	--	ND	--	ND
CHRYSENE	218-01-9	ND	--	ND	--	ND	--	ND	--	ND
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--	ND	--	ND	--	ND
DIBENZOFURAN	132-64-9	ND	--	ND	--	ND	--	ND	--	ND
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--	ND	--	ND	--	ND
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--	ND	--	ND	--	ND
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--	ND	--	ND	--	ND
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--	ND	--	ND	--	ND
FLUORANTHENE	206-44-0	ND	--	ND	--	ND	--	ND	--	ND
FLUORENE	86-73-7	1,100	0.0950	170	0.0016	170	0.0000	170	0.0599	110
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--	ND	--	ND	--	ND
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--	ND	--	ND	--	ND
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--	ND	--	ND	--	ND
HEXACHLOROETHANE	67-72-1	ND	--	ND	--	ND	--	ND	--	ND
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--	ND	--	ND	--	ND
ISOPHORONE	78-59-1	ND	--	ND	--	ND	--	ND	--	ND
NAPHTHALENE	91-20-3	9,800	0.8465	1,100	0.0105	1,100	0.0000	1,100	0.3877	1,000
NITROBENZENE	98-95-3	ND	--	ND	--	ND	--	ND	--	ND
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--	ND	--	ND	--	ND
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--	ND	--	ND	--	ND
PENTACHLOROPHENOL	87-86-5	ND	--	ND	--	ND	--	ND	--	ND
PHENANTHRENE	85-01-8	2,000	0.1727	220	0.0021	220	0.0000	220	0.0775	210
PHENOL	108-95-2	ND	--	ND	--	ND	--	ND	--	ND
PYRENE	129-00-0	ND	--	34	0.0003	34	0.0000	34	0.0120	33
Total SVOCs	--	--	**2.93**	--	**0.03**	--	**0.00**	--	**1.26**	--
Period Total SVOC Mass Removed (lbs)		**2.9**		**0.0**		**0.0**		**1.3**		--
Cumulative Total VOC Mass Removed (lbs)		**9.3**		**9.3**		**9.3**		**10.6**		--

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200		SP200
	Ramboll Sample ID	CMR-SP200-220830		CMR-SP200-221214		CMR-SP200-221214		CMR-SP200-221214		CMR-DS2-
	Sample Date	9/30/2022		10/31/2022		11/30/2022		12/14/2022		12/14/2022
	Effluent Volume (L)*	39,179		4,319		17		159,877		--
	Notes									Field Duplicate
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**
EPH										
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	--	--	103,000	0.98	103,000	0.00	103,000	36.30	--
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	--	--	50,100	0.48	50,100	0.00	50,100	17.66	--
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	--	--	264,000	2.51	264,000	0.01	264,000	93.05	--
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	--	--	417,000	3.97	417,000	0.02	417,000	146.98	--
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	2,550,000	220.25	362,000	3.45	362,000	0.01	362,000	127.59	--
Total EPHs	--	**--**	**220.25**	**--**	**3.45**	**--**	**0.01**	**--**	**127.59**	**--**
Period Total EPH Mass Removed (lbs)		**220.3**		**3.4**		**0.0**		**127.6**		**--**
Cumulative Total EPH Mass Removed (lbs)		**855.7**		**859.1**		**859.1**		**986.7**		**--**
VPH										
BENZENE	71-43-2	--	--	--	--	--	--	--	--	--
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	2,860	0.25	ND	--	ND	--	ND	--	7,480
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	--	--	--	--	--	--	--	--	--
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	29,500	2.55	42,500	0.40	42,500	0.00	42,500	14.98	65,500
ETHYL BENZENE	100-41-4	--	--	--	--	--	--	--	--	--
M,P-XYLENE	179601-23-1	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	--	--	--	--	--	--	--	--	--
NAPHTHALENE	91-20-3	--	--	--	--	--	--	--	--	--
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--	--	--	--
TOLUENE	108-88-3	--	--	--	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS	TPH	62,800	5.42	119,000	1.13	119,000	0.00	119,000	41.94	163,000
Total VPHs	--	**--**	**5.42**	**--**	**1.13**	**--**	**0.00**	**--**	**41.94**	**--**
Period Total VPH Mass Removed (lbs)		**5.4**		**1.1**		**0.0**		**41.9**		**--**
Cumulative Total VPH Mass Removed (lbs)		**70.5**		**71.6**		**71.6**		**113.6**		**--**

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-230126		CMR-SP200-230228		CMR-SP200-230321		CMR-SP200-230503	
	Sample Date	1/26/2023		2/28/2023		3/21/2023		5/3/2023	
	Effluent Volume (L)*	88,291		48,336		89,975		127,742	
	Notes								
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs									
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--	ND	--	1.9	0.00
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--	ND	--
1,4-DIOXANE	123-91-1	ND	--	ND	--	ND	--	ND	--
2-BUTANONE	78-93-3	ND	--	ND	--	ND	--	18	0.01
2-HEXANONE	591-78-6	ND	--	ND	--	ND	--	9.8	0.00
4-METHYL-2-PENTANONE	108-10-1	ND	--	ND	--	ND	--	5	0.00
ACETONE	67-64-1	40	0.01	ND	--	ND	--	45	0.01
BENZENE	71-43-2	23	0.0045	6	0.0006	21	0.0042	90	0.0253
BROMOCHLOROMETHANE	74-97-5	ND	--	ND	--	ND	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--	ND	--	0.49	0.00
BROMOFORM	75-25-2	5.1	0.00	ND	--	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	--	ND	--	ND	--	ND	--
CARBON DISULFIDE	75-15-0	ND	--	ND	--	ND	--	ND	--
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	--	ND	--	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	--	ND	--	ND	--	ND	--
CHLOROFORM	67-66-3	ND	--	ND	--	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	--	ND	--	ND	--	ND	--
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	ND	--	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--	ND	--	ND	--
CUMENE	98-82-8	15	0.0029	ND	--	ND	--	2.6	0.0007
CYCLOHEXANE	110-82-7	39	0.01	ND	--	ND	--	5.1	0.00
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--	ND	--	ND	--
ETHYL BENZENE	100-41-4	34	0.0066	ND	--	37	0.0073	29	0.0082
M,P-XYLENE	179601-23-1	1000	0.19	100	0.01	240	0.05	140	0.04
METHYL ACETATE	79-20-9	ND	--	ND	--	ND	--	ND	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	44	0.01	ND	--	ND	--	4.7	0.00
METHYLENE CHLORIDE	75-09-2	ND	--	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	1300	0.2530	130	0.0139	110	0.0218	61	0.0172
ORTHO-XYLENE	95-47-6	310	0.06	48	0.01	81	0.02	40	0.01
STYRENE	100-42-5	ND	--	ND	--	ND	--	1.3	0.00
TETRACHLOROETHENE	127-18-4	ND	--	ND	--	ND	--	ND	--
TOLUENE	108-88-3	15	0.00	ND	--	20	0.00	11	0.00
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	--	ND	--	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	--	ND	--	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	--	--	--	--	--	--	--	--
Total VOCs	--	--	**0.550**	--	**0.030**	--	**0.101**	--	**0.131**
Period Total VOC Mass Removed (lbs)		**0.550**		**0.030**		**0.101**		**0.131**	
Cumulative Total VOC Mass Removed (lbs)		**8.41**		**8.44**		**8.54**		**8.67**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-230126		CMR-SP200-230228		CMR-SP200-230321		CMR-SP200-230503	
	Sample Date	1/26/2023		2/28/2023		3/21/2023		5/3/2023	
	Effluent Volume (L)*	88,291		48,336		89,975		127,742	
	Notes								
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
SVOCs									
1,2,4,5-TETRACHLOROBENZENE	95-94-3	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	120-82-1	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	95-50-1	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	541-73-1	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	106-46-7	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	--	ND	--	ND	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	--	ND	--	450	0.0893	ND	--
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	--	ND	--	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	1,100	0.2141	390	0.0416	440	0.0873	ND	--
2-METHYLPHENOL	95-48-7	ND	--	ND	--	ND	--	ND	--
2-NITROANILINE	88-74-4	ND	--	ND	--	ND	--	ND	--
2-NITROPHENOL	88-75-5	ND	--	ND	--	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--	ND	--	ND	--
3-NITROANILINE	99-09-2	ND	--	ND	--	ND	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--	ND	--	ND	--
4-METHYLPHENOL	106-44-5	ND	--	ND	--	ND	--	22	0.01
4-NITROANILINE	100-01-6	ND	--	ND	--	ND	--	ND	--
4-NITROPHENOL	100-02-7	ND	--	ND	--	ND	--	ND	--
ACENAPHTHENE	83-32-9	ND	--	10	0.0011	ND	--	ND	--
ACENAPHTHYLENE	208-96-8	ND	--	ND	--	ND	--	ND	--
ANTHRACENE	120-12-7	ND	--	ND	--	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	--	ND	--	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--	ND	--	17	0.00
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--	ND	--	ND	--
CARBAZOLE	86-74-8	ND	--	ND	--	ND	--	ND	--
CHRYSENE	218-01-9	ND	--	ND	--	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--	ND	--	ND	--
DIBENZOFURAN	132-64-9	ND	--	ND	--	ND	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--	ND	--	ND	--
FLUORANTHENE	206-44-0	14	0.00	ND	--	ND	--	ND	--
FLUORENE	86-73-7	ND	--	29	0.0031	ND	--	ND	--
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	--	ND	--	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--	ND	--	ND	--
ISOPHORONE	78-59-1	ND	--	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	460	0.0895	160	0.0170	220	0.0436	ND	--
NITROBENZENE	98-95-3	ND	--	ND	--	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--	ND	--	25	0.01
PENTACHLOROPHENOL	87-86-5	ND	--	ND	--	ND	--	ND	--
PHENANTHRENE	85-01-8	130	0.0253	45	0.0048	40	0.0079	ND	--
PHENOL	108-95-2	ND	--	ND	--	ND	--	12	0.00
PYRENE	129-00-0	32	0.0062	8	0.0009	9	0.0017	3	0.0007
Total SVOCs	--	--	**0.34**	--	**0.07**	--	**0.23**	--	**0.02**
Period Total SVOC Mass Removed (lbs)		**0.3**		**0.1**		**0.2**		**0.0**	
Cumulative Total VOC Mass Removed (lbs)		**10.9**		**11.0**		**11.2**		**11.2**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-230126		CMR-SP200-230228		CMR-SP200-230321		CMR-SP200-230503	
	Sample Date	1/26/2023		2/28/2023		3/21/2023		5/3/2023	
	Effluent Volume (L)*	88,291		48,336		89,975		127,742	
	Notes								
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH									
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	209,000	40.68	49,500	5.27	92,500	18.35	22,300	6.28
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	--	--	--	--	--	--	--	--
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	--	--	--	--	--	--	--	--
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	713,000	138.78	200,000	21.31	560,000	111.08	99,100	27.91
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	977,000	190.17	240,000	25.57	569,000	112.87	138,000	38.86
Total EPHs	--	**--**	**190.17**	**--**	**25.57**	**--**	**112.87**	**--**	**38.86**
Period Total EPH Mass Removed (lbs)		**190.2**		**25.6**		**112.9**		**38.9**	
Cumulative Total EPH Mass Removed (lbs)		**1176.9**		**1202.5**		**1315.3**		**1354.2**	
VPH									
BENZENE	71-43-2	--	--	--	--	--	--	--	--
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	1,690	0.33	ND	--	894	0.18	718	0.20
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	--	--	--	--	--	--	--	--
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	38,400	7.47	42,000	4.48	10,500	2.08	8,120	2.29
ETHYL BENZENE	100-41-4	--	--	--	--	--	--	--	--
M,P-XYLENE	179601-23-1	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	--	--	--	--	--	--	--	--
NAPHTHALENE	91-20-3	--	--	--	--	--	--	--	--
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--	--	--
TOLUENE	108-88-3	--	--	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS	TPH	76,500	14.89	85,600	9.12	21,100	4.19	15,700	4.42
Total VPHs	--	**--**	**14.89**	**--**	**9.12**	**--**	**4.19**	**--**	**4.42**
Period Total VPH Mass Removed (lbs)		**14.9**		**9.1**		**4.2**		**4.4**	
Cumulative Total VPH Mass Removed (lbs)		**128.4**		**137.6**		**141.8**		**146.2**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-230531		CMR-SP200-290623		CMR-SP200-110723	
	Sample Date	5/31/2023		6/23/2023		7/11/2023	
	Effluent Volume (L)*	151,878		306,490		125,244	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs							
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--	21	0.01
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--
1,4-DIOXANE	123-91-1	ND	--	ND	--	ND	--
2-BUTANONE	78-93-3	ND	--	ND	--	ND	--
2-HEXANONE	591-78-6	ND	--	ND	--	ND	--
4-METHYL-2-PENTANONE	108-10-1	ND	--	ND	--	ND	--
ACETONE	67-64-1	ND	--	ND	--	ND	--
BENZENE	71-43-2	27	0.0090	84.9	0.0574	53	0.0146
BROMOCHLOROMETHANE	74-97-5	ND	--	ND	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--	ND	--
BROMOFORM	75-25-2	ND	--	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	--	ND	--	ND	--
CARBON DISULFIDE	75-15-0	ND	--	ND	--	ND	--
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	--	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	--	ND	--	ND	--
CHLOROFORM	67-66-3	ND	--	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	--	ND	--	ND	--
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--	ND	--
CUMENE	98-82-8	17	0.0057	8.73	0.0059	37	0.0102
CYCLOHEXANE	110-82-7	16	0.01	ND	--	28	0.01
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--	ND	--
ETHYL BENZENE	100-41-4	78	0.0261	101	0.0682	300	0.0828
M,P-XYLENE	179601-23-1	770	0.26	--	--	1500	0.41
METHYL ACETATE	79-20-9	ND	--	ND	--	ND	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	19	0.01	ND	--	35	0.01
METHYLENE CHLORIDE	75-09-2	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	760	0.2545	--	--	430	0.1187
ORTHO-XYLENE	95-47-6	270	0.09	157	0.11	550	0.15
STYRENE	100-42-5	ND	--	ND	--	17	0.00
TETRACHLOROETHENE	127-18-4	ND	--	ND	--	ND	--
TOLUENE	108-88-3	6.1	0.00	ND	--	29	0.01
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	--	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	--	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	--	--	--	--	--	--
Total VOCs	--	**--**	**0.657**	**--**	**0.238**	**--**	**0.828**
Period Total VOC Mass Removed (lbs)		**0.657**		**0.238**		**0.828**	
Cumulative Total VOC Mass Removed (lbs)		**9.33**		**9.57**		**10.40**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-230531		CMR-SP200-290623		CMR-SP200-110723	
	Sample Date	5/31/2023		6/23/2023		7/11/2023	
	Effluent Volume (L)*	151,878		306,490		125,244	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
SVOCs							
1,2,4,5-TETRACHLOROBENZENE	95-94-3	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	120-82-1	--	--	--	--	--	--
1,2-DICHLOROBENZENE	95-50-1	--	--	--	--	--	--
1,3-DICHLOROBENZENE	541-73-1	--	--	--	--	--	--
1,4-DICHLOROBENZENE	106-46-7	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	--	ND	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	--	28	0.0189	ND	--
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	--	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	1,200	0.4018	80	0.0543	4,000	1.1044
2-METHYLPHENOL	95-48-7	ND	--	ND	--	ND	--
2-NITROANILINE	88-74-4	ND	--	ND	--	ND	--
2-NITROPHENOL	88-75-5	ND	--	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--	ND	--
3-NITROANILINE	99-09-2	ND	--	ND	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--	ND	--
4-METHYLPHENOL	106-44-5	ND	--	--	--	ND	--
4-NITROANILINE	100-01-6	ND	--	ND	--	ND	--
4-NITROPHENOL	100-02-7	ND	--	ND	--	ND	--
ACENAPHTHENE	83-32-9	ND	--	ND	--	ND	--
ACENAPHTHYLENE	208-96-8	ND	--	ND	--	ND	--
ANTHRACENE	120-12-7	ND	--	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	--	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--	ND	--
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--	ND	--
CARBAZOLE	86-74-8	ND	--	ND	--	ND	--
CHRYSENE	218-01-9	ND	--	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--	ND	--
DIBENZOFURAN	132-64-9	ND	--	ND	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--	ND	--
FLUORANTHENE	206-44-0	ND	--	ND	--	ND	--
FLUORENE	86-73-7	ND	--	6	0.0041	ND	--
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	--	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--	ND	--
ISOPHORONE	78-59-1	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	570	0.1909	74	0.0500	2,100	0.5798
NITROBENZENE	98-95-3	ND	--	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--	ND	--
PENTACHLOROPHENOL	87-86-5	ND	--	ND	--	ND	--
PHENANTHRENE	85-01-8	110	0.0368	5	0.0034	350	0.0966
PHENOL	108-95-2	ND	--	ND	--	ND	--
PYRENE	129-00-0	22	0.0074	1	0.0008	67	0.0185
Total SVOCs	--	--	**0.64**	--	**0.13**	--	**1.80**
Period Total SVOC Mass Removed (lbs)		**0.6**		**0.1**		**1.8**	
Cumulative Total VOC Mass Removed (lbs)		**11.9**		**12.0**		**13.8**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-230531		CMR-SP200-290623		CMR-SP200-110723	
	Sample Date	5/31/2023		6/23/2023		7/11/2023	
	Effluent Volume (L)*	151,878		306,490		125,244	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH							
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	77,000	25.78	83,500	56.42	331,000	91.39
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	--	--	--	--	--	--
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	--	--	--	--	--	--
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	348,000	116.52	354,000	239.19	--	--
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	388,000	129.91	643,000	434.46	1,850,000	510.81
Total EPHs	--	**--**	**129.91**	**--**	**434.46**	**--**	**510.81**
Period Total EPH Mass Removed (lbs)		**129.9**		**434.5**		**510.8**	
Cumulative Total EPH Mass Removed (lbs)		**1484.1**		**1918.6**		**2429.4**	
VPH							
BENZENE	71-43-2	--	--	--	--	--	--
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	3,690	1.24	ND	--	2,160	0.60
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	--	--	--	--	--	--
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	112,000	37.50	3,790	2.56	12,300	3.40
ETHYL BENZENE	100-41-4	--	--	--	--	--	--
M,P-XYLENE	179601-23-1	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	--	--	--	--	--	--
NAPHTHALENE	91-20-3	--	--	--	--	--	--
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--
TOLUENE	108-88-3	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS	TPH	154,000	51.56	10,800	7.30	37,500	10.35
Total VPHs	--	**--**	**51.56**	**--**	**7.30**	**--**	**10.35**
Period Total VPH Mass Removed (lbs)		**51.6**		**7.3**		**10.4**	
Cumulative Total VPH Mass Removed (lbs)		**197.7**		**205.0**		**215.4**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200	
	Ramboll Sample ID	CMQ-SP200-101223		CUR-SP200-122723	
	Sample Date	10/12/2023		12/27/2023	
	Effluent Volume (L)*	33,349		54,067	
	Notes				
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs					
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--
1,4-DIOXANE	123-91-1	--	--	--	--
2-BUTANONE	78-93-3	ND	--	ND	--
2-HEXANONE	591-78-6	--	--	ND	--
4-METHYL-2-PENTANONE	108-10-1	ND	--	ND	--
ACETONE	67-64-1	ND	--	ND	--
BENZENE	71-43-2	0.452	0.0000	300	0.0358
BROMOCHLOROMETHANE	74-97-5	--	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--
BROMOFORM	75-25-2	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	--	ND	--
CARBON DISULFIDE	75-15-0	--	--	1.35	0.0002
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	--	ND	--
CHLOROFORM	67-66-3	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	--	ND	--
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--
CUMENE	98-82-8	ND	--	3.42	0.0004
CYCLOHEXANE	110-82-7	--	--	--	--
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--
ETHYL BENZENE	100-41-4	ND	--	23.7	0.0028
M,P-XYLENE	179601-23-1	--	--	--	--
METHYL ACETATE	79-20-9	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	--	--	--	--
METHYLENE CHLORIDE	75-09-2	ND	--	ND	--
NAPHTHALENE	91-20-3	0.357	0.0000	47.6	0.0057
ORTHO-XYLENE	95-47-6	--	--	--	--
STYRENE	100-42-5	ND	--	ND	--
TETRACHLOROETHENE	127-18-4	ND	--	ND	--
TOLUENE	108-88-3	ND	--	ND	--
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	--	--	--	--
Total VOCs	--	--	**0.000**	--	**0.045**
Period Total VOC Mass Removed (lbs)		**0.000**		**0.045**	
Cumulative Total VOC Mass Removed (lbs)		**10.40**		**10.44**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200	
	Ramboll Sample ID	CMQ-SP200-101223		CUR-SP200-122723	
	Sample Date	10/12/2023		12/27/2023	
	Effluent Volume (L)*	33,349		54,067	
	Notes				
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
SVOCs					
1,2,4,5-TETRACHLOROBENZENE	95-94-3	--	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	--	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	--	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	--	--	ND	--
2,4,5-TRICHLOROPHENOL	95-95-4	--	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	--	47	0.0056
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	--	--	57	0.0068
2-METHYLPHENOL	95-48-7	--	--	ND	--
2-NITROANILINE	88-74-4	--	--	ND	--
2-NITROPHENOL	88-75-5	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--
3-NITROANILINE	99-09-2	--	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--
4-METHYLPHENOL	106-44-5	--	--	--	--
4-NITROANILINE	100-01-6	--	--	ND	--
4-NITROPHENOL	100-02-7	ND	--	ND	--
ACENAPHTHENE	83-32-9	ND	--	8	0.0010
ACENAPHTHYLENE	208-96-8	ND	--	ND	--
ANTHRACENE	120-12-7	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--
CARBAZOLE	86-74-8	--	--	--	--
CHRYSENE	218-01-9	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--
DIBENZOFURAN	132-64-9	--	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--
FLUORANTHENE	206-44-0	ND	--	ND	--
FLUORENE	86-73-7	ND	--	16	0.0019
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--
ISOPHORONE	78-59-1	ND	--	ND	--
NAPHTHALENE	91-20-3	7	0.0005	19	0.0023
NITROBENZENE	98-95-3	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--
PENTACHLOROPHENOL	87-86-5	ND	--	ND	--
PHENANTHRENE	85-01-8	ND	--	11	0.0013
PHENOL	108-95-2	ND	--	ND	--
PYRENE	129-00-0	ND	--	4	0.0005
Total SVOCs	--	--	**0.00054**	--	**0.019**
Period Total SVOC Mass Removed (lbs)		**0.00054**		**0.019**	
Cumulative Total VOC Mass Removed (lbs)		**13.79**		**13.81**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200	
	Ramboll Sample ID	CMQ-SP200-101223		CUR-SP200-122723	
	Sample Date	10/12/2023		12/27/2023	
	Effluent Volume (L)*	33,349		54,067	
	Notes				
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH					
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	--	--	1,170,000	139.46
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	--	--	102,000	12.16
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	--	--	306,000	36.47
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	--	--	--	--
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	508.0	0.037	914,000	108.94
Total EPHs	--	**--**	**0.04**	**--**	**108.94**
Period Total EPH Mass Removed (lbs)		**0.037**		**108.9**	
Cumulative Total EPH Mass Removed (lbs)		**2429.4**		**2538.3**	
VPH					
BENZENE	71-43-2	--	--	--	--
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	ND	--	ND	--
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	30.3	0.00	3,790	0.45
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	43.4	0.00	10,300	1.23
ETHYL BENZENE	100-41-4	--	--	--	--
M,P-XYLENE	179601-23-1	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	--	--	--	--
NAPHTHALENE	91-20-3	--	--	--	--
ORTHO-XYLENE	95-47-6	--	--	--	--
TOLUENE	108-88-3	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS	TPH	74.8	0.0055	14,800	1.76
Total VPHs	--	**--**	**0.0055**	**--**	**1.76**
Period Total VPH Mass Removed (lbs)		**0.0055**		**1.76**	
Cumulative Total VPH Mass Removed (lbs)		**215.4**		**217.2**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-013124		CMR-SP200-240208		CMR-SP200-240320	
	Sample Date	1/31/2024		2/8/2024		3/20/2024	
	Effluent Volume (L)*	19,177		32,365		36,438	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs							
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--	5.94	0.00
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--
1,4-DIOXANE	123-91-1	--	--	--	--	--	--
2-BUTANONE	78-93-3	ND	--	2.07	0.00	4.35	0.00
2-HEXANONE	591-78-6	ND	--	ND	--	ND	--
4-METHYL-2-PENTANONE	108-10-1	ND	--	3.07	0.00	4.72	0.00
ACETONE	67-64-1	ND	--	ND	--	28.4	0.00
BENZENE	71-43-2	10.6	0.0004	2.51	0.0002	1.31	0.0001
BROMOCHLOROMETHANE	74-97-5	ND	--	ND	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--	ND	--
BROMOFORM	75-25-2	ND	--	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	--	ND	--	ND	--
CARBON DISULFIDE	75-15-0	ND	--	ND	--	ND	--
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	--	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	--	ND	--	ND	--
CHLOROFORM	67-66-3	ND	--	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	--	ND	--	ND	--
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--	ND	--
CUMENE	98-82-8	ND	--	0.709	0.0001	1.24	0.0001
CYCLOHEXANE	110-82-7	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--	ND	--
ETHYL BENZENE	100-41-4	7	0.0003	2.56	0.0002	6.22	0.0005
M,P-XYLENE	179601-23-1	--	--	--	--	--	--
METHYL ACETATE	79-20-9	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	--	--	--	--	--	--
METHYLENE CHLORIDE	75-09-2	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	97.5	0.0041	10.3	0.0007	13.0	0.0010
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--
STYRENE	100-42-5	ND	--	ND	--	ND	--
TETRACHLOROETHENE	127-18-4	ND	--	ND	--	ND	--
TOLUENE	108-88-3	ND	--	2.67	0.00	4.39	0.00
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	--	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	--	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	--	--	--	--	--	--
Total VOCs	--	**--**	**0.005**	**--**	**0.002**	**--**	**0.006**
Period Total VOC Mass Removed (lbs)		**0.005**		**0.002**		**0.006**	
Cumulative Total VOC Mass Removed (lbs)		**10.45**		**10.45**		**10.45**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-013124		CMR-SP200-240208		CMR-SP200-240320	
	Sample Date	1/31/2024		2/8/2024		3/20/2024	
	Effluent Volume (L)*	19,177		32,365		36,438	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
SVOCs							
1,2,4,5-TETRACHLOROBENZENE	95-94-3	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	--	--	--	--	--	--
1,3-DICHLOROBENZENE	541-73-1	--	--	--	--	--	--
1,4-DICHLOROBENZENE	106-46-7	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	ND	--	ND	--	ND	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	--	ND	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	--	24.2	0.0017	15.3	0.0012
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	--	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	156	0.0066	ND	--	1.88	0.0002
2-METHYLPHENOL	95-48-7	ND	--	ND	--	ND	--
2-NITROANILINE	88-74-4	ND	--	ND	--	ND	--
2-NITROPHENOL	88-75-5	ND	--	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--	ND	--
3-NITROANILINE	99-09-2	ND	--	ND	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--	ND	--
4-METHYLPHENOL	106-44-5	--	--	--	--	--	--
4-NITROANILINE	100-01-6	ND	--	ND	--	ND	--
4-NITROPHENOL	100-02-7	ND	--	ND	--	ND	--
ACENAPHTHENE	83-32-9	ND	--	ND	--	ND	--
ACENAPHTHYLENE	208-96-8	ND	--	ND	--	ND	--
ANTHRACENE	120-12-7	ND	--	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	--	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--	ND	--
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--	ND	--
CARBAZOLE	86-74-8	--	--	--	--	--	--
CHRYSENE	218-01-9	ND	--	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--	ND	--
DIBENZOFURAN	132-64-9	ND	--	ND	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--	ND	--
FLUORANTHENE	206-44-0	ND	--	ND	--	ND	--
FLUORENE	86-73-7	61	0.0026	ND	--	ND	--
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	--	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--	ND	--
ISOPHORONE	78-59-1	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	50	0.0021	2	0.0001	1	0.0001
NITROBENZENE	98-95-3	ND	--	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--	ND	--
PENTACHLOROPHENOL	87-86-5	ND	--	ND	--	ND	--
PHENANTHRENE	85-01-8	50	0.0021	ND	--	1	0.0001
PHENOL	108-95-2	ND	--	ND	--	ND	--
PYRENE	129-00-0	26	0.0011	1	0.00	0	0.00
Total SVOCs	--	**--**	**0.014**	**--**	**0.0019**	**--**	**0.002**
Period Total SVOC Mass Removed (lbs)		**0.014**		**0.0019**		**0.002**	
Cumulative Total VOC Mass Removed (lbs)		**13.82**		**13.82**		**13.82**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-013124		CMR-SP200-240208		CMR-SP200-240320	
	Sample Date	1/31/2024		2/8/2024		3/20/2024	
	Effluent Volume (L)*	19,177		32,365		36,438	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH							
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	252,000	10.65	4,390	0.31	10,500	0.84
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	228,000	9.64	4,780	0.34	10,200	0.82
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	539,000	22.79	10,900	0.78	34,100	2.74
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	1,020,000	43.12	20,100	1.43	54,800	4.40
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	1,020,000	43.12	20,100	1.43	54,800	4.40
Total EPHs	--	**--**	**43.12**	**--**	**1.43**	**--**	**4.40**
Period Total EPH Mass Removed (lbs)		**43.1**		**1.43**		**4.4**	
Cumulative Total EPH Mass Removed (lbs)		**2581.5**		**2582.9**		**2587.3**	
VPH							
BENZENE	71-43-2	--	--	--	--	--	--
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	401	0.02	95	0.01	ND	--
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	6,670	0.28	500	0.04	1,990	0.16
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	27,800	1.18	2,080	0.15	6,610	0.53
ETHYL BENZENE	100-41-4	--	--	--	--	--	--
M,P-XYLENE	179601-23-1	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	--	--	--	--	--	--
NAPHTHALENE	91-20-3	--	--	--	--	--	--
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--
TOLUENE	108-88-3	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS	TPH	35,100	1.48	2,710	0.19	8,620	0.69
Total VPHs	--	**--**	**1.48**	**--**	**0.19**	**--**	**0.69**
Period Total VPH Mass Removed (lbs)		**1.48**		**0.19**		**0.69**	
Cumulative Total VPH Mass Removed (lbs)		**218.6**		**218.8**		**219.5**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240430		CMR-SP200-240522		CMR-SP200-240620	
	Sample Date	4/30/2024		5/22/2024		6/20/2024	
	Effluent Volume (L)*	37,097		342,387		155,891	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs							
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--	ND	--
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--
1,4-DIOXANE	123-91-1	--	--	--	--	--	--
2-BUTANONE	78-93-3	258	0.02	ND	--	ND	--
2-HEXANONE	591-78-6	ND	--	ND	--	ND	--
4-METHYL-2-PENTANONE	108-10-1	9.64	0.00	ND	--	ND	--
ACETONE	67-64-1	1820	0.15	ND	--	ND	--
BENZENE	71-43-2	250	0.0204	68.5	0.0517	11.1	0.0038
BROMOCHLOROMETHANE	74-97-5	ND	--	ND	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--	ND	--
BROMOFORM	75-25-2	ND	--	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	--	ND	--	ND	--
CARBON DISULFIDE	75-15-0	ND	--	ND	--	ND	--
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	--	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	--	ND	--	ND	--
CHLOROFORM	67-66-3	ND	--	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	--	ND	--	ND	--
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--	ND	--
CUMENE	98-82-8	3.76	0.0003	ND	--	ND	--
CYCLOHEXANE	110-82-7	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--	ND	--
ETHYL BENZENE	100-41-4	25.9	0.0021	16.8	0.0127	ND	--
M,P-XYLENE	179601-23-1	--	--	--	--	--	--
METHYL ACETATE	79-20-9	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	--	--	--	--	--	--
METHYLENE CHLORIDE	75-09-2	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	ND	--	33.9	0.0256	70.0	0.0241
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--
STYRENE	100-42-5	ND	--	ND	--	ND	--
TETRACHLOROETHENE	127-18-4	ND	--	ND	--	ND	--
TOLUENE	108-88-3	3.29	0.00	ND	--	ND	--
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	--	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	--	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	--	--	--	--	--	--
Total VOCs	--	--	**0.194**	--	**0.090**	--	**0.028**
Period Total VOC Mass Removed (lbs)		**0.194**		**0.090**		**0.028**	
Cumulative Total VOC Mass Removed (lbs)		**10.65**		**10.74**		**10.77**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240430		CMR-SP200-240522		CMR-SP200-240620	
	Sample Date	4/30/2024		5/22/2024		6/20/2024	
	Effluent Volume (L)*	37,097		342,387		155,891	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
SVOCs							
1,2,4,5-TETRACHLOROBENZENE	95-94-3	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	--	--	--	--	--	--
1,3-DICHLOROBENZENE	541-73-1	--	--	--	--	--	--
1,4-DICHLOROBENZENE	106-46-7	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	ND	--	ND	--	ND	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	--	ND	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	--	ND	--	ND	--
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	--	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	62	0.0051	280	0.2113	26.30	0.0090
2-METHYLPHENOL	95-48-7	ND	--	ND	--	ND	--
2-NITROANILINE	88-74-4	ND	--	ND	--	ND	--
2-NITROPHENOL	88-75-5	ND	--	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--	ND	--
3-NITROANILINE	99-09-2	ND	--	ND	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--	ND	--
4-METHYLPHENOL	106-44-5	--	--	--	--	--	--
4-NITROANILINE	100-01-6	ND	--	ND	--	ND	--
4-NITROPHENOL	100-02-7	ND	--	ND	--	ND	--
ACENAPHTHENE	83-32-9	ND	--	17	0.0129	2	0.0008
ACENAPHTHYLENE	208-96-8	ND	--	ND	--	ND	--
ANTHRACENE	120-12-7	ND	--	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	--	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--	ND	--
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--	ND	--
CARBAZOLE	86-74-8	--	--	--	--	--	--
CHRYSENE	218-01-9	ND	--	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--	ND	--
DIBENZOFURAN	132-64-9	ND	--	ND	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--	ND	--
FLUORANTHENE	206-44-0	ND	--	ND	--	ND	--
FLUORENE	86-73-7	ND	--	ND	--	4	0.0013
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	--	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--	ND	--
ISOPHORONE	78-59-1	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	23	0.0019	119	0.0898	21	0.0071
NITROBENZENE	98-95-3	ND	--	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--	ND	--
PENTACHLOROPHENOL	87-86-5	ND	--	ND	--	ND	--
PHENANTHRENE	85-01-8	8	0.0007	21	0.0160	3	0.0009
PHENOL	108-95-2	ND	--	ND	--	ND	--
PYRENE	129-00-0	6	0.0005	5	0.00	ND	--
Total SVOCs	--	--	**0.008**	--	**0.3339**	--	**0.019**
Period Total SVOC Mass Removed (lbs)		**0.008**		**0.3339**		**0.019**	
Cumulative Total VOC Mass Removed (lbs)		**13.83**		**14.17**		**14.19**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240430		CMR-SP200-240522		CMR-SP200-240620	
	Sample Date	4/30/2024		5/22/2024		6/20/2024	
	Effluent Volume (L)*	37,097		342,387		155,891	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH							
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	75,800	6.20	79,600	60.08	34,100	11.72
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	62,000	5.07	44,800	33.82	22,300	7.66
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	205,000	16.77	224,000	169.08	80,600	27.70
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	343,000	28.05	348,000	262.68	137,000	47.08
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	343,000	28.05	348,000	262.68	137,000	47.08
Total EPHs	--	--	**28.05**	--	**262.68**	--	**47.08**
Period Total EPH Mass Removed (lbs)		**28.1**		**262.68**		**47.1**	
Cumulative Total EPH Mass Removed (lbs)		**2615.4**		**2878.0**		**2925.1**	
VPH							
BENZENE	71-43-2	--	--	--	--	--	--
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	1,010	0.08	1,750	1.32	ND	--
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	3,230	0.26	7,670	5.79	4,170	1.43
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	11,400	0.93	20,600	15.55	7,240	2.49
ETHYL BENZENE	100-41-4	--	--	--	--	--	--
M,P-XYLENE	179601-23-1	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	--	--	--	--	--	--
NAPHTHALENE	91-20-3	--	--	--	--	--	--
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--
TOLUENE	108-88-3	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS	TPH	16,100	1.32	30,500	23.02	11,500	3.95
Total VPHs	--	--	**1.32**	--	**23.02**	--	**3.95**
Period Total VPH Mass Removed (lbs)		**1.32**		**23.02**		**3.95**	
Cumulative Total VPH Mass Removed (lbs)		**220.8**		**243.9**		**247.8**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240711		CMR-SP200-240816		CMR-SP200-240924	
	Sample Date	7/11/2024		8/16/2024		9/24/2024	
	Effluent Volume (L)*	111,401		47,927		73,074	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
VOCs							
1,1,1-TRICHLOROETHANE	71-55-6	ND	--	ND	--	ND	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	ND	--	ND	--	ND	--
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ND	--	ND	--	ND	--
1,1,2-TRICHLOROETHANE	79-00-5	ND	--	ND	--	ND	--
1,1-DICHLOROETHANE	75-34-3	ND	--	ND	--	ND	--
1,1-DICHLOROETHENE	75-35-4	ND	--	ND	--	ND	--
1,2,3-TRICHLOROBENZENE	87-61-6	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ND	--	ND	--	ND	--
1,2-DIBROMOETHANE	106-93-4	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	ND	--	ND	--	ND	--
1,2-DICHLOROETHANE	107-06-2	ND	--	ND	--	ND	--
1,2-DICHLOROPROPANE	78-87-5	ND	--	ND	--	ND	--
1,3-DICHLOROBENZENE	541-73-1	ND	--	ND	--	ND	--
1,4-DICHLOROBENZENE	106-46-7	ND	--	ND	--	ND	--
1,4-DIOXANE	123-91-1	--	--	--	--	--	--
2-BUTANONE	78-93-3	ND	--	ND	--	ND	--
2-HEXANONE	591-78-6	ND	--	ND	--	ND	--
4-METHYL-2-PENTANONE	108-10-1	ND	--	ND	--	ND	--
ACETONE	67-64-1	ND	--	ND	--	ND	--
BENZENE	71-43-2	11.6	0.0028	2.4	0.0003	4.61	0.0007
BROMOCHLOROMETHANE	74-97-5	ND	--	ND	--	ND	--
BROMODICHLOROMETHANE	75-27-4	ND	--	ND	--	ND	--
BROMOFORM	75-25-2	ND	--	ND	--	ND	--
BROMOMETHANE	74-83-9	ND	--	ND	--	ND	--
CARBON DISULFIDE	75-15-0	ND	--	ND	--	ND	--
CARBON TETRACHLORIDE	56-23-5	ND	--	ND	--	ND	--
CHLOROBENZENE	108-90-7	ND	--	ND	--	ND	--
CHLOROETHANE	75-00-3	ND	--	ND	--	ND	--
CHLOROFORM	67-66-3	3.5	0.00	ND	--	ND	--
CHLOROMETHANE	74-87-3	ND	--	ND	--	ND	--
CIS-1,2-DICHLOROETHENE	156-59-2	ND	--	ND	--	ND	--
CIS-1,3-DICHLOROPROPENE	10061-01-5	ND	--	ND	--	ND	--
CUMENE	98-82-8	2.02	0.0005	ND	--	ND	--
CYCLOHEXANE	110-82-7	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	124-48-1	ND	--	ND	--	ND	--
DICHLORODIFLUOROMETHANE	75-71-8	ND	--	ND	--	ND	--
ETHYL BENZENE	100-41-4	9.73	0.0024	ND	--	2.06	0.0003
M,P-XYLENE	179601-23-1	--	--	--	--	--	--
METHYL ACETATE	79-20-9	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	ND	--	ND	--	ND	--
METHYLCYCLOHEXANE	108-87-2	--	--	--	--	--	--
METHYLENE CHLORIDE	75-09-2	ND	--	4.5	0.00	ND	--
NAPHTHALENE	91-20-3	88.5	0.0217	ND	--	12.9	0.0021
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--
STYRENE	100-42-5	ND	--	ND	--	ND	--
TETRACHLOROETHENE	127-18-4	ND	--	ND	--	ND	--
TOLUENE	108-88-3	ND	--	ND	--	ND	--
TRANS-1,2-DICHLOROETHENE	156-60-5	ND	--	ND	--	ND	--
TRANS-1,3-DICHLOROPROPENE	10061-02-6	ND	--	ND	--	ND	--
TRICHLOROETHENE	79-01-6	ND	--	ND	--	ND	--
TRICHLOROFLUOROMETHANE	75-69-4	ND	--	ND	--	ND	--
VINYL CHLORIDE	75-01-4	ND	--	ND	--	ND	--
XYLENES (TOTAL)	1330-20-7	--	--	--	--	--	--
Total VOCs	--	--	**0.028**	--	**0.001**	--	**0.003**
Period Total VOC Mass Removed (lbs)		**0.028**		**0.001**		**0.003**	
Cumulative Total VOC Mass Removed (lbs)		**10.79**		**10.79**		**10.80**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240711		CMR-SP200-240816		CMR-SP200-240924	
	Sample Date	7/11/2024		8/16/2024		9/24/2024	
	Effluent Volume (L)*	111,401		47,927		73,074	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
SVOCs							
1,2,4,5-TETRACHLOROBENZENE	95-94-3	ND	--	ND	--	ND	--
1,2,4-TRICHLOROBENZENE	120-82-1	ND	--	ND	--	ND	--
1,2-DICHLOROBENZENE	95-50-1	--	--	--	--	--	--
1,3-DICHLOROBENZENE	541-73-1	--	--	--	--	--	--
1,4-DICHLOROBENZENE	106-46-7	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	ND	--	ND	--	ND	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	ND	--	ND	--	ND	--
2,4,5-TRICHLOROPHENOL	95-95-4	ND	--	ND	--	ND	--
2,4,6-TRICHLOROPHENOL	88-06-2	ND	--	ND	--	ND	--
2,4-DICHLOROPHENOL	120-83-2	ND	--	ND	--	ND	--
2,4-DIMETHYLPHENOL	105-67-9	ND	--	10.0	0.0011	8.5	0.0014
2,4-DINITROPHENOL	51-28-5	ND	--	ND	--	ND	--
2,4-DINITROTOLUENE	121-14-2	ND	--	ND	--	ND	--
2,6-DINITROTOLUENE	606-20-2	ND	--	ND	--	ND	--
2-CHLORONAPHTHALENE	91-58-7	ND	--	ND	--	ND	--
2-CHLOROPHENOL	95-57-8	ND	--	ND	--	ND	--
2-METHYLNAPHTHALENE	91-57-6	34	0.0083	ND	--	ND	--
2-METHYLPHENOL	95-48-7	ND	--	ND	--	ND	--
2-NITROANILINE	88-74-4	ND	--	ND	--	ND	--
2-NITROPHENOL	88-75-5	ND	--	ND	--	ND	--
3,3'-DICHLOROBENZIDINE	91-94-1	ND	--	ND	--	ND	--
3-NITROANILINE	99-09-2	ND	--	ND	--	ND	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	--	ND	--	ND	--
4-BROMOPHENYL-PHENYL ETHER	101-55-3	ND	--	ND	--	ND	--
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	--	ND	--	ND	--
4-CHLOROPHENYL-PHENYL ETHER	7005-72-3	ND	--	ND	--	ND	--
4-METHYLPHENOL	106-44-5	--	--	--	--	--	--
4-NITROANILINE	100-01-6	ND	--	ND	--	ND	--
4-NITROPHENOL	100-02-7	ND	--	ND	--	ND	--
ACENAPHTHENE	83-32-9	ND	--	ND	--	ND	--
ACENAPHTHYLENE	208-96-8	ND	--	ND	--	ND	--
ANTHRACENE	120-12-7	ND	--	ND	--	ND	--
BENZO(A)ANTHRACENE	56-55-3	ND	--	ND	--	ND	--
BENZO(A)PYRENE	50-32-8	ND	--	ND	--	ND	--
BENZO(B)FLUORANTHENE	205-99-2	ND	--	ND	--	ND	--
BENZO(G,H,I)PERYLENE	191-24-2	ND	--	ND	--	ND	--
BENZO(K)FLUORANTHENE	207-08-9	ND	--	ND	--	ND	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	ND	--	ND	--	ND	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	ND	--	ND	--	ND	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	ND	--	ND	--	ND	--
BUTYLBENZYLPHTHALATE	85-68-7	ND	--	ND	--	ND	--
CARBAZOLE	86-74-8	--	--	--	--	--	--
CHRYSENE	218-01-9	ND	--	ND	--	ND	--
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	--	ND	--	ND	--
DIBENZOFURAN	132-64-9	ND	--	ND	--	ND	--
DIETHYLPHTHALATE	84-66-2	ND	--	ND	--	ND	--
DIMETHYLPHTHALATE	131-11-3	ND	--	ND	--	ND	--
DI-N-BUTYLPHTHALATE	84-74-2	ND	--	ND	--	ND	--
DI-N-OCTYLPHTHALATE	117-84-0	ND	--	ND	--	ND	--
FLUORANTHENE	206-44-0	ND	--	ND	--	ND	--
FLUORENE	86-73-7	ND	--	ND	--	ND	--
HEXACHLOROBENZENE	118-74-1	ND	--	ND	--	ND	--
HEXACHLOROBUTADIENE	87-68-3	ND	--	ND	--	ND	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	--	ND	--	ND	--
HEXACHLOROETHANE	67-72-1	ND	--	ND	--	ND	--
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	--	ND	--	ND	--
ISOPHORONE	78-59-1	ND	--	ND	--	ND	--
NAPHTHALENE	91-20-3	12	0.0029	ND	--	ND	--
NITROBENZENE	98-95-3	ND	--	ND	--	ND	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	ND	--	ND	--	ND	--
N-NITROSODIPHENYLAMINE	86-30-6	ND	--	ND	--	ND	--
PENTACHLOROPHENOL	87-86-5	ND	--	26	0.00	ND	--
PHENANTHRENE	85-01-8	11	0.0028	ND	--	4	0.0006
PHENOL	108-95-2	ND	--	ND	--	ND	--
PYRENE	129-00-0	5	0.0011	4	0.00	2	0.00
Total SVOCs	--	--	**0.015**	--	**0.0042**	--	**0.002**
Period Total SVOC Mass Removed (lbs)		**0.015**		**0.0042**		**0.002**	
Cumulative Total VOC Mass Removed (lbs)		**14.20**		**14.20**		**14.21**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

	Location	SP200		SP200		SP200	
	Ramboll Sample ID	CMR-SP200-240711		CMR-SP200-240816		CMR-SP200-240924	
	Sample Date	7/11/2024		8/16/2024		9/24/2024	
	Effluent Volume (L)*	111,401		47,927		73,074	
	Notes						
Analyte	**CAS No.**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**	**Result (ug/L)**	**Mass (lb)**
EPH							
C11 THROUGH C22 AROMATIC HYDROCARBONS	C11-C22-AROM	52,100	12.80	38,700	4.09	23,800	3.83
C19 THROUGH C36 ALIPHATIC HYDROCARBONS	C19-C36-ALIP	48,300	11.86	35,800	3.78	21,700	3.50
C9 THROUGH C18 ALIPHATIC HYDROCARBONS	C09-C18-ALIP	136,000	33.40	97,400	10.29	61,100	9.84
TOTAL EXTRACTABLE HYDROCARBON (POST FRACTIONATION)	68334-30-5S	236,000	57.96	172,000	18.17	107,000	17.24
TOTAL EXTRACTABLE HYDROCARBON	68334-30-5E	236,000	57.96	172,000	18.17	107,000	17.24
Total EPHs	--	**--**	**57.96**	**--**	**18.17**	**--**	**17.24**
Period Total EPH Mass Removed (lbs)		**58.0**		**18.17**		**17.2**	
Cumulative Total EPH Mass Removed (lbs)		**2983.1**		**3001.3**		**3018.5**	
VPH							
BENZENE	71-43-2	--	--	--	--	--	--
C5 THROUGH C8 ALIPHATIC HYDROCARBONS (ADJUSTED)	C05-C08-ALIP-J	1,020	0.25	ND	--	459	0.07
C9 THROUGH C10 AROMATIC HYDROCARBONS	C09-C10-AROM	16,400	4.03	4,250	0.45	7,970	1.28
C9 THROUGH C12 ALIPHATIC HYDROCARBONS (ADJUSTED)	C09-C12-ALIP-J	37,400	9.19	10,900	1.15	19,000	3.06
ETHYL BENZENE	100-41-4	--	--	--	--	--	--
M,P-XYLENE	179601-23-1	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	1634-04-4	--	--	--	--	--	--
NAPHTHALENE	91-20-3	--	--	--	--	--	--
ORTHO-XYLENE	95-47-6	--	--	--	--	--	--
TOLUENE	108-88-3	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS	TPH	54,900	13.48	15,300	1.62	27,400	4.41
Total VPHs	--	**--**	**13.48**	**--**	**1.62**	**--**	**4.41**
Period Total VPH Mass Removed (lbs)		**13.48**		**1.62**		**4.41**	
Cumulative Total VPH Mass Removed (lbs)		**261.3**		**262.9**		**267.3**	

Appendix D
Historical Analytical Results and Contaminant Mass Removal - Liquid
Calumet Montana Refining, LLC - Great Falls, Montana

Notes:

*Effluent volumes represent volume of groundwater extracted during the start-up (October 2021), commissioning (November 2021 - December 2021), and first quarter of standard operation (January 2022 - March 2022). Effluent volumes beginning April 2022 represent volume extracted during the month which the sample was taken.

1. Results from May 17, 2022 appear anomalously high and separate phase non-aqueous phase liquid was identified in the sampling jar; therefore, these results do not appear representative of dissolved phase concentrations and were rejected. Due to the rejected May 2022 results, the effluent volume associated with the April 2022 sampling event represents the volume recovered from April 1, 2022 - May 15, 2022 and effluent volume associated with the June 17, 2022 sampling event represents the volume recovered from May 16, 2022 through June 30, 2022.

2. Sample was not collected during September 2022, therefore results from August 2022 were used for mass removal calculations.

3. Sample was not collected during October 2022 and November 2022, therefore results from December 2022 were used for mass removal calculations.

4. April 2023 sample was collected on May 3, 2023

5. Samples were not collected during August and September 2023, therefore results from July 2023 were used for mass removal calculations

6. Samples were not collected during November 2023, therefore results from December 2023 were used for mass removal calculations

Sample Calculation

$$\boldsymbol{Mass\ Removed\ (lb) = 1800\ \frac{ug}{L} \times 10^{-6}\ \frac{g}{ug} \times \frac{1}{453.6}\ \frac{lb}{g} \times 21138\ L}$$

Abbreviations:

EPH : Extractable Petroleum Hydrocarbon
ND : Non Detect
SVOCs : Semi-volatile Organic Compounds
ug/L : micrograms per liter
VOCs : Volatile Organic Compounds
VPH : Volatile Petroleum Hydrocarbons

APPENDIX E
GROUNDWATER SAMPLING PURGE LOGS

Calumet Montana Refinery, LLC
Great Falls, Montana

Low Flow Groundwater Sampling Field Log

Monitoring Well - **MW-41S**

Sampling Information

Date (MM/DD/YY) - **9/12/2024**
Personnel - **Kyle Groves & Ashley Warner**
Weather - **Overcast, 54 degrees F, breezy**
Sampling Device - **Geotech Peristaltic Pump**

Pump on - **946**
Pump off - **1007**

Well Information

Well Casing PID - **--** ppm
Well Diameter - **2** inch
Screened Zone - **4 - 14** ft BGS

Measured Depth to Bottom - **16.53** ft BTOC
Depth to LNAPL - **---** ft BTOC
Depth to Water - **8.28** ft BTOC
Depth to Pump Intake - **13.0** ft BTOC

Well Evacuation Data

Stabilization Criteria			± 0.1 SU	± 3 %	± 10 % < 5 NTU	N/A	± 10 mV	± 10 % <0.5 mg/L	0.3 ft	
Time	**Vol.** L	**Rate** ml/min	**pH** Std	**Cond.** ms/cm	**Turb.** NTU	**Temp.** C	**ORP** mV	**DO** mg/L	**DTW** ft	**Appearance or Comments**
946	0.4	86	6.79	1.367	---	14.80	-59	0.46	---	
952	0.5	86	6.88	1.387	---	14.80	-100	---	---	
959	0.6	86	6.87	1.382	---	14.80	-110	---	---	
1004	0.4	86	6.85	1.372	---	14.90	-111	---	---	

Notes / Sample Information

Appearance at Start - **---**
Appearance After Purging - **---**

Sample ID - **CMR-MW-41S-240912**
Sample Time - **1007**

Total Volume Purged - **2.0** L
Purge Rate - **85.7** ml/min

Additional Sample - **None**
Additional Sample ID -

Analysis - VOCs (8260);
VPH (Montana VPH);
Modified Skinner Metals (6020B/7471B);
SVOCs (8270);
EPH (Montana EPH)

Equipment Information

Multi-Gas Meter / PID # - **NA**
Water Quality Meter # - **20B000237**

Oil / Water Interface Probe # - **NA**
Peristaltic Pump # - **NA**

Notes

Calumet Montana Refinery, LLC
Great Falls, Montana

Low Flow Groundwater Sampling Field Log

Monitoring Well - **MW-105**

Sampling Information

Date (MM/DD/YY) - **9/12/2024**
Personnel - **Kyle Groves & Ashley Warner**
Weather - **Overcast, 59 degrees F, breezy, damp**
Sampling Device - **Geotech Peristaltic Pump**

Pump on - **1302**
Pump off - **1327**

Well Information

Well Casing PID - **--** ppm
Well Diameter - **2** inch
Screened Zone - **5 - 10** ft BGS

Measured Depth to Bottom - **9.80** ft BTOC
Depth to LNAPL - **---** ft BTOC
Depth to Water - **6.06** ft BTOC
Depth to Pump Intake - **8.5** ft BTOC

Well Evacuation Data

Stabilization Criteria			± 0.1 SU	± 3 %	± 10 % < 5 NTU	N/A	± 10 mV	± 10 % <0.5 mg/L	0.3 ft	
Time	**Vol.** L	**Rate** ml/min	**pH** Std	**Cond.** ms/cm	**Turb.** NTU	**Temp.** C	**ORP** mV	**DO** mg/L	**DTW** ft	**Appearance or Comments**
1302	0.3	75	7.08	1.987	---	16.80	-122	0.69	---	
1307	0.4	75	6.98	1.865	---	16.90	-112	---	---	
1312	0.4	75	7.00	1.745	---	17.70	-94	---	---	
1322	0.8	75	7.18	1.569	---	17.30	-28	---	---	

Notes / Sample Information

Appearance at Start - **---**
Appearance After Purging - **---**

Sample ID - **CMW-MW105-240912**
Sample Time - **1327**

Total Volume Purged - **1.8** L
Purge Rate - **75** ml/min

Additional Sample - **None**
Additional Sample ID -

Analysis - VOCs (8260);
VPH (Montana VPH);
Modified Skinner Metals (6020B/7471B);
SVOCs (8270);
EPH (Montana EPH)

Equipment Information

Multi-Gas Meter / PID # - **NA**
Water Quality Meter # - **20B000237**

Oil / Water Interface Probe # - **NA**
Peristaltic Pump # - **NA**

Notes

Calumet Montana Refinery, LLC
Great Falls, Montana

Low Flow Groundwater Sampling Field Log

Monitoring Well - **MW-106**

Sampling Information

Date (MM/DD/YY) - **9/12/2024**
Personnel - **Kyle Groves & Ashley Warner**
Weather - **Overcast, 54 degrees F, rainy**
Sampling Device - **Geotech Peristaltic Pump**

Pump on - **1043**
Pump off - **1054**

Well Information

Well Casing PID - **--** ppm
Well Diameter - **---** inch
Screened Zone - **---** ft BGS

Measured Depth to Bottom - **12.37** ft BTOC
Depth to LNAPL - **---** ft BTOC
Depth to Water - **4.94** ft BTOC
Depth to Pump Intake - **8.0** ft BTOC

Well Evacuation Data

Stabilization Criteria			± 0.1 SU	± 3 %	± 10 % < 5 NTU	N/A	± 10 mV	± 10 % <0.5 mg/L	0.3 ft	
Time	**Vol.** L	**Rate** ml/min	**pH** Std	**Cond.** ms/cm	**Turb.** NTU	**Temp.** C	**ORP** mV	**DO** mg/L	**DTW** ft	**Appearance or Comments**
1043	0.4	78	7.06	1.714	---	15.10	-106	0.10	---	
1048	0.4	78	7.06	1.707	---	15.70	-113	---	---	
1053	0.4	78	7.06	1.700	---	16.10	-119	---	---	

Notes / Sample Information

Appearance at Start - **---**
Appearance After Purging - **---**

Sample ID - **CMR-MW106-240912**
Sample Time - **1054**

Total Volume Purged - **1.2** L
Purge Rate - **77.9** ml/min

Additional Sample - **None**
Additional Sample ID -

Analysis - VOCs (8260);
VPH (Montana VPH);
Modified Skinner Metals (6020B/7471B);
SVOCs (8270);
EPH (Montana EPH)

Equipment Information

Multi-Gas Meter / PID # - **NA**
Water Quality Meter # - **20B000237**
Oil / Water Interface Probe # - **NA**
Peristaltic Pump # - **NA**

Notes