TERMINAL 30 2024 ANNUAL SITE PERFORMANCE REPORT – YEAR 5 / 5-YEAR EVALUATION REPORT

Terminal 30 Site

December 2025

Port of Seattle

AECOM

Terminal 30 2024 Annual Site Performance Report – Year 5

Port of Seattle
Terminal 30 Site

Project number: 60681370

December 2025

Delivering a better world

Quality information

Prepared by	Approved by
	
Gus Friedman Environmental Engineer	Jamalyn Green Project Manager

Prepared for:

Port of Seattle

Prepared by:

AECOM
1111 Third Avenue
Suite 1600
Seattle, WA 98101
aecom.com

Copyright © 2025 by AECOM

All rights reserved. No part of this copyrighted work may be reproduced, distributed, or transmitted in any form or by any means without the prior written permission of AECOM.

Table of Contents

1. Introduction 1-1
2. Site Monitoring 2-1
   - 2.1 Site Monitoring Methods 2-1
   - 2.1.1 PSCAA Vapor Sampling Methods 2-1
   - 2.1.2 Free Product Gauging and Removal Methods 2-2
   - 2.1.3 Groundwater Sampling Methods 2-2
   - 2.2 Site Monitoring Deviations from the CMP 2-2
3. AS/SVE System Performance 3-1
   - 3.1 System Operation 3-1
   - 3.2 System Performance – Field Data 3-1
   - 3.3 Soil Vapor Gas Sampling 3-2
   - 3.3.1 Quality Assurance 3-2
   - 3.4 System Maintenance 3-2
   - 3.5 System Optimization 3-3
   - 3.5.1 AS/SVE Well Redevelopment 3-3
   - 3.5.2 AS Compressor Fault Management 3-3
   - 3.5.3 SVE Water Accumulation 3-3
4. Free Product Gauging and Recovery 4-1
   - 4.1 Free Product Gauging 4-1
   - 4.2 Free Product Removal 4-1
   - 4.3 Free Product Recovery Termination 4-2
5. Groundwater Sampling 5-1
   - 5.1 Performance Monitoring Wells 5-1
   - 5.2 Interior Monitoring Wells 5-2
   - 5.3 CPOC Monitoring Wells 5-2
   - 5.4 Shoreline Water Quality Monitoring Wells 5-2
   - 5.5 Quality Assurance 5-2
6. Year 5 Evaluation of Trends 6-1
   - 6.1 SVE Trends 6-1
   - 6.2 AS Trends 6-1
   - 6.3 AS/SVE Well Operation 6-1
   - 6.4 Groundwater Monitoring 6-1
   - 6.5 LNAPL Recovery Evaluation 6-2
   - 6.6 Water production 6-2
7. Conclusions and Recommendations for CMP Modifications 7-3
   - 7.1 Conclusions and Operational Recommendations 7-3
   - 7.2 Recommendations for CMP Modifications 7-3
   - 7.3 Schedule and Reporting 7-4
8. References 8-1

Tables

Table 1 – Indicator Hazardous Substances
Table 2 – Compliance Monitoring Frequency and Analytes
Table 3 – Compliance Monitoring Schedule
Table 4 – AS/SVE and Oxidizer Operational Data
Table 5 – AS/SVE and Oxidizer Analytical Data
Table 6 – LNAPL Gauging and Recovery Results
Table 7 – LNAPL Gauging Results in Monitoring Wells
Table 8 – Performance and Interior Monitoring Well Groudwater Analytical Data
Table 9 – COPC and Shoreline Water Quality Monitoring Well Groundwater Analytical Data – TPH and BTEX
Table 10 –COPC and Shoreline Water Quality Monitoring Well Groundwater Analytical Data – PAH
Table 11 – Monitoring Well Groundwater Sampling Parameters
Table 12 – Well Construction Information

Figures

Figure 1 – Site Location
Figure 2 – Baseline Extent of Impacts and Location of Cleanup Action
Figure 3 – Compliance Monitoring Well Network With Final 2024 Groundwater Conditions
Figure 4 – End of 2024 Compliance Monitoring Analytical Results
Figure 5 – Period VOC Removal Rates
Figure 6 – Cumulative VOC Mass Removal
Figure 7 – LNAPL Thickness in Recovery Wells
Figure 8 – LNAPL Thickness in Monitoring Wells
Figure 9 – LNAPL Recovery Volumes
Figure 10 – Cumulative LNAPL Recovery Volume
Figure 11 – Performance Monitoring Well TPH-Dx Concentrations

Appendices

Appendix A – O&M Field Forms
Appendix B – Vapor Sampling Field Forms
Appendix C – Vapor Sampling Laboratory Analytical Reports
Appendix D – Vapor Sampling Summary Data Quality Review Reports
Appendix E – LNAPL Gauging and Recovery Field Notes
Appendix F – Groundwater Sampling Field Forms
Appendix G – Groundwater Sampling Laboratory Analytical Reports
Appendix H – Groundwater Sampling Summary Data Quality Review Reports
Appendix I – Select Figures from the Groundwater Compliance Monitoring Plan

Acronyms and Abbreviations

µg/L	microgram per liter
AECOM	AECOM Technical Services, Inc.
AS	air sparging
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CAP	Cleanup Action Plan
CD	Consent Decree
CMP	Groundwater Compliance Monitoring Plan
cPAH	carcinogenic polynuclear aromatic hydrocarbon
CPOC	conditional point of compliance
COI	contaminant of interest
COC	contaminant of concern
CRETE	CRETE Consulting
CUL	cleanup level
DO	dissolved oxygen
DTW	depth to water
EC	equivalent carbons
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EPA	United States Environmental Protection Agency
ft	foot/feet
GAC	granular activated carbon
GFCI	ground fault circuit interrupter
H2K	H2K Solutions Inc.
IHS	indicator hazardous substance
ITRC	Interstate Technology and Regulatory Council
KOT	knock-out tank
LCS/LCSD	laboratory control sample/ laboratory control sample duplicate
LNAPL	light non-aqueous phase liquid
MDL	method detection limit
MEP	maximum extent practicable
MNA	monitored natural attenuation
MRL	method reporting limit
MS/MSD	matrix spike/ matrix spike duplicate
NAD83	North American Datum of 1983 (horizontal)
NAVD88	North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
NOC	notice of construction
NSZD	natural source zone depletion
ORP	oxidation-reduction potential
PAH	polynuclear aromatic hydrocarbon
PGG	Pacific Groundwater Group
PID	photoionization detector
Port	Port of Seattle
PPMV	parts per million by volume
PSCAA	Puget Sound Clean Air Agency
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RI/FS	Remedial Investigation/Feasibility Study
REL	remediation level
RPD	relative percent difference
scfm	standard cubic feet per minute
SOP	standard operating procedure
SVE	soil vapor extraction
T30 or Site	Terminal 30

TEF	toxicity equivalency factor
TEQ	toxic equivalent concentration
Tn	transmissivity
TPH	total petroleum hydrocarbons
TPH-Dx	total petroleum hydrocarbons – diesel and lube oil range
TPH-Gx	total petroleum hydrocarbons – gasoline range
VOC	volatile organic compound
WAC	Washington Administrative Code

1. Introduction

In 2019 the Port of Seattle (Port), under the oversight of Washington State Department of Ecology (Ecology), completed construction of the selected cleanup action alternative at Terminal 30 (T30, Site), located at 1901 East Marginal Way South in Seattle, Washington (Figure 1), to satisfy requirements of the Consent Decree (CD) between Ecology and the Port, filed July 19, 2017 (Ecology, 2017). Details of the construction action are documented in the Construction Completion Report (CRETE, 2020a). The selected cleanup action remedy for the Site includes an Air Sparging/Soil Vapor Extraction (AS/SVE) system, free product recovery, and compliance monitoring. The construction of the cleanup remedy was completed from July 6, 2019, through November 9, 2019, and cleanup elements included the installation of 3 horizontal SVE wells, 7 vertical SVE wells, 27 AS wells, 10 light non-aqueous phase liquid (LNAPL) recovery wells, an AS/SVE system, and a vapor treatment thermal oxidizer. The purpose of the AS/SVE system is to reduce contaminant mass in shallow groundwater within, and downgradient of, the sheen area. Groundwater flows generally west towards the East Waterway, as shown in Figure 1 of Pacific Groundwater Group's (PGG) 2016 Tidal Study, included as Appendix B of the RI/FS (PGG, 2016), and also included in Appendix A of the Groundwater Compliance Monitoring Plan (CMP) within Appendix E of the Engineering Design Report (EDR) (CRETE 2018). The purpose of free product recovery is to reduce free product thickness to a sheen (less than 0.01 feet). The footprint of the cleanup action is shown on Figure 2.

On September 17, 2021, remedial system operation and compliance monitoring were transferred from CRETE Consulting, Inc (CRETE) to AECOM Technical Services, Inc. (AECOM) by the Port. This annual report (Annual Report) was prepared by AECOM on behalf of the Port and was completed using data collected by AECOM in 2024. This represents the fifth year of monitoring, referenced as Year 5 in this Annual Report. This Annual Report is based on the monitoring requirements in the CMP and Quality Assurance Project Plan (QAPP) included as Appendix E of the Engineering Design Report (CRETE, 2018). This Annual Report provides the operation and monitoring results for site cleanup actions conducted during Year 5, including performance and confirmational sampling data associated with the operation and monitoring of the AS/SVE system. Groundwater data is compared against site cleanup levels (CULs) and remediation levels[1] (RELs), while AS/SVE system vapor data is compared against criteria identified in the Puget Sound Clean Air Agency (PSCAA) notice of construction (NOC) worksheet (Puget Sound Clean Air Agency, 2019).

[1] The EDR and CMP describe development of groundwater CULs and RELs for the Site.

2. Site Monitoring

The Site cleanup action monitoring plan is detailed in the CMP and summarized in this section. Monitoring includes AS/SVE system performance monitoring, PSCAA vapor compliance sampling, free product gauging and removal, and groundwater sampling.

The AS/SVE system operation and maintenance activities include system checks and collection of PSCAA vapor samples to verify that emissions are below acceptable limits.

Free product-related activities in Year 5, including product thickness gauging and product recovery, were completed at 9 wells across the Site (Figure 3, Table 6). Groundwater monitoring was completed at 15 wells in Year 5, including the Performance, Interior, and CPOC wells listed below. The groundwater monitoring wells are also shown on Figure 3 and are grouped as follows:

- **Performance Monitoring Wells** (within the AS/SVE field zones): MW-59, RW-11A, and MW-89
- **Performance Monitoring Wells** (downgradient of AS/SVE field zones): MW-36A, RW-9, MW-39A, and MW-42
- **Interior Monitoring Wells**[2]: RW-1, RW-5A, MW-93
- **Conditional Point of Compliance (CPOC) Monitoring Wells**: MW-45A, MW-46B, MW-58A, MW-86B, and MW-92
- **Shoreline Water Quality Monitoring Wells**: MW-84A, MW-85A, MW-86B, and MW-87A
- **Free Product Gauging**: MW-59, RW-12, RW-101-110, MW-36, MW-39A, MW-89, and MW-93
- **Interior Monitoring Wells** (Gauging Only): MW-35, MW-36, MW-54, and MW-64

Samples from groundwater monitoring wells are analyzed for Site Indicator Hazardous Substances (IHSs) (Table 1). Samples are collected from Performance, select Interior, CPOC, and Shoreline Water Quality monitoring wells according to the compliance monitoring phase and sampling plan. Water quality samples are not collected from free product gauging wells, monitoring wells with free product present, and Interior monitoring wells listed above as gauged only. The frequency of groundwater monitoring varies by well group and by compliance monitoring phase (Table 2 and Table 3). Compliance monitoring is divided into three sequential phases:

- Baseline Monitoring – A full round of compliance well gauging and sampling that occurred shortly before or during start-up of the AS/SVE system and initiation of free product recovery activities (completed in October 2019 and summarized in the 2020 Annual Report).
- Performance Monitoring (current monitoring phase) – Compliance well gauging and sampling that occurs during, and for 2 years following the completion of, AS/SVE system operation and free product recovery to determine whether rebound occurs and if further cleanup actions are needed to achieve RELs.
- Confirmational Monitoring – Long-term compliance well gauging and sampling that occurs once RELs and CULs have been achieved in performance and CPOC monitoring wells.

Table 3 illustrates the monitoring schedule by compliance monitoring phase.

2.1 Site Monitoring Methods

Samples were collected in accordance with the CMP and QAPP (CRETE, 2018). This section provides an overview of sampling and product gauging and recovery methods and discusses any deviations from the CMP.

2.1.1 PSCAA Vapor Sampling Methods

Vapor samples were historically collected from two dedicated sampling ports on the treatment system before the oxidizer (SVE effluent) and after (oxidizer effluent). After the disconnection of the oxidizer in March 2023, vapor samples

[2] MW-38 was removed from the Interior Monitoring Well network due to subsurface blockage in 2020 and it was decommissioned in 2021. More information is included in Section 2.2.

have only been collected from the SVE effluent sample port. Samples are collected with laboratory-provided Summa® canisters, which when opened create a negative pressure, drawing the sample stream into the sample canister. Low-density polyethylene (LDPE) tubing is used to connect the sampling port to the sample canister.

Data from the vapor samples are used to evaluate SVE performance and determine TPH and BTEX mass removal calculations. The results of these sampling efforts are discussed in Section 3.2.

2.1.2 Free Product Gauging and Removal Methods

Free product removal is completed using a vacuum truck. The vacuum truck uses a multi-lobed positive displacement blower to create a vacuum in the attached holding tank. This tank vacuum in turn pulls fluids through the attached hoses and/or piping. During removal, a down-well "stinger" or pipe is inserted into the well to the target level just below the measured bottom of free product. Prior to 2021 a drum vacuum was used for these removals, but the method was revised to vacuum truck due to its increased efficiency removing fluids (oil and water) from the target wells. Free product removal activities completed during 2024 were in accordance with standard operating procedure (SOP) 505 from the Operation Maintenance & Monitoring Plan (CRETE, 2020b).

2.1.3 Groundwater Sampling Methods

Groundwater samples were collected using the Environmental Protection Agency (EPA) Low-Flow Groundwater Sampling Procedure (US EPA, 2017), detailed in the CMP. Groundwater wells were gauged prior to purging. This information was used to verify that no free product was present and to determine the inlet placement depth for the groundwater sampling tubing. The inlet was maintained near the midpoint of the saturated well screen interval. For wells with significant tidal influence, the inlet was placed at least 2 feet from the bottom of the well. During purging field parameters (temperature, specific conductance, and pH) were measured to determine when conditions had stabilized, indicated by recording three consecutive field parameter measurements measured in 2-minute intervals or greater. Groundwater samples were collected with low-flow pumping rates (approximately100 to 200 mL/min) to minimize volatilization of constituents. All water samples were collected from the pump discharge lines directly into appropriate laboratory-provided sample containers. Samples submitted for dissolved analyses were filtered in the laboratory using 0.45-micron filters. Sampling equipment was either decontaminated between monitoring wells (such as the water level tape) or new dedicated materials were used (such as tubing and gloves).

A subset of wells at T30 are sufficiently tidally influenced that they require sampling at specific times to reduce tidal influence on groundwater chemistry. Best practice per the Tidal Study (PGG, 2016) includes sampling at the tidal lag times to ensure a representative sample. Below is a summary of tidal lag times[3]. Note that the CPOC and Shoreline Water Quality Monitoring Wells listed below were not required to be sampled during this reporting period:

- Performance Monitoring Well MW-89: 130-190 minutes after low-low tide.
- CPOC Monitoring Well MW-58A: 70-130 minutes after low-low tide.
- CPOC Monitoring Well MW-86B: 130-190 minutes after low-low tide.
- Shoreline Water Quality Monitoring Wells (MW-84A, MW-85A, MW- 87A): 130-190 minutes after low-low tide.
- All other CPOC, performance, and interior monitoring wells have limited tidal influence and do not require coordinating sampling time with tidal lag.

2.2 Site Monitoring Deviations from the CMP

Deviations from the groundwater CMP included the following:

- The CMP does not require LNAPL gauging outside of the planned recovery and sampling events. However, consistent with previous years, LNAPL gauging was executed on monthly basis throughout Year 5.
- LNAPL recovery events were conducted once per quarter during Year 5 per approval by Ecology via e-mail on December 7, 2022.

There were no other deviations from the CMP during the reporting period.

[3] Low-low tide is as measured at National Oceanic and Atmospheric Administration (NOAA) Tide Station ID: 9447130

3. AS/SVE System Performance

This section summarizes the AS/SVE system performance for Year 5. The AS/SVE system equipment requires routine maintenance, which was performed by Port of Seattle Marine Maintenance staff (Marine Maintenance) on a monthly basis. The system also requires routine performance monitoring and adjustments to achieve optimal VOC removal. AECOM performed monitoring visits twice per month throughout Year 5.

Performance monitoring field forms are included in Appendix A. A layout of the AS/SVE system components is included on Figure 2.

3.1 System Operation

The SVE system ran for 8,274 hours during this reporting period, an operation rate of approximately 95% after accounting for intentional downtime for system maintenance and LNAPL activity. The cumulative runtime since startup was approximately 38,395 hours at year-end (Table 4). The AS system operated for 7,167 hours in Year 5, with > 3,000 hours of intentional downtime when only Zone 5 was operated, pulsing on and off. The result is an effective operational rate of >95% as well. This continues the upward trend in sparge operation, up from 86% in year 4 and 65% in Year 3. The sparge system has a cumulative runtime total of 25,359 hours since startup.

During this reporting period, emission rates remained below the 2.74 lb/day (1000 lb/year) TPH PSCAA emission limit as calculated by analytical or field data. The average emission rate for was approximately 0.08 lb/day (32 lb/year) by either data set. As shown in Table 5, BTEX removal rates were also well below PSCAA emission limits.

From January to May 2024, air sparging delivery was focused on Zone 5 to target the remaining known dissolved COCs. The October 2023 groundwater monitoring results showed that MW-59, located in Zone 5, was the only sampled monitoring well with elevated COC concentrations. Results from the subsequent sampling event in April 2024 indicated that in addition to MW-59 the TPH-Dx concentration at RW-11A, located in Zone 4, was also above the REL (see Section 5.1 for further detail). In response, in May 2024 sparging system programming was adjusted to alternate pulsing between Zone 4 and Zone 5.

The sparging system programming was focused back to Zone 5 only in December 2024 after the analytical results from the November 2024 sampling showed the RW-11A dissolved TPH-Dx concentrations had dropped back below the CUL. The sparging manifolds were rearranged to put one Zone 5 well on each of the five manifolds and the programming was adjusted to pulse between each manifold, effectively pulsing between each Zone 5 well. The goal was to increase flow to all Zone 5 wells but primarily to target AS-25, which has historically received the lowest flows of the zone (2-4 standard cubic feet per minute (scfm)). AS-25 is adjacent to MW-59, which was the last remaining well exceeding a COC REL. Results from this effort were not available prior to the end of the reporting period.

3.2 System Performance – Field Data

The field data from the biweekly system performance system inspections are presented in Table 4. Data collected includes flows, operating temperatures, pressure and vacuum levels, and VOC concentrations in the SVE effluent via photoionization detector (PID). Mass removal rates were calculated based on VOC concentrations and the SVE flow. The analytical data from Table 5 are used for the VOC concentrations for the days that a sample was taken; for non-sampling site visits, the concentration is an adjustment of the PID reading based on the ratio of the most recent lab result to its corresponding PID reading. This is further explained in Note 4 of Table 4.

For this reporting period, the removal rate ranged from 0.008 pounds (lb) per day (November 14, 2024) to 0.2 lb per day (August 22, 2024) (see Table 4 and Figure 5). The total mass removed for the year is approximately 29 lb. An asymptotic curve for VOC removal is illustrated on Figure 6, which provides cumulative VOC mass removal through the end of Year 5. In the first three months of system operation following system startup in 2019, the average VOC removal was 423 lb/month. This increased to 552 lb/month of operation in 2020, and has steadily decreased since, down to 7.4 lb/month in 2023 and 2.4 lb/month in 2024. See Figure 5. The cumulative VOC mass removal from startup through the end of this reporting period, as calculated with the field data, is 9,985 lb.

The PSCAA permit requires the SVE flow to remain below 375 standard cubic feet per minute (scfm); all readings from this reporting period were below this limit (Puget Sound Clean Air Agency, 2019). The 2024 flows ranged from 153 scfm (January-March 2024) to 212 scfm (June 2024), with an average flow of 179 scfm (Table 4).

3.3 Soil Vapor Gas Sampling

Soil gas samples were collected on a quarterly basis throughout the reporting period. This was done to demonstrate compliance with PSCAA emissions requirements and to track system operation to optimize mass removal (Puget Sound Clean Air Agency, 2019). Gas samples were collected at the SVE outlet in a 1-liter summa cannister. The samples were delivered to Friedman and Bruya, Inc., located in Seattle, Washington, for analysis of petroleum hydrocarbons by method MA-APH and BTEX by method TO15. The MA-APH method provides data for three petroleum subgroups (EC 5-8 aliphatics, EC 9-12 aliphatics, and EC 9-10 aromatics) that are summed for a TPH estimate. These are the TPH concentrations reported in Table 5. The PSCAA permit requirements are outlined above in Section 3.2.

Soil vapor samples were collected on: 3/28/2024, 6/7/2024, 9/20/2024, and 12/19/2024. The analytical data for all samples are presented in Table 5 and are incorporated, with field data, in Figure 5 and Figure 6. Vapor sampling field forms are provided in Appendix B. Laboratory analytical reports are provided in Appendix C.

Laboratory results for the influent samples indicate that 31.1 lb of TPH were extracted from the subsurface in 2024, with 7,786.9 lb extracted cumulatively since startup. In the first three months of operation in 2019 following system startup, the average lab-analyzed TPH removal was 604 lb/month. The monthly mass removal has decreased every year since, down to an average of 7.0 lb/month in 2023 and 2.6 lb/month in 2024.

3.3.1 Quality Assurance

All vapor samples collected in 2024 were delivered to Friedman & Bruya Inc. located in Seattle, Washington. Laboratory reports were reviewed and reporting flags, when applicable, were accepted and are included in Table 5. Per the Summary Data Quality Reviews in Appendix D, all laboratory quality assurance metrics were achieved for this project, the method reporting limits (MRLs) met the project needs for all analytes, and all data were determined to be usable. Laboratory reports and chain-of-custody forms are provided in Appendix C.

3.4 System Maintenance

Notable system maintenance performed during Year 5 are summarized below. They are documented in Table 4. Routine machinery maintenance was completed by Marine Maintenance, which included changing oil, greasing components, checking and replacing filters, checking and replacing belts, and checking levels in moisture separator tanks.

- Air sparging system:
  - No significant equipment maintenance or replacement was required this reporting period.
  - See Section 3.5.1 for AS-25 redevelopment.
- SVE system:
  - Heat trace on the knock-out tank (KOT) transfer pipe failed in January 2024, resulting in frozen pipe and 12 days system downtime. Replaced by Marine Maintenance and upgraded with pipe insulation.
  - HSVE-2 vapor sample port replaced in April 2024 following failure due to normal wear and tear.
  - Boken ground fault circuit interrupter (GFCI) prevented manifold vapor readings for one month until Marine Maintenance was able to provide a replacement.
  - Heat trace on the KOT transfer pipe failed in November 2024 and was replaced by Marine Maintenance in December 2024.
- General:
  - Various rotameters and gauges replaced throughout the year due to normal wear and tear.

3.5 System Optimization

3.5.1 AS/SVE Well Redevelopment

The total air sparge flow in Zone 4 was approximately 5-16 scfm between May and December 2024. This was below the designed total of 36 scfm and was also less than the 15-50 scfm observed in other zones. This was primarily due to wells AS-17, -18, -19, and -21, which typically only received 0-1 scfm. AS-25 and SVE-9 in Zone 5 were also receiving significantly lower flows than the other wells in the zone. Well logs show that the sparge wells were all completed to 25 ft below ground surface (bgs), with two feet of screen in each from 23 to 25 ft bgs. The SVE wells were installed to 10 ft bgs and screened 5-10 ft bgs. Between September and December, AECOM collected depth-to-bottom measurements at a number of these wells to determine if the well screens had silted in to prevent airflow. The results were as follows, in feet of silt inferred by calculating the difference between the total depth on the well log and the depth to bottom measured in the field. Measurements were collected on September 12 (AS-18 and SVE-9), October 10 (AS-19 and AS-20), and December 12 (AS-25).

- AS-18: 2.0 ft
- AS-19: 7.25 ft
- AS-20: 0.15 ft
- AS-25: 0.25 ft
- SVE-9: <0.25 ft

The silt depths in AS-18 and AS-19 are likely factors in the low flow rates observed at those wells. Well redevelopment techniques were explored to remove the built-up silt. The low flow rates at AS-20 and AS-25 remained harder to explain based on the results, but silting buildup within the sandpack around the screened interval would also be improved by redevelopment activity to increase flow.

The sparging schedule was adjusted in December to focus on Zone 5 after the November groundwater sampling results indicated that the Zone 4 wells were below cleanup levels. As a result, system operation in the Zone 4 sparging wells was tabled. Redevelopment attempts moved forward at AS-25 despite the minimal silt build-up within the well for three reasons: 1) to remove the 0.25 ft of silt in the well; 2) to clear any clogging of the sandpack around the screened interval; 3) and to confirm the viability of the selected hand-surging plus vacuum truck technique for well redevelopment at the Site. Well AS-25 was redeveloped on December 12 using HDPE tubing with a foot valve and surge block to agitate the screened interval and pump out water. This was followed by full clearance of the well via vacuum truck. After the well had sufficiently recharged, the process was repeated. After the two rounds, silt removal was confirmed with the DTB measured 0.25 ft lower than the initial, and redevelopment was concluded. Unfortunately, when the AS/SVE system was restarted there was not a significant difference in flow observed at AS-25. Nevertheless, the technical approach was ultimately determined to be successful and recommendable should additional wells need to be redeveloped in the future. AS-25 flow rates will continue to be monitored to assess any longer-term impacts of the redevelopment.

3.5.2 AS Compressor Fault Management

Motor overload monitoring continued for the air sparge compressor during Year 5. However, fault-causing conditions were managed to prevent system downtime.

3.5.3 SVE Water Accumulation

While water accumulation from the SVE system was a significant maintenance issue in prior years, it was not a significant issue during Year 5. This is likely at least partially attributed to previous efforts made to decrease vacuum and add elevated loops to aboveground air hoses to prevent low points for accumulation. In May 2024, biweekly dewatering efforts were expanded to include the buried lateral pipes in addition to the manifold deadlegs. Access to the lateral pipes was achieved via ball valves added to the lateral stub-up caps inside the system compound. Recovery was conducted via peristaltic pump and HDPE tubing.

Consistent with their location in Zone 5 and the remaining LNAPL plume, the water removed from the SVE-9 and SVE-10 piping frequently had odor, coloration, and appearance indicative of product.

4. Free Product Gauging and Recovery

Free product gauging and recovery events have been executed in accordance with the CMP since January 2020, shortly after system startup. Events were completed on a monthly schedule until November 2020, when the product recovery frequency was reduced from monthly to bimonthly. The recovery frequency was further reduced to quarterly in October 2022. Product gauging has been maintained on a monthly schedule throughout. Year 5 began and ended with eight wells in the gauging/recovery protocol, with MW-35, and RW-1, -12, -103, -106, -107, and -110 consistent throughout. MW-59 was removed from the protocol following the January 2024 gauging, when it achieved one year of gauging results with product thicknesses less than 0.01 ft. MW-36 had been out of the monthly monitoring protocol since December of 2022, but was returned to the protocol after LNAPL was measured >0.01 ft during its biannual gauging in December 2024.

4.1 Free Product Gauging

As shown in Figure 7 and Figure 8, LNAPL thickness trends in 2024 were generally stable or decreasing with an outlier spike in RW-106 and RW-107 in March. LNAPL was thickest in the recovery wells at the southernmost end of the AS and SVE wellfield, farthest away from the remediation system (see Figure 2). Free product thicknesses and maxima since startup are reported in Tables 6 and 7 and summarized below. See Section 4.3 for further information of recovery well termination.

- **MW-35** LNAPL thickness ranged from 0.00-0.51 ft (multiple occasions and 12/12/24, respectively). This is down from a historical max of 0.52 ft on 10/8/20.
- **MW-36**, which had been out of the monthly monitoring protocol since December of 2022, is gauged biannually per the CMP. This gauging, executed December 12, 2024, resulted in 0.03 ft of LNAPL measured in the well. The historical max is 1.00 ft on 6/19/20.
- **RW-1** LNAPL thickness ranged from 0.01-0.21 (6/13/24 and 11/14/24, respectively). This is down from a historical max of 0.59 ft on 6/19/20.
- **RW-12** LNAPL thickness ranged from 0.03-0.30 ft (11/14/24 and 8/8/24, respectively). This is down from a historical max of 0.78 ft on 3/12/20 and 5/16/20.
- **RW-103** LNAPL thickness ranged from 0.00-0.25 ft (multiple occasions and 5/9/24, respectively). This is down from a historical max of 1.74 ft on 9/10/20.
- **RW-106** LNAPL thickness ranged from 0.00-2.84 ft (11/14/24 and 3/14/24 respectively). This exceeds the previous historical max of 2.09 ft on 11/10/22 but was an outlier in 2024. The next highest measurements for the year were 1.13 ft and 0.58 ft (5/9/24 and 6/13/24, respectively)
- **RW-107** LNAPL thickness ranged from 0.00-1.32 ft (2/8/24 and 3/14/24, respectively). This is down from a historical max of 2.49 ft on 10/8/20. In line with RW-106, 1.32 ft during the March event was also an outlier for RW-107 in 2024. The next highest measurements were 0.55 ft and 0.53 ft (11/14/24, and 5/9/24, respectively).
- **RW-110** LNAPL thickness ranged from 0.00-0.30 (multiple occasions and 3/14/24, respectively). This is down from a historical max of 0.46 ft on 7/28/20.

During the 2024 LNAPL gauging and recovery events, LNAPL was measured for, but not encountered in, the following wells:

- **MW-59** (historical max of 2.19 ft on 1/9/20). This well was retired from regular gauging following the January event after achieving four consecutive quarters of LNAPL measurements less than 0.01 ft.

LNAPL thickness was also measured at each groundwater sampling well during the groundwater sampling events (discussed in Section 5).

4.2 Free Product Removal

Year 5 LNAPL removal was conducted on a quarterly basis using a vacuum truck as discussed in Section 2.1.2. Table 6 provides a summary of the data collected during the free product removal events since the baseline in October 2019. Approximately 54 gallons of free product were removed from the 8 wells listed above over the four events executed in

Year 5. This was down from 91 gallons over four events in 2023. Approximately 994 gallons of free product have been removed cumulatively since removals began in January 2020. These volumes are approximations due to the difficulties inherent in measuring LNAPL volume after it separates within the holding tank on the vacuum truck. Detailed gauging tables providing results of the removal events are included Appendix E.

As shown in Figure 9, the volume of LNAPL recovered per event leveled out in Year 5, ranging from 11.11 gallons (September) to 16.09 gallons (March) recovered. This was a decrease from Year 4, which averaged 23 gallons and marked the lowest annual volume since system startup. Figure 10 shows the cumulative LNAPL recovery since system startup. The LNAPL thickness trends on a well-by-well basis are described above in Section 4.1 and shown in Figure 7 and Figure 8.

4.3 Free Product Recovery Termination

Free product recovery at an individual well can be terminated when product thickness has been reduced to less than a measurable thickness of 0.01 ft for a period of one year. This recovery termination criterion will result in sequential removal of recovery wells from recovery events as the area with measurable free product shrinks. Wells RW-101 through RW-110 will be left in place for one year after the last well meets the termination criteria, after which they will be decommissioned consistent with Washington Administrative Code (WAC) 173-160. During 2024, only MW-59 met these termination requirements, and it was retired from regular gauging following the January event.

5. Groundwater Sampling

During Year 5, two groundwater performance monitoring events were conducted. The first event was completed on April 11, 2024, for the performance wells within AS/SVE system radius of influence (MW-59, RW-11A, and MW-89). The second was on November 14 - 15, 2024, and included the performance wells both within and downgradient of the AS/SVE system radius of influence (MW-59, RW-11A, MW-89, MW-36A, MW-39A, RW-9, and MW-42), as well as interior monitoring wells (MW-93, RW-1, and RW-5A) and CPOC wells (MW-45A, MW-46B, MW-58A, MW-86B, and MW-92). The shoreline wells were not scheduled for sampling. Table 2 includes a summary of the sampling program and Table 3 includes the monitoring schedule.

Groundwater samples were collected and analyzed consistent with the protocols outlined in the CMP. All wells were analyzed for TPH in the gasoline range (TPH-Gx) via NWTPH-Gx, TPH in the diesel and lube oil range (TPH-Dx) via NWTPH-Dx, and BTEX by EPA Methods 8021B and 8260. Additionally, the CPOC wells were analyzed for polycyclic aromatic hydrocarbons (PAHs) and 2-methylnaphthylene via EPA Method 8270. Groundwater results are summarized in Tables 8-10 and on Figure 4. TPH-Dx data are also shown on Figure 11. Water quality parameters including temperature, pH, specific conductance, turbidity, dissolved oxygen (DO) and oxidation-reduction potential (ORP) were measured and recorded continually during purging until stable, representative conditions were met prior to sampling. Results for these water quality parameters are provided in Table 11. Copies of Year 5 sampling field forms are included in Appendix F and laboratory analytical reports are provided in Appendix G.

Per the CMP, any monitoring well with LNAPL present becomes qualified for sampling once four consecutive quarters of gauging data are collected with product thickness detected <0.01 ft (Table 2, Note 2). By the end of 2024, the only remaining well this is applicable to was Interior Monitoring Well RW-1, which had product present every month of 2024. Well RW-1 was not sampled in 2024 due to the presence of free product. The presence of free product is assumed to indicate TPH concentrations above site cleanup goals.

This section provides an overview of groundwater sampling activities at the wells shown on Figure 3 and Figure 4. Construction information and all analytical results and field parameters since system startup are summarized in Tables 8 through 12.

5.1 Performance Monitoring Wells

As shown in Table 8 and Figure 4, the only Performance wells still exceeding a COC CUL in 2024 were for TPH-Dx (500 µg/L): MW-59 (April and November); and RW-11A (April). These samples also exceeded the TPH-Dx REL of 2,085 µg/L. For reference, the remediation system is to be operated until Performance Monitoring Wells within and downgradient of the AS/SVE system (RW-9, RW-11A, MW-42, MW-39A, MW-36A, MW-59, and MW-89) achieve the RELs, or if the AS/SVE system is no longer significantly removing contaminant mass.

MW-59 had not been sampled for performance monitoring purposes since system startup due to the presence of LNAPL in the well. Results from a September 2020 sample are included in Table 4, but product had been measured in the well within the previous four quarters and the well was not qualified for performance sampling at the time (see Table 6). In January 2024, the well achieved four quarters of LNAPL results below 0.01 ft thickness, and it became eligible for performance sampling. The April 2024 sampling event results for TPH-Dx were above the REL (17,770 µg/L and a duplicate sample of 23,620 µg/L), The November 2024 sampling event results for TPH-Dx were also above the REL (6,600 µg/L). All other COCs were below CULs.

RW-11A analytical results had been below all COC CULs since an initial exceedance of the TPH-Dx CUL during baseline sampling (1,100 µg/L). In July of 2023, air sparge programming was adjusted to reflect this trend and Zone 4, where RW-11A is located, was taken out of the sparging schedule. The subsequent October 2023 sampling results stayed below CULs for all COCs. The results from the April 2024 event, however, showed a rebound in dissolved TPH-Dx concentrations to above the REL (4,100 µg/L). All other COC concentrations stayed below CULs. In response, pulsed air sparging was resumed in Zone 4 in May 2024. The November 2024 results showed that TPH-Dx concentrations had returned to below the CUL (non-detect) again. Air sparging was adjusted in December 2024 to focus solely on Zone 5, where MW-59 is located.

5.2 Interior Monitoring Wells

As shown in Tables 2 and 3, the November 2024 monitoring event included the biannual sampling of Interior wells MW-93 and RW-5A. Interior monitoring well RW-1 was not sampled due to free product being encountered within the preceding four quarters. As shown in Table 8 and Figure 4, RW-5A was the only Interior well to exceed a COC CUL (TPH-Dx). The interior monitoring wells are located upgradient (east) of the AS/SVE system, within the original "sheen area" with <0.1 ft product thickness (Figure 2 and Figure 3). Interior monitoring wells are sampled for TPH-Gx, -Dx, and BTEX, and are used to track long-term reductions in contaminant mass that are not associated with operation of the AS/SVE system. The Interior Monitoring Wells will next be sampled in fall 2026, in accordance with their biannual schedule.

RW-5A had a TPH-Dx result of 860 µg/L, which is below the REL but exceeds the CUL of 500 µg/L. RW-5A has been below each COC's CUL and REL during all previous sampling events. The previous historical maximum concentration of TPH-Dx was 290 µg/L during the baseline 2019 event.

RW-1 had product present every month of 2024, with thicknesses ranging from 0.01-0.11 ft and one outlier of 0.21 ft in November.

The Interior wells will next be sampled in fall 2026, in accordance with their biannual schedule.

5.3 CPOC Monitoring Wells

CPOC wells MW-45A, MW-46B, MW-58A, MW-86B, and MW-92 were sampled during the November 2024 biannual event. Consistent with past results, none of the wells had results above the CULs for any COC (Tables 9 and 10). The CPOC monitoring wells are located downgradient of the Performance and Interior wells, between the source area and the East Waterway. CPOC wells are sampled for the full suite of IHSs (TPH-Gx, -Dx, BTEX, and PAHs) to monitor potential risk to the East Waterway.

The CPOC wells will next be sampled in fall 2026, in accordance with their biannual schedule.

5.4 Shoreline Water Quality Monitoring Wells

The Shoreline Water Quality Monitoring Wells are located along the T30 apron nearest to the East Waterway (Figure 3). During baseline sampling in 2019, these wells were sampled and analyzed for the full suite of IHSs listed in Table 1 (TPH-Gx, -Dx, BTEX, and PAHs). They are not a part of the ongoing sampling plan outside of contingent actions and have not been sampled since (see Appendix I and CMP sections 6.5-6.6). The baseline analytical results are summarized in Tables 9 and 10.

5.5 Quality Assurance

The groundwater CMP includes quality assurance protocols, also detailed in the QAPP. For each groundwater sampling event, at least one duplicate sample and one set of MS/MSD samples were collected to assess field and laboratory precision. This precision is determined by the relative percent difference (RPD) between the original sample, and its duplicate, with an allowable tolerance of +/- 35%. As shown in the Summary Data Quality Reviews in Appendix H, the RPDs were within the project goals for all samples.

Laboratory reports and chain-of-custody forms are provided in Appendix G. The April and November 2024 samples were hand-delivered to Friedman & Bruya Inc. located in Seattle, Washington. Laboratory reports were reviewed and reporting flags, when applicable, were accepted; these are included in Tables 8-10. Precision and accuracy were assessed during data validation using the MS/MSD results and were acceptable in each case. Sampling precision was assessed during data validation using the field duplicate results. Per the Summary Data Quality Reviews in Appendix H, laboratory quality assurance metrics were achieved, the MRLs met the project needs for all COCs, and all data were determined to be usable.

6. Year 5 Evaluation of Trends

This report presents the results of the fifth year of compliance monitoring at the Site. The CMP identifies in Section 7.2.3 that after 5 years of system operation that trends will be evaluated, and that the CMP will be reviewed and updated by addendum (with Ecology review) if changes to the monitoring program are appropriate. Evaluation of five years of site data results in the identification of following trends:

6.1 SVE Trends

The SVE system removed COC mass from the subsurface in Year 5 at a lower rate than in prior years. This trend has been observed for each successive year of system operation. As calculated with biweekly PID data from the field (Table 4), the AS/SVE system extracted approximately 29 lb TPH during the reporting period (approximately 0.08 lb/day), for a cumulative total of 9,985 lb TPH removed since system startup. These values were slightly higher for the year when calculated with quarterly laboratory data (Table 5), which show the system extracted over 31.1 lb TPH during the reporting period (approximately 0.08 lb/day) and 7,787 lb TPH since system startup.

6.2 AS Trends

Runtime and Pulsed Operation:
Air sparging was sporadic from system startup in 2019 through the transition to AECOM operation in 2021, with frequent shutdowns reported due to pressure faults. Despite the design intent for pulsed sparging, all five sparge zones were operated simultaneously during this period to reduce pressure as much as possible to avoid pressure faults. In total, between downtime due to the pressure faults and approximately 5 months of system shutdown during the beginning of the 2020 pandemic, the system ran for approximately 30% of the period between September 2019 and September 2021 (5,634 hours). AECOM resolved the pressure faults in November 2019 and achieved >70% system operation between September 2021 and the end of Year 5. Pulsed sparging was implemented in April 2022 and has been maintained since. The pulsing was optimized throughout 2024 to focus efforts on the areas with elevated dissolved COCs. Zone 5 (AS-23-AS-27; MW-59) was targeted throughout the year, with MW-59 measured above the TPH-Dx REL in both 2024 sampling events. RW-11A exceeded the Dx REL in the April sampling event but fell back below the CUL by the November event; Zone 4 (AS-17-AS22; RW-9, RW-11A, and MW-36A) was sparged between May and December in response. No other sparge zones were targeted in the reporting period as analytical results did not support the need to do so.

Flowrates:
The AS system design was for approximately 35 cfm to be delivered to each zone in a pulsed sparging scenario, equating to 6-7 cfm per well. A high-flow/low-pressure motor and pump were selected during construction, capable of delivering 100 cfm at a max of 11 psi. Unfortunately, many of the sparge wells have higher breakthrough pressures than the design estimated, and those wells received no flow at the designed operational pressure of 6-7 psi. A number of the wells only receive a few cfm even at the maximum of 11 psi. As the compressor cannot operate at higher pressures, the sparge system has underperformed at many of the wells compared to the design parameters.

6.3 AS/SVE Well Operation

Air sparge flowrates were observed to decrease in a number of Zone 4 and 5 wells over the course of system operation. Silting-in of the screened intervals was hypothesized as a likely cause. With Zone 5 as the only zone operating by the end of Year 5, AS-25 was selected for redevelopment as a proof of concept. The redevelopment of the well in December 2024 did not lead to immediate increases in flow, however. Further analysis into Year 6 is necessary before concluding the ultimate impact.

6.4 Groundwater Monitoring

Since startup, 10 monitoring wells have had dissolved-phase exceedances above the CUL, and of those, 5 were above a REL. One, RW-1, has had LNAPL present since startup and has never been sampled. In Year 5, just three wells had exceedances. During the April sampling event, RW-11A (Performance Well) exceeded the TPH-Dx CUL and MW-59 (Performance Well) exceeded the REL. During the November sampling event, RW-5A (Interior Well) exceeded the CUL

and MW-59 (Performance Well) again exceeded the REL. The CMP recommends that the system be operated until all Performance Monitoring Wells have fallen below the RELs, or until the system is no longer significantly removing contaminant mass.

6.5 LNAPL Recovery Evaluation

LNAPL recovery events were maintained on a quarterly schedule in Year 5. An average of 13.6 gal was recovered per event in Year 5, compared with 22.6 gal per event in Year 4. This value has decreased with each successive year of system operation since startup, as shown on Figure 10. An estimated 54 gallons of free product were recovered during the reporting period, and a cumulative total of 994 gallons have been recovered since removal activities began (Table 6).

Washington regulations state to remove free product to the maximum extent practicable (MEP), with the primary objective of limiting plume migration. Hydraulic recovery is an effective remedial technology to reduce the LNAPL saturation and reduce potential for migration. It is therefore most useful early in the LNAPL lifecycle, when the majority of LNAPL is mobile and recoverable. Whether the mobile fraction of LNAPL is removed by extraction or natural source zone depletion (NSZD), what is left behind is in a predominantly residual, and less recoverable, state (ITRC, 2018). MEP often results in LNAPL removal beyond the physical limitations of hydraulic recovery, resulting in continued operations despite asymptotic results.

Site-specific LNAPL transmissivity (T_n) can identify the mobility of the LNAPL and inform optimal remedial actions. LNAPL recovery using a hydraulic method (e.g., dual-phase extraction, skimmer pumping, vacuum truck operations) is typically not effective where LNAPL transmissivity is less than 0.1 to 0.8 square feet per day (ft^2/day) (ITRC, 2018). The United States Environmental Protection Agency further clarifies that removal of stable LNAPL (mobile and residual LNAPL) is not necessary to meet the requirement of removing LNAPL to the MEP (US EPA, 2023).

LNAPL baildown tests conducted on Site in 2011 indicated LNAPL transmissivity at RW-12 was less than 0.01 ft^2/day, and at MW-59 ranged from 0.3 to 1.1 ft^2/day (PGG, 2012). Those values indicate limited value for hydraulic recovery at RW-12, but promising value at MW-59. LNAPL is no longer measured in MW-59 greater than 0.01 feet, and the average LNAPL thickness at RW-12 in 2024 was 0.18 feet, less than half the thickness measured during the LNAPL baildown test in 2011. Quarterly LNAPL recovery rates have decreased from approximately 40 gallons/quarter in late 2022/early 2023 to approximately 15 gallons/quarter over the past six quarters (Figure 9). Figure 10 indicates hydraulic recovery is approaching asymptotic conditions.

As the effectiveness of hydraulic recovery decreases, NSZD becomes a more sustainable and effective remedy to address the remaining LNAPL on site. The Port also has environmental and sustainability goals to consider. Operation of a vacuum truck emits approximately 0.1 tons of carbon dioxide per day of operation, equivalent to burning approximately 10 gallons of diesel fuel per the EPA. Over Year 5, it therefore required approximately 40 gallons of diesel fuel to hydraulicly recover just 55 gallons of LNAPL. AECOM plans to collect soil gas measurements from various monitoring wells and vapor monitoring points to determine the subsurface oxygen, carbon dioxide, and methane composition on Site. From that data, site-specific NSZD rates can be estimated. Historically, across various sites, these rates have ranged from 100s to 1,000s of gallons per acre per year (Garg et al., 2017). With LNAPL remaining present across approximately 0.75 acres of the Site, the annual depletion rate is likely far greater than the current hydraulic recovery rate and does not cause additional environmental impact.

It is AECOM's analysis that the LNAPL plume on site is stable and that hydraulic recovery should be phased out due to its decreasing effectiveness and carbon footprint. NSZD is a passive option that should be pursued at this stage of remediation.

6.6 Water production

Water accumulation in the SVE manifold and moisture separator was significant in the first several years of system operation. AECOM improved recovery efforts in each year of system operation, with Year 5 featuring biweekly dewatering of the buried lateral pipes in addition to the manifold deadlegs. Water accumulation was kept at a low level in the manifold rotameters as a result, improving equipment performance.

7. Conclusions and Recommendations for CMP Modifications

The CMP identifies a process for evaluating CMP procedures and modifying the CMP as necessary after the five year-review. The evaluation of the trends presented for this fifth year of compliance monitoring at the Site provides the basis for the following conclusions and CMP modification recommendations.

7.1 Conclusions and Operational Recommendations

- System shutdown is recommended, initiating the final two years of Performance Monitoring before Confirmational Monitoring begins (see Table 3). While the AS/SVE system has removed 7,812 lb TPH to date (based upon laboratory analyses), Figure 6 shows mass removal has been asymptotic since approximately 2023. The removal rate over 2023 and 2024 averaged 0.20 lb/day.
- The environmental impact of continued AS/SVE system operation should also be considered against potential benefit. The power usage in Year 5 was equivalent to the emission of approximately 51 tons of CO2 (US EPA, 2024).
- TPH-Dx was the only COC with dissolved concentrations above a CUL or REL in 2024. By year-end, MW-59 was the only Performance Well with an REL exceedance.
- Termination of LNAPL recovery events is recommended. The remaining plume is predominantly residual and immobile, and unlikely to be significantly affected by continued hydraulic recovery. 54.4 gallons were recovered in Year 5, accounting for roughly 5 percent of the total recovered since 2020. Figure 10 indicates hydraulic recovery approaching asymptotic conditions and suggests diminishing returns from continued hydraulic recovery attempts. AECOM recommends a transition to NSZD.
- AECOM recommends a reduction in LNAPL gauging frequency from a monthly to quarterly basis.

7.2 Recommendations for CMP Modifications

The flow chart in Figure 5 of the CMP (included for reference in Appendix I) provides guidance on decision making criteria. Based upon evaluation of trends after five years of system operation and monitoring, the conclusions presented above, and the decision-making framework provided in Figure 5 of the CMP, the following modifications to the CMP are recommended:

- The CMP requires free product recovery at any well with product thickness greater than 0.01 ft. We propose a modification to allow for the cessation of hydraulic recovery should annual recovery rates drop below the NSZD rate. Based on NSZD literature and the current hydraulic recover rates on site, it is likely that this is already the case. To confirm, soil gas measurements should be collected from monitoring points across the site, from which site-specific NSZD rates can be extrapolated.
- Section 6.4 of the CMP states that AS/SVE operation will continue until the Performance Monitoring Wells within and downgradient of the AS/SVE system (RW-9, RW-11A, MW-42, MW-39A, MW-36A, MW-59, and MW-89) achieve remediation levels, or the AS/SVE system no longer significantly removes contaminant mass[4]. While well MW-59 continues to exceed the TPH-Dx REL, AECOM has concluded that the AS/AVE system is no longer significantly removing contaminant mass, per the asymptotic trend shown in Figure 6. AECOM recommends system shutdown as described in Section 6.4 and shown in Appendix I. The final two-year window of Performance Monitoring would be triggered as a result.
- Biodegradation is a large component of NSZD and AECOM recommends analysis of secondary geochemical indicators during groundwater monitoring events to assist in the evaluation of NSZD on site. This should be completed at one well minimum in each of the three zones: upgradient, within the plume, and downgradient of the plume. The geochemical data can be collected during planned semi-annual monitoring events for at least the first two years following system shutdown to determine biodegradation rates on Site.

[4] The statement “the AS/SVE system is no longer significantly removing contaminant mass” has not been defined.

- In the two-year period following AS/SVE shutdown, Section 6.4 of the CMP recommends that the system is restarted should dissolved COC concentrations rebound above any REL. AECOM recommends that this be amended with an exception for MW-59, as that well has a TPH-Dx concentration that remains slightly above the TPH-Dx REL. Should rebound above RELs occur, an analysis will be completed comparing attenuation rates to historic system removal rates to determine if system restart is warranted.
- AECOM recommends termination of sampling and analysis for TPH-G and BTEX. Lab results from all wells have been below both RELs and CULs for these analyses since 2019 (Table 8, Table 9).

7.3 Schedule and Reporting

The groundwater monitoring frequencies are provided on Tables 2 and 3. Performance monitoring will continue for the duration of AS/SVE system operation plus 2 years, at which time confirmational monitoring will be initiated. Free product will be gauged at least quarterly to track the progress of NSZD. Progress reports will be prepared on a quarterly basis, in accordance with the requirements of the Consent Decree, and submitted to Ecology via email no later than the 30th day of the month following each quarterly reporting period. Schedule revisions will be documented in the quarterly progress reports.

Annual reporting will continue for Year 6. Reports will be submitted to Ecology following the end of the annual monitoring cycle.

8. References

CRETE (CRETE Consulting). 2018. Engineering Design Report. December 20, 2018.

CRETE. 2020a. Construction Completion Report, Terminal 30 Cleanup Project. February 27, 2020.

CRETE. 2020b. Terminal 30 Cleanup Project Operation Maintenance & Monitoring Plan. March 2020.

CRETE. 2021. Monitoring Well MW-38 Decommissioning. May 11, 2021.

Ecology (Washington State Department of Ecology). 2017. Consent Decree and Cleanup Action Plan. July 19, 2017.

S. Garg, C.J. Newell, P.R. Kulkarni, D.C. King, D.T. Adamson, I. Renno, T. Sale. 2017. Overview of natural source zone depletion: processes, controlling factors, and composition change. Groundwater Monitoring & Remediation, 37 (2017), pp. 62-81

ITRC, 2018. LNAPL Site Management: LCSM Evolution, Decision Process, and Remedial Technologies. LNAPL-3. Washington, D.C.: Interstate Technology & Regulatory Council. LNAPL Update Team. https://lnapl-3.itrcweb.org.

PGG (Pacific Groundwater Group). 2016. Port of Seattle Terminal 30 Revised 2013 Remedial Investigation/Feasibility Study. January 11, 2016.

PSCAA (Puget Sound Clean Air Agency). 2019. Notice of Construction (NOC) Worksheet. NOC No. 11885. August 20, 2019.

Jonathon J. Smith, Steven T. Gaito, and Brad W. Koons. 2023. Bioventing revisited: efficacy of enhanced biodegradation for sites with mobile LNAPL. Quarterly Journal of Engineering Geology and Hydrogeology. Volume 56. https://doi.org/10.1144/qjegh2022-085

US EPA (U.S. Environmental Agency). 2017. Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. September 19, 2017.

US EPA, 2023. Question 6: A Clarification of the Federal UST Regulation on Free Product Removal. https://www.epa.gov/ust/ust-technical-compendium-release-investigation-confirmation-and-corrective-action

Figures



SITE LOCATION

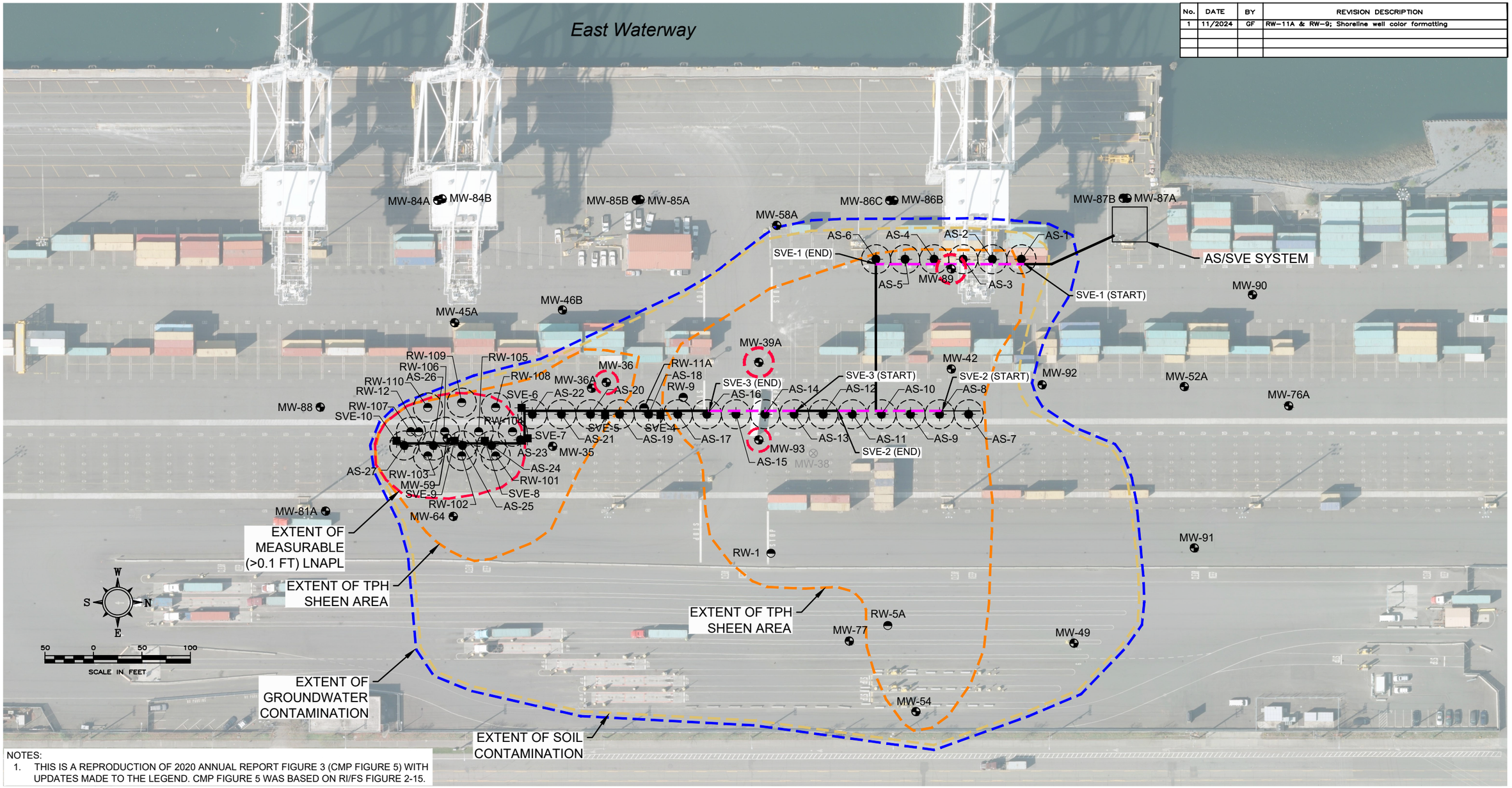
MAY 2022

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 1

K:\Port_of_Seattle\2022\Fig 1 Site Location Map.dwg May 17, 2022 - 8:12am

No.	DATE	BY	REVISION DESCRIPTION
1	11/2024	GF	RW-11A & RW-9; Shoreline well color formatting



NOTES:
1. THIS IS A REPRODUCTION OF 2020 ANNUAL REPORT FIGURE 3 (CMP FIGURE 5) WITH UPDATES MADE TO THE LEGEND. CMP FIGURE 5 WAS BASED ON RI/FS FIGURE 2-15.

LEGEND

- AS WELL
- SVE WELL (VERTICAL)
- PRODUCT RECOVERY WELL
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- HORIZONTAL SVE SCREEN
- AS & SVE PIPING
- EXTENT OF BASELINE GROUNDWATER TPH/BTEX CONTAMINATION ABOVE CUL (2017 AND EARLIER)
- EXTENT OF BASELINE SOIL TPH/BTEX CONTAMINATION ABOVE CUL (2017 AND EARLIER)
- EXTENT OF BASELINE MEASURABLE LNAPL (>0.1 FT)(2017 AND EARLIER)
- EXTENT OF BASELINE TPH SHEEN (2017 AND EARLIER)

AECOM

BASELINE EXTENT OF IMPACTS AND LOCATION OF CLEANUP ACTION

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 2

K:\Port_of_Seattle\2024\Fig 2 Baseline Extent of Impacts and Location of Cleanup Action.dwg Nov 27, 2024 - 6:31am

East Waterway

MW-84A MW-84B MW-85B MW-85A MW-86C MW-86B MW-87B MW-87A

MW-58A

AS/SVE SYSTEM

MW-89

MW-90

MW-46B

MW-45A

SEE NOTE 4

RW-109 RW-106 RW-105 RW-108

MW-36

MW-39A

MW-42

MW-92

MW-52A

MW-76A

RW-110 RW-12 RW-107

MW-36A

RW-9

MW-88

RW-11A

RW-104

MW-93

SEE NOTE 3

MW-35

MW-38

RW-103 MW-59 RW-101

MW-81A

RW-102 MW-64

MW-91

RW-1

SEE NOTE 3

RW-5A

MW-77

MW-49

MW-54

W S N E

50 0 50 100

SCALE IN FEET

NOTES:
1. GRAYED OUT MONITORING WELLS (MW-84B, MW-85B, MW-86C AND MW-87B) ARE NOT INCLUDED AS COMPLIANCE MONITORING WELLS.
2. GROUNDWATER Dx CONTOURS ARE BASED ON THOSE SHOWN IN 2020 ANNUAL REPORT FIGURE 3 (ALSO CMP FIGURE 5) AND RI/FS FIGURE 2-15. ADJUSTMENTS HAVE BEEN MADE BASED ONTHE MOST RECENT ANALYTICAL DATA AVAILABLE FOR EACH WELL.
3. THE DISSOLVED DX CONCENTRATION IS ESTIMATED AS >REL FOR WELLS WITH LNAPL MEASURED >0.01 FT. WELLS WITH LNAPL ARE NOT SAMPLED, THUS ANALYTICAL DATA DOES NOT EXIST.
4. MW-36 IS SHOWN OUTSIDE OF THE DX CUL PLUME TO MATCH ANALYTICAL RESULTS OF SURROUNDING MONITORING WELLS (MW-36A, -11A, AND RW-9).

LEGEND

- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- PRODUCT RECOVERY WELL
- PERFORMANCE MONITORING WELL
- INTERIOR MONITORING WELL (MW-35, MW-36, MW-54, and MW-64 are gauging only)
- CPOC MONITORING WELL
- SHORELINE MONITORING WELL
- FREE PRODUCT GAUGING WELL
- HORIZONTAL SVE SCREEN
- AS & SVE PIPING
- EXTENT OF GROUNDWATER Dx CONTAMINATION ABOVE REL (NOV 2024)²
- EXTENT OF GROUNDWATER Dx CONTAMINATION ABOVE CUL (NOV 2024)²
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) ON DEC 12, 2024
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) IN 2024 (PRIOR TO DEC 12, 2024)

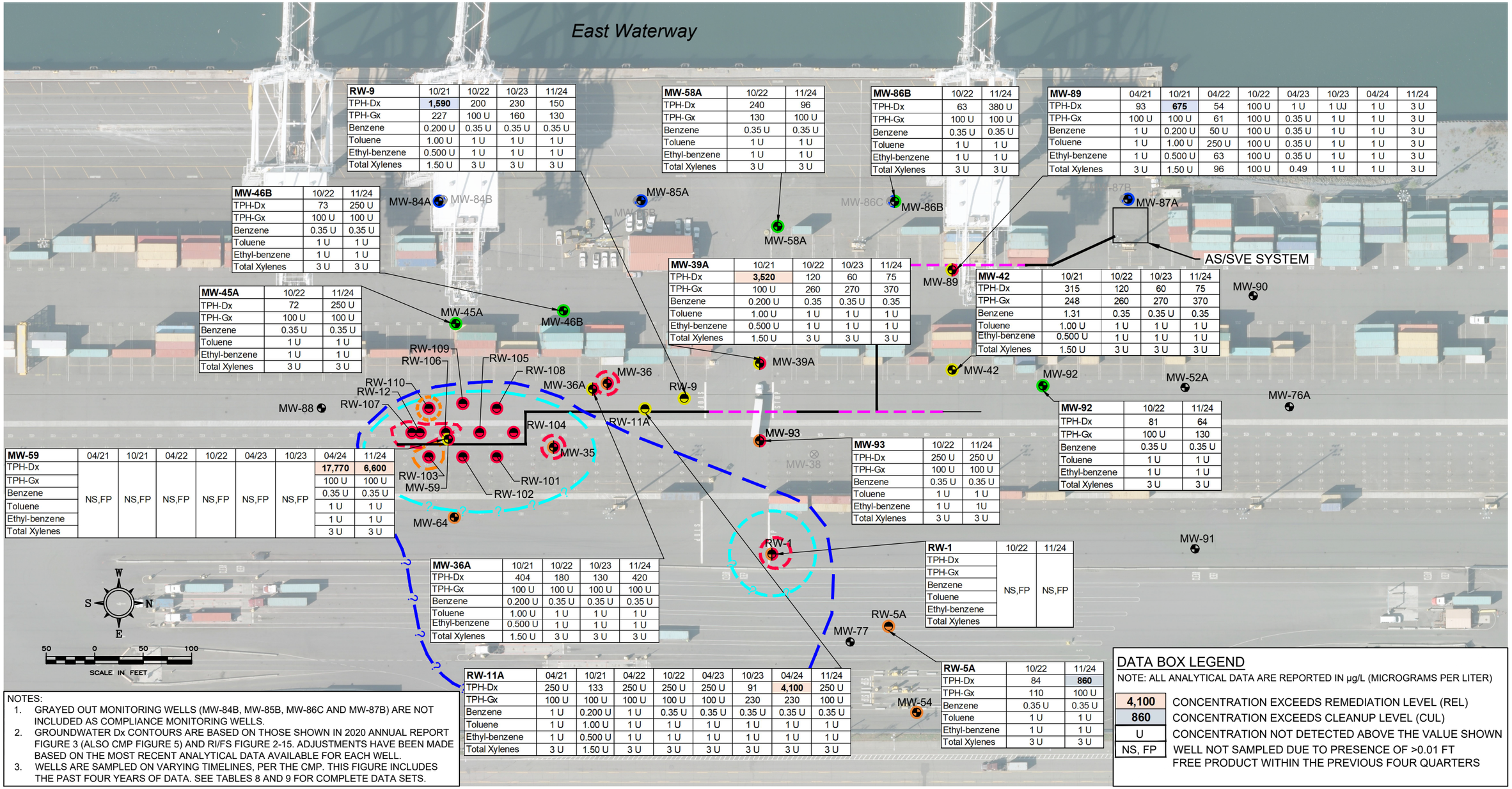
AECOM

COMPLIANCE MONITORING NETWORK WITH FINAL 2024 GROUNDWATER CONDITIONS

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 3

\\na.aecomnet.com\Wa\AMER\Portland--USPOR01\JOBS\GIS\Port_of_Seattle\2024\Fig 3 Compliance Monitoring Network with Final 2024 GW Conditions.dwg Feb 19, 2025 - 3:10pm



RW-9	10/21	10/22	10/23	11/24
TPH-Dx	**1,590**	200	230	150
TPH-Gx	227	100 U	160	130
Benzene	0.200 U	0.35 U	0.35 U	0.35 U
Toluene	1.00 U	1 U	1 U	1 U
Ethyl-benzene	0.500 U	1 U	1 U	1 U
Total Xylenes	1.50 U	3 U	3 U	3 U

MW-58A	10/22	11/24
TPH-Dx	240	96
TPH-Gx	130	100 U
Benzene	0.35 U	0.35 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	3 U

MW-86B	10/22	11/24
TPH-Dx	63	380 U
TPH-Gx	100 U	100 U
Benzene	0.35 U	0.35 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	3 U

MW-89	04/21	10/21	04/22	10/22	04/23	10/23	04/24	11/24
TPH-Dx	93	**675**	54	100 U	1 U	1 UJ	1 U	3 U
TPH-Gx	100 U	100 U	61	100 U	0.35 U	1 U	1 U	3 U
Benzene	1 U	0.200 U	50 U	100 U	0.35 U	1 U	1 U	3 U
Toluene	1 U	1.00 U	250 U	100 U	0.35 U	1 U	1 U	3 U
Ethyl-benzene	1 U	0.500 U	63	100 U	0.35 U	1 U	1 U	3 U
Total Xylenes	3 U	1.50 U	96	100 U	0.49	1 U	1 U	3 U

MW-46B	10/22	11/24
TPH-Dx	73	250 U
TPH-Gx	100 U	100 U
Benzene	0.35 U	0.35 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	3 U

MW-39A	10/21	10/22	10/23	11/24
TPH-Dx	**3,520**	120	60	75
TPH-Gx	100 U	260	270	370
Benzene	0.200 U	0.35	0.35 U	0.35
Toluene	1.00 U	1 U	1 U	1 U
Ethyl-benzene	0.500 U	1 U	1 U	1 U
Total Xylenes	1.50 U	3 U	3 U	3 U

MW-42	10/21	10/22	10/23	11/24
TPH-Dx	315	120	60	75
TPH-Gx	248	260	270	370
Benzene	1.31	0.35	0.35 U	0.35
Toluene	1.00 U	1 U	1 U	1 U
Ethyl-benzene	0.500 U	1 U	1 U	1 U
Total Xylenes	1.50 U	3 U	3 U	3 U

MW-45A	10/22	11/24
TPH-Dx	72	250 U
TPH-Gx	100 U	100 U
Benzene	0.35 U	0.35 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	3 U

MW-92	10/22	11/24
TPH-Dx	81	64
TPH-Gx	100 U	130
Benzene	0.35 U	0.35 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	3 U

MW-59	04/21	10/21	04/22	10/22	04/23	10/23	04/24	11/24
TPH-Dx	NS,FP	NS,FP	NS,FP	NS,FP	NS,FP	NS,FP	**17,770**	**6,600**
TPH-Gx							100 U	100 U
Benzene							0.35 U	0.35 U
Toluene							1 U	1 U
Ethyl-benzene							1 U	1 U
Total Xylenes							3 U	3 U

MW-93	10/22	11/24
TPH-Dx	250 U	250 U
TPH-Gx	100 U	100 U
Benzene	0.35 U	0.35 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1U
Total Xylenes	3 U	3 U

MW-36A	10/21	10/22	10/23	11/24
TPH-Dx	404	180	130	420
TPH-Gx	100 U	100 U	100 U	100 U
Benzene	0.200 U	0.35 U	0.35 U	0.35 U
Toluene	1.00 U	1 U	1 U	1 U
Ethyl-benzene	0.500 U	1 U	1 U	1 U
Total Xylenes	1.50 U	3 U	3 U	3 U

RW-1	10/22	11/24
TPH-Dx	NS,FP	NS,FP
TPH-Gx		
Benzene		
Toluene		
Ethyl-benzene		
Total Xylenes		

RW-11A	04/21	10/21	04/22	10/22	04/23	10/23	04/24	11/24
TPH-Dx	250 U	133	250 U	250 U	250 U	91	**4,100**	250 U
TPH-Gx	100 U	100 U	100 U	100 U	100 U	230	230	100 U
Benzene	1 U	0.200 U	1 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
Toluene	1 U	1.00 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethyl-benzene	1 U	0.500 U	1 U	1 U	1 U	1 U	1 U	1 U
Total Xylenes	3 U	1.50 U	3 U	3 U	3 U	3 U	3 U	3 U

RW-5A	10/22	11/24
TPH-Dx	84	**860**
TPH-Gx	110	100 U
Benzene	0.35 U	0.35 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	3 U

NOTES:
1. GRAYED OUT MONITORING WELLS (MW-84B, MW-85B, MW-86C AND MW-87B) ARE NOT INCLUDED AS COMPLIANCE MONITORING WELLS.
2. GROUNDWATER Dx CONTOURS ARE BASED ON THOSE SHOWN IN 2020 ANNUAL REPORT FIGURE 3 (ALSO CMP FIGURE 5) AND RI/FS FIGURE 2-15. ADJUSTMENTS HAVE BEEN MADE BASED ON THE MOST RECENT ANALYTICAL DATA AVAILABLE FOR EACH WELL.
3. WELLS ARE SAMPLED ON VARYING TIMELINES, PER THE CMP. THIS FIGURE INCLUDES THE PAST FOUR YEARS OF DATA. SEE TABLES 8 AND 9 FOR COMPLETE DATA SETS.

DATA BOX LEGEND

NOTE: ALL ANALYTICAL DATA ARE REPORTED IN µg/L (MICROGRAMS PER LITER)

4,100	CONCENTRATION EXCEEDS REMEDIATION LEVEL (REL)
860	CONCENTRATION EXCEEDS CLEANUP LEVEL (CUL)
U	CONCENTRATION NOT DETECTED ABOVE THE VALUE SHOWN
NS, FP	WELL NOT SAMPLED DUE TO PRESENCE OF >0.01 FT FREE PRODUCT WITHIN THE PREVIOUS FOUR QUARTERS

LEGEND

- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- PRODUCT RECOVERY WELL
- PERFORMANCE MONITORING WELL
- INTERIOR MONITORING WELL (MW-35, MW-54, and MW-64 are gauging only)
- CPOC MONITORING WELL
- SHORELINE MONITORING WELL
- FREE PRODUCT GAUGING WELL
- HORIZONTAL SVE SCREEN
- AS & SVE PIPING
- EXTENT OF GROUNDWATER Dx CONTAMINATION ABOVE REL (NOV 2024)²
- EXTENT OF GROUNDWATER Dx CONTAMINATION ABOVE CUL (NOV 2024)²
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) ON DEC 12, 2024
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) IN 2024 (PRIOR TO DEC 12, 2024)

AECOM

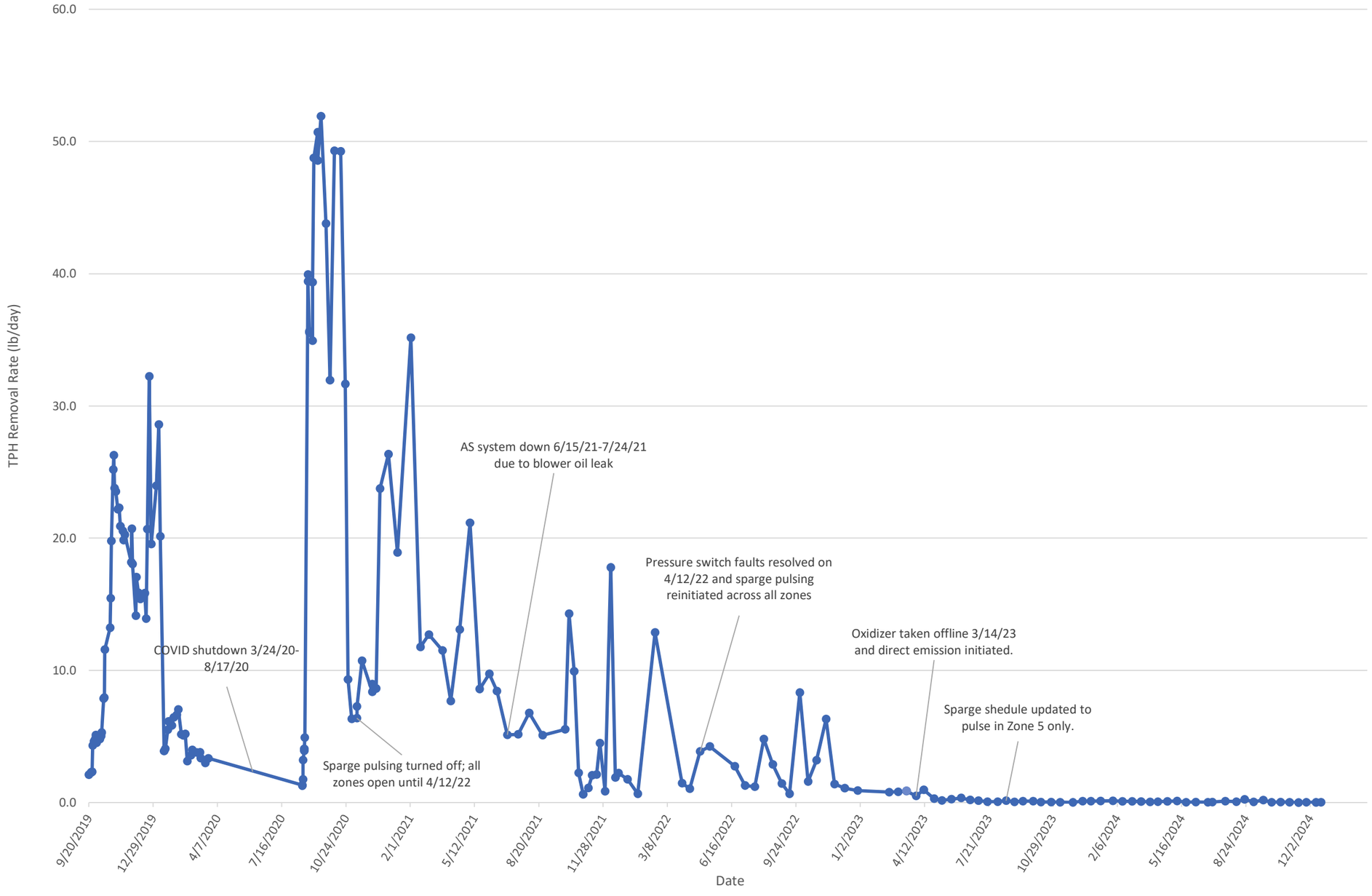
END OF 2024 COMPLIANCE MONITORING ANALYTICAL RESULTS

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 4

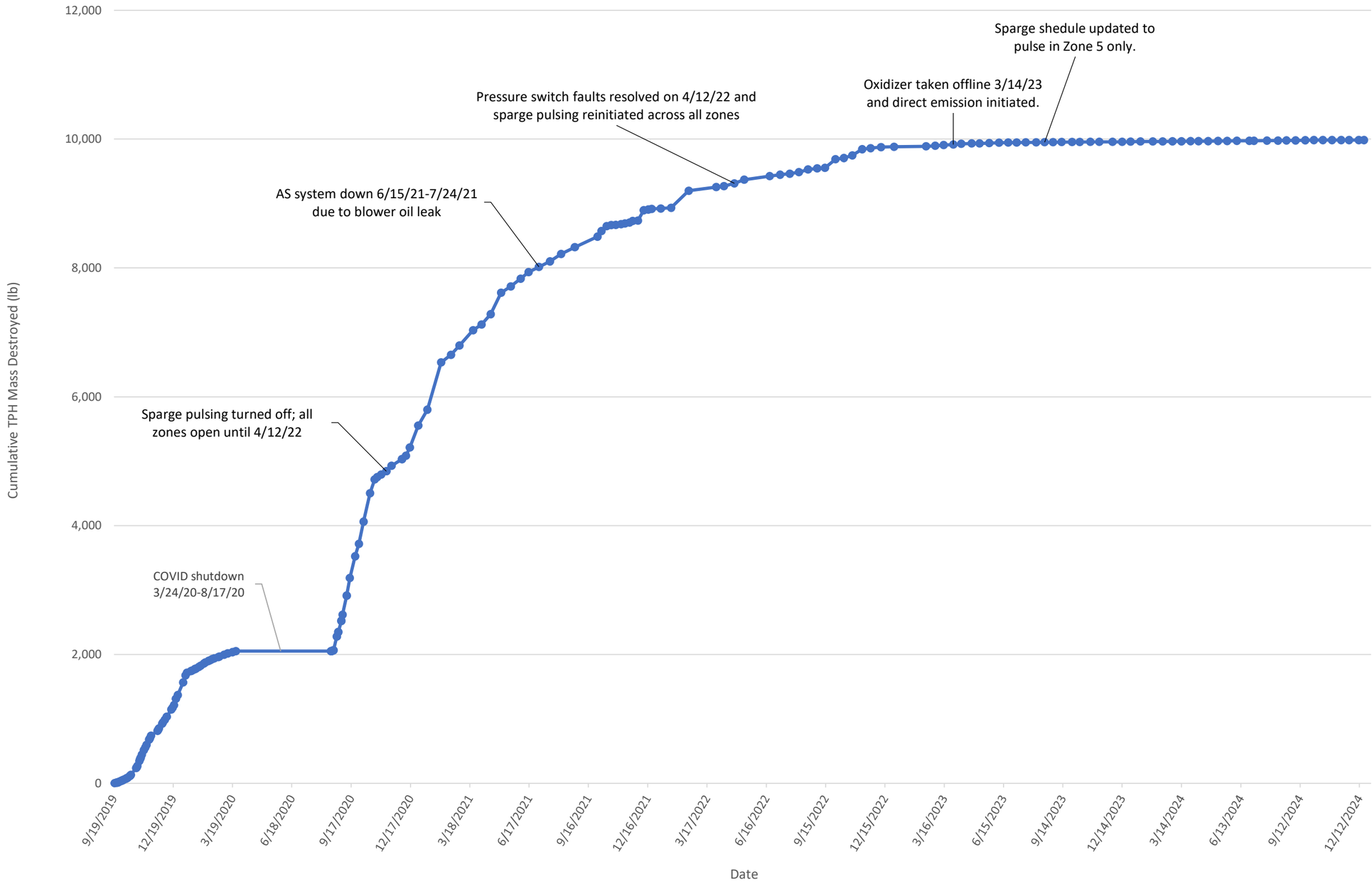
\\vn.aecomnet.com\fs\AMER\Portland--USPOR001\DCS\GIS\Port_of_Seattle\2024\Fig 4 End of 2024 Compliance Monitoring Analytical Results.dwg Feb 20, 2025 - 6:57am

Figure 5 - Period VOC Removal Rates



Notes:
1. Data shown is a combination of PID field data and laboratory-analyzed vapor data.

Figure 6 - Cumulative VOC Mass Removal



Notes:
1. Data shown is a combination of PID field data and laboratory-analyzed vapor data.

Figure 7 - LNAPL Thickness in Recovery Wells

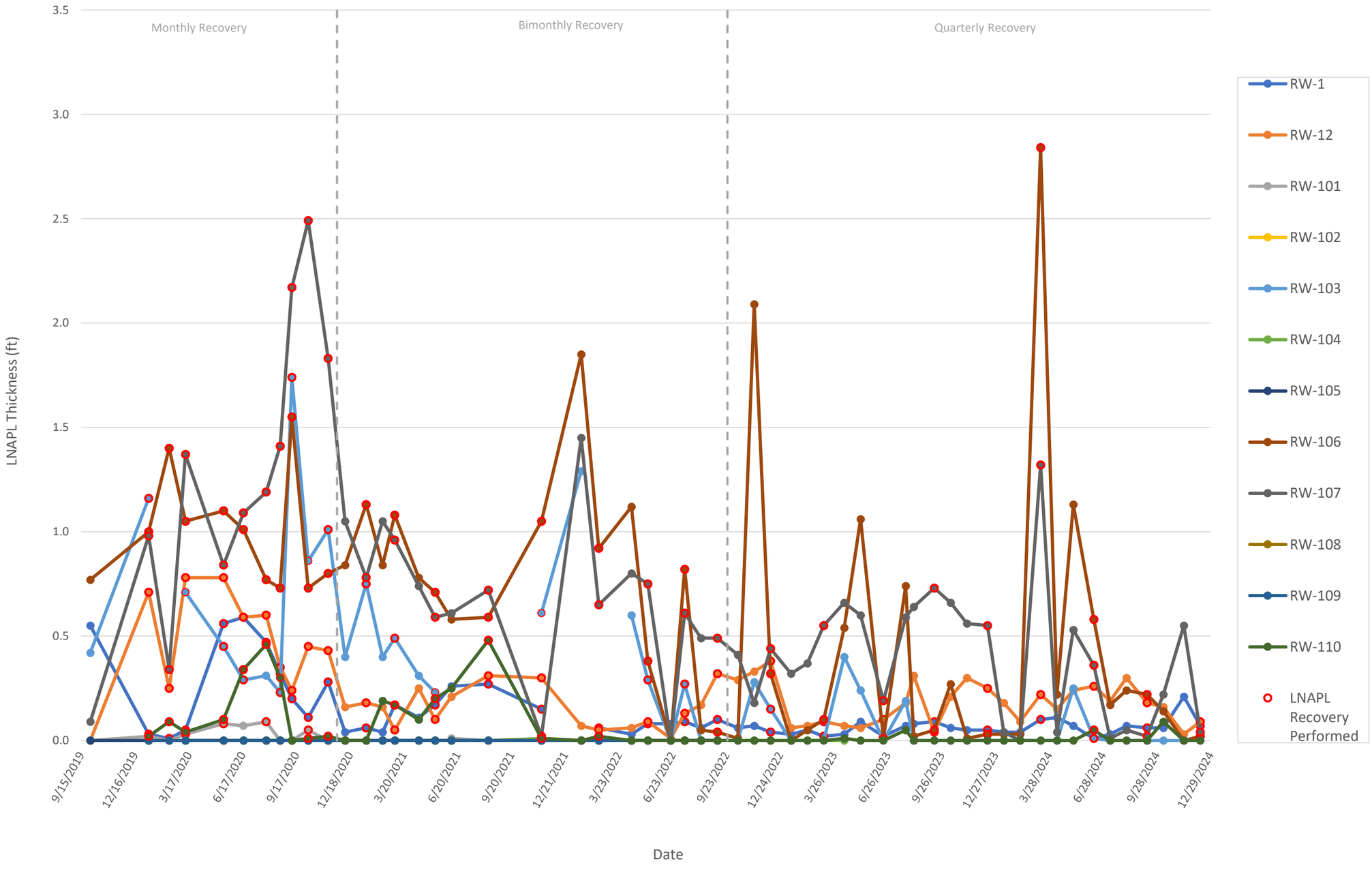


Figure 8 - LNAPL Thickness in Monitoring Wells

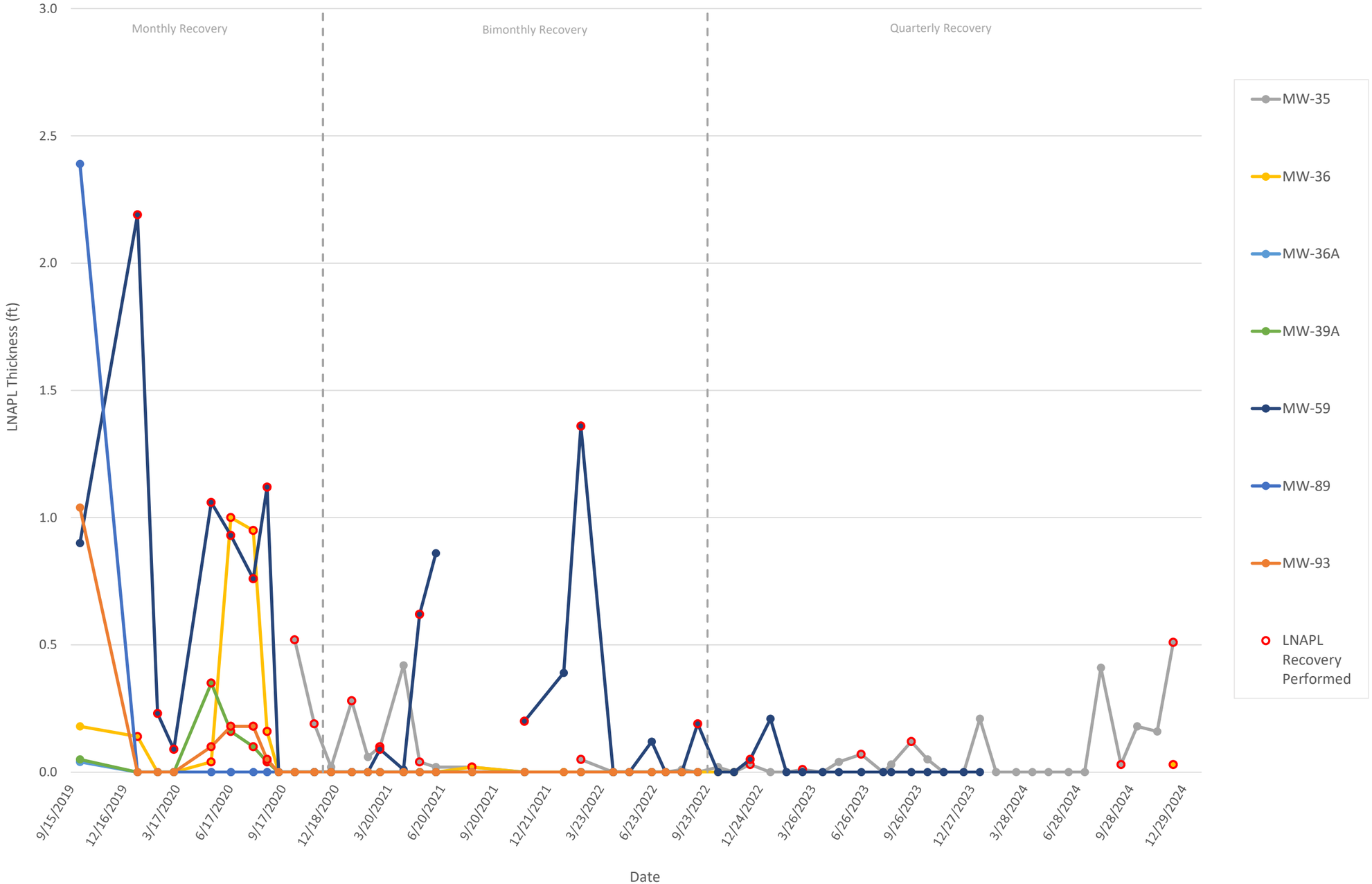
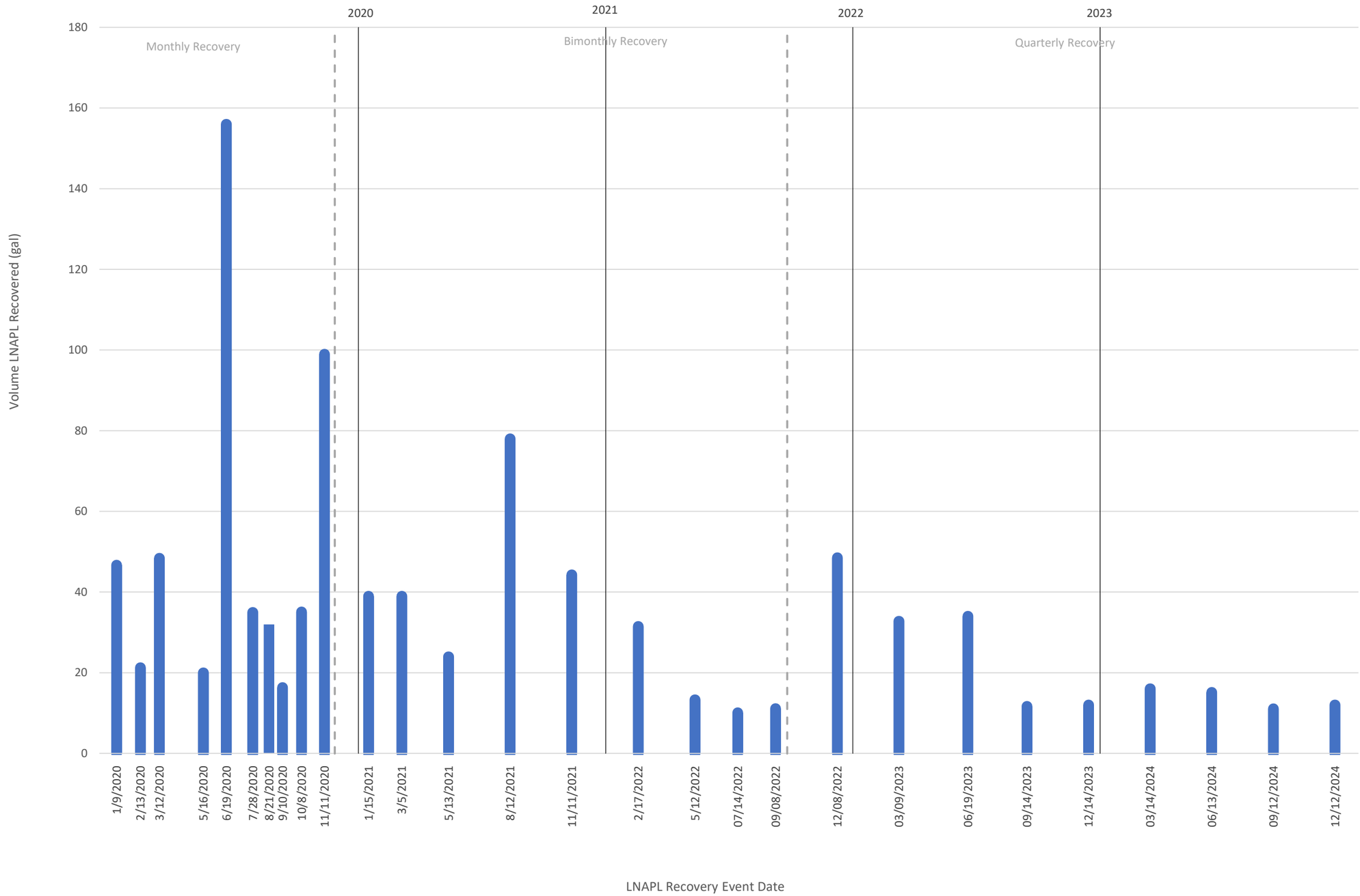


Figure 9 - LNAPL Recovery Volumes



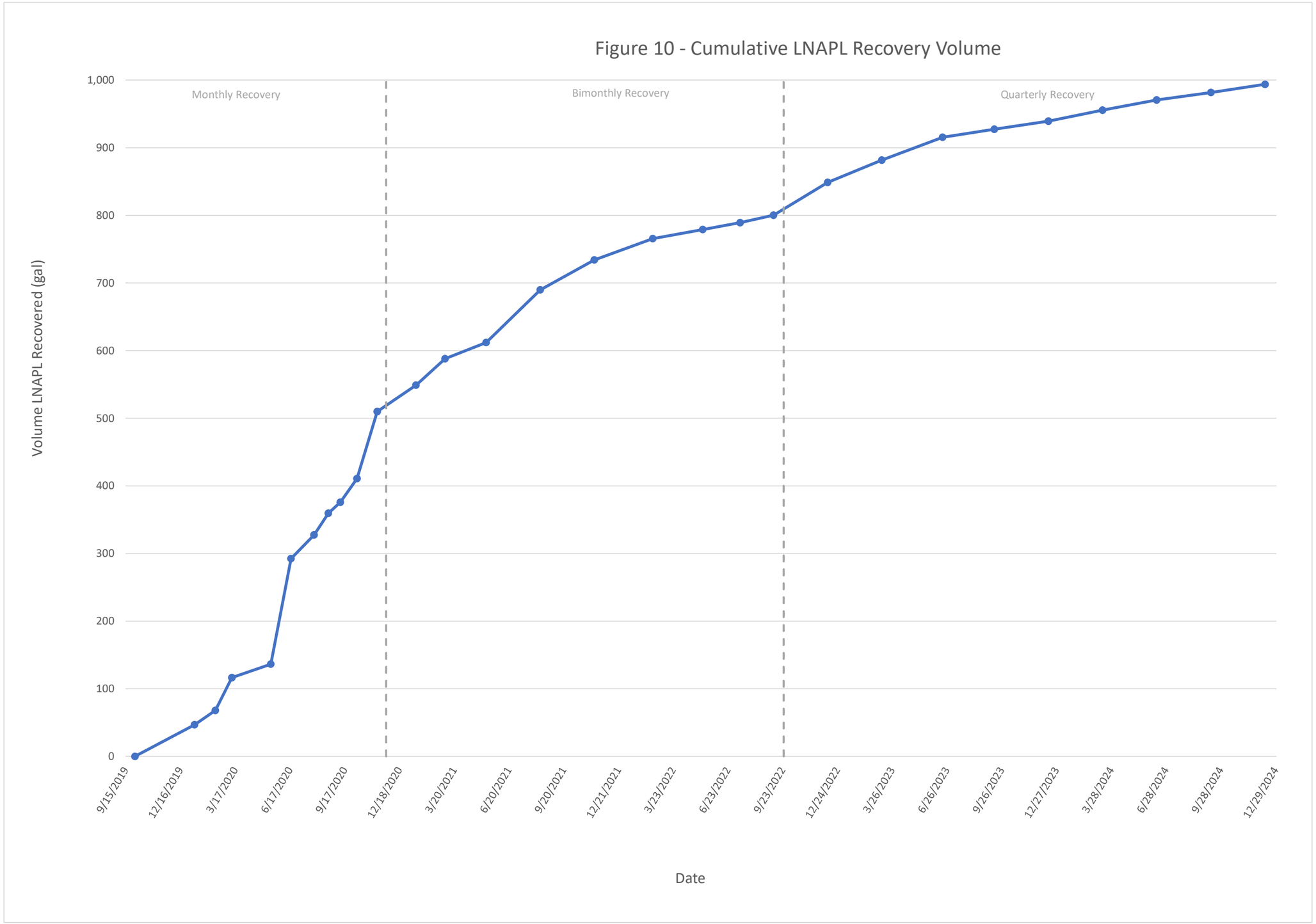
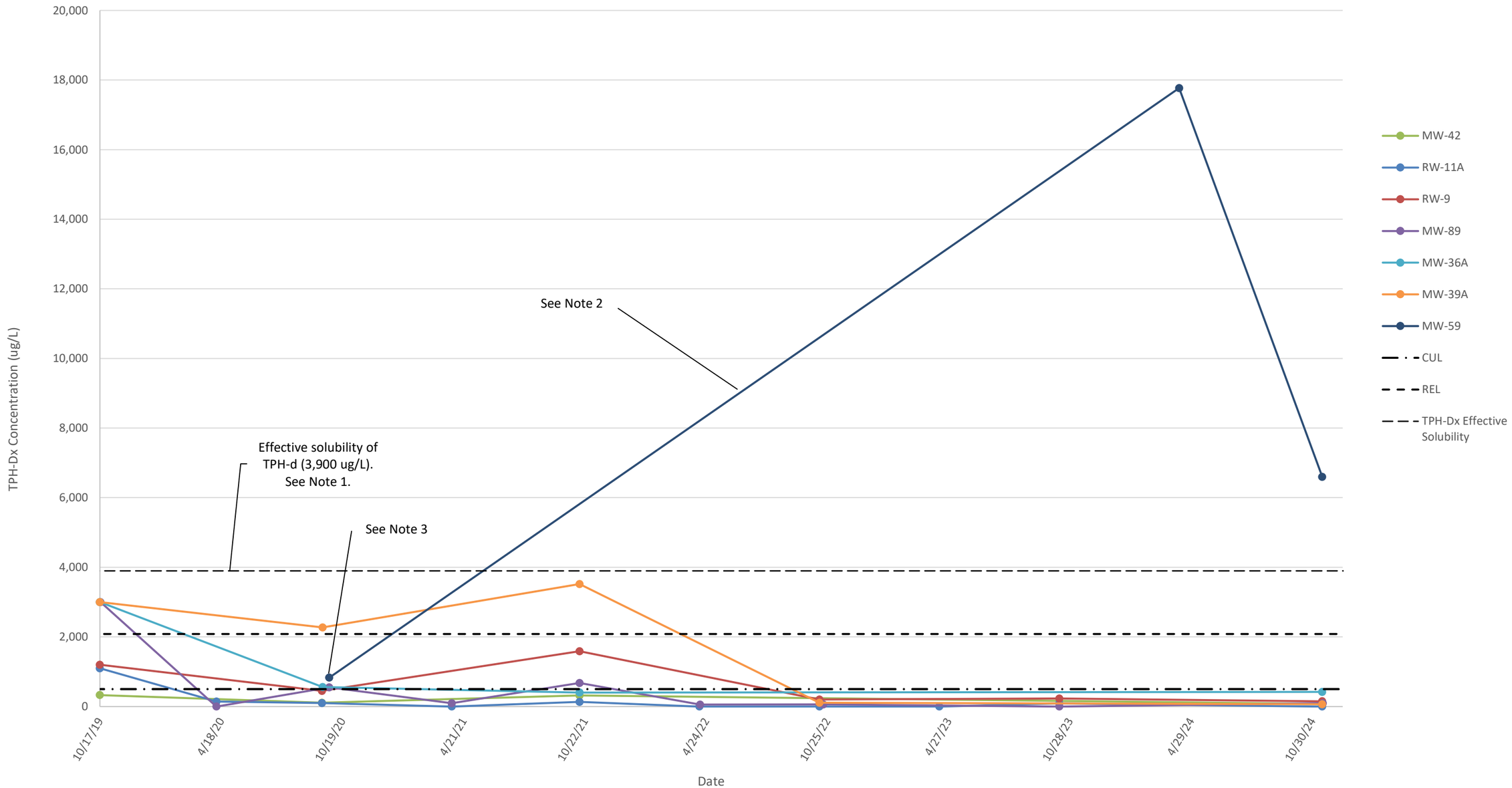

Figure 10 - Cumulative LNAPL Recovery Volume
Monthly Recovery
Bimonthly Recovery
Quarterly Recovery
Volume LNAPL Recovered (gal)
1,000
900
800
700
600
500
400
300
200
100
0
9/15/2019
12/16/2019
3/17/2020
6/17/2020
9/17/2020
12/18/2020
3/20/2021
6/20/2021
9/20/2021
12/21/2021
3/23/2022
6/23/2022
9/23/2022
12/24/2022
3/26/2023
6/26/2023
9/26/2023
12/27/2023
3/28/2024
6/28/2024
9/28/2024
12/29/2024
Date

Figure 11 - Performance Monitoring Well TPH-Dx Concentrations



Notes:

1. The effective solubility of TPH-Dx is 3,900 ug/L, per API Bulletin No. 9. An analytical result greater than this is indicative of NAPL in the sample, despite non-detects measured via interface probe during sampling.
2. Per the CMP, a well is not to be sampled if LNAPL has been encountered in the well in the preceeding year. These instances are not indicated in this figure.
3. MW-59 was sampled on 9/29/20 despite LNAPL encounters within the prior year. Per the CMP, this data should not be used for performance monitoring purposes.

Tables

PORT OF SEATTLE - TERMINAL 30
Table 1
Indicator Hazardous Substances

Constituent (BTEX, SVOC, TPH)	Constituent (PAH)
BTEX Compounds	***PAH Compounds (filtered)***
Benzene	Acenaphthene
Toluene	Acenaphthylene
Ethylbenzene	Anthracene
Xylenes (total)	Benzo[a]anthracene
Semivolatile Organic Compounds	Benzo[a]pyrene
2-Methylnaphthalene	Benzo[b]fluoranthene
Petroleum Hydrocarbons	Benzo[g,h,i]perylene
TPH, gasoline range organics	Benzo[k]fluoranthene
TPH, diesel range organics	Chrysene
TPH, heavy oils	Dibenzo[a,h]anthracene
	Fluoranthene
	Fluorene
	Indeno[1,2,3-cd]pyrene
	Naphthalene
	Phenanthrene
	Pyrene
	Naphthalene

PORT OF SEATTLE - TERMINAL 30
Table 2
Compliance Monitoring Frequency and Analytes

Well Network	Compliance Monitoring Phase		
	Baseline Sampling	Performance Monitoring*	Confirmational Monitoring
Groundwater Sampling (See Note 1)			
Performance Monitoring Wells – Within (MW-59, RW-11A, MW-89**[b])**	Single Event - **Sampled: 10/2019** (NWTPH-G/BTEX, NWTPH-Dx)	Every 6 Months - **Sampled: 4/2020, 9/2020, 4/2021, 10/2021, 4/2022, & 10/2022, 4/2023, 10/2023, 4/2024, & 11/2024** (NWTPH-G/BTEX, NWTPH-Dx)	None Scheduled
Performance Monitoring Wells – Downgradient (MW-36A, RW-9, MW-39A[b], MW-42)**		Every Year - **Sampled: 9/2020, 10/2021, 10/2022, 10/2023, & 11/2024** (NWTPH-G/BTEX, NWTPH-Dx)	
Interior Monitoring Wells - (MW-38[a], MW-93, RW-1, RW-5A)	Single Event - **Sampled: 10/2019** (NWTPH-G/BTEX, NWTPH-Dx)	Every 2 Years - **Sampled: 9/2020, 10/2022, & 11/2024** (NWTPH-G/BTEX, NWTPH-Dx)	Every 5 Years (NWTPH-G/BTEX, NWTPH-Dx)
Interior Monitoring Wells, Gauging Only - (MW-35, MW-36, MW-54, MW-64)	Single Event - **Gauged: 10/2019** (Free Product Gauging)	Every 2 Years - **Gauged: 9/2020, 10/2022, & 11/2024** (Free Product Gauging)	Every 5 Years (Free Product Gauging)
CPOC Monitoring Wells (MW-45A, MW-46B, MW-58A, MW-86B*, MW-92)**	Single Event - **Sampled: 10/2019** (NWTPH-G/BTEX, NWTPH-Dx, PAHs, 2-methylnaphthalene)	Every 2 Years - **Sampled: 9/2020, 10/2022, & 11/2024** (NWTPH-G/BTEX, NWTPH-Dx, PAHs, 2-methylnaphthalene)	Varies – See Table 3 (NWTPH-G/BTEX, NWTPH-Dx, PAHs, 2-methylnaphthalene)
Shoreline Water Quality Monitoring Wells (MW-84A, MW-85A, MW-86B*, MW-87A)**	Single Event - **Sampled: 10/2019** (NWTPH-G/BTEX, NWTPH-Dx, PAHs, 2-methylnaphthalene)	None Scheduled	None Scheduled
Free Product Recovery and Gauging (See Note 2)			
Free Product Gauging Wells (MW-59, RW-12, New Recovery Wells [RW-101 to 110], MW-36, MW-39A**, MW-89**, MW-93)**	Single Event (Free Product Gauging)	Quarterly at minimum (Free Product Gauging)	None Scheduled

Notes:

1. This schedule can be modified based on data collected during system performance.
2. For all monitoring wells, the measurement of free product in a well will trigger free product removal activities. Free product gauging (and removal, if free product is present) will occur quarterly for a minimum of 4 consecutive quarters.[c]

* Performance monitoring will continue for the duration of AS/SVE system operation plus 2 years, at which time confirmational monitoring will be initiated.

** MW-59, MW-39A, and MW-89 will become Performance Monitoring Wells once free product has not been present for four consecutive quarters.[b,d]

***MW-86B is both a CPOC Well and a Shoreline Water Quality Well.

[a] A below-grade obstruction was observed in MW-38 on 9/18/20 and the well was decomissioned on May 6, 2021.

[b] MW-89 qualified in October of 2020. MW-39A qualified in August of 2021.

[c] Per the CMPT, wells qualify for perfomance monitoring analyses once 4 quarters of free product gauging result in product thicknesses of <0.01 ft. If product is encountered during sampling, the well is not to be sampled.

[c] The original version of Table 2 in the CMP had a typo in the ** note, stating that only two quarters of clean data were required to transition to Performance Monitoring Wells. The text of the CMP stated the duration as four quarters, and the note has been revised.

PORT OF SEATTLE - TERMINAL 30
TABLE 3
Compliance Monitoring Schedule

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Post AS/SVE Startup Years:	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**22**	**27**	**32**
Post AS/SVE Shutdown Years:							**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**17**	**22**	**27**
Confirmational Monitoring Years									**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**	**25**
	Baseline	**Performance Monitoring Period**							**Confirmational Monitoring Period**												
CPOC Wells	*Once*	*Biannual*							*Annual*					*Biannual*				*Every 5 years*			
MW-45A	X	X		X		X		X	X	X	X	X	X	X		X		X	X	X	X
MW-46B	X	X		X		X		X	X	X	X	X	X	X		X		X	X	X	X
MW-58A	X	X		X		X		X	X	X	X	X	X	X		X		X	X	X	X
MW-86B	X	X		X		X		X	X	X	X	X	X	X		X		X	X	X	X
MW-92	X	X		X		X		X	X	X	X	X	X	X		X		X	X	X	X
Performance Wells																					
Within	*Once*	*Semiannual*							None												
MW-59	X	XX	XX	XX	XX	XX	XX	XX													
MW-89	X	XX	XX	XX	XX	XX	XX	XX													
RW-11A	X	XX	XX	XX	XX	XX	XX	XX													
Downgradient	*Once*	*Annual*							None												
MW-36A	X	X	X	X	X	X	X	X													
MW-39A	X	X	X	X	X	X	X	X													
MW-42	X	X	X	X	X	X	X	X													
RW-9	X	X	X	X	X	X	X	X													
Interior Wells	*Once*	*Biannual*							*Every 5 years*												
~~MW-38~~[1]	~~X~~	~~X~~		~~X~~		~~X~~		~~X~~					~~X~~					~~X~~	~~X~~	~~X~~	~~X~~
MW-93	X	X		X		X		X					X					X	X	X	X
RW-1	X	X		X		X		X					X					X	X	X	X
RW-5A	X	X		X		X		X					X					X	X	X	X

Notes:

The monitoring frequency for the Shoreline water quality monitoring wells and free product gauging wells are not shown on this table.

1. A below-grade obstruction was observed in MW-38 on 9/18/20 and the well was decomissioned on May 6, 2021.

Abbreviations and Formatting:

AS/SVE = air sparge/soil vapor extraction

CPOC = Conditional Point of Compliance

PORT OF SEATTLE - TERMINAL 30
Table 4
AS/SVE and Oxidizer Operational Data

		Operating Parameters								Mass Removal						Mass Removal			
			Calculated								Calculated			Calculated		Calculated			
Date	Time	SVE Blower Hr Meter[2] (Hours)	Cumulative SVE Blower Runtime[2] (Hours)	Cumulative SVE Blower Runtime (Days)	Period SVE Blower Runtime (Days)	SVE Inlet Vacuum (In. H_2O)	SVE Inlet ΔP (In. H_2O)	SVE Inlet Temp (^0F)	SVE Inlet Flow Rate[1] (scfm)	SVE Discharge Total VOC PID (ppmv)	SVE Discharge Total VOCs[3,4] ($\mu g/m^3$)	Oxidizer Fire Box Temp[8] (F)	Oxidizer Discharge Total VOC PID[7] (ppmv)	Oxidizer Discharge Total VOCs[3,4,6] ($\mu g/m^3$)	Period Destruction Efficiency[7] (%)	Mass Removal Rate[5] (Lb/Day)	Period Mass Removal[6] (Lb)	Cumulative Mass Removal[9] (Lb)	Comments/Notes
9/19/2019	12:00	9.9	--	START	NA	35.0	0.25	72	98		0	--	NM	NA	NA	0.0	0.0	0.0	SVE Start; Oxidizer Start
9/20/2019	16:04	33.9	--	1.0	1.0	35.0	0.25	68	99	198	238,228	--	NM	4,903	NA	2.1	2.1	2.1	
9/23/2019	13:58	105.9	--	4.0	3.0	35.0	0.25	68	99	212	255,073	--	NM	4,903	NA	2.3	6.8	8.9	
9/24/2019	10:00	129.9	--	5.0	1.0	30.0	0.25	70	99	215	258,682	--	NM	4,903	NA	2.3	2.3	11.2	
9/25/2019	9:20	153.9	--	6.0	1.0	34.0	0.25	66	99	218	262,292	--	NM	4,903	NA	2.3	2.3	13.5	
9/26/2019	9:00	176.1	--	6.9	0.9	38.0	0.25	66	98	405	487,285	--	NM	4,903	NA	4.3	4.0	17.5	
9/28/2019	12:19	227.5	--	9.1	2.1	46.0	0.25	65	97	440	529,396	--	NM	4,903	NA	4.6	9.9	27.5	
9/30/2019	9:35	272.5	--	10.9	1.9	56.0	0.25	62	96	463	557,069	--	NM	4,903	NA	4.8	9.1	36.5	
10/1/2019	9:25	296.6	--	11.9	1.0	54.0	0.25	61	97	488	587,148	--	9.4	4,903	99	5.1	5.1	41.6	
10/2/2019	9:20	320.6	--	12.9	1.0	44.0	0.25	62	98	427	513,755	--	8.7	4,538	99	4.5	4.5	46.2	
10/3/2019	8:50	344.1	--	13.9	1.0	50.0	0.25	61	97	457	549,850	--	NM	4,538	NA	4.8	4.7	50.9	
10/4/2019	11:40	371.0	--	15.0	1.1	55.0	0.25	66	96	469	564,288	--	7.9	4,121	99	4.9	5.5	56.4	
10/7/2019	12:08	443.4	--	18.1	3.0	61.0	0.25	65	95	466	560,678	--	5.2	2,712	100	4.8	14.5	70.9	
10/8/2019	9:05	464.4	--	18.9	0.9	70.0	0.25	60	95	487	585,945	--	8.8	4,590	99	5.0	4.4	75.2	
10/9/2019	10:07	489.4	--	20.0	1.0	73.0	0.25	60	94	494	594,367	--	7.0	3,651	99	5.0	5.2	80.5	
10/10/2019	10:24	513.7	--	21.0	1.0	69.0	0.25	61	95	517	622,040	--	4.1	2,139	100	5.3	5.4	85.8	
10/13/2019	9:33	585.7	--	24.0	3.0	78.0	0.5	60	132	550	661,745	--	8.3	4,329	99	7.9	23.6	109.4	
10/14/2019	9:39	608.9	--	25.0	1.0	81.0	0.5	61	131	558	671,370	--	NM	4,329	NA	7.9	7.7	117.1	
10/15/2019	12:25	632.9	--	26.0	1.0	82.0	0.75	64	160	667	802,516	--	5.4	2,817	100	11.6	11.6	128.7	
10/23/2019	11:20	826.5	--	34.0	8.1	86.0	1	60	185	662	796,500	--	8.8	4,590	99	13.2	106.7	235.4	Lab Data
10/24/2019	9:35	848.8	--	35.0	0.9	93.0	1.5	57	224	637	766,421	--	7.7	4,016	99	15.5	14.4	249.7	
10/25/2019	9:50	873.0	--	36.0	1.0	90.0	1.75	58	243	752	904,785	--	6.3	3,286	100	19.8	20.0	269.7	
10/28/2019	11:00	946.1	--	39.0	3.0	85.0	2.5	56	294	793	954,116	--	7.3	3,808	100	25.2	76.7	346.4	
10/29/2019	9:15	969.6	--	40.0	1.0	82.0	2.5	56	295	823	990,211	--	7.7	4,016	100	26.3	25.7	372.1	
10/30/2019	12:30	995.7	--	41.1	1.1	81.0	2.5	56	295	744	895,160	--	6.7	3,495	100	23.8	25.9	398.0	
11/1/2019	14:00	1,045.1	--	43.1	2.1	79.0	2.5	56	296	734	883,128	--	6.1	3,182	100	23.5	48.4	446.4	
11/4/2019	16:05	1,120.3	--	46.3	3.1	80.0	2.75	55	311	660	794,094	--	4.8	2,504	100	22.2	69.5	515.9	
11/6/2019	10:18	1,162.5	--	48.0	1.8	86.0	2.75	56	307	670	806,125	--	4.9	2,556	100	22.3	39.2	555.1	
11/8/2019	9:08	1,209.3	--	50.0	2.0	86.0	2.75	55	308	628	755,592	--	5.0	2,608	100	20.9	40.8	595.9	
11/12/2019	10:30	1,306.6	--	54.0	4.1	92.0	2.5	56	290	654	786,875	--	3.6	1,878	100	20.5	83.3	679.2	
11/13/2019	9:30	1,329.6	--	55.0	1.0	91.0	2.5	56	291	631	759,202	--	7.0	3,651	100	19.9	19.0	698.2	
11/15/2019	12:40	1,377.6	--	57.0	2.0	91.0	2.75	56	305	614	738,748	--	3.7	1,930	100	20.3	40.5	738.7	
11/25/2019	10:52	1,477.2	--	61.1	4.2	89.0	2.75	50	308	546	656,932	--	7.5	3,912	99	18.2	75.5	814.2	SVE & oxidizer down on 11/19/19 at 12:23 due to low propane. Restarted on 11/25/19 at 10:00.
11/26/2019	10:25	1,500.8	--	62.1	1.0	88.0	2.75	50	308	621	747,170	--	4.4	2,295	100	20.7	20.3	834.5	
11/27/2019	10:40	1,524.8	--	63.1	1.0	88.0	2.75	50	308	541	650,916	--	5.6	1,705	100	18.0	18.1	852.6	Lab Data is questionable and not used in calculations. Destruction Efficiency Based on PID.
12/2/2019	9:53	1,644.2	--	68.1	5.0	88.0	2.75	50	308	424	510,145	--	4.0	1,218	100	14.1	70.4	922.9	
12/3/2019	14:00	1,671.1	--	69.2	1.1	84.0	2.75	50	310	508	611,211	--	4.5	1,370	100	17.0	19.1	942.1	SVE system shutdown on 12/3/19 between 12:13 and 13:45 due to power outage.
12/6/2019	9:21	1,738.4	--	72.0	2.8	89.0	2.75	50	308	477	573,913	--	4.8	1,461	100	15.9	44.5	986.6	
12/9/2019	9:14	1,810.3	--	75.0	3.0	98.0	2.75	50	303	469	564,288	--	4.4	1,340	100	15.4	46.1	1,032.7	
12/16/2019	10:47	1,979.9	--	82.1	7.1	99.0	2.5	50	289	507	610,008	--	4.0	1,218	100	15.8	112.0	1,144.7	
12/18/2019	10:34	2,027.4	--	84.1	2.0	94.0	2.5	50	291	442	531,802	--	8.2	2,497	100	13.9	27.6	1,172.2	
12/20/2019	9:46	2,074.7	--	86.0	2.0	94.0	2	50	260	734	883,128	--	4.6	1,401	100	20.7	40.8	1,213.0	
12/23/2019	12:02	2,148.9	--	89.1	3.1	96.0	2	50	260	662	1,381,000	--	4.9	1,125	100	32.2	99.7	1,312.7	Lab Data. Re-sample for 11/27/19.
12/26/2019	9:38	2,218.6	--	92.0	2.9	90.0	2.25	50	278	375	782,289	--	6.6	1,515	100	19.6	56.8	1,369.4	Empty water storage tank on 12/24/19.
1/3/2020	15:00	2,416.1	--	100.3	8.2	88.0	2	50	263	486	1,013,846	--	4.9	1,125	100	24.0	197.2	1,566.7	
1/7/2020	10:25	2,507.7	--	104.1	3.8	85.0	1.75	50	247	617	1,287,125	--	5.1	1,171	100	28.6	109.1	1,675.8	Empty water storage tank on 1/7/20.
1/9/2020	10:55	2,556.2	--	106.1	2.0	81.0	1.75	50	249	432	901,196	--	4.3	987	100	20.1	40.7	1,716.5	
1/15/2020	11:32	2,701.0	--	112.1	6.0	84.0	1.5	50	229	353	188,970	--	6.9	340	100	3.9	23.5	1,740.0	Lab Data.
1/17/2020	14:30	2,750.6	--	114.2	2.1	84.0	1.75	50	247	342	183,081	--	6.0	296	100	4.1	8.4	1,748.4	Started air sparging.
1/21/2020	10:00	2,848.0	--	118.3	4.1	86.0	1.75	50	247	465	248,926	--	3.3	163	100	5.5	22.4	1,770.8	
1/22/2020	15:12	2,873.1	--	119.3	1.0	92.0	1.75	50	244	522	279,440	--	2.6	128	100	6.1	6.4	1,777.3	
1/23/2020	11:00	2,893.3	--	120.1	0.8	93.0	1.5	50	226	564	301,924	--	5.0	246	100	6.1	5.2	1,782.4	Empty water storage tank on 1/23/20.
1/27/2020	1:51	2,992.2	--	124.3	4.1	88.0	1.75	50	246	492	263,380	--	2.5	123	100	5.8	24.0	1,806.4	Empty water storage tank on 1/27/20.
1/30/2020	9:36	3,059.8	--	127.1	2.8	93.0	1.75	50	244	549	293,894	--	5.9	291	100	6.4	18.2	1,824.6	Empty water storage tank on 1/30/20.
2/4/2020	13:25	3,183.4	--	132.2	5.2	97.0	1.75	50	242	569	304,600	--	6.1	301	100	6.6	34.2	1,858.8	Empty water storage tank on 2/5/20.
2/6/2020	16:30	3,234.4	--	134.4	2.1	84.0	1.5	50	229	638	341,538	--	2.8	138	100	7.0	15.0	1,873.7	
2/11/2020	12:05	3,350.2	--	139.2	4.8	75.0	1.5	50	232	462	247,321	--	4.9	1,090	100	5.2	24.9	1,898.7	Collected lab air sample. Sample suspect. Lab data not used in calculations.
2/14/2020	9:34	3,418.1	--	142.0	2.8	69.0	1.5	50	234	450	240,897	--	5.6	1,246	99	5.1	14.4	1,913.0	Empty water storage tank on 2/13/20. AS system off from 2/13/20 @ 09:00 to 2/14/20 @ 09:00.
2/17/2020	9:40	3,490.3	--	145.0	3.0	72.0	1.5	50	233	462	247,321	--	4.1	912	100	5.2	15.6	1,928.6	
2/20/2020	13:45	3,566.4	--	148.2	3.2	40.0	0.75	52	172	377	201,818	--	6.3	1,401	99	3.1	9.9	1,938.6	Empty water storage tank on 2/20/20. Approximately 12" in tank. Turned down vacuum to SVE well field to reduce water extracted.
2/26/2020	13:34	3,710.3	--	154.2	6.0	42.0	1	56	198	377	201,818	--	NT	1,401	NA	3.6	21.5	1,960.1	Started pulsing AS system. Zones 4 & 5 ON. Pulsing every 8 hours between Zones 1, 2, and 3. AS system down between 08:24 on 2/27/20 and 10:00 on 2/27/20 due to PSH Alarm.
2/28/2020	10:23	3,755.2	--	156.1	1.9	50.0	1.25	51	220	377	201,818	--	NT	1,401	NA	4.0	7.5	1,967.5	AS system down between 18:49 on 2/27/20 and 09:00 on 2/28/20 due to PSH Alarm. Pulsing AS system with Zone 5 ON. Pulsing every 6 hours between Zones 1, 2, 3, and 4.
3/6/2020	10:30	3,923.5	--	163.1	7.0	50.0	1	52	196	401	214,666	--	NT	1,401	NA	3.8	26.6	1,994.1	
3/11/2020	14:30	4,046.3	--	168.2	5.1	50.0	1.25	52	219	360	192,717	--	5.7	1,268	99	3.8	19.5	2,013.6	
3/12/2020	10:15	4,066.0	--	169.0	0.8	50.0	1.25	51	220	318	170,234	--	7.5	1,668	99	3.4	2.8	2,016.3	Collected Lab air sample. Inlet concentration lab data suspect. Need to re-sample upon start up. Lab data not used in calculations.

PORT OF SEATTLE - TERMINAL 30
Table 4
AS/SVE and Oxidizer Operational Data

		Operating Parameters								Mass Removal						Mass Removal			
			Calculated								Calculated			Calculated		Calculated			
Date	Time	SVE Blower Hr Meter[2] (Hours)	Cumulative SVE Blower Runtime[2] (Hours)	Cumulative SVE Blower Runtime (Days)	Period SVE Blower Runtime (Days)	SVE Inlet Vacuum (In. H_2O)	SVE Inlet ΔP (In. H_2O)	SVE Inlet Temp (^{0}F)	SVE Inlet Flow Rate[1] (scfm)	SVE Discharge Total VOC PID (ppmv)	SVE Discharge Total VOCs[3,4] ($\mu g/m^3$)	Oxidizer Fire Box Temp[8] (F)	Oxidizer Discharge Total VOC PID[7] (ppmv)	Oxidizer Discharge Total VOCs[3,4,6] ($\mu g/m^3$)	Period Destruction Efficiency[7] (%)	Mass Removal Rate[5] (Lb/Day)	Period Mass Removal[6] (Lb)	Cumulative Mass Removal[9] (Lb)	Comments/Notes
3/19/2020	14:15	4,211.6	--	175.1	6.1	50.0	1.25	52	219	284	152,033	--	3.5	779	99	3.0	18.2	2,034.5	System off for 6.5 hours on 3/19/20 to install catalyst in oxidizer.
3/24/2020	14:30	4,325.4	--	179.8	4.7	50.0	1.25	56	219	319	170,769	--	3.1	690	100	3.4	15.9	2,050.4	System shut off at 15:00 on 3/24/20 due to COVID-19 travel restrictions.
8/17/2020	9:59	4,334.7	--	180.2	0.4	69	1	79	186	147	78,693	--	1.3	289	100	1.3	0.5	2,050.9	Measurement within 2-hours after system re-start since 3/24/2020. SVE wells being turned on one at a time.
8/17/2020	11:50	4,336.9	--	180.3	0.1	63	1	79	188	141	75,481	--	0.5	111	100	1.3	0.1	2,051.1	All SVE wells except HSVE-1 and HSVE-2 turned on.
8/18/2020	7:26	4,356.2	--	181.1	0.8	61	1	79	188	193	103,532	--	0.5	111	100	1.8	1.4	2,052.5	All SVE wells except HSVE-1 and HSVE-2 turned on.
8/18/2020	8:54	4,357.8	--	181.2	0.1	63	1.25	79	210	318	170,234	--	1.5	334	100	3.2	0.2	2,052.7	Extracting at all SVE wells except HSVE-1 (partially open).
8/20/2020	13:39	4,410.7	--	183.4	2.2	62	1.25	82	210	389	208,028	--	0.4	89	100	3.9	8.6	2,061.3	Readings prior to individual SVE well adjustments
8/20/2020	14:28	4,411.6	--	183.4	0.0	58	1.25	82	211	401	214,666	--	0.8	178	100	4.1	0.2	2,061.5	Readings after to individual SVE well adjustments
8/21/2020	6:51	4,427.8	--	184.1	0.7	60	1.25	79	211	485	259,633	--	0.6	133	100	4.9	3.3	2,064.8	No system adjustments conducted
8/26/2020	14:07	4,555.7	--	189.4	5.3	59	1.25	78	211	408	2,101,500	--	0.4	6,570	100	39.9	212.8	2,277.6	Collected lab gas sample and PID measurements at 1407
8/26/2020	15:18	4,556.3	--	189.4	0.0	68	1.25	78	209	334	2,101,500	--	0.6	9,855	100	39.4	1.0	2,278.6	Adjusted Hertz on SVE blower and made individual SVE well adjustments on manifold.
8/28/2020	13:48	4,602.8	--	191.4	1.9	68	1.25	80	208	303	1,903,305	--	0.7	11,498	99	35.6	69.0	2,347.7	No appreciable oil in SVE-4 and SVE-5 flow gauges.
8/28/2020	14:39	4,603.6	--	191.4	0.0	68	1.25	80	208	302	1,898,900	--	0.5	8,213	100	35.6	1.2	2,348.9	Readings after system adjustments
9/2/2020	11:22	4,719.9	--	196.3	4.8	64	1.25	81	209	295	1,856,115	--	0.6	9,855	99	34.9	169.2	2,518.1	Readings pre-adjustments
9/2/2020	14:44	4,723.3	--	196.4	0.1	63	1.5	81	230	303	1,906,451	--	0.5	8,213	100	39.4	5.6	2,523.7	Readings post-adjustments. Post AS system re-start since 3/24/2020.
9/4/2020	11:55	4,768.6	--	198.3	1.9	80	2	80	259	333	2,095,837	--	0.0	0	100	48.8	92.0	2,615.7	Readings after draining water from SVE-6, SVE-8, SVE-9, and after air sparge schedule and flow adjustments
9/10/2020	8:08	4,909.0	--	204.1	5.8	84	2	78	258	348	2,188,958	--	0.9	14,783	99	50.7	296.6	2,912.3	Before system tweaks/adjustments.
9/10/2020	8:54	4,909.4	--	204.1	0.0	76	2	78	261	329	2,071,299	--	0.6	9,855	100	48.6	0.8	2,913.1	After system tweaks/adjustments.
9/15/2020	15:21	5,036.3	--	209.4	5.3	78	2	78	260	353	2,220,417	--	0.7	11,498	99	51.9	274.4	3,187.5	
9/23/2020	7:00	5,220.0	--	217.1	7.7	77	1.75	72	245	316	1,988,560	--	NM	11,498	NA	43.8	335.2	3,522.7	Collected measurements without PID/LEL meter. Used averages of before and after values
9/29/2020	9:02	5,366.3	--	223.2	6.1	78	1.75	78	243	279	1,460,900	--	0.7	9,570	99	31.9	194.7	3,717.4	Collected lab gas sample
10/6/2020	8:14	5,533.6	--	230.2	7.0	78	2	69	262	400	2,090,887	--	1.9	25,976	99	49.3	343.6	4,061.0	
10/16/2020	14:59	5,748.9	--	239.1	9.0	81	2	66	262	400	2,092,980	--	1.9	25,976	99	49.3	441.8	4,502.8	Suspect MultiRAE PID probe saturation (biased high measurement). Measurement >999-ppm. Used average of before and after PID measurements.
10/23/2020	8:22	5,910.3	--	245.9	6.7	82	2	60	263	256	1,339,507	--	1.0	13,671	99	31.7	212.9	4,715.7	Used MultiRAE PID. No apparent probe saturation.
10/27/2020	8:43	6,006.8	--	249.9	4.0	82	2	59	263	166	394,000	--	1.0	5,250	99	9.3	37.5	4,753.2	Collected lab gas sample. Used MultiRAE PID. No apparent probe saturation.
11/2/2020	14:48	6,158.1	--	256.2	6.3	80	2	63	263	113	267,967	--	0.8	4,200	98	6.3	39.9	4,793.1	Used RKI.
11/10/2020	14:39	6,348.7	--	264.1	7.9	86	2	54	263	114	270,341	--	0.8	4,200	98	6.4	50.7	4,843.8	Used RKI. Readings SVE flow pre-adjustments.
11/10/2020	15:01	6,349.0	--	264.1	0.0	80	2	54	265	129	304,994	--	1.3	6,825	98	7.3	0.1	4,843.9	Used RKI. Readings SVE flow post-adjustments.
11/18/2020	13:56	6,540.1	--	272.1	8.0	84	2	52	264	139	452,000	--	0.7	14,400	97	10.7	85.4	4,929.4	Used RKI. Readings SVE flow post-adjustments. Gas sample results suspect. Re-sampling
12/4/2020	13:18	29.4	6,832.3	284.3	12.2	76	2	52	267	107	348,342	--	1.6	32,914	91	8.4	101.9	5,031.3	Used MultiRAE. Readings SVE flow pre-adjustments. Run time hour tally reset on PLC, SVE cumulative run time hours calculated.
12/4/2020	13:40	29.8	6,832.7	284.3	0.0	79	2	53	266	115	374,663	--	1.7	34,971	91	9.0	0.1	5,031.4	Used MultiRAE. Readings SVE flow post-adjustments.
12/10/2020	15:37	174.7	6,977.6	290.3	6.0	81	2	51	266	115	361,503	--	1.7	34,971	90	8.6	52.1	5,083.5	Used RKI. Probe saturation. Individual PID value not representative. Used average of previous two PID values as substitute.
12/16/2020	8:21	305.0	7,107.9	295.7	5.4	83	1.5	50	229	79	1,151,000	--	1.0	9,170	99	23.7	128.9	5,212.5	Collected lab gas samples. Measurement collected pre-adjustments.
12/29/2020	8:22	617.2	7,420.1	308.8	13.0	84	1.5	50	229	88	1,279,213	--	1.0	9,170	99	26.4	342.8	5,555.3	No Oxidizer discharge PID hits (checked multiple times).
1/12/2021	8:58	928.4	7,731.3	321.7	13.0	88	1.5	50	228	89	924,000	--	1.4	8,570	99	18.9	245.3	5,800.6	Collected lab gas samples. Measurement collected pre-adjustments.
2/2/2021	9:05	1,429.9	8,232.8	342.6	20.9	85	1.5	50	229	163.7	1,709,139	--	0.6	3,673	100	35.2	734.6	6,535.2	Measurements collected before system adjustments.
2/17/2021	13:03	1,669.1	8,472.0	352.6	10.0	80	1.5	49	231	52.4	566,950	--	0.7	3,160	99	11.8	117.2	6,652.4	Collected lab gas samples. Measurement collected pre-adjustments.
3/2/2021	8:43	1,942.6	8,745.5	364.0	11.4	78	1.5	49	231	56.4	610,229	--	0.1	451	100	12.7	144.7	6,797.2	Measurements collected before system adjustments.
3/23/2021	15:28	2,434.9	9,237.8	384.5	20.5	84	1.5	58	227	128.8	563,000	--	1.5	10,850	98	11.5	236.1	7,033.2	Collected lab gas samples. Measurement collected pre-adjustments.
4/5/2021	14:04	2,709.5	9,512.4	395.9	11.4	82	1.5	60	228	85.8	375,042	--	0.1	723	100	7.7	87.8	7,121.1	Measurements collected before system adjustments.
4/19/2021	14:50	3,006.1	9,809.0	408.3	12.4	78	1.5	69	227	83.2	641,000	--	0.7	21,570	97	13.1	161.7	7,282.8	Collected lab gas samples. Measurement collected pre-adjustments. Turned off air sparge system at 1600 due to observed air sparge blower oil leak.
5/5/2021	7:57	3,381.4	10,184.3	423.9	15.6	82	1.5	62	227	134.5	1,036,232	--	1.0	30,814	97	21.2	331.0	7,613.8	Air sparge repaired (gasket oil leak) and restarted on 5/4/2021 at ~12:25. No system adjustments conducted.
5/20/2021	9:09	3,662.5	10,465.4	435.6	11.7	80	1.5	66	227	72.9	420,900	--	1.4	7,010	98	8.6	100.6	7,714.4	Power outage earlier this morning. Normal system operations for ~2-hours prior to data collection. Increased setting on pressure switch.
6/4/2021	8:29	3,957.5	10,760.4	447.9	12.3	81	1.5	71	226	83.1	479,791	--	0.7	3,505	99	9.7	119.6	7,834.0	Generator maintenance on late afternoon 6/3, system was shutdown from 6/3 ~1530 to 6/4 0740. System running for ~50-minutes prior to collection of readings.
6/16/2021	9:11	4,245.0	11,047.9	459.9	12.0	91	1.5	68	223	133.3	421,000	--	1.9	5,250	99	8.4	101.0	7,935.0	Collected lab gas samples. Air sparge OFF since 6/15/2021 at 1916. Air sparge to remain OFF indefinitely due to undetermined blower oil loss.
7/2/2021	10:00	4,628.8	11,431.7	475.9	16.0	80	1.5	80	224	80.4	253,926	--	1.0	2,763	99	5.1	81.8	8,016.8	Air sparge system still OFF (blower sent out for servicing). Measurements collected prior to system adjustments. Drained fluids out of SVE manifold (hoses and sumps) and then re-adjusted SVE flow rates.
7/19/2021	14:06	5,024.6	11,827.5	492.4	16.5	81	1.5	83	223	81.8	257,000	--	1.0	5,700	98	5.2	85.0	8,101.8	Collected lab gas samples. Air sparge system still OFF (blower to be re-installed).
8/5/2021	7:22	5,423.6	12,226.5	509.0	16.6	77	1.5	78	225	106.5	334,603	--	1.4	7,980	98	6.8	112.8	8,214.6	Air sparge re-started 7/24/21
8/26/2021	14:25	5,935.1	12,738.0	530.3	21.3	77.0	1.5	77	226	66.4	251,000	--	0.0	4,070	98	5.1	108.6	8,323.2	Collected lab gas samples. Air sparge bleeder valve wide open, reducing air to AS wells. Air sparge wells need inspected, maybe cleaned/re-developed. AS flow meters need cleaned.
9/30/2021	13:05	6,640.2	13,443.1	559.7	29.4	78.0	1.5	62	229	56.0	269,500	680	0.9	3,030	99	5.5	162.7	8,485.9	AECOM assumes control of system operations from CRETE. See Footnote 6. Collected lab gas samples. PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
10/6/2021	15:20	6,785.5	13,588.4	565.8	6.1	78.0	1.5	65	227.9	144.8	696,850	689	2.5	8,417	99	14.3	86.5	8,572.3	PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
10/14/2021	9:03	6,972.3	13,775.2	573.6	7.8	78.0	1.5	60	229.0	100.2	482,213	684	1.9	6,397	99	9.9	77.3	8,649.6	PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.

PORT OF SEATTLE - TERMINAL 30
Table 4
AS/SVE and Oxidizer Operational Data

		Operating Parameters								Mass Removal						Mass Removal			
			Calculated								Calculated			Calculated		Calculated			
Date	Time	SVE Blower Hr Meter[2] (Hours)	Cumulative SVE Blower Runtime[2] (Hours)	Cumulative SVE Blower Runtime (Days)	Period SVE Blower Runtime (Days)	SVE Inlet Vacuum (In. H_2O)	SVE Inlet ΔP (In. H_2O)	SVE Inlet Temp (^{0}F)	SVE Inlet Flow Rate[1] (scfm)	SVE Discharge Total VOC PID (ppmv)	SVE Discharge Total VOCs[3,4] ($\mu g/m^3$)	Oxidizer Fire Box Temp[8] (F)	Oxidizer Discharge Total VOC PID[7] (ppmv)	Oxidizer Discharge Total VOCs[3,4,6] ($\mu g/m^3$)	Period Destruction Efficiency[7] (%)	Mass Removal Rate[5] (Lb/Day)	Period Mass Removal[6] (Lb)	Cumulative Mass Removal[9] (Lb)	Comments/Notes
10/21/2021	14:30	7,141.7	13,944.6	580.6	7.1	76.0	1.5	60	229.7	117.6	108,510	680	2.6	1,900	98	2.2	15.8	8,665.4	Collected lab gas samples. PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
10/28/2021	14:15	7,309.8	14,112.7	587.6	7.0	80.0	2.0	60	263.6	28.6	26,389	664	0.5	365	99	0.6	4.4	8,669.8	SVE Blower off from 10/21/2021 until 10/28/2021. Could be result of low PID measurement. PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
11/5/2021	14:30	7,502.7	14,305.6	595.7	8.0	84.0	2.0	55	263.3	50.6	46,689	681	6.6	4,823	90	1.1	8.9	8,678.7	PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
11/11/2021	21:21	7,654.1	14,457.0	602.0	6.3	86.0	1.5	54	227.5	109.7	101,221	680	2.5	1,827	98	2.1	13.1	8,691.8	PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
11/18/2021	12:30	7,807.8	14,610.7	608.4	6.4	86.0	1.5	50	228.4	47.6	103,250	686	1.0	1,020	99	2.1	13.6	8,705.3	Collected lab gas samples. Replacement AS Compressor pressure switch installed on 11/17/21 by Marine Maintenance.
11/23/2021	16:30	7,932.0	14,734.9	613.5	5.2	86.0	2.0	50	263.7	87.5	189,798	682	0.9	918	100	4.5	23.3	8,728.6	No new PAH alarms since the pressure switch replacement.
12/1/2021	15:55	8,122.9	14,925.8	621.5	8.0	85.0	1.5	55	227.6	19.4	42,081	652	1.1	1,122	97	0.9	6.9	8,735.5	No new PAH alarms since the pressure switch replacement.
12/10/2021	14:15	8,337.3	15,140.2	630.4	8.9	86.0	1.5	50	228.4	399.3	866,129	676	0.0	0	100	17.8	158.9	8,894.4	No new PAH alarms since the pressure switch replacement.
12/17/2021	15:17	8,499.7	15,302.6	637.2	6.8	88.0	1.5	50	227.7	42.5	92,188	676	0.6	612	99	1.9	12.8	8,907.2	No new PAH alarms since the pressure switch replacement.
12/22/2021	12:15	8,616.9	15,419.8	642.1	4.9	90.0	1.5	50	227.0	55.3	**109,700**	682	0.7	1,250	99	**2.2**	10.9	8,918.1	Collected lab gas samples. No new PAH alarms since the pressure switch replacement.
1/5/2022	12:41	8,697.9	15,500.8	645.5	3.4	84.0	1.0	50	187.1	52.8	104,741	684	1.2	2,143	98	1.8	5.9	8,924.0	AS bleed valve closed 100% to try to increase airflow to subsurface.
1/21/2022	13:47	9,005.0	15,807.9	658.2	12.8	85.0	1.5	54	227.9	16.3	32,335	672	0.3	536	98	0.7	8.5	8,932.5	New AS PAH alarm on 1/12/22, the first since the pressure switch replacement. AS bleed valve opened up to relieve pressure on 1/13/22. Despite that, PAH alarms continue to shut down the AS system.
2/17/2022	20:20	9,499.3	16,302.2	678.8	20.6	80.0	1.0	50	188.2	383.2	760,163	675	7.9	14,107	98	12.9	264.9	9,197.5	Last AECOM visit under the initial short term service directive. PAH alarms continue to shut down the AS system.
3/31/2022	11:50	10,460.2	17,263.1	718.9	40.0	78.0	0.8	63	161.5	17.0	**101,000**	697	0.4	1,900	98	**1.5**	58.7	9,256.2	First AECOM visit under the new service directive. Oxidizer and SVE ON on arrival but AS system OFF due to a PAH alarm. Alarm cleared and AS restarted at 10:50. Collected lab gas samples. AS pressure switch tested and determined to be manlfunctioning. Switch taken offline to prevent further false alarm shut-downs.
4/12/2022	15:45	10,736.6	17,539.5	730.4	11.5	82.0	1.0	52	187.3	10.5	62,382	708	0.3	1,425	98	1.1	12.1	9,268.3	AS Compressor working as desired since disconnection of pressure switch. Zone sparging re-instituted at 5/5/5/4.5/4.5-hr intervals.
4/28/2022	15:59	11,021.7	17,824.6	742.3	11.9	74.0	1.0	60	188.1	38.5	228,735	670	0.7	3,325	99	3.9	46.0	9,314.2	4.15.22 - Rotameters cleaned for improved reading and operation; vacuum gauges replaced on SVE-4, -5, -7, -8, -9, and -10 (gauges should have been 0 " H_2O with system off but were reading from 7-27 " H_2O). 4.18.22 - Oxidizer magnehelic gauge replaced. 4.28.22 - Systems ON on arrival operating with zone sparging. Water continues to impede accurate readings of several SVE rotameters.
5/13/2022	15:11	11,337.5	18,140.4	755.4	13.2	78.0	1.5	60	229.0	34.7	206,159	668	0.4	1,900	99	4.2	55.8	9,370.1	--
6/21/2022	17:55	11,824.4	18,627.3	775.7	20.3	74.0	1.3	72	212.0	24.3	144,371	672	1.6	7,600	95	2.8	55.8	9,425.9	System down 5/25/22-6/13/22 due to lapsed invoices and lack of propane. Water continues to impede accurate readings of several SVE rotameters. SVE-5 rotameter gets stuck and needs replacing. AS VFD had a motor overload error code flashing (A2010), but the system was operational. AS zone runtimes were adjusted at EOD to add a 30-minute overlap during each transition. If the VFD motor overloads were happening during the zone transitions, this should help avoid them moving forward. Alarm notifications went inactive ~6/8/22 due to outdated telemetry software, fix pending.
7/7/2022	17:09	12,206.1	19,009.0	791.6	15.9	76.0	1.0	64	186.8	13.0	77,235	625	1.0	4,750	94	1.3	20.6	9,446.5	6/29/22 - Collected lab gas samples. No other system readings taken. 7/7/22 - Systems were ON on arrival operating with zone sparging. No system downtime this period. Sparge VFD had the motor overload error code flashing again (A2010) but the system was still running. AS Zones 2 and 4 were analyzed for breakthrough pressures and valves positions were adjusted for optimal flow distribution. At EOD, PLC was rewired so that the zones on the HMI control the same-named zones in the field. Zone 1 and 2 runtimes swapped at EOD. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending.
7/22/2022	16:10	12,556.2	19,359.1	806.2	14.6	74.0	1.0	78	184.9	12.1	71,888	681	0.9	4,275	94	1.2	17.4	9,464.0	Systems were ON on arrival operating with zone sparging. No system downtime this period. Rotameters for several SVE wells have observable signs of usage wear and tear. Water in the SVE lines continues to make accurate readings difficult. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending.
8/5/2022	14:45	12,679.6	19,482.5	811.4	5.1	85.0	1.0	80	181.5	49.6	294,682	677	2.5	11,875	96	4.8	24.7	9,488.7	Systems ON on arrival operating with zone sparging. The systems only operated for ~1/3 of the period due to several Oxidizer alarms that did not trigger notifications due to the telemetry software issue (fix pending). Rotameters for several SVE wells have observable signs of usage wear and tear. Water in the SVE lines continues to make accurate readings difficult.
8/19/2022	15:15	13,014.8	19,817.7	825.3	14.0	74.0	1.0	82	184.2	29.3	174,076	695	2.7	12,825	93	2.9	40.3	9,529.0	Systems were ON on arrival operating with zone sparging. No system downtime this period. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending. Rotameters for several SVE wells have observable signs of usage wear and tear. Water in the SVE lines continues to make accurate readings difficult. AS Zone 1 well valve positions were optimized for desired flow distribution.
9/2/2022	14:55	13,294.7	20,097.6	837.0	11.7	72.0	1.5	82	226.3	12.0	71,294	661	2.8	13,300	81	1.5	16.9	9,545.9	Oxidizer and SVE systems ON upon arrival. Sparge system was OFF on arrival due to a Sparge Blower TAH alarm from 14:48 on 8/31/22. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending. AS system restarted at 15:00. Water in the SVE lines continues to make accurate readings difficult.

PORT OF SEATTLE - TERMINAL 30
Table 4
AS/SVE and Oxidizer Operational Data

		Operating Parameters								Mass Removal						Mass Removal			
			Calculated								Calculated			Calculated		Calculated			
Date	Time	SVE Blower Hr Meter[2] (Hours)	Cumulative SVE Blower Runtime[2] (Hours)	Cumulative SVE Blower Runtime (Days)	Period SVE Blower Runtime (Days)	SVE Inlet Vacuum (In. H_2O)	SVE Inlet ΔP (In. H_2O)	SVE Inlet Temp (^0F)	SVE Inlet Flow Rate[1] (scfm)	SVE Discharge Total VOC PID (ppmv)	SVE Discharge Total VOCs[3,4] ($\mu g/m^3$)	Oxidizer Fire Box Temp[8] (F)	Oxidizer Discharge Total VOC PID[7] (ppmv)	Oxidizer Discharge Total VOCs[3,4,6] ($\mu g/m^3$)	Period Destruction Efficiency[7] (%)	Mass Removal Rate[5] (Lb/Day)	Period Mass Removal[6] (Lb)	Cumulative Mass Removal[9] (Lb)	Comments/Notes
9/14/2022	9:54	13,567.8	20,370.7	848.4	11.4	72.0	1.5	84	225.9	4.5	**32,570**	664	0.5	2,070	94	**0.7**	7.5	9,553.4	Systems ON on arrival operating with zone sparging. No alarms triggered this period (no downtime), but alarm notifications were inactive. During O&M, the AS bleed valve was closed to vent excess air through the pressure relief valve on an as-needed basis instead. SVE-5, 6, and 8 were pumped out until dry using a peristaltic pump; ~4 gallons total extracted from the manifold and stub ups.
09/30/2022	13:10	13,953.2	20,756.1	864.4	16.1	78.0	1.5	72	226.4	56.5	408,934	694	5.7	23,598	94	8.3	133.7	9,687.1	Systems ON on arrival operating with zone sparging. Sparge TAH alarms occurred on 9/14, 9/15, and 9/20, likely due to the bleed valve adjustment made on 9/14/22. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending. The PRV discharges hotter air into the AS enclosure than the bleed valve does, likely impacting the compressed air temperatures. The bleed valve was re-opened ~1/2-turn on 9/20/22, resolving the issue for the rest of the period. Water was once again visible in SVE-6 and -8, despite dewatering last visit. Water also visible in SVE-9 (not dewatered last visit).
10/13/2022	15:13	14,261.6	21,064.5	877.3	12.9	78.0	2.0	68	262.4	9.3	67,311	667	0.7	2,898	96	1.6	20.4	9,707.5	SVE ON on arrival, but AS OFF due to a VFD motor overtemp fault. The fault occurred on 10/4/22 but was not resolved prior to the 10/13 site visit. System was shut down after O&M for the groundwater sampling sampling event in the evening of October 13, 2022. Both systems were restarted following sampling at 00:15 on 10/14/22. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending.
10/26/2022	16:00	14,564.8	21,367.7	889.9	12.6	83.0	1.5	58	227.7	21.6	156,336	682	0.7	2,898	98	3.2	40.4	9,747.9	10/17/22 - AS VFD motor overtemp alarm, triggered 10/14/22, was resolved by MM and the system was restarted. 10/19/22 - AS VFD motor overtemp alarm, triggered 10/18/22, was resolved by AECOM during VFD troubleshooting. If backpressure is too high, the VFD sends excessive amps to the motor and faults out. Bleed valve increased to 1 full turn open to relieve pressure. 10/26/22 - Systems ON on arrival. Measured amps in each wire in and out of the VFD. Based on results, ABB tech support believes the motor is having issues, not the VFD. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending.
11/10/22	15:05	14,923.3	21,726.2	904.8	14.9	85.0	1.5	53	228.1	42.6	308,329	681	0.8	3,312	99	6.3	94.4	9,842.4	All systems ON on arrival. Sparge Zone 5 active. Systems ran continuously since last visit. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending.
11/23/22	15:35	15,228.3	22,031.2	917.6	12.7	86.0	1.8	53	246.0	8.8	63,692	669	1.1	4,554	93	1.4	17.9	9,860.3	All systems ON on arrival. Sparge Zone 5 active. Systems ran nearly continuously since last visit. Pilot SVE dewatering piping upgrade was successfully used to dewater SVE-8. SVE header PID readings taken for the first time with new brake bleeder mini knockout tank. ~68% of total mass removal due to HSVE-2 via PID measurements. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending.
12/09/22	10:45	15,572.4	22,375.3	931.9	14.3	96.0	1.8	50	242.8	11.8	49,650	685	1.0	660	99	1.1	15.5	9,875.8	**12/8/22:** System restarted following LNAPL recovery event and storage tank vac-out. System had shut down due to a Moisture Separator high level alarm at 14:22 on 12/7/22. **12/9/22:** All systems ON on arrival. Sparge Zone 4 active. ~74% of total mass removal due to HSVE-2 via PID measurements. Alarm notifications have been inactive since ~6/8/22 due to outdated telemetry software, fix pending.
12/29/22	15:47	15,730.0	22,532.9	938.5	6.6	>100	1.7	<50	237.8	10.1	42,497	670	1.2	792	98	0.9	6.0	9,881.8	**12/19/22**: System restarted following vac-out of the storage tank by MM. System had shut down on 12/15/22 at 21:03 due to a Moisture Separator high level alarm. **12/28/22**: System restarted at 16:00 by MM. System was down due to an oxidizer alarm triggered at 9:40 on 12/21/22. Cause unknown. **12/29/22**: System OFF on arrival due to a Moisture Separator high level alarm triggered at 18:26 on 12/28/22. A broken union was discovered on the water transfer pipe, presumed due to the freezing temperatures on 12/22/22. Union repaired while on site. Bottom moisture separator float switch also discovered to be broken, also likely due to freezing. Immediate repair not possible, and normal automatic draining capability disabled as a result. The system was run for several hours under supervision to collect readings but was shut down prior to departure.
02/16/23	15:30	15,942.0	22,744.9	947.3	8.8	100.0	1.5	50	223.4	9.4	39,552	678	0.3	198	99	0.8	7.0	9,888.8	**1/27/23**: System restarted following float switch repair and telemetry upgrade. Alarm notification functionality restored. **2/6/23**: System shut down, water storage full. **2/16/23**: System ON on arrival. The storage tank was vacuumed out in the morning and system was restarted at 10:30. Readings collected ~5 hrs later. Dewatering valves added to SVE-5, 7, 8, and 9. ~2 gal of free product (dark brown/black viscous) was extracted from the SVE-9 deadleg. The deadleg refilled immediately after with a product/water mix. SVE-6 and 8 were both full of water and drained. Both refilled immediately after. ~41% of total mass removal due to HSVE-2 via PID measurements.
03/02/23	15:44	16,189.6	22,992.5	957.6	10.3	100.0	1.5	50	223.4	9.6	40,393	680	0.9	594	99	0.8	8.4	9,897.2	**2/26/23**: System shut down, water storage full. Telemetry failed to send notifications when floats triggered. **2/28/23**: Water storage vacuumed out & system restarted. **3/2/23**: All systems ON on arrival. SVE wells adjusted at end of day to decrease water production: SVE-4 (30% open) and -8 (10% open). ~65% of total mass removal due to HSVE-2 via PID measurements.

PORT OF SEATTLE - TERMINAL 30
Table 4
AS/SVE and Oxidizer Operational Data

		Operating Parameters								Mass Removal						Mass Removal			
			Calculated								Calculated			Calculated		Calculated			
Date	Time	SVE Blower Hr Meter[2] (Hours)	Cumulative SVE Blower Runtime[2] (Hours)	Cumulative SVE Blower Runtime (Days)	Period SVE Blower Runtime (Days)	SVE Inlet Vacuum (In. H_2O)	SVE Inlet ΔP (In. H_2O)	SVE Inlet Temp (^0F)	SVE Inlet Flow Rate[1] (scfm)	SVE Discharge Total VOC PID (ppmv)	SVE Discharge Total VOCs[3,4] ($\mu g/m^3$)	Oxidizer Fire Box Temp[8] (F)	Oxidizer Discharge Total VOC PID[7] (ppmv)	Oxidizer Discharge Total VOCs[3,4,6] ($\mu g/m^3$)	Period Destruction Efficiency[7] (%)	Mass Removal Rate[5] (Lb/Day)	Period Mass Removal[6] (Lb)	Cumulative Mass Removal[9] (Lb)	Comments/Notes
03/15/23	15:36	16,495.7	23,298.6	970.4	12.8	98.0	1.5	52	223.4	12.6	43,370	--	--	--	--	0.9	11.1	9,908.3	**3/8/23**: Storage Tank LAH triggered. System stayed on. **3/9/23**: Storage tank vac'd out following product recovery event. **3/14/23**: Oxidizer taken offline with PSCAA approval. New emission stack constructed for direct emissions to atmosphere. **3/15/23:** System ON on arrival, with oxidizer offline. Sparge zone 3 active. 7.5 gal pumped from SVE deadlegs. ~77% of total mass removal due to HSVE-2 via PID measurements.
03/30/23	11:34	16,850.3	23,653.2	985.1	14.8	96.0	1.5	58	223.4	7.3	25,127	--	--	--	--	0.5	7.5	9,915.7	System ON on arrival. Sparge zone 2 active. 4 gal pumped from SVE deadlegs initially. Water production spiked following a 45-minute shutdown; an additional 4.5 gal recovered in 45 min following restart. ~83% of mass removal due to HSVE-2.
04/11/23	17:18	17,141.8	23,944.7	997.3	12.1	>100	1.4	55	215.8	14.4	49,566	--	--	--	--	1.0	11.7	9,927.4	**4/5/23:** Poly tank vac'd out in response to an LAH notification on 4/2/23. **4/11/23:** System ON on arrival. Zone 3 active. SVE vacuum >100 "wc. ~600 gal water collected total in poly tank since 3/30. SVE dilution valve opened 1 turn from closed to decrease vacauum and water production. SVE dewatered, 1/2 gal or less from each well. SVE-9 water was murky tan color due to product. ~86% of total mass removal due to HSVE-2 via PID measurements.
04/27/23	13:09	17,464.5	24,267.4	1,010.7	13.4	76.0	0.8	70	163.1	6.0	20,652	--	--	--	--	0.3	4.1	9,931.5	System ON on arrival. Zone 5 active. SVE vacuum at 76 "wc with DV open 1 turn. ~21 gallons water collected in poly tank since last visit. Dewatered deadlegs - SVE wells 4, 5, 8, 9, and 10 all contained brown/muddy water during dewatering. ~85% of total mass removal due to HSVE-2 via PID measurements.
05/09/23	14:32	17,752.3	24,555.2	1,022.7	12.0	82.0	0.9	70	168.1	3.2	11,015	--	--	--	--	0.2	2.0	9,933.5	System ON on arrival. Zone 5 active. SVE vacuum at 82 "wc with DV closed. SVE-5 and -8 off due to high water accumulation and low flow. ~0 gallons water collected in poly tank since last visit. During dewatering, SVE-9 and -10 had discolored water; all others were clear. ~73% of total mass removal due to HSVE-2 via PID measurements.
05/24/23	13:55	18,107.7	24,910.6	1,037.5	14.8	85.0	1.0	72	182.4	4.5	15,489	--	--	--	--	0.3	3.8	9,937.2	System ON on arrival. Zone 5 active. SVE-6 and -8 off due to high water accumulation and low flow. ~40 gallons water collected in poly tank since last visit. During dewatering, SVE-4, -9, and -10 had discolored water. All others were clear. ~66% of total mass removal due to HSVE-2 via PID measurements. SVE-6 opened at EOD.
06/08/23	13:24	18,465.6	25,268.5	1,052.4	14.9	79.0	1.1	75	191.3	6.1	20,997	--	--	--	--	0.4	5.4	9,942.6	System ON on arrival. Zone 5 active. SVE-8 off due to high water accumulation and low flow. ~27 gallons water collected in poly tank since last visit. During dewatering, only SVE-9 had discolored water; all others were clear. ~53% of total mass removal due to HSVE-2 via PID measurements.
06/22/23	14:27	18,799.3	25,602.2	1,066.3	13.9	79.0	1.1	70	191.3	4.9	12,000	--	--	--	--	0.2	2.9	9,945.5	System ON on arrival. Zone 5 active. SVE-8 off due to high water accumulation and low flow. SVE-9 had protuct in its rotameter. During dewatering, SVE-9 had brown oily water, all others were clear. Poly tank was vac'd on 6/19/23 after the 2Q LNAPL recovery event.
07/05/23	11:23	19,105.1	25,908.0	1,079.1	12.7	78.0	1.2	69	199.8	3.4	8,327	--	--	--	--	0.1	1.9	9,947.4	System ON on arrival. Zone 4 active. SVE-8 off due to high water accumulation and low flow. SVE-9 had protuct in its rotameter. During dewatering, SVE-9 had discolored water with some product, while all others were clear. SVE dilution valve opened 1 full turn (from closed) to reduce vacuum and water extraction at manifold. Sparge pulsing adjusted to only run in Zone 2 and Zone 5 based on gw analytical results.
07/19/23	12:27	19,433.7	26,236.6	1,092.8	13.7	72.0	0.5	76	122.3	2.6	6,367	--	--	--	--	0.1	1.0	9,948.3	System ON on arrival. Zone 2 active. SVE-8 off due to water accumulation. SVE-9 had protuct in its rotameter. During dewatering, SVE-4 and 9 had some product in their water, all others were clear.
08/04/23	14:00	19,815.2	26,618.1	1,108.7	15.9	52.0	0.8	85	163.1	1.9	4,653	--	--	--	--	0.1	1.1	9,949.4	System ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE-9 had dark brown product water. Sparging adjusted to pulse on and off in Zone 5 only.
08/17/23	13:00	20,122.0	26,924.9	1,121.5	12.8	46.0	0.5	86	129.0	5.1	12,490	--	--	--	--	0.1	1.9	9,951.3	System ON on arrival. No AS zone active. SVE-8 off due to water accumulation. During dewatering, SVE-9 started with clear water but ended with protuct mixed in.
08/30/23	9:22	20,429.1	27,232.0	1,134.3	12.8	50.0	0.5	70	129.0	2.1	5,143	--	--	--	--	0.1	0.8	9,952.0	System ON on arrival. SVE-8 off due to water accumulation. During dewatering , SVE-9 had product in water.
09/12/23	9:23	20,739.8	27,542.7	1,147.2	12.9	46.0	0.5	68	129.0	3.7	9,061	--	--	--	--	0.1	1.4	9,953.4	System ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE-4 had large brown flakes in water and SVE-9 had product in water, all others clear.
09/28/23	12:08	21,125.0	27,927.9	1,163.2	16.1	47.0	0.4	65	115.3	4.9	10,380	--	--	--	--	0.1	1.7	9,955.1	System ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE-9 had product present.
10/10/23	10:22	21,410.2	28,213.1	1,175.1	11.9	48.0	0.5	61	129.0	1.5	3,178	--	--	--	--	0.04	0.4	9,955.6	System ON on arrival. Zone 5 active. Zone 5 active. SVE-8 off due to water accumulation.
10/26/23	11:56	21,731.6	28,534.5	1,188.5	13.4	36.0	0.4	59	115.3	1.6	3,389	--	--	--	--	0.04	0.5	9,956.0	System ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE-10 had clear water with an odor, SVE-9 had water with product, all other wells were clear. Lower %operational value due to downtime around GWM on 10/12/23.
11/09/23	12:55	22,067.8	28,870.7	1,202.5	14.0	30.0	0.4	56	115.3	1.4	2,966	--	--	--	--	0.03	0.4	9,956.5	System ON on arrival. SVE-8 off due to water accumulation. No AS zone active during site visit. During SVE-9 had brown, oily water.
11/29/23	10:23	22,543.9	29,346.8	1,222.4	19.8	30.0	0.4	50	115.3	0.8	1,695	--	--	--	--	0.02	0.3	9,956.8	System ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE-9 had brown and oily water; all other wells were clear.
12/14/23	11:50	22,902.7	29,705.6	1,237.3	15.0	42.0	0.7	50	152.6	3.8	8,050	--	--	--	--	0.1	1.7	9,958.5	Systems ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE 9 and 10 had brown product-impacted water, SVE-4 had bits of debris, and all other wells were clear.
12/27/23	11:15	23,212.7	30,015.6	1,250.2	12.9	48.0	0.7	52	152.6	1.9	7,900	--	--	--	--	0.1	1.4	9,959.9	Systems ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE 9 and 10 had brown product-impacted water, SVE-4 and HSVE-1 had bits of debris, and all other wells were clear.

PORT OF SEATTLE - TERMINAL 30
Table 4
AS/SVE and Oxidizer Operational Data

		Operating Parameters								Mass Removal						Mass Removal			
			Calculated								Calculated			Calculated		Calculated			
Date	Time	SVE Blower Hr Meter[2] (Hours)	Cumulative SVE Blower Runtime[2] (Hours)	Cumulative SVE Blower Runtime (Days)	Period SVE Blower Runtime (Days)	SVE Inlet Vacuum (In. H_2O)	SVE Inlet ΔP (In. H_2O)	SVE Inlet Temp (^0F)	SVE Inlet Flow Rate[1] (scfm)	SVE Discharge Total VOC PID (ppmv)	SVE Discharge Total VOCs[3,4] ($\mu g/m^3$)	Oxidizer Fire Box Temp[8] (F)	Oxidizer Discharge Total VOC PID[7] (ppmv)	Oxidizer Discharge Total VOCs[3,4,6] ($\mu g/m^3$)	Period Destruction Efficiency[7] (%)	Mass Removal Rate[5] (Lb/Day)	Period Mass Removal[6] (Lb)	Cumulative Mass Removal[9] (Lb)	Comments/Notes
01/11/24	11:51	23,570.5	30,373.4	1,265.1	14.9	58.0	0.8	50	157.9	2.0	8,316	--	--	--	--	0.1	1.8	9,961.6	Systems ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE 9 and 10 had dark product-impacted water, and SVE-4 and had bits of product present; all other extracted water was clear.
01/30/24	11:30	23,731.5	30,534.4	1,271.9	6.7	59.0	0.7	56	152.6	2.5	10,395	--	--	--	--	0.1	1.0	9,962.6	Systems ON on arrival, sparge in a rest cycle. SVE-8 off due to water accumulation. SVE-9 and SVE-10 had light brown product-impacted water accumulated, all others clear. Minimal water present for extraction. HSVE-2 has a broken sample port pending repair. System was down 1/12/24-1/24/24 due to frozen pipe troubleshooting.
02/14/24	11:00	24,088.9	30,891.8	1,286.7	14.9	59.0	0.8	55	163.1	1.5	6,237	--	--	--	--	0.1	1.4	9,963.9	Systems ON on arrival. Zone 5 active. SVE-9 and SVE-10 had brown product-impacted water accumulated, all others clear. Minimal water present for extraction. HSVE-2 sample port broken (repair pending).
02/29/24	9:12	24,445.4	31,248.3	1,301.6	14.9	66.0	0.7	50	152.6	1.8	7,484	--	--	--	--	0.1	1.5	9,965.5	Systems ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering SVE 10 had brown, product-impacted water. Minimal water present for extraction over all. HSVE-2 sample port broken (repair pending).
03/14/24	10:39	24,779.5	31,582.4	1,315.5	13.9	64.0	0.7	58	152.6	1.4	5,821	--	--	--	--	0.1	1.1	9,966.6	Systems ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering, SVE-9 and SVE-10 had brown, product-impacted water. Minimal water present for extraction over-all. Product visible in SVE-9 rotometer. HSVE-2 sample port broken (repair pending).
03/28/24	9:25	25,108.1	31,911.0	1,329.2	13.7	62.0	0.9	58	173.0	1.8	3,880	--	--	--	--	0.1	0.8	9,967.4	Systems ON on arrival. SVE-8 off due to water accumulation. During dewatering, SVE-9 and SVE-10 had brown, product-impacted water. Minimal water present for extraction over-all. Product visible in SVE-9 rotometer. HSVE-2 sample port broken (repair pending).
04/09/24	12:21	25,372.9	32,175.8	1,340.2	11.0	64.0	1.0	60	182.4	2.1	4,527	--	--	--	--	0.1	0.8	9,968.2	Systems ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering, SVE-9 and SVE-10 had brown, product-impacted water. Minimal water present for extraction over-all. Product visible in SVE-9 rotometer. HSVE-2 sample port repaired.
04/24/24	11:55	25,704.0	32,506.9	1,354.0	13.8	66.0	0.9	66	173.0	2.9	6,251	--	--	--	--	0.1	1.3	9,969.6	Systems ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering, SVE-9 and SVE-10 had brown product-impacted water. All other water was clear. System was shut down for LNAPL gauging and GWM on 4.11.24 for approx 24 hr.
05/09/24	11:10	26,052.6	32,855.5	1,368.6	14.5	65.0	1.0	73	182.4	3.5	7,544	--	--	--	--	0.1	1.8	9,971.4	Systems ON on arrival. Zone 5 active. SVE-8 off due to water accumulation. During dewatering, SVE-9 and SVE-10 had brown product-impacted water. All other water was clear. Sparge zone runtimes reprogrammed at EOD to include Zone 4 again, as GWM results showed rebound. Set to 3.5 hr pulses between Zones 4 and 5.
05/23/24	10:04	26,383.8	33,186.7	1,382.4	13.8	68.0	1.0	68	182.4	0.8	1,724	--	--	--	--	0.03	0.4	9,971.8	Systems ON on arrival. Zone 4 active. SVE-8 off due to water accumulation. During dewatering, SVE-9 and SVE-10 had brown product-impacted water. All other water was clear. Repairs made to SVE-4, SVE-5, and SVE-10 rotameters.
06/07/24	9:36	26,738.4	33,541.3	1,397.1	14.8	57.0	1.4	70	211.9	1.1	2,460	--	--	--	--	0.05	0.7	9,972.5	Systems ON on arrival. Zone 4 active. Significant bob in SVE-10 rotometer float resolved by dewatering the well lateral. SVE-8 off due to water accumulation. During dewatering, SVE-9 and SVE-10 had brown product-impacted water. All other water was clear. PID values not collected due to broken GFCI and lack of power. Repair by Port is pending.
06/26/24	10:45	27,195.4	33,998.3	1,416.2	19.0	58.0	1.2	72	199.8	0.7	1,565	--	--	--	--	0.03	0.5	9,973.0	Systems ON on arrival. Zone 4 active. PID values not collected due to broken GFCI and lack of power. Repair by Port still pending. No dewatering performed due to time constraints. Leak observed and plugged around the HSVE-1 deadleg drain pipe at the tapped hole.
07/03/24	11:36	27,333.7	34,136.6	1,421.9	5.8	52.0	0.9	76	173.0	1.1	2,460	--	--	--	--	0.04	0.2	9,973.2	Systems ON on arrival. Zone 4 active. SVE-8 off due to water accumulation. Power restored at the GFCI, replaced by MM. During dewatering, SVE-9 and SVE-10 had brown product-impacted water. All other water was clear.
07/23/24	9:40	27,809.9	34,612.8	1,441.8	19.8	52.0	0.9	66	173.0	3.1	6,933	--	--	--	--	0.1	2.1	9,975.3	Systems ON on arrival. Zone 4 active. Sparge flow rates (~10 scfm) continue to be lower than historic levels (~15 scfm). Discolored/impacted water extracted from SVE-4, -6, and -9 piping. The SVE-10 rotometer float was fluctuating on arrival, but was stable on departure after removing 1.5 gal of water from the well lateral.
08/09/24	9:18	28,214.4	35,017.3	1,458.6	16.9	48.0	0.9	72	173.0	2.0	4,473	--	--	--	--	0.1	1.2	9,976.5	Systems ON on arrival. AS Zone 4 active. Sparge flow rates (~10 scfm) continue to be lower than historic levels (~15 scfm). Discolored/impacted water extracted from HSVE-1 and SVE-4, -5, and -9 piping.
08/22/24	9:14	28,524.5	35,327.4	1,471.6	12.9	48.0	0.9	70	173.0	7.0	15,655	--	--	--	--	0.2	3.1	9,979.7	Systems ON on arrival. Sparge flow rates (~5 scfm) continue to be lower than historic levels (~15 scfm) Torque % for the AS Blower in Zone 4 has steadily increased since Zone 4 sparging was restarted in May 2024. The current trend shows it reaching 100% torque ~April 2025. Discolored/impacted water extracted from SVE-9 and -10. SVE-10 rotameter repaired.
09/05/24	9:59	28,859.0	35,661.9	1,485.5	13.9	45.0	0.9	72	173.0	1.5	3,355	--	--	--	--	0.1	0.7	9,980.4	Systems ON on arrival. AS Zone 4 active. Sparge flow rates (~5 scfm) continue to be lower than historic levels (~15 scfm). Discolored/impacted water extracted from SVE-9 and -10. SVE-10 rotameter repaired again.
09/20/24	9:17	29,184.9	35,987.8	1,499.1	13.6	40.0	1.3	64	207.9	7.2	10,600	--	--	--	--	0.2	2.7	9,983.1	Systems ON on arrival. AS Zone 4 active. Sparge flow rates (~5 scfm) continue to be lower than historic levels (~15 scfm). Discolored/impacted water extracted from SVE-4, -9, and -10. Magnahelic gauge accuracy confirmed with a digital manometer. Faulty snubber and gauge replaced on SVE-6 and SVE-2. Email notification for float alarms did not send during float switch testing.
10/03/24	9:33	29,494.7	36,297.6	1,512.0	12.9	48.0	1.1	66	191.3	1.0	1,472	--	--	--	--	0.03	0.3	9,983.4	Systems ON on arrival. AS Zone 4 active. Sparge flow rates (~5 scfm) continue to be lower than historic levels (~15 scfm). Discolored/impacted water extracted from SVE-10. Telemetry alarm notifications tested and function confirmed.

PORT OF SEATTLE - TERMINAL 30
Table 4
AS/SVE and Oxidizer Operational Data

		Operating Parameters								Mass Removal						Mass Removal			
			Calculated								Calculated			Calculated		Calculated			
Date	Time	SVE Blower Hr Meter[2] (Hours)	Cumulative SVE Blower Runtime[2] (Hours)	Cumulative SVE Blower Runtime (Days)	Period SVE Blower Runtime (Days)	SVE Inlet Vacuum (In. H_2O)	SVE Inlet ΔP (In. H_2O)	SVE Inlet Temp (^0F)	SVE Inlet Flow Rate[1] (scfm)	SVE Discharge Total VOC PID (ppmv)	SVE Discharge Total VOCs[3,4] ($\mu g/m^3$)	Oxidizer Fire Box Temp[8] (F)	Oxidizer Discharge Total VOC PID[7] (ppmv)	Oxidizer Discharge Total VOCs[3,4,6] ($\mu g/m^3$)	Period Destruction Efficiency[7] (%)	Mass Removal Rate[5] (Lb/Day)	Period Mass Removal[6] (Lb)	Cumulative Mass Removal[9] (Lb)	Comments/Notes
10/17/24	10:23	29,827.8	36,630.7	1,525.9	13.9	48.0	1.1	62	191.3	1.8	2,650	--	--	--	--	0.05	0.6	9,984.0	Systems ON on arrival. AS Zone 4 active. Sparge flows rebounded to 12.5 scfm due to rebounded flow at AS-20. Cause unknown. Discolored/impacted water extracted from SVE-9.
10/31/24	10:22	30,162.5	36,965.4	1,539.8	13.9	48.0	1.0	58	182.4	1.3	1,914	--	--	--	--	0.03	0.4	9,984.5	Systems ON on arrival. AS Zone 4 active (11.6 scfm). Discolored/impacted water extracted from SVE-9 and -10.
11/14/24	11:35	30,497.5	37,300.4	1,553.8	14.0	49.0	1.1	58	191.3	0.3	442	--	--	--	--	0.01	0.1	9,984.6	Systems ON on arrival. AS Zone 4 active (14.0 scfm). Discolored/impacted water extracted from SVE-9 and -10.
11/26/24	9:45	30,775.5	37,578.4	1,565.4	11.6	52.0	1.1	53	191.3	1.0	1,472	--	--	--	--	0.03	0.3	9,984.9	Systems ON on arrival. AS Zone 4 active (11.1 scfm). Discolored/impacted water extracted from SVE-9 and -10. Heat trace on poly tank transfer pipe broken and faulting out the gfci, taken offline. Sparging re-programmed to pulse solely in Zone 5 following ND results at RW-11A (Zone 4) from the 11/14/24 GWM event.
12/11/24	11:39	31,136.0	37,938.9	1,580.4	15.0	49.0	1.0	51	182.4	0.5	736	--	--	--	--	0.01	0.2	9,985.1	Systems ON on arrival. Zone 5 active (25 scfm). Opaque water extracted from SVE-10. System OFF on departure in preparation for LNAPL recovery.
12/19/24	9:37	31,290.3	38,093.2	1,586.8	6.4	52.0	1.1	57	191.3	0.1	1,920	--	--	--	--	0.03	0.2	9,985.3	Systems ON on arrival. Zone 5 active (24.9 scfm). Opaque water from SVE-10. Replacement heat trace installed on 12/18/24. Sparging hoses rearranged to put each Zone 5 well on its own manifold; programming adjusted to pulse between Zone 5 wells.

Footnotes:

1. Standard flow (scfm) is calculated using differential pressure, pressure, and temperature as recorded in the field per the equation below (as identified with green highlighting in the table). The PSCAA permit requires the SVE flowrate to be less than or equal to 375 scfm.

Pitot Tube Flow Equation for Any Gas			**Notes:**
Q (SCFM) = 128.8 x K x D^2 x SQRT ((P x delta P)/(T +460) x Ss)			From Dwyer Bulletin F-50
Q	SCFM	Flow in standard cubic feet per minute	See Table for Calculation from Gauge Reading
K	0.67	Flow Coefficient for 3 and 4-inch pipe	From Dwyer Bulletin F-50
D	3.79	Inside Diameter of Pipe measured in inches	SVE Sch. 80 PVC Pipe Inside Diameter
T	50	Degrees Fahrenheit	Average Temp of Extracted Air
delta P	0.4	Differential Pressure read on Magnehelic Gauge	See Table for Gauge Reading (in H2O)
V	-3.0	Pressure (vacuum psig) inside pipe	Field Measurements Recorded as in H20. Conversion is 1.00 in H20 = 0.0361 psig
P	11.7	Static Line Pressure (psia) = 14.7 + V	PSIA plus Vacuum. Calculate Vacuum as a Negative Number.
Ss	1.00	Specific Gravity (SG) of Air at 60 degrees F	SG is Unitless

2. On 12/03/20, the blower hour meter was reset after an extended power outage and changeover to generator power.
3. The TPH concentration is the sum of APH EC5-8 aliphatics, APH EC9-12 aliphatics, and APH EC9-10 aromatics. If one of these was not detected, a conservative approach of 1x the reporting limit was used in the calculation.
4. For dates with laboratory data, the Total VOC Concentration equals the laboratory TPH concentration. For dates without laboratory data, the Total VOC Concentration is calculated by adjusting the PID measurement with a correction factor. This correction factor is calculated by dividing the laboratory-measured TPH concentration from the most recent sampling event by the field-collected PID measurement from the same day.
5. Removal rates are calculated via:

$$Q_c \approx \frac{(C_c) \times (F) \times \left(0.02832\ {}^{m^3}/_{ft^3}\right) \times \left(60\ {}^{min}/_{hr}\right) \times \left(24\ {}^{hrs}/_{dy}\right) \times \left(2.205\ {}^{lb}/_{kg}\right)}{\left(10^6\ {}^{\mu g \cdot m^3}/_{L \cdot kg}\right)}$$

Where:
Q_c = Mass Emission Rate of Contaminant c, lbs/day
C_c = Concentration of Contaminant c, µg/L
F = Vapor flow, scfm

6. Unless otherwise indicated, all data from before 9/30/2021 was collected by CRETE and was not reviewed or validated by AECOM.
7. Destruction efficiency is calculated with the Total VOC Oxidizer Outlet Concentration and the Total VOC Oxidizer Inlet Concentration. The PSCAA permit dictates that:

At all times during operation of the SVE system, the abatement device shall meet the following requirements, as applicable:

a) ≥98.5% control efficiency if inlet TPH ≥2,000 ppmv, measured as hexane or its equivalent; or
b) ≥97% control efficiency if inlet TPH ≥200 ppmv and <2,000 ppmv, measured as hexane or its equivalent; or
c) ≥90% control efficiency if inlet TPH <200 ppmv, measured as hexane or its equivalent; or
d) ≤10 ppmv at the outlet of the control device, measured as hexane or its equivalent.

8. The PSCAA permit states that: *The minimum operating temperature at the fire box of the thermal oxidizer shall be at least 1,400°F, on an hourly average.* When the thermal oxidizer was retrofitted to a catalytic oxidizer on 3/19/20, the minimum operating temperature became 600°F. The hourly requirement is met by the shut-down alarm programmed if the temperature drops below the permitted threshold.
9. This calculation was revised by AECOM to use the mass removal rate from the single day's data rather than the average with the previous visit as CRETE had done.

Abbreviations, Symbols, and Notes:

-- = not analyzed or not applicable
ΔP = Differential Pressure
H_2O = Water
Hr = Hour
°F = Degrees Fahrenheit
In. = Inch
Lb = pound
ppmv = Parts per million volume
scfm = Standard Cubic Feet Per Minute
$\mu g/m^3$ = micrograms per cubic meter

Red values indicate approximated values or averaged values as placeholder for data not recorded in the field.
Blue values indicate data collected by CRETE but input by AECOM, or calculated by AECOM with data previously collected by CRETE.

PORT OF SEATTLE - TERMINAL 30
Table 5
AS/SVE and Oxidizer Analytical Data

	SVE Field Data			Laboratory SVE Discharge Results						Mass Removal[3]							Laboratory Oxidizer Discharge Results							
	Calculated			Calculated						Calculated							Calculated							Calculated	
Date	Cumulative SVE Blower Runtime[1] (Days)	Period SVE Blower Runtime[1] (Days)	SVE Inlet Vapor Flow Rate[1] (scfm)	TPH[2] ($\mu g/m^3$)	TPH[7,8] (ppmv)	Benzene ($\mu g/m^3$)	Toluene ($\mu g/m^3$)	Ethyl-benzene ($\mu g/m^3$)	Total Xylenes ($\mu g/m^3$)	TPH[2,9] (lbs/day)	Benzene[9] (lbs/day)	Toluene[9] (lbs/day)	Ethyl-benzene[9] (lbs/day)	Total Xylene[9] (lbs/day)	TPH Period Mass Removed (lb)	TPH Cumulative Mass Removed (lb)	TPH[2] ($\mu g/m^3$)	TPH[7,8] (ppmv)	Benzene ($\mu g/m^3$)	Toluene ($\mu g/m^3$)	Ethyl-benzene ($\mu g/m^3$)	Total Xylenes ($\mu g/m^3$)	TPH Destruction Efficiency[4,8] (%)	Comments
10/23/2019	34.03	34.03	185	796,500	194.8	160	7,200	170	500	13.23	0.0027	0.120	0.003	0.008	450.1	450.1	4,590	1.1	210	150	4	18	99.4	SVE was started on 9/19/2019.
11/27/2019	63.12	29.10	308	917	0.2	1	58	1	4	18.04	--	--	--	--	525.0	975.1	1,705	0.4	130	64	1.5	4.5	99.7	Lab Data is questionable and not used in calculations. See Note 5.
12/23/2019	89.13	26.00	260	1,381,000	337.7	320	770	54	96	32.24	0.0075	0.018	0.001	0.002	838.3	1,813.3	1,125	0.3	18	57	1.3	3.9	99.9	
1/15/2020	112.13	23.00	229	188,970	46.2	23	730	17	51	3.89	0.0005	0.015	0.000	0.001	89.6	1,902.9	340	0.1	2.6	60	1.4	4.2	99.8	
2/11/2020	139.18	27.05	232	94,970	23.2	12	730	17	51	1.98	0.0003	0.015	0.000	0.001	53.7	1,956.5	1,090	0.3	2.6	150	3.5	10.5	98.9	
3/12/2020	169.00	29.83	220	641	0.2	1	62	1	4	3.36	--	--	--	--	100.3	2,056.8	515	0.1	0.96	57	1.3	3.9	99.7	Inlet concentration lab data suspect. Need to re-sample upon start up. Lab data not used in calculations. See Note 5.
8/26/2020	189.43	20.43	134	2,101,500	513.9	260	680	97	251	25.26	0.0031	0.008	0.001	0.003	516.0	2,572.9	6,570	1.6	11	660	15	45	99.7	System was off line March 24 - August 17, 2020 due to the Covid 19 Pandemic
9/29/2020	223.18	33.75	243.2	1,460,900	357.2	120	680	56	118	31.94	0.0026	0.015	0.001	0.003	1,078.1	3,650.9	9,570	2.3	11	660	15	45	99.3	
10/27/2020	249.87	26.69	263.1	394,000	96.3	270	16,000	370	1,120	9.32	0.0064	0.378	0.009	0.026	248.7	3,899.7	5,250	1.3	4.5	260	6.1	18.1	98.7	
11/18/2020	272.09	22.22	264.0	452,000	110.5	140	8,100	190	560	10.73	0.0033	0.192	0.005	0.013	238.5	4,138.1	14,400	3.5	12	680	16	47	99.0[5]	
12/16/2020	295.75	23.66	229.5	1,151,000	281.5	73	2,600	61	181	23.75	0.0015	0.054	0.001	0.004	561.8	4,699.9	9,170	2.2	4.8	280	6.5	31.5	99.2	
1/12/2021	321.72	25.98	227.7	924,000	225.9	86	3,000	69	209	18.92	0.0018	0.061	0.001	0.004	491.4	5,191.3	8,570	2.1	4.8	280	9.1	53.3	99.1	
2/17/2021	352.59	30.86	230.7	566,950	138.6	50	720	28	50	11.76	0.0010	0.015	0.001	0.001	363.1	5,554.4	3,160	0.8	50.0	720	28	50	99.4	
3/23/2021	384.49	31.91	227.3	563,000	137.7	140	8,500	200	590	11.51	0.0029	0.174	0.004	0.012	367.2	5,921.6	10,850	2.7	5.8	340	32	83	98.1	
4/19/2021	408.29	23.80	227.0	641,000	156.7	140	8,300	190	570	13.09	0.0029	0.169	0.004	0.012	311.4	6,233.0	21,570	5.3	4.8	280	59	217	96.6	AS blower shut down due to oil leak.
5/20/2021	435.64	27.35	227.0	420,900	102.9	17	680	24	47	8.59	0.0003	0.014	0.000	0.001	235.0	6,468.0	7,010	1.7	1.5	87	69	233	98.3	AS blower restarted on 5/4/21 with repaired oil gasket.
6/16/2021	459.92	24.27	222.7	421,000	102.9	140	8,100	190	560	8.43	0.0028	0.162	0.004	0.011	204.6	6,672.6	5,250	1.3	4.5	260	6.1	18.1	98.8	AS system down since 6/15/21 for blower servicing.
7/19/2021	492.40	32.48	223.1	257,000	62.8	150	8,700	200	600	5.15	0.0030	0.175	0.004	0.012	167.4	6,840.1	5,700	1.4	5.1	300	6.9	20.9	97.8	AS system down since 6/15/21 for blower servicing.
8/26/2021	530.34	37.94	225.7	251,000	61.4	150 U	8,900 U	200 U	610 U	5.09	0.0030	0.181	0.004	0.012	193.2	7,033.3	4,070	1.0	4.8 U	280 U	6.5 U	19.5 U	98.4	AS system restarted 7/24/21. PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
9/30/2021	559.72	29.38	228.5	269,500 J	65.9	83 U	4,900 U	110 U	340 U	5.54	0.0017	0.101	0.002	0.007	162.7	7,196.0	3,030	0.7	1.9 U	110 U	2.6 U	7.7 U	98.9	AECOM takes over system operation. See Footnote 6. SVE and Oxidizer running smoothly. PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
10/21/2021	580.61	20.90	229.7	108,510 J	26.5	6.0	340 U	10	24 U	2.24	0.0001	0.007	0.000	0.000	46.8	7,242.9	1,900	0.5	1.9 U	110 U	2.5 U	7.5 U	98.2	PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
11/18/2021	608.37	27.75	228.4	103,250 J	25.2	7.5	340 U	11 J	24 UJ	2.12	0.0002	0.007	0.000	0.000	58.9	7,301.7	1,020	0.2	1.9 U	110 U	2.6 U	7.9 U	99.0	SVE and Oxidizer running smoothly with the exception of SVE downtime 10/21-10/28. Replacement AS Compressor pressure switch installed on 11/17/21 by Marine Maintenance. AS system running smoothly since.
12/22/2021	642.08	33.71	227.0	109,700	26.8	56 U	3,300 U	76 U	226 U	2.24	0.0011	0.067	0.002	0.005	75.5	7,377.2	1,250	0.3	1.8 U	110 U	2.5 U	7.5 U	98.9	AS, SVE, and Oxidizer running smoothly. No new AS PAH alarms since the pressure switch replacement.
3/31/2022	718.88	76.80	161.5	101,000 J	24.7	13 U	790 U	18 U	54 U	1.47	0.0002	0.011	0.000	0.001	112.6	7,489.8	1,900	0.5	1.9 U	110 U	2.6 U	7.9 U	98.1	Oxidizer and SVE ON on arrival but AS system OFF due to a PAH alarm. Alarm cleared and AS restarted at 10:50. Sample taken at
6/29/2022	775.72	56.84	212.0	73,100 J	17.9	15 U	870 U	20	60 U	1.39	0.0003	0.017	0.000	0.001	79.2	7,569.0	800	0.2	1.9 U	110 U	2.6 U	7.8 U	98.9	Sample collected but biweekly system readings not recorded. AS system down on arrival due to a THA alarm from 6/25/22. Samples collected after 30 min AS runtime and PID readings within expected range (18.4 ppmv intake; 0.7 ppmv discharge). Zone 5 active.
9/14/2022	848.37	72.64	225.9	32,570 J	8.0	6.1 U	360 U	8.3 U	25 U	0.66	0.0001	0.007	0.000	0.001	48.1	7,617.1	2,070	0.5	2.1 U	120 U	2.8 U	8.4 U	93.6	All systems ON on arrival. Zone 4 active.
12/9/2022	931.89	83.53	242.8	49,650	12.1	12 U	720 U	17 U	50 U	1.08	0.0003	0.016	0.000	0.001	90.5	7,707.6	660	0.2	1.6 U	94 U	2.2 U	6.5 U	98.7	All systems ON on arrival. Zone 4 active.
3/15/2023	970.36	38.47	223.4	43,370	10.6	4.8 U	280 U	6.5 U	20 U	0.87	0.0001	0.006	0.000	0.000	33.5	7,741.1	--	--	--	--	--	--	--	Sytem ON on arrival, Zone 3 active. Oxidizer taken offline 3/14 with PSCAA approval. New emission stack constructed for direct emission to atmosphere.
6/22/2023	1066.34	95.98	191	12,000	2.934	2.7 U	63 U	3.6 U	11 U	0.21	0.0000	0.0011	0.0001	0.0002	19.8	7,761.0	--	--	--	--	--	--	--	System ON on arrival. Zone 5 active. SVE-8 off due to high water accumulation and low flow.
9/28/2023	1163.25	96.90	115	10,380	2.538	2.4 U	56 U	3.2 U	10 U	0.11	0.0000	0.0006	0.0000	0.0001	10.4	7,771.4	--	--	--	--	--	--	--	System ON on arrival. Zone 5 active. SVE-8 off due to high water accumulation and low flow.
12/27/2023	1250.24	86.99	153	7,900	1.932	2.5 U	60 U	3.4 U	10 U	0.11	0.0000	0.0008	0.0000	0.0001	9.4	7,780.8	--	--	--	--	--	--	--	System ON on arrival. Zone 5 active. SVE-8 off due to high water accumulation and low flow.
3/28/2024	1329.21	78.97	173	3,880	0.949	1.6 U	60 U	3.4 U	10 U	0.06	0.0000	0.0009	0.0001	0.0002	4.8	7,785.6	--	--	--	--	--	--	--	System ON on arrival. Zone 5 active. SVE-8 off due to high water accumulation and low flow.
6/7/2024	1397.14	67.93	212	2,460	0.602	2.6 U	61 U	3.5 U	11 U	0.05	0.0000	0.0012	0.0001	0.0002	3.2	7,788.8	--	--	--	--	--	--	--	System ON on arrival. Zone 5 active. SVE-8 off due to high water accumulation and low flow.
9/20/2024	1499.08	101.94	208	10,600	2.592	2.6 U	62 U	3.6 U	11 U	0.20	0.0000	0.0012	0.0001	0.0002	20.2	7,809.0	--	--	--	--	--	--	--	System ON on arrival. Zone 4 active. SVE-8 off due to high water accumulation and low flow.
12/19/2024	1586.80	87.73	191	1,920	0.469	1.6 U	38 U	2.2 U	7 U	0.03	0.0000	0.0007	0.0000	0.0001	2.9	7,811.9	--	--	--	--	--	--	--	System ON on arrival. Zone 5 active. SVE-8 off due to high water accumulation and low flow.

Year-end Cumulative Mass Removed (lb/yr)[9]:	2019	**2071**	0	4	0	0
	2020	**3212**	0.4	16.5	0.4	1.3
	2021	**2433**	0.6	31.5	0.7	2.2
	2022	374	0.1	4.2	0.1	0.3
	2023	105	0.0	0.7	0.0	0.1
	2024	32	0.0	0.3	0.0	0.1
PSCAA Permit Threshold for Control Device Need (lbs/yr)[9]:		1,000	6.62	--	76.9	--

Footnotes:

1. Refer to Table 4 for details and calculations. The PSCAA permit requires the SVE flowrate to be less than or equal to 375 scfm.
2. The TPH concentration is the sum of APH EC5-8 aliphatics, APH EC9-12 aliphatics, and APH EC9-10 aromatics. If one of these was not detected, a consertaive approach of 1x the reporting limit was used in the calculation.
3. Mass emission and removal rates are calculated by variations of:

$$Q_c \approx \frac{(C_c) \times (F) \times \left(0.02832\ {}^{m^3}/_{ft^3}\right) \times \left(60\ {}^{min}/_{hr}\right) \times \left(24\ {}^{hrs}/_{dy}\right) \times \left(2.205\ {}^{lb}/_{kg}\right)}{\left(10^6\ {}^{mg \cdot m^3}/_{L \cdot kg}\right)}$$

Where:
Q_c = Mass Emission Rate of Contaminant c, lbs/day
C_c = Concentration of Contaminant c, µg/L
F = Vapor flow, scfm

4. Destruction efficiency is calculated with the Total VOC Oxidizer Outlet Concentration and the Total VOC Oxidizer Inlet Concentration.
5. TPH calculations are based on the Table 4 adjusted field PID readings as the samples may have been diluted.
6. Unless otherwise indicated, all data from before 9/30/2021 was collected by CRETE and was not reviewed or validated by AECOM.
7. 100 g/mol is used as the average molecular weight of TPH-G used to calculate ppmv. In the equation below, P is atmospheric pressure at sea level, or 101.325 kPa. T is standard temperautre, 298 K.

$$ppmV = \frac{\mu g}{L} \times \frac{1}{Molecular\ Weight_{contaminant\ [g/mol]}} \times 8.3144 \left[\frac{L \cdot kPa}{mol \cdot K}\right] \times T_{air}[K] \times \frac{1}{P_{air}[kPa]}$$

8. The PSCAA permit dictates that:
At all times during operation of the SVE system, the abatement device shall meet the following requirements, as applicable:
a) ≥98.5% control efficiency if inlet TPH ≥2,000 ppmv, measured as hexane or its equivalent; or
b) ≥97% control efficiency if inlet TPH ≥200 ppmv and <2,000 ppmv, measured as hexane or its equivalent; or
c) ≥90% control efficiency if inlet TPH <200 ppmv, measured as hexane or its equivalent; or
d) ≤10 ppmv at the outlet of the control device, measured as hexane or its equivalent.
9. The PSCAA permit dictates the following. Values in excess of the permit are indicated with bold formatting.
The owner or operator may operate the SVE system without the control device when inlet sampling data from two or more c onsecutive months
a) Pre-control TPH emission rate is equal to or less than 2.74 lbs/day [eq 1,000 lb/yr];
b) Pre-control benzene emission rate is equal to or less than 0.018 lbs/day [eq 6.62lbs/yr];
c) Pre-control ethylbenzene emission rate is equal to or less than 0.21 lbs/day [eq 76.9 lbs/yr];
d) Pre-control toluene emission rate is equal to or less than 657 lbs/day [no annual equivalent]; *and*
e) Pre-control xylene emission rate is equal to or less than 29.0 lbs/day [no annual equivalent].

Abbreviations, Symbols, and Notes:
µg/m³ = micrograms per cubic meter
J = Estimated value
NA = Not Applicable
lb = pound
lbs/yr = pounds per year
NL = Not listed
scfm = standard cubic feet per minute
SQER = Small Quantity Emission Rates
TPH = Total Petroleum Hydrocarbons
U = Concentration is below the laboratory reporting limit, so the reporting limit is shown
Red values indicate approximated values or averaged values as placeholder for data not recorded in the field.

Blue values indicate data collected by CRETE but input by AECOM, or calculated by AECOM with data previously collected by CRETE.

Bold values = exceeds PSCAA permit limit for removal of control device

PORT OF SEATTLE - TERMINAL 30
Table 6
LNAPL Gauging and Recovery Results

Date	Time of Fieldwork	Tidal Position: Time of Nearest Low Tide[F]	Tidal Position: Time of Nearest High Tide[F]	Average DTW (FT)	Period Product Removed[L] (Gal)	Cumulative Product Removed (Gal)	MW-35[K,M] Initial LNAPL Thickness (Ft)	MW-35[K,M] Final LNAPL Thickness[H] (Ft)	MW-36[M] Initial LNAPL Thickness (Ft)	MW-36[M] Final LNAPL Thickness[H] (Ft)	MW-36A[M] Initial LNAPL Thickness (Ft)	MW-36A[M] Final LNAPL Thickness[H] (Ft)	MW-39A Initial LNAPL Thickness (Ft)	MW-39A Final LNAPL Thickness[H] (Ft)	MW-59 Initial LNAPL Thickness (Ft)	MW-59 Final LNAPL Thickness[H] (Ft)	MW-89 Initial LNAPL Thickness (Ft)	MW-89 Final LNAPL Thickness[H] (Ft)	MW-93[M] Initial LNAPL Thickness (Ft)	MW-93[M] Final LNAPL Thickness[H] (Ft)
Baseline[J]	NA	---	---	---	NA	NA	NM	---	0.18	---	0.04	---	0.05	---	0.90	---	2.39	---	1.04	---
01/09/2020	NM	---	---	---	46.7	46.7	NM	NM	0.14	0.00	<0.01	---	<0.01	---	2.19	0.00	<0.01[A]	---	<0.01	---
02/13/2020	NM	---	---	---	21.3	68	NM	NM	0.00	---	<0.01	---	<0.01	---	0.23	0.10[B]	<0.01	---	<0.01	---
03/12/2020	NM	---	---	---	48.4	116.4	NM	NM	0.00	---	<0.01	---	<0.01	---	0.09	<0.01	<0.01	---	<0.01	---
05/16/2020	NM	---	---	---	20	136.4	NM	NM	0.04	0.00	0.00	---	0.35	0.00	1.06	0.00	0.00	---	0.10	0.00
06/19/2020	NM	---	---	---	156	292.4	NM	NM	1.00	0.01	0.00	---	0.16	<0.01	0.93	<0.01	0.00	---	0.18	<0.01
07/28/2020	NM	---	---	---	35	327.4	NM	NM	0.95	<0.01	0.00	---	0.10	0.01	0.76	0.01	0.00	---	0.18	0.00
08/21/2020	NM	---	---	---	32	359.4	NM	NM	0.16	0.00	<0.01	---	0.04	<0.01	1.12	<0.01	0.00	---	0.05	<0.01
09/10/2020	NM	---	---	---	16.4	375.8	NM	NM	0.00	---	0.00	---	TRACE	---	0.00	NM	0.00	---	TRACE	TRACE
10/08/2020	15:30-21:51	20:24	14:24	---	35.1	410.9	0.52	0.00	0.00	---	0.00	---	0.00	---	<0.01	0.00	0.00	---	0.00	---
11/11/2020	07:50-14:45	05:48	12:18	---	99	509.9	0.19	DRY	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
12/10/2020[C]	16:12-17:46	17:24	12:12	---	NA	509.9	0.02	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
01/15/2021	07:53-16:02	07:42	15:06	---	39	548.9	0.28	0.00	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
2/12/2021[CJ]	08:07-10:07	11:49	06:09	---	NA	548.9	0.06	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
03/05/2021	07:15-13:14	11:00	05:54	---	39[D]	587.9	0.10	0.00	0.00	---	0.00	---	0.00	---	0.09	0.00	0.00	---	0.00	---
4/15/2021[C]	16:33-18:35	20:42	13:54	---	NA	587.9	0.42	---	0.00	---	0.00	---	0.00	---	0.01	---	0.00	---	0.00	---
05/13/2021	16:01-20:39	19:30	13:00	---	24	611.9	0.04	0.00	0.00	---	0.00	---	0.00	---	0.62	0.00	0.00	---	0.00	---
6/10/2021[C]	15:05-17:29	18:36	11:48	---	NA	611.9	0.02	---	0.00	---	0.00	---	0.00	---	0.86	---	0.00	---	0.00	---
08/12/2021	16:31-20:26	21:03	14:50	---	78	689.9	0.02	0.00	0.02	0.00	0.00	---	TRACE	---	WI	WI	0.00	---	0.00	---
11/11/2021[G]	15:25-21:20	11:18	19:06	8.77	44.3	734.2	0.00	---	0.00	---	0.00	---	0.00	---	0.20	0.00	0.00	---	0.00	---
1/18/2022[C]	16:37-17:57	19:54	14:30	7.87	NA	734.2	NM	NM	0.00	---	NM	NM	0.00	---	0.39	---	NM	NM	0.00	---
02/17/2022	16:42-19:08	19:48	14:06	8.65	31.48	765.68	0.05	0.00	0.00	---	0.00	---	0.00	---	1.36	0.00	0.00	---	0.00	---
4/14/2022[C]	18:27-19:57	17:48	23:24	8.74	NA	765.68	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
05/12/2022	16:30-21:05	16:24	22:18	9.10	13.3	778.98	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
6/20/2022[C]	08:31-10:14	05:25	10:07	9.01	NA	778.98	0.00	---	0.00	---	0.00	---	0.00	---	0.12	---	0.00	---	0.00	---
07/14/2022	16:29-20:48	11:55	19:33	8.83	10.12	789.1	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
08/11/2022[C]	16:40-17:23	18:00	11:00	8.98	NA	789.1	0.01	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
09/08/2022	16:40-17:49	22:47	17:13	9.53	11.14	800.24	TRACE	---	0.00	---	0.00	---	0.00	---	0.19	0.01	0.00	---	0.00	---
10/13/2022[C]	17:19-18:12	19:11	14:04	9.44	NA	800.24	0.02	---	0.00	---	NA[O]	NA[O]	NA[O]	NA[O]	0.00	---	NA[O]	NA[O]	NA[O]	NA[O]
11/10/2022[C]	18:00-18:49	23:54	16:51	8.68	NA	800.24	<0.01	---	0.00	---	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
12/08/2022	16:51-20:30	22:55	15:45	8.79	48.55	848.79	0.03	---	x	NA[O]	NA	NA	NA	NA	0.05	0.00	NA	NA	NA	NA
01/12/2023[C]	17:20-17:55	19:41	12:11	7.92	NA	848.79	0.00	---	NA	NA	NA	NA	NA	NA	0.21	---	NA	NA	NA	NA
02/09/2023[C]	16:55-17:36	17:00	13:33	8.50	NA	848.79	0.00	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
03/09/2023	16:57-20:10	12:17	20:11	8.57	32.78	881.57	0.01	0.00	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
04/13/2023[C]	18:07 -18:50	17:36	10:00	8.53	NA	881.57	<0.01	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
05/11/2023[C]	18:11-18:46	16:09	08:41	8.48	NA	881.57	0.04	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
06/19/2023	08:45-13:20	12:18	05:05	9.01	34.06	915.63	0.07	0.00	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
07/27/2023[C]	16:38-17:02	18:31	14:31	9.27	NA	915.63	TRACE	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
08/10/2023[C]	16:42-17:00	20:11	15:28	8.68	NA	915.63	0.03	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
09/14/2023	17:00-22:00	23:58	18:00	9.08	11.7	927.33	0.12	0.00	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
10/12/2023[C]	17:52-18:28	23:01	16:40	9.79	NA	927.33	0.05	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
11/9/2023[C]	18:22-1851	20:58	14:10	8.90	NA	927.33	0.00	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
12/14/2023	16:25-21:00	16:20	23:58	8.43	12.04	939.37	0.00	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
01/11/2024[C]	16:46-17:56	22:50	15:28	8.43	NA	939.37	0.21	---	NA	NA	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA
02/08/2024[C]	16:35-17:08	17:49	14:35	7.64	NA	939.37	0.00	---	NA	NA	NA	NA	NA	NA	NA[O]	NA[O]	NA	NA	NA	NA
03/14/2024	16:32-20:52	14:55	21:48	8.53	16.09	955.46	0.00	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04/11/2024[C]	18:06-18:25	13:34	20:43	9.37	NA	955.46	0.00	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05/09/2024[C]	17:18-18:15	12:24	19:52	8.90	NA	955.46	0.00	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06/13/2024	16:30-19:11	16:28	23:51	9.87	15.18	970.64	TRACE	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
07/11/2024[C]	16:49-17:15	15:03	22:10	9.35	NA	970.64	0.00	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
08/08/2024[C]	17:07-17:44	13:54	20:38	9.43	NA	970.64	0.41	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09/12/2024	16:45-18:55	20:15	14:48	10.12	11.11	981.75	0.03	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/10/2024[C]	17:23-1826	21:22	17:25	9.24	NA	981.75	0.18	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/14/2024[C]	00:21-01:02	21:37 (prev day)	04:41	9.65	NA	981.75	0.16	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12/12/2024	17:00-00:10	20:33	04:06 (next day)	9.71	12.04	993.79	0.51	0.00	0.03	TRACE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

PORT OF SEATTLE - TERMINAL 30
Table 6
LNAPL Gauging and Recovery Results

	RW-1[M]		RW-12			RW-101		RW-102		RW-103		RW-104		RW-105		RW-106		
	Initial LNAPL Thickness	Final LNAPL Thickness[H]	Initial LNAPL Thickness	Final LNAPL Thickness[H]	DTW[Q]	Initial LNAPL Thickness	Final LNAPL Thickness[H]	Initial LNAPL Thickness	Final LNAPL Thickness[H]	Initial LNAPL Thickness	Final LNAPL Thickness[H]	Initial LNAPL Thickness	Final LNAPL Thickness[H]	Initial LNAPL Thickness	Final LNAPL Thickness[H]	Initial LNAPL Thickness	Final LNAPL Thickness[H]	DTW[Q]
Date	(Ft)	(Ft)	(Ft)	(Ft)	(Ft BTOC)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft BTOC)
Baseline[J]	0.55	---	0.00	---	---	0.02	---	0.00	---	1.16	---	0.00	---	0.00	---	1.00	---	---
01/09/2020	0.03	0.01[B]	0.71	0.03[B]	---	0.02	<0.01	0.00	NM	1.16	<0.01	0.00	NM	0.00	NM	1.00	<0.01	---
02/13/2020	0.01	<0.01	0.25	0.03[B]	---	<0.01	NM	WI	WI	WI	WI	NM	NM	NM	NM	1.40	<0.01	---
03/12/2020	0.05	<0.01	0.78	0.08[B]	---	0.03	<0.01	0.00	NM	0.71	0.01[B]	0.00	NM	0.00	NM	1.05	0.06[B]	---
05/16/2020	0.56	0.22[B]	0.78	0.05[B]	---	0.08	---	0.00	---	0.45	0.01[B]	0.00	---	0.00	---	1.10	0.00	---
06/19/2020	0.59	0.08[B]	0.59	0.00	---	0.07[B]	0.05[B]	0.00	---	0.29	0.01[B]	0.00	---	0.00	---	1.01	0.00	---
07/28/2020	0.47	0.02[B]	0.60	0.00	---	0.09	0.00	0.00	---	0.31[B]	---	0.00	---	0.00	---	0.77	<0.01	---
08/21/2020	0.32	0.01[B]	0.35	0.02[B]	---	0.00	---	0.00	---	0.23	0.01[B]	0.00	---	0.00	---	0.73	0.00	---
09/10/2020	0.20	<0.01	0.24	0.02[B]	---	0.00	---	0.00	---	1.74	0.00	0.00	---	0.00	---	1.55	0.00	---
10/08/2020	0.11	0.01B	0.45	0.02[B]	---	0.05	0.00	<0.01[B]	---	0.86	0.00	0.00	---	0.00	---	0.73	0.00	---
11/11/2020	0.28	0.09[B]	0.43	NM	---	<0.01	0.00	0.00	---	1.01	0.00	0.00	---	0.00	---	0.80	0.00	---
12/10/2020[C]	0.04	---	0.16	---	---	0.00	---	0.00	---	0.40	---	0.00	---	0.00	---	0.84	---	---
01/15/2021	0.06	0.01[B]	0.18	0.01[B]	---	0.00	---	0.00	---	0.75	0.00	0.00	---	0.00	---	1.13	0.00	---
2/12/2021[C,I]	0.03	---	0.03	---	---	0.00	---	0.00	---	0.87	---	0.00	---	0.00	---	1.19	---	---
03/05/2021	0.17	0.01[B]	0.05	0.00	---	0.00	---	0.00	---	0.49	0.00	0.00	---	0.00	---	1.08	0.00	---
4/15/2021[C]	0.11	---	0.25	---	---	0.00	---	0.00	---	0.31	---	0.00	---	0.00	---	0.78	---	---
05/13/2021	0.17	0.02[B]	>0.10	0.00	---	WI	WI	0.00	---	0.23	0.00	0.00	---	0.00	---	0.71	0.00	---
6/10/2021[C]	0.26	---	0.21	---	---	0.01	---	WI	WI	WI	WI	0.00	---	0.00	---	0.58	---	---
08/12/2021	0.27	0.1[B]	0.31	0.01[B]	---	0.00	---	WI	WI	WI	WI	0.00	---	0.00	---	0.59	0.00	---
11/11/2021[G]	0.15	0.00	0.30	0.00	9.40	0.00	---	0.00	---	0.61	0.00	0.01	0.00	0.00	---	1.05	0.00	8.50
1/18/2022[C]	NM	NM	0.07	---	8.26	0.00	---	NM	NM	1.29	---	0.00	---	0.00	---	1.85	---	7.37
02/17/2022	0.06	0.01	0.05	0.01	9.15	0.00	---	0.00	---	NM	NM	0.00	---	0.00	---	0.92	0.02	8.09
4/14/2022[C]	0.03	---	0.06	---	9.04	0.00	---	0.00	---	0.60	---	0.00	---	0.00	---	1.12	---	8.13
05/12/2022	0.08	<0.01	0.09	0.00	9.50	0.00	---	0.00	---	0.29	0.00	0.00	---	0.00	---	0.38	0.00	8.64
6/20/2022[C]	0.08	---	0.01	---	9.20	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	8.76
07/14/2022	0.09	0.00	0.13	0.00	9.46	0.00	---	0.00	---	0.27	0.00	0.00	---	0.00	---	0.82	0.00	8.50
08/11/2022[C]	0.06	---	0.17	---	9.43	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.05	---	9.03
09/08/2022	0.10	0.01	0.32	TRACE	9.57	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	0.04	0.01	9.15
10/13/2022[C]	0.06	---	0.29	---	9.73	NA[O]	NA[O]	NA[O]	NA[O]	0.00	---	0.00	---	NA[O]	NA[O]	0.01	---	9.27
11/10/2022[C]	0.07	---	0.33	---	9.18	NA	NA	NA	NA	0.28	---	0.00	---	NA	NA	2.09	---	7.24
12/08/2022	0.04	0.00	0.38	<0.01	9.27	NA	NA	NA	NA	0.15	0.00	0.00	---	NA	NA	0.32	0.00	8.52
01/12/2023[C]	0.03	---	0.06	---	8.12	NA	NA	NA	NA	0.00	---	0.00	---	NA	NA	0.00	---	7.52
02/09/2023[C]	0.05	---	0.07	---	8.83	NA	NA	NA	NA	0.00	---	0.00	---	NA	NA	0.05	---	8.36
03/09/2023	0.02	0.00	0.09	0.00	8.91	NA	NA	NA	NA	0.00	---	0.00	---	NA	NA	0.10	0.01	8.51
04/13/2023[C]	0.03	---	0.07	---	9.09	NA	NA	NA	NA	0.40	---	0.00	---	NA	NA	0.54	---	8.12
05/11/2023[C]	0.09	---	0.06	---	8.81	NA	NA	NA	NA	0.24	---	NA[O]	NA[O]	NA	NA	1.06	---	7.70
06/19/2023	0.02	0.00	0.10	0.00	9.26	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.01	0.00	8.92
07/27/2023[C]	0.07	---	0.18	---	9.68	NA	NA	NA	NA	0.19	---	NA	NA	NA	NA	0.74	---	8.99
08/10/2023[C]	0.08	---	0.31	---	8.82	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.02	---	8.25
09/14/2023	0.09	0.00	0.04	0.00	9.47	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.05	0.00	9.04
10/12/2023[C]	0.06	---	0.21	---	10.09	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.27	---	9.83
11/9/2023[C]	0.05	---	0.30	---	9.11	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.01	---	8.81
12/14/2023	0.05	0.00	0.25	0.00	8.67	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.03	0.00	8.41
01/11/2024[C]	0.04	---	0.18	---	8.46	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.03	---	8.94
02/08/2024[C]	0.04	---	0.09	---	8.16	NA	NA	NA	NA	TRACE	---	NA	NA	NA	NA	0.03	---	7.29
03/14/2024	0.10	0.00	0.22	0.00	9.19	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	2.84	0.00	8.63
04/11/2024[C]	0.11	---	0.15	---	9.87	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.22	---	9.49
05/09/2024[C]	0.07	---	0.24	---	9.49	NA	NA	NA	NA	0.25	---	NA	NA	NA	NA	1.13	---	8.71
06/13/2024	0.01	0.00	0.26	0.00	10.47	NA	NA	NA	NA	0.01	0.00	NA	NA	NA	NA	0.58	0.00	9.90
07/11/2024[C]	0.03	---	0.19	---	9.59	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.17	---	9.32
08/08/2024[C]	0.07	---	0.30	---	9.69	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.24	---	9.35
09/12/2024	0.06	0.02[R]	0.18	0.00	10.51	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.22	0.11[R]	10.28
10/10/2024[C]	0.06	---	0.16	---	9.86	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.14	---	9.04
11/14/2024[C]	0.21	---	0.03	---	10.30	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.00	---	9.83
12/12/2024	0.07	0.05[R]	0.09	0.03[R]	10.21	NA	NA	NA	NA	0.00	---	NA	NA	NA	NA	0.02	0.05[R]	10.12

PORT OF SEATTLE - TERMINAL 30
Table 6
LNAPL Gauging and Recovery Results

	RW-107			RW-108		RW-109		RW-110	
Date	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)	DTW[Q] (Ft BTOC)	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)
Baseline[J]	0.98	---	---	0.00	---	0.00	---	0.02	---
01/09/2020	0.98	<0.01	---	0.00	NM	0.00	NM	0.02	<0.01
02/13/2020	0.34	0.09[B]	---	0.00	NM	0.00	NM	0.09	<0.01
03/12/2020	1.37	<0.01	---	0.00	NM	0.00	NM	0.04	<0.01
05/16/2020	0.84	0.00	---	0.00	---	0.00	---	0.10	0.00
06/19/2020	1.09	0.27[B]	---	0.00	---	0.00	---	0.34	0.00
07/28/2020	1.19	<0.01	---	0.00	---	0.00	---	0.46	<0.01
08/21/2020	1.41	0.00	---	0.00	---	0.00	---	0.30	0.00
09/10/2020	2.17	0.00	---	0.00	---	0.00	---	0.00	---
10/08/2020	2.49	NM	---	0.00	---	0.00	---	0.01	<0.01
11/11/2020	1.83	0.00	---	0.00	---	0.00	---	0.02	0.00
12/10/2020[C]	1.05	---	---	0.00	---	0.00	---	0.00	---
01/15/2021	0.78	0.00	---	0.00	---	0.00	---	0.00	---
2/12/2021[C,I]	1.00	---	---	0.00	---	0.00	---	0.19	---
03/05/2021	0.96	0.00	---	0.00	---	0.00	---	0.17	0.00
4/15/2021[C]	0.74	---	---	0.00	---	0.00	---	0.10	---
05/13/2021	0.59	0.00	---	0.00	---	0.00	---	0.20	0.00
6/10/2021[C]	0.61	---	---	0.00	---	0.00	---	0.25	---
08/12/2021	0.72	0.02[B]	---	0.00	---	0.00	---	0.48	0.00
11/11/2021[G]	0.02	0.00	9.02	0.00	---	0.00	---	0.01	0.00
1/18/2022[C]	1.45	---	7.65	0.00	---	0.00	---	0.00	---
02/17/2022	0.65	0.02	8.44	0.00	---	0.00	---	0.02	Trace
4/14/2022[C]	0.80	---	8.41	0.00	---	0.00	---	0.00	---
05/12/2022	0.75	0.00	8.87	0.00	---	0.00	---	0.00	---
6/20/2022[C]	0.00	---	9.03	0.00	---	0.00	---	0.00	---
07/14/2022	0.61	0.00	8.82	0.00	---	0.00	---	0.00	---
08/11/2022[C]	0.49	---	9.34	0.00	---	0.00	---	0.00	---
09/08/2022	0.49	0.37[N]	9.44	0.00	---	0.00	---	0.00	---
10/13/2022[C]	0.41	---	9.57	NA[O]	NA[O]	NA[O]	NA[O]	0.00	---
11/10/2022[C]	0.18	---	8.61	NA	NA	NA	NA	0.00	---
12/08/2022	0.44	0.00	8.77	NA	NA	NA	NA	0.00	---
01/12/2023[C]	0.32	---	8.02	NA	NA	NA	NA	0.00	---
02/09/2023[C]	0.37	---	8.72	NA	NA	NA	NA	0.00	---
03/09/2023	0.55	0.10	8.81	NA	NA	NA	NA	0.00	---
04/13/2023[C]	0.66	---	8.38	NA	NA	NA	NA	0.01	---
05/11/2023[C]	0.60	---	9.44	NA	NA	NA	NA	0.00	---
06/19/2023	0.19	0.70[P]	9.22	NA	NA	NA	NA	0.00	---
07/27/2023[C]	0.59	---	9.23	NA	NA	NA	NA	0.05	---
08/10/2023[C]	0.64	---	8.76	NA	NA	NA	NA	0.00	---
09/14/2023	0.73	0.00	9.52	NA	NA	NA	NA	0.00	---
10/12/2023[C]	0.66	---	9.96	NA	NA	NA	NA	0.00	---
11/9/2023[C]	0.56	---	9.05	NA	NA	NA	NA	0.00	---
12/14/2023	0.55	0.00	8.48	NA	NA	NA	NA	0.00	---
01/11/2024[C]	0.04	---	8.64	NA	NA	NA	NA	0.00	---
02/08/2024[C]	0.00	---	7.71	NA	NA	NA	NA	0.00	---
03/14/2024	1.32	0.04	8.03	NA	NA	NA	NA	0.30	0.00
04/11/2024[C]	0.04	---	9.69	NA	NA	NA	NA	0.00	---
05/09/2024[C]	0.53	---	8.94	NA	NA	NA	NA	0.00	---
06/13/2024	0.36	0.00	9.85	NA	NA	NA	NA	0.05	0.00
07/11/2024[C]	0.01	---	9.57	NA	NA	NA	NA	0.00	---
08/08/2024[C]	0.05	---	9.60	NA	NA	NA	NA	0.00	---
09/12/2024	0.02	0.03[R]	10.39	NA	NA	NA	NA	0.00	---
10/10/2024[C]	0.22	---	9.18	NA	NA	NA	NA	0.09	---
11/14/2024[C]	0.55	---	9.78	NA	NA	NA	NA	0.00	---
12/12/2024	0.04	0.67[R]	10.05	NA	NA	NA	NA	0.00	---

Abbreviations, Symbols, and Formatting:

Ft = Feet
Gal = Gallon
LNAPL = Light Non-Aqueous Phase Liquid
NM = Not Measured
NA = Well not intended to be gauged/vacuumed
WI = Well inaccessible
--- = Data not needed/relevant
Red values = approximated values or averaged values as placeholder for data not recorded in the field.
Blue values = data collected by CRETE but input by AECOM, or calculated by AECOM with data previously collected by CRETE.
= Interior Monitoring Well
= Performance Monitoring well

Notes:

A. Approximately 4 gallons of LNAPL and water were previously removed from this well (MW-89) on November 14, 2019.

B. Vacuum removal was not executed.

C. LNAPL gauging event; no LNAPL removal.

D. Measurement not taken. The total volume extracted was similar to the prior removal event, so the prior product volume was repeated as an estimate.

E. MW-38 was found to be obstructed during during field activities on 09/18/2020. It was not monitored thereafter and was decomissioned on 05/06/2021.

F. Tidal information source: https://tidesandcurrents.noaa.gov/stationhome.html?id=9447130

G. Unless otherwise indicated, all data prior to 10/14/2021 was collected by CRETE and was not reviewed or validated by AECOM.

H. The final LNAPL thickness is the value measured after the final recovery cycle at a well is complete. Recovery is determined complete when the LNAPL thickness is reduced to <0.01 ft or three recovery cycles have been executed within a single event.

I. The data previously entered for the 2/12/21 gauging event did not match the field notes. Values have been updated by AECOM as needed.

J. Baseline LNAPL data was collected during the 10/16/19-10/18/19 gauging and sampling event and during to the first LNAPL recovery event on 1/9/20. AECOM reviewed the historical field notes and revised all wells that had non-detect LNAPL thicknesses to 0.0 ft from the previously reported values of <0.01 ft. Depth to product was not successfully measured/recorded at MW-35 prior to gauging on 10/8/20.

K. MW-35 was initially identified as a biannual gauging well in the CMP. After LNAPL was measured in the well on 10/9/20 it entered into the monthly gauging/removal protocol.

L. Product volume estimated by the vac truck contractor after allowing the water and free product in the truck tank to separate out over night.

M. These monitoring wells temporarily became recovery wells when product was encountered during gauging activities. The CMP dictates that they be monitored at least quarterly after product is encountered, and sample data cannot be used for performance monitoring purposes until 4 consecutive quarters occur with measurements of ≤0.01 ft.

N. RW-107 was extracted by vac truck 3 times for a total of 110 minutes with little impact on LNAPL thickness. The vac truck was confirmed to be working.

O. The prior results marked at least 1 year of measurements < 0.01 ft, resulting in the removal of the well from the product monitoring/recovery protocol.

P. Vacuum recovery performed 3 times for 20, 50, and 60 minutes, per SOP. Cause of LNAPL thickness increase unknown.

Q. DTW measurements have been corrected higher using the specific gravity of diesel (0.94) when LNAPL is present.

R. Further vac not attempted due to time constraints or unproductive prior result.

PORT OF SEATTLE - TERMINAL 30
Table 7
LNAPL Gauging Results in Non-LNAPL Wells

Date	Time of Fieldwork	Tidal Position		MW-35	MW-36	MW-38[B]	MW-42	MW-45A	MW-46B	MW-54	MW-58A	MW-64	MW-84A
		Time of Nearest Low Tide[A]	Time of Nearest High Tide[A]	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)	LNAPL Thickness (Ft)
Baseline[C]	NM	---	---	NM	0.18	0.0	0.0	0.0	0.0	NM	0.0	NM	0.0
10/8/2020[D]	NM	---	---	0.52[E]	0.00	---	---	---	---	NM	---	NM	---
6/20/2022[F]	09:38	05:25	10:07	---	---	---	---	---	---	---	---	0.0	---
10/13/2022[D]	17:33	19:11	14:04	0.02	0.00	---	---	---	---	0.0	---	0.0	---
11/15/2024[D]	17:33	19:11	14:04	0.16	NM	---	---	---	---	0.0	---	0.0	---
12/12/2024[D]	18:54	20:33	04:06 (next day)	---	0.03	---	---	---	---	---	---	---	---

Abbreviations, Symbols, and Formatting:

Ft = Feet
LNAPL = Light Non-Aqueous Phase Liquid
NM = Not Measured
WI = Well inaccessible
--- = Data not needed/relevant
Blue values = data collected by CRETE but input by AECOM

= Interior Monitoring Well
= Performance Monitoring well
= CPOC Monitoring Well
= Shoreline Monitoring Well

Notes:

A. Tidal information sourced from https://tidesandcurrents.noaa.gov/stationhome.html?id=9447130

B. MW-38 was found to be obstructed during during field activities on 09/18/2020. It was not monitored thereafter and was decomissioned on 05/06/2021.

C. Baseline LNAPL data was collected during the gauging and sampling event from 10/16/19-10/18/19. Depth to product was not successfully measured/recorded at MW-54 or MW-64. All wells with thicknesses of 0.0 were corrected from the previously reported values of <0.01 ft after a review of the field notes. Depth to product was not successfully measured/recorded at MW-35 prior to the gauging on 10/8/20.

D. Biannual gauging event for MW-35, MW-36, MW-54, and MW-64.

E. MW-35 was initially identified as a biannual gauging well in the CMP. After LNAPL was measured in the well on 10/9/20 it entered into the product gauging/removal protocol. That data is shown in Table 6.

F. MW-64 was added to the 6/20/22 routine LNAPL gauging event when AECOM discovered that it had not been previously gauged as planned in the CMP schedule.

PORT OF SEATTLE - TERMINAL 30
Table 7
LNAPL Gauging Results in Non-LNAPL Wells

Date	MW-85A LNAPL Thickness (Ft)	MW-86B LNAPL Thickness (Ft)	MW-87A LNAPL Thickness (Ft)	MW-92 LNAPL Thickness (Ft)	RW-5A LNAPL Thickness (Ft)	RW-9 LNAPL Thickness (Ft)	RW-11A LNAPL Thickness (Ft)
Baseline[C]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/8/2020[D]	---	---	---	---	---	---	---
6/20/2022[F]	---	---	---	---	---	---	---
10/13/2022[D]	---	---	---	---	---	---	---
11/15/2024[D]	---	---	---	---	---	---	---
12/12/2024[D]	---	---	---	---	---	---	---

Abbreviations, Symbols, and Formatting:

Ft = Feet
LNAPL = Light Non-Aqueous Phase Liquid
NM = Not Measured
WI = Well inaccessible
--- = Data not needed/relevant
Blue values = data collected by CRETE but input by AECOM

= Interior Monitoring Well
= Performance Monitoring well
= CPOC Monitoring Well
= Shoreline Monitoring Well

PORT OF SEATTLE - TERMINAL 30
Table 8
Performance and Interior Groundwater Analytical Data

Well Type	Well ID	Sample Date	Diesel Range Organics (µg/L)	Lube Oil (µg/L)	Diesel Range Organics SGC (µg/L)	Lube Oil SGC (µg/L)	TPH-Dx (Diesel + Lube Oil) [a] (µg/L)	Gasoline Range Organics (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)
		GW CULs (µg/L)	--	--	--	--	500	1,000/800 [e]	23	15,000	2,100	1,000
		GW RELs (µg/L)	--	--	--	--	2,085	2,085	47	30,000	4,200	2,000
Performance Wells	**RW-11A**	10/17/19	5,600	1,100 [b]	1,100	250 U	**1,100**	260	1 U	1 U	1 U	3.0
		4/11/20	3,700 [b]	440 [b]	140	250 U	140	100 U	1 U	1 U	1 U	3 U
		4/11/20 DUP	4,400 [b]	480 [b]	160	250 U	160	100 U	1 U	1 U	1 U	3 U
		9/18/20	2,800	330 [b]	98	250 U	98	100 U	1 U	1 U	1 U	3 U
		4/3/21	NAn	NAn	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U
		10/14/21	1,230	163 U	133 [d]	157 U	133	100 U	0.200 U	1.00 U	0.500 U	1.50 U
		4/14/22	1,700 [b]	440 [b]	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U
		10/13/22	4,800	410 [b]	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
		10/13/22 DUP	4,900	510 [b]	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
		4/13/23	780 [b]	250 U	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
		4/13/23 DUP	700 [b]	250 U	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
		10/12/23	12,000 [b]	680 [b]	91	250 U	91	230	0.35 U	1 U	1 U	3 U
		4/11/24	62,000 [b]	3000 U	4,100	300 U	**4,100**	230	0.35 U	1 U	1 U	3 U
		11/14/24	140 [b]	250 U	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
		11/14/2024 DUP	120 [b]	250 U	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
	MW-59	10/17/19	Well not sampled; free product encountered									
		4/11/20	Well not sampled; free product encountered									
		9/29/2020[f]	1,600	250 U	830	250 U	**830**	100 U	1 U	1 U	1 U	3 U
		4/3/21	Well not sampled; free product encountered									
		10/14/21	Well not sampled; free product encountered									
		4/14/22	Well not sampled per CMP; free product encountered within the preceding four quarters									
		10/13/22	Well not sampled per CMP; free product encountered within the preceding four quarters									
		4/13/23	Well not sampled per CMP; free product encountered within the preceding four quarters									
		10/12/23	Well not sampled per CMP; free product encountered within the preceding four quarters									
		4/11/24	25,000 [b]	950 [b]	17,000	770 [b]	**17,770**	100 U	0.35 U	1 U	1 U	3 U
		4/11/2024 DUP	29,000 J [b]	1,100 J [b]	23,000	620 [b]	**23,620**	100 U	0.35 U	1 U	1 U	3 U
		11/14/24	13,000 [b]	1,500 [b]	6,600	250 U	**6,600**	100 U	0.35 U	1 U	1 U	3 U

PORT OF SEATTLE - TERMINAL 30
Table 8
Performance and Interior Groundwater Analytical Data

Well Type	Well ID	Sample Date	Diesel Range Organics (µg/L)	Lube Oil (µg/L)	Diesel Range Organics SGC (µg/L)	Lube Oil SGC (µg/L)	TPH-Dx (Diesel + Lube Oil) [a] (µg/L)	Gasoline Range Organics (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)
		GW CULs (µg/L)	--	--	--	--	500	1,000/800 [e]	23	15,000	2,100	1,000
		GW RELs (µg/L)	--	--	--	--	2,085	2,085	47	30,000	4,200	2,000
Performance Wells (Cont'd)	MW-89	10/18/19	Well not sampled; free product encountered									
		4/11/2020[f]	1,500 [b]	420 [b]	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U
		9/29/2020[f]	6,000	540 [b]	550	250 U	**550**	140 [b]	1 U	1 U	1 U	3 U
		4/3/21	NAn	NAn	93	250 U	93	100 U	1 U	1 U	1 U	3 U
		4/3/21 DUP	NAn	NAn	88	250 U	88	100 U	1 U	1 U	1 U	3 U
		10/14/21	827	334	410 [d]	265	**675**	100 U	0.200 U	1.00 U	0.500 U	1.50 U
		4/15/22	780 [b]	440 [b]	54	250 U	54	100 U	1 U	1 UJ	1 U	3 U
		4/15/22 DUP	910 [b]	480 [b]	50 U	250 U	250 U	170	1 U	6.8 J	1.4	7.7
		10/19/22	550 [b]	250 U	61	250 U	61	100 U	0.35 U	1 U	1 U	3 U
		4/13/23	410 [b]	250 U	50 U	250 U	50 U	100 U	0.35 U	1 U	1 U	3 U
		10/12/23	600 [b]	250 U	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
		4/11/24	1,400 [b]	1,400 [b]	63	300 U	63	100 U	0.35 U	1 U	1 U	3 U
		11/15/24	2,900 [b]	1,500 [b]	96	250 U	96	100 U	0.49	1 U	1 U	3 U
	RW-9	10/17/19	3,100	750 b	1200	250 U	**1,200**	720	1 U	1 U	1.6	3.9
		9/18/20	3,300	440 b	450	250 U	450	430	1 U	1.4	1 U	3 U
		10/14/21	6,360	150 U	1,590	165 U	**1,590**	227	0.200 U	1.00 U	0.500 U	1.50 U
		10/13/22	9,500 J [b]	2,000 J [b]	200	250 U	200	100 U	0.35 U	1 U	1 U	3 U
		10/12/23	12,000 [b]	620 [b]	230	250 U	230	160	0.35 U	1 U	1 U	3 U
		10/12/2023 DUP	11,000 [b]	590 [b]	210	250 U	210	200	0.35 U	1 U	1 U	3 U
		11/14/24	7,900 [b]	1,700 [b]	150	250 U	150	130	0.35 U	1 U	1 U	3 U
	MW-36A	10/17/19	Well not sampled; free product encountered									
		9/19/2020[f]	3,100	360 [b]	560	250 U	**560**	120	1 U	1 U	1 U	3 U
		10/14/21	2,610	178 U	404	167 U	404	100 U	0.200 U	1.00 U	0.500 U	1.50 U
		10/13/22	4,900	460 b	180	250 U	180	100 U	0.35 U	1 U	1 U	3 U
		10/12/23	4,800 b	250 U	130	250 U	130	100 U	0.35 U	1 U	1 U	3 U
		11/14/24	3,400 [b]	940 [b]	420	300 U	420	100 U	0.35 U	1 U	1 U	3 U

PORT OF SEATTLE - TERMINAL 30
Table 8
Performance and Interior Groundwater Analytical Data

Well Type	Well ID	Sample Date	Diesel Range Organics (µg/L)	Lube Oil (µg/L)	Diesel Range Organics SGC (µg/L)	Lube Oil SGC (µg/L)	TPH-Dx (Diesel + Lube Oil) [a] (µg/L)	Gasoline Range Organics (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)
		GW CULs (µg/L)	--	--	--	--	500	1,000/800 [e]	23	15,000	2,100	1,000
		GW RELs (µg/L)	--	--	--	--	2,085	2,085	47	30,000	4,200	2,000
	MW-39A	10/17/19	Well not sampled; free product encountered									
		9/19/2020[f]	3,100	1,100	1,500	770	**2,270**	160	1 U	1 U	1 U	3 U
		10/14/21	2,870	1,760	1,980 [d]	1,540	**3,520**	100 U	0.200 U	1.00 U	0.500 U	1.50 U
		10/13/22	6,800 [b]	1,200 [b]	110	250 U	110	100 U	0.35 U	1 U	1 U	3 U
		10/12/23	1,500 [b]	250 U	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
		11/14/24	1,200 [b]	310 [b]	67	250 U	67	100 U	0.35 U	1 U	1 U	3 U
	MW-42	10/17/19	6,600	2,600 [b]	330 [b]	250 U	330 [b]	**2,100**	**37**	17	5.1	16
		9/18/20	5,500	1,300 [b]	110 [b]	250 U	110 [b]	620	5.2	3.5	1 U	7.4
		10/14/21	4,780	165 U	315 [c]	150 U	315 [c]	248	1.31	1.00 U	0.500 U	1.50 U
		10/13/22	5,600 [b]	1,400 [b]	120	250 U	120	260	0.35	1 U	1 U	3 U
		10/12/23	8,800 [b]	1,500 [b]	60	250 U	60	270	0.35 U	1 U	1 U	3 U
		11/14/24	9,800 [b]	1,800 [b]	75	250 U	75	370	0.35	1 U	1 U	3 U
Interior Wells	**RW-1**	10/17/19	Well not sampled; free product encountered									
		9/19/20	Well not sampled; free product encountered									
		10/13/22	Well not sampled per CMP; free product encountered within the preceding four quarters									
		11/14/24	Well not sampled per CMP; free product encountered within the preceding four quarters									
	RW-5A	10/17/19	1,300	810 [b]	290 [b]	250 U	290 [b]	190	1 U	1 U	1 U	3 U
		9/18/20	1,700	330 [b]	120 [b]	250 U	120 [b]	230	1 U	1 U	1 U	3 U
		10/13/22	1,400 [b]	310 [b]	84	250 U	84	110	0.35 U	1 U	1 U	3 U
		11/14/24	1,500	1,300	180	680	**860**	100 U	0.35 U	1 U	1 U	3 U
	MW-38	10/16/19	Well not sampled; water volume insufficient.									
		9/18/20	Well observed broken below grade, not sampled. Well decomissioned on May 6, 2021.									
	MW-93	10/17/19	Well not sampled; free product encountered									
		9/19/2020[f]	8,700	4,100	5,400	3,200	**8,600**	280	1 U	1 U	1 U	3 U
		10/13/22	2,300 [b]	590 [b]	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
		11/14/24	3,500 [b]	660 [b]	50 U	250 U	250 U	100 U	0.35 U	1 U	1U	3 U

PORT OF SEATTLE - TERMINAL 30
Table 8
Performance and Interior Groundwater Analytical Data

Well Type	Well ID	Sample Date	Diesel Range Organics (µg/L)	Lube Oil (µg/L)	Diesel Range Organics SGC (µg/L)	Lube Oil SGC (µg/L)	TPH-Dx (Diesel + Lube Oil) [a] (µg/L)	Gasoline Range Organics (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)
	GW CULs (µg/L)		--	--	--	--	500	1,000/800 [e]	23	15,000	2,100	1,000
	GW RELs (µg/L)		--	--	--	--	2,085	2,085	47	30,000	4,200	2,000

Notes:

[a] Total TPH D + lube oil is the sum of the Silica Gel Cleanup results.

[b] The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

[c] Result is estimated due to overlap from Gasoline Range Organics or other VOCs.

[d] The sample chromatographic pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component

[e] If benzene is present below method detection limits, the TPH-Gx cleanup level is 1000 µg/L. If not, the TPH-Gx cleanup level is 800 µg/L.

[f] Data is not to be used for performance monitoring purposes. Free product was present in excess of 0.01 ft during the four quarters prior to the sampling event, rendering the well ineligible per CMP guidance on qualifaction for performance monitoring sampling.

Abbreviations and Formatting:

BOLD = result was detected above the CUL
BOLD = result was detected above the REL
µg/L = micrograms per liter
CUL = cleanup level
GW = groundwater
J = estimated value
NR = not reported
NAn = not analyzed (analysis was not requested)
REL = remediation level
SGC = silica gel cleanup
U = not detected above the value shown

PORT OF SEATTLE - TERMINAL 30
Table 9
CPOC and Shoreline Groundwater Analytical Data - TPH and BTEX

Well Type	Well ID	Sample Date	Diesel Range Organics (µg/L)	Lube Oil (µg/L)	Diesel Range Organics w/ SGC (µg/L)	Lube Oil w/ SGC (µg/L)	TPH-Dx (Diesel + Lube Oil) [a] (µg/L)	Gasoline Range Organics (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)
		GW CULs (ug/L)	--	--	--	--	500	1000/800	23	15,000	2,100	1,000
		GW RELs (ug/L)	--	--	--	--	2085	2085	47	30,000	4,200	2,000
CPOC Wells	MW-45A	10/21/19	610 [b]	250 U	71 [b]	250 U	71 [b]	100 U	1 U	1 U	1 U	3 U
		10/21/19 DUP	600 [b]	250 U	66 [b]	250 U	66 [b]	100 U	1 U	1 U	1 U	3 U
		9/18/20	490	250 U	54 [b]	250 U	54 b	100 U	1 U	1 U	1 U	3 U
		10/13/22	1,100 [b]	300 U	72	300 U	72	100 U	0.35 U	1 U	1 U	3 U
		11/14/24	730 [b]	500 U	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
	MW-46B	10/16/19	1,500	380 [b]	150 [b]	250 U	150 [b]	100 U	1 U	1 U	1 U	3 U
		9/18/20	1,300	250 U	81 [b]	250 U	81 b	110	1 U	1 U	1 U	3 U
		10/13/22	890 [b]	250 U	73	250 U	73	100 U	0.35 U	1 U	1 U	3 U
		11/14/24	1,200 [b]	250 U	50 U	250 U	250 U	100 U	0.35 U	1 U	1 U	3 U
	MW-58A	10/17/19	1,900	610 [b]	280 [b]	250 U	280 [b]	360	1 U	1 U	1 U	3 U
		9/24/20	3,000	320 [b]	420	250 U	420	390	1 U	1 U	1 U	4.7
		10/19/22	6,300 J [b]	900 J [b]	240	250 U	240	130	0.35 U	1 U	1 U	3 U
		11/14/24	3,200 [b]	560 [b]	96	250 U	96	100 U	0.35 U	1 U	1 U	3 U
	MW-86B	10/17/19	1,500	610 [b]	1600	250 U	**1600**	360	1 U	1 U	1 U	3 U
		9/24/20	650	250 U	95	250 U	95	130	1 U	1 U	1 U	3 U
		9/24/20 DUP	890	250 U	94	250 U	94	100	1 U	1 U	1 U	3 U
		10/19/22	1,600 [b]	400 [b]	63	250 U	63	100 U	0.35 U	1 U	1 U	3 U
		10/19/22 DUP	1,600 [b]	420 [b]	89	250 U	89	100 U	0.35 U	1 U	1 U	3 U
		11/15/24	3,200 J [b]	850 J [b]	75 U	380 U	380 U	100 U	0.35 U	1 U	1 U	3 U
		11/15/24 DUP	8,200 J [b]	1,700 J [b]	75 U	380 U	380 U	100 U	0.35 U	1 U	1 U	3 U
	MW-92	10/16/19	5,200	1100 [b]	120 [b]	250 U	120 [b]	250	1 U	1 U	1.2	3 U
		9/18/20	4,800	720 [b]	75 [b]	250 U	75 [b]	200	1 U	1 U	1 U	3 U
		10/19/22	2,400 [b]	410 [b]	81	250 U	81	100 U	0.35 U	1 U	1 U	3 U
		11/14/24	2,600 [b]	340 [b]	64	250 U	64	130	0.35 U	1 U	1 U	3 U
Shoreline Water Quality Wells	MW-84A	10/17/19	1,100	250 U	410 [b]	250 U	410 [b]	100 U	1 U	1 U	1 U	3 U
	MW-85A	10/18/19	130 [b]	250 U	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U
		10/18/19 DUP	130 [b]	250 U	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U
	MW-87A	10/18/19	420 [b]	570 [b]	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U

Notes :

[a] Total TPH (Diesel + lube oil) is the sum of the Silica Gel Cleanup results.

[b] The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Abbreviations/formatting

BOLD = result was detected above the CUL

BOLD = result was detected above the REL

ug/L = micrograms per liter
CPOC = Conditional Point of Compliance
CUL = cleanup level
GW = groundwater
REL = remediation level
SGC = silica gel cleanup
U - not detected above the laboratory reporting limit

PORT OF SEATTLE - TERMINAL 30
Table 10
CPOC and Shoreline Groundwater Analytical Data - PAHs

Well Type	Well ID	Sample Date	Naphthalene (µg/L)	Acenaphthylene (µg/L)	Acenaphthene (µg/L)	Fluorene (µg/L)	Phenanthrene (µg/L)	Anthracene (µg/L)	Fluoranthene (µg/L)	Pyrene (µg/L)	Benzo (g,h,i) perylene (µg/L)	1-Methyl naphthalene (µg/L)	2-Methyl naphthalene (µg/L)	Benzo[a] anthracene (µg/L)	Chrysene (µg/L)	Benzo[a] pyrene (µg/L)	Benzo[b] fluoranthene (µg/L)	Benzo[k] fluoranthene (µg/L)	Indeno [1,2,3-cd] pyrene (µg/L)	Dibenzo [a,h] anthracene (µg/L)	Total cPAH TEQ[a] (µg/L)
	GW CULs (µg/L)		4,940	--	643	3,460	--	25,900	90	2,590	--	--	--	See Total cPAH TEQ[b]							0.018
CPOC Wells	**MW-45A**	10/21/19	0.1 U	0.039	4.0	0.35	0.77	0.01 U	0.032	0.017	0.01 U	NR	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		10/21/19 DUP	Nan	NAn	NAn	Nan	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn
		9/18/20	0.11	NAn	4.3	0.17	0.21	0.022	0.014	0.012	0.02 U	0.11	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		10/13/22	0.2 U	0.02 U	3.7 J	0.039	0.02 U	0.02 U	0.02 U	0.02 U	0.04 U	0.2 U	0.2 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.015
		11/14/24	0.1 UJ	0.01 U	0.55	0.01 U	0.01 U	0.01 U	0.01 U	0.017	0.01 U	0.1 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
	MW-46B	10/16/19	0.1 U	NAn	3.1	0.036	0.080	0.01 U	0.049	0.035	0.01 U	NR	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		9/18/20	0.1 U	NAn	2.3	0.01 U	0.052 J	0.013	0.017	0.017	0.02 U	0.1 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		10/13/22	0.2 U	0.02 U	0.29	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.04 U	0.2 U	0.2 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.015
		11/14/24	0.1 U	0.01 U	1.1	0.01 U	0.025	0.012	0.041	0.037	0.01 U	0.1 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
	MW-58A	10/17/19	0.96	NAn	5.8	1.3	4.2	0.34	1.0	0.51	0.01 U	NR	0.52	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		9/24/20	0.65	NAn	6.0	2.1	0.054	0.33	0.52	0.26	0.02 U	0.24	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		10/19/22	0.2 U	0.02 U	2.8	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.04 U	0.2 U	0.2 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.015
		11/14/24	6.9	0.01 U	6.6	1.5	0.18	0.13	0.75	0.50	0.01 U	0.95	0.33	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
	MW-86B	10/17/19	0.1 U	NAn	3.2	0.079	0.17	0.15	0.51	0.26	0.01 U	NR	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		9/24/20	0.1 U	NAn	1.9	0.01 U	0.016	0.041	0.49	0.31	0.02 U	0.1 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		9/24/20 DUP	0.1 U	NAn	2.2	0.01 U	0.012	0.048	0.53	0.38	0.02 U	0.1 U	0.1 U	0.011	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		10/19/22	0.2 U	0.02 U	0.96 J	0.02 U	0.02 U	0.02 U	0.084	0.060	0.04 U	0.2 U	0.2 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.015
		10/19/22 DUP	0.2 U	0.02 U	2.6 J	0.02 U	0.02 U	0.02 U	0.041	0.028	0.04 U	0.2 U	0.2 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.015
		11/15/24	0.1 U	0.01 U	0.70	0.01 U	0.059	0.028	0.067	0.078	0.01 U	0.1 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		11/15/24 DUP	0.1 U	0.01 U	0.62	0.01 U	0.047	0.027	0.057	0.70	0.01 U	0.1 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
	MW-92	10/16/19	0.1 U	NAn	0.071	0.027	0.029	0.01 U	0.01 U	0.01 U	0.01 U	NR	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		9/18/20	0.1 U	NAn	0.087	0.01 U	0.02 J	0.013	0.01 U	0.01 U	0.02 U	0.1 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		10/13/22	0.2 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.04 U	0.2 U	0.2 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.015
		11/14/24	0.1 U	0.01 U	0.088	0.01 U	0.056	0.011	0.016	0.021	0.01 U	0.10	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
Shoreline Water Quality Wells	**MW-84A**	10/17/19	0.1 U	NAn	64	0.74	1.3	0.05	0.031	0.033	0.01 U	NR	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
	MW-85A	10/18/19	0.1 U	NAn	49	0.51	0.90	0.034	0.018	0.018	0.01 U	NR	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008
		10/18/19 DUP	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn	NAn
	MW-87A	10/18/19	0.1 U	NAn	0.14	0.015	0.019	0.01 U	0.01 U	0.01 U	0.01 U	NR	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.008

Notes:

[a] cPAH TEQ values are calculated by multiplying the laboratory concentrations by the TEFs provided in MTCA Table 708-2 (WAC 173- 340-900). For ND values, 1/2 of the reporting limit is used as the concentration.

[b] Individual cPAH compounds do not have remediation levels

Abbreviations/Formatting:

BOLD = result was detected above the CUL
-- = No Value
µg/L = micrograms per liter
cPAH = carcinogenic polyaromatic hydrocarbon
CPOC = Conditional Point of Compliance
CUL = cleanup level
GW = groundwater
J = estimated value
MTCA = Model Toxics Control Act
NAn = not analyzed (analysis was not requested)
NR = not reported
PAH = polyaromatic hydrocarbon
TEF = toxicity equivalency factor
TEQ = toxic equivalent concentration
U = not detected above the laboratory reporting limit
WAC = Washington Administrative Code

PORT OF SEATTLE - TERMINAL 30
Table 11
Monitoring Well Groundwater Sampling Parameters

	Well ID	Total Well Depth (ft)	MP Elevation (ft NAD 83)	MP Elevation (ft NAVD 88)	Sample Date	Depth to LNAPL (ft BTOC)	Depth to Groundwater (ft BTOC)	Groundwater Elevation (ft NAD 83)	Groundwater Elevation (ft NAVD 88)	LNAPL Thickness (ft)	TEMP (°F)	TEMP (°C)	pH	Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Performance Wells	RW-11A	20	18.02	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					04/11/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					04/03/21	ND	9.37	8.65	--	0	64.0	17.8	6.47	1.03	--	6.6	0.03	-33
					10/14/21	ND	9.7	8.32	--	0	70.2	21.2	7.42	1.28	--	7.3	0.97	27
					04/14/22	ND	9.38	8.64	--	0	60.4	15.79	6.66	1.21	--	3.6	2.58	49
					10/13/22	ND	9.9	8.12	--	0	70.2	21.2	6.92	--	1,390	3.45	0.22	-29.4
					04/13/23	ND	9.4	8.62	--	0	61.9	16.6	6.78	--	1,051	15.6	2.1	96.6
					10/12/23	ND	10.26	7.76	--	0	69.4	20.8	6.81	--	668	19.0	0.14	-117.4
					04/11/24	ND	9.88	8.14	--	0	61.5	16.4	6.67	--	1,254	8.67	0.37	-108.2
					11/14/24	ND	9.34	8.68	--	0	64.0	17.8	6.34	--	1,487	12.9	3.02	214
	MW-59	--	--	--	10/17/19	--	--	--	--	--	Well not sampled due to free product encountered							
					04/11/20	--	--	--	--	--	Well not sampled due to free product encountered							
					9/29/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					04/03/21	--	--	--	--	--	Well not sampled due to free product encountered							
					10/14/21	9.31	10.70	--	--	1.39	Well not sampled per CMP; free product encountered within the preceding four quarters							
					04/14/22	9.24	9.25	--	--	0.01	Well not sampled per CMP; free product encountered within the preceding four quarters							
					10/13/22	ND	9.40	--	--	0	Well not sampled per CMP; free product encountered within the preceding four quarters							
					04/13/23	ND	8.79	--	--	0	Well not sampled per CMP; free product encountered within the preceding four quarters							
					10/12/23	ND	9.91	--	--	0	Well not sampled per CMP; free product encountered within the preceding four quarters							
					04/11/24	ND	9.93	--	--	0	62.2							
					11/14/24	ND	9.76	--	--	0	66.02	18.9	6.96	--	1,432	98.4	5.33	-55.9
	MW-89	20	17.91	--	10/18/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					04/11/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/29/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					04/03/21	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	ND	9.87	8.04	--	0	69.7	20.94	4.37	4.56	--	38.1	3.6	460
					04/15/22	ND	10.22	7.69	--	0	64.9	18.29	4.72	1.50	--	4.8	7.43	150
					10/19/22	ND	10.7	7.21	--	0	72.3	22.4	3.48	--	2,947	1.2	5.26	227
					04/13/23	ND	10.43	7.48	--	0	59.4	15.2	3.71	--	2,406	1.1	5.43	-50.4
					10/12/23	ND	10.22	7.69	--	0	68.4	20.2	3.89	--	3,109	2.88	0.15	314.5
					04/11/24	ND	10.41	7.5	--	0	61.2	16.2	6.13	--	1,069	4.6	0.36	53.6
					11/14/24	ND	10.22	7.69	--	0	66.6	19.2	6.9	--	2,011	19.40	0.47	-27.4
	RW-9	--	--	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	ND	9.33	--	--	0	73.9	23.26	7.13	1.10	--	5.1	0	-107
					10/13/22	ND	9.33	--	--	0	73.6	23.1	6.94	--	1,072	0.86	0.13	-127.5
					10/12/23	ND	9.6	--	--	0	69.3	20.7	6.98	--	1,276	3.5	0.09	-144.6
					11/14/24	ND	9.36	--	--	0	64.4	18	7.09	--	1,660	4.19	0.41	-120
	MW-36A	20.5	NM	NM	10/17/19	--	--	--	--	--	Well not sampled due to free product encountered							
					09/19/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	ND	10.05	--	--	0	66.5	19.18	7.73	2.61	--	12.8	0.54	-318
					10/13/22	ND	11.7	--	--	0	66.9	19.4	6.99	--	1,902.00	73.0	0.19	-139
					10/12/23	ND	11.17	--	--	0	65.5	18.6	7	--	1,440.00	3.5	0.17	-136.1
					11/14/24	ND	9.79	--	--	0	68.4	20.2	6.33	--	2,166	47.10	3.03	-5.9
	MW-39A	20.5	NM	NM	10/17/19	--	--	--	--	--	Well not sampled due to free product encountered							
					09/19/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	ND	9.4	--	--	0	68.8	20.44	7.25	1.12	--	3.8	0.13	-142
					10/13/22	ND	9.25	--	--	0	69.4	20.8	6.92	--	1,426.00	9.5	0.1	-141.8
					10/12/23	ND	9.21	--	--	0	66.6	19.2	6.79	--	937.00	3.0	0.18	-164.3
					11/14/24	ND	8.72	--	--	0	63.5	17.5	6.89	--	1,025	9.20	0.11	-114.1

PORT OF SEATTLE - TERMINAL 30
Table 11
Monitoring Well Groundwater Sampling Parameters

	Well ID	Total Well Depth (ft)	MP Elevation (ft NAD 83)	MP Elevation (ft NAVD 88)	Sample Date	Depth to LNAPL (ft BTOC)	Depth to Groundwater (ft BTOC)	Groundwater Elevation (ft NAD 83)	Groundwater Elevation (ft NAVD 88)	LNAPL Thickness (ft)	TEMP (°F)	TEMP (°C)	pH	Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
	MW-42	--	--	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	ND	10.08	--	--	0	67.1	19.51	7.55	1.87	--	1.4	0.3	-168
					10/13/22	ND	10.85	--	--	0	66.4	19.1	6.73	--	1,496.00	51.9	0.23	-115.8
					10/12/23	ND	10.08	--	--	0	66.4	19.1	6.77	--	1,419.00	1.5	0.28	-171
					11/14/24	ND	9.82	--	--	0	64.2	17.9	6.64	--	1,443	2.50	0.14	-79.5
	RW-1	--	--	--	10/17/19	--	--	--	--	--	Well not sampled due to free product encountered							
					09/19/20	--	--	--	--	--	Well not sampled due to free product encountered							
					10/13/22	9.13	9.19	--	--	0.06	Well not sampled per CMP; free product encountered within the preceding four quarters							
					11/14/24													
	RW-5A	20	18.07	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/13/22	ND	8.88	9.19	--	0	61.88	16.6	6.8	--	878.00	60	0.2	-138.6
Interior Wells					11/14/24	ND	8.53	9.54	--	0	58.28	14.6	7.17	--	987	175	0.35	-138.4
	MW-38	--	--	--	10/16/19	--	--	--	--	--	Well not sampled; water volume insufficient.							
					9/18/20	Well observed broken below grade, not sampled. Well decomissioned on May 6, 2021.												
	MW-93	20.5	NM	NM	10/17/19	--	--	--	--	--	Well not sampled due to free product encountered							
					09/19/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/13/22	ND	9.74	--	--	0	68.9	20.5	6.44	--	1,198.00	103.8	0.68	-71.6
					11/14/24	ND	9.11	--	--	0	71.1	21.7	6.8	--	1,168	7.21	0.1	-148.3
	MW-45A	20.1	--	16.52	10/21/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/13/22	ND	10.51	--	6.01	0	63.7	17.6	6.73	--	876.00	6.5	0.19	-95.1
					11/14/24	ND	10.15	--	6.37	0	57.4	14.1	6.7	--	1,532	4.98	0.63	-98.6
	MW-46B	20.3	--	16.07	10/16/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/13/22	ND	10.64	--	5.43	0	63.86	17.7	6.71	--	1,080	6.45	1.01	-63.5
					11/14/24	ND	10.02	--	6.05	0	59.0	15	6.67	--	1,087	13.6	0.45	-66.4
	MW-58A	25	NM	NM	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
CPOC Wells					09/24/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/19/22	ND	11.02	--	--	0	66.56	19.2	6.76	--	1,157	17.5	0.12	-124.2
					11/14/24	ND	9.11	--	--	0	63.1	17.3	6.92	--	504	79.8	7.4	-32.6
	MW-86B	20	18.28	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/24/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/19/22	ND	12.48	5.8	--	0	65.48	18.6	7.13	--	1,917	1.07	0.15	-116.8
					11/15/24	ND	11.34	6.94	--	0	60.4	15.8	7.64	--	1,571	8.27	0.99	-143.1
	MW-92	20	NM	NM	10/16/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/13/22	ND	9.93	--	--	0	64.04	17.8	6.6	--	933	253.1	0.2	-132.6
					11/14/24	ND	9.46	--	--	0	61.9	16.6	6.83	--	1,007	1.7	6.95	-118.5
Shoreline Water Quality Wells	MW-84A	40	NM	NM	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-85A	20	18.09	--	10/18/19	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-87A	20	17.98	--	10/18/19	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

1. All gw parameter data presented in this table was recorded at the time of sampling after stabilization was achieved in accordance with EPA's low-flow sampling procedures.
2. This table was created by AECOM in October 2021. Any water quality parameters collected by CRETE prior to AECOM involvement are not included, but are available in the relevant historical field forms.

Abbreviations/Formatting:

-- = Data irrelevant/not available
µS/cm = microsiemens per centimeter
BTOC = below top of casing
CPOC = Conditional Point of Compliance
mg/L = milligram per liter
MP = monitoring point
mV = millivolt
Ft = Feet
Gal = Gallon
NM = Not Measured
LNAPL = Light Non-Aqueous Phase Liquid
NTU = Nephelometric Turbidity unit
ORP = oxidation-reduction potential

PORT OF SEATTLE - TERMINAL 30
Table 12
Well Construction Information

	Well Identification	Date of Installation	Casing Diameter (inch)	Well Screen Interval (ft BGS)	Well Depth (ft BGS)	Northing (ft)	Easting (ft)	MP Elevation (ft NAD83/NAVD88)
Performance Wells	RW-9	--	6	--		--	--	--
	RW-11A	04/24/08	4	5 - 20	20.0	216683.94	1268216.99	18.02 [a]
	MW-36A	10/15/16	2	5 - 20	20.5	NM	NM	NM
	MW-39A	10/15/17	2	5 - 20	20.5	NM	NM	NM
	MW-42	--	2	--	--	--	--	--
	MW-59	--	2	--	--	--	--	--
	MW-89	04/22/08	2	5 - 20	20.0	217003.93	1268079.62	17.91 [a]
Interior Wells	RW-1	--	--	--	--	--	--	--
	RW-5A	04/25/08	4	5 - 20	20.0	216931.12	1268445.78	18.07 [a]
	MW-38 [c]	--	--	--	--	--	--	--
	MW-93	10/15/17	2	5 - 20	20.5	NM	NM	NM
CPOC Wells	MW-45A	11/17/16	2	5.1 - 20.1	20.1	216490.82	1268124.80	16.52 [b]
	MW-46B	11/14/16	2	5.3 - 20.3	20.3	216602.90	1268114.90	16.07 [b]
	MW-58A	08/29/13	2	5 - 25	25.0	NM	NM	NM
	MW-86B	04/22/08	2	5 - 20	20.0	216946.15	126807.76	18.28 [a]
	MW-92	08/30/13	2	5 - 20	20.0	NM	NM	NM
Shoreline Water Quality Wells	MW-84A	04/29/09	2	30-40	40.0	NM	NM	NM
	MW-85A	04/24/08	2	5 - 20	20.0	216682.46	1268002.20	18.09 [a]
	MW-87A	04/22/08	2	5 - 20	20.0	217186.75	1268010.28	17.98 [a]

Notes:

[a] Monitoring Point (MP) and water table elevations in ft (NAD 83)

[b] Monitoring Point (MP) and water table elevations in ft (NAVD 88)

[c] MW-38 decomission May 6, 2021 due to a subsurface obstruction.

Abbreviations/Formatting:

-- = data not available

BGS = below ground surface

CPOC = Conditional Point of Compliance

MP = monitoring ponit

NM - not measured

Appendices

Appendix A

O&M Field Forms

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	42° sunny
Date:	1/11/24	Personnel:	AB

Observations

	Time	Observation Description
1	1114	Arrived on-site; scope: biweekly O&M
2		Safety tailgate - system on upon arrival
3	1137	Taking HMI readings
4	1154	Taking system readings
5	1221	SVE discharge PID: 2.0 ppmV
6		Begin taking PID readings of well heads
7	1254	No PID readings over 0.7 ppmV
8		Taking pressure and flow readings
9	1303	Begin dewatering
10		Inspected secondary containment water for
11		sheen then drained
12	1338	Taking post dewatering readings
13	1355	Dewatering back side of well heads
14		Brown water coming out of SVE-9 and
15		SVE-10
16		Sent pictures of forms to Gus
17	1424	Going to run equipment back to office
18		before LNAP gauging
19	1600	System has been turned off
20	1636	Begin LNAPL gauging
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 1/11/24	Field Tech(s): AB		Actual Time: 1151
PID ID: 43994	Weather: 42° sunny		HMI Time: 1241
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	23570.5 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.9 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	15481.7 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	15475.3 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/15.2/55.4% HMI	Sparge Zone 5 Time Span(s) Operational:	0000-0300, 0500-0800 1000-1300, 1500-1800 2000-2200
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.7/94.3% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	66°	SVE Blower Dilution Valve (# turns open)	1.2
AS Blower Intake Pressure (" H2O) - *DPI-500*	3.0	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.75
AS Blower Discharge Pressure (PSI) - *PI-501*	8.75	Transfer Pump Discharge Pressure (PSI) - *PI-300*	2.0
SVE Blower Inlet Temperature (°F) - *TI-200*	150°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.2
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	58	SVE Blower Discharge Temperature (°F) - *TI-400*	90°
Knockout Tank Level (Sightglass % Full)[1]	40%		
SVE Discharge PID (ppmv)	2.0	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	1/2
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45

NOTES:

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	9.5	4.5	100	
AS-24	8.75	3.25		
AS-25	9.0	1.5		
AS-26	9.75	4.0		
AS-27	8.75	4.0		

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	1/11/24	Time:	1255
Field Tech(s):	AB	PID ID:	43994
Weather:	42° sunny		

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	28	56	25	0.2		SVE-10	53	14	100	0.7	
HSVE-3	28	59	25	0.1		SVE-9	64	—	100	0.5	Float stuck
SVE-4	54	11	100	0.3		SVE-8	—	—	0	—	closed
SVE-5	58	—	100	0.3	Float stuck	SVE-6	58	13	100	0.2	
SVE-7	51	16	100	0.1		HSVE-1	16	47	25	0.3	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	58

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date:	1/11/24	Time:	1301
Field Tech(s):	AB	Pump ID:	044106
Weather:	42° cloudy		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/6	clear	SVE-10	1/4	very dirty wate
HSVE-3	trace	Trace amounts of clear water	SVE-9	trace	trace amounts of dirty water
SVE-4	1/2	clear w/bits of product	SVE-8	—	closed
SVE-5	1/4	clear	SVE-6	1/3	clear
SVE-7	1/4	clear	HSVE-1	1/2	clear

Notes: HSVE-1: trace; SVE-6: Ø; SVE-9: 1.5 gal light brown; SVE-10: 2 gal dark brown; SVE-7: 2.25 gal clear

Abbreviations: Gal = gallons

SVE-5: 1/2-gal clear; SVE-4: trace clear

HSVE-3: trace clear HSVE-2: trace clear

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	1/11/24	Time:	1347
Field Tech(s):	AB	Weather:	41° cloudy

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	27	55	25		SVE-10	52	14	100	Cloudy water in solo
HSVE-3	28	60	25		SVE-9	63	—	100	
SVE-4	58	19	100		SVE-8	—	—	0	closed
SVE-5	54	—	100	Float stuck	SVE-6	58	13	100	
SVE-7	57	8	100		HSVE-1	16	48	25	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	58

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

Port of Seattle Terminal 30 -- LNAPL Gauging Event

Field Technician(s): AB GF	**Client:** Port of Seattle
Date: 1/4/24	**Location:** Terminal 30, Seattle
Project Number: 60681370	**Weather:** 31° Snow
Closest High Tide:	**Closest Low Tide:**

Well ID	Well Location	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Comments
MW-35	**D 314 ****	1755	8.14	8.35	0.21	Thick residue on probe
MW-36	C 309.5	*Removed from LNAPL monitoring protocol following 11/10/22 event*				
MW-36A	C 311.5	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-39A	C 237	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-59	**D 324 ****	1728	TRACE	8.79	—	✓
MW-89	A 257	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-93	D 275	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-1	Entry lanes W of wall, even w/ D 275	1745	7.53	7.57	0.04	Thick residue on probe
RW-12	D 327	1646	8.45	8.63	0.18	✓
RW-101	D 319.5	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-102	**D 322.5 ****	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-103	D 326	1657	—	8.29	—	✓
RW-104	D 318	*Removed from LNAPL monitoring protocol following 04/13/23 event*				
RW-105	D 321	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-106	D 324	1715	8.10	11.30	3.20	Small amt water from monument got down well
RW-107	D 327	1650	8.66	8.70	0.04	✓
RW-108	C/D 320	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-109	C/D 323	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-110	C/D 326	1756	—	8.50	—	✓

Notes:

1. Feet BTOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. ND = LNAPL not detected using interface probe.
4. NA - Not Available (not able to detect or measure)
5. TRACE, MINOR - Indications of LNAPL present, but no accurate measurement or below measurable amount.
6. During the 10/6/22 Ops Meeting, agreed that wells measured <0.01 ft for 1 yr can be removed from monitoring schedule.

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 43994
Description MiniRAE 3000
Calibrated 1/8/2024 1:42:12PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-925645
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 44

Calibration Specifications

Group # 1
Group Name VOC
Stated Accy Pct of Range

Range Acc % 3.0000
Reading Acc % 0.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	109.8	100.4	0.40%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result *Calibration Successful*
Who Calibrated *Hakam Benlashher*

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building I Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 44106
Description Solinst Pump
Calibrated 1/9/2024 6:20:21PM

Manufacturer Solinst
Model Number Pump
Serial Number/ Lot Number na
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 41

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	30° clear
Date:	1/12/24	Personnel:	GF

Observations

	Time	Observation Description
1	1700	GF onsite
2		· Scope: check system for freeze damage/upgrade to
3		prevent future damage
4		· Safety tailgate: cold stress; slips & trips
5		· System OFF on arrival due to a SVE VFD alarm
6		from earlier in the day. No indication of cause
7		· cycled power to clear the alarm but system
8		still won't restart. Not clear why. VFD worked at
9		· No obvious broken pipes or fittings. No frozen puddles from leaks
10		· transfer pipe btw KOT & poly tank appeared
11		to be full & frozen. couldn't turn ball valves
12		& nothing happened when sample port was opened.
13		Heat trace was cold, not working. 30-40 ft.
14		⇒ need to replace, ideally w/ pipe insulation around it.
15		amps spiked, but no life at either blower.
16		· plan to replace transfer pipe sample port to allow
17		for air compressor blow-out. Isolate pressure gauge
18		w/ mini ball valve & add a quick connect plug.
19	1830	· cleaned up & locked up. System left OFF. will check
20		back when the weather warms.
21		· GF offsite.
22		
23		Added extension cord & new GF
24		heat trace to the KOT sightglass 1/12/24
25		& around the KOT base.

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	45° clear
Date:	1/24/24	Personnel:	GF

Observations

	Time	Observation Description
1	1130	· GF onsit w/ P Kealiher & J Green (AECOM) & B Spangler
2		& J Buddy (P.O.S) & M Collinsworth (M/A)
3		· Scope: System tour / system restart
4		· Safety talkgate: slips trips; crane safety
5		· Gave PoS folks a rundown of the system. It
6		had been OFF since the freeze shutdown
7		on 1/12/24. Fired right up when switched to
8		Auto, so the prior issue resolved itself.
9	1220	· No big questions from PoS. Everyone offsite
10		except GF
11		· Added bushing + 2" ball valve to HOSE -1, -2, & -3
12		at the sump tops.
13		· Checked on new heat trace from last visit & found
14		it cold to the touch - only operates below a certain
15		temp.
16		· Found a motor starter for the transfer pump that
17		needed to be reset, then the pump kicked right
18		back on again.
19		· Noticed the transfer pipe from the VOT came apart
20		at the slip coupler repair from last year during
21		last week's freeze / thaw. Clean, but no puddle,
22		visible on the ground below (asphalt). Called MC
23		who said there were pigs in the conex & to leave
24		them in a bucket for her when I was done. Managed
25		to re-secure the coupling after resetting the compression

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	1/24/24	Personnel:	GF

Observations

	Time	Observation Description
1		ring + cleaning off the pipe. Cleared up the sleeve w/ alcohol at the pigs
2		
3		• Upgraded the transfer pipe sample port. Added
4		a mini ball valve at the pressure gauge. Replaced
5		the mini ball valve at the sample port + finished
6		it w/ an air quick connect fitting so the line
7		can be blown out if needed.
8		• Tried to repair MS VE-2 sample port bc the nipple
9		was cracked + leaking air. Unfortunately, it snapped
10		+ I couldn't extract the halves. Need to order:
11		• 1" Femco coupler,
12		• 1" Slip to 1/4" npt bushing
13		• 1/4" NPT Sch 80 tee
14		• Adj. SVE-6 vac gauge down 4 in wc
15		• After restart, AS was not getting air to 3 of the
16		5 Zone 5 wells, and only 2 scfm at AS-24 and
17		1 scfm at AS-27. Bleed is at its usual
18		1/2-turn open. Even with it fully closed, only
19		getting 1-3 scfm per well. Pressure maxed
20		out only ~10 psi, which normally results in
21		~5 scfm per well?
22	1530	• cleaned up + locked up.
23		-GF= offsite
24		GF
25		1/24/24

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 1/30/24	Field Tech(s): AB		Actual Time: 1130
PID ID: 39786	Weather: 53° rain		HMI Time: 1219
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	23731.5 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.0 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	15575.0 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	15568.5 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/15.5/56.8	Sparge Zone 5 Time Span(s) Operational:	0000-0300, 0500-0800 1000-1300, 1500-1800 2000-2200 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.9/96.0 HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	95°	SVE Blower Dilution Valve (# turns open)	1.2
AS Blower Intake Pressure (" H2O) - *DPI-500*	0	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	6.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	6.7
AS Blower Discharge Pressure (PSI) - *PI-501*	0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	3.5
SVE Blower Inlet Temperature (°F) - *TI-200*	56	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.2
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	59	SVE Blower Discharge Temperature (°F) - *TI-400*	102°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	2.5	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	1/2
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45

NOTES:

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	6.25	0	100	
AS-24	5.75	0	↓	
AS-25	5.5	0		
AS-26	6.5	0		
AS-27	6.5	0		

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Sparge system off

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	1/30/24	Time:	1403
Field Tech(s):	AB	PID ID:	38786
Weather:	52° cloudy		

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	–	55	25	–	Broken sample port	SVE-10	57	10	100	0.5	
HSVE-3	28	60	25	0.2		SVE-9	65	0	100	0.7	Float stuck
SVE-4	59	–	100	0.3	Float broken off rod	SVE-8	0	0	0	3.5	closed
SVE-5	58	0	100	0.2	Float not stuck	SVE-6	55	5	100	0.3	
SVE-7	60	9	100	0.3		HSVE-1	16	48	25	0.4	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	58

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date:	1/30/24	Time:	1408
Field Tech(s):	AB	Pump ID:	38679
Weather:	55 cloudy		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	< 1/4	clear	SVE-10	1/4	dark brown
HSVE-3	< 1/4	clear	SVE-9	< 1/4	light brown
SVE-4	< 1/4	clear	SVE-8	—	closed
SVE-5	1/4	clear	SVE-6	< 1/4	clear
SVE-7	1/4	clear	HSVE-1	1/2	clear

Notes:
No water in back hoses

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	1/30/24	Time:	1503
Field Tech(s):	AB	Weather:	55° cloudy

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	—	55	25	Gauge missing	SVE-10	56	12	100	
HSVE-3	30	56	25		SVE-9	66	0	100	Float stuck
SVE-4	60	—	100	Float off rod	SVE-8	—	—	—	
SVE-5	59	0	100	Float not stuck	SVE-6	49	8	100	
SVE-7	58	0	100	Float not stuck	HSVE-1	16	48	25	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	59

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T30	Location:	Port of Seattle
Project/Task No.:		Weather:	53° rain
Date:	1/30/24	Personnel:	AB

Observations

	Time	Observation Description
1	1037	Arrived on-site, system on upon arrival
2		Safety tailgate - scope: biweekly O&M
3	1100	Waiting out a bit of rain - small
4		system coming in and should pass soon
5	1116	Taking HMI readings
6	1130	Breaking for an hour for other client call
7	1230	Back on-site - taking system readings
8	1320	PID at SVE discharge: 2.5 ppmv
9		Taking zone readings
10	1340	Taking PID readings from wells
11	1408	Begin dewatering
12	1503	Taking final readings and sending to
13		Gus
14	1530	Off-site
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 38679
Description Solinst 410 Reristaltic Pump
Calibrated 1/29/2024 1:44:02PM

Manufacturer Solinst
Model Number 410
Serial Number/ Lot Number 1591
Location Seattle
Department

State Certified
Status Pass
Temp °C 21
Humidity % 45

Calibration Specifications

Group # 1
Group Name
Test Performed: N/A **As Found Result:** **As Left Result:**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 38786
Description MiniRae 3000
Calibrated 1/29/2024 1:00:46PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-919184
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 65

Calibration Specifications

Group # 1
Group Name VOC
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	82.00	100.50	0.50%	Pass

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	46° cloudy
Date:	2/14/24	Personnel:	AB

Observations

	Time	Observation Description
1	1040	Arrived on-site, system on upon arrival
2		Safety tailgate - scope: biweekly O&M
3	1100	Taking HMI readings
4	1115	Taking zone readings while active
5	1120	Taking System readings
6		Recalibrating PID
7		PID reading: 1.5 ppmv
8	1208	Taking well readings and PID readings
9	1249	Dewatering
10	1350	Taking final readings and sending to Gus
11	1420	Attempting to adjust valves to bring
12		more flow to SVE-5
13	1434	No real success - closing up and heading out
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 2/14/24	Field Tech(s): AB		Actual Time: 1100
PID ID: 39399	Weather: 47° cloudy		HMI Time: 1150
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	24688.9 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.0 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	15782.6 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	15775.8 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/15.6/57.2% HMI	Sparge Zone 5 Time Span(s) Operational:	0000-0300, 0500-0900 1000-1300, 1500-1800 2000-2200 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.9/96.4% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	76°	SVE Blower Dilution Valve (# turns open)	1.2
AS Blower Intake Pressure (" H2O) - *DPI-500*	2.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.8
AS Blower Discharge Pressure (PSI) - *PI-501*	8.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5
SVE Blower Inlet Temperature (°F) - *TI-200*	55°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.2
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	59	SVE Blower Discharge Temperature (°F) - *TI-400*	97°
Knockout Tank Level (Sightglass % Full)[1]	25%		
SVE Discharge PID (ppmv)	1.5	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	1/2
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45

NOTES:

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	9.0	4.5	100	
AS-24	8.5	4.0		
AS-25	8.5	2.0		
AS-26	9.5	7.5		
AS-27	9.0	5.0		

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	Time: 1220
Field Tech(s):	PID ID: 39399
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	—	55	25	—	gauge missing	SVE-10	57	18-40	100	0.8	Float bobbing after water cleared - fills back with water
HSVE-3	26	60	25	0.5		SVE-9	64	0	100	0.4	small amounts of pdt in roto - Float not stuck
SVE-4	56	—	100	0.6	float off rod	SVE-8	—	—	—	—	closed
SVE-5	57	0	100	0.6	float not stuck	SVE-6	49	13	100	0.3	
SVE-7	54	12	100	0.7		HSVE-1	15	48	25	0.6	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	59

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date:		Time:	1250
Field Tech(s):		Pump ID:	46330
Weather:			

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	trace	clear	SVE-10	1/2	brown - cleared water in roto
HSVE-3	trace	clear	SVE-9	trace	clear
SVE-4	trace	clear	SVE-8	—	closed
SVE-5	trace	clear	SVE-6	1/4	clear
SVE-7	trace	clear	HSVE-1	1/4	clear

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	Time: 1350
Field Tech(s):	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	–	54	25		SVE-10	53	6-25	100	Float bobbing
HSVE-3	26	61	25		SVE-9	64	–	100	Float not stuck
SVE-4	50	–	100	Float off rod	SVE-8	–	–	–	closed
SVE-5	58	–	100	Float not Stuck	SVE-6	48	11	100	
SVE-7	57	3	100		HSVE-1	15	48	25	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	58

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 46330
Description Solinst Pump
Calibrated 2/12/2024 5:46:22PM

Manufacturer Solinst
Model Number Pump
Serial Number/ Lot Number na
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 40

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Last Cal Date/ Opened Date	Next Cal Date / Expiration Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 39399
Description RAE Sytems MiniRAE 3000 V2.22A
Calibrated 2/12/2024 11:31:14AM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-920293
Location Seattle
Department

State Certified
Status Pass
Temp °C 16
Humidity % 52

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	97.30	100.10	0.10%	Pass

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	40° cloudy
Date:	2/29/24	Personnel:	AB

Observations

	Time	Observation Description
1	0848	Arrived on-site, system on upon arrival
2		Scope: biweekly O&M, safety tailgate
3	0908	Taking HMI readings
4	0917	Taking SVE system readings
5	0938	Taking PID reading of effluent
6		→ 1.9 ppmv
7	0945	Taking PID of well heads, as well as
8		vac and flow readings
9	1020	Taking zone readings now that zone 5
10		is active
11	1030	Begin dewatering
12	1112	Dewatering backside of well heads
13	1147	Taking final system readings
14	1210	Sent data to Gus to discuss
15	1239	Just finished discussing data w/Gus - heading
16		to office to drop off equipment
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 2/29	Field Tech(s): AB		Actual Time: 0912
PID ID: 51778	Weather: 40° cloudy		HMI Time: 1004
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	24445.4 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.0 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	15989.2 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	15982.3 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/16.5/60.6 HMI	Sparge Zone 5 Time Span(s) Operational:	0600-0300, 0300-0800 2000-2200 1000-1300, 1500-1800 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/11.2/98.7 HMI	Sparge Zone Active:	will take reading when 5 is active
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	55°	SVE Blower Dilution Valve (# turns open)	1.2
AS Blower Intake Pressure (" H2O) - *DPI-500*	3.0	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.7
AS Blower Discharge Pressure (PSI) - *PI-501*	9.25	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.0
SVE Blower Inlet Temperature (°F) - *TI-200*	<50°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	66	SVE Blower Discharge Temperature (°F) - *TI-400*	93°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	1.8	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	1/2
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45

NOTES:

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings									
Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2					Zone 4				
AS-7					AS-17				
AS-8					AS-18				
AS-9					AS-19				
AS-10					AS-20				
AS-11					AS-21				
					AS-22				
Zone 3					Zone 1				
AS-12					AS-1				
AS-13					AS-2				
AS-14					AS-3				
AS-15					AS-4				
AS-16					AS-5				
					AS-6				
Zone 5									
AS-23	10	4.5	160						
AS-24	9	4.0							
AS-25	9	1.5							
AS-26	10	4.0							
AS-27	9	4.5							

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	2/29/24	Time:	0945
Field Tech(s):	AB	PID ID:	51778
Weather:	40° cloudy		

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	–	45	25	–	Gauge missing	SVE-10	63	15-25	100	0.5	water in roto
HSVE-3	28	55	25	0.1		SVE-9	72	–	100	0.1	Float stuck
SVE-4	68	–	100	0.2	Float off rod	SVE-8	–	–	–	–	closed
SVE-5	64	0	|	0.1	Float not stuck	SVE-6	56	13	100	0.2	
SVE-7	64	8	|	0.1		HSVE-1	16	50	25	0.5	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	68

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date:	2/24	Time:	1030
Field Tech(s):	AJ	Pump ID:	044106
Weather:	45° cloudy		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	trace	clear	SVE-10	1/2	Brown
HSVE-3	1/4	clear	SVE-9	trace	
SVE-4	1/4	clear	SVE-8	—	closed
SVE-5	1/4	clear	SVE-6	1/3	clear
SVE-7	1/4	clear	HSVE-1	1/4	clear w/some debris

Notes: HSVE-1: 1/2 gal; SVE-6: trace; SVE-8: 2.5 gal; SVE-9: 1.75 gal brown
SVE-10: 1/2 gal very brown, SVE-7: 0 gal; SVE-5: 3/4 gal

Abbreviations: Gal = gallons

AECOM

SVE-4: 1/4 gal HSVE-3: trace HSVE-2: trace

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 2/29/24	Time: 1147
Field Tech(s): AB	Weather: 50° cloudy

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	–	46	25		SVE-10	57	15-25	100	
HSVE-3	26	56	25		SVE-9	70	0	100	Float stuck
SVE-4	67	–	100	float off rod	SVE-8	–	–	0	closed
SVE-5	63	0	100	float not stuck	SVE-6	54	10	100	
SVE-7	57	8	100		HSVE-1	13	64	25	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	606

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 51778
Description MIniRAE 3000_V2.22
Calibrated 2/26/2024 12:41:04PM

State Certified
Status Pass
Temp °C 16
Humidity % 42

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-601748
Location Seattle
Department

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Range

Range Acc % 3.0000
Reading Acc % 0.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	112.10	100.10	0.10%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044 -1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 44106
Description Solinst Pump
Calibrated 2/26/2024 3:55:30PM

Manufacturer Solinst
Model Number Pump
Serial Number/ Lot Number na
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 40

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	44° sunny
Date:	3/14/24	Personnel:	AB

Observations

	Time	Observation Description
1	0945	Arrived on-site, system on upon arrival
2		Safety tailgate, scope: biweekly O&M
3	.	Taking HNU readings
4	1025	Taking system readings
5	1050	Taking zone readings
6		SVE Discharge PID: 1.4 ppmv
7	1105	Taking PID & well head vac & flow readings
8	1143	Begin dewatering
9	1242	Taking post dewatering readings
10	1302	Calling Gus to discuss results
11	1325	Leaving site to drop off equipment
12	1430	Back on site - discussing results w/Gus
13		Changing gauge on HSVE-2
14	1632	Begin gauging wells
15	1821	RW-107, which needed 3 vacs last time,
16		went from 1.32 ft to 0.04 ft of pdt
17	2055	Heading to system to drain poly tank
18	2130	Poly tank drained, vac truck dipped
19		for estimate - closing up and heading
20		home.
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 3/14/24	Field Tech(s): AB		Actual Time: 1039
PID ID: 42510	Weather: 45° sunny		HMI Time: 1031
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	24779.5 HMI	Sparge Zone 1 Time Span(s) Operational:	– HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.0 HMI	Sparge Zone 2 Time Span(s) Operational:	– HMI
AS Blower Runtime (Hours) - *Sparge Blower*	16183.3 HMI	Sparge Zone 3 Time Span(s) Operational:	– HMI
AS Heat Exchanger Runtime (Hours)	16176.1 HMI	Sparge Zone 4 Time Span(s) Operational:	– HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/16.2/59.9% HMI	Sparge Zone 5 Time Span(s) Operational:	0000-0300, 0500-0800 1000-1300, 1500-1800 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.8/95.8% HMI	Sparge Zone Active:	2000-2200 5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	66°	SVE Blower Dilution Valve (# turns open)	1.2
AS Blower Intake Pressure (" H2O) - *DPI-500*	3.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.7
AS Blower Discharge Pressure (PSI) - *PI-501*	9.0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.0
SVE Blower Inlet Temperature (°F) - *TI-200*	58°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.2
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	64	SVE Blower Discharge Temperature (°F) - *TI-400*	103°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	1.4	Treated Vapor Discharge PID (ppmv)[2]	–
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	–	SVE Compressor Oil Level[3] (% full sightglass)	–
DTF in Storage Tank (ft)	–	WD in Storage Tank[4] (ft)	1/2
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45
NOTES:			

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	9.5	4.5-5.5	100	Float bobbing
AS-24	8.5	3.5-6.0		↓
AS-25	8.0	1.5		
AS-26	9.5	4.5		
AS-27	9.0	5.0	↓	

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 3/14/24	Time: 1105
Field Tech(s): AB	PID ID: 42510
Weather: 45° sunny	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	—	46	25	—	gauge missing	SVE-10	59	8-16	100	0.8	Float bobbing
HSVE-3	23	56	25	0.3		SVE-9	70	—	100	0.3	Float not stuck Pdt in roto
SVE-4	58	—	100	0.5	Float off rod	SVE-8	—	—	—	—	closed
SVE-5	60	0	|	0.3	Float not stuck	SVE-6	52	9	100	0.2	
SVE-7	59	10-20	|	0.3	Float bobbing Water in roto	HSVE-1	15	50	25	1.2	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	0.3

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30

SVE Manifold Readings (2 of 3)

Date:	3/14/24	Time:	1150
Field Tech(s):	AB	Pump ID:	044106
Weather:	50° sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/4	clear	SVE-10	1/3	brown
HSVE-3	< 1/4	clear	SVE-9	1/4	murky
SVE-4	1/4	clear	SVE-8	-	closed
SVE-5	< 1/4	clear	SVE-6	1/4	clear
SVE-7	1/3	clear	HSVE-1	1/3	clear

Notes: No water in back side hoses

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	3/14/24	Time:	1257
Field Tech(s):	AB	Weather:	50° sunny

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	–	45	25		SVE-10	56	10-20	100	
HSVE-3	20	55	25		SVE-9	64	–	〃	Float not stuck
SVE-4	52	–	100	Float off rod	SVE-8	–	–	–	closed
SVE-5	54	17	〃		SVE-6	44	7	25	
SVE-7	52	12-15	〃	water in roto	HSVE-1	15	47	〃	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	58

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 42510
Description RAE MiniRAE 3000
Calibrated 3/12/2024 1:58:02PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-925245
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 45

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	113.5	100.3	0.30%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 44106
Description Solinst Pump
Calibrated 3/13/2024 1:28:29PM

Manufacturer Solinst
Model Number Pump
Serial Number/ Lot Number na
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 34

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result:** Pass **As Left Result:** Pass

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	48° cloudy
Date:	3/28/24	Personnel:	AB

Observations

	Time	Observation Description
1	0900	Arrived on-site, system on upon arrival
2		Safety tailgate, scope: biweekly O&M
3		Oil sheen observed inside and outside
4		of fence - pictures taken
5	0920	Taking HMI readings
6		Waiting for sparge V to turn on before
7		taking readings V for AS
8	0940	Taking system readings
9	1000	Taking zone readings now that AS
10		is on - no flow in roto - going to
11		wait til zone has been on longe
12		SVE discharge PID: 1.8 ppmV
13	1011	Zone rotometers flowing - taking rest
14		of HMI, zone, and system readings
15	1017	Taking PID readings
16	1048	Taking rest of readings from well heads
17	1103	Begin dewatering
18	1129	Dewatering back side of well heads
19	1222	Taking final readings
20	1247	Taking summa can air sample w/Gus
21	1325	Zone 5 pressure gauges reading 6.5-7.5
22		when system off V V
23	1427	Finished quarterly maintenance tasks
24		Repaired sample port on HSVE-2, redid
25		KO tank heat trace to match manufacture

Comments / Site Activities / Personnel Tracking

No cal docs for Pine equipment

DAILY FIELD LOG

Project Information Page _____ of _____

Project Name:		Location:	
Project/Task No.:		Weather:	
Date:		Personnel:	

Observations

	Time	Observation Description
1	1425	Marine maintenance, installed heat trace
2		needs contact w/pipe
3		Attempted to fix SVE-4 rotometer - top
4		nipple was found to be broken upon disassembly
5		Could not remove broken nipple - closed SVE-4
6	1435	System restarted
7		Leaving to drop off air sample & pick
8		equipment
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

AECOM

T-30 Summa Can Vapor Sampling Field Form

Project: Terminal 30 Site Address: 1901 East Marginal Way South, Seattle, WA

Date: 3/28/24 Field Personnel: AB, GF

Weather: 50° cloudy Weather Barometric Pressure (in Hg): 29.7

Sample ID: SVE-EFF-032824 (INLET/DISCHARGE-mmddyy)

Sample Port Description: SVE effluent

Conditions at Sample Port:

Pressure (PSI)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.0	100	1.8	25108.1

Before Sampling:

	Yes or No (Y/N)
Install clean tubing on the sample port	Y
Purge the tubing (30-60 seconds)	Y

Summa Can Leak Test[1]:

Initial Canister Reading (in-Hg)	Duration of Test (2 min recommended)	Final Canister Reading (in-Hg)
>30	2 min	>30

[1] For the summa can leak test, connect the flow controller to the can with the cap nut secured. No air should enter the can when the can valve is opened. Once this is confirmed, open the summa can valve and record the initial vacuum. Wait for two minutes and then record the vacuum again. If the two readings do not match there is a leak and a new can and valve should be acquired before sampling.

Sampling Information[2]:

Sample Canister LAB ID	Flow Controller LAB ID	Sample Canister Size	Initial Canister Reading (in-Hg)[3]	Sample Times	Sample Date(s)	Final Canister Reading (in-Hg)[3]
3347	71	1L	>30	Sample Start: 1247	3/28	5
Analyses Requested: TO15-GBTEX, APH				Sample End: 1252	3/28	

[2] The flow controller should be for a 4-5 minute integrated sample

[3] Canisters measured using a standard vacuum gauge

Sample Collection Notes and General Observations:

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 3/28/24	Field Tech(s): AB		Actual Time: 0925
PID ID: 39399	Weather: 48° cloudy		HMI Time: 0916
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	25108.1 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.0 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	16374.6 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	16367.3 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/16.0/58.0% HMI	Sparge Zone 5 Time Span(s) Operational:	0000 - 0300, 0500 - 0400 1000 - 1300, 1500 - 1800 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.7/94.4% HMI	Sparge Zone Active:	2000 - 2200 5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	84°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	3.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.9
AS Blower Discharge Pressure (PSI) - *PI-501*	9.25	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.5
SVE Blower Inlet Temperature (°F) - *TI-200*	58°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.0
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	62	SVE Blower Discharge Temperature (°F) - *TI-400*	100°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	1.8	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	—
Water Volume in Storage Tank[5] (gal)	—	Spare Volume to LAH float[6] (gal)	—
NOTES:	Storage tank recently emptied		

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	9.5	6.5	100	
AS-24	9.0	4-5.5		
AS-25	8.5	1.5		
AS-26	10.0	5-6		
AS-27	9.0	5		

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	3/25	Time:	1048
Field Tech(s):	AB	PID ID:	39399
Weather:	48° Cloudy		

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	—	46	25	—		SVE-10	58	24	100	0.5	
HSVE-3	25	57	25	0.2		SVE-9	69	0	1	0.1	Pdt in roto
SVE-4	57	-	100	6.2	Float off rod	SVE-8	—	—	—	—	closed
SVE-5	62	5	1	0.1		SVE-6	52	12	100	0.1	water in roto
SVE-7	51	24	1	6.0	water in roto	HSVE-1	14	50	25	0.3	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	65

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date:	3/28/24	Time:	1103
Field Tech(s):	AB	Pump ID:	38679
Weather:	48° cloudy		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	<1/4	clear	SVE-10	1/4	brown, bits of debris
HSVE-3	trace	clear	SVE-9	1/4	brown
SVE-4	1/2	clear	SVE-8	–	closed
SVE-5	<1/4	clear	SVE-6	1/3	clear
SVE-7	1/2	clear	HSVE-1	1/3	clear

Notes: 1: trace, 6: <1/4 clear, 9: 2 1/2 gal brown, 10: 1 1/2 gal brown
2: 1/2 gal, 3: 1/4, 4: 1/4

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	3/28/24	Time:	1222
Field Tech(s):	AB	Weather:	50° rainy

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	17	47	25	gauge replaced	SVE-10	60	12	50	
HSVE-3	26	55	25		SVE-9	68	-	100	Float stuck Pdt in roto
SVE-4	52	-	100	Float off rod	SVE-8	—	-	—	closed
SVE-5	59	23	100	Float bobbing	SVE-6	50	10	100	
SVE-7	56	27	100	water in roto	HSVE-1	14	50	25	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	64

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
Megger Testing of Motor Windings

Field Tech(s): AB, GF
Date: 3/28/24
Equipment ID: _____

Baseline Readings (See Note 2)					
	Motor	**AS Compressor**		**SVE Blower**	
Motor Wires	Date	Winding Resistance (Ohms)	Insulation Resistance (Megaohms)	Winding Resistance (Ohms)	Insulation Resistance (Megaohms)
G & B	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
G & O	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
G & Y	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
B & O	N/A	NM	N/A (0.00)	NM	N/A (0.00)
O & Y	N/A	NM	N/A (0.00)	NM	N/A (0.00)
B & Y	N/A	NM	N/A (0.00)	NM	N/A (0.00)

Legend:
G= Ground Wire
B= Brown Wire
O= Orange Wire
Y= Yellow Wire
N/A= Not applicable

Notes:
1 These tests check for a breakdown of insulation within the internal motor windings over time. Use a Megger Model MIT 220.
2 Baseline data is unavailable. Testing was not conducted by CRETE and readings were only initiated once issues with the AS motor were identified.
3 Insulation resistance testing was completed between winding phase at 500 volts over approximately 30 seconds
4 >1,000 Mohm readings generally means you have an open curcuit
5 0.00 Mohm readings mean that the phase being tested is shorted to Ground
6 Ideally the phase-to-phase winding resistance readings between each phase should be the same or at least very close
7 Phase-to-phase winding resistance readings should not be 0 ohms (i.e. short) or OL (overload) or infinity
8 Generally high resistance readings (greater than 10 Mohms) indicate the motor insulation is good

Motor	**AS Compressor Motor**						Comments
Test	**Winding Resistance**			**Insulation Resistance**			
Motor Wires	B & O	O & Y	B & Y	G & B	G & O	G & Y	
Date/Time	(Ohms)	(Ohms)	(Ohms)	(Megaohms)	(Megaohms)	(Megaohms)	
Baseline	N/A	N/A	N/A	N/A	N/A	N/A	
	1.75	1.75	1.75	0.11	0.12	0.12	

Motor	**SVE Blower Motor**						Comments
Test	**Winding Resistance**			**Insulation Resistance**			
Motor Wires	B & O	O & Y	B & Y	G & B	G & O	G & Y	
Date/Time	(Ohms)	(Ohms)	(Ohms)	(Megaohms)	(Megaohms)	(Megaohms)	
Baseline	N/A	N/A	N/A	N/A	N/A	N/A	
	0.94	0.95	0.94	0.11	0.11	0.12	

AECOM

SAMPLE CHAIN OF CUSTODY

Report To Paul Kalina
Company AECOM
Address 1111 Third Avenue, #1600
City, State, ZIP Seattle, WA 98101
Phone 206-310-5097 Email paul.kalina@aecom.com

SAMPLERS (signature) Austin Bragg
PROJECT NAME & ADDRESS T-30
PO #
NOTES:
INVOICE TO

Page # 1 of 1

TURNAROUND TIME
(Standard)
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
(Default: Clean following final report delivery)
Hold (Fee may apply):

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium	TO15 - GBTEX	Notes
SVE-EFF-032824		3347	71	IA / (SG)	03/28/24	730	1247	5	1252				X		X	
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Austin Bragg	Austin Bragg	AECOM	3/28/24	1455
Received by: Nhan Phan	Nhan Phan	FEBI	3/28/24	1455
Relinquished by:				
Received by:				

FORMS\COC\COCTO-15.DOC

Field Tech(s): _____

Date: _____

T-30 Quarterly O&M Checklist

REGULAR TASKS

System ON:

- [x] Zero out mag gauges
- [ ] Confirm mag gauges w/ a manometer
- [x] Test AS pressure gauge accuracy (turn zone on and off. All gauges should equilibrate)
- [ ] If possible: Check AS pressure on individual well heads in the well field and compare to readings at the manifold

System OFF:

- [x] Test poly tank float switches
- [x] Test KO tank float switches
- [x] Check SVE vac gauges for zeroing
- [x] Scrub out KOT sightglass
- [ ] Check particulate filter housing for water accumulation. Empty if needed. Visually inspect filter.
- [x] Megger test SVE & AS motors
- [x] Clean out any garbage/weeds from the system area
- [x] LOTO electrical and tighten wire lugs/terminals on all control and electrical connections inside cabinet
- [x] Exercise all valves (open valves normally closed and then return to original position)

EXTRA TASKS

- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____

AECOM

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	52° cloudy
Date:	4/9/24	Personnel:	AB

Observations

	Time	Observation Description
1	1143	Arrived on-site, system on upon arrival
2		Safety tailgate, Scope: biweekly O&M
3	1203	Taking HMI readings
4	1215	Taking System readings
5		Effluent PID: 2.1 ppmv
6	1240	Taking zone readings
7	1254	Taking wellhead readings
8	1305	Taking wellhead PID readings
9	1330	Begin dewatering
10	1415	Taking final readings
11		Sent forms to Gus for review
12	1443	Closing up and dropping off equipment
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 4/9/24	Field Tech(s): AB		Actual Time: 1221
PID ID: 29604	Weather: 52° cloudy		HMI Time: 1210
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	25372.9 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.0 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	16530.1 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	16522.7 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/16.1/59.7% HMI	Sparge Zone 5 Time Span(s) Operational:	0000-0300, 0500-0800 1000-1300, 1500-1800 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.5/92.2% HMI	Sparge Zone Active:	5 2000-2200
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	77°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	3.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.0
AS Blower Discharge Pressure (PSI) - *PI-501*	8.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.0
SVE Blower Inlet Temperature (°F) - *TI-200*	60°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.0
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	64	SVE Blower Discharge Temperature (°F) - *TI-400*	105°
Knockout Tank Level (Sightglass % Full)[1]	35%		
SVE Discharge PID (ppmv)	2.1	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	—
Water Volume in Storage Tank[5] (gal)	—	Spare Volume to LAH float[6] (gal)	—

NOTES:

Tank emptied recently during vac event - trace liquid visible

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	9.0	4	100	
AS-24	6.5	4		
AS-25	6.0	2.5		
AS-26	9.5	4		
AS-27	6.75	5.5		

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	4/9/24	Time:	1253
Field Tech(s):	AB	PID ID:	29604
Weather:	52° cloudy		

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	17	47	25	1.9		SVE-10	62	10-20	100	0.6	Float bobbing
HSVE-3	28	58	25	0.4		SVE-9	72	–	100	0.5	Float NOT Stuck Pdt in roto
SVE-4	64	13	100	0.6		SVE-8	–	–	0	–	closed
SVE-5	64	11	↓	0.5		SVE-6	58	14	100	0.5	
SVE-7	61	17	↓	0.4	water in roto	HSVE-1	16	50	25	1.4	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	67

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30

SVE Manifold Readings (2 of 3)

Date:	4/a/24	Time:	1335
Field Tech(s):	AB	Pump ID:	46330
Weather:	Rain 50°		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	<1/4	clear	SVE-10	1/2	brown
HSVE-3	<1/4	clear	SVE-9	<1/4	brown
SVE-4	1/4	clear	SVE-8	—	closed
SVE-5	<1/4	clear	SVE-6	1/4	clear
SVE-7	1/3	clear	HSVE-1	1/4	clear

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	4/9/24	Time:	1420
Field Tech(s):	AB	Weather:	52° cloudy

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	18	47	25		SVE-10	64	10-20	100	Float bobbing
HSVE-3	29	58	↓		SVE-9	74	—	100	Float stuck pdt in rota
SVE-4	64	14	100		SVE-8	—	—	—	closed
SVE-5	66	0-20	↓	Float bobbing	SVE-6	58	15	100	
SVE-7	68	10	↓		HSVE-1	14	52	25	
Dilution Valve		# Turns Open:		1					
		Vacuum ("H2O):		68					

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 46330
Description Solinst Pump
Calibrated 4/8/2024 10:40:48AM

Manufacturer Solinst
Model Number Pump
Serial Number/ Lot Number na
Location Seattle
Department

State Certified
Status Pass
Temp °C 15
Humidity % 40

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated *Dzung Pham*

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 29604
Description RAE MiniRAE 3000
Calibrated 4/8/2024 11:23:44AM

State Certified

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-913168
Location Seattle
Department

Status Pass
Temp °C 16
Humidity % 43

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	91.0	100.3	0.30%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044 -1	8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	54° cloudy
Date:	4/24/24	Personnel:	AB

Observations

	Time	Observation Description
1	1130	Arrived on-site, scope: biweekly O&M
2		Safety tailgate - System on upon arrival
3	1155	Taking HMI readings
4	1205	Taking system readings
5	1225	~~Effluent~~ PID reading: 2.9 ppmV
6		Taking zone readings
7		
8	1230	Taking rest of PID readings at wells
9		Restarting PID after several zero readings
10		Tried multiple bags - still getting zeroes
11	1250	Taking rest of readings at well heads
12	1255	Begin dewatering
13	1335	Taking final readings and sending to Gus
14		to discuss
15		We decided to leave the wells as is until
16		we have more data from PID
17	1400	closing down and dropping off equipment
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 4/24/24	Field Tech(s): AB		Actual Time: 1135
PID ID: 42510	Weather: 54° cloudy		HMI Time: 1146
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	25704.0 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.0 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	16721.6 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	16713.9 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/16.5/61.4% HMI	Sparge Zone 5 Time Span(s) Operational:	0000-0500, 0500-0800, 1000-1300, 1500-1900 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.4/91.3% HMI	Sparge Zone Active:	2000-2200 5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	75°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	3.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.9
AS Blower Discharge Pressure (PSI) - *PI-501*	8.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	4.0
SVE Blower Inlet Temperature (°F) - *TI-200*	66°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.0
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	66	SVE Blower Discharge Temperature (°F) - *TI-400*	106°
Knockout Tank Level (Sightglass % Full)[1]	90%		
SVE Discharge PID (ppmv)	2.9	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	1/2
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45
NOTES:			

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	9	4	100	
AS-24	8.5	4.5		
AS-25	7.5	2.5		
AS-26	9.5	3.5		
AS-27	8.5	5.5		

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	4/24/24	Time:	1230
Field Tech(s):	AB	PID ID:	42510
Weather:	55° cloudy		

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	14	49	25	0.4		SVE-10	65	10-25	100	0.1	Float bobbing
HSVE-3	22	62	↓	0.0		SVE-9	70	0	100	0.0	Float not stuck - pdt in roto
SVE-4	60	10-25	100	0.0	Float bobbing	SVE-8	—	—	—	—	closed
SVE-5	59	0-20	↓	0.0	Float bobbing	SVE-6	53	10-25	100	0.0	Float bobbing
SVE-7	62	15-20	↓	0.0	Float bobbing	HSVE-1	12	43	25	0.4	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	66

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date:	4/24/24	Time:	1255
Field Tech(s):	AB	Pump ID:	46330
Weather:	55° cloudy		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	<1/4	clear	SVE-10	1/4	brown
HSVE-3	<1/4	clear	SVE-9	<1/4	brown, cloudy
SVE-4	1/4	clear	SVE-8	–	closed
SVE-5	1/4	clear	SVE-6	1/4	clear
SVE-7	1/3	clear	HSVE-1	<1/4	Clear

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	4/24/24	Time:	1335
Field Tech(s):	AB	Weather:	54° cloudy

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	14	46	25		SVE-10	61	10-25	100	Float bobbing
HSVE-3	22	61	25		SVE-9	68	0	"	Float not stuck
SVE-4	58	10-25	100	Float bobbing	SVE-8	—	—	—	closed
SVE-5	63	0-20	"	Float bobbing	SVE-6	54	10-25	100	
SVE-7	59	16	"		HSVE-1	12	44	25	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	65

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 42510
Description RAE MiniRAE 3000
Calibrated 4/22/2024 1:35:18PM
Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-925245
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 34

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	98.0	100.1	0.10%	Pass

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402321612-1	Isobutylene (C4H8) 100 PPM	Airgas	31721	304-402321612-1		12/29/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 46330
Description Solinst Pump
Calibrated 4/23/2024 10:56:11AM

Manufacturer Solinst
Model Number Pump
Serial Number/ Lot Number na
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 36

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated *Dzung Pham*

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	63° sunny
Date:	5/9/24	Personnel:	IAB

Observations

	Time	Observation Description
1	1045	Arrived on-site, safety tailgate
2		Scope: biweekly O&M, system on upon arrival
3	1105	Taking HMI readings
4	1115	Taking system readings
5	1140	SVE effluent PID: 3.5 ppmv
6	1150	Taking zone readings
7	1200	Taking well head PID readings
8	1235	Taking rest of well head readings
9	1250	Begin dewatering
10	1315	Dewatering back side of well heads
11	1430	Had to step out for one hour for meeting
12		& back to dewatering
13	1455	Taking final system readings and
14		sending to GUS
15	1508	closed up and headed to office to
16		drop equipment
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 5/9/24	Field Tech(s): AB		Actual Time: 1110
PID ID: 41369	Weather: 63° sunny		HMI Time: 1059
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	26052.6 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.1 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	16924.3 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	16916.4 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/16.2/59.4% HMI	Sparge Zone 5 Time Span(s) Operational:	0000-0800, 0500-0800, 1000-1300, 1500-1800 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.3/90.6% HMI	Sparge Zone Active:	2000-2200 5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	86°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	3.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.0
AS Blower Discharge Pressure (PSI) - *PI-501*	8.0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	3.0
SVE Blower Inlet Temperature (°F) - *TI-200*	73°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.0
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	65	SVE Blower Discharge Temperature (°F) - *TI-400*	117°
Knockout Tank Level (Sightglass % Full)[1]	50%		
SVE Discharge PID (ppmv)	3.5	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	1/2
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45

NOTES:

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	8.5	4.5	100	
AS-24	8.0	4.75		
AS-25	6.5	2.5		
AS-26	9.0	4.0		
AS-27	8.5	5.5		

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume

PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30

SVE Manifold Readings (1 of 3)

Date:	5/9/24	Time:	1210
Field Tech(s):	AB	PID ID:	41369
Weather:	65° sunny		

****Instructions**: Take readings down **PRIOR** to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	16	50	25	1.4		SVE-10	62	10-35	100	0.9	Float bobbing
HSVE-3	23	60	1	0.3		SVE-9	68	0	1	0.3	Float not stuck
SVE-4	66	39	100	0.4		SVE-8	—	—	—	—	closed
SVE-5	57	10-25	1	0.4	water in roto	SVE-6	49	11	100	0.4	
SVE-7	64	15-20	1	0.3	Float bobbing	HSVE-1	13	43	25	2.9	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	65

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30

SVE Manifold Readings (2 of 3)

Date:	5/9/24	Time:	1248
Field Tech(s):	AB	Pump ID:	487944
Weather:	67° sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/4	clear	SVE-10	1/3	cloudy
HSVE-3	<1/4	clear	SVE-9	1/4	brown, cloudy
SVE-4	1/4	clear	SVE-8	–	closed
SVE-5	1/4	clear	SVE-6	1/3	clear
SVE-7	1/2	clear	HSVE-1	1/3	clear

Notes: HSVE-1: <1/4, SVE-6: Ø, SVE-9: 2.75 gal (brown, then clear) SVE-10: 1.5 gal HSVE-2: <1/4 gal, HSVE-3: Ø, SVE-4: 1 gal, SVE 5: 1.5 gal SVE-7: 1.5 gal

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	5/9/24	Time:	1455
Field Tech(s):	AB	Weather:	67° sunny

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	15	50	25		SVE-10	56	17	100	
HSVE-3	22	60	1		SVE-9	67	0	1	Float not stuck
SVE-4	56	35	100		SVE-8	—	—	—	closed
SVE-5	60	10	1		SVE-6	52	16	100	
SVE-7	53	13	1		HSVE-1	12	44	25	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	63

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 48794
Description Solinst Peristaltic Pump
Calibrated 5/8/2024 11:05:05AM

Manufacturer Solinst
Model Number 410
Serial Number/ Lot Number 266696
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 39

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated *Dzung Pham*

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St
Building I Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 41369
Description MIniRae 3000
Calibrated 5/7/2024 4:38:45PM

Manufacturer Rae Systems
Model Number PGM 7320
Serial Number/ Lot Number 592-922375
Location Seattle
Department

State Certified
Status Pass
Temp °C 21
Humidity % 39

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	0.0	100.1	0.10%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402235157-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066			11/16/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle SODO
Project/Task No.:		Weather:	Cloudy 57°
Date:	5/23/24	Personnel:	GF, JC

Observations

	Time	Observation Description
1	0930	· GF onsite, JC already here
2		· Scope: biweekly O+M
3		· Safety tailgate - STF, pressurized systems
4		sitework for JC - 1st time here
5		· Begin collecting O+M readings, dewatering, etc.
6		Minimal water production, but water in several
7		rotameters. < 1K gal collected from dead legs & laterals.
8		Poly tank had ~3 in water in it.
9		- PID @ effluent was 0.6 ppmv.
10		- PID max @ header was SVE-2 (3.2 ppmv)
11		- SVE-9 & -10 rotameters very dirty
12		- Significant bounce in SVE-10, totally flattened
13		bottom bumper. Bounce remained, may be slightly
14		less so, even after dewatering dead leg & laterals.
15	1300	- System shut down for rotameter repairs
16		· SVE-10 taken apart. Appears that the float banging was
17		severe enough to have cracked the clear casing. Will
18		need a full replacement. In the meantime, we were able
19		to clean the inside & reinstall as it was. The pressure from
20		the fittings on each end are enough to hold it in place
21		& allow for operation.
22		· Took apart SVE-4. Not sure why the rod dislocated again.
23		Cleaned it out & put back together. Appears fine.
24		· Took apart SVE-5. bottom bumper squished & needed
25		replacing. Float also needed replacing, bottom hole was

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle 5050
Project/Task No.:		Weather:	partial sun 62°
Date:	5/23/24	Personnel:	GF, JC

Observations

	Time	Observation Description
1		eroded out a bit.
2	~~**~~	>> only 1 spare float left. Good on all other
3		spare parts.
4	1400	· System restarted.
5		· Tied glove around crack in SVE-10 to limit leak
6		· Tried opening SVE-8 but immediately filled w/ water
7		· No adjustments made to any wells
8		· Cleaned up site & locked up gate
9	1430	· GF & JC offsite
10		
11		
12		
13		
14		
15		GF
16		5/23/24
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 5/23/24	Field Tech(s): Jonathan Cronk & Gus Friedman		Actual Time: 10:04
PID ID:	Weather: Cloudy		HMI Time: 9:51
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	26383.8	Sparge Zone 1 Time Span(s) Operational:	OFF
Transfer Pump Runtime (Hours) - *MS Pump*	8.1	Sparge Zone 2 Time Span(s) Operational:	OFF
AS Blower Runtime (Hours) - *Sparge Blower*	17253.5	Sparge Zone 3 Time Span(s) Operational:	OFF
AS Heat Exchanger Runtime (Hours)	17245.6	Sparge Zone 4 Time Span(s) Operational:	02:30-06:00, 08:30-12:00, 14:30-18:00, 20:30-00:00
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/16.2/59	Sparge Zone 5 Time Span(s) Operational:	23:30-03:00, 05:30-09:00, 11:30-15:00, 17:30-21:00
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52/10.5/92	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	76°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	3.75	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.0
AS Blower Discharge Pressure (PSI) - *PI-501*	8.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	~~4? Gauge drift?~~ JC ? backpressure
SVE Blower Inlet Temperature (°F) - *TI-200*	68°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	JC ~~2~~ 3.0
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	68	SVE Blower Discharge Temperature (°F) - *TI-400*	112
Knockout Tank Level (Sightglass % Full)[1]	90		
SVE Discharge PID (ppmv)	0.8	Treated Vapor Discharge PID (ppmv)[2]	NA
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		SVE Compressor Oil Level[3] (% full sightglass)	
DTF in Storage Tank (ft)	6.6	WD in Storage Tank[4] (ft)	0.32
Water Volume in Storage Tank[5] (gal)	85.3	Spare Volume to LAH float[6] (gal)	917.5
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23				
AS-24				
AS-25				
AS-26				
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8	3.7	100	
AS-18	8.5	0	100	
AS-19	8	1.4	100	
AS-20	8.5	3.7	100	
AS-21	5.5	1.0	100	
AS-22	8.3	2.6-32	100	
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 5/23/24	Time: 1100
Field Tech(s): Jonathan C. & Gus F.	PID ID: 045294
Weather: Cloudy, 59°	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	18	49	20	3.2	-	SVE-10	66	20*	100	0.4	Rotometer bottoming out while bouncing & brown cake on walls
HSVE-3	26	60	40	0.8	-	SVE-9	70	0	100	0.1	Rust-colored cake on rotometer, (not stuck)
SVE-4	45	Rotameter broken	100	0.4	Rotometer rod got offset again	SVE-8	-	-	0	-	Off
SVE-5	60	10*	100	0.2	Rotometer bouncing & filled with water	SVE-6	56	15	100	0.4	-
SVE-7	68	15*	100	0.1	Rotometer unstable & some water	HSVE-1	13	44	20	0.3	-

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	68

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 5/23/24	Time: 1130
Field Tech(s): GF & JC	Pump ID: 388679
Weather: 57 cloudy	

SVE Dewatering

Well ID	Dewater (Gal)	Deadleg stub-up (gal)	Comments	Well ID	Dewater (Gal)	Lateral stub-up (gal)	Comments
HSVE-2	0.25	<0.25		SVE-10	0.5	<0.25	
HSVE-3	0.25	0.25		SVE-9	0.5	2.25	Stub up water slightly emulsified (cloudy, sheen) Deadleg also emulsified.
SVE-4	0.25	0.25		SVE-8	NM	NM	
SVE-5	0.25	1.75		SVE-6	0.25	NM	
SVE-7	<0.25	3.25		HSVE-1	<0.25	0.25	

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 5/23/24	Time: 13:30
Field Tech(s): Jonathan C. & Gus F.	Weather: Partly Cloudy

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	22	60	20		SVE-10	39	6-15	100	
HSVE-3	26-32	60	40		SVE-9	52	0	100	
SVE-4	44	14	100		SVE-8	—	~~off~~	—	
SVE-5	35	JC ~~47~~	100		SVE-6	34	14	100	
SVE-7	32	18	100		HSVE-1	8	45	30	

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 38679
Description Solinst 410 Reristaltic Pump
Calibrated 5/21/2024 1:33:48PM

Manufacturer Solinst
Model Number 410
Serial Number/ Lot Number 1591
Location Seattle
Department

State Certified
Status Pass
Temp °C 22
Humidity % 33

Calibration Specifications

Group # 1
Group Name
Test Performed: N/A **As Found Result:** **As Left Result:**

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 45294
Description MIniRAE 3000
Calibrated 5/22/2024 12:59:20PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-927290
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 44

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Range

Range Acc % 3.0000
Reading Acc % 0.0000
Plus/Minus 0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100 / 100	PPM	100	PPM	94	100	0.10%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	64° Sun
Date:	6/7/24	Personnel:	GF, JC

Observations

	Time	Observation Description
1	0915	- GF & JC on site
2		- Scope: 2Q O&M w/ vapor Sample
3		- Safety Tailgate: traffic STF, pinch points, pressure
4	0945	- Initiated O&M reading collection
5	1020	- Tried to use vapor pump but no power appears to be a
6		GFCI issue - blinks red when TEST button is pushed. Cycled
7		power to try to clear it but no luck. Talked w/ P Kaling
8	**	& will ask Marina to replace it. Will forego the
9		header readings today. can still get readings & sample
10		from the effluent (no pump needed).
11		- Replaced the 6 Zone 4 rotameters. AS Compressor
12		OFF.
13	1200	- Replacements complete. AS compressor back ON. Leak
14		check complete.
15	**	→ remaining task to add extra strut for top
16		support. Ask Marina.
17	1230	- Set up for vapor sample. SVE-EFF-060724.
18		- discharge PID = 1.1 ppmv
19	1302	- Sample collected.
20	1320	- Dewatering SVE ~~manifold~~ Stub-ups / laterals
21		-SVE-7 & -10 had 1.75 + 1.25 gal, respectively
22	1400	- Dewatering SVE manifold. Leak observed from #SVE-1
23		dead leg drain port tap. Tapped hole wasn't done well & is
24		bigger than the pipe - Several seem to be the same. Will
25		bring some putty next time to try & seal it up.

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-20	Location:	
Project/Task No.:		Weather:	
Date:	6/7/24	Personnel:	GF JC

Observations

	Time	Observation Description
1		• SVE-10 has flattened its bottom bumper again.
2		won't fix until new tube comes in to replace broken
3		one.
4		→ water came back into rotameter immediately
5		after pumping lateral & deadleg. Maybe triggered
6		by clearing the rotameters via back ball valve?
7		→ pumped lateral again, this time fluctuating vacuum
8		at the deadleg BV. Got 3.5 add'l gal from the lateral
9		plus a significant amt coming through the rotameter.
10		Eventually got it seemingly dry after 5-10 min.
11		No more float bounce or moisture in rotameter.
12		• 20 tanks System turned OFF
13		- Sensors tested, all good
14		- VOT sightglass cleaned
15		- mag gauges zeroed. SVE pitot gauge had
16		drifted ~0.15" wc high.
17		- Vac gauges checked. Pressure gauges checked. None
18		needed replacing
19		- Megger test completed w/ power deenergized
20	1505	• System reenergized & restarted.
21		• Final SVE measurements taken. All dry & good.
22		• Clean up & secure site
23	1530	• GF & JC offsite.
24		
25		GF 6/7/24

Comments / Site Activities / Personnel Tracking

** Algae / biogrowth observed in poly tank secondary containment. Photos taken. Reach out to Marina re next steps

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 6/7/24	Field Tech(s): GF & SC		Actual Time: 0947
PID ID:	Weather: 64° Sun		HMI Time: 0936
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	26738.4	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.1	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	17608.1	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	17600.2	Sparge Zone 4 Time Span(s) Operational:	0230-0600; 0830-1200; 1430-1800; 2030-0000
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/15.3A/56.5%	Sparge Zone 5 Time Span(s) Operational:	2330-0300; 0530-0900 1130-1500; 1730-2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.6A/43.2%	Sparge Zone Active:	4
SVE/AS System Settings & Readings	A2010 motor overload flashing		
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	90	SVE Blower Dilution Valve (# turns open)	0.5
AS Blower Intake ~~Pressure~~ VAC (" H2O) - *DPI-500*	4.0	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	1.0
AS Bleed Valve (# turns open)	1/2	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.35
AS Blower Discharge Pressure (PSI) - *PI-501*	8.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.0 (pipe full)
SVE Blower Inlet Temperature (°F) - *TI-200*	70	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.2
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	57	SVE Blower Discharge Temperature (°F) - *TI-400*	112°
Knockout Tank Level (Sightglass % Full)[1]	25		
SVE Discharge PID (ppmv)	1.1	Treated Vapor Discharge PID (ppmv)[2]	N/A
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		SVE Compressor Oil Level[3] (% full sightglass)	
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	0.5
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

6/7/24
GF, JC

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				1525
AS-23	8.5	5.5	100	
AS-24	8.0	5.25	↓	
AS-25	~~8.0~~ 8.5	2.5	↓	
AS-26	8.5	4.5	↓	
AS-27	8.5	4.5	↓	

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				10:00
AS-17	8.5	2.5	100	
AS-18	8.5	0	↓	not stuck
AS-19	8.5	1.3	↓	
AS-20	8.5	4.1	↓	
AS-21	5.5	1.1	↓	
AS-22	8.0	3.1	↓	
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:
Switched from Zone 4 to Zone 5 midday. Readings taken w/ each zone running on its own.

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 6/7/24	Time:
Field Tech(s): GF JC	PID ID:
Weather: 64 sm	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	22	65	20	NM	✓	SVE-10	48	10-25	100	NM	bounce, minor water
HSVE-3	26	66	40	NM	✓	SVE-9	58	0	100		not stuck. dirty
SVE-4	48	6-20	100	NM	bounce, minor water	SVE-8	–	–	Ø		OFF
SVE-5	46	0-12	100	NM	bounce, water	SVE-6	38	11	100		✓
SVE-7	48	15	100	NM	✓	HSVE-1	14	47	15		✓

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	

Notes:
No power for vapor pump, couldn't take PIDs.

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 6/7/24	Time:
Field Tech(s): GF, JC	Pump ID:
Weather: 70 Sun	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	0.25	NM		SVE-10	0.25	1.25 + 4 = 5.25	mostly clear some black flake/sediment
HSVE-3	0.5	NM		SVE-9	Trace	NM	
SVE-4	0.25	1/2		SVE-8	0.75	NM	
SVE-5	0.25	1/2		SVE-6	0.25	Trace	
SVE-7	0.25	1.75		HSVE-1	Trace	NM	leak from deadleg drain port. Needs putty

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 6/7/24	Time:
Field Tech(s): GF, JC	Weather: 70 Sun

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	14	64	20		SVE-10	42	16	100	steady!
HSVE-3	32	63	40		SVE-9	52	0	100	
SVE-4	40	10	100		SVE-8	—	-	0	
SVE-5	44	0-9	100	slight bob	SVE-6	35	14	100	
SVE-7	42	25	100		HSVE-1	13	45	15	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	49

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

Field Tech(s): GF JC

Date: 6/7/24

T-30 Quarterly O&M Checklist

REGULAR TASKS

System ON:

- [✓] Zero out mag gauges
- [x] Confirm mag gauges w/ a manometer
- [✓] Test AS pressure gauge accuracy (turn zone on and off. All gauges should equilibrate)
- [x] If possible: Check AS pressure on individual well heads in the well field and compare to readings at the manifold

System OFF:

- [✓] Test poly tank float switches
- [✓] Test KO tank float switches
- [✓] Check SVE vac gauges for zeroing
- [✓] Scrub out KOT sightglass
- [✓] Check particulate filter housing for water accumulation. Empty if needed. Visually inspect filter. trace water
- [✓] Megger test SVE & AS motors
- [✓] Clean out any garbage/weeds from the system area
- [x] LOTO electrical and tighten wire lugs/terminals on all control and electrical connections inside cabinet
- [x] Exercise all valves (open valves normally closed and then return to original position)

EXTRA TASKS

- [ ] Poly tank sec. containment
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

AECOM

PORT OF SEATTLE - TERMINAL 30
Megger Testing of Motor Windings

Field Tech(s): GF JC
Date: 6/7/24

Equipment ID: _____

Baseline Readings (See Note 2)					
	Motor	AS Compressor		SVE Blower	
Motor Wires	Date	Winding Resistance (Ohms)	Insulation Resistance (Megaohms)	Winding Resistance (Ohms)	Insulation Resistance (Megaohms)
G & B	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
G & O	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
G & Y	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
B & O	N/A	NM	N/A (0.00)	NM	N/A (0.00)
O & Y	N/A	NM	N/A (0.00)	NM	N/A (0.00)
B & Y	N/A	NM	N/A (0.00)	NM	N/A (0.00)

Legend:
G= Ground Wire
B= Brown Wire
O= Orange Wire
Y= Yellow Wire
N/A= Not applicable

Notes:
1 These tests check for a breakdown of insulation within the internal motor windings over time. Use a Megger Model MIT 220.
2 Baseline data is unavailable. Testing was not conducted by CRETE and readings were only initiated once issues with the AS motor were identified.
3 Insulation resistance testing was completed between winding phase at 500 volts over approximately 30 seconds
4 >1,000 Mohm readings generally means you have an open curcuit
5 0.00 Mohm readings mean that the phase being tested is shorted to Ground
6 Ideally the phase-to-phase winding resistance readings between each phase should be the same or at least very close
7 Phase-to-phase winding resistance readings should not be 0 ohms (i.e. short) or OL (overload) or infinity
8 Generally high resistance readings (greater than 10 Mohms) indicate the motor insulation is good

Motor	AS Compressor Motor						Comments
Test	Winding Resistance			Insulation Resistance			
Motor Wires	B & O	O & Y	B & Y	G & B	G & O	G & Y	
Date/Time	(Ohms)	(Ohms)	(Ohms)	(Megaohms)	(Megaohms)	(Megaohms)	
Baseline	N/A	N/A	N/A	N/A	N/A	N/A	
6/7/24	1.82	1.82	1.82	0.12	0.12	0.13	

Motor	SVE Blower Motor						Comments
Test	Winding Resistance			Insulation Resistance			
Motor Wires	B & O	O & Y	B & Y	G & B	G & O	G & Y	
Date/Time	(Ohms)	(Ohms)	(Ohms)	(Megaohms)	(Megaohms)	(Megaohms)	
Baseline	N/A	N/A	N/A	N/A	N/A	N/A	
6/7/24	0.95	0.95	0.95	0.12	0.12	0.12	

AECOM

Summa Can Sample Sheet

~~DAILY FIELD LOG~~

Project Information

Page 1 of 1

Project Name:	T-30	Location:	
Project/Task No.:		Weather:	
Date:	6/7/24	Personnel:	GF JC

Observations

	Time	Observation Description
1		Can ID : 3671
2		Flow ID : 234
3		Vapor Sample ID: SVE-EFF-060724
4		
5		Leak test :
6		1247, 29.5" Hg
7		1252, 29.5" Hg, no change, passed
8		
9		Sample Port: SVE effluent
10		- pressure: 3.2" WC
11		- Temp: 112° F
12		- New tubing? Yes
13		- 1.1 ppmv via PID
14		
15		Sample Start: 1302
16		initial vac 29.5" Hg
17		Sample End: 1309
18		final vac: 5.0" Hg
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

SAMPLE CHAIN OF CUSTODY

Report To Paul Kalina
Company AECOM
Address 1111 3rd Ave Ste 1600
City, State, ZIP Seattle WA 98101
Phone 206-310-5097 Email paul.kalina@aecom.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: T-30

PO #

NOTES:

INVOICE TO

Page # 1 of 1

TURNAROUND TIME
Standard
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Default: Clean following final report delivery
Hold (Fee may apply):

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 [illegible]	TO15 cVOCs	APH	Helium		Notes
SVE-EFF-060724		3671	734	IA / (SG)	06/07/24	29.5	1302	5	1309		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Jonathan Cronk	AECOM	06/07/24	15:46
Received by:	ANH PHAN	F&B	06/07/24	15:46
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 45619
Description MiniRAE 3000
Calibrated 6/5/2024 4:39:01PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-927281
Location Seattle
Department

State Certified
Status Pass
Temp °C 21
Humidity % 46

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	108.0	100.2	0.20%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

DAILY FIELD LOG

Project Information Page 1 of 1

Project Name:	T-30	Location:	
Project/Task No.:		Weather:	61 drizzle
Date:	6/27/24	Personnel:	GF

Observations

	Time	Observation Description
1	1630	• GF on site
2		• Scope: Biweekly O&M
3		• Safety talk
4		• System ON on arrival. Zone 4 active. Only SVE-5 has
5		water in the rotameter.
6	1645	• Started collecting readings.
7		• lower flows at Zone 4 wells. 0's at 2 wells and
8		<2 cfm at two others.
9		• MM replaced / added strut to support the replaced
10		rotameters. looks great. Photos taken.
11		• GFCI is still dead. My tester indicated an issue on
12		the hot wire.
13		• 0.7 ppmv from SVE discharge. Can't get manifold
14		readings w/o power for the vapor pump.
15		• Skipping water pumping this week, ran out of time
16		• 101 tank is empty; minimal transfer since
17		last event two weeks ago.
18		• Added plumbers putty to the leaking tapped hole at the
19		HSVE-1 double drain. Photo taken.
20	1720	• GF offsite. System ON. Gate locked.
21		
22		
23		GF
24		6/27/24
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30

SVE/AS System Data

Date: 6/27/24	Field Tech(s): CT		Actual Time: 1645
PID ID:	Weather: 61 drizzle		HMI Time:
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	27195.4 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.1 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	14063.6 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	18055.8 HMI	Sparge Zone 4 Time Span(s) Operational:	Same HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/15.2/56% HMI	Sparge Zone 5 Time Span(s) Operational:	Same HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52/10.5/92.5% HMI	Sparge Zone Active:	4
SVE/AS System Settings & Readings	A2010 fault flashing		
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	86	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	4.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1 1/2	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.2
AS Blower Discharge Pressure (PSI) - *PI-501*	9.0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.5
SVE Blower Inlet Temperature (°F) - *TI-200*	72	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.2
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	58	SVE Blower Discharge Temperature (°F) - *TI-400*	110
Knockout Tank Level (Sightglass % Full)[1]	75%		
SVE Discharge PID (ppmv)	0.7	Treated Vapor Discharge PID (ppmv)[2]	N/A
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		SVE Compressor Oil Level[3] (% full sightglass)	
DTF in Storage Tank (ft)		WD in Storage Tank[4] (ft)	
Water Volume in Storage Tank[5] (gal)	0	Spare Volume to LAH float[6] (gal)	
NOTES:			

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23				
AS-24				
AS-25				
AS-26				
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8.5	~~6.0~~ 1.25	100	
AS-18	9.5	0		
AS-19	8.5	1.0		
AS-20	9.5	4.25		
AS-21	6.5	0		
AS-22	10	3.75		
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume

PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	6/27/24	Time:	1700
Field Tech(s):	GF	PID ID:	46916
Weather:	61 cloudy		

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	22	66		NM		SVE-10	50	14-30		NM	bouncing, dry
HSVE-3	30	63				SVE-9	58	0			
SVE-4	57	10-20			bouncing, dry	SVE-8	—	—	0		
SVE-5	44	6			lots of water	SVE-6	42	15			
SVE-7	63	19				HSVE-1	13	47			

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	57

Notes:
GFCI still down, can't extract manifold vapors

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 6/24/17	Time: 1707
Field Tech(s): GF	Pump ID:
Weather: Cl & cloud	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2				SVE-10			
HSVE-3				SVE-9			
SVE-4				SVE-8			
SVE-5				SVE-6			
SVE-7				HSVE-1			

Notes:
No pumping, ran out of time. Water visible in HSVE-1, 2, 3 & SVE-4 hoses. Also SVE-5 rotameter.

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 6/24/17	Time: 1707
Field Tech(s): GF	Weather: Cloud

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2					SVE-10				
HSVE-3					SVE-9				
SVE-4					SVE-8				
SVE-5					SVE-6				
SVE-7					HSVE-1				
Dilution Valve		# Turns Open:							
		Vacuum ("H2O):							

Notes:
No changes made

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 46910
Description MiniRae 3000_V2.22A
Calibrated 6/26/2024 1:25:14PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-928443
Location Seattle
Department

State Certified
Status Pass
Temp °C 23
Humidity % 40

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	100.00	100.30	0.30%	Pass

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 7/3/24	Field Tech(s): AB		Actual Time: 1133
PID ID: 46910	Weather: 65° Sunny		HMI Time: 1120
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	27333.7 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.1 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	18201.9 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	16194.0 HMI	Sparge Zone 4 Time Span(s) Operational:	0230-0600, 0830-1200 1430-1800, 2050-0000
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/14.3/51.8% HMI	Sparge Zone 5 Time Span(s) Operational:	0530-0900, 1130-1500, 1730-2100, 2330-0300
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.5/92.6% HMI	Sparge Zone Active:	4, 5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	89°	SVE Blower Dilution Valve (# turns open)	1.0
AS Blower Intake Pressure (" H2O) - *DPI-500*	4.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.9
AS Blower Discharge Pressure (PSI) - *PI-501*	8.0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.0
SVE Blower Inlet Temperature (°F) - *TI-200*	76°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.3
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	52	SVE Blower Discharge Temperature (°F) - *TI-400*	1130
Knockout Tank Level (Sightglass % Full)[1]	6%		
SVE Discharge PID (ppmv)	1.1	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	—	WD in Storage Tank[4] (ft)	1/2
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	869.45
NOTES:			

Abbreviations:

" H_2O = Inches of Water

°F = Degrees Fahrenheit

PSI = Pounds per Square Inch

% = Percent

DTF - Depth to Fluid

DTB - Depth to Bottom

MP - Measuring Point

WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	6.0	<1	100	
AS-24	5.75	"	"	
AS-25	4.0	"	"	
AS-26	6.5	"	"	
AS-27	5.0	"	"	

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	7.5	<1	100	
AS-18	8.5	<1	75	
AS-19	7.5	<1	100	
AS-20	8.0	3	"	
AS-21	4.75	<1	"	
AS-22	8.0	2.5	"	
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes: Took readings during 30-minute overlap period of both zones being active

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	7/3/24	Time:	1215
Field Tech(s):	AB	PID ID:	46910
Weather:	66° sunny		

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	20	65	25	0.9		SVE-10	44	19	100	1.5	
HSVE-3	25	64	↓	1.5		SVE-9	55	–	↓	0.6	water in roto keeping flow down
SVE-4	41	13	100	1.5		SVE-8	—	–	—	—	closed
SVE-5	41	10→25	↓	1.6	water in roto	SVE-6	39	16	100	0.7	
SVE-7	51	17	↓	1.2		HSVE-1	9	47	25	2.7	

Dilution Valve	# Turns Open:	1.0
	Vacuum ("H2O):	51

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date:	7/3	Time:	1250
Field Tech(s):	AB	Pump ID:	38679
Weather:	67° sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	~~0~~		SVE-10	1/4	brown, murky
HSVE-3	trace	clear	SVE-9	1/3	brown, murky
SVE-4	1/3	clear	SVE-8	–	closed
SVE-5	1/3	clear	SVE-6	1/3	clear
SVE-7	1/4	clear	HSVE-1	1/3	clear w/debris

Notes:

No water in back side

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:	7/3/24	Time:	1330
Field Tech(s):	AB	Weather:	68° sunny

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	20	58	25		SVE-10	36	22	100	
HSVE-3	19	58	1		SVE-9	41	10-20	100	Float bobbing
SVE-4	31	14	100		SVE-8	—	—	—	closed
SVE-5	35	10-20	↓	Float bobbing	SVE-6	28	19	100	
SVE-7	48	19	↓		HSVE-1	11	43	25	

Dilution Valve	# Turns Open:	1.0
	Vacuum ("H2O):	42

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

DAILY FIELD LOG

Project Information Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	65° Sunny
Date:	7/3/24	Personnel:	AB

Observations

	Time	Observation Description
1	1114	Arrived on-site, construction forced long detour
2		System on upon arrival, safety tailgate
3		Scope: bi-weekly O&M, setting up equipment
4	1133	Taking HMI readings
5	1140	Taking zone readings while active
6	1145	Taking system readings
7	1210	SVE discharge PID: 1.1 ppmV
8		Taking well head PID's
9		No cal docs for PID
10	1227	Taking rest of well head readings
11	1245	Dewatering
12	1330	Taking post dewater readings
13	1345	Calling Gus to discuss results
14	1400	Closing up and dropping off equipment
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID *38679*
Description *Solinst 410 Reristaltic Pump*
Calibrated *6/26/2024 1:32:59PM*

Manufacturer *Solinst*
Model Number 410
Serial Number/ Lot Number 1591
Location Seattle
Department

State Certified
Status Pass
Temp °C 23
Humidity % 36

Calibration Specifications

Group # 1
Group Name
Test Performed: N/A **As Found Result:** **As Left Result:**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated *Dzung Pham*

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 07/23	Field Tech(s): JC ELC		Actual Time: 4:40
PID ID:	Weather: Sunny, 64°		HMI Time:
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	27809.9	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.1	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	18678.2	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	18670.3	Sparge Zone 4 Time Span(s) Operational:	02:30-6:00, 8:30-12:00, 14:30-18:00, 20:30-24:00
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/14.3/52.3%	Sparge Zone 5 Time Span(s) Operational:	23:30-03:00, 05:30-09:00, 11:30-15:00, 17:30-21:00
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.6/94.0%	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	40°F	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5"	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1/2	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	~~0~~
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	6
SVE Blower Inlet Temperature (°F) - *TI-200*	66°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.2
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	52	SVE Blower Discharge Temperature (°F) - *TI-400*	112°
Knockout Tank Level (Sightglass % Full)[1]	70%		
SVE Discharge PID (ppmv)		Treated Vapor Discharge PID (ppmv)[2]	
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		el[3] (% full sightglass)	
DTF in Storage Tank (ft)	7	WD in Storage Tank[4] (ft)	0.5
Water Volume in Storage Tank[5] (gal)	133.35	Spare Volume to LAH float[6] (gal)	1866.65
NOTES:			

3.1ppm.
Collected 4:22pm

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 07/23/24	Time: 10:01
Field Tech(s): VC LC	PID ID:
Weather: Clear	

**Instructions: Take readings down PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	23	62	30	1.6		SVE-10	48	0-35	100	5.8	Float bottoming out Rotameter called black
HSVE-3	26	63	50	3.3		SVE-9	52	Not stuck 0	↓	4.1	Frothy water in rotameter, rust coating to interior
SVE-4	44	13	100	3.2		SVE-8	-	-	-	-	
SVE-5	41	0-2	↓	11.4	Rotameter water-logged	SVE-6	36	15	100	2.9	Some water in rotameter
SVE-7	42	16	↓	3.3		HSVE-1	12	44	30	5.2	

Dilution Valve	# Turns Open: 1	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 07/23/24	Time: 10:30
Field Tech(s): JC LC	Pump ID:
Weather: Clear, 64°	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	0.25	0.5		SVE-10	0.5	1.5	
HSVE-3	0.25	0.25		SVE-9	0.5	3.5	Deadleg water cloudy
SVE-4	<.25	<.25	Dark flecks floating in water Product odor	SVE-8	—	—	
SVE-5	0.5	2		SVE-6	0.25	0.25	Water Brown and murkey
SVE-7	<.25	<.25		HSVE-1	0.5	0.25	

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				NOT RUNNING
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				NOT RUNNING
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	9.0	4.5	95%	@ 11:33
AS-24	8.5	5.0	100	
AS-25	7.0	1.0	100	added 0.5 psi to reading because reads 0.5 low
AS-26	~~9~~ 8.5"	5.5	100	subtracted 0.5 psi from reading because reads 0.5 high
AS-27	8.5	5.0	100	

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8.5	0.0	100	@ 0940
AS-18	9.5	0.0	5	
AS-19	8.5	1.0	100	
AS-20	9.5	4.0	100	
AS-21	6.0	0.0	100	
AS-22	9.5	3.0	100	
Zone 1				
AS-1				
AS-2				NOT RUNNING
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 07/23/24	Time: 11:32
Field Tech(s): JC LC	Weather: Clear, 65°

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	18	58	30		SVE-10	41	16	100	Float stable
HSVE-3	22	62	50		SVE-9	42	0	↓	
SVE-4	40	12	100		SVE-8	–	–	–	
SVE-5	30	6-8	↓	Small quantities of water in rotameter	SVE-6	32	14	100 ↓	Rotameter clear
SVE-7	40	18	↓		HSVE-1	9	43	↓	
Dilution Valve		# Turns Open:		1					
		Vacuum ("H2O):							

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 24195
Description MIniRae 3000 V2.22A
Calibrated 7/19/2024 12:53:16PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-910776
Location Seattle
Department

State Certified
Status Pass
Temp °C 26
Humidity % 44

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	97.00	100.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

7-23-24 64° Sunny Jonathan Cronk

09:38 On site with LC

10:30 No alarms on HMI
Routine maintenance.
SVE-10 bottoming out, rotameter caked with black substance.
Suspected source is rubber ring being smashed and decomposing.

11:47 LC & JC off site

JC

Rite in the Rain

8/9/24 T-30 Jonathan Cronk 67° Clear, 64 AQI

09:00 - Onsite with Gus Friedman
Safety tailgate complete

Systems on; site clean and secure
Dead rabbit by water storage tank

0915 Began collecting measurements;
Water in SVE-5 and 9
SVE-10 coated in black substance

0945 PID ran for SVE Discharge

0950 AS flows look low.
Pressure still high, meter floats not steady

1015 Collecting PID for SVE wells

1040 Starting dewater.

1200 SVE-10 float completely unable to view

1230 JC & GF offsite

END

Rite in the Rain

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 8/9/24	Field Tech(s): Jonathan Creek & Gus Friedman		Actual Time: 9:18
PID ID:	Weather: Clear, smoky, 67° (64 AQI)		HMI Time: 9:04
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	28214.4 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.2 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	19082.5 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	19074.6 HMI	Sparge Zone 4 Time Span(s) Operational:	02:30-06:00, 08:30-11:30, 14:30-18:00, 20:30-24:00
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	420/14.0/50.5	Sparge Zone 5 Time Span(s) Operational:	23:30-03:00, 05:30-09:00, 11:30-15:00, 17:30-21:00
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.7/94.6 HMI	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	90°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	4.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	~~0~~ NM
AS Blower Discharge Pressure (PSI) - *PI-501*	9.0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5
SVE Blower Inlet Temperature (°F) - *TI-200*	72°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	4.4
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	48	SVE Blower Discharge Temperature (°F) - *TI-400*	111
Knockout Tank Level (Sightglass % Full)[1]	80%		
SVE Discharge PID (ppmv)	2.0	~~Treated Vapor Discharge PID (ppmv)~~[2]	
Other Components			
~~AS Compressor Oil Level[2]~~ (~~% full sightglass~~)		SVE Compressor Oil Level[3] (~~% full sightglass~~)	
DTF in Storage Tank (ft)	6.17'	WD in Storage Tank[4] (ft)	0.75'
Water Volume in Storage Tank[5] (gal)	200	Spare Volume to LAH float[6] (gal)	802.8
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 8/9/24	Time: 10:00
Field Tech(s): JC & GF	PID ID:
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	18	58	50	0.3	Small amounts of water in Rotameter.	SVE-10	46	10-30	100	0.2	Interior of rotameter completely covered with black substance
HSVE-3	24	63	50	1.0	Water in rotameter	SVE-9	48	0	↓	0.3	*Float bottoming out Emulsified water, unstable Float not stuck
SVE-4	42	15	100	0.2	Brown substance lightly coating rotameter interior	SVE-8	-	-	-	-	
SVE-5	40	5	|	0.3	Unstable flow of water in rotameter	SVE-6	35	18	100	0.4	
SVE-7	44	19	V	0.2		HSVE-1	12	44	50	0.9	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	48

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

JC & GF — 8/9/24

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
~~Zone 5~~ 1				
AS-23				
AS-24				
AS-25				
AS-26				
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8.5	0	100	Not stuck (NS)
AS-18	9.0	0		NS
AS-19	8.5	1		
AS-20	9	4.5		
AS-21	5.5	0		NS
AS-22	9	3	V	
Zone ~~2~~ 5				
AS-~~23~~	8.5	4.5	100	
AS-~~24~~	8	5		
AS-~~25~~	6	2.5		
AS-~~26~~	9	5		
AS-~~27~~	8.5	5	V	
~~AS-6~~				

Readings taken at EOD after zone change

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 8/9/24	Time: 11:00
Field Tech(s): JC & GF	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	0.25	JC ~~0~~ 0.75		SVE-10	0.25	0.25	
HSVE-3	0	0.5		SVE-9	0.5	0.5	Let rotameter drain in deadleg
SVE-4	<0.25	<0.25	Brown flakes suspended (~1 inch)	SVE-8	–	–	
SVE-5	0.5	4	Murky brown; some suspended black particles (~.1 inch)	SVE-6	0.25	0	
SVE-7	0.5	0.25		HSVE-1	0.25	~0	LNAPL sheen

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 8/9/24	Time:
Field Tech(s): JC & GF	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	14	58	50		SVE-10	20	~~50~~ ~20 >15	100	View to float blocked by black substance
HSVE-3	22	60	↓		SVE-9	50	0	↓	
SVE-4	38	12	100		SVE-8	—	—	—	
SVE-5	36	8	↓		SVE-6	33	17	100	
SVE-7	26	16	↓		HSVE-1	12	43	60	
Dilution Valve		# Turns Open:							
		Vacuum ("H2O):							

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 41680
Description MiniRAE 3000
Calibrated 8/5/2024 1:02:37PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-923335
Location Seattle
Department

State Certified
Status Pass
Temp °C 25
Humidity % 45

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	98.0	100.1	0.10%	Pass

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100-304-402950172-1	Isobutylene (C4H8) 100 PPM	Airgas		304-402950172-1		1/27/2028

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 44106
Description Solinst Pump
Calibrated 8/7/2024 11:36:09AM

Manufacturer Solinst
Model Number Pump
Serial Number/ Lot Number na
Location Seattle
Department

State Certified
Status Pass
Temp °C 24
Humidity % 40

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 8-22-24	Field Tech(s): Jonathan Cronk		Actual Time: 0914
PID ID:	Weather: 62°F, Cloudy, 39 AQI		HMI Time: 0859
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	28,524.5	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump* Switch JC	19,392.5	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	8.2	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	19,384.4	Sparge Zone 4 Time Span(s) Operational:	0230 - 0600, 0830 - 1200 1430 - 1800, 2030 - 2400
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/13.7/50.0%	Sparge Zone 5 Time Span(s) Operational:	2330 - 0300, 0530 - 0900 1130 - 1500, 1730 - 2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52/10.8/95.3	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	84	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5"	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	—
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	6
SVE Blower Inlet Temperature (°F) - *TI-200*	70	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	4
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	48	SVE Blower Discharge Temperature (°F) - *TI-400*	108
Knockout Tank Level (Sightglass % Full)[1]	10		
SVE Discharge PID (ppmv)	7.0	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	5.42	WD in Storage Tank[4] (ft)	0.5
Water Volume in Storage Tank[5] (gal)	1,445.5 ↔ Switch JC	Spare Volume to LAH float[6] (gal)	133.35
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30

SVE Manifold Readings (1 of 3)

Date: 8-22	Time: 9:40
Field Tech(s): JL	PID ID:
Weather: Light rain	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	24	56	30	1.0	–	SVE-10	6 ~~40~~ JL	– ~~18~~ JL	50 ~~100~~ JL	6.5	Emulsified water in rota. JL switch
HSVE-3	26	56	40	2.4	–	SVE-9	45 ~~6~~ JL	0(ns) ~~7~~ JL	100 ~~50~~ JL	0.6	Rota. guide ~~bar~~ rod missing JL
SVE-4	42	10-18	100	1.2	Rotameter float unstable	SVE-8	–	–	–	–	–
SVE-5	43	2	↓	2.1	Water in rotameter	SVE-6	33	17	100	0.4	–
SVE-7	40	18	↓	3.3	–	HSVE-1	16	65	30	2.6	–

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30

AS Manifold Readings 0950 Light rain

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23				
AS-24				
AS-25				
AS-26				
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8	0	100	
AS-18	9.5	0		
AS-19	8.5	1.5		
AS-20	10	0		
AS-21	6	0		
AS-22	10	2.5		
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date:	8/22	Time:	10:41
Field Tech(s):	JC	Pump ID:	
Weather:	Partially cloudy,		

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	<0.25	0.25		SVE-10	0.5	—	Not enough vacuum? No water in lateral stubup
HSVE-3	0.25	0.25		SVE-9 *	0.5	4.5	Oily light brown water
SVE-4	0.25	<0.25		SVE-8	—	—	
SVE-5 *	0.25	0.5		SVE-6	0.25	<0.25	
SVE-7	0.25	<0.25		HSVE-1	0.25	<.25	

Notes:
*: Had water in rota.

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 8-22	Time: 12:52
Field Tech(s): JC	Weather:

****Instructions**: Take these readings **AFTER** dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	14	54	30		SVE-10	40	10-25	100	Unstable
HSVE-3	16	57	40		SVE-9	34	0	↓	
SVE-4	33	11	100		SVE-8	–	–	–	
SVE-5	19	12	|		SVE-6	24	16	100	
SVE-7	23	26	↓		HSVE-1	12	60	↓	

Dilution Valve	# Turns Open:		
	Vacuum ("H2O):		

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 45306
Description MIniRae 3000
Calibrated 8/19/2024 11:40:23AM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-927248
Location Seattle
Department

State Certified
Status Pass
Temp °C 24
Humidity % 47

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 5.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	96.0	100.0	0.00%	Pass

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100-304-402950172-1	Isobutylene (C4H8) 100 PPM	Airgas		304-402950172-1		1/27/2028

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

8-22-24 T-30 Jonathan Cronk 62° Cloudy 39AQI

0845 - On site. Safety tailgate conducted
Site appears secure.
Flare corpse still unmoved. Advanced state of decay. Site otherwise clean and safe

0900 - Guide bar in SVE-10 rotameter missing.
Gus notified

0910 - Began collecting readings
No new alarms on HMI

0920 - Raining lightly / leaking
Water [redacted] From SVE-1 Collected
bef[redacted] significant rain)

0950 - AS manifold readings seem much lower than typical

0955 - PID prepared in car to keep components dryer. Began PID readings

Rite in the Rain.

8-22-24 T-30 Jonathan Cronk 62° Cloudy

11 53 - Dewater complete
Calling Gus to discuss

12 10 - System off for rotameter repair

12 30 - Calling manufacturer to discuss
possible cause of missing rod

12 51 - System back on
No leaks seen in SVE-10
↳ Error in reassembly
Systems off

13 01 Systems back on, final measurements

13 15 Site locked
Systems on
JC off site

Rite in the Rain.

514QI

9-5-24 T-30 Jonathan Cook 70° clear

0930 - JC on site
Safety tailgate conducted
Site appears secure & as left on previous visit. Systems ON

0950 - Rod missing on SVE-10 again
Leak still present at SVE-1 deadleg
Notified Gus and begin collecting field form data.

1010 - Nothing unusual noticed.
Setting up PID

1055 - Sampling complete
Setting up perl pump for dewatering

1227 - Dewatering complete
Met with Gus on Teams to discuss action for SVE10 guide rod
Beginning rotameter repair.
Systems OFF.

1302 - Systems ON
Rotameter repaired. JC off site

Rite in the Rain

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 9/5/24	Field Tech(s): JC		Actual Time: 9:59
PID ID:	Weather: Clear		HMI Time: 9:44
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	28859.0 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.3 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	19727.0 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	19718.9 HMI	Sparge Zone 4 Time Span(s) Operational:	0230-0600, 0830-1200, 1430-1800, 2030-2400 HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/13.3/47.9 HMI	Sparge Zone 5 Time Span(s) Operational:	2330-0300, 0530-0900, 1130-1500, 1730-2100 HMI
A2010 → AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52/10.6/93.7 HMI	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	95°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5"	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	—
AS Blower Discharge Pressure (PSI) - *PI-501*	9	Transfer Pump Discharge Pressure (PSI) - *PI-300*	6
SVE Blower Inlet Temperature (°F) - *TI-200*	72°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.5
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	45"	SVE Blower Discharge Temperature (°F) - *TI-400*	110
Knockout Tank Level (Sightglass % Full)[1]	90%		
SVE Discharge PID (ppmv)	1.5	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)		WD in Storage Tank[4] (ft)	0.5
Water Volume in Storage Tank[5] (gal)	133.4	Spare Volume to LAH float[6] (gal)	869.4
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 9-5-24	Time: 10:32
Field Tech(s): JC	PID ID:
Weather:	

**Instructions: Take readings down PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	22	56	40	0.5	–	SVE-10	✱	✱	✱	✱	Rod moving again, float blocking rotameter bottom.
HSVE-3	24	54	50	1.9 ~~1.8~~ JC	–	SVE-9	48	0	100	0.3	Some water in rotameter, emulsified
SVE-4	37	12 (7-17)	100	0.8	Water in rotameter	SVE-8	–	–	–	–	–
SVE-5	39	11	100	0.3	–	SVE-6	30	14	100	0.3	Thin brown powder layer coating rotameter interior
SVE-7	39	17	100	0.1	-	HSVE-1	15	64	30	0.8	–

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23				
AS-24				
AS-25				
AS-26				
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8.5	0		Small amount of water in rotameter
AS-18	9	0		
AS-19	8.5	1		
AS-20	8.5	0		
AS-21	5	0		
AS-22	8.5	3.5		Unsteady, ~2 - 5 scfm
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 4-5-24	Time: 11:00
Field Tech(s): JC	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	0	0.5		SVE-10	0.5	0.75	Cloudy, white
HSVE-3	0.25	0.5		SVE-9	0.25	3	LNAPL sheen
SVE-4	0.25	0.25 ~~2.75~~ JC		SVE-8	—	—	
SVE-5	0	2.75 ~~1.5~~ JC		SVE-6	0.25	0.25	
SVE-7	0.25	1.5 ~~0.75~~ JC		HSVE-1	0.5	<0.25	

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 9-5-24	Time:
Field Tech(s): JC	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	14	47	40		SVE-10	4	54	50 ~~100~~	
HSVE-3	16	48	50		SVE-9	40	0	↓	
SVE-4	28	10	100	Still slightly unstable	SVE-8	—	—	—	
SVE-5	28	0	↓		SVE-6	10	16	100	
SVE-7	28	24	↓		HSVE-1	11	55	30	

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 46910
Description MiniRae 3000_V2.22A
Calibrated 9/3/2024 11:19:09AM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-928443
Location Seattle
Department

State Certified
Status Pass
Temp °C 23
Humidity % 46

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	100.40	100.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date
SEA ISO 100-304-402950172-1	Isobutylene (C4H8) 100 PPM	Airgas		304-402950172-1	1/27/2028

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

T-30 Jonathan Cronk 9-20-24 Cloudy - 56° 16 AQI

0915 - JC on site beginning preliminary O&M (basic biweekly tasks)

1025 - PID complete
Dewatering

Site is secure & Systems ON
as it was left on previous visit

1153 - Biweekly O&M complete
GF working on trimming butterfly bush

1214 - Bush removed
Systems OFF

1321 - Quarterly complete
Fire extinguisher serviced by marine maintenance (proof on label)
Systems ON

1331 SVE6 PI not working properly
Seems to be issue w/ pulse dampener.
SVE2 PI not working properly

Rite in the Rain

→ Scrubber & gauge on 6

13 50 - All PIs applied → Gauge on 2, scrubber
↳ Ask Marion to order more gauges

13 56 - Beginning Summa can & tedlar

14 21 - Systems ON on departure
& GF off site

Note: Email for float alarms
was never sent.

Rite in the Rain

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 9-20-24	Field Tech(s): JC		Actual Time: 9:17
PID ID:	Weather: 56° cloudy 16 AQI		HMI Time: 9:02
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	29,184.9 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	8.3 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	20,052.9 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	20,044.9 HMI	Sparge Zone 4 Time Span(s) Operational:	0230-0600, 0830-1200, 1430-1800, 2030-2400
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/12.9/46.0 HMI	Sparge Zone 5 Time Span(s) Operational:	2330-0300, 0530-0900 1130-1500, 1730-2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52/10.8/95.4 HMI	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	80	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.3
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	6
SVE Blower Inlet Temperature (°F) - *TI-200*	64	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.8
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	40	SVE Blower Discharge Temperature (°F) - *TI-400*	98
Knockout Tank Level (Sightglass % Full)[1]	35		
SVE Discharge PID (ppmv)	7.2	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		SVE Compressor Oil Level[3] (% full sightglass)	
DTF in Storage Tank (ft)		WD in Storage Tank[4] (ft)	0.5'
Water Volume in Storage Tank[5] (gal)	133.4	Spare Volume to LAH float[6] (gal)	869.4
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 9/20/24	Time:
Field Tech(s): JC	PID ID:
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	24 ~~25~~	52 ~~47~~	30	1.9	Thin layer of water.	SVE-10	40 ~~2~~	15-30 ~~59~~	50	7.4	Low pressure? ↳ Valve left open, leak
HSVE-3	26 ~~23~~	51 ~~46~~	40	5.0	Drops pressure & flow suddenly, then returns. Some water present.	SVE-9	44 ~~39~~	0-1	100	0.8	Thin brown layer. Droplets of water
SVE-4	38 ~~30~~	0-12	100	2.8	Thin brown layer. Unstable. Abundant water.	SVE-8	–	–	–	–	–
SVE-5	36 ~~34~~	0-10 ~~0-2~~	↓	4.5	Thin brown layer. Unstable. Abundant water.	SVE-6	30	17	100	0.7	Some water
SVE-7	40 ~~35~~	15-25 ~~0-20~~	↓	3.0	Thin layer of water. Unstable.	HSVE-1	18	62	50	1.8	Thin layer of water

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

JC

PORT OF SEATTLE - TERMINAL 30

AS Manifold Readings

4/20/24

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23				Still receiving
AS-24				Flow, system off and
AS-25				valves closed?
AS-26				Very strange
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8.5	0	100	
AS-18	10	0		
AS-19	8.5	1		
AS-20	10	0		
AS-21	~~8.5~~ 6.5	0		Bad gauge corrected to +2 (estimate)
AS-22	10	3	✓	
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 4/20/24	Time:
Field Tech(s): JC	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	0.25	0.25		SVE-10	0.25	1	Sheen to water
HSVE-3	0.25	0.25		SVE-9	0.5	1	Sheen to water
SVE-4	0.25	0.25	Sheen	SVE-8	—	—	—
SVE-5	0.5	1.25		SVE-6	0.5	<.25	—
SVE-7	0.25	1.5		HSVE-1	<.25	0.5	—

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 9/20/24	Time:
Field Tech(s): JC	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	16	52	30		SVE-10	32	20	50	
HSVE-3	22	51	40		SVE-9	40	6	100	
SVE-4	33	11	100		SVE-8	-	-	-	
SVE-5	36	7	|		SVE-6	40	18	100	
SVE-7	35	26	↓		HSVE-1	7	60	↓	

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

AECOM

T-30 Summa Can Vapor Sampling Field Form

Project: Terminal 30 Site Address: 1901 East Marginal Way South, Seattle, WA

Date: 9/20/24 Field Personnel: GF & JC

Weather: 57° cloudy Weather Barometric Pressure (in Hg): 30.15

Sample ID: SVE-EFF-092024 (SVE-EFF-mmddyy)

Sample Port Description: SVE effluent

Conditions at Sample Port:

Pressure ~~(PSI)~~	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.7 "wc	110	9.3	29188.6

Before Sampling:

	Yes or No (Y/N)
Install clean tubing on the sample port	Y
Purge the tubing (30-60 seconds)	Y

Summa Can Leak Test[1]:

Initial Canister Reading (in-Hg)	Duration of Test (2 min recommended)	Final Canister Reading (in-Hg)
29.5	10:42 - 10:47	29.5 ✓

[1] For the summa can leak test, connect the flow controller to the can with the cap nut secured. No air should enter the can when the can valve is opened. Once this is confirmed, open the summa can valve and record the initial vacuum. Wait for two minutes and then record the vacuum again. If the two readings do not match there is a leak and a new can and valve should be acquired before sampling.

Sampling Information[2]:

Sample Canister LAB ID	Flow Controller LAB ID	Sample Canister Size	Initial Canister Reading (in-Hg)[3]	Sample Times	Sample Date(s)	Final Canister Reading (in-Hg)[3]
9568	35	1L	29.5	Sample Start: 1405	9/20/24	5.0
Analyses Requested: TO15 BTEX, APH				Sample End: 1411	9/20/24	

[2] The flow controller should be for a 4-5 minute integrated sample

[3] Canisters measured using a standard vacuum gauge

Sample Collection Notes and General Observations:

Also filled a tedlar for CH_4, CO_2, & O_2. Same sample ID. Sampled @ 1413

PORT OF SEATTLE - TERMINAL 30
Megger Testing of Motor Windings

Field Tech(s): GF JC
Date: 09/26/24

Equipment ID: MIT220

Baseline Readings (See Note 2)					
	Motor	AS Compressor		SVE Blower	
Motor Wires	Date	Winding Resistance (Ohms)	Insulation Resistance (Megaohms)	Winding Resistance (Ohms)	Insulation Resistance (Megaohms)
G & B	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
G & O	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
G & Y	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
B & O	N/A	NM	N/A (0.00)	NM	N/A (0.00)
O & Y	N/A	NM	N/A (0.00)	NM	N/A (0.00)
B & Y	N/A	NM	N/A (0.00)	NM	N/A (0.00)

Legend:
G= Ground Wire
B= Brown Wire
O= Orange Wire
Y= Yellow Wire
N/A= Not applicable

Notes:
1. These tests check for a breakdown of insulation within the internal motor windings over time. Use a Megger Model MIT 220.
2. Baseline data is unavailable. Testing was not conducted by CRETE and readings were only initiated once issues with the AS motor were identified.
3. Insulation resistance testing was completed between winding phase at 500 volts over approximately 30 seconds
4. >1,000 Mohm readings generally means you have an open curcuit
5. 0.00 Mohm readings mean that the phase being tested is shorted to Ground
6. Ideally the phase-to-phase winding resistance readings between each phase should be the same or at least very close
7. Phase-to-phase winding resistance readings should not be 0 ohms (i.e. short) or OL (overload) or infinity
8. Generally high resistance readings (greater than 10 Mohms) indicate the motor insulation is good

Motor	AS Compressor Motor						Comments
Test	Winding Resistance			Insulation Resistance			
Motor Wires	B & O	O & Y	B & Y	G & B	G & O	G & Y	
Date/Time	(Ohms)	(Ohms)	(Ohms)	(Megaohms)	(Megaohms)	(Megaohms)	
Baseline	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	1.74	1.74	1.75	0.11	0.12	0.13	

Motor	SVE Blower Motor						Comments
Test	Winding Resistance			Insulation Resistance			
Motor Wires	B & O	O & Y	B & Y	G & B	G & O	G & Y	
Date/Time	(Ohms)	(Ohms)	(Ohms)	(Megaohms)	(Megaohms)	(Megaohms)	
Baseline	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	0.89	0.90	0.89	0.11	0.12	0.12	

AECOM

Field Tech(s): GF, JC

Date: 9/20/24

T-30 Quarterly O&M Checklist

REGULAR TASKS

System ON:

- [✓] Zero out mag gauges
- [✓] Confirm mag gauges w/ a manometer all 3 w/in 0.1 "wc of manometer
- [✓] Test AS pressure gauge accuracy (turn zone on and off. All gauges should equilibrate) AS-21 replaced
- [X] If possible: Check AS pressure on individual well heads in the well field and compare to readings at the manifold

System OFF:

- [✓] Test poly tank float switches both triggered alarms.
- [✓] Test KO tank float switches
- [✓] Check SVE vac gauges for zeroing
- [✓] Scrub out KOT sightglass
- [✓] Check particulate filter housing for water accumulation. Empty if needed. Visually inspect filter. minor water
- [✓] Megger test SVE & AS motors
- [✓] Clean out any garbage/weeds from the system area brush cut down
- [X] LOTO electrical and tighten wire lugs/terminals on all control and electrical connections inside cabinet
- [✓] Exercise all valves (open valves normally closed and then return to original position)

EXTRA TASKS

- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____

AECOM

SAMPLE CHAIN OF CUSTODY

Report To Paul Kalina
Company AECOM
Address 1111 3rd Ave
City, State, ZIP Seattle WA 98101
Phone 2063105097 Email Paul.Kalina@aecom.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: T-30

PO #

NOTES:

INVOICE TO

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Default: Clean following final report delivery
Hold (Fee may apply):

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEX	APH	Chlorinated VOCs	Helium	CH_4, CO_2, O_2	Notes
SVE-EFF-092024		9568	35	IA / (SG)	9/20/24	29.5	1405	5.0	1411		X	X				
SVE-EFF-092024		Tedlar	-	IA / (SG)	9/20/24	—	—	—	1413						X	Tedlar
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Jonathan Crank	AECOM	9/20/24	14:58
Received by:	Nhan Phan	FRB	9/20/24	1458
Relinquished by:				
Received by:				

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 39399
Description RAE Sytems MiniRAE 3000 V2.22A
Calibrated 9/16/2024 2:29:05PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-920293
Location Seattle
Department

State Certified
Status Pass
Temp °C 20
Humidity % 56

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	92.00	100.20	0.20%	Pass

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

10/3/24 | 52° Clear | Jonathan Cronk | T-30 O&M

0923 - Safety tailgate held. JC on site. Lock difficult to open, possibly related to temperature? System ON at arrival Site secure & as left
* SVE 10 guide rod missing again.

0948 - Collecting PID readings

1026 - Beginning dewater

1133 - Lateral dewater complete
Dewatering deadleys

* SVE 4 and 10 observed by touch to be forcefully vibrating, likely causing the guide rod issue.
Other SVEs either vibrating softly and/or continuously.
Only SVE 5 vibrates comparably forcefully, but does so continuously.

1217 - Notes sent to Gabe for review.

→

Rite in the Rain

10/3/24 | 59° Clear | Jonathan Cronk | T-30 O&M

1245 - Test alarms & float w/ GVS
* Seem to be working now

Systems OFF
* SVE-10 float removed and not replaced

1315 Systems ON
Final measurements taken

Rite in the Rain

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 10/3/24	Field Tech(s): Jonathan Crank		Actual Time: 04:33
PID ID:	Weather: Clear, 52°		HMI Time: 04:17
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	29,494.7	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.4	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	20,362.7	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	20,354.6	Sparge Zone 4 Time Span(s) Operational:	0230-0600, 0830-1200 1430-1800, 2030-2400
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/14.0/50.7	Sparge Zone 5 Time Span(s) Operational:	2330-0300, 0530-0900 1130-1500, 1730-2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52/10.7/94.5	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	78°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5"	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	~0
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.1
AS Blower Discharge Pressure (PSI) - *PI-501*	10	Transfer Pump Discharge Pressure (PSI) - *PI-300*	6
SVE Blower Inlet Temperature (°F) - *TI-200*	66°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.5
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	48	SVE Blower Discharge Temperature (°F) - *TI-400*	100
Knockout Tank Level (Sightglass % Full)[1]	0		
SVE Discharge PID (ppmv)	1.0	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		SVE Compressor Oil Level[3] (% full sightglass)	
DTF in Storage Tank (ft)		WD in Storage Tank[4] (ft)	
Water Volume in Storage Tank[5] (gal)		Spare Volume to LAH float[6] (gal)	
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 10/3/24	Time:
Field Tech(s): JC	PID ID:
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	16	49	30	0.3		SVE-10	–	–	–	–	Float guide rod missing again
HSVE-3	26	59	50	1.1		SVE-9	48	0-2	100	0.3	Frothy brown water in rotameter
SVE-4	41	0-25	100	0.1		SVE-8	–	–	–	–	
SVE-5	40	0-10	↓	0.2	Water in rota.	SVE-6	44	18	100	0.3	
SVE-7	43	23	↓	0.6		HSVE-1	8	64	50	3.7	
Dilution Valve		# Turns Open:									
		Vacuum ("H2O):									

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 10/3/24	Time:
Field Tech(s): JC	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	<0.25	0.25		SVE-10	0.5	1.5	No vacuum, float obstructing rotam; oil sheen
HSVE-3	0.25	0.25		SVE-9	0.25	2.75	Water is clear - not frothy
SVE-4	<0.25	0.5		SVE-8	—	—	
SVE-5	0.25	1.25		SVE-6	0.25	0.25	
SVE-7	0.5	1.5		HSVE-1	0.25	0.25	

Notes:

Abbreviations: Gal = gallons

AECOM

10/3/24

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Jonathan Crank

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23				
AS-24				
AS-25				
AS-26				
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8.5	0		condensed water on rota interior
AS-18	9.5	0		↓
AS-19	9	0?		
AS-20	9.5	0		
AS-21	8.5	0		↓
AS-22	9.5	3.5		
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 10/3/24	Time:
Field Tech(s): JC	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	12	46	30		SVE-10	44	?	60 ~~100~~	
HSVE-3	19	44	50		SVE-9	39	1	100	
SVE-4	36	13	100		SVE-8	-	-	-	
SVE-5	38	4	1		SVE-6	40	15	100	
SVE-7	35	25	V		HSVE-1	4	62	↓	

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 45294
Description MIniRAE 3000
Calibrated 9/30/2024 2:35:47PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-927290
Location Seattle
Department

State Certified
Status Pass
Temp °C 20
Humidity % 39

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Range

Range Acc % 3.0000
Reading Acc % 0.0000
Plus/Minus 0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100 / 100	PPM	100	PPM	102	100	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100 304-403259577-1	Isobutylene (C4H8) 100 PPM	Airgas		304-403259577 -1		6/13/2028

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

T-30 | Jonathan | 51°

10/17/24 Biweekly O&M | Crook | Partly Cloudy, 20 AQI

1023 - JC on site. Site found secured and undisturbed. Systems ON. Error message on HMI on arrival. Gus notified.

1040 - Taking PID measurements. Light rain.

1110 - PID complete. Collecting AJ readings & bagging dewater.

1130 - Moderate rain, leaving paperwork in vehicle to prevent damage. Continuing work.

1255 - Site left in good condition. No changes made from Gus. Systems ON.

Off site

Rite in the Rain.

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 10/17/24	Field Tech(s): JZ		Actual Time: 10:23
PID ID:	Weather: D. Cloudy 51°		HMI Time: 10:08
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	29827.8	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.4	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	20695.8	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	20687.6	Sparge Zone 4 Time Span(s) Operational:	0230-0600, 0830-1200 1430-1800, 2030-2400
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/14.0/51.0	Sparge Zone 5 Time Span(s) Operational:	2330-0300, 0530-0900, 1130-1500, 1730-2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	520/10.6/93.9	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	78°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5.5	SVE Blower Filter Differential Pressure (" H2O) - *DPI-200*	0.0
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H2O) - *FI-200*	1.1
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.5
SVE Blower Inlet Temperature (°F) - *TI-200*	62°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.6
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	48	SVE Blower Discharge Temperature (°F) - *TI-400*	98
Knockout Tank Level (Sightglass % Full)[1]	85		
SVE Discharge PID (ppmv)	1.8	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)		WD in Storage Tank[4] (ft)	
Water Volume in Storage Tank[5] (gal)		Spare Volume to LAH float[6] (gal)	
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 10/17/24	Time:
Field Tech(s): JC	PID ID:
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	16	48	30	0.6	–	SVE-10	51	–	50	0.6	
HSVE-3	26	57	40	2.6	–	SVE-9	46	0 (NS)	100	0.5	Frothy brown water in rota.
SVE-4	40	0-20	100	1.2	Some water in rota.	SVE-8	–	–	–	–	–
SVE-5	39	0-10	↓	2.5	Water in rota. Feather(?) in rota.	SVE-6	44	17	100	0.7	–
SVE-7	40	20	↓	0.4	Some water in rota	HSVE-1	8	64	50	1.2	–

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 10/17/24	Time:
Field Tech(s): JC	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	<0.25	1/4	—	SVE-10	0.25	0.25	—
HSVE-3	<0.25	1/4	—	SVE-9	0.25	3.25	Brown flakes in water LNAPL sheen
SVE-4	0.25	1/2	—	SVE-8	—	—	—
SVE-5	0.25	[illegible]	—	SVE-6	0.25	<0.25	—
SVE-7	0.25	2	—	HSVE-1	<0.25	0.25	—

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30

AS Manifold Readings

Pressure/Flow Readings									
Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2					Zone 4				
AS-7					AS-17	8.5	0	100	—
AS-8					AS-18	9.5	0	|	—
AS-9					AS-19	8.5	1	|	—
AS-10					AS-20	10.0	4.5-6.0	|	—
AS-11					AS-21	8.5	0	|	—
					AS-22	10.0	2.5-4.5 ↓		—
Zone 3					Zone 1				
AS-12					AS-1				
AS-13					AS-2				
AS-14					AS-3				
AS-15					AS-4				
AS-16					AS-5				
					AS-6				
Zone 5									
AS-23									
AS-24									
AS-25									
AS-26									
AS-27									

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 10/17/24	Time: 12:18
Field Tech(s): JC	Weather: Moderate Rain

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	14	48	30	-	SVE-10	47	-	50	
HSVE-3	24	55	40	-	SVE-9	42	8	100	
SVE-4	38	13	100	-	SVE-8	-	-	-	
SVE-5	40	[illegible]	↓	-	SVE-6	44	18	100	
SVE-7	40	25	↓	-	HSVE-1	7	62	50	-

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 41680
Description MiniRAE 3000
Calibrated 10/15/2024 2:45:46PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-923335
Location Seattle
Department

State Certified
Status Pass
Temp °C 20
Humidity % 52

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	89.0	100.9	0.90%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100 304-403259577-1	Isobutylene (C4H8) 100 PPM	Airgas		304-403259577 -1		6/13/2028

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

10-31-24 Jonathan Crank T-30 O&M 45° P. Cloudy, 37 AQI

1000- On site. for routine bi weekly O&M
Ponding ~2" deep on SW corner of system enclosure; both sides of the fence.
Site secured
Systems ON
Collecting system readings

1107- GFCI outlet not providing power.
Gus notified
Attempted • reset & test
• Cycle MPE Power breaker
• Both outlets (top & bottom)
PID unable to be collected exept at pressurized effluent

1128- Starting dewater
Didn't take stack of gloves before event, should have ordered more with Pine.

1230- off site, no changes made.
Systems ON on departure

Rite in the Rain

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 10-31-24	Field Tech(s): Jonathan Crook		Actual Time: 10 22
PID ID:	Weather: 45° P.Cloudy		HMI Time: 10 05
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	30,162.5	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.5	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	21,030.4	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	21,022.3	Sparge Zone 4 Time Span(s) Operational:	0230-0600; 0830-1200 1430-1800; 2030-2400
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/14.2/51.6%	Sparge Zone 5 Time Span(s) Operational:	2330-0300; 0530-0900 1130-1500; 1730-2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	53/10.7/94.2%	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	78	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.0
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	6
SVE Blower Inlet Temperature (°F) - *TI-200*	58	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.6
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	48	SVE Blower Discharge Temperature (°F) - *TI-400*	93
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	~~1.3~~ ppm	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		SVE Compressor Oil Level[3] (% full sightglass)	
DTF in Storage Tank (ft)		WD in Storage Tank[4] (ft)	0.75
Water Volume in Storage Tank[5] (gal)	200	Spare Volume to LAH float[6] (gal)	802
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 10-31-24	Time:
Field Tech(s): JC	PID ID:
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	16	48	30	☆	—	SVE-10	51	—	100	☆	Moderate brown water in rota. Black powder lining walls
HSVE-3	27	55	50	☆	—	SVE-9	46	0-2	↓	☆	Dark brown powder lining walls
SVE-4	40	0-15	100	☆	Light water in rota.	SVE-8	—	—	—	—	—
SVE-5	36	0-10	↓	☆	Moderate water in rota.	SVE-6	44	13	100	☆	Light brown powder lining walls
SVE-7	40	17	↓	☆	—	HSVE-1	10	64	40	☆	

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 10-31-24	Time:
Field Tech(s): JC	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	<0.25	<0.25	—	SVE-10	0.5	0.75	Extremely muddy water, completely opaque
HSVE-3	<0.25	<0.25	—	SVE-9	0.5	1.0	Brown flakes ~1" diameter
SVE-4	0.25	0.5	—	SVE-8	—	—	—
SVE-5	0.5	0.75	—	SVE-6	0.5	0.25	—
SVE-7	0.25	1.5	—	HSVE-1	0.5	0.25	—

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23				
AS-24				
AS-25				
AS-26				
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8.5	0	100	—
AS-18	9.5	0	↓	Water in rota
AS-19	9.0	1.5	↓	↓
AS-20	9.5	4.2	↓	—
AS-21	8.5	0	↓	—
AS-22	9.0	3.5	↓	Brown dust caking rotameter.
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 10-31-24	Time:
Field Tech(s): JC	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	18	48	30		SVE-10	50	–	100	
HSVE-3	26	55	50		SVE-9	44	0	↓	
SVE-4	39	12	100		SVE-8	–	–	–	
SVE-5	34	4	↓		SVE-6	44	17	100	
SVE-7	40	23	↓		HSVE-1	3	64	40	

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 29126
Description MiniRAE 3000 V2.22A
Calibrated 10/28/2024 11:57:44AM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-915425
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 52

Calibration Specifications

Group # 1
Group Name Isobutylene (VOC)
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	100.00	100.10	0.10%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100-304-403100153-1	Isobutylene (C4H8) 100 PPM	Airgas		304-403100153-1		7/25/2028

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

T-30 Jonathan Cronk 11-14-24 Rainy 50's

1030- JC on site Systems ON
Training crane in use, car parked behind enclosure for safety.
Site is clean and secure.
Slight oil sheen to ponded rainwater.

1100 Starting PID readings. Rain intensity has decreased.
GFCI working after reset + test.

1200 Tape measurer used for more accurate WD reading.
Starting Dewater

1245 Offsite, enclosure locked
Systems ON at departure.

Rite in the Rain

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 11-14-24	Field Tech(s): Jonathon Crook		Actual Time: 1135
PID ID:	Weather: Rainy 50s		HMI Time: 1117
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	30497.5	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.6	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	21365.4	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	21357.3	Sparge Zone 4 Time Span(s) Operational:	0230-0600; 0830-1200 1430-1800; 2030-2400
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/14.3/52.0%	Sparge Zone 5 Time Span(s) Operational:	2330-0300; 0530-0900 1130-1500; 1730-2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.6/93.7	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	75	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.0
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.1
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.5
SVE Blower Inlet Temperature (°F) - *TI-200*	55	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.6
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	49	SVE Blower Discharge Temperature (°F) - *TI-400*	90
Knockout Tank Level (Sightglass % Full)[1]	60%		
SVE Discharge PID (ppmv)	0.3	Treated Vapor Discharge PID (ppmv)[2]	
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		SVE Compressor Oil Level[3] (% full sightglass)	
DTF in Storage Tank (ft)	5.92'	WD in Storage Tank[4] (ft)	1'
Water Volume in Storage Tank[5] (gal)	266.7	Spare Volume to LAH float[6] (gal)	
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings									
Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2					Zone 4				
AS-7					AS-17	8.5	0	100	
AS-8					AS-18	9.5	0	↓	
AS-9					AS-19	8.5	1.0		
AS-10					AS-20	9.5	7.0		
AS-11					AS-21	8.5	0		
					AS-22	9.5	3.0	↓	Brown staining
Zone 3					Zone 1				
AS-12					AS-1				
AS-13					AS-2				
AS-14					AS-3				
AS-15					AS-4				
AS-16					AS-5				
					AS-6				
Zone 5									
AS-23									
AS-24									
AS-25			OFF						
AS-26									
AS-27									

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date:	Time:
Field Tech(s):	PID ID:
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	18	48	30	0.5	—	SVE-10	50	~~4~~	50	0.0	Black staining
HSVE-3	28	55	40	0.1	—	SVE-9	46	0	100	0.0	Brown staining
SVE-4	40	10-15	100	0.0	Brown staining	SVE-8	—	—	—	-	—
SVE-5	32	7	|	0.0	Brown staining	SVE-6	46	16	100	0.0	Light brown staining
SVE-7	42	19	↓	0.0	—	HSVE-1	9	65	~~50%~~ 30	0.3	—

Dilution Valve	# Turns Open:		
	Vacuum ("H2O):		

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 11-14	Time:
Field Tech(s): JC	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	0.25	0.25	–	SVE-10	0.25	0.75	Dark, cloudy water Brown/emulsified effluent
HSVE-3	0.25	0.25	–	SVE-9	0.25	0.25	–
SVE-4	0.25	0.5	–	SVE-8	–	–	–
SVE-5	0.25	0.75	–	SVE-6	0.25	0.25	–
SVE-7	0.25	0.75	–	HSVE-1	0.25	0.25	–

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date:					Time:				
Field Tech(s):					Weather:				
**Instructions: Take these readings AFTER dewatering and adjusting vac/flow to limit water production.									
FINAL Vacuum/Flow readings									
Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	18	49	30		SVE-10	50	4	50	
HSVE-3	27	56	40		SVE-9	45	0 NS	100	
SVE-4	41	12	100		SVE-8	-	-	-	
SVE-5	33	6	↓		SVE-6	46	17	100	
SVE-7	40	17	↓		HSVE-1	8	65	50	
Dilution Valve		# Turns Open:							
		Vacuum ("H2O):							
Notes:									

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID R8200
Description MiniRAE 3000
Calibrated 11/11/2024 12:51:47PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-000265
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 53

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	99.00	100.10	0.10%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100-304-403100153-1	Isobutylene (C4H8) 100 PPM	Airgas		304-403100153-1		7/25/2028

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

T-30 11-26-24 Jonathan Cook 40s Cloudy

0930- Site unlocked on arrival
Systems on
Site deemed safe and clean

1040- Top GFCI outlet tested to be open hot
Bottom outlet correct
Starting DID sampling

1145 Off call with Cory and Gus
to discuss GFCI, determined to
be a fault in heat trace plugged
in near storage tank.
Related cable unplugged (Red extension cord)
and GFCI reset. Left ON with orange
cable plugged in.
Gus to notify Paul Kalina and MM

1235 Denator complete
Bucket holding dip-stick PVC found
to be broken & dip-stick on ground.
I speculate from the recent storm.
1236- Updates requested From Gus and
field forms sent
1245 - JC off site. Systems ON on departure.

Rite in the Rain.

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 11-26-24	Field Tech(s): Jonathan Crank		Actual Time: 0945
PID ID:	Weather: 40's; Cloudy		HMI Time: 1028
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	30775.5	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.6	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	21643.4	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	21635.3	Sparge Zone 4 Time Span(s) Operational:	0230-0600; 0830-1200 1430-1800; 2030-2400
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/14.7/53.0	Sparge Zone 5 Time Span(s) Operational:	2330-0300; 0530-0900 1130-1500; 1730-2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.7/94.8	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	76°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	5.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.0
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.1
AS Blower Discharge Pressure (PSI) - *PI-501*	9.0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	6
SVE Blower Inlet Temperature (°F) - *TI-200*	53°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.6
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	52	SVE Blower Discharge Temperature (°F) - *TI-400*	89
Knockout Tank Level (Sightglass % Full)[1]	45 %		
SVE Discharge PID (ppmv)	1.0	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)	~~5.69~~ 5.67'	WD in Storage Tank[4] (ft)	1.25' + 15"
Water Volume in Storage Tank[5] (gal)	—	Spare Volume to LAH float[6] (gal)	—
NOTES: ~22" water in secondary containment, drained to ground			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23				
AS-24				
AS-25				
AS-26				
AS-27				

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17	8.5	0	100	
AS-18	9.5	0		
AS-19	8.5	1.25		
AS-20	9.5	4.0		Instability/Jumping in rotameter ~1/sec
AS-21	8.5	0		
AS-22	9.5	3.0-4.0	↓	Brown powder slightly eased up?
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 11-26-24	Time: 10:10
Field Tech(s): JC	PID ID: 45306
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	20	50	30	0.2	—	SVE-10	55	0	50	0.0	Rod & flow removed previously
HSVE-3	30	57	40	0.3	—	SVE-9	49	0 NS	100	0.1	Brown powder in rotameter more reddish, maybe clogging bottom flow?
SVE-4	46	14	100	0.0	—	SVE-8	—	—	—	—	OFF
SVE-5	47	4-6	↓	0.0	—	SVE-6	46	11	100	0.0	Brown powder thinner than last week
SVE-7	47	10-20	↓	0.0	—	HSVE-1	10	67	50	0.2	—

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 11-26-24	Time: 10:10
Field Tech(s): JC	PID ID: 45306
Weather:	

**Instructions: Take readings down PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	20	50	30	0.2	—	SVE-10	55	↺	50	0.0	Rod & Float removed previously
HSVE-3	30	57	40	0.3	—	SVE-9	49	0 NS	100	0.1	Brown powder in rotameter more reddish, maybe clogging bottom flow?
SVE-4	46	14	100	0.0	—	SVE-8	—	—	—	—	OFF
SVE-5	47	4-6	1	0.0	—	SVE-6	46	11	100	0.0	Brown powder thinner than last week
SVE-7	47	10-20	V	0.0	—	HSVE-1	10	67	50	0.2	—

Dilution Valve	# Turns Open:		
	Vacuum ("H2O):		

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 11-26-24	Time: 1152
Field Tech(s): JC	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	<0.25	0.25	—	SVE-10	0.25	0.75	Frothy, emulsified water Turbid
HSVE-3	<0.25	<0.25	—	SVE-9	0.25	1.0	Slightly turbid
SVE-4	0.25	0.75	—	SVE-8	—	—	off
SVE-5	0.25	0.75	—	SVE-6 (2)	0.5	0.25	—
SVE-7	0.25	2.25	—	HSVE-1	0.25	0.25	—

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 11-26-24	Time:
Field Tech(s): JC	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	18	50			SVE-10	53	✓		
HSVE-3	30	56			SVE-9	50	0 ns		
SVE-4	42	12			SVE-8	—	—	—	—
SVE-5	46	0 ns			SVE-6	48	15		
SVE-7	40	14			HSVE-1	18	68		
Dilution Valve		# Turns Open:							
		Vacuum ("H2O):							

Notes:
No adjustments made

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 45306
Description MIniRae 3000
Calibrated 11/22/2024 12:37:13PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-927248
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 46

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 5.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	96.6	100.0	0.00%	Pass

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100 PPM 304-402150198-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402150198-1		6/23/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

T-30 Jonathan Crank | 43° cloudy 58AQI | 12/11/24

1130- On site, tailgate complete
Systems ON at arrival
Site secured & in good condition
Starting readings collection

1152- All readings nominal, collecting PID ~~collection~~ readings

1226- Readings complete, seem nominal.
Breaking for lunch

1247- Starting dewater

1333- Dewater complete
Calling Gus to discuss readings
Noted that sightglass at O, & constantly emptying

1348- System OFF
Zone 5 set to: 0000-0300, 0500-0800
1000-1300, 1500-1800
2000-2200
Transfer pump functionality confirmed to be working, Source of issue unclear

1400 TC off site. System OFF.

Rite in the Rain

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 12/11/24	Field Tech(s): JC		Actual Time: 1139
PID ID: 36947	Weather: Cloudy 43°		HMI Time: 1222
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	31136.0	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.7	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	22003.9	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	21995.8	Sparge Zone 4 Time Span(s) Operational:	0230-0600; 0830-1200; 1430-1800; 2030-2400
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/14.2/52.0	Sparge Zone 5 Time Span(s) Operational:	0330-0300; 0530-0900 1130-1500; 1730-2100
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.7/94.3	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	76	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	6.0	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.0
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.0
AS Blower Discharge Pressure (PSI) - *PI-501*	9.0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5
SVE Blower Inlet Temperature (°F) - *TI-200*	51	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.7
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	49	SVE Blower Discharge Temperature (°F) - *TI-400*	88°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	0.5	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	—	SVE Compressor Oil Level[3] (% full sightglass)	—
DTF in Storage Tank (ft)		WD in Storage Tank[4] (ft)	1.25'
Water Volume in Storage Tank[5] (gal)	—	Spare Volume to LAH float[6] (gal)	—
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30

SVE Manifold Readings (1 of 3)

Date: 12/11/24	Time:
Field Tech(s): JC	PID ID:
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	17	50	30	0.0	—	SVE-10	50	~~4~~	50	0.1	~~4~~
HSVE-3	26	58	40	0.1	—	SVE-9	48	0 NS	100	0.8	Brown dots on interior rota.
SVE-4	40	0-17	100	0.1	Rod jumping out of bottom socket frequently	SVE-8	—	—	—	—	—
SVE-5	42	7	|	0.1	—	SVE-6	44	14	100	0.4	Thin brown powder, mostly has been cleared by water. Float stuck at first.
SVE-7	42	10-20	V	0.1	—	HSVE-1	9.5	65	50	0.9	—

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 12/11/24	Time:
Field Tech(s): JC	Pump ID:
Weather:	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	0.25	0.25	—	SVE-10	0.5	0.5	Turbid brown water
HSVE-3	0.25	0.25	—	SVE-9	0.25	0.5	—
SVE-4	0.5	0.75	—	SVE-8	—	~~0.5~~ ↑	—
SVE-5	0.25	0.5	—	SVE-6	0.25	<0.25	—
SVE-7	0.25	2.25	—	HSVE-1	0.5	0.25	—

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	9.5	4-6	100	—
AS-24	9.0	35.5	|	—
AS-25	8.0	2.0	|	—
AS-26	9.5	4.0	|	—
AS-27	9.0	4.5	V	-

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

deg F - degrees Fahrenheit

N/A = Not applicable

ppmv = Parts per million volume

PSIG = Pounds per square inch gauge

SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 12/11/24	Time:
Field Tech(s): JZ	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	16	50	30		SVE-10	50	~~0~~	50	
HSVE-3	26	59	40		SVE-9	47	0 WS	100	
SVE-4	40	12	100		SVE-8	—	.	—	
SVE-5	31	6 ~~0~~ WS	1		SVE-6	46	17	100	
SVE-7	33	14	↓		HSVE-1	7	65	↓	

Dilution Valve	# Turns Open:		
	Vacuum ("H2O):		

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
SCFMG = Standard cubic feet per minute gauge

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 36947
Description MIniRae 3000
Calibrated 12/9/2024 4:15:45PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-918817
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 44

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	97.00	99.90	-0.10%	Pass

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044 -1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

12/19/24 T-30 Jonathan Conk 405 Cloudy

0900- On site. Systems ON at arrival.
Gate locked, AECOM hardhat on the ground outside.
Bucket used to store PVC dipstick found out of place and broken.
Recommend new storage option.

0930 Starting to collect readings

0945 GF on site

1237 Biweekly work complete.
Assisting Gus with quarterly work.

Zone 1: 27
Zone 4: 26
Zone 5: 25
Zone 3: 24
Zone 2: 23

1400 Complications with AS 23-27 enhancement.
- Flow ~~restr~~ cannot be increased because increases to pressure both
  1 Push the blower to be unproductive (blower curve affected by age)
  2 Trigger pressure release valve

Rotameters will be left in adjusted state, however increased flow is not expected

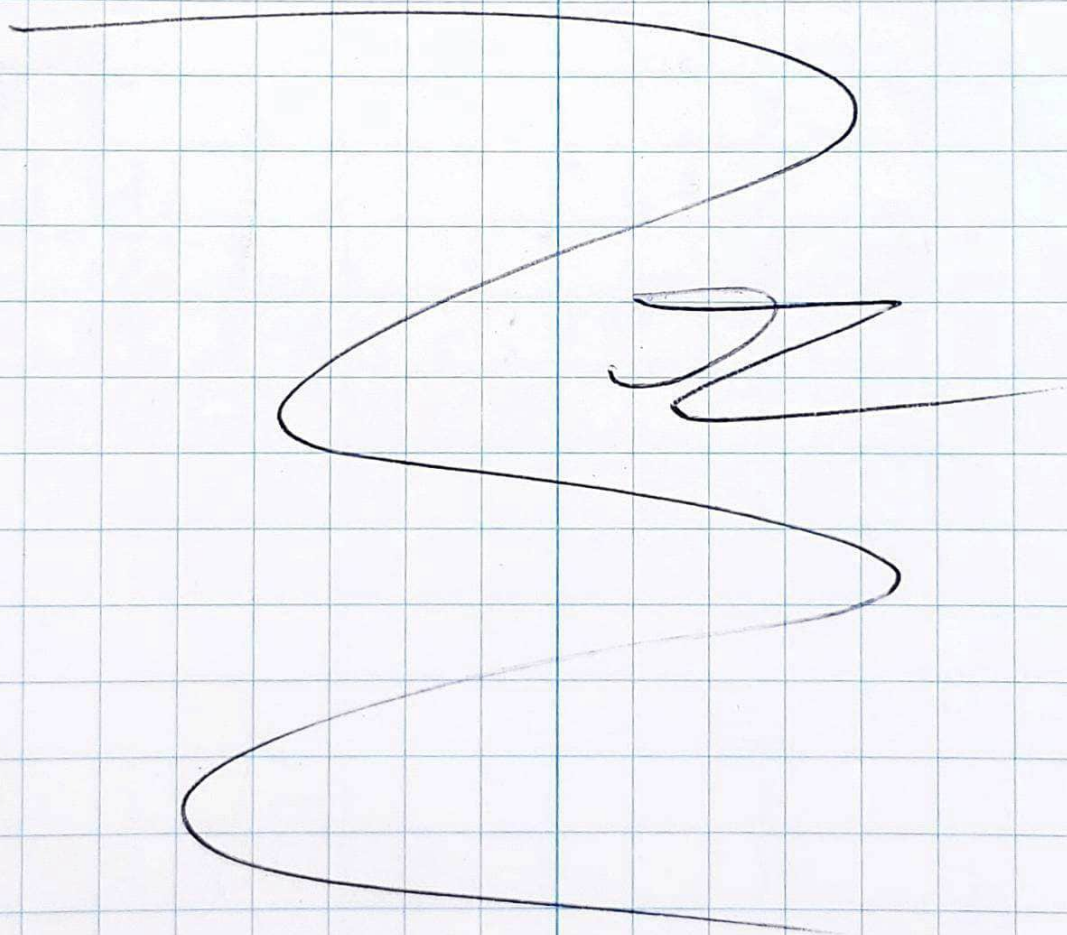
Rite in the Rain

12/19/24 T-30 Jonathan Crank

1420 - DPI 200 adjusted +0.5 "wc
FI 200 no change
DPI 500 no change

~~SVE-7 adjusted +17 "wc~~
SVE-5 adjusted +8 "wc
All others unadjusted

1600 - GF + JC off site
Systems ON



Rite in the Rain.

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	12/16/24	Personnel:	GF + JC

Observations

	Time	Observation Description
1	–	Supplemental notes to JC's regarding AS system troubleshooting.
2		• w/single-zone sparging @ Zone 5 re-initiated we repositioned the Zone 5 wells to each be on its
3		own manifold, allowing pulsing at each well.
4		AS23 → "Zone 2" on arrival 10/3-5 cfm Adjusted 9/4.75 cfm
5		AS24 → "Zone 3" 9/3-6 9/4.0
6		AS25 → No change 8/2.5 8.5/0 *
7		AS26 → "Zone 4" 10/4 8.5/4.5 *
8		AS27 → "Zone 1" 9/4-5 9.5/1.0 *
9		• On arrival, system was pushing 19.5 cfm into
10		the 5 Zone 5 wells, w/ pressures from 8-10 PSI.
11		The updated hose orientations resulted in decreased
12		flow to two of the wells, including AS25, nearest
13		to MW-59. See before & after values above.
14		- called C Braun to troubleshoot. Attempted decreasing
15		the VFD from initial 52 Hz to see if it allowed
16		us to close off the bleed valve. w/ no BV
17		adjustments, it still ran at 45 Hz. At 40 & 35,
18		closing off the BV any more made the pump choke
19		out/sputter to a stop. Even at 45 Hz, closing
20		the BV down more than the original ½ turn resulted
21		in additional air discharge from the pressure
22		relief valve (not desired, hot air from pre-heat
23		exchanger).

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	12/19/24	Personnel:	GF, JC

Observations

	Time	Observation Description
1		- Not sure what else to try. Compressor isn't
2		giving the expected results. Bleed valve seems the
3		likely x-factor.
4		- PRV dog tag indicates its max pressure is
5		8.5 PSI, so it is limiting operation above
6		that (diverting flow, dropping pressure)
7		→ Moving the PRV to after the heat exchanger
8		&/or increasing its max pressure could be
9		a good first step in assessing what needs
10		changed.
11		→ Should also call the compressor vendor (Sutorbilt/
12		Gardner-Denver) to get their thoughts.
13		• Left the system pulsing in the configuration recorded
14		on the following page.
15	1615	• offsite.
16	1706	• Received notification email of Sparge VFD fault.
17		→ JC returned the next day & increased the bleed
18		valve to resolve. (12/20)
19		
20		
21		
22		GF
23		
24		
25		

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information Page 1 of 1

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	50 rain
Date:	12/19/24	Personnel:	GF + JC

Observations

	Time	Observation Description					
1		New sparge well alignment record. Zone 5 wells distributed to the other manifolds.					
2							
3							
4		Manifold	Wells	Flow	Pressure	% open	comp pressure
5		Zone 4	26	4.5	8.5	100	
6			18	0	9.0	100	
7			19	pressure pressures		0	
8			21	drop → 9 psi, no flow		0	
9			22			0	
10		Zone 5	15	3	9.0	50	9.0
11			25	0	8.5	100	
12			17	→ higher pressure		0	
13		Zone 1	27	1.0	9.5	100	9.25
14			2	0	8.5	100	
15			3	—		0	
16			4	—		0	
17			5	—		0	
18			6	—		0	
19		Zone 2	23	4.75	9.0	100	
20			8	0		100	
21			9	—		0	
22			10	—		0	
23			11	3.5	9.0	5	
24		Zone 3	12	—		0	9.75
25			13	3.0	7.5	5	
			14	—		0	
			24	4.0	9.0	100	
			16	—		0	

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information Page 1 of 1

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	50 rain
Date:	12/19/24	Personnel:	GF + JC

Observations

	Time	Observation Description					
1		New sparge well alignment record. Zone 5 wells distributed to the other manifolds.					
2							
3							
4		Manifold	Wells	Flow	Pressure	% open	comp pressure
5		Zone 4	26	4.5	8.5	100	
6			18	0	9.0	100	
7			19	pressure pressures		0	
8			21	drop → 9 psi, no flow		0	
9			22			0	
10		Zone 5	15	3	9.0	50	9.0
11			25	0	8.5	100	
12			17	→ higher pressure		0	
13		Zone 1	27	1.0	9.5	100	9.25
14			2	0	8.5	100	
15			3	—		0	
16			4	—		0	
17			5	—		0	
18			6	—		0	
19		Zone 2	23	4.75	9.0	100	
20			8	0		100	
21			9	—		0	
22			10	—		0	
23			11	3.5	9.0	5	
24		Zone 3	12	—		0	9.75
25			13	3.0	7.5	5	
			14	—		0	
			24	4.0	9.0	100	
			16	—		0	

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 12/19/2024	Field Tech(s): JC + GF		Actual Time: 0937
PID ID:	Weather: Cloudy 40's		HMI Time: 1020
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	31290.3	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	8.7	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	22094.2	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	22086.0	Sparge Zone 4 Time Span(s) Operational:	—
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/14.4/52.9	Sparge Zone 5 Time Span(s) Operational:	0000 - 0300; 0500 - 0800 1000 - 1300; 1500 - 1800; → 2010 - 220
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52/10.7/94.2	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	71	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	~~9.5~~ 5.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.0
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.1
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	5.0
SVE Blower Inlet Temperature (°F) - *TI-200*	57	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.6
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	52	SVE Blower Discharge Temperature (°F) - *TI-400*	90
Knockout Tank Level (Sightglass % Full)[1]	55%		
SVE Discharge PID (ppmv)	0.1	Treated Vapor Discharge PID (ppmv)[2]	—
Other Components			
AS Compressor Oil Level[3] (% full sightglass)		SVE Compressor Oil Level[3] (% full sightglass)	
DTF in Storage Tank (ft)		WD in Storage Tank[4] (ft)	0
Water Volume in Storage Tank[5] (gal)		Spare Volume to LAH float[6] (gal)	
NOTES:			

Abbreviations:

" H_2O = Inches of Water
°F = Degrees Fahrenheit
PSI = Pounds per Square Inch
% = Percent
DTF - Depth to Fluid
DTB - Depth to Bottom
MP - Measuring Point
WD - Water Depth

Notes:

1. Low float = 0% full. Mid float = 100% full.
2. If applicable
3. Oil level should be at the middle of the sightglass **with the machine not operating.**
4. WD = 6.92-DTF OR as measured with the dipstick
   WD at the LAH float = 3.76 ft (1002.8 gal).; WD at the LAHH float = 4.26 ft (1136.1 gal).
5. Water vol = WD*266.7
   The tank holds 266.7 gal/ft (2000 gal; 7.25' dia x 7.5' H)
6. Spare vol to LAH float = 1002.8-current water volume

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (1 of 3)

Date: 12/19/2024	Time:
Field Tech(s): JC + GF	PID ID:
Weather:	

Instructions: Take readings down **PRIOR to dewatering or adjusting vac/flow. Mini knockout allows PID readings to be taken even if water is present in the rotameters.

Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments
HSVE-2	20	51	30	0.0		SVE-10	52	~~V~~	50	0.0	
HSVE-3	30	58	40	0.0		SVE-9	52	0 NS	100	0.0	Dark brown powder coating rota. interior.
SVE-4 •	46	9	100	0.0		SVE-8	—	-	-	-	-
SVE-5	40	4 to 5	↓	0.0		SVE-6	51	17	100	0.0	Brown powder coating rota. interior.
SVE-7 •	39	15	↓	0.0		HSVE-1	10	66	30	0.8	

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (2 of 3)

Date: 12/19/2024	Time:
Field Tech(s): JC	Pump ID:
Weather: Cloudy 40s	

SVE Dewatering

Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments	Well ID	Deadleg Dewater (Gal)	Lateral Stub-up Dewater (Gal)	Comments
HSVE-2	<0.25	0.25		SVE-10	0.25	1.0	Emulsified brown water mixture
HSVE-3	<0.25	0.5		SVE-9	0.25	1.25	Brown flakes ~1" diameter
SVE-4	0.25	0.75		SVE-8	—	—	—
SVE-5	0.25	0.5		SVE-6	0.25	0.25	—
SVE-7	0.5	1.5		HSVE-1	<0.25	0.25	—

Notes:

Abbreviations: Gal = gallons

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Manifold Readings

Pressure/Flow Readings

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7				
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 5				
AS-23	10.0	3-5	100	—
AS-24	9.0	3-6		—
AS-25	8.0	2.5		—
AS-26	10.0	4		—
AS-27	9.0	4-5	✓	—

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
AS-5				
AS-6				

Notes:

Abbreviations:

% = Percent
" H_2O = Inches of water
deg F - degrees Fahrenheit
N/A = Not applicable
ppmv = Parts per million volume
PSIG = Pounds per square inch gauge
SCFMG = Standard cubic feet per minute gauge

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings (3 of 3)

Date: 12/19/24	Time:
Field Tech(s): JC + GF	Weather:

Instructions: Take these readings **AFTER dewatering and adjusting vac/flow to limit water production.

FINAL Vacuum/Flow readings

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
HSVE-2	15	53	30		SVE-10				
HSVE-3	25	62	40		SVE-9				
SVE-4	44	9	100		SVE-8				
SVE-5	20	0 ns	1		SVE-6				
SVE-7			V		HSVE-1				

Dilution Valve	# Turns Open:	
	Vacuum ("H2O):	

Notes:

Abbreviations:

% = Percent

" H_2O = Inches of water

SCFMG = Standard cubic feet per minute gauge

AECOM

AECOM

T-30 Summa Can Vapor Sampling Field Form

Project: Terminal 30 Site Address: 1901 East Marginal Way South, Seattle, WA

Date: 12/19/24 Field Personnel: GF, JC

Weather: 48 cloudy Weather Barometric Pressure (in Hg): 30.08

Sample ID: SVE-EFF-121924 (SVE-EFF-mmddyy)

Sample Port Description: SVE effluent sample port

Conditions at Sample Port:

Pressure (PSI)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.5" wc	92	0.1	

Before Sampling:

	Yes or No (Y/N)
Install clean tubing on the sample port	Y
Purge the tubing (30-60 seconds)	Y

Summa Can Leak Test[1]:

Initial Canister Reading (in-Hg)	Duration of Test (2 min recommended)	Final Canister Reading (in-Hg)
>30	1045 1057 12	>30

[1] For the summa can leak test, connect the flow controller to the can with the cap nut secured. No air should enter the can when the can valve is opened. Once this is confirmed, open the summa can valve and record the initial vacuum. Wait for two minutes and then record the vacuum again. If the two readings do not match there is a leak and a new can and valve should be acquired before sampling.

Sampling Information[2]:

Sample Canister LAB ID	Flow Controller LAB ID	Sample Canister Size	Initial Canister Reading (in-Hg)[3]	Sample Times	Sample Date(s)	Final Canister Reading (in-Hg)[3]
29-MC14	18	1L	>30	Sample Start 1115	12/19/24	5.0
Analyses Requested: TO15-BTEX, APH				Sample End 1120	12/19/24	

[2] The flow controller should be for a 4-5 minute integrated sample

[3] Canisters measured using a standard vacuum gauge

Sample Collection Notes and General Observations:

PORT OF SEATTLE - TERMINAL 30
Megger Testing of Motor Windings

Field Tech(s): GF + JC
Date: 12/19/24
Equipment ID: _____

Baseline Readings (See Note 2)					
	Motor	AS Compressor		SVE Blower	
Motor Wires	Date	Winding Resistance (Ohms)	Insulation Resistance (Megaohms)	Winding Resistance (Ohms)	Insulation Resistance (Megaohms)
G & B	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
G & O	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
G & Y	N/A	N/A (>100.0)	NM	N/A (>100.0)	NM
B & O	N/A	NM	N/A (0.00)	NM	N/A (0.00)
O & Y	N/A	NM	N/A (0.00)	NM	N/A (0.00)
B & Y	N/A	NM	N/A (0.00)	NM	N/A (0.00)

Legend:
G= Ground Wire
B= Brown Wire
O= Orange Wire
Y= Yellow Wire
N/A= Not applicable

Notes:
1. These tests check for a breakdown of insulation within the internal motor windings over time. Use a Megger Model MIT 220.
2. Baseline data is unavailable. Testing was not conducted by CRETE and readings were only initiated once issues with the AS motor were identified.
3. Insulation resistance testing was completed between winding phase at 500 volts over approximately 30 seconds
4. >1,000 Mohm readings generally means you have an open curcuit
5. 0.00 Mohm readings mean that the phase being tested is shorted to Ground
6. Ideally the phase-to-phase winding resistance readings between each phase should be the same or at least very close
7. Phase-to-phase winding resistance readings should not be 0 ohms (i.e. short) or OL (overload) or infinity
8. Generally high resistance readings (greater than 10 Mohms) indicate the motor insulation is good

Motor	AS Compressor Motor						Comments
Test	Winding Resistance			Insulation Resistance			
Motor Wires	B & O	O & Y	B & Y	G & B	G & O	G & Y	
Date/Time	(Ohms)	(Ohms)	(Ohms)	(Megaohms)	(Megaohms)	(Megaohms)	
Baseline	N/A	N/A	N/A	N/A	N/A	N/A	
12/19	1.83	1.84	1.88	0.11	0.12	0.12	

Motor	SVE Blower Motor						Comments
Test	Winding Resistance			Insulation Resistance			
Motor Wires	B & O	O & Y	B & Y	G & B	G & O	G & Y	
Date/Time	(Ohms)	(Ohms)	(Ohms)	(Megaohms)	(Megaohms)	(Megaohms)	
Baseline	N/A	N/A	N/A	N/A	N/A	N/A	
12/19	0.94	0.93	0.92	0.11	0.12	0.12	

AECOM

Field Tech(s): GF + JC

Date: 12/19/24

T-30 Quarterly O&M Checklist

REGULAR TASKS

System ON:

- [X] Zero out mag gauges
- [X] Confirm mag gauges w/ a manometer
- [X] Test AS pressure gauge accuracy (turn zone on and off. All gauges should equilibrate)
- [—] If possible: Check AS pressure on individual well heads in the well field and compare to readings at the manifold

System OFF:

- [X] Test poly tank float switches
- [X] Test KO tank float switches
- [X] Check SVE vac gauges for zeroing
- [X] Scrub out KOT sightglass
- [/] Check particulate filter housing for water accumulation. Empty if needed. Visually inspect filter.
- [X] Megger test SVE & AS motors
- [X] Clean out any garbage/weeds from the system area
- [—] LOTO electrical and tighten wire lugs/terminals on all control and electrical connections inside cabinet
- [/] Exercise all valves (open valves normally closed and then return to original position)

EXTRA TASKS

- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____
- [ ] _____

AECOM

SAMPLE CHAIN OF CUSTODY

Report To Paul Kalina
Company AECOM
Address 1111 3rd Ave Ste 1600
City, State, ZIP Seattle WA 98101
Phone 206-310-5097 Email paul.kalina@aecom.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: Terminal 30

PO #

NOTES:

INVOICE TO

Page # 1 of 1

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Default: Clean following final report delivery
Hold (Fee may apply):

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEX	APH	Chlorinated VOCs	Helium	[redacted]	Notes
				IA / SG								[redacted]				
SVE-EFF-121924		29-MCHV 18		IA / (SG)	12/19/24	730	1115	5.0	1120		X	X				
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Jonathan Cronk	AECOM	12/19/24	1630
Received by:	Liz Webster-Bruya	F?B	12/19/24	1630
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 36947
Description MIniRae 3000
Calibrated 12/16/2024 12:46:08PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-918817
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 45

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	103.00	100.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100PPM 304-402817044-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402817044-1		8/11/2027

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Warren Baxter

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

Appendix B

Vapor Sampling Field Forms

AECOM

T-30 Summa Can Vapor Sampling Field Form

Project: Terminal 30 Site Address: 1901 East Marginal Way South, Seattle, WA

Date: 3/28/24 Field Personnel: AB, GF

Weather: 50° cloudy Weather Barometric Pressure (in Hg): 29.7

Sample ID: SVE-EFF-032824 (INLET/DISCHARGE-mmddyy)

Sample Port Description: SVE effluent

Conditions at Sample Port:

Pressure (PSI)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.0	100	1.8	25108.1

Before Sampling:

	Yes or No (Y/N)
Install clean tubing on the sample port	Y
Purge the tubing (30-60 seconds)	Y

Summa Can Leak Test[1]:

Initial Canister Reading (in-Hg)	Duration of Test (2 min recommended)	Final Canister Reading (in-Hg)
>30	2 min	>30

[1] For the summa can leak test, connect the flow controller to the can with the cap nut secured. No air should enter the can when the can valve is opened. Once this is confirmed, open the summa can valve and record the initial vacuum. Wait for two minutes and then record the vacuum again. If the two readings do not match there is a leak and a new can and valve should be acquired before sampling.

Sampling Information[2]:

Sample Canister LAB ID	Flow Controller LAB ID	Sample Canister Size	Initial Canister Reading (in-Hg)[3]	Sample Times	Sample Date(s)	Final Canister Reading (in-Hg)[3]
3347	71	1L	>30	Sample Start: 1247	3/28	5
Analyses Requested: TO15- BTEX, APH				Sample End: 1252	3/28	

[2] The flow controller should be for a 4-5 minute integrated sample

[3] Canisters measured using a standard vacuum gauge

Sample Collection Notes and General Observations:

Summa Can Sample Sheet

~~DAILY FIELD LOG~~

Project Information

Page 1 of 1

Project Name:	T-30	Location:	
Project/Task No.:		Weather:	
Date:	6/7/24	Personnel:	GF JC

Observations

	Time	Observation Description
1		Can ID : 3671
2		Flow ID : 234
3		Vapor Sample ID: SVE-EFF-060724
4		
5		Leak test :
6		1247, 29.5" Hg
7		1252, 29.5" Hg, no change, passed
8		
9		Sample Port: SVE effluent
10		- pressure: 3.2" WC
11		- Temp: 112° F
12		- New tubing? Yes
13		- 1.1 ppmv via PID
14		
15		Sample Start: 1302
16		initial vac 29.5" Hg
17		Sample End: 1309
18		final vac: 5.0" Hg
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

AECOM

T-30 Summa Can Vapor Sampling Field Form

Project: Terminal 30 Site Address: 1901 East Marginal Way South, Seattle, WA

Date: 9/20/24 Field Personnel: GF & JC

Weather: 57° cloudy Weather Barometric Pressure (in Hg): 30.15

Sample ID: SVE-EFF-092024 (SVE-EFF-mmddyy)

Sample Port Description: SVE effluent

Conditions at Sample Port:

Pressure ~~(PSI)~~	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.7 "wc	110	9.3	29188.6

Before Sampling:

	Yes or No (Y/N)
Install clean tubing on the sample port	Y
Purge the tubing (30-60 seconds)	Y

Summa Can Leak Test[1]:

Initial Canister Reading (in-Hg)	Duration of Test (2 min recommended)	Final Canister Reading (in-Hg)
29.5	10:42 - 10:47	29.5 ✓

[1] For the summa can leak test, connect the flow controller to the can with the cap nut secured. No air should enter the can when the can valve is opened. Once this is confirmed, open the summa can valve and record the initial vacuum. Wait for two minutes and then record the vacuum again. If the two readings do not match there is a leak and a new can and valve should be acquired before sampling.

Sampling Information[2]:

Sample Canister LAB ID	Flow Controller LAB ID	Sample Canister Size	Initial Canister Reading (in-Hg)[3]	Sample Times	Sample Date(s)	Final Canister Reading (in-Hg)[3]
9568	35	1L	29.5	Sample Start: 1405	9/20/24	5.0
Analyses Requested: TO15 BTEX, APH				Sample End: 1411	9/20/24	

[2] The flow controller should be for a 4-5 minute integrated sample

[3] Canisters measured using a standard vacuum gauge

Sample Collection Notes and General Observations:

Also filled a tedlar for CH_4, CO_2, & O_2. Same sample ID. Sampled @ 1413

AECOM

T-30 Summa Can Vapor Sampling Field Form

Project: Terminal 30 Site Address: 1901 East Marginal Way South, Seattle, WA

Date: 12/19/24 Field Personnel: GF, JC

Weather: 48 cloudy Weather Barometric Pressure (in Hg): 30.08

Sample ID: SVE-EFF-121924 (SVE-EFF-mmddyy)

Sample Port Description: SVE effluent sample port

Conditions at Sample Port:

Pressure (PSI)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.5" wc	92	0.1	

Before Sampling:

	Yes or No (Y/N)
Install clean tubing on the sample port	Y
Purge the tubing (30-60 seconds)	Y

Summa Can Leak Test[1]:

Initial Canister Reading (in-Hg)	Duration of Test (2 min recommended)	Final Canister Reading (in-Hg)
>30	1045 1057 12	>30

[1] For the summa can leak test, connect the flow controller to the can with the cap nut secured. No air should enter the can when the can valve is opened. Once this is confirmed, open the summa can valve and record the initial vacuum. Wait for two minutes and then record the vacuum again. If the two readings do not match there is a leak and a new can and valve should be acquired before sampling.

Sampling Information[2]:

Sample Canister LAB ID	Flow Controller LAB ID	Sample Canister Size	Initial Canister Reading (in-Hg)[3]	Sample Times	Sample Date(s)	Final Canister Reading (in-Hg)[3]
29-MC14	18	1L	>30	Sample Start 1115	12/19/24	5.0
Analyses Requested: TO15-BTEX, APH				Sample End 1120	12/19/24	

[2] The flow controller should be for a 4-5 minute integrated sample

[3] Canisters measured using a standard vacuum gauge

Sample Collection Notes and General Observations:

Appendix C

Vapor Sampling

Laboratory Analytical Reports

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

April 12, 2024

Paul Kalina, Project Manager
AECOM
1111 3rd Ave, Suite 1600
Seattle, WA 98101

Dear Mr Kalina:

Included are the results from the testing of material submitted on March 28, 2024 from the T-30 60681370, F&BI 403444 project. There are 8 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
AEC0412R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 28, 2024 by Friedman & Bruya, Inc. from the AECOM T-30 60681370, F&BI 403444 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
403444 -01	SVE-EFF-032824

Non-petroleum compounds identified in the air phase hydrocarbon (APH) ranges were subtracted per the MA-APH method.

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVE-EFF-032824	Client:	AECOM
Date Received:	03/28/24	Project:	T-30 60681370, F&BI 403444
Date Collected:	03/28/24	Lab ID:	403444-01 1/5.0
Date Analyzed:	04/08/24	Data File:	040814.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	2,800
APH EC9-12 aliphatics	960
APH EC9-10 aromatics	<120

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370, F&BI 403444
Date Collected:	Not Applicable	Lab ID:	04-0773 mb
Date Analyzed:	04/08/24	Data File:	040813.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<75
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVE-EFF-032824	Client:	AECOM
Date Received:	03/28/24	Project:	T-30 60681370, F&BI 403444
Date Collected:	03/28/24	Lab ID:	403444-01 1/5.0
Date Analyzed:	04/08/24	Data File:	040814.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<1.6	<0.5
Toluene	<38	<10
Ethylbenzene	<2.2	<0.5
m,p-Xylene	<4.3	<1
o-Xylene	<2.2	<0.5

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370, F&BI 403444
Date Collected:	Not Applicable	Lab ID:	04-0773 mb
Date Analyzed:	04/08/24	Data File:	040813.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.32	<0.1
Toluene	<7.5	<2
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1

Date of Report: 04/12/24
Date Received: 03/28/24
Project: T-30 60681370, F&BI 403444

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 403444-01 1/5.0 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	2,800	2,800	0
APH EC9-12 aliphatics	ug/m3	960	890	8
APH EC9-10 aromatics	ug/m3	<120	<120	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	111	70-130
APH EC9-12 aliphatics	ug/m3	67	124	70-130
APH EC9-10 aromatics	ug/m3	67	88	70-130

Date of Report: 04/12/24
Date Received: 03/28/24
Project: T-30 60681370, F&BI 403444

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 403444-01 1/5.0 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.6	<1.6	nm
Toluene	ug/m3	<38	<38	nm
Ethylbenzene	ug/m3	<2.2	<2.2	nm
m,p-Xylene	ug/m3	<4.3	<4.3	nm
o-Xylene	ug/m3	<2.2	<2.2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	100	70-130
Toluene	ug/m3	51	101	70-130
Ethylbenzene	ug/m3	59	101	70-130
m,p-Xylene	ug/m3	120	101	70-130
o-Xylene	ug/m3	59	105	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

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

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

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

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

vo - The value reported fell outside the control limits established for this analyte.

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

403444

SAMPLE CHAIN OF CUSTODY

03/28/24

Report To Paul Kalina
Company AECOM
Address 1111 Third Avenue, #1600
City, State, ZIP Seattle, WA 98101
Phone 206-310-5097 Email paul.kalina@aecom.com

SAMPLERS (*signature*) Austin Bragg

PROJECT NAME & ADDRESS: T-30

PO # 60681370

NOTES:

INVOICE TO

Page # 1 of 1

TURNAROUND TIME
Standard
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Default: Clean following final report delivery
Hold (Fee may apply):

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium	TO15-6BTEX	Notes
SVE-EFF-032824	01	3347	71	IA / (SG)	03/28/24	730	1247	5	1252				X		X	BTEX ms 3/28/24
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												Samples received at 20 °C
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Austin Bragg	Austin Bragg	AECOM	3/28/24	1455
Received by: Nhan Pham	Nhan Pham	FEBI	3/28/24	1455
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

June 24, 2024

Paul Kalina, Project Manager
AECOM
1111 3rd Ave, Suite 1600
Seattle, WA 98101

Dear Mr Kalina:

Included are the results from the testing of material submitted on June 7, 2024 from the T-30 60681370, F&BI 406108 project. There are 8 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
AEC0624R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on June 7, 2024 by Friedman & Bruya, Inc. from the AECOM T-30 60681370, F&BI 406108 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
406108 -01	SVE-EFF-060724

Non-petroleum compounds identified in the air phase hydrocarbon (APH) ranges were subtracted per the MA-APH method.

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVE-EFF-060724	Client:	AECOM
Date Received:	06/07/24	Project:	T-30 60681370, F&BI 406108
Date Collected:	06/07/24	Lab ID:	406108-01 1/8.1
Date Analyzed:	06/19/24	Data File:	061923.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	1,600
APH EC9-12 aliphatics	660
APH EC9-10 aromatics	<200

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370, F&BI 406108
Date Collected:	Not Applicable	Lab ID:	04-1317 MB
Date Analyzed:	06/19/24	Data File:	061911.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	86	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<75
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVE-EFF-060724	Client:	AECOM
Date Received:	06/07/24	Project:	T-30 60681370, F&BI 406108
Date Collected:	06/07/24	Lab ID:	406108-01 1/8.1
Date Analyzed:	06/19/24	Data File:	061923.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<2.6	<0.81
Toluene	<61	<16
Ethylbenzene	<3.5	<0.81
m,p-Xylene	<7	<1.6
o-Xylene	<3.5	<0.81

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370, F&BI 406108
Date Collected:	Not Applicable	Lab ID:	04-1317 MB
Date Analyzed:	06/19/24	Data File:	061911.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	88	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.32	<0.1
Toluene	<7.5	<2
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1

Date of Report: 06/24/24
Date Received: 06/07/24
Project: T-30 60681370, F&BI 406108

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 406179-01 1/5.6 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	590	560	5
APH EC9-12 aliphatics	ug/m3	<140	<140	nm
APH EC9-10 aromatics	ug/m3	<140	<140	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	98	70-130
APH EC9-12 aliphatics	ug/m3	67	115	70-130
APH EC9-10 aromatics	ug/m3	67	105	70-130

Date of Report: 06/24/24
Date Received: 06/07/24
Project: T-30 60681370, F&BI 406108

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 406179-01 1/5.6 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.8	<1.8	nm
Toluene	ug/m3	<42	<42	nm
Ethylbenzene	ug/m3	3.9	3.9	0
m,p-Xylene	ug/m3	13	13	0
o-Xylene	ug/m3	5.6	5.5	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	113	70-130
Toluene	ug/m3	51	119	70-130
Ethylbenzene	ug/m3	59	121	70-130
m,p-Xylene	ug/m3	120	121	70-130
o-Xylene	ug/m3	59	129	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

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

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

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

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

vo - The value reported fell outside the control limits established for this analyte.

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

406108

SAMPLE CHAIN OF CUSTODY

06/07/24 —

Page # 1 of 1

Report To Paul Kalina
Company AECOM
Address 1111 3rd Ave Ste 1600
City, State, ZIP Seattle WA 98101
Phone 206-310-5097 Email paul.kalina@aecom.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: T-30

PO #

NOTES:

INVOICE TO

TURNAROUND TIME
Standard
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Default: Clean following final report delivery
Hold (Fee may apply):

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEX	TO15 cVOCs	APH	Helium		Notes
SVE-EFF-060724	01	3671	234	IA / (SG)	06/7/24	29.5	1302	5	1309		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG							Samples received at 22 °C					
				IA / SG												
				IA / SG												
				IA / SG												

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Jonathan Cronk	AECOM	06/07/24	15:46
Received by:	ANH PHAN	F&B	06/07/24	15:46
Relinquished by:				
Received by:				

FORMS\COC\COCTO-15.DOC

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 406108 CLIENT ~~DOF~~ AECOM INITIALS/ DATE: AP 06/07/24

If custody seals are present on cooler, are they intact? ☒ NA ☐ YES ☐ NO

Cooler/Sample temperature _____ °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☐ YES ☒ NO

How did samples arrive?
☒ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☒ YES ☐ NO Initials/ Date: AP 06/07/24
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 0 days

Are the samples clearly identified? (explain "no" answer below) ☒ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☒ YES ☐ NO

Were appropriate sample containers used? ☒ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☒ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☐ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's	☒ Yes ☐ No	☐ Not on COC/label
Date Sampled	☒ Yes ☐ No	☐ Not on COC/label
Time Sampled	☒ Yes ☐ No	☐ Not on COC/label
# of Containers	☒ Yes ☐ No	
Relinquished	☒ Yes ☐ No	
Requested analysis	☒ Yes ☐ On Hold	

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☐ NA ☐ YES ☒ NO

Number of unused TO15 canisters _____ **Number of unused TO17 tubes** _____

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

October 7, 2024

Paul Kalina, Project Manager
AECOM
1111 3rd Ave, Suite 1600
Seattle, WA 98101

Dear Mr Kalina:

Included are the results from the testing of material submitted on September 20, 2024 from the T-30 60681370, F&BI 409330 project. There are 8 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
AEC1007R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 20, 2024 by Friedman & Bruya, Inc. from the AECOM T-30 60681370, F&BI 409330 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
409330 -01	SVE-EFF-092024
409330 -02	SVE-EFF-092024

The sample was sent to Alliance Technical Group for major gases analysis. The report is enclosed.

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVE-EFF-092024	Client:	AECOM
Date Received:	09/20/24	Project:	T-30 60681370, F&BI 409330
Date Collected:	09/20/24	Lab ID:	409330-01 1/8.2
Date Analyzed:	09/28/24	Data File:	092726.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	5,500
APH EC9-12 aliphatics	4,900
APH EC9-10 aromatics	<200

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370, F&BI 409330
Date Collected:	Not Applicable	Lab ID:	04-2228 mb
Date Analyzed:	09/27/24	Data File:	092712.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<75
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVE-EFF-092024	Client:	AECOM
Date Received:	09/20/24	Project:	T-30 60681370, F&BI 409330
Date Collected:	09/20/24	Lab ID:	409330-01 1/8.2
Date Analyzed:	09/28/24	Data File:	092726.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<2.6	<0.82
Toluene	<62	<16
Ethylbenzene	<3.6	<0.82
m,p-Xylene	<7.1	<1.6
o-Xylene	<3.6	<0.82

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370, F&BI 409330
Date Collected:	Not Applicable	Lab ID:	04-2228 mb
Date Analyzed:	09/27/24	Data File:	092712.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.32	<0.1
Toluene	<7.5	<2
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1

Date of Report: 10/07/24
Date Received: 09/20/24
Project: T-30 60681370, F&BI 409330

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 409324-01 1/5.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	450	410	9
APH EC9-12 aliphatics	ug/m3	290	310	7
APH EC9-10 aromatics	ug/m3	<140	<140	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	85	70-130
APH EC9-12 aliphatics	ug/m3	67	95	70-130
APH EC9-10 aromatics	ug/m3	67	89	70-130

Date of Report: 10/07/24
Date Received: 09/20/24
Project: T-30 60681370, F&BI 409330

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 409324-01 1/5.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.8	<1.8	nm
Toluene	ug/m3	<43	<43	nm
Ethylbenzene	ug/m3	<2.5	<2.5	nm
m,p-Xylene	ug/m3	<5	<5	nm
o-Xylene	ug/m3	<2.5	<2.5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	104	70-130
Toluene	ug/m3	51	109	70-130
Ethylbenzene	ug/m3	59	114	70-130
m,p-Xylene	ug/m3	120	108	70-130
o-Xylene	ug/m3	59	115	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

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

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

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

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

vo - The value reported fell outside the control limits established for this analyte.

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

~~20~~ · 409330

SAMPLE CHAIN OF CUSTODY 09/20/24

Page # 1 of 1

Report To Paul Kalina
Company AECOM
Address 1111 3rd Ave
City, State, ZIP Seattle WA 98101
Phone 2063105097 Email Paul.Kalina@aecom.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: T-30

PO #

NOTES:

INVOICE TO

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Default: Clean following final report delivery
Hold (Fee may apply):

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEX	APH	Chlorinated VOCs	Helium	CH_4, CO_2, O_2	Notes
SVE-EFF-092024	01	9564	35	IA / (SG)	9/20/24	29.5	1405	5.0	1411		x	x				
SVE-EFF-092024	02	Tedlar	-	IA / (SG)	9/20/24	—	—	—	1413						x	Tedlar
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG						Samples received at 21 °C						
				IA / SG												

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Jonathan Crank	AECOM	9/20/24	14:58
Received by:	Nhan Phan	FB&T	9/20/24	1458
Relinquished by:				
Received by:				

FORMS\COC\COCTO-15.DOC

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 409330 CLIENT AECOM INITIALS/DATE: (NP) 9/20/24

If custody seals are present on cooler, are they intact? ☑ NA ☐ YES ☐ NO

Cooler/Sample temperature 2/ °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☐ YES ☑ NO

How did samples arrive?
☑ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☑ YES ☐ NO Initials/Date: (NP) 9/20/24
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 0 days

Are the samples clearly identified? (explain "no" answer below) ☑ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☑ YES ☐ NO

Were appropriate sample containers used? ☑ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☑ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☑ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's	☑ Yes	☐ No	☐ Not on COC/label
Date Sampled	☑ Yes	☐ No	☐ Not on COC/label
Time Sampled	☑ Yes	☐ No	☐ Not on COC/label
# of Containers	☑ Yes	☐ No	
Relinquished	☑ Yes	☐ No	
Requested analysis	☑ Yes	☐ On Hold	

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☑ NA ☐ YES ☐ NO

Number of unused TO15 canisters _____ **Number of unused TO17 tubes** _____

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

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

RE: 409330,
Work Order Number: 2409406

September 30, 2024

Attention Michael Erdahl:

Fremont Analytical, Inc, an Alliance Technical Group company, received 1 sample(s) on 9/23/2024 for the analyses presented in the following report.

Major Gases by EPA Method 3C

All analyses were performed according to our accredited Quality Assurance program. Please contact the laboratory if you should have any questions about the results.

Please note, while the appearance of our logo and branding will update, our commitment to accuracy, speed, and customer service remain values celebrated and shared by Alliance Technical Group. Thank you for the opportunity to serve you.

Sincerely,

Brianna Barnes
Project Manager

Date: *09/30/2024*

CLIENT: Friedman & Bruya
Project: 409330
Work Order: 2409406

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2409406-001	SVE-EFF-092024	09/20/2024 2:13 PM	09/23/2024 9:49 AM

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

Original

Case Narrative

WO#: **2409406**

Date: **9/30/2024**

CLIENT: Friedman & Bruya

Project: 409330

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Major gases are reported as % ratio of the Major Gases analyzed (Carbon dioxide, Carbon Monoxide, Methane, Nitrogen, Oxygen and Hydrogen).

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS). The LCS is processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

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

Note: The estimated BTU calculation is based off of the methane result.

Qualifiers:

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

Acronyms:

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

Analytical Report

Work Order: **2409406**
Date Reported: **9/30/2024**

CLIENT: Friedman & Bruya
Project: 409330

Lab ID: 2409406-001 **Collection Date:** 9/20/2024 2:13:00 PM
Client Sample ID: **SVE-EFF-092024** **Matrix:** Air

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Major Gases by EPA Method 3C				Batch ID: R94620		Analyst: CO
Carbon Dioxide	2.82	0.0500		%	1	9/23/2024 12:55:00 PM
Carbon Monoxide	ND	0.0500		%	1	9/23/2024 12:55:00 PM
Methane	ND	0.0500		%	1	9/23/2024 12:55:00 PM
Nitrogen	78.4	0.0500		%	1	9/23/2024 12:55:00 PM
Oxygen	18.7	0.0500		%	1	9/23/2024 12:55:00 PM
Hydrogen	ND	0.0500		%	1	9/23/2024 12:55:00 PM
BTU	ND			BTU/ft^3	1	9/23/2024 12:55:00 PM

Work Order: 2409406
CLIENT: Friedman & Bruya
Project: 409330

QC SUMMARY REPORT

Major Gases by EPA Method 3C

Sample ID: **LCS-R94620** SampType: **LCS** Units: **%** Prep Date: **9/23/2024** RunNo: **94620**
Client ID: **LCSW** Batch ID: **R94620** Analysis Date: **9/23/2024** SeqNo: **1975936**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Carbon Dioxide	99.2	0.0500	100.0	0	99.2	90	110				
Carbon Monoxide	99.2	0.0500	100.0	0	99.2	90	110				
Methane	99.0	0.0500	100.0	0	99.0	90	110				
Nitrogen	99.6	0.0500	100.0	0	99.6	90	110				
Oxygen	99.4	0.0500	100.0	0	99.4	90	110				
Hydrogen	101	0.0500	100.0	0	101	90	110				

Sample ID: **2409406-001AREP** SampType: **REP** Units: **%** Prep Date: **9/23/2024** RunNo: **94620**
Client ID: **SVE-EFF-092024** Batch ID: **R94620** Analysis Date: **9/23/2024** SeqNo: **1975935**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Carbon Dioxide	2.81	0.0500						2.820	0.446	30	
Carbon Monoxide	ND	0.0500						0		30	
Methane	ND	0.0500						0		30	
Nitrogen	78.3	0.0500						78.45	0.185	30	
Oxygen	18.9	0.0500						18.73	0.837	30	
Hydrogen	ND	0.0500						0		30	
BTU	ND							0	0	30	

Sample Log-In Check List

Client Name:	FB	Work Order Number:	2409406
Logged by:	Morgan Wilson	Date Received:	9/23/2024 9:49:00 AM

Chain of Custody

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

Log In

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

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

17. Additional remarks:

Item Information

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2409406

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 5500 4th Ave S

City, State, ZIP Seattle, WA 98108

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER
Alliance Technical Group

PROJECT NAME/NO.	PO #
409330	E-416

REMARKS
EQuIS

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

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: major gases										Notes
SVE-EFF-092024		9/20/2024	1413	vapor	1	x										

Short Hold Time

Friedman & Bruya, Inc. 3012 16th Avenue West Seattle, WA 98119-2029 Ph. (206) 285-8282 Fax (206) 283-5044	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
	~~Relinquished by:~~	Michael Erdahl	Friedman & Bruya	9/23/24	0745AM
	Received by:	Nathan Koffler	ATG	9/23/24	949
	Relinquished by:				
	Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

January 6, 2025

Paul Kalina, Project Manager
AECOM
1111 3rd Ave, Suite 1600
Seattle, WA 98101

Dear Mr Kalina:

Included are the results from the testing of material submitted on December 19, 2024 from the Terminal 30 60681370, F&BI 412383 project. There are 8 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
AEC0106R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 19, 2024 by Friedman & Bruya, Inc. from the AECOM Terminal 30 60681370, F&BI 412383 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
412383 -01	SVE-EFF-121924

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVE-EFF-121924	Client:	AECOM
Date Received:	12/19/24	Project:	Terminal 30, F&BI 412383
Date Collected:	12/19/24	Lab ID:	412383-01 1/5.0
Date Analyzed:	12/28/24	Data File:	122721.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	980
APH EC9-12 aliphatics	820
APH EC9-10 aromatics	<120

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	Terminal 30, F&BI 412383
Date Collected:	Not Applicable	Lab ID:	04-3166 mb
Date Analyzed:	12/27/24	Data File:	122711.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	85	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<75
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVE-EFF-121924	Client:	AECOM
Date Received:	12/19/24	Project:	Terminal 30, F&BI 412383
Date Collected:	12/19/24	Lab ID:	412383-01 1/5.0
Date Analyzed:	12/28/24	Data File:	122721.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<1.6	<0.5
Toluene	<38	<10
Ethylbenzene	<2.2	<0.5
m,p-Xylene	<4.3	<1
o-Xylene	<2.2	<0.5

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	Terminal 30, F&BI 412383
Date Collected:	Not Applicable	Lab ID:	04-3166 mb
Date Analyzed:	12/27/24	Data File:	122711.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	90	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.32	<0.1
Toluene	<7.5	<2
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1

Date of Report: 01/06/25
Date Received: 12/19/24
Project: Terminal 30 60681370, F&BI 412383

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 412409-01 1/5.6 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	420	<420	nm
APH EC9-12 aliphatics	ug/m3	<140	<140	nm
APH EC9-10 aromatics	ug/m3	<140	<140	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	106	70-130
APH EC9-12 aliphatics	ug/m3	67	117	70-130
APH EC9-10 aromatics	ug/m3	67	93	70-130

Date of Report: 01/06/25
Date Received: 12/19/24
Project: Terminal 30 60681370, F&BI 412383

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 412409-01 1/5.6 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 25)
Benzene	ug/m3	<1.8	<1.8	nm
Toluene	ug/m3	<42	<42	nm
Ethylbenzene	ug/m3	<2.4	<2.4	nm
m,p-Xylene	ug/m3	<4.9	<4.9	nm
o-Xylene	ug/m3	<2.4	<2.4	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	104	70-130
Toluene	ug/m3	51	108	70-130
Ethylbenzene	ug/m3	59	112	70-130
m,p-Xylene	ug/m3	120	104	70-130
o-Xylene	ug/m3	59	119	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

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

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

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported between the method detection limit and the lowest calibration point. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

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

vo - The value reported fell outside the control limits established for this analyte.

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

412383

SAMPLE CHAIN OF CUSTODY 12/19/24

Page # 1 of 1

Report To [redacted] Paul Karlina

Company AECOM

Address 1111 3rd Ave Ste 1600

City, State, ZIP Seattle WA 98101

Phone 206-310-5097 Email paul.karlina@aecom.com

SAMPLERS (*signature*) [redacted]

PROJECT NAME & ADDRESS: Terminal 30

PO #:

NOTES:

INVOICE TO:

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Default: Clean following final report delivery
Hold (Fee may apply):

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEX [redacted]	APH	Chlorinated VOCs	Helium	[redacted]	Notes
				IA / SG								[redacted]				
SVE-EFF-121924	01	2G-MCIV 18		IA / (SG)	12/19/24	730	1115	5.0	1120		X	X				Canister #2300 (WP) 12/20
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												Samples received at 22°C
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Jonathan Cronk	AECOM	12/19/24	1630
Received by:	Liz Webster-Bruya	F?B	12/19/24	1630
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 412383 CLIENT AECOM INITIALS/ DATE: EMB 12/19

If custody seals are present on cooler, are they intact? ☒ NA ☐ YES ☐ NO

Cooler/Sample temperature 22 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☐ YES ☒ NO

How did samples arrive?
☒ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☒ YES ☐ NO Initials/ Date: JB 12/20
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 0 days

Are the samples clearly identified? (explain "no" answer below) ☒ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☒ YES ☐ NO

Were appropriate sample containers used? ☑ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☑ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☒ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's	☑ Yes	☐ No	☐ Not on COC/label
Date Sampled	☑ Yes	☐ No	☐ Not on COC/label
Time Sampled	☒ Yes	☐ No	☒ Not on COC/label
# of Containers	☒ Yes	☐ No	
Relinquished	☒ Yes	☐ No	
Requested analysis	☒ Yes	☐ On Hold	

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☐ NA ☐ YES ☐ NO

Number of unused TO15 canisters _____ Number of unused TO17 tubes _____

Appendix D

Vapor Sampling Summary

Data Quality Review Reports

AECOM
1111 3rd Ave
Suite 1600
Seattle, WA 98101
www.aecom.com

206 438 2700 tel
866 495 5288 fax

Memorandum

To	Paul Kalina, Project Manager	Info	Final
Subject	Summary Data Quality Review Port of Seattle – T-30 Vapor Sampling – March 2024		
From	Lucy Panteleeff, Chemist Chelsey Cook, Chemist		
Date	July 31, 2024		

The summary data quality review of one vapor sample collected on March 28, 2024, has been completed. The sample was analyzed at Friedman & Bruya, Inc. located in Seattle, Washington for Air-phase Petroleum Hydrocarbons (APHs) by Massachusetts Department of Environmental Protection Method MA-APH and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method TO-15. The laboratory provided a summary report containing sample results and associated quality assurance (QA) and quality control (QC) data for all samples. The following samples are associated with Friedman & Bruya, Inc. laboratory group 403444:

Sample ID	Laboratory ID	Requested Analyses
SVE-EFF-032824	403444-01	APH, BTEX

Data were evaluated based on validation criteria established in the *National Functional Guidelines for Organic Superfund Methods Data Review*, November 2020.

The following data components were reviewed during the limited data validation procedure for compliance with method specific or laboratory control charted criteria where appropriate: chain of custody forms, holding times, method blanks, surrogate recoveries, matrix spike and/or matrix spike duplicate recoveries, laboratory and field duplicate results, laboratory control sample and/or laboratory control sample duplicate recoveries, reporting limits, and electronic data deliverables.

A summary of qualifiers that may be assigned to results in this laboratory group are included in Table 1. Qualifiers that may be assigned to results include:

- U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
- DNR - Do Not Report. Another result is available that is more reliable or appropriate.

AECOM

Summary Data Quality Review
Port of Seattle - T-30
Vapor Sampling – March 2024
Laboratory Group: 403444

Sample Receipt

Upon receipt by the laboratory, the sample container information was compared to the chain-of-custody (COC). No discrepancies related to sample identification were noted by the laboratory.

Organic Analyses

The sample was analyzed for APHs and BTEX by the methods described in the introduction of this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable

3. Surrogates – Acceptable

4. Laboratory Control Sample (LCS) – Acceptable

5. Laboratory Duplicate – Acceptable

   General – Laboratory duplicates for both analyses were performed using SVE-EFF-032824. Results were comparable.

6. Reporting Limits – Acceptable

   General – Reporting limits for one or more analytes reported as not detected were raised due to dilution and/or sample cannister pressure.

Overall Assessment of Data

The data reported in this laboratory group are usable for meeting project objectives. The completeness for Friedman & Bruya, Inc. laboratory group 403444 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
No Data Qualifiers Were Assigned Based on this Data Review.					

AECOM
1111 3rd Ave
Suite 1600
Seattle, WA 98101
www.aecom.com

206 438 2700 tel
866 495 5288 fax

Memorandum

To	Paul Kalina, Project Manager	Info	Final
Subject	Summary Data Quality Review Port of Seattle – T-30 Vapor Sampling – June 2024		
From	Lucy Panteleeff, Chemist Chelsey Cook, Chemist		
Date	July 31, 2024		

The summary data quality review of one vapor sample collected on June 7, 2024, has been completed. The sample was analyzed at Friedman & Bruya, Inc. located in Seattle, Washington for Air-phase Petroleum Hydrocarbons (APHs) by Massachusetts Department of Environmental Protection Method MA-APH and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method TO-15. The laboratory provided summary reports containing sample results and associated quality assurance (QA) and quality control (QC) data for all samples. The following samples are associated with Friedman & Bruya, Inc. laboratory group 406108:

Sample ID	Laboratory ID	Requested Analyses
SVE-EFF-060724	406108-01	APH, BTEX

Data were evaluated based on validation criteria established in the *National Functional Guidelines for Organic Superfund Methods Data Review*, November 2020.

The following data components were reviewed during the limited data validation procedure for compliance with method specific or laboratory control charted criteria where appropriate: chain of custody forms, holding times, method blanks, surrogate recoveries, matrix spike and/or matrix spike duplicate recoveries, laboratory and field duplicate results, laboratory control sample and/or laboratory control sample duplicate recoveries, reporting limits, and electronic data deliverables.

A summary of qualifiers that may be assigned to results in this laboratory group are included in Table 1. Qualifiers that may be assigned to results include:

- U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
- DNR - Do Not Report. Another result is available that is more reliable or appropriate.

Summary Data Quality Review
Port of Seattle - T-30
Vapor Sampling – June 2024
Laboratory Group: 406108

Sample Receipt

Upon receipt by the laboratory, the sample container information was compared to the chain-of-custody (COC). No discrepancies related to sample identification were noted by the laboratory.

Organic Analyses

The sample was analyzed for APHs and BTEX by the methods described in the introduction of this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable

3. Surrogates – Acceptable

4. Laboratory Control Sample (LCS) – Acceptable

5. Laboratory Duplicate – Acceptable

   General – Laboratory duplicates for these analyses were performed using a sample from an unrelated project. Results were comparable.

6. Reporting Limits – Acceptable

   General – Reporting limits for one or more analytes reported as not detected were raised due to dilution and/or sample cannister pressure.

Overall Assessment of Data

The data reported in this laboratory group are usable for meeting project objectives. The completeness for Friedman & Bruya, Inc. laboratory group 406108 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
No Data Qualifiers Were Assigned Based on this Data Review.					

AECOM
1111 3rd Ave
Suite 1600
Seattle, WA 98101
www.aecom.com

206 438 2700 tel
866 495 5288 fax

Memorandum

To	Paul Kalina, Project Manager	Info	Final
Subject	Summary Data Quality Review Port of Seattle – T-30 Vapor Sampling – September 2024		
From	Lucy Panteleeff, Chemist Chelsey Cook, Chemist		
Date	October 16, 2024		

The summary data quality review of one vapor sample collected on September 20, 2024, has been completed. The sample was analyzed at Friedman & Bruya, Inc. located in Seattle, Washington for Air-phase Petroleum Hydrocarbons (APHs) by Massachusetts Department of Environmental Protection Method MA-APH and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method TO-15. The sample was subcontracted to Alliance Technical Group located in Seattle, Washington and analyzed for gases by EPA Method 3C. The laboratory provided a summary report containing sample results and associated quality assurance (QA) and quality control (QC) data for all samples. The following samples are associated with Friedman & Bruya, Inc. laboratory group 409330:

Sample ID	Laboratory ID	Requested Analyses
SVE-EFF-092024	409330 -01	APH, BTEX
SVE-EFF-092024	409330 -02 / 2409406-001	Gases

Data were evaluated based on validation criteria established in the *National Functional Guidelines for Organic Superfund Methods Data Review*, November 2020.

The following data components were reviewed during the limited data validation procedure for compliance with method specific or laboratory control charted criteria where appropriate: chain of custody forms, holding times, method blanks, surrogate recoveries, matrix spike and/or matrix spike duplicate recoveries, laboratory and field duplicate results, laboratory control sample and/or laboratory control sample duplicate recoveries, reporting limits, and electronic data deliverables.

A summary of qualifiers that may be assigned to results in this laboratory group are included in Table 1. Qualifiers that may be assigned to results include:

- U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

- DNR - Do Not Report. Another result is available that is more reliable or appropriate.

Sample Receipt

Upon receipt by the laboratory, the sample container information was compared to the chain-of-custody (COC). No discrepancies related to sample identification were noted by the laboratories.

Organic Analyses

The sample was analyzed for BTEX, APHs and gases by the methods described in the introduction of this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable

3. Surrogates – Acceptable

4. Laboratory Control Sample (LCS) – Acceptable

5. Laboratory Duplicate – Acceptable

   BTEX by Method TO-15 – A laboratory duplicate was performed using a sample from an unrelated project. Results were comparable.

   APH by Method MA-APH – A laboratory duplicate was performed using a sample from an unrelated project. Results were comparable.

   Gases by Method 3C – A laboratory duplicate was performed using SVE-EFF-092024. Results were comparable.

6. Reporting Limits – Acceptable

   General – The reporting limits were raised for one or more analytes due to dilution and/or sample cannister pressure.

Overall Assessment of Data

The data reported in this laboratory group, as qualified, are usable for meeting project objectives. The completeness for Friedman & Bruya, Inc. laboratory group 409330 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
No Data Qualifiers Were Assigned Based on This Data Review.					

AECOM
1111 3rd Ave
Suite 1600
Seattle, WA 98101
www.aecom.com

206 438 2700 tel
866 495 5288 fax

Memorandum

To	Paul Kalina, Project Manager	Info	Final
Subject	Summary Data Quality Review Port of Seattle – T-30 Vapor Sampling – December 2024		
From	Lucy Panteleeff, Chemist Chelsey Cook, Chemist		
Date	February 11, 2025		

The summary data quality review of one vapor sample collected on December 19, 2024, has been completed. The sample was analyzed at Friedman & Bruya, Inc. located in Seattle, Washington for Air-phase Petroleum Hydrocarbons (APHs) by Massachusetts Department of Environmental Protection Method MA-APH and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method TO-15. The laboratory provided a summary report containing sample results and associated quality assurance (QA) and quality control (QC) data for the sample. The following sample is associated with Friedman & Bruya, Inc. laboratory group 412383:

Sample ID	Laboratory ID	Requested Analyses
SVE-EFF-121924	412383 -01	APH, BTEX

Data were evaluated based on validation criteria established in the *National Functional Guidelines for Organic Superfund Methods Data Review*, November 2020.

The following data components were reviewed during the limited data validation procedure for compliance with method specific or laboratory control charted criteria where appropriate: chain of custody forms, holding times, method blanks, surrogate recoveries, matrix spike and/or matrix spike duplicate recoveries, laboratory and field duplicate results, laboratory control sample and/or laboratory control sample duplicate recoveries, reporting limits, and electronic data deliverables.

A summary of qualifiers that may be assigned to results in this laboratory group are included in Table 1. Qualifiers that may be assigned to results include:

- U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
- DNR - Do Not Report. Another result is available that is more reliable or appropriate.

AECOM

Summary Data Quality Review
Port of Seattle – T-30
Vapor Sampling – December 2024
Laboratory Group: 412383

Sample Receipt

Upon receipt by the laboratory, the sample container information was compared to the chain-of-custody (COC). No discrepancies related to sample identification were noted by the laboratories.

Organic Analyses

The sample was analyzed for BTEX and APHs by the methods described in the introduction of this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable

3. Surrogates – Acceptable

4. Laboratory Control Sample (LCS) – Acceptable

5. Laboratory Duplicate – Acceptable

   BTEX by Method TO-15 – A laboratory duplicate was performed using a sample from an unrelated project. Results were comparable.

   APH by Method MA-APH – A laboratory duplicate was performed using a sample from an unrelated project. Results were comparable.

6. Reporting Limits – Acceptable

   General – The reporting limits were raised for one or more analytes due to dilution and/or sample cannister pressure.

Overall Assessment of Data

The data reported in this laboratory group are usable for meeting project objectives. The completeness for Friedman & Bruya, Inc. laboratory group 412383 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
No Data Qualifiers Were Assigned Based on This Data Review.					

Appendix E

LNAPL Gauging and Recovery Field Notes

Port of Seattle Terminal 30 LNAPL Gauging Event (January 11, 2023)

Closest Low Tide: 22:50

Closest High Tide: 15:28

Avg
8.34

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	17:35	8.14	8.35	0.21	8.15	thick residue on probe
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*					
MW-36A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-39A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-59	17:28	TRACE	8.79	0.00	8.79	--
MW-89	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-93	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-1	17:45	7.53	7.57	0.04	7.53	thick residue on probe
RW-12	16:46	8.45	8.63	0.18	8.46	--
RW-101	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-102	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-103	16:57	--	8.29	0.00	8.29	--
RW-104	*Removed from LNAPL monitoring protocol following 4/13/23 event*					
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	17:15	8.10	11.30	3.20	8.29	Monument silted in. Small amt of water released down-well when J-plug was removed.
RW-107	16:50	8.66	8.70	0.04	8.66	--
RW-108	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-109	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-110	17:56	--	8.50	0.00	8.50	--

Notes:

1. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Abbreviations

Feet BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.

= Product encountered >0.01 ft

Port of Seattle Terminal 30 LNAPL Gauging Event (February 8, 2024)

Closest Low Tide: 17:49

Closest High Tide: 14:35

Avg
7.63

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	16:35	--	7.78	0.00	7.78	Trace product on probe w/ odor
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*					
MW-36A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-39A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-59	*Removed from LNAPL monitoring protocol following 1/11/24 event*					
MW-89	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-93	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-1	17:08	7.40	7.44	0.04	7.40	Product on probe w/ odor
RW-12	16:54	8.15	8.24	0.09	8.16	Odor
RW-101	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-102	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-103	17:00	TRACE	7.23	0.00	7.23	--
RW-104	*Removed from LNAPL monitoring protocol following 4/13/23 event*					
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	16:51	7.29	7.32	0.03	7.29	Odor
RW-107	16:56	--	7.71	0.00	7.71	--
RW-108	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-109	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-110	17:02	--	7.87	0.00	7.87	Odor

Notes:

1. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Abbreviations

Feet BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.

= Product encountered >0.01 ft

Port of Seattle Terminal 30 LNAPL Removal Event
(March 14, 2024)

Avg DTW: 8.39

Closest Low Tide: 14:55 Closest High Tide: 21:48

	Initial Gauging					First Removal							End of Day												
Well ID	Time of Gauging	Initial Depth to LNAPL (Ft BTOC)	Initial Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	Corrected Depth to Water[2] (Ft BTOC)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	Time Lapse Since Extraction (minutes)	% of Initial LNAPL Thickness (%)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)
MW-35	20:22	--	8.25	0.00	8.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*																								
MW-36A	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
MW-39A	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
MW-59	*Removed from LNAPL monitoring protocol following 01/11/24 event*																								
MW-89	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
MW-93	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
RW-1	20:30	8.10	8.20	0.10	8.11	20	20:32	20:52	20:52	--	9.38	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-12	19:15	9.18	9.40	0.22	9.19	20	19:57	20:17	20:18	--	10.16	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-101	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
RW-102	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
RW-103	17:00	--	7.83	0.00	7.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-104	*Removed from LNAPL monitoring protocol following 40/13/23 event*																								
RW-105	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
RW-106	18:33	8.46	11.30	2.84	8.63	60	19:00	19:55	19:57	--	9.1	0.00	NM	NM	NM	NM	NM	NM	--	--	--	--	--	--	--
RW-107	16:32	7.95	9.27	1.32	8.03	60	17:15	18:15	18:15	8.74	8.78	0.04	NM	NM	NM	NM	NM	NM	--	--	--	--	--	--	--
RW-108	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
RW-109	*Removed from LNAPL monitoring protocol following 09/08/22 event*																								
RW-110	17:37	8.64	8.94	0.30	8.66	30	18:21	18:50	18:57	--	8.9	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--

VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS

Estimated volume in vac truck after completion of LNAPL recovery (prior to holding tank) (gal):	**300**
Estimated volume in vac truck at end of day (including holding tank) (gal):	**554**
Estimated combined volume, measured by DH the following day (gal):	**559.62**
--> Estimated product portion (gal):	**16.09**
--> Estimated water portion (gal):	**543.54**

COMMENTS:

Product depth at RW-107 following first removal (0.04 ft) was <25% of the initial product depth (1.32 ft). Per SOP, a second removal was not required.

Guidelines:

- If product thickness is 0.01 - 0.25 ft, vac for approx 20 min
- If product thickness is 0.26 - 0.5 ft, vac for approx 30-40 min
- If product thickness is greater than 0.51 ft, vac for approx 60 min
- Repeat vac events until product thickness is <0.01 ft or three vac events have been completed
- Perform an end-of-day DTW/product gauge for any well that initially had >0.25 ft of product

Abbreviations & Formatting

BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR - LNAPL present, but no accurate measurement

Red wells extracted by DH Environmental with vacuum truck.

Notes:

1. During the 10/6/22 Ops Meeting, agreed that wells measured <0.01 ft for 1 yr can be removed from monitoring schedule.
2. The DTW correction when LNAPL is present is based off of the specific gravity of petroleum, 0.94.

Port of Seattle Terminal 30 LNAPL Gauging Event (April 11, 2024)

Closest Low Tide: 13:34

Closest High Tide: 20:43

Avg
9.36

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	18:22	--	8.70	0.00	8.70	Sheen
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*					
MW-36A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-39A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-59	*Removed from LNAPL monitoring protocol following 1/11/24 event*					
MW-89	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-93	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-1	18:25	8.30	8.41	0.11	8.31	--
RW-12	18:09	9.86	10.01	0.15	9.87	--
RW-101	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-102	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-103	18:14	--	9.38	0.00	9.38	--
RW-104	*Removed from LNAPL monitoring protocol following 4/13/23 event*					
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	18:06	9.48	9.70	0.22	9.49	--
RW-107	18:13	9.69	9.73	0.04	9.69	--
RW-108	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-109	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-110	18:16	--	10.05	0.00	10.05	--

Notes:

1. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Abbreviations

Feet BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.

= Product encountered >0.01 ft

Port of Seattle Terminal 30 LNAPL Gauging Event (May 9, 2024)

Closest Low Tide: 12:24

Closest High Tide: 19:52

Avg
8.90

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	18:05	--	8.82	0.00	8.82	--
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*					
MW-36A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-39A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-59	*Removed from LNAPL monitoring protocol following 1/11/24 event*					
MW-89	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-93	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-1	18:15	8.70	8.77	0.07	8.70	Thick amber/brown product on probe
RW-12	17:30	9.48	9.72	0.24	9.49	Light petroleum odor
RW-101	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-102	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-103	17:50	8.56	8.81	0.25	8.58	Light petroleum odor
RW-104	*Removed from LNAPL monitoring protocol following 4/13/23 event*					
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	17:35	8.64	9.77	1.13	8.71	Strong petroleum odor. Replaced broken ball valve in well cap.
RW-107	17:26	8.91	9.44	0.53	8.94	Strong petroleum odor
RW-108	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-109	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-110	17:18	--	9.05	0.00	9.05	Petroleum odor

Notes:

1. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Abbreviations

Feet BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.

= Product encountered >0.01 ft

Port of Seattle Terminal 30 LNAPL Removal Event (June 13, 2024)

Avg DTW: 9.87

Closest Low Tide: 16:28 Closest High Tide: 23:51

	Initial Gauging					First Removal							Second Removal							End of Day						
Well ID	Time of Gauging	Initial Depth to LNAPL (Ft BTOC)	Initial Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	Corrected Depth to Water[2] (Ft BTOC)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	Time Lapse Since Extraction (minutes)	% of Initial LNAPL Thickness (%)	LNAPL Extraction Duration (Minutes)
MW-35	16:58	9.27	9.27	SHEEN	9.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*																									
MW-36A	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
MW-39A	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
MW-59	*Removed from LNAPL monitoring protocol following 01/11/24 event*																									
MW-89	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
MW-93	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
RW-1	17:02	9.91	9.92	0.01	9.91	20	19:36	19:56	19:57	10.31	10.31	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-12	16:52	10.45	10.71	0.26	10.47	30	18:18	18:48	18:49	11.57	11.57	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-101	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
RW-102	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
RW-103	16:48	9.57	9.58	0.01	9.57	20	19:09	19:29	19:30	9.75	9.75	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-104	*Removed from LNAPL monitoring protocol following 40/13/23 event*																									
RW-105	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
RW-106	16:32	9.87	10.45	0.58	9.90	60	17:18	18:18	18:19	10.13	10.13	0.00	--	--	--	--	--	--	--	19:11	10.81	10.81	SHEEN	113	< 1%	--
RW-107	16:30	9.83	10.19	0.36	9.85	40	16:36	17:16	17:18	10.09	10.09	0.00	--	--	--	--	--	--	--	18:20	9.90	9.92	0.02	104	5.5%	--
RW-108	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
RW-109	*Removed from LNAPL monitoring protocol following 09/08/22 event*																									
RW-110	16:37	10.12	10.17	0.05	10.12	20	18:48	19:08	19:09	10.21	10.21	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--

VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS

Estimated volume in vac truck after completion of LNAPL recovery (prior to holding tank) (gal):	**232**
Estimated volume in vac truck at end of day (including holding tank) (gal):	**466**
Estimated combined volume, measured by DH the following day (gal):	**459.79**
--> Estimated product portion (gal):	**15.18**
--> Estimated water portion (gal):	**444.61**

COMMENTS:

Guidelines:

- If product thickness is 0.01 - 0.25 ft, vac for approx 20 min
- If product thickness is 0.26 - 0.5 ft, vac for approx 30-40 min
- If product thickness is greater than 0.51 ft, vac for approx 60 min
- Repeat vac events until product thickness is <0.01 ft or three vac events have been completed
- Perform an end-of-day DTW/product gauge for any well that initially had >0.25 ft of product

Abbreviations & Formatting

BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR - LNAPL present, but no accurate measuremen

Red wells extracted by DH Environmental with vacuum truck.

Notes:

1. During the 10/6/22 Ops Meeting, agreed that wells measured <0.01 ft for 1 yr can be removed from monitoring schedule.
2. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Port of Seattle Terminal 30 LNAPL Gauging Event (July 11, 2024)

Closest Low Tide: 1503

Closest High Tide: 2210

Avg
9.35

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	1710	--	9.00	0.00	9.00	--
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*					
MW-36A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-39A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-59	*Removed from LNAPL monitoring protocol following 1/11/24 event*					
MW-89	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-93	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-1	1715	9.02	9.05	0.03	9.02	J-plug blown out by pressurization since last event
RW-12	1652	9.58	9.77	0.19	9.59	--
RW-101	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-102	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-103	1658	--	9.18	0.00	9.18	--
RW-104	*Removed from LNAPL monitoring protocol following 4/13/23 event*					
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	1701	9.31	9.48	0.17	9.32	Approx LNAPL thickness value, OWI probe malfunction
RW-107	1649	9.57	9.58	0.01	9.57	--
RW-108	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-109	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-110	1700	--	9.79	0.00	9.79	--

Notes:

1. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Abbreviations

Feet BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.

= Product encountered >0.01 ft

Port of Seattle Terminal 30 LNAPL Gauging Event (August 8, 2024)

Closest Low Tide: 13:54

Closest High Tide: 20:38

Avg
9.43

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	1738	9.19	9.60	0.41	9.21	--
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*					
MW-36A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-39A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-59	*Removed from LNAPL monitoring protocol following 1/11/24 event*					
MW-89	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-93	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-1	1744	9.06	9.13	0.07	9.06	--
RW-12	1712	9.67	9.97	0.30	9.69	--
RW-101	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-102	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-103	1732	--	9.28	0.00	9.28	--
RW-104	*Removed from LNAPL monitoring protocol following 4/13/23 event*					
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	1726	9.34	9.58	0.24	9.35	--
RW-107	1707	9.60	9.65	0.05	9.60	--
RW-108	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-109	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-110	1729	--	9.83	0.00	9.83	--

Notes:

1. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Abbreviations

Feet BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.

= Product encountered >0.01 ft

Port of Seattle Terminal 30 LNAPL Removal Event
(September 12, 2024)

Avg DTW
10.12

Closest Low Tide: 20:15 Closest High Tide: 14:48

	Initial Gauging					First Removal							Second Removal						
Well ID	Time of Gauging	Initial Depth to LNAPL (Ft BTOC)	Initial Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	Corrected Depth to Water[2] (Ft BTOC)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)
MW-35	17:33	9.66	9.69	0.03	9.66	20	18:25	18:50	18:53	--	13.26	0.00	--	--	--	--	--	--	--
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*																		
MW-36A	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
MW-39A	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
MW-59	*Removed from LNAPL monitoring protocol following 01/11/24 event*																		
MW-89	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
MW-93	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
RW-1	18:15	9.09	9.15	0.06	9.09	20	19:25	19:40	19:45	10.27	10.29	0.02	Further vac deemed unnecessary			--	--	--	--
RW-12	17:14	10.50	10.68	0.18	10.51	20	17:25	17:45	18:02	SHEEN	14.68	0.00	--	--	--	--	--	--	--
RW-101	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
RW-102	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
RW-103	17:20	--	10.17	0.00	10.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-104	*Removed from LNAPL monitoring protocol following 40/13/23 event*																		
RW-105	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
RW-106	17:01	10.27	10.49	0.22	10.28	20	17:45	18:05	18:41	10.35	10.58	0.23	20	18:55	19:15	19:17	10.87	10.98	0.11
RW-107	16:45	10.39	10.41	0.02	10.39	20	17:00	17:25	17:58	10.61	10.64	0.03	20	18:05	18:25	18:35	10.54	10.56	0.02
RW-108	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
RW-109	*Removed from LNAPL monitoring protocol following 09/08/22 event*																		
RW-110	17:06	--	10.70	0.00	10.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--

VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS

Estimated volume in vac truck after completion of LNAPL recovery (prior to holding tank) (gal):	**425**
Estimated volume in vac truck at end of day (including holding tank) (gal):	**637**
Estimated combined volume, measured by DH the following day (gal):	**619.9**
--> Estimated product portion (gal):	**11.11**
--> Estimated water portion (gal):	**608.79**

COMMENTS:
Due to time constraints and prior results, a 3rd vac was deemed unnecessary at RW-106 and -107. As no wells had initial thicknesses >0.25 ft, end-of-day DTW measurements were not taken.

Guidelines:

- If product thickness is 0.01 - 0.25 ft, vac for approx 20 min
- If product thickness is 0.26 - 0.5 ft, vac for approx 30-40 min
- If product thickness is greater than 0.51 ft, vac for approx 60 min
- Repeat vac events until product thickness is <0.01 ft or three vac events have been completed
- Perform an end-of-day DTW/product gauge for any well that initially had >0.25 ft of product

Abbreviations & Formatting

BTOC = Feet below top of well casing.
LNAPL = Light Non-Aqueous Phase Liquid
ND = LNAPL not detected using interface probe.
NA - Not Available (not able to detect or measure)
TRACE, MINOR - LNAPL present, but no accurate measurement.
Red wells extracted by DH Environmental with vacuum truck.

Notes:

1. During the 10/6/22 Ops Meeting, agreed that wells measured <0.01 ft for 1 yr can be removed from monitoring schedule.
2. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Port of Seattle Terminal 30 LNAPL Gauging Event (October 10th, 2024)

Closest Low Tide: 17:25

Closest High Tide: 21:22

Avg
9.24

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	1815	9.28	9.46	0.18	9.29	-
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*					
MW-36A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-39A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-59	*Removed from LNAPL monitoring protocol following 1/11/24 event*					
MW-89	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-93	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-1	1826	9.11	9.17	0.06	9.11	-
RW-12	1728	9.85	10.01	0.16	9.86	-
RW-101	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-102	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-103	1745	-	8.77	0.00	8.77	-
RW-104	*Removed from LNAPL monitoring protocol following 4/13/23 event*					
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	1801	9.03	9.17	0.14	9.04	-
RW-107	1723	9.17	9.39	0.22	9.18	-
RW-108	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-109	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-110	1753	9.39	9.48	0.09	9.40	-

Notes:

1. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Abbreviations

Feet BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.

Port of Seattle Terminal 30 LNAPL Gauging Event (November 14, 2024)

Closest Low Tide: 21:37

Closest High Tide: 04:41 (next day)

Avg
9.65

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	0021	9.24	9.40	0.16	9.25	--
MW-36	*Removed from LNAPL monitoring protocol following 11/10/22 event*					
MW-36A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-39A	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-59	*Removed from LNAPL monitoring protocol following 1/11/24 event*					
MW-89	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
MW-93	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-1	0030	8.80	9.01	0.21	8.81	--
RW-12	0036	10.30	10.33	0.03	10.30	--
RW-101	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-102	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-103	0043	--	9.57	0.00	9.57	--
RW-104	*Removed from LNAPL monitoring protocol following 4/13/23 event*					
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	0048	--	9.83	0.00	9.83	--
RW-107	0052	9.75	10.30	0.55	9.78	--
RW-108	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-109	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-110	0056	--	9.98	0.00	9.98	--

Biannual Gauge-Only Wells						
MW-35	*Covered in the section above due to LNAPL measured >0.01 ft within the last year.*					
MW-36	NM	NM	NM	NM	NM	Well missed, will be gauged next event.
MW-54	0120	--	8.34	0.00	8.34	--
MW-64	0110	--	9.84	0.00	9.84	--

Notes:

1. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Abbreviations

Feet BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.

= Product encountered >0.01 ft

Port of Seattle Terminal 30 LNAPL Removal Event
(December 12, 2024)

Avg DTW: 9.71

Closest Low Tide:

Closest High Tide:

Well ID	Initial Gauging					First Removal							Second Removal							Third Removal							End of Day			
	Time of Gauging	Initial Depth to LNAPL (Ft BTOC)	Initial Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	Corrected Depth to Water[2] (Ft BTOC)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start Time (Approx.)	Extraction End Time (Approx.)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)	Time of Gauging	Depth to LNAPL (Ft BTOC)	Depth to Water (Ft BTOC)	LNAPL Thickness (Feet)
MW-35	19:40	9.14	9.65	0.51	9.17	60	19:45	20:50	23:46	--	10.58	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	EOD gauge not performed due to time constraints			
MW-36	18:54	9.56	9.59	0.03	9.56	20	19:25	19:45	20:45	SHEEN	9.9	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-36A	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
MW-39A	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
MW-59	*Removed from LNAPL monitoring protocol following 01/11/24 event*																													
MW-89	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
MW-93	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
RW-1	21:07	8.45	8.52	0.07	8.45	20	23:55	0:15	00:10	8.6	8.65	0.05	No further vac executed due to time constraints				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-12	21:15	10.20	10.29	0.09	10.21	20	23:25	23:45	23:46	11.13	11.16	0.03	No further vac executed due to time constraints				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-101	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
RW-102	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
RW-103	19:14	--	9.80	0.00	9.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-104	*Removed from LNAPL monitoring protocol following 40/13/23 event*																													
RW-105	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
RW-106	17:38	10.12	10.14	0.02	10.12	20	17:54	18:14	18:24	10.00	10.10	0.10	20	18:44	19:10	21:02	9.92	10.01	0.09	20	21:25	21:45	22:04	10.05	10.10	0.05	--	--	--	--
RW-107	17:03	10.05	10.09	0.04	10.05	20	17:32	17:52	17:53	10.26	10.56	0.30	30	18:14	18:44	21:05	9.97	10.7	0.73	60	22:25	23:25	23:26	10.18	10.85	0.67	--	--	--	--
RW-108	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
RW-109	*Removed from LNAPL monitoring protocol following 09/08/22 event*																													
RW-110	21:17	--	10.30	0.00	10.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS

Estimated volume in vac truck after completion of LNAPL recovery (prior to holding tank) (gal):	**466**
Estimated volume in vac truck at end of day (including holding tank) (gal):	**839**
Estimated combined volume, measured by DH the following day (gal):	**851.27**
--> Estimated product portion (gal):	**12.04**
--> Estimated water portion (gal):	**839.23**

COMMENTS:

Cause of increased LNAPL thickness following initial vac at RW-107 unknown. No visible product on OWI probe and minimal odor.

MW-36, a biannual gauging well, was not gauged during the 11/15/24 GWM event. As a result it was gauged this visit, and found with 0.03 ft of LNAPL. It had last been gauged November 2022, at which point it had not had detectable LNAPL for 12 consecutive months and was removed from the monthly gauging protocols. Per the CMP, it will again be gauged monthly until it again meets the requirements for retirement.

Guidelines:

- If product thickness is 0.01 - 0.25 ft, vac for approx 20 min
- If product thickness is 0.26 - 0.5 ft, vac for approx 30-40 min
- If product thickness is greater than 0.51 ft, vac for approx 60 min
- Repeat vac events until product thickness is <0.01 ft or three vac events have been completed
- Perform an end-of-day DTW/product gauge for any well that initially had >0.25 ft of product

Abbreviations & Formatting

BTOC = Feet below top of well casing.

LNAPL = Light Non-Aqueous Phase Liquid

ND = LNAPL not detected using interface probe.

NA - Not Available (not able to detect or measure)

TRACE, MINOR - LNAPL present, but no accurate measurem

Red wells extracted by DH Environmental with vacuum

Notes:

1. During the 10/6/22 Ops Meeting, agreed that wells measured <0.01 ft for 1 yr can be removed from monitoring schedule.
2. The DTW correction when LNAPL is present is based off of the specific gravity of diesel (0.94).

Appendix F

Groundwater Sampling

Field Forms

AECOM

DATE 4/11/2024

DAY	S	M	T	W	TH	F	S

WEATHER	BRIGHT SUN	CLEAR	OVERCAST	RAIN	SNOW
TEMP	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

PROJECT MANAGER: Paul Kalina

PROJECT: T-30

JOB NO.:

AECOM FIELD REP:

SUB-CONTRACTORS ON SITE:

EQUIPMENT ON SITE:

WORK PERFORMED: 1430 Arrive + meet DB at T-30 gate. Check in w/guard + drive to treatment area

1445 Safety tailgate + confirm shut off of treatment System. - see 4/12

1500 Set up at MW-89

1507 Pump on at MW-89

1600 Sample MW-89

1615 Set up at RW-11A.

1632 Pump on at RW-11A.

1655 Sample RW-11A

1700 Pack equipment + move to MW-59 to help DB w/ sampling

1730 Sample MW-59. Collect DUP-1 and MS/MSD.

1745 Set up for LNAPL gauging

1800 Begin LNAPL gauging

1830 Complete gauging. Dump purge water. turn treatment System on.

1840 Sign out + leave site.

BY TITLE

SHEET ____ OF ____

AECOM

DATE 4/11/24

DAY | S | M | T | W | (TH) | F | S |

PROJECT MANAGER: Raul Kalina

PROJECT: I-30

JOB NO.: 60681376

AECOM FIELD REP: D. Behrens

WEATHER	BRIGHT SUN	(CLEAR)	OVERCAST	RAIN	SNOW
TEMP	To 32	(32-50)	50-70	70-85	85 up
WIND	Still	(Moder)	High	Report No.	
HUMIDITY	Dry	(Moder)	Humid		

SUB-CONTRACTORS ON SITE: —

EQUIPMENT ON SITE: (2) Peri pumps, (2) YSI, (2) Hach 2100Q, (2) WLM, (1) interface probe (all Solinst). Have locks

WORK PERFORMED:

- 1425 - DB, ER meet outside I-30 entrance. Enter facility
- 1430 - Arrive at system area/corner. Hold safety tailgate, discuss scope, PPE, slips trips falls, traffic safety, Verify system is off. DB closes main breaker & locks out
- 1450 - DB, ER find tidal well MW-89. Set up cones & block off work area w/ cones
- 1507 - Start purging MW-89
- 1600 - Collect sample MW-89-0424
- 1615 - DB/ER split up. DB goes to MW-59
- 1730 - Collect sample MW-59-0424 (MS/MSD) DUP-1-0424 collected (sample time 1620)
- 1800 - Begin monthly LNAPL Gauging
- 1830 - LNAPL gauge complete. Purge water dumped, System restarted.
- 1840 - DB texts PK - DB/ER offsite for day.

BY D. Behrens TITLE Hydrogeologist

SHEET 1 OF 1

Port of Seattle Terminal 30 -- LNAPL Gauging Event

Field Technician(s): DB, ER	**Client:** Port of Seattle
Date: 4/11/24	**Location:** Terminal 30, Seattle
Project Number: 60681370	**Weather:** o/c, ~50
Closest High Tide:	**Closest Low Tide:**

Well ID	Well Location	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Comments
MW-35	**D 314 ****	1822		8.70		Sheen
MW-36	C 309.5	*Removed from LNAPL monitoring protocol following 11/10/22 event*				
MW-36A	C 311.5	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-39A	C 237	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-59	**D 324 ****	*Removed from LNAPL monitoring protocol following01/11/24 event*				
MW-89	A 257	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-93	D 275	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-1	Entry lanes W of wall, even w/ D 275	1825	8.30	8.41		
RW-12	D 327	1809	9.86	10.01	0.15	
RW-101	D 319.5	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-102	**D 322.5 ****	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-103	D 326	1814	—	9.38	—	
RW-104	D 318	*Removed from LNAPL monitoring protocol following 04/13/23 event*				
RW-105	D 321	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-106	D 324	1806	9.48	9.70		
RW-107	D 327	1813	9.69	9.73	0.04	Cap ~~open~~ off when monument opened
RW-108	C/D 320	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-109	C/D 323	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-110	C/D 326	1816	—	10.05	—	

Notes:

1. Feet BTOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. ND = LNAPL not detected using interface probe.
4. NA - Not Available (not able to detect or measure)
5. TRACE, MINOR - Indications of LNAPL present, but no accurate measurement or below measurable amount.
6. During the 10/6/22 Ops Meeting, agreed that wells measured <0.01 ft for 1 yr can be removed from monitoring schedule.

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 4/11/24
Weather: 50 °F

Well ID: RW-11A
Sample ID: RW-11A- [Well ID-MMYY]
Well Cond.: Good
Sampled by: ER

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.62
Depth to Product (ft btoc) : —
Product Thickness (ft): —
Water Column (ft):
Water Volume in Well (gal)[1]:
Inner Casing Diameter (Inch): 4
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): ~15
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1632
Total Volume Purged (gal):

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1635	150	9.71	16.0	1272	1.18	6.70	-98.2	20.0	
1640	150	9.77	16.2	1241	0.61	6.68	-104.0	15.1	
1645	150	9.84	16.4	1245	0.43	6.69	-107.6	10.1	
1650	150	9.86	16.1	1256	0.44	6.67	-106.7	9.16	
1653	150	9.88	16.4	1254	0.37	6.67	-108.2	8.67	

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
RW-11A-0424	1655	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	6 ~~7~~	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--

REQUIRED STABILIZATION RANGES[4]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)
HC odor

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	049814
YSI:	47516
Interface Probe:	336674
Turbidity:	032744

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 4/11/24
Weather: 53°F, cloudy breezy

Well ID: MW-59
Sample ID: MW-59-0424 [Well ID-MMYY]
Well Cond: Fair
Sampled by: DB

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.68 @ 1630
Depth to Product (ft btoc): —
Product Thickness (ft): 0.00
Water Column (ft): 10.32
Water Volume in Well (gal)[1]: 1.69
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): Assumed ~20 ft bgs.
Screened Interval (ft bgs): Unknown. Assumed to match other wells on site, ~5-20 ft bgs.
Tubing Inlet Depth (ft bgs): ~15'
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1647
Total Volume Purged (gal): ~2 gal

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1650	160	9.74	16.1	1752	3.51	7.17	60.2	286	yellow/orange cloudy
1655	125	9.79	16.5	1746	3.41	7.16	51.2	194	"
1700	125	9.74	16.3	1739	3.50	7.14	35.1	194	"
1705	140	9.96	15.6	1731	4.03	7.13	28.6	224	"
1710	180	9.91	16.9	1736	3.78	7.11	25.7	183	" DB 4/11
1713	180	9.92	16.9	1722	3.94	7.11	15.3	178	"
1713	180	9.92	16.7	1699	4.19	7.06	-4.9	214	"
1716	180	9.93	16.9	1692	4.09	7.04	-10.6	184	"
DB ~~1719~~ 1722	180	9.93	17.6	1677	3.99	7.02	-17.2	173	" battery dies, pump briefly off
1725	140	9.93	16.8	1650	4.18	7.00	-23.5	183	"

DB 4/11

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-59-0424	1730	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	18 ~~2~~ DB	HCL
		Dx	NWTPH-Dx	500 mL Amber	3 + 4/12	--

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)
Yellow/orange cloudy, odor, no odor
Duplicate (DUP-1-0424) sample collected @ 1620 ; MS/MSD DB 4/12

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive

SAMPLING EQUIPMENT MODELS & IDs

Pump:	033239
YSI:	212186
Interface Probe:	22363
Turbidity:	050184

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 4/11/24
Weather: 53°F, cloudy, breezy

Well ID: MW-89
Sample ID: MW-89- 0424 [Well ID-MMYY]
Well Cond.: fair
Sampled by: DB/ER

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 10.17
Depth to Product (ft btoc) : —
Product Thickness (ft): 0.00
Water Column (ft): 9.83
Water Volume in Well (gal)[1]: 1.61
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): ~15'
Sampling Tube Material: LPDE

****Tidal well, sample 130-190 min after the low-low tide (1334)*****

PURGING INFORMATION

Start Purge Time: 1507
Total Volume Purged (gal): ~3gal

	Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
0	1510	150	10.49	16.6	1066	1.35	6.11	46.1	118	orange flakes/particles
5	1515	150	10.38	16.7	1065	1.10	6.11	62.5	38.8	no odor
10	1520	150	10.45	16.6	1061	0.89	6.13	63.0	24.9	↓
15	~~1525~~ 1525	150	10.47	16.6	1059	0.66	6.12	61.6	12.0	↓
18	1528	150	10.48	16.5	1061	0.61	6.13	58.6	12.5	
21	1531	150	10.47	16.4	1062	0.55	6.13	57.1	11.3	
24	1534	150	10.42	16.4	1062	0.55	6.12	56.9	11.6	
27	1537	150	10.41	16.1	1065	0.50	6.14	57.5	10.6	
30	1540	150	10.41	16.1	1065	0.47	6.14	55.1	10.9	
33	~~1543~~ 1543	150	10.42	16.0	1063	0.42	6.13	57.2	5.31	
36	1546	150	10.41	16.1	1067	0.42	6.13	56.3	6.37	

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-89-0424	1600 1537 ER 4/11	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	6 ~~3~~ DB	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING EQUIPMENT MODELS & IDs

Pump:	049814
YSI:	47516
Interface Probe:	336679
Turbidity:	032784

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date:
Weather:

Well ID: MW-89
Sample ID: MW-89- 0424 [Well ID-MMYY]
Well Cond.: Fair
Sampled by: ER, DB

PRE-PURGE INFORMATION

See Prev Sheet
DB
4/11/24

Initial Depth to Water (ft btoc):
Depth to Product (ft btoc):
Product Thickness (ft):
Water Column (ft):
Water Volume in Well (gal)[1]:
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): ~15
Sampling Tube Material: LPDE

PURGING INFORMATION

****Tidal well, sample 130-190 min after the low-low tide (_____)*****

Start Purge Time: _____
Total Volume Purged (gal): ~3 gal

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1549	150	10.41	16.0	1068	0.40	6.12	57.2	4.53	
1552	150	10.41	16.1	1070	0.38	6.14	53.0	3.96	
1555	150	10.41	16.2	1069	0.36	6.13	53.6	4.56	
					4/11	DB			

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-89-0424	1600	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	6	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING EQUIPMENT MODELS & IDs

Pump:	049414
YSI:	47516
Interface Probe:	336674
Turbidity:	032784

SAMPLE CHAIN OF CUSTODY

Report To Paul Kalina, Gus Friedman
Company AECOM
Address 1111 3rd Ave Suite 1600
City, State, ZIP Seattle WA 98101
Phone 206-316-5097 Email paul.kalina@aecom

SAMPLERS (signature)

PROJECT NAME: T-30
PO #: 601681370

REMARKS: 1 ~~µg~~ µg/L MRL for BTEX per DB 4/11 EPA 8260D
Project specific RLs? - Yes / No

INVOICE TO: Paul Kalina

Page # 1 of 1

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	NWTPH Dx w/ silica gel cleanup	BTEX 8260D			Notes
MW-89-0424		4/11/24	1600	GW	7	X	X						X	X			
RW-11A-0424		"	1655	"	7	"	"						"	"			
DUP-1-0424		"	1620	"	7	"	"						"	"			
MW-59-0424		"	1730	"	21	"	"						"	"			MS/MSD
TRIP BLANK				-	2												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	David Behrens	AECOM	4/12/24	1045
Received by:	ANHPHAN	F&B	04/12/24	10:45
Relinquished by:				
Received by:				

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

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 212186
Description YSI Pro Quatro
Calibrated 4/5/2024 2:41:28PM

Manufacturer YSI
Model Number 605000
Serial Number/ Lot Number 22D104355
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 34

Calibration Specifications

Group # 1
Group Name PH
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
7.00 / 7.00	PH	7.00	PH	6.92	7.01	0.14%	Pass
4.00 / 4.00	PH	4.00	PH	3.85	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	9.97	10.01	0.10%	Pass

Group # 2
Group Name Conductivity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.000

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
1.413 / 1.413	ms/cm	1.413	ms/cm	1.357	1.413	0.00%	Pass

Group # 3
Group Name Redox (ORP)
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
240.00 / 240.00	mv	240.00	mv	235.60	240.00	0.00%	Pass

Group # 4
Group Name Dissolved Oxygen Span
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	%	100.00	%	99.00	100.00	0.00%	Pass

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 212186
Description YSI Pro Quatro
Calibrated 4/5/2024 2:41:28PM

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date
SEA COND 1.413 3GE0626	Conductivity solution 1.413 µS/cm 3GE0626	AquaPhoenix Scientific	Conductivity 1.413 mS/cm	3GE0626	5/31/2024
SEA ORP-3GL0404	ORP STANDARD 240 mV	Pine Environmental Services, Inc.	32001	3GL0404	9/1/2024
SEA PH 10 2GGG018	pH 10 Buffer Solution	AquaPhoenix Scientific	32034	2GGG018	7/24/2024
SEA PH 7 2GG042	pH 7 Buffer Solution	AquaPhoenix Scientific	32025	2GG042	7/31/2024
SEA PH4 2GG184	pH 4 Buffer Solution	AquaPhoenix Scientific	32017	2GG184	7/31/2024

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 47516
Description YSI Pro Plus
Calibrated 4/9/2024 11:11:02AM

Manufacturer YSI
Model Number Pro Plus
Serial Number/ Lot Number 19M100460
Location Seattle
Department

State Certified
Status Pass
Temp °C 16
Humidity % 46

Calibration Specifications

Group # 1
Group Name PH
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
7.00 / 7.00	PH	7.00	PH	7.02	7.01	0.14%	Pass
4.00 / 4.00	PH	4.00	PH	4.03	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	10.02	10.00	0.00%	Pass

Group # 2
Group Name Conductivity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.000

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
1.413 / 1.413	ms/cm	1.413	ms/cm	1.421	1.413	0.00%	Pass

Group # 3
Group Name Redox (ORP)
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
240.00 / 240.00	mv	240.00	mv	241.20	240.00	0.00%	Pass

Group # 4
Group Name Disolved Oxygen Span
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	%	100.00	%	99.00	100.00	0.00%	Pass

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 47516
Description YSI Pro Plus
Calibrated 4/9/2024 11:11:02AM

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date
SEA COND 1.413 3GE0626	Conductivity solution 1.413 µS/cm 3GE0626	AquaPhoenix Scientific	Conductivity 1.413 mS/cm	3GE0626	5/31/2024
SEA ORP-3GL0404	ORP STANDARD 240 mV	Pine Environmental Services, Inc.	32001	3GL0404	9/1/2024
SEA PH 10 2GGG018	pH 10 Buffer Solution	AquaPhoenix Scientific	32034	2GGG018	7/24/2024
SEA PH 7 2GG042	pH 7 Buffer Solution	AquaPhoenix Scientific	32025	2GG042	7/31/2024
SEA PH4 2GG184	pH 4 Buffer Solution	AquaPhoenix Scientific	32017	2GG184	7/31/2024

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 32090
Description wlm 100' SOLINST
Calibrated 4/8/2024 1:56:15PM

Manufacturer Solinst
Model Number
Serial Number/ Lot Number 40551
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 39

Calibration Specifications

Group # 1
Group Name Function test & Battery Check
Test Performed: N/A **As Found Result:** **As Left Result:**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building I Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 30926
Description WLM 100'
Calibrated 4/8/2024 1:58:42PM

Manufacturer Solinst
Model Number WLM
Serial Number/ Lot Number 337778
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 39

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 50188
Description HACH 2100Q Turbidity meter
Calibrated 4/9/2024 12:11:36PM

Manufacturer HACH
Model Number 2100Q
Serial Number/ Lot Number 21010D000162
Location Seattle
Department

State Certified NJ Cert#: 11034
Status Pass
Temp °C 17
Humidity % 45

Calibration Specifications

Group # 1
Group Name Turbidity
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
10.00 / 10.00	NTU	10.00	NTU	10.10	10.00	0.00%	Pass
20.00 / 20.00	NTU	20.00	NTU	20.00	20.00	0.00%	Pass
100.00 / 100.00	NTU	100.00	NTU	100.00	100.00	0.00%	Pass
800.00 / 800.00	NTU	800.00	NTU	791.00	800.00	0.00%	Pass

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 32784
Description HACH 2100Q Turbidity meter
Calibrated 4/9/2024 12:12:42PM

Manufacturer HACH
Model Number 2100Q
Serial Number/ Lot Number 15030C040052
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 45

Calibration Specifications

Group # 1
Group Name Turbidity
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
10.00 / 10.00	NTU	10.00	NTU	9.82	10.00	0.00%	Pass
20.00 / 20.00	NTU	20.00	NTU	21.30	20.00	0.00%	Pass
100.00 / 100.00	NTU	100.00	NTU	113.00	100.00	0.00%	Pass
800.00 / 800.00	NTU	800.00	NTU	835.00	800.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 33239
Description Geo Pump
Calibrated 4/9/2024 11:38:00AM

Manufacturer Geotech
Model Number 23672
Serial Number/ Lot Number n/a
Location Seattle
Department

State Certified
Status Pass
Temp °C 16
Humidity % 45

Calibration Specifications

Group # 1
Group Name Functional Test
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 49814
Description Geotech Peristaltic Pump
Calibrated 4/9/2024 11:23:26AM

Manufacturer Geotech
Model Number 900-1280
Serial Number/ Lot Number L20005085
Location Seattle
Department

State Certified
Status Pass
Temp °C 16
Humidity % 46

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

AECOM

DATE 14 NOV 24

DAY	S	M	T	W	TH	F	S

WEATHER	BRIGHT SUN	CLEAR	OVERCAST	(RAIN)	SNOW
TEMP	To 32	(32-50)	50-70	70-85	85 up
WIND	(Still)	Moder	High	Report No.	
HUMIDITY	Dry	Moder	(Humid)		

PROJECT MANAGER: Paul Kalina

PROJECT: T-30

JOB NO.: 60681370

AECOM FIELD REP: Kyle Costa

SUB-CONTRACTORS ON SITE:

EQUIPMENT ON SITE: Turbidimeter 48426 Gauge 28300
P-Pump 49811
YSI 34641

WORK PERFORMED:

1650 Arrived on site, Tailgate completed.
1700 Sorting out equipment and coolers.
1825 Start purge at MW-93.
1858 Samples collected at MW-93
1945 Start purge at MW-39A
2015 Samples collected at ~~2015~~ MW-39A
2125 Start purge at MW-92
2150 Samples collected at MW-92
2246 Start purge at MW-58A
2320 Samples collected at MW-58A
0021 Start LNAPL Gauging
0120 Finish LNAPL Gauging
0130 Heading offsite

KC

BY Kyle Costa TITLE Env Sci

SHEET ____ OF ____

AECOM

DATE 11/14/2024

DAY	S	M	T	W	TH	F	S

WEATHER	BRIGHT SUN	CLEAR	OVERCAST	RAIN	SNOW
TEMP	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

PROJECT MANAGER: P. Kalina

PROJECT: T-30

JOB NO.: 60608137O

AECOM FIELD REP: E. Richardson

SUB-CONTRACTORS ON SITE:

EQUIPMENT ON SITE:

WORK PERFORMED: 1700 ER, MM, KC on Site. Check remediation system - Still on. So call PM + confirm steps to shut off.
1710 Conduct Safety tailgate and divide equipment. Shut off system.
1745 MM begins sampling. ER + KC locate wells + set up.
1800 Set up at MW-316A.
1808 Pump on/start purge.
1840 Sample MW-316A-1124 collected.
1900 Move to MW-59 & set up.
1912 Start purge. Weather changes to v. heavy rain.
1950 Sample MW-59-1124 collected.
2000 Drive to RW-5A + set up. Sediment in well monument. Dug most out. Small amount fell down well when opened.
2031 Start purge. Rain stops.
2048 Sample RW-5A-1124 collected. only 5 VOAs, one VOA cap fell down well - no preservative in well.
2110 Move to MW-42 & set up.
2128 Pump on/start purge.
2205 Sample MW-42-1124 collected.
2215 Help MM + KC w/ sampling.
2300 5 (ea-1A) Divide bottles for tidal wells. Insufficient volume to collect parent sample & dup at MW-316B and ## parent sample at MW-89. (3 ambers left). Contact PM & create plan to fill 2 ambers @ MW-316B & 1 @ MW-89.
0000 Set up at MW-316B.
0010 Pump on/start purge.
0047 Sample DUP-2-1124 given time 0001.

BY E. Richardson TITLE Geologist II

AECOM

DAILY QUALITY CONTROL REPORT

PROJECT:

REPORT NO.

JOB NO.:

DATE

0100 Dump Purge Water, Organize samples, Write chain

0120 Turn system back to on (all knobs to "AUTO")

0130 Sign out + leave site

PROBLEMS ENCOUNTERED/CORRECTION ACTION TAKEN:

TOMORROW'S EXPECTATIONS:

BY E. Richardson TITLE Geologist II

SHEET 2 OF 2

AECOM

DATE 11/14/24

DAY	S	M	T	W	TH	F	S

WEATHER	BRIGHT SUN	CLEAR	OVERCAST	RAIN	SNOW
TEMP	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

PROJECT MANAGER: Paul Calina

PROJECT: I-30

JOB NO: 60608870

AECOM FIELD REP: M. McDonald

SUB-CONTRACTORS ON SITE: —

EQUIPMENT ON SITE: —

WORK PERFORMED:

1645: MM on site
1655: ER + KC on site
1700: Parked to distribute equipment and prepare
1800: Setting up at RW-11A
1840: Sampling RW-11A, Dup-1-1124 is 1925
1900: Setting up at MW-45A. MS/MSD well
1955: Sampling MW-45A. took ~ 35 minutes to fill all bottles
2040: Group chat about tidal wells and distributing paperwork
2100: Set up at MW-46B
2123: Start purge at ↑
2150: Sampling MW-46B
2300: Set up at RW-9
2309: Begin purging RW-9
2332: Sampling RW-9
0000: Setting up at MW-89
0023: Begin purging MW-89
0045: Sampling MW-89
0100: Dumping purge water
0115: MM offsite

MM

BY Molly McDonald TITLE Geologist I

SHEET 1 OF ___

Port of Seattle Terminal 30 -- LNAPL Gauging Event

Field Technician(s): KC	**Client:** Port of Seattle
Date: 14 Nov 24	**Location:** Terminal 30, Seattle
Project Number: 60681370	**Weather:** Rain
Closest High Tide:	**Closest Low Tide:** 2187

Well ID	Well Location	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Comments
MW-35	D 314 **	0021	9.24	9.4		
MW-36	C 309.5	*Removed from LNAPL monitoring protocol following 11/10/22 event*				
MW-36A	C 311.5	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-39A	C 237	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-59	D 324 **	0102	—	10.33		
MW-89	A 257	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
MW-93	D 275	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-1	Entry lanes W of wall, even w/ D 275	0030	8.80	9.01		
RW-12	D 327	0036	10.30	10.33		
RW-101	D 319.5	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-102	D 322.5 **	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-103	D 326	0043	—	9.57		
RW-104	D 318	*Removed from LNAPL monitoring protocol following 04/13/23 event*				
RW-105	D 321	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-106	D 324	0048	—	9.83		
RW-107	D 327	0052	9.75	10.30		
RW-108	C/D 320	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-109	C/D 323	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-110	C/D 326	0056	—	9.98		

Notes:

1. Feet BTOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. ND = LNAPL not detected using interface probe.
4. NA - Not Available (not able to detect or measure)
5. TRACE, MINOR - Indications of LNAPL present, but no accurate measurement or below measurable amount.
6. During the 10/6/22 Ops Meeting, agreed that wells measured <0.01 ft for 1 yr can be removed from monitoring schedule.

Port of Seattle Terminal 30 -- Biannual Interior Well Gauging Event

Field Technician(s): K C	**Client:** Port of Seattle
Date: 14 Nov 24	**Location:** Terminal 30, Seattle
Project Number: 60681370	**Weather:** Rain
Closest High Tide:	**Closest Low Tide:**

Location	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Comments
MW-35[1]					Gauging information can be found in the LNAPL gauging field form
MW-36[1]					Gauging information can be found in the LNAPL gauging field form
MW-54	0120	—	8.34		
MW-64	0110	—	9.84		

Abbreviations:

BTOC = below top of well casing

LNAPL = Light Non-Aqueous Phase Liquid

NA - Not Available (not able to detect or measure)

ND = LNAPL not detected using interface probe.

TRACE, MINOR - Indications of LNAPL present, but no accurate measurement or below measurable amount.

Notes:

1. Well is in the LNAPL gauging protocol due to LNAPL measured >0.01 ft within the last year.

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/2024
Weather: Heavy Rain

Well ID: MW-59
Sample ID: MW-59- 1124 [Well ID-MMYY]
Well Cond: Good
Sampled by: ER

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.76
Depth to Product (ft btoc): NA
Product Thickness (ft): NA
Water Column (ft): 10.24
Water Volume in Well (gal)[1]: 1.67 gal
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): Assumed ~20 ft bgs.
Screened Interval (ft bgs): Unknown. Assumed to match other wells on site, ~5-20 ft bgs.
Tubing Inlet Depth (ft bgs): 15
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1912
Total Volume Purged (gal): _____

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1914	120	9.88	16.4	1491	7.36	7.13	11.6	437	
1919	120	9.88	16.2	1473	5.53	7.11	1.8	230	
1924	120	9.97	19.1	1476	5.74	7.14	1.0	317	
1929	120		18.7	1470	5.25	7.05	4.2	233	
1932	120	9.97	18.3	1461	5.92	7.03	9.3	167	
1935	120	9.97	18.3	1457	5.73	7.03	-3.5	128	
1938	120	9.97	19.1	1442	5.41	7.00	-62.8	128	
1941	120	9.97	19.1	1441	5.53	6.99	-58.5	106	
1944	120	9.97	19.1	1440	5.32	6.99	-51.2	103	
1947	120	9.98	18.9	1432	5.33	6.96	-55.9	98.4	
	120								

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-59-1124	1950	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--

REQUIRED STABILIZATION RANGES[2]

Specific Conductance: +/- 5%

Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

Rain completely diluted DTW reading @ 1929.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	GeoPump 408203
YSI:	Pro Plus | Quatro 50145
Interface Probe:	Solinst 74851
Turbidity:	Hach 2100Q 44716D

NOTES

1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

SAMPLING INFORMATION

time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/2024
Weather: Heavy Rain, 40s-50s

Well ID: MW-36A
Sample ID: MW-36A-1124 (Well ID-MMYY)
Well Cond.: Good
Sampled by: ER

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.79
Depth to Product (ft btoc): NA
Product Thickness (ft): NA
Water Column (ft): 10.71
Water Volume in Well (gal)[1]: 1.75
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20.5
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): 15
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1808
Total Volume Purged (gal): _____

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1810	100	9.97	19.5	2367	3.70	6.24	-55.1	263	
1815	100	10.25	20.8	2377	3.42	6.24	-31.0	88.5	
1820	100	10.20	19.9	2298	3.12	6.28	-27.7	91.3	
1825	100	10.23	19.9	2255	2.95	6.31	-13.4	109	
1828	100	10.26	19.8	2213	2.95	6.32	-7.9	56.0	
1831	100	10.26	19.8	2191	3.14	6.31	-13.6	52.7	
1834	100	10.27	20.2	2183	3.06	6.31	-13.0	51.7	
1837	100	10.29	20.2	2166	3.03	6.33	-5.9	47.1	

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-36A-1124	1840	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--

REQUIRED STABILIZATION RANGES[4]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	Geo Pump 46803
YSI:	Pro Plus/ Quatro 50145
Interface Probe:	Solinst 7481
Turbidity:	Hach 2100 Q 44760

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/15/2024
Weather: Light Rain, 40s

Well ID: MW-86B
Sample ID: MW-86B-1124 (Well ID-MMYY)
Well Cond.: Good
Sampled by: ER

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 11.34
Depth to Product (ft btoc): NA
Product Thickness (ft): NA
Water Column (ft): 8.66
Water Volume in Well (gal)[1]: 1.42 gal
Inner Casing Diameter (inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): 15
Sampling Tube Material: LPDE

****Tidal well, sample 130-190 min after the low-low tide (21:37)*****

PURGING INFORMATION

Start Purge Time: 00:10
Total Volume Purged (gal): _____

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
0011	150	11.34	13.8	1377	1.63	8.30	-129.1	40.6	
0016	150	11.34	14.1	1395	2.20	8.00	-129.4	30.7	
0021	150	11.31	14.4	1328	2.09	7.97	-132.4	29.2	
00216	150	11.26	14.8	1381	1.84	7.76	-127.8	29.9	
0031	200	11.25	15.5	1479	1.30	7.66	-135.5	14.1	
0036	200	11.25	15.6	1558	0.89	7.63	-138.2	11.9	
0039	200	11.27	15.7	1561	0.99	7.67	-143.6	8.73	
0042	200	11.27	15.7	1558	0.99	7.60	-141.3	8.36	
0045	200	11.27	15.8	1571	0.99	7.64	-143.1	8.27	

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	COC	Method	Container	No. of bottles	Preservative
MW-86B-1124	0047	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--
DUP-2-1124	0001	PAHs & 2-methylnaphthalene	SVOCs	1 L Ambler	1	--

REQUIRED STABILIZATION RANGES[4]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)
Split ambers between parent + dup samples. Insufficient volume for both.
PAH field filtered.

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	Geo Pump 46803
YSI:	YSI Pro Quatro 50145
Interface Probe:	Solinst 7481
Turbidity:	Hach 2100Q 44H00

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/2024
Weather: Heavy Rain. 40s

Well ID: RW-5A
Sample ID: RW-5A-1124 [Well ID-MMYY]
Well Cond.: Fair - Silt in monument.
Sampled by: ER

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 8.53
Depth to Product (ft btoc): N/A
Product Thickness (ft): N/A
Water Column (ft): 11.47
Water Volume in Well (gal)[1]: +- 7.52 gal
Inner Casing Diameter (Inch): 4
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): 15
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 2031
Total Volume Purged (gal): _____

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
2032	150	8.53	14.3	971	0.89	7.39	-126.7	272	
2037	150	8.53	14.4	990	0.66	7.16	-137.1	197	
2042	150	8.53	14.7	987	0.41	7.17	-136.5	184	
2045	150	8.53	14.7	988	0.38	7.17	-137.5	178	
2048	150	8.54	14.6	987	0.35	7.17	-138.4	175	

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
RW-5A-1124	2048	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	5 (3R)	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--

REQUIRED STABILIZATION RANGES[4]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)
some sediment fell into well when opening.

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	GeoPump 410803
YSI:	50145 ProQuatro Plus
Interface Probe:	Solinst 7481
Turbidity:	44760 Hach 2100Q

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/2024
Weather: 40s, Cloudy

Well ID: MW-42
Sample ID: MW-42-1124 [Well ID-MMYY]
Well Cond.: Good
Sampled by: ER

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.82
Depth to Product (ft btoc): NA
Product Thickness (ft): NA
Water Column (ft): 9.28 (TOTB 19.1 - 9.82)
Water Volume in Well (gal)[1]: 1.52 gal
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): Measured as 19.1 ft bgs on 10/13/22. Well construction log is missing.
Screened Interval (ft bgs): Unknown. Assumed to match other wells on site, ~5-20 ft bgs.
Tubing Inlet Depth (ft bgs):
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 2128
Total Volume Purged (gal):

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
2131	160	10.17	18.4	1500	0.26	6.59	-70.9	75.9	
2136	140	10.42	18.6	1531	0.18	6.53	-88.9	35.4	
2141	140	10.35	18.0	1529	0.28	6.57	-76.3	17.3	
2146	140	10.37	17.8	1509	0.59	6.59	-77.5	7.50	
2151	140	~~10.38~~ 10.37	17.8	1501	0.37	6.60	-79.3	7.91	
2154	140	10.38	17.6	1483	0.17	6.61	-77.3	6.13	
2157	140	10.40	17.5	1456	0.15	6.61	-78.4	3.75	
2200	140	10.41	17.8	1449	0.14	6.63	-76.6	2.74	
2203	140	10.42	17.9	1443	0.14	6.64	-79.5	2.50	

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-42-1124	2205	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	–

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%
NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	GeoPump 406803
YSI:	Quatro/ProPlus 50145
Interface Probe:	Solinst 7481
Turbidity:	Hach2100Q 447160

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 14 Nov 24
Weather: Good

Well ID: MW-93
Sample ID: MW-93- 1124 [Well ID-MMYY]
Well Cond.: Good
Sampled by: KC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.11
Depth to Product (ft btoc): —
Product Thickness (ft): —
Water Column (ft):
Water Volume in Well (gal)[1]:
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20.5
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): 14.5
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1825
Total Volume Purged (gal):

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1827	150	9.59	22.9	1052	0.37	6.67	-115.2	32.6	
1833		10.01	22.4	1063	0.35	6.72	-121.5	29.4	
1838		10.11	21.9	1091	0.22	6.80	-134.1	18.4	
1841		10.11	21.7	1110	0.16	6.81	-138.7	18.3	
1844		10.19	21.9	1113	0.14	6.81	-141.7	17.8	
1847		10.19	21.9	1138	0.12	6.80	-144.4	9.77	
1850		10.19	21.5	1163	0.13	6.80	-147.0	7.45	
1853		10.19	21.7	1168	0.10	6.80	-148.3	7.21	

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-93-1124	1858	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	49811
YSI:	34641
Interface Probe:	28300
Turbidity:	48426

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 14 Nov 24
Weather: Rain

Well ID: MW-39A
Sample ID: MW-39A-1124 (Well ID-MMYY)
Well Cond.: Good
Sampled by: KC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 8.72
Depth to Product (ft btoc):
Product Thickness (ft):
Water Column (ft):
Water Volume in Well (gal)[1]:
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20.5
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): 14
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1945
Total Volume Purged (gal):

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1951	210	9.38	17.2	979	0.64	6.87	-87.0	46.5	
1956			17.4	1002	0.22	6.86	-99.5	26.3	
2001			17.6	1006	0.15	6.87	-108.1	15.2	
2004			17.7	1016	0.10	6.87	-111.4	10.9	
2007			17.5	1019	0.10	6.88	-115.1	9.5	
2010			17.5	1025	0.11	6.89	-114.1	9.2	
						KC			

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-39A-1124	2015	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--

REQUIRED STABILIZATION RANGES[4]

Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES

Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES

1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING INFORMATION

There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	49811
YSI:	34641
Interface Probe:	28300
Turbidity:	48426

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 14 Nov 24
Weather: Rain

Well ID: MW-92
Sample ID: MW-92-1124 (Well ID-MMYY)
Well Cond.: Good
Sampled by: KC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.46
Depth to Product (ft btoc) :
Product Thickness (ft):
Water Column (ft):
Water Volume in Well (gal)[1]:
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): 15
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 2125
Total Volume Purged (gal):

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
2130	190	9.56	17.1	1006	7.06	6.76	-60.6	29.9	
2135			16.9	1004	7.15	6.79	-111.9	4.01	
2140			16.5	1004	7.15	6.82	-117.3	1.82	
2143			16.6	1004	7.06	6.82	-114.4	1.76	
2146			16.6	1007	6.95	6.83	-118.5	1.70	
						KC			

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	COC	Method	Container	No. of bottles	Preservative
MW-92-1124	2150	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--
		PAHs & 2-methylnaphthalene	SVOCs	1 L Ambler	1	--

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%
NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	49811
YSI:	34641
Interface Probe:	28300
Turbidity:	48426

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 14 Nov 24
Weather: Rain

Well ID: MW-58A
Sample ID: MW-58A- [Well ID MMYY]
Well Cond.: Good
Sampled by: KC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.11
Depth to Product (ft btoc):
Product Thickness (ft):
Water Column (ft):
Water Volume in Well (gal)[1]:
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 25
Screened Interval (ft bgs): 5-25
Tubing Inlet Depth (ft bgs): 17
Sampling Tube Material: LPDE
70-130

****Tidal well, sample ~~T90-100~~ min after the low-low tide (21:37)*****

PURGING INFORMATION

Start Purge Time: 2246
Total Volume Purged (gal):

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
2250	144	9.56	16.5	954	0.76	7.04	-103.3	88.7	
2255	|	|	17.3	492.3	1.11	7.01	-108.1	140	
2300	|	|	17.2	21.0	6.94	6.97	-67.4	112	
2303	|	|	17.4	14.1	7.59	6.95	-58.4	98.3	
2306	|	|	17.4	17.3	7.53	6.91	-44.7	82.4	
2309	|	|	17.0	3.9	7.44	6.96	-30.0	75.4	
2312	|	|	17.3	503.9	7.40	6.92	-32.6	79.8	
								KC	

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	COC	Method	Container	No. of bottles	Preservative
MW-58A-1124	2320	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	–
		PAHs & 2-methylnaphthalene	SVOCs	1 L Ambler	1	–

REQUIRED STABILIZATION RANGES[4]

Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES

Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES

1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

Specific Conductance not stabalizing most likely due to the tide and salt water.

SAMPLING INFORMATION

There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	49811
YSI:	34641
Interface Probe:	29300
Turbidity:	48426

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/24
Weather: raining °F

Well ID: RW-11A
Sample ID: RW-11A- 1124 [Well ID-MMYY]
Well Cond.: good
Sampled by: MM

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.34
Depth to Product (ft btoc): —
Product Thickness (ft): —
Water Column (ft): 10.66
Water Volume in Well (gal)[1]: 6.99
Inner Casing Diameter (Inch): 4
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): 12.5 — tubing got jammed
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1810
Total Volume Purged (gal): _____

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1817	100	9.42	17.1	1466	4.81	6.37	234.9	14.3	mild HC odor
1822	" "	9.47	17.7	1489	3.94	6.35	222.2	12.6	fine particles
1827	" "	9.53	17.5	1486	3.36	6.35	218.2	12.0	" "
1832	" "	9.58	17.4	1486	3.18	6.34	216.3	13.4	" "
1837	" "	9.63	17.8	1487	3.02	6.34	214.0	12.9	" "
							MM		

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
RW-11A-1124	1840	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3 6	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	–

REQUIRED STABILIZATION RANGES[4]

Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES

Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES

1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

DUP-1-1124 : 1925

SAMPLING INFORMATION

There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	210298
YSI:	PRO PLUS 43952
Interface Probe:	Solinst 200' 19184
Turbidity:	HACH 2100 Q 214050

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/24
Weather: raining, windy

Well ID: MW-45A
Sample ID: MW-45A-1124 (Well ID-MMYY)
Well Cond.: good
Sampled by: MM

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 10.15
Depth to Product (ft btoc): —
Product Thickness (ft): —
Water Column (ft): 9.95
Water Volume in Well (gal)[1]: 1.63
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20.1
Screened Interval (ft bgs): 5.1-20.1
Tubing Inlet Depth (ft bgs): 15'
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1933
Total Volume Purged (gal): _____

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
1937	90	10.38	13.4	1465	2.26	6.79	-83.4	64.7	cloudy
1942	" "	10.41	14.8	1498	1.27	6.75	-90.5	15.1	mild HC odor
1947	" "	10.39	14.2	1516	0.89	6.70	-93.6	4.27	" "
1952	" "	10.41	14.1	1532	0.63	6.70	-98.6	4.98	less cloudy

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	COC	Method	Container	No. of bottles	Preservative
MW-45A-1124	1955	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	6	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--
		PAHs & 2-methylnaphthalene	SVOCs	1 L Ambler	1	--

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)
MS | MSD

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	210298
YSI:	PRO PLUS 43952
Interface Probe:	Solinst IP 200' 19184
Turbidity:	HACH 2100Q 214050

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/24
Weather: Cold, Windy

Well ID: MW-46B
Sample ID: MW-46B-1124 [Well ID-MMYY]
Well Cond.: good
Sampled by: MM

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 10.02
Depth to Product (ft btoc): —
Product Thickness (ft): —
Water Column (ft):
Water Volume in Well (gal)[1]:
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20.3
Screened Interval (ft bgs): 5.3-20.3
Tubing Inlet Depth (ft bgs): 15'
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 2123
Total Volume Purged (gal):

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
2126	90	10.24	14.3	1052	3.81	6.63	-12.3	48.2	cloudy
2131	" "	10.32	14.7	1060	1.48	6.61	-25.3	23.5	" "
2136	" "	10.40	15.4	1041	0.71	6.60	-36.5	21.4	white particles
2141	" "	10.43	15.2	1057	0.56	6.55	-47.5	20.4	" "
2146	" "	10.45	15.3	1084	0.48	6.66	-63.0	14.5	" "
2149	" "	10.45	15.0	1087	0.45	6.67	-66.4	13.6	" "

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	COC	Method	Container	No. of bottles	Preservative
MW-46B-1124	2150	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	6	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	--
		PAHs & 2-methylnaphthalene	SVOCs	1 L Ambler	1	--

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING EQUIPMENT MODELS & IDs

Pump:	210298
YSI:	PRO PLUS 43952
Interface Probe:	SOLINST IP200' 19184
Turbidity:	HACH 2100Q 214050

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/24
Weather: sprinkling, cold

Well ID: RW-9
Sample ID: RW-9-1124 [Well ID-MMYY]
Well Cond.: good
Sampled by: MM

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.36
Depth to Product (ft btoc): —
Product Thickness (ft): —
Water Column (ft): 10.64
Water Volume in Well (gal)[1]: ?
Inner Casing Diameter (Inch): 6
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): Assumed ~20 ft bgs.
Screened Interval (ft bgs): Unknown. Assumed to match other wells on site, ~5-20 ft bgs.
Tubing Inlet Depth (ft bgs): LPDE 15'
Sampling Tube Material:

PURGING INFORMATION

Start Purge Time: 2309
Total Volume Purged (gal): _____

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
2311	100	9.51	17.1	1422	2.06	7.10	-79.6	13.1	Strong HC odor
2316	" "	9.55	18.0	1610	1.17	7.09	-94.5	6.96	" "
2321	" "	9.60	18.4	1648	0.51	7.08	-112.8	4.96	" "
2326	" "	9.62	18.2	1655	0.42	7.09	-116.0	4.79	" "
2331	" "	9.67	18.0	1660	0.41	7.09	-120.0	4.19	" "

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
RW-9-1124	2332	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	6	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	—

REQUIRED STABILIZATION RANGES[4]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit
PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive recordings.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	210298
YSI:	PRO PLUS 439S2
Interface Probe:	SOLINST 200' IP 19184
Turbidity:	HACH 2100Q 214050

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 11/14/24
Weather: cold, windy

Well ID: MW-89
Sample ID: MW-89-1124 (Well ID-MMYY)
Well Cond.: good
Sampled by: MM

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 10.22
Depth to Product (ft btoc): —
Product Thickness (ft): —
Water Column (ft): 9.78
Water Volume in Well (gal)[1]: 1.60
Inner Casing Diameter (Inch): 2
Inner Casing Material: PVC

Purge/Sample Method: Low-Flow
Purge/Sample Equipment: Peristaltic Pump
Total Well Depth (ft bgs): 20
Screened Interval (ft bgs): 5-20
Tubing Inlet Depth (ft bgs): 15'
Sampling Tube Material: LPDE

****Tidal well, sample 130-190 min after the low-low tide (21:37)*****

PURGING INFORMATION

Start Purge Time: 0023
Total Volume Purged (gal): _____

Time	Purge Rate[2] (mL/min)	Depth to Water[3] (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (SI Units)	ORP mV	Turbidity (NTU)	Comments
0026	100	10.50	17.8	1560	1.22	6.03	-44.9	60.5	tiny particles
0031	" "	10.50	18.9	1948	0.71	6.96	-30.6	33.2	" "
0036	" "	10.52	19.3	1982	0.60	6.93	-28.8	18.9	mild sulfur odor
0041	" "	10.51	19.2	2008	0.46	6.91	-27.4	17.6	" "
0044	" "	10.50	19.2	2011	0.47	6.90	-27.4	19.4	" "

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-89-1124	0045	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	6	HCL
		Dx	NWTPH-Dx	500 mL Amber	1	—

REQUIRED STABILIZATION RANGES[2]
Specific Conductance: +/- 5%
Temperature: +/- 3 %
pH: +/- 0.1 unit

PREFERRED STABILIZATION RANGES
Dissolved Oxygen: +/- 10%
Redox Potential: +/- 10%
Turbidity: +/- 10%

NOTES
1. If parameters do not stabilize after 3-5 casing volumes have been purged, proceed with sampling.
2" casing: 1 ft = 0.164 gal = 0.62 L
4" casing: 1 ft = 0.656 gal = 2.48 L
2. Flow rate should be 100-200 mL/min.
3. Drawdown should be limited to <1 ft.

SAMPLING INFORMATION
There is no minimum requirement for purge time. Record parameters every 2-5 minutes. Sample once parameters stay within the required ranges for 3 consecutive

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

SAMPLING EQUIPMENT MODELS & IDs

Pump:	PINE 210298
YSI:	PRO PLUS 439S2
Interface Probe:	SOLINST IP 200' 19189
Turbidity:	14CH 21002 214050

SAMPLE CHAIN OF CUSTODY

Report To PAUL KALINA
Company AECOM
Address 1111 3rd Ave Suite 11600
City, State, ZIP SEATTLE WA 98101
Phone 206 310 5987 Email PAUL.KALINA@AECOM.COM
LUCY.PANTELEEFF@AECOM.COM

SAMPLERS (*signature*)

PROJECT NAME: T-30

PO #

REMARKS

INVOICE TO

Project specific RLs? - Yes / No

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Dx w/Silica Gel	BTEX 8260			Notes
MW-41B-1124		11/14/24	2150		9	X	X				X		X	X			FAll incl. 2-methylnaphthalene
RW-9-1124		↓	2332		7	X	X						X	X			
MW-58A-1124		↓	2320		9	X	X				X		X	X			
MW-86B-1124		11/15/24	0047		7	X	X				X		X	X			SPLIT AMBERS W/ DUP 2
DUP-2-1124		↓	0001		7	X	X				X		X	X			SPLIT AMBERS W/ MW-86B
MW-89-1124		↓	0015		7	X	X						X	X			
TRIP BLANK 1							X							X			
TRIP BLANK 2							X							X			

ANALYSES REQUESTED

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	EMILY RICHARDSON	AECOM	11/15/24	1207
Received by:	Mac Gowan	FBI	11/15/24	1700
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SAMPLE CHAIN OF CUSTODY

Page # _____ of _____

Report To PAUL KALINA

Company AECOM

Address 1111 3rd Ave Suite 11000

City, State, ZIP SEATTLE WA 98101

Phone 206-210-5017 Email PAUL.KALINA@AECOM.COM
LUCY.PANTELEEFF@AECOM.COM

SAMPLERS (*signature*)

PROJECT NAME: T-30

PO #

REMARKS

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☐ Standard turnaround
- ☐ RUSH _____
- Rush charges authorized by: _____

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other _____
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Dx w/ Silica Gel				Notes
MW-36A-1124		11/14/24	1840		7	X	X	X					X				
MW-93-1124			1858		7	X	X	X					X				
RW-11A-1124			[illegible]		7	X	X	X					X				
DUP-1-1124			1725		7	X	X	X					X				
MW-59-1124			1950		7	X	X	X					X				
MW-39-1124			2015		7	X	X	X					X				PAH INCL 2-Methyl-Naphthalene
MW-45A-1124			1955		6	X	X	X			X		X				M (MS)
RW-5A-1124			2048		6	X	X	X					X				5 VOAs
MW-42-1124			2205		7	X	X	X					X				
MW-92-1124		↓	2150		9	X	X	X			X		X				All include 2-methylnaphthalene

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	EMILY RICHARDSON	AECOM	11/15/24	1307
Received by:	Mark Golden	FBI	11/15/24	1207
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 28300
Description Solinst Interface
Calibrated 11/12/2024 12:27:06PM

Manufacturer	Solinst	**State Certified**	
Model Number	IP	**Status**	Pass
Serial Number/ Lot Number	237475	**Temp °C**	19
Location	Seattle	**Humidity %**	41
Department			

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 34641
Description YSI Pro Plus
Calibrated 11/11/2024 11:58:28AM

Manufacturer YSI
Model Number
Serial Number/ Lot Number 18M102986
Location Seattle
Department

State Certified
Status Pass
Temp °C 20
Humidity % 45

Calibration Specifications

Group # 1
Group Name PH
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
4.00 / 4.00	PH	4.00	PH	3.98	4.00	0.00%	Pass
7.00 / 7.00	PH	7.00	PH	7.08	7.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	10.02	10.00	0.00%	Pass

Group # 2
Group Name Conductivity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.000

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
1.413 / 1.413	ms/cm	1.413	ms/cm	1.434	1.413	0.00%	Pass

Group # 3
Group Name Redox (ORP)
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
240.0 / 240.0	mv	240.0	mv	245.0	240.0	0.00%	Pass

Group # 4
Group Name DO Oxygen Span
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	%	100.0	%	102.0	100.0	0.00%	Pass

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 34641
Description YSI Pro Plus
Calibrated 11/11/2024 11:58:28AM

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA 7 PH	SEA 7 PH 3GE007	Pine	32025	3GE007		5/30/2025
SEA PH10 32034	SEA PH10 BUFFER	Pine	32034	3GA510		1/28/2025
SEA PH4 3GE-0156	SEA PH4 BUFFER 3GE0156	Pine	32017	EGE-0156		5/30/2025
SEA-ORP 4GC1490	ORP STANDARD 240 mV	Pine Environmental Services, Inc.	32001	4GE1370		2/28/2025
SEACOND 1.413	SEA-COND 1.413	Pine	31986	4GF1133		6/28/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 49811
Description Peristaltic Pump
Calibrated 11/12/2024 10:53:48AM

Manufacturer	Geotech	**State Certified**	NJ Cert#: 11034
Model Number	M20004214	**Status**	Pass
Serial Number/ Lot Number	M20004214	**Temp °C**	18
Location	Seattle	**Humidity %**	46
Department			

Calibration Specifications

Group # 1
Group Name Peristalsis and Function Test
Test Performed: N/A **As Found Result:** **As Left Result:**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 48426
Description 48663
Calibrated 11/12/2024 11:50:34AM

Manufacturer HACH
Model Number 2100Q
Serial Number/ Lot Number 19070C077831
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 44

Calibration Specifications

Group # 1
Group Name NTU Turbiditity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 3.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
10.00 / 10.00	NTU	10.00	NTU	9.93	10.00	0.00%	Pass

Group # 2
Group Name NTU Turbiditity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
20.00 / 20.00	NTU	20.00	NTU	19.60	20.00	0.00%	Pass

Group # 3
Group Name NTU Turbidiity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	NTU	100.00	NTU	101.00	100.00	0.00%	Pass

Group # 4
Group Name NTU Turbiditity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
800.00 / 800.00	NTU	800.00	NTU	799.00	800.00	0.00%	Pass

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 48426
Description 48663
Calibrated 11/12/2024 11:50:34AM

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

ER

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 7481
Description Solinst Interface
Calibrated 11/12/2024 12:26:22PM

Manufacturer Solinst
Model Number IP 200'
Serial Number/ Lot Number 286714
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 41

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 50145
Description YSI PRO QUATRO
Calibrated 11/11/2024 12:44:28PM

Manufacturer YSI
Model Number PRO QUATRO
Serial Number/ Lot Number 21C103688
Location Seattle
Department

State Certified
Status Pass
Temp °C 20
Humidity % 44

Calibration Specifications

Group # 1
Group Name PH
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
7.00 / 7.00	PH	7.00	PH	7.36	7.00	0.00%	Pass
4.00 / 4.00	PH	4.00	PH	4.45	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	10.18	10.00	0.00%	Pass

Group # 2
Group Name Conductivity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.000

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
1.413 / 1.413	ms/cm	1.413	ms/cm	1.350	1.413	0.00%	Pass

Group # 3
Group Name Redox (ORP)
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
240.00 / 240.00	mv	240.00	mv	243.00	240.00	0.00%	Pass

Group # 4
Group Name Disolved Oxygen Span
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	%	100.00	%	98.00	100.00	0.00%	Pass

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 50145
Description YSI PRO QUATRO
Calibrated 11/11/2024 12:44:28PM

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date / Opened Date	Next Cal Date / Expiration Date
SEA 7 PH	SEA 7 PH 3GE007	Pine	32025	3GE007		5/30/2025
SEA PH10 32034	SEA PH10 BUFFER	Pine	32034	3GA510		1/28/2025
SEA PH4 3GE-0156	SEA PH4 BUFFER 3GE0156	Pine	32017	EGE-0156		5/30/2025
SEA-ORP 4GC1490	ORP STANDARD 240 mV	Pine Environmental Services, Inc.	32001	4GE1370		2/28/2025
SEACOND 1.413	SEA-COND 1.413	Pine	31986	4GF1133		6/28/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

ER

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 44760
Description HACH 2100Q Turbidimeter
Calibrated 11/12/2024 11:52:28AM

Manufacturer HACH
Model Number 2100Q
Serial Number/ Lot Number 18090C069265
Location Seattle
Department

State Certified NJ Cert#: 11034
Status Pass
Temp °C 19
Humidity % 43

Calibration Specifications

Group # 1
Group Name Turbidity
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 5.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
10.00 / 10.00	NTU	10.00	NTU	9.66	10.00	0.00%	Pass
20.00 / 20.00	NTU	20.00	NTU	19.80	20.00	0.00%	Pass
100.00 / 100.00	NTU	100.00	NTU	102.00	100.00	0.00%	Pass
800.00 / 800.00	NTU	800.00	NTU	827.00	800.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

E2

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 46803
Description Geotech Peristaltic Pump
Calibrated 11/12/2024 10:53:09AM

Manufacturer	Pine Environmental Services, Inc.	**State Certified**	
Model Number	Geopump	**Status**	Pass
Serial Number/ Lot Number	n/a	**Temp °C**	18
Location	Seattle	**Humidity %**	46
Department			

Calibration Specifications

Group # 1
Group Name PERISTALSIS AND FUNCTIONAL TEST

Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

MM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID	19184
Description	Solinst IP 200'
Calibrated	11/11/2024 12:56:08PM

Manufacturer	Solinst	**State Certified**	
Model Number	122	**Status**	Pass
Serial Number/ Lot Number	268265	**Temp °C**	20
Location	Seattle	**Humidity %**	44
Department			

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

MM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building I Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 210298
Description Pine Environmental Peristaltic Pump
Calibrated 11/8/2024 1:12:02PM

Manufacturer	Pine Environmental Services, Inc.	**State Certified**	
Model Number		**Status**	Pass
Serial Number/ Lot Number	n/a	**Temp °C**	19
Location	Seattle	**Humidity %**	38
Department			

Calibration Specifications

Group # 1
Group Name
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration **(As Of Cal Entry Date)**

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

MM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 214050
Description HACH 2100Q Turbidity meter
Calibrated 11/12/2024 11:54:20AM

Manufacturer	HACH	**State Certified**	NJ Cert#: 11034
Model Number	2100Q	**Status**	Pass
Serial Number/ Lot Number	22070D000072	**Temp °C**	19
Location	Seattle	**Humidity %**	43
Department			

Calibration Specifications

Group # 1
Group Name Turbidity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
10.00 / 10.00	NTU	10.00	NTU	9.50	10.00	0.00%	Pass
20.00 / 20.00	NTU	20.00	NTU	20.30	20.00	0.00%	Pass
100.00 / 100.00	NTU	100.00	NTU	102.00	100.00	0.00%	Pass
800.00 / 800.00	NTU	800.00	NTU	775.00	800.00	0.00%	Pass

Test Instruments Used During the Calibration (As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

MM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 43952
Description YSI Professional Plus
Calibrated 11/11/2024 4:15:11PM

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA 7 PH	SEA 7 PH 3GE007	Pine	32025	3GE007		5/30/2025
SEA PH10 32034	SEA PH10 BUFFER	Pine	32034	3GA510		1/28/2025
SEA PH4 3GE-0156	SEA PH4 BUFFER 3GE0156	Pine	32017	EGE-0156		5/30/2025
SEA-ORP 4GC1490	ORP STANDARD 240 mV	Pine Environmental Services, Inc.	32001	4GE1370		2/28/2025
SEACOND 1.413	SEA-COND 1.413	Pine	31986	4GF1133		6/28/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 43952
Description YSI Professional Plus
Calibrated 11/11/2024 4:15:11PM

Manufacturer YSI
Model Number Professional Plus
Serial Number/ Lot Number 18J102188
Location Seattle
Department

State Certified
Status Pass
Temp °C 20
Humidity % 42

Calibration Specifications

Group # 1
Group Name PH
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
7.00 / 7.00	PH	7.00	PH	7.03	7.00	0.00%	Pass
4.00 / 4.00	PH	4.00	PH	3.96	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	9.95	10.00	0.00%	Pass

Group # 2
Group Name Conductivity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.000

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
1.413 / 1.413	ms/cm	1.413	ms/cm	1.387	1.413	0.00%	Pass

Group # 3
Group Name Redox (ORP)
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
240.00 / 240.00	mv	240.00	mv	244.00	240.00	0.00%	Pass

Group # 4
Group Name Disolved Oxygen Span
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	%	100.00	%	110.00	100.00	0.00%	Pass

Appendix G

Groundwater Sampling

Laboratory Analytical Reports

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

April 24, 2024

Paul Kalina, Project Manager
AECOM
1111 3rd Ave, Suite 1600
Seattle, WA 98101

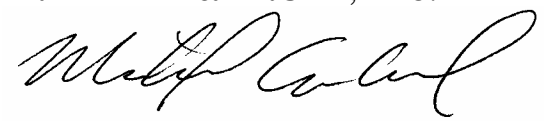
Dear Mr Kalina:

Included are the results from the testing of material submitted on April 12, 2024 from the T-30 60681370, F&BI 404195 project. There are 14 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Gus Friedman
AEC0424R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 12, 2024 by Friedman & Bruya, Inc. from the AECOM T-30 60681370, F&BI 404195 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
404195 -01	MW-89-0424
404195 -02	RW-11A-0424
404195 -03	DUP-1-0424
404195 -04	MW-59-0424
404195 -05	Trip Blank

All quality control requirements were acceptable.

Date of Report: 04/24/24
Date Received: 04/12/24
Project: T-30 60681370, F&BI 404195
Date Extracted: 04/17/24
Date Analyzed: 04/17/24

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
MW-89-0424 404195-01	<100	87
RW-11A-0424 404195-02	230	93
DUP-1-0424 404195-03	<100	89
MW-59-0424 404195-04	<100	88
Method Blank 04-850 MB	<100	86

Date of Report: 04/24/24
Date Received: 04/12/24
Project: T-30 60681370, F&BI 404195
Date Extracted: 04/15/24
Date Analyzed: 04/15/24 and 04/16/24

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
MW-89-0424 404195-01	1,400 x	1,400 x	106
RW-11A-0424 404195-02 1/10	62,000 x	<3,000	ip
DUP-1-0424 404195-03	29,000 x	1,100 x	ip
MW-59-0424 404195-04	25,000 x	950 x	139
Method Blank 04-940 MB	<50	<250	107

Date of Report: 04/24/24
Date Received: 04/12/24
Project: T-30 60681370, F&BI 404195
Date Extracted: 04/15/24
Date Analyzed: 04/15/24 and 04/23/24

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
MW-89-0424 404195-01 1/1.2	63	<300	108
RW-11A-0424 404195-02 1/1.2	4,100	<300	119
DUP-1-0424 404195-03	23,000	620 x	133
MW-59-0424 404195-04	17,000	770 x	141
Method Blank 04-940 MB	<50	<250	105

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-89-0424	Client:	AECOM
Date Received:	04/12/24	Project:	T-30 60681370, F&BI 404195
Date Extracted:	04/18/24 08:46	Lab ID:	404195-01
Date Analyzed:	04/18/24 13:15	Data File:	041820.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	78	126
Toluene-d8	99	84	115
4-Bromofluorobenzene	101	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	RW-11A-0424	Client:	AECOM
Date Received:	04/12/24	Project:	T-30 60681370, F&BI 404195
Date Extracted:	04/18/24 08:46	Lab ID:	404195-02
Date Analyzed:	04/18/24 13:37	Data File:	041821.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	108	78	126
Toluene-d8	100	84	115
4-Bromofluorobenzene	102	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	DUP-1-0424	Client:	AECOM
Date Received:	04/12/24	Project:	T-30 60681370, F&BI 404195
Date Extracted:	04/18/24 08:46	Lab ID:	404195-03
Date Analyzed:	04/18/24 18:50	Data File:	041835.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	100	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-59-0424	Client:	AECOM
Date Received:	04/12/24	Project:	T-30 60681370, F&BI 404195
Date Extracted:	04/18/24 08:46	Lab ID:	404195-04
Date Analyzed:	04/18/24 19:13	Data File:	041836.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	98	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370, F&BI 404195
Date Extracted:	04/18/24	Lab ID:	04-0786 mb
Date Analyzed:	04/18/24	Data File:	041809.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	97	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Date of Report: 04/24/24
Date Received: 04/12/24
Project: T-30 60681370, F&BI 404195

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

Laboratory Code: 404195-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	<100	90	76	50-150	17

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	99	70-130

Date of Report: 04/24/24
Date Received: 04/12/24
Project: T-30 60681370, F&BI 404195

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

Laboratory Code: 404195-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	25,000	13 b	13 b	50-150	0 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	92	72-139

Date of Report: 04/24/24
Date Received: 04/12/24
Project: T-30 60681370, F&BI 404195

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

Laboratory Code: 404195-04 (Matrix Spike) Silica Gel

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	18,000	71 b	37 b	50-150	63 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	84	65-151

Date of Report: 04/24/24
Date Received: 04/12/24
Project: T-30 60681370, F&BI 404195

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

Laboratory Code: 404195-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	102	107	50-150	5
Toluene	ug/L (ppb)	10	<1	99	105	50-150	6
Ethylbenzene	ug/L (ppb)	10	<1	98	105	50-150	7
m,p-Xylene	ug/L (ppb)	20	<2	96	102	50-150	6
o-Xylene	ug/L (ppb)	10	<1	96	102	50-150	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	101	99	70-130	2
Toluene	ug/L (ppb)	10	101	100	70-130	1
Ethylbenzene	ug/L (ppb)	10	104	102	70-130	2
m,p-Xylene	ug/L (ppb)	20	102	101	70-130	1
o-Xylene	ug/L (ppb)	10	101	99	70-130	2

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

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

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

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

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

vo - The value reported fell outside the control limits established for this analyte.

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

404195

SAMPLE CHAIN OF CUSTODY 04/12/24 C2/VW5

Report To Paul Kalina, Gus Friedman
Company AECOM
Address 1111 3rd Ave Suite 1600
City, State, ZIP Seattle WA 98101
Phone 206-316-5097 Email paul.kalina@aecom

SAMPLERS (signature)
PROJECT NAME: T-30
PO #: 60681370
REMARKS: 1 µg/L MRL for BTEX EPA 8260D 4/12
INVOICE TO: Paul Kalina
Project specific RLs? - Yes / No

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	NWTPH Dx w/ Silica gel cleanup	BTEX 8260D			Notes
						ANALYSES REQUESTED											
MW-89-0424	01 A-G	4/11/24	1600	GW	7	X	X						X	X			
RW-11A-0424	02		1655		7												
DUP-1-0424	03		1620		7												
MW-59-0424	04 A-U		1730		21												MS/MSD
TRIP BLANK	05 A-B			–	2												
							Samples received at 0 °C										

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	David Behrens	AECOM	4/12/24	1045
Received by:	ANHPHAN	F&B	04/12/24	10:45
Relinquished by:				
Received by:				

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

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

December 16, 2024

Paul Kalina, Project Manager
AECOM
1111 3rd Ave, Suite 1600
Seattle, WA 98101

Dear Mr Kalina:

Include is the amended report from the testing of material submitted on November 15, 2024 from the T-30 60681370 Task 5 project, F&BI 411251. The "x" qualifier was removed from the non-detect motor oil result for sample RW-11A-1124.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Lucy Panteleeff
AEC1126R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

November 26, 2024

Paul Kalina, Project Manager
AECOM
1111 3rd Ave, Suite 1600
Seattle, WA 98101

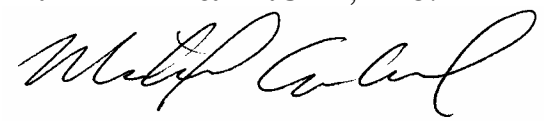
Dear Mr Kalina:

Included are the results from the testing of material submitted on November 15, 2024 from the T-30 60681370 Task 5 project, F&BI 411251. There are 39 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Lucy Panteleeff
AEC1126R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 15, 2024 by Friedman & Bruya, Inc. from the AECOM T-30 60681370 Task 5, F&BI 411251. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
411251 -01	MW-36A-1124
411251 -02	MW-93-1124
411251 -03	RW-11A-1124
411251 -04	DUP-1-1124
411251 -05	MW-59-1124
411251 -06	MW39A-1124
411251 -07	MW-45A-1124
411251 -08	RW-5A-1124
411251 -09	MW-42-1124
411251 -10	MW-92-1124
411251 -11	MW-46B-1124
411251 -12	RW-9-1124
411251 -13	MW-58A-1124
411251 -14	MW-86B-1124
411251 -15	DUP-2-1124
411251 -16	MW-89-1124
411251 -17	TRIP BLANK 1
411251 -18	TRIP BLANK 2

The 8270E PAH samples MW-45A-1124, MW-92-1124, MW-46B-1124, and MW-58A-1124 were filtered prior to analysis. The data were flagged accordingly.

Phenanthrene was detected in the 8270E method blank at a level greater than one tenth the concentration detected in samples MW-92-1124, MW-46B-1124, MW-86B-1124, DUP-2-1124. The data were flagged accordingly.

All other quality control requirements were acceptable.

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251
Date Extracted: 11/19/24
Date Analyzed: 11/19/24 and 11/20/24

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
MW-36A-1124 411251-01	<100	92
MW-93-1124 411251-02	<100	85
RW-11A-1124 411251-03	<100	86
DUP-1-1124 411251-04	<100	89
MW-59-1124 411251-05	<100	85
MW39A-1124 411251-06	<100	91
MW-45A-1124 411251-07	<100	93
RW-5A-1124 411251-08	<100	84
MW-42-1124 411251-09	370	109
MW-92-1124 411251-10	130	99
MW-46B-1124 411251-11	<100	93

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251
Date Extracted: 11/19/24
Date Analyzed: 11/19/24 and 11/20/24

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
RW-9-1124 411251-12	130	96
MW-58A-1124 411251-13	<100	91
MW-86B-1124 411251-14	<100	91
DUP-2-1124 411251-15	<100	89
MW-89-1124 411251-16	<100	90
TRIP BLANK 1 411251-17	<100	95
TRIP BLANK 2 411251-18	<100	95
Method Blank 04-2718 MB	<100	84

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251
Date Extracted: 11/19/24
Date Analyzed: 11/21/24

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
MW-36A-1124 411251-01 1/1.2	420	<300	97
MW-93-1124 411251-02	<50	<250	83
RW-11A-1124 411251-03	<50	<250	98
DUP-1-1124 411251-04	<50	<250	93
MW-59-1124 411251-05	6,600	<250	132
MW39A-1124 411251-06	67	<250	91
MW-45A-1124 411251-07	<50	<250	96
RW-5A-1124 411251-08	180	680	90
MW-42-1124 411251-09	75	<250	89
MW-92-1124 411251-10	64	<250	87
MW-46B-1124 411251-11	<50	<250	88

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251
Date Extracted: 11/19/24
Date Analyzed: 11/21/24

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
RW-9-1124 411251-12	150	<250	99
MW-58A-1124 411251-13	96	<250	89
MW-86B-1124 411251-14 1/1.5	<75	<380	77
DUP-2-1124 411251-15 1/1.5	<75	<380	82
MW-89-1124 411251-16	96	<250	84
Method Blank 04-2875 MB	<50	<250	90

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251
Date Extracted: 11/19/24
Date Analyzed: 11/20/24

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
MW-36A-1124 411251-01	3,400 x	940 x	107
MW-93-1124 411251-02	3,500 x	660 x	98
RW-11A-1124 411251-03	140 x	<250	118
DUP-1-1124 411251-04	120 x	<250	107
MW-59-1124 411251-05	13,000 x	1,500 x	120
MW39A-1124 411251-06	1,200 x	310 x	106
MW-45A-1124 411251-07 1/2	730 x	<500	114
RW-5A-1124 411251-08	1,500	1,300	96
MW-42-1124 411251-09	9,800 x	1,800 x	106
MW-92-1124 411251-10	2,600 x	340 x	115
MW-46B-1124 411251-11	1,200 x	<250	111

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251
Date Extracted: 11/19/24
Date Analyzed: 11/20/24

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
RW-9-1124 411251-12	7,900 x	1,700 x	126
MW-58A-1124 411251-13	3,200 x	560 x	116
MW-86B-1124 411251-14	3,200 x	850 x	101
DUP-2-1124 411251-15	8,200 x	1,700 x	110
MW-89-1124 411251-16	2,900 x	1,500 x	105
Method Blank 04-2875 MB	<50	<250	96

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-36A-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-01
Date Analyzed:	11/19/24	Data File:	111908.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	78	126
Toluene-d8	99	84	115
4-Bromofluorobenzene	84	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-93-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-02
Date Analyzed:	11/19/24	Data File:	111909.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	78	126
Toluene-d8	99	84	115
4-Bromofluorobenzene	87	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	RW-11A-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-03
Date Analyzed:	11/19/24	Data File:	111910.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	115	78	126
Toluene-d8	96	84	115
4-Bromofluorobenzene	92	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	DUP-1-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-04
Date Analyzed:	11/19/24	Data File:	111911.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	78	126
Toluene-d8	95	84	115
4-Bromofluorobenzene	91	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-59-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-05
Date Analyzed:	11/19/24	Data File:	111912.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	91	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW39A-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-06
Date Analyzed:	11/19/24	Data File:	111922.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	100	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-45A-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-07
Date Analyzed:	11/20/24	Data File:	112012.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	78	126
Toluene-d8	95	84	115
4-Bromofluorobenzene	99	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	RW-5A-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-08
Date Analyzed:	11/19/24	Data File:	111913.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	83	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-42-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-09
Date Analyzed:	11/19/24	Data File:	111914.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	91	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-92-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-10
Date Analyzed:	11/19/24	Data File:	111915.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	103	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-46B-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-11
Date Analyzed:	11/19/24	Data File:	111916.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	93	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	RW-9-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-12
Date Analyzed:	11/19/24	Data File:	111917.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	103	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-58A-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-13
Date Analyzed:	11/19/24	Data File:	111921.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	78	126
Toluene-d8	95	84	115
4-Bromofluorobenzene	83	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-86B-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-14
Date Analyzed:	11/19/24	Data File:	111918.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	101	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	DUP-2-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-15
Date Analyzed:	11/19/24	Data File:	111919.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	78	126
Toluene-d8	96	84	115
4-Bromofluorobenzene	102	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-89-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-16
Date Analyzed:	11/19/24	Data File:	111920.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	101	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	0.49
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	TRIP BLANK 1	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-17
Date Analyzed:	11/19/24	Data File:	111906.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	96	84	115
4-Bromofluorobenzene	95	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	TRIP BLANK 2	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-18
Date Analyzed:	11/19/24	Data File:	111907.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	88	72	130

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	04-2845 mb
Date Analyzed:	11/19/24	Data File:	111908.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	71	132
Toluene-d8	97	68	139
4-Bromofluorobenzene	103	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-45A-1124 f	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-07 1/0.5
Date Analyzed:	11/19/24	Data File:	111915.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	83	11	173
2-Fluorobiphenyl	74	25	128
2,4,6-Tribromophenol	103 ca	10	140
Terphenyl-d14	84	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.1
2-Methylnaphthalene	<0.1
1-Methylnaphthalene	<0.1
Acenaphthylene	<0.01
Acenaphthene	0.55
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	0.017
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-92-1124 f	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-10 1/0.5
Date Analyzed:	11/19/24	Data File:	111916.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	84	11	173
2-Fluorobiphenyl	74	25	128
2,4,6-Tribromophenol	105 ca	10	140
Terphenyl-d14	82	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.1
2-Methylnaphthalene	<0.1
1-Methylnaphthalene	0.10
Acenaphthylene	<0.01
Acenaphthene	0.088
Fluorene	<0.01
Phenanthrene	0.056 fb
Anthracene	0.011
Fluoranthene	0.016
Pyrene	0.021
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-46B-1124 f	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-11 1/0.5
Date Analyzed:	11/19/24	Data File:	111917.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	78	11	173
2-Fluorobiphenyl	74	25	128
2,4,6-Tribromophenol	81 ca	10	140
Terphenyl-d14	80	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.1
2-Methylnaphthalene	<0.1
1-Methylnaphthalene	<0.1
Acenaphthylene	<0.01
Acenaphthene	1.1
Fluorene	<0.01
Phenanthrene	0.025 fb
Anthracene	0.012
Fluoranthene	0.041
Pyrene	0.037
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-58A-1124 f	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-13 1/0.5
Date Analyzed:	11/19/24	Data File:	111918.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	77	11	173
2-Fluorobiphenyl	76	25	128
2,4,6-Tribromophenol	104 ca	10	140
Terphenyl-d14	72	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	6.9
2-Methylnaphthalene	0.33
1-Methylnaphthalene	0.95
Acenaphthylene	<0.01
Acenaphthene	6.6
Fluorene	1.5
Phenanthrene	0.18
Anthracene	0.13
Fluoranthene	0.75
Pyrene	0.50
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	MW-86B-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-14
Date Analyzed:	11/19/24	Data File:	111919.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	85	11	173
2-Fluorobiphenyl	93	25	128
2,4,6-Tribromophenol	97 ca	10	140
Terphenyl-d14	87	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.1
2-Methylnaphthalene	<0.1
1-Methylnaphthalene	<0.1
Acenaphthylene	<0.01
Acenaphthene	0.70
Fluorene	<0.01
Phenanthrene	0.059 fb
Anthracene	0.028
Fluoranthene	0.067
Pyrene	0.078
Benz(a)anthracene	<0.01 j
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	DUP-2-1124	Client:	AECOM
Date Received:	11/15/24	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	411251-15
Date Analyzed:	11/19/24	Data File:	111920.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	88	11	173
2-Fluorobiphenyl	91	25	128
2,4,6-Tribromophenol	100 ca	10	140
Terphenyl-d14	90	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.1
2-Methylnaphthalene	<0.1
1-Methylnaphthalene	<0.1
Acenaphthylene	<0.01
Acenaphthene	0.62
Fluorene	<0.01
Phenanthrene	0.047 fb
Anthracene	0.027
Fluoranthene	0.057
Pyrene	0.070
Benz(a)anthracene	<0.01 j
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30 60681370 Task 5
Date Extracted:	11/19/24	Lab ID:	04-2835 mb2 1/0.5
Date Analyzed:	11/19/24	Data File:	111914.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	72	11	173
2-Fluorobiphenyl	65	25	128
2,4,6-Tribromophenol	72 ca	10	140
Terphenyl-d14	77	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.05
2-Methylnaphthalene	<0.05
1-Methylnaphthalene	<0.05
Acenaphthylene	<0.005
Acenaphthene	<0.005
Fluorene	<0.005
Phenanthrene	0.0065 lc
Anthracene	<0.005
Fluoranthene	<0.005
Pyrene	<0.005
Benz(a)anthracene	<0.005 j
Chrysene	<0.005
Benzo(a)pyrene	<0.005
Benzo(b)fluoranthene	<0.005
Benzo(k)fluoranthene	<0.005
Indeno(1,2,3-cd)pyrene	<0.005
Dibenz(a,h)anthracene	<0.005
Benzo(g,h,i)perylene	<0.005

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251

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

Laboratory Code: 411251-07 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	<100	96	92	50-150	4

Laboratory Code: Laboratory Control Sample

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

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251

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

Laboratory Code: 411251-07 (Matrix Spike) Silica Gel

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	<50	84	88	50-150	5

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	80	65-151

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251

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

Laboratory Code: 411251-07 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	780	85	85	50-150	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	80	65-151

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251

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

Laboratory Code: 411251-07 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	108	107	50-150	1
Toluene	ug/L (ppb)	10	<1	107	105	50-150	2
Ethylbenzene	ug/L (ppb)	10	<1	110	108	50-150	2
m,p-Xylene	ug/L (ppb)	20	<2	107	107	50-150	0
o-Xylene	ug/L (ppb)	10	<1	102	102	50-150	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	107	106	70-130	1
Toluene	ug/L (ppb)	10	108	104	70-130	4
Ethylbenzene	ug/L (ppb)	10	107	105	70-130	2
m,p-Xylene	ug/L (ppb)	20	106	104	70-130	2
o-Xylene	ug/L (ppb)	10	105	103	70-130	2

Date of Report: 11/26/24
Date Received: 11/15/24
Project: T-30 60681370 Task 5, F&BI 411251

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR SEMIVOLATILES BY EPA METHOD 8270E

Laboratory Code: 411251-07 1/0.5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	10	<0.1	60	44 vo	50-150	31 vo
2-Methylnaphthalene	ug/L (ppb)	10	<0.1	65	46	29-118	34 vo
1-Methylnaphthalene	ug/L (ppb)	10	<0.1	66	47	10-174	34 vo
Acenaphthylene	ug/L (ppb)	10	<0.01	79	60	50-150	27 vo
Acenaphthene	ug/L (ppb)	10	0.55	78	57	21-127	31 vo
Fluorene	ug/L (ppb)	10	<0.01	87	66	50-150	27 vo
Phenanthrene	ug/L (ppb)	10	<0.01	88	69	50-150	24 vo
Anthracene	ug/L (ppb)	10	<0.01	93	70	50-150	28 vo
Fluoranthene	ug/L (ppb)	10	<0.01	83	65	50-150	24 vo
Pyrene	ug/L (ppb)	10	0.017	99	73	50-150	30 vo
Benz(a)anthracene	ug/L (ppb)	10	<0.01	90	70	50-150	25 vo
Chrysene	ug/L (ppb)	10	<0.01	92	72	50-150	24 vo
Benzo(a)pyrene	ug/L (ppb)	10	<0.01	102 J	78	50-150	27 vo
Benzo(b)fluoranthene	ug/L (ppb)	10	<0.01	113 J	84	50-150	29 vo
Benzo(k)fluoranthene	ug/L (ppb)	10	<0.01	116 J	86	50-150	30 vo
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	10	<0.01	70 J	63	37-129	11
Dibenz(a,h)anthracene	ug/L (ppb)	10	<0.01	69 J	61	33-134	12
Benzo(g,h,i)perylene	ug/L (ppb)	10	<1	61 J	54	19-140	12

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	10	67	75	58-93	11
2-Methylnaphthalene	ug/L (ppb)	10	67	77	63-97	14
1-Methylnaphthalene	ug/L (ppb)	10	69	78	62-99	12
Acenaphthylene	ug/L (ppb)	10	86	89	68-111	3
Acenaphthene	ug/L (ppb)	10	84	88	67-104	5
Fluorene	ug/L (ppb)	10	88	92	70-130	4
Phenanthrene	ug/L (ppb)	10	89	94	70-130	5
Anthracene	ug/L (ppb)	10	91	93	70-130	2
Fluoranthene	ug/L (ppb)	10	86	88	70-130	2
Pyrene	ug/L (ppb)	10	81	84	70-130	4
Benz(a)anthracene	ug/L (ppb)	10	84	86	70-130	2
Chrysene	ug/L (ppb)	10	88	91	70-130	3
Benzo(a)pyrene	ug/L (ppb)	10	89	91	70-130	2
Benzo(b)fluoranthene	ug/L (ppb)	10	86	87	70-130	1
Benzo(k)fluoranthene	ug/L (ppb)	10	87	90	70-130	3
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	10	101	99	70-130	2
Dibenz(a,h)anthracene	ug/L (ppb)	10	98	97	70-130	1
Benzo(g,h,i)perylene	ug/L (ppb)	10	95	95	68-131	0

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

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

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

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported between the method detection limit and the lowest calibration point. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

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

vo - The value reported fell outside the control limits established for this analyte.

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

411251

SAMPLE CHAIN OF CUSTODY 11/15/24 VW5/F4

Report To PAUL KALINA
Company AECOM
Address 1111 3rd Ave Suite 11600
City, State, ZIP SEATTLE WA 98101
Phone 206-310-5097 Email PAUL.KALINA@AECOM.COM
LUCY.PANTELEEFF@AECOM.COM

SAMPLERS (signature)

PROJECT NAME: T-30

PO #

REMARKS: Project specific RLs? - Yes / No

INVOICE TO

Page # _____ of _____

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type AP 11/15	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8260 ~~8021~~	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Dx w/ Silica Gel				Notes
MW-36A-1124	01 A-G	11/14/24	1840	Water	7	X	X	X					X				
MW-93-1124	02		1858		7	X	X	X					X				
RW-11A-1124	03		1840		7	X	X	X					X				
DUP-1-1124	04		1925		7	X	X	X					X				
MW-59-1124	05		1950		7	X	X	X					X				
MW-39A-1124	06		2015		7	X	X	X					X				
MW-45A-1124	07 A-AA		1955		~~27~~	X	X	X			X		X				PAH INCL. 2-methyl-naphthalene MS/MSD
RW-5A-1124	08 A-F		2048		6	X	X	X					X				5 VOAs
MW-42-1124	09 A-G		2205		7	X	X	X					X				
MW-92-1124	10 A-I		2150		9	X	X	X			X		X				PAH include 2-methylnaphthalene

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	EMILY RICHARDSON	AECOM	11/15/24	1207
Received by:		FBZ	11/15/24	1207
Relinquished by:				
Received by:	Samples received at 8 °C			

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

41251

SAMPLE CHAIN OF CUSTODY 11/15/24 VW5/F4

Page # 2 of 2

Report To PAUL KALINA
Company AECOM
Address 1111 3rd Ave Suite 16600
City, State, ZIP SEATTLE WA 98101
Phone 206-310-5097 Email PAUL.KALINA@AECOM.COM
LUCY.PANTELEEFF@AECOM.COM

SAMPLERS (signature)

PROJECT NAME: T-30

PO #

REMARKS

Project specific RLs? - Yes / No

INVOICE TO

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type (AP 11/15)	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Dx w/ Silica Gel	BTEX 8260D			Notes
MW-46B-1124	11 A-I	11/14/24	2150	Water	9	X	X				X		X	X			PAH incl. 2-methylnaphthalene
RW-9-1124	12 A-G	↓	2332	↓	7	X	X						X	X			
MW-58A-1124	13 A-I	↓	2320	↓	9	X	X				X		X	X			
MW-86B-1124	14 A-G	11/15/24	0047	↓	7	X	X				X		X	X			SPLIT AMBERS W/ DUP-2
DUP-2-1124	15 ↓	↓	0001	↓	7	X	X				X		X	X			SPLIT AMBERS W/ MW-86B
MW-89-1124	16 ↓	↓	0045	↓	7	X	X						X	X			
TRIP BLANK 1	17 A-B	-	-	↓	2 (AP 11/15)		X							X			
TRIP BLANK 2	18 ↓	-	-	↓	2 ↓		X							X			

ANALYSES REQUESTED

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	EMILY RICHARDSON	AECOM	11/15/24	1207
Received by:		FBI	11/15/24	1207
Relinquished by:				
Received by:	Samples received at 3 °C			

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 411251 CLIENT AECOM INITIALS/ DATE: MR 11/15

If custody seals are present on cooler, are they intact? ☒ NA ☐ YES ☐ NO

Cooler/Sample temperature 3 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☒ YES ☐ NO

How did samples arrive?
☒ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☒ YES ☐ NO Initials/ AP
*or other representative documents, letters, and/or shipping memos Date: 11/15/24

Number of days samples have been sitting prior to receipt at laboratory Ø-1 days

Are the samples clearly identified? (explain "no" answer below) ☐ YES ☒ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☒ YES ☐ NO

Were appropriate sample containers used? ☒ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☒ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☐ NA ☐ YES ☒ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's	☐ Yes	☒ No	☐ Not on COC/label
Date Sampled	☒ Yes	☐ No	☐ Not on COC/label
Time Sampled	☒ Yes	☐ No	☐ Not on COC/label
# of Containers	☒ Yes	☐ No	
Relinquished	☒ Yes	☐ No	
Requested analysis	☒ Yes	☐ On Hold	

Other comments (use a separate page if needed)

a) -17A,B and -18A,B are label Trip Blank. Randomly selected 2 VOAs for Trip Bank and others for Trip Blank 2.
b) No sample ID on 1VOA. Labeled based on time (07AA)
c) Headspace on 1VOA for MW-86B-1124 (14G)

Air Samples: Were any additional canisters/tubes received? ☒ NA ☐ YES ☐ NO

Number of unused TO15 canisters _____ Number of unused TO17 tubes _____

Appendix H

Groundwater Sampling Summary

Data Quality Review Reports

AECOM
1111 3rd Ave
Suite 1600
Seattle, WA 98101
www.aecom.com

206 438 2700 tel
866 495 5288 fax

Memorandum

To	Paul Kalina, Project Manager	Info	Final
Subject	Summary Data Quality Review Port of Seattle – T-30 April 2024 Groundwater Sampling		
From	Lucy Panteleeff, Chemist Chelsey Cook, Chemist		
Date	December 16, 2024		

The summary data quality review of 4 groundwater samples collected on April 11, 2024, has been completed. The samples were analyzed at Freidman and Bruya, Incorporated (F&BI) located in Seattle, Washington for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8260D, total petroleum hydrocarbons (TPHs) by Washington State Department of Ecology Methods NWTPH-Gx (gasoline-range TPH) and NWTPH-Dx (diesel-range and motor oil-range TPH) with silica gel cleanup (SGC) and NWTPH-Dx (diesel-range and motor oil-range TPH) without SGC. The laboratory provided a summary report containing sample results and associated quality assurance (QA) and quality control (QC) data for all samples. For this report, the sample identifications (IDs) do not include the sampling date suffixes (-0424). The following samples are associated with F&BI laboratory group 404195:

Sample ID	Laboratory ID	Requested Analyses
MW-89-0424	404195-01	BTEX, NWTPH-Gx, NWTPH-Dx
RW-11A-0424	404195-02	BTEX, NWTPH-Gx, NWTPH-Dx
DUP-1 (Field duplicate of MW-59-0424)	404195-03	BTEX, NWTPH-Gx, NWTPH-Dx
MW-59-0424	404195-04	BTEX, NWTPH-Gx, NWTPH-Dx
Trip Blank	404195-05	None

Data were evaluated based on laboratory QC criteria and validation criteria established in the *National Functional Guidelines for Organic Superfund Methods Data Review*, November 2020.

The following data components were reviewed during the limited data validation procedure for compliance with method specific or laboratory control charted criteria where appropriate: chain of custody forms, holding times, method/trip/instrument blanks, surrogate recoveries, matrix spike/matrix spike duplicate recoveries, laboratory and field duplicate results, laboratory control sample/laboratory control sample duplicate recoveries, reporting limits, and electronic data deliverables.

A summary of qualifiers that may be assigned to results in these laboratory groups are included in Table 1. Qualifiers that may be assigned to results include:

- U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

- DNR - Do Not Report. Another result is available that is more reliable or appropriate.

Sample Receipt

Upon receipt by the laboratory, the sample jar information was compared to the chain-of-custody (COC) and the cooler temperature was recorded. The cooler was received by the laboratory at a temperature within the EPA recommended limits of greater than 0°C and less than or equal to 6°C. The trip blank was not marked for analysis on the COC and was not logged or analyzed by the laboratory. As VOCs were non-detect in the samples data were not impacted.

Organic Analyses

Samples were analyzed for BTEX and TPHs by the methods identified in the introduction of this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable

3. Surrogates – Acceptable except as noted below:

   Diesel-range and Motor Oil-range TPH by NWTPH-Dx (No SGC) – The percent recoveries for o-terphenyl exceeded the control limits of 41-152% in the following samples.

Sample ID	Recovery
RW-11A (x10)	155%
DUP-1	157%

   RW-11A was analyzed at a dilution (x10); therefore, data were not qualified based on this surrogate result. The results for diesel-range and motor oil-range TPHs in DUP-1 were qualified as estimated and flagged 'J' based on this surrogate result.

4. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – Acceptable

5. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable except as noted below:

   General –MS/MSDs were performed using MW-59 for all analyses. Results were acceptable except as noted below:

   Diesel-range and Motor Oil-range TPH by NWTPH-Dx – The percent recoveries and/or relative percent differences (RPDs) for diesel-range TPH were outside the following control limits.

Sample ID	Analyte	MS	MSD	RPD CL = 20%	Control Limits
MW-59	Diesel-range TPH	13%	13%	ok	50-150%

Sample ID	Analyte	MS	MSD	RPD CL = 20%	Control Limits
MW-59	Diesel-range TPH (SGC)	ok	37%	63%	50-150%

ok – acceptable CL – control limit

The sample concentration for diesel-range TPH and diesel-range TPH (SGC) were greater than four times the spike concentration in MW-59; therefore, data were not qualified based on these MS/MSD results.

6. Field Duplicate – Acceptable

   General – A field duplicate was submitted for MW-59 and identified as DUP-1. Results greater than five times the reporting limit were comparable.

7. Reporting Limits - Acceptable

8. Other Items of Note:

   Diesel-range and Motor Oil-range TPH by NWTPH-Dx (No SGC) – The laboratory noted that the diesel-range and/or motor-oil-range hydrocarbon patterns for several samples did not resemble the fuel standard used for quantitation. No qualifiers were assigned based on these qualitative observations.

Overall Assessment of Data

The data reported in this laboratory group, as qualified, are usable for meeting project objectives. The completeness for F&BI laboratory group 404195 is 100%.

Table 1 – Summary of Qualified Data

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result
DUP-1-0424	404195-03	NWTPH-Dx	Diesel-Range TPH	29,000	ug/L	29,000 J
DUP-1-0424	404195-03	NWTPH-Dx	Motor Oil-Range TPH	1,100	ug/L	1,100 J

AECOM
1111 3rd Ave
Suite 1600
Seattle, WA 98101
www.aecom.com

206 438 2700 tel
866 495 5288 fax

Memorandum

To	Paul Kalina, Project Manager	Info	Final
Subject	Summary Data Quality Review Port of Seattle – T-30 November 2024 Groundwater Sampling		
From	Lucy Panteleeff, Chemist Chelsey Cook, Chemist		
Date	December 16, 2024		

The summary data quality review of 16 groundwater samples and two trip blanks collected on November 14 and 15, 2024, has been completed. The samples were analyzed at Freidman and Bruya, Incorporated (F&BI) located in Seattle, Washington for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8260D; total petroleum hydrocarbons (TPHs) by Washington State Department of Ecology Methods NWTPH-Gx (gasoline-range TPH) and NWTPH-Dx (diesel-range and motor oil-range TPH) with silica gel cleanup (SGC) and NWTPH-Dx (diesel-range and motor oil-range TPH) without SGC; and/or polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270E modified by selected ion monitoring (SIM). The laboratory provided a summary report containing sample results and associated quality assurance (QA) and quality control (QC) data for all samples. For this report, the sample identifications (IDs) do not include the sampling date suffixes (-1124). The following samples are associated with F&BI laboratory group 411251:

Sample ID	Laboratory ID	Requested Analyses
MW-36A-1124	411251-01	BTEX, NWTPH-Gx, NWTPH-Dx
MW-93-1124	411251-02	BTEX, NWTPH-Gx, NWTPH-Dx
RW-11A-1124	411251-03	BTEX, NWTPH-Gx, NWTPH-Dx
DUP-1-1124 (Field Duplicate of RW-11A-1124)	411251-04	BTEX, NWTPH-Gx, NWTPH-Dx
MW-59-1124	411251-05	BTEX, NWTPH-Gx, NWTPH-Dx
MW39A-1124	411251-06	BTEX, NWTPH-Gx, NWTPH-Dx
MW-45A-1124	411251-07	BTEX, NWTPH-Gx, NWTPH-Dx, PAHs
RW-5A-1124	411251-08	BTEX, NWTPH-Gx, NWTPH-Dx
MW-42-1124	411251-09	BTEX, NWTPH-Gx, NWTPH-Dx
MW-92-1124	411251-10	BTEX, NWTPH-Gx, NWTPH-Dx, PAHs
MW-46B-1124	411251-11	BTEX, NWTPH-Gx, NWTPH-Dx, PAHs
RW-9-1124	411251-12	BTEX, NWTPH-Gx, NWTPH-Dx
MW-58A-1124	411251-13	BTEX, NWTPH-Gx, NWTPH-Dx, PAHs
MW-86B-1124	411251-14	BTEX, NWTPH-Gx, NWTPH-Dx, PAHs
DUP-2-1124 (Field Duplicate of MW-86B-1124)	411251-15	BTEX, NWTPH-Gx, NWTPH-Dx, PAHs
MW-89-1124	411251-16	BTEX, NWTPH-Gx, NWTPH-Dx
Trip Blank 1	411251-17	BTEX, NWTPH-Gx
Trip Blank 2	411251-18	BTEX, NWTPH-Gx

Data were evaluated based on laboratory QC criteria and validation criteria established in the *National Functional Guidelines for Organic Superfund Methods Data Review*, November 2020.

The following data components were reviewed during the limited data validation procedure for compliance with method specific or laboratory control charted criteria where appropriate: chain of

custody forms, holding times, method/trip/instrument blanks, surrogate recoveries, matrix spike/matrix spike duplicate recoveries, laboratory and field duplicate results, laboratory control sample/laboratory control sample duplicate recoveries, reporting limits, and electronic data deliverables.

A summary of qualifiers that may be assigned to results in these laboratory groups are included in Table 1. Qualifiers that may be assigned to results include:

- U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
- DNR - Do Not Report. Another result is available that is more reliable or appropriate.

Sample Receipt

Upon receipt by the laboratory, the sample jar information was compared to the chain-of-custody (COC) and the cooler temperature was recorded. The cooler was received by the laboratory at a temperature within the EPA recommended limits of greater than 0°C and less than or equal to 6°C.

The laboratory noted that Trip Blank 1 and Trip Blank 2 were both identified as “trip blank”. The laboratory designated the trip blanks. One volatile organic analysis (VOA) vial was missing the sample identification. The sample was correctly logged as MW-45A by the laboratory using the sample time indicated on the vial. One VOA vial for MW-86B was received with headspace but was not used for analysis.

Organic Analyses

Samples were analyzed for BTEX, TPHs and/or PAHs by the methods identified in the introduction of this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable except as noted below:

   PAHs by EPA 8270E-SIM – Phenanthrene (0.0065 ug/L) was detected in the method blank identified as 04-2835 mb. Phenanthrene was detected in the associated samples at concentrations greater than two times the reporting limit; therefore, data were not qualified based on this method blank result.

3. Surrogates – Acceptable

4. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – Acceptable

5. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable except as noted below:

General –MS/MSDs were performed using MW-45A for all analyses. Results were acceptable except as noted below:

PAHs by EPA 8270E-SIM – The percent recoveries and/or relative percent differences (RPDs) for the following PAHs were outside control limits in MW-45A.

Analyte	MS	MSD	RPD CL = 20%	Control Limits
Naphthalene	ok	44%	31%	50-150%
2-Methylnaphthalene	ok	ok	34%	29-118%
1-Methylnaphthalene	ok	ok	34%	10-174%
Acenaphthylene	ok	ok	27%	50-150%
Acenaphthene	ok	ok	31%	21-127%
Fluorene	ok	ok	27%	50-150%
Phenanthrene	ok	ok	24%	50-150%
Anthracene	ok	ok	28%	50-150%
Fluoranthene	ok	ok	24%	50-150%
Pyrene	ok	ok	30%	50-150%
Benzo(a)anthracene	ok	ok	25%	50-150%
Chrysene	ok	ok	24%	50-150%
Benzo(a)pyrene	ok	ok	27%	50-150%
Benzo(b)fluoranthene	ok	ok	29%	50-150%
Benzo(k)fluoranthene	ok	ok	30%	50-150%

ok – acceptable CL - control limit

The result for naphthalene in MW-45A was qualified as estimated and flagged ‘UJ’ based on this MS/MSD result. The percent recoveries for the MS and MSD for all other analytes listed in the table above were acceptable; therefore, data were not qualified based on these analyte RPDs.

6. Field Duplicate – Acceptable except as noted below:

General – Field duplicates were submitted for RW-11A and MW-86B and identified as DUP-1 and DUP-2, respectively. Results greater than five times the reporting limit were comparable with the following exception.

Diesel-range and Motor Oil-range TPH by NWTPH-Dx (No SGC) – The RPDs for diesel-range and motor oil-range TPHs (no SGC) exceeded 30% in the MW-86B/DUP-2 field duplicate pair. The results for diesel-range and motor oil-range TPHs in MW-86B and DUP-2 were qualified as estimated and flagged ‘J’ based on these field duplicate results.

7. Reporting Limits - Acceptable

8. Other Items of Note:

Diesel-range and Motor Oil-range TPH by NWTPH-Dx (No SGC) – The laboratory noted that the diesel-range and/or motor-oil-range hydrocarbon patterns for several samples did not resemble the fuel standard used for quantitation. No qualifiers were assigned based on these qualitative observations.

PAHs by EPA 8270E-SIM – The laboratory noted that the continuing calibration verification (CCV) for the surrogate 2,4,6-tribromophenol exceeded the method-recommended control limit of ±20%. Data were not qualified based on CCV results of a surrogate.

Overall Assessment of Data

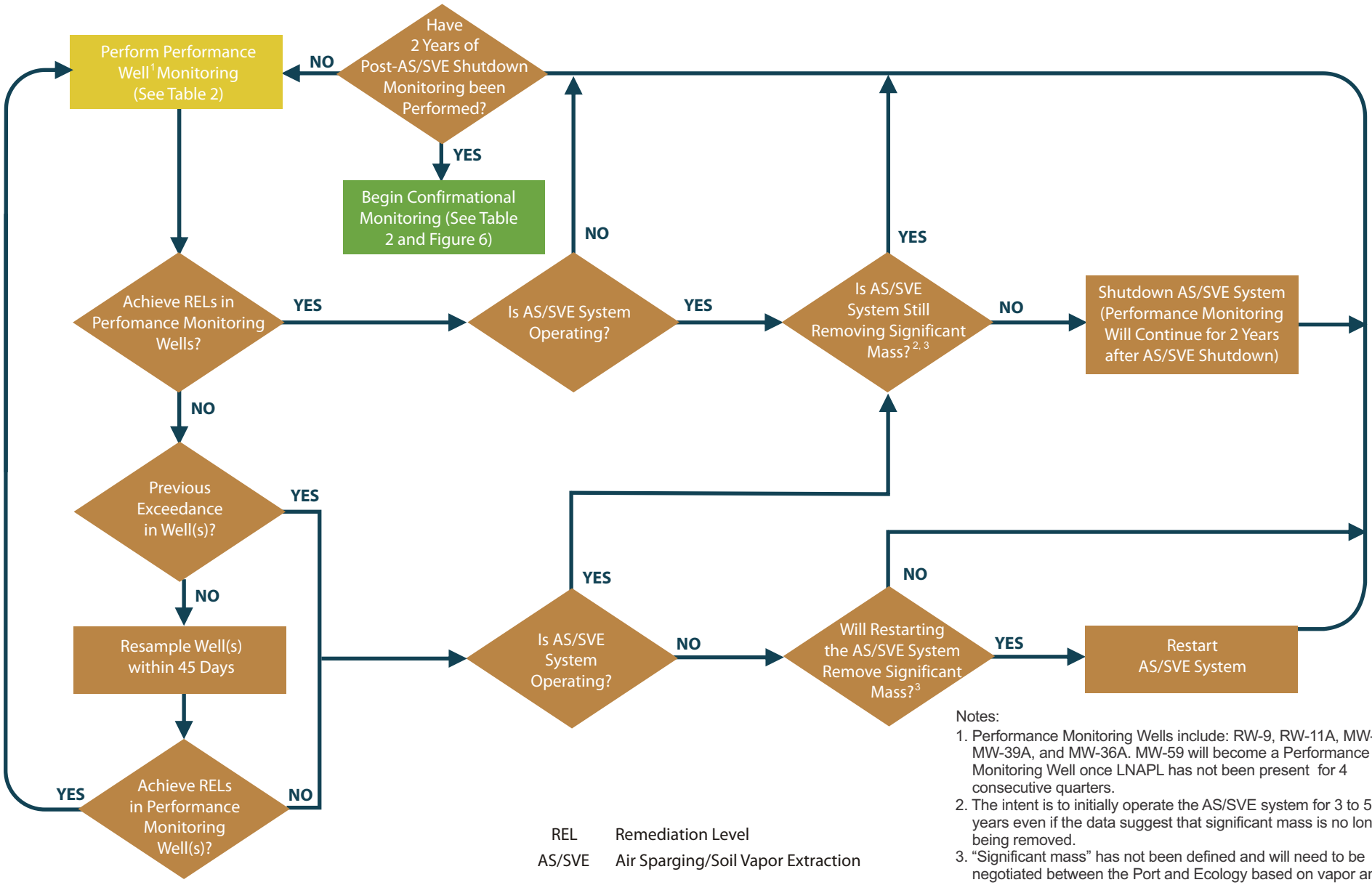
The data reported in this laboratory group, as qualified, are usable for meeting project objectives. The completeness for F&BI laboratory group 411251 is 100%.

Table 1 – Summary of Qualified Data

Sample ID	Laboratory ID	Method	Analyte	Laboratory Result	Units	Final Result
MW-45A	411251-07	8270E-SIM	Naphthalene	0.1 U	ug/L	0.1 UJ
MW-86B	411251-14	NWTPH-Dx	Diesel-Range TPH	3200	ug/L	3200 J
MW-86B	411251-14	NWTPH-Dx	Motor Oil-Range TPH	850	ug/L	850 J
DUP-2	411251-15	NWTPH-Dx	Diesel-Range TPH	8200	ug/L	8200 J
DUP-2	411251-15	NWTPH-Dx	Motor Oil-Range TPH	1700	ug/L	1700 J

Appendix I

Select Figures from the Groundwater Compliance Monitoring Plan



REL Remediation Level
AS/SVE Air Sparging/Soil Vapor Extraction

Notes:

1. Performance Monitoring Wells include: RW-9, RW-11A, MW-42, MW-39A, and MW-36A. MW-59 will become a Performance Monitoring Well once LNAPL has not been present for 4 consecutive quarters.
2. The intent is to initially operate the AS/SVE system for 3 to 5 years even if the data suggest that significant mass is no longer being removed.
3. "Significant mass" has not been defined and will need to be negotiated between the Port and Ecology based on vapor and groundwater data.

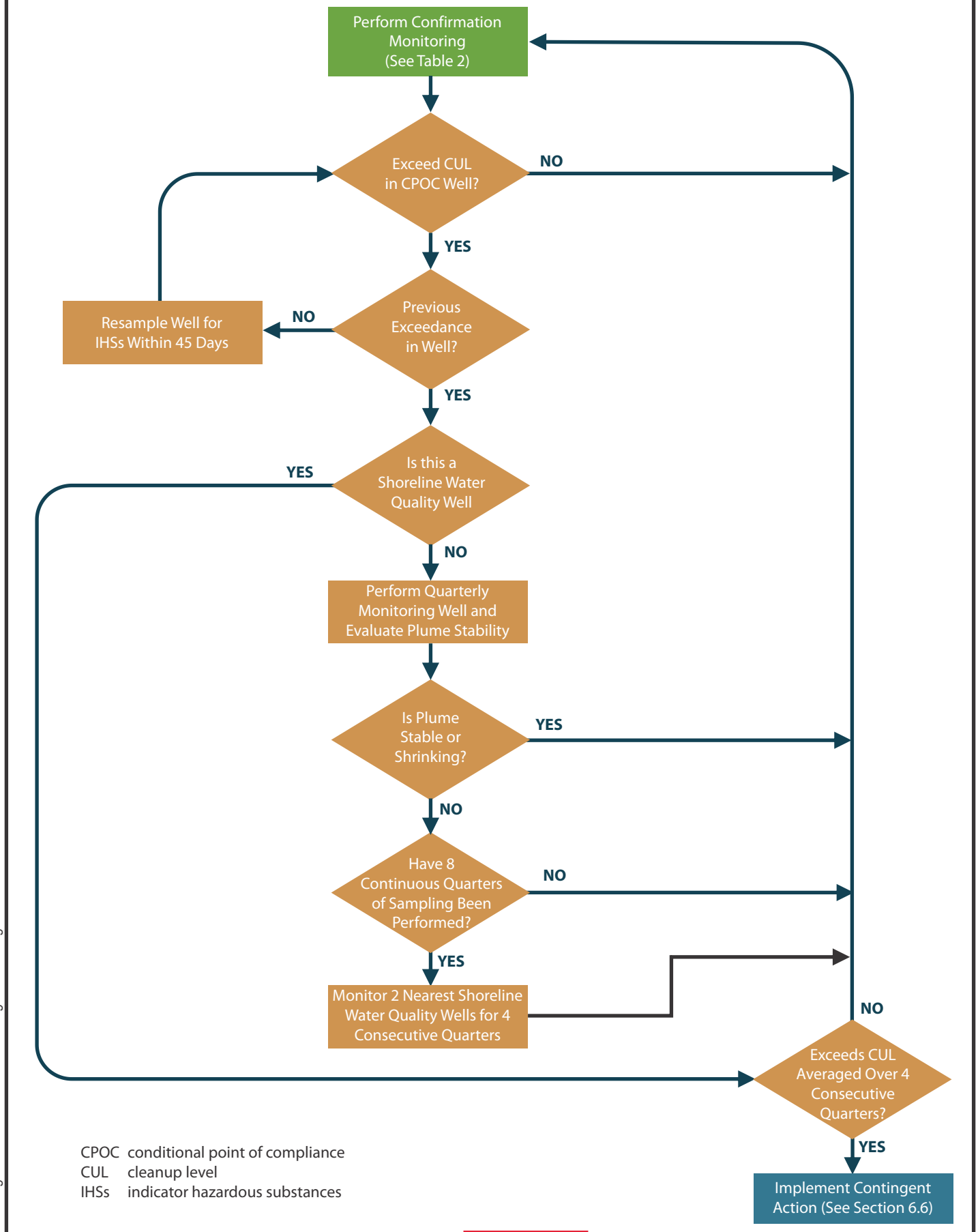
CRETE CONSULTING, INC.

PORT OF SEATTLE
TERMINAL 30 GROUNDWATER
COMPLIANCE MONITORING PLAN

PERFORMANCE WELL MONITORING WELL AND AS/SVE OPERATION DECISION MATRIX

DATE: 11/28/2018 | DRWN: bts | **FIGURE 5**

File: G:\Clients\CRETE\Figure 5\Well Monitoring and SE/SVE Operation Decision Matrix



CPOC conditional point of compliance
CUL cleanup level
IHSs indicator hazardous substances

File: G:\Clients\CRETE\Figure 6\Confirmation Monitoring and Contingent Action Decision Matrix

CRETE CONSULTING, INC.

PORT OF SEATTLE
TERMINAL 30 GROUNDWATER COMPLIANCE MONITORING PLAN

CONFIRMATIONAL MONITORING AND CONTINGENT ACTION DECISION MATRIX

DATE:11/28/2018 | DRWN: bts | **FIGURE 6**