TERMINAL 30 2023 ANNUAL SITE PERFORMANCE REPORT – YEAR 4

Terminal 30 Site

February 2025

Port of Seattle

AECOM

2023 Annual Terminal 30 Site Performance Report

Port of Seattle
Terminal 30 Site

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Quality information

Prepared by	Checked by	Verified by	Approved by
Gus Friedman Environmental Engineer	Scott Larson Environmental Scientist	Jamalyn Green Senior Engineer	Paul Kalina Project Manager

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Prepared for:

Port of Seattle

Prepared by:

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

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Acronyms and Abbreviation

µg/L	microgram per liter
AECOM	AECOM Technical Services, Inc.
AS	air sparging
BTEX	benzene, toluene, ethyl-benzene, 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
T30 or Site	Terminal 30
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
H2K	H2K Solutions Inc.
IHS	indicator hazardous substance
LCS/LCSD	laboratory control sample/ laboratory control sample duplicate
LNAPL	light non-aqueous phase liquid
MDL	method detection limit
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
ORP	oxidation-reduction potential
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
TEF	toxicity equivalency factor
TEQ	toxic equivalent concentration
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 the Terminal 30 project site (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 T30 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 2023. This represents the third year of monitoring, referenced as Year 4 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 4, 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 explain how groundwater CULs and RELs were developed for the site.

2. Site Monitoring

The site cleanup action monitoring plan is detailed in the CMP and summarized briefly 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 oxidizer destruction efficiency is above the acceptable limits.

Free product-related activities in Year 4 included product thickness gauging at 9 wells and product removal at 8 wells across the site (Figure 3, Table 6). Groundwater monitoring was completed at 7 Performance Monitoring Wells in Year 4 and included depth to water (DTW) gauging, free product gauging, and groundwater sampling. 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 the 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 (SVE effluent) and after the oxidizer (oxidizer effluent). After the disconnection of the oxidizer in March 2023 (see Section

[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.

3.1), vapor samples 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 2023 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 mid-point 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 (~100 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 T-30 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 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: between 130 and 190 minutes after low-low tide
- CPOC Monitoring Well MW-58A: between 70 and 130 minutes after low-low tide
- CPOC Monitoring Well MW-86B: between 130 and 190 minutes after low-low tide
- Shoreline Water Quality Monitoring Wells (MW-84A, MW-85A, MW- 87A): between 130 and 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 recovery and sampling events. However, LNAPL gauging was executed on a more frequent monthly basis throughout Year 4.
- LNAPL recovery events were conducted once per quarter during Year 4, a reduction in frequency from the prior bimonthly schedule following approval by Ecology via e-mail on December 7, 2022.

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

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

3. AS/SVE System Performance

This section summarizes the AS/SVE system performance for Year 4. 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 4.

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 7,482 hours during this reporting period, an operation rate of 86%. The cumulative runtime since startup was over 30,115 hours at year-end (Table 4). The AS system operated for 5,971 hours in Year 4, with 1,512 hours of intentional downtime between August 4, 2023, and the end of the year when the sparge pulse schedule was adjusted from all five zones to Zone 5 only, with the system pulsing on and off at 3-hour intervals. This change was made in response to groundwater monitoring results that indicated contaminant of concern (COC) exceedances were limited to that zone. Other than that intentional downtime, the sparge system also achieved an operational rate of 86% in Year 4. This was up from the previous annual high of 5,609 hours in Year 3 (a 65% operational rate). The sparge system has a cumulative runtime total of 18,235 hours since startup.

The PSCAA permit states that a control device for soil vapor treatment is not needed once removal rates drop below the relevant COC thresholds for two consecutive months. This requirement was met in late 2021 through 2022 (see Table 5). Oxidizer removal was approved by PSCAA via a phone call on December 13, 2022, and on March 14, 2023, the thermal oxidizer was taken offline and replaced with a new SVE effluent emission stack. The TPH emission limit is 1000 lb/year, which equates to 2.74 lb/day. During this reporting period, calculated emission rates based upon results from all four sampling events, and all 23 field events remained below that threshold. As shown in Table 5, BTEX removal rates were also well below regulated emission limits during this reporting period.

Water accumulation from the SVE system was significant over the first four months of 2023. The system storage tank was filled 5 times between January 27 and April 2 3023. On April 11, 2023, the SVE dilution valve was adjusted to reduce manifold vacuum and thus decrease water extraction rates. Wells producing significant water but low vapor mass removal rates were also taken offline, including SVE-5 briefly and SVE-8 for a longer term. In July, the SVE hoses were replaced with longer lengths to mitigate low points where water had been collecting. These combined efforts reduced water accumulation. Consistent with their location in the wellfield, the water removed from the SVE-9 and SVE-10 piping frequently had evidence of product in odor, coloration, and appearance.

On August 4, 2023, the sparging schedule was adjusted to alternate between sparging Zone 5 for three hours and resting for two hours. This change was made after groundwater analytical results showed that elevated COC levels only remained in Zone 5 wells. Prior to that, the system had been pulsing in 4–5-hour intervals alternating between all five zones since April 2022.

The sparge compressor motor overload concerns from 2022 were still present but were successfully mitigated in 2023. Ongoing variable-frequency drive (VFD) notifications were addressed by opening the bleed valve at the compressor one full turn to reduce load on the compressor motor.

3.2 System Performance – Field Data

The field data from the biweekly system performance system inspections are presented in Table 4. This includes flow rates, 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 flowrate. The analytical data from Table 5 are used for the VOC concentrations for the days that a sample was taken; for the non-sampling site visits, the concentration is an adjustment of the PID reading based on the ratio of the most recent lab datum to its associated PID reading. This is further explained in Note 4 of Table 4.

For this reporting period, the influent removal rate ranged from 0.018 pounds (lb) per day (November 29, 2023) to 0.96 lb per day (April 11, 2023) (see Table 4 and Figure 5). The total mass removed for the year is approximately 78 lb. An

asymptotic curve for VOC removal is illustrated on Figure 6, which provides cumulative VOC mass removal through the end of Year 4. In the first three months of system operation following system startup in 2019, the average VOC removal was 423 lb/month. This dropped to 552 lb/month of operation in 2020, 280 lb/month in 2021, 87.6 lb/month in 2022, and 7.4 lb/month in 2023. Per Figure 5, with a few outlier exceptions, this downward trend has been in effect since mid-February of 2021. The cumulative VOC mass removal from startup through the end of this reporting period, as calculated with the field data, is 9,960 lb.

The PSCAA permit requires the SVE flowrate to remain below 375 standard cubic feet per minute (scfm);all readings from this reporting period fell below this limit (Puget Sound Clean Air Agency, 2019). The 2023 flow rates ranged from 115.3 scfm (October & November 2023) to 223.4 scfm (February and March 20234), with an average of 164 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:03/15/2023, 06/22/2023, 09/28/2023, and 12/27/2023. 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 73.2 lb of TPH were extracted from the subsurface in 2023, with 7,780.8 lb extracted cumulatively since startup. These values are 6% and 22% lower, respectively, than the totals calculated with adjusted field data (Table 4). In the first three months of operation in 2019 following system startup, the average lab-analyzed TPH removal was 604 lb/month. In the seven months of operation in 2020 the average was 412 lb/month. In 2021, removals decreased to 223 lb/month, then 34.5 lb/month in 2022, and then 7.0 lb/month in 2023.

3.3.1 Quality Assurance

All samples 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 4 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 air sparging system maintenance was required this reporting period.
- SVE system:
  - As described in Section 3.1, on March 14, 2023, the thermal oxidizer was taken offline with PSCAA approval after extended operation with low mass removal. A new 10-ft tall emission stack was connected to the existing SVE effluent piping to allow direct emissions. The oxidizer, owned by the Port, remains in place for potential future re-purposing.
  - Extended freezing temperatures mid-December 2022 resulted in freezing pipes at both the moisture separator sight glass and the transfer pipe between the separator and the large water storage tank. A pipe

union and float sensor broke as a result. The broken union was repaired when it was discovered, and the replacement float sensor was replaced on January 27, 2023. The originally installed heat trace, which had failed during the freeze event, was replaced by Marine Maintenance in March 2023.

  - In July 2023, the SVE air hoses were replaced between the pipe lateral stub-ups and the piping manifold. This was done to remove the original hoses that had become brittle with weathering, but also to replace them with longer hose lengths that could be given an elevated loop to decrease moisture collection in the rotameters. This was of concern after a winter and spring of significant moisture extraction (>7 gal/day). Together with the valve adjustments mentioned in Section 3.1, water extraction was reduced to less than 0.5 gal/day for the remainder of the reporting period.

- General:
  - On January 27, 203, alarm notification functionality was restored to the telemetry with a software upgrade from H2K. Functionality had been lacking since June 2022.
  - Various rotameters and gauges replaced throughout the year due to normal wear and tear.

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 4 began with nine wells in the gauging/recovery protocol and ended with eight. RW-104 was removed from the protocol following the April 2023 gauging, when it achieved one year of gauging results with product thicknesses less than 0.01 ft.

4.1 Free Product Gauging

As shown in Figure 7 and Figure 8, LNAPL thickness trends in 2023 were generally stable or decreasing. 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 from0.0-0.12 ft (multiple occasions and 7/14/23, respectively). This is down from a historical max of 0.52 ft on 10/8/20.
- MW-59 LNAPL thickness ranged from 0.0-0.21 ft (multiple occasions and 1/12/23, respectively). This is down from a historical max of 2.19 ft on 1/9/20.
- RW-1 LNAPL thickness ranged from 0.0.02-0.09 (twice and twice, respectively). This is down from a historical max of 0.59 ft on 6/19/20.
- RW-12 LNAPL thickness ranged from 0.04-0.31 ft (9/14/23 and 8/10/23, 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 0.00-0.40 ft (multiple occasions and 4/13/23, respectively). This is down from a historical max of 1.74 ft on 9/10/20.
- RW-106 LNAPL thickness ranged from 0.00-1.06 ft (1/12/23 and 5/11/23 respectively). This is down from a historical max of 2.09 ft on 11/10/22.
- RW-107 LNAPL thickness ranged from 0.19-0.73 ft (6/19/23 and 9/14/23, respectively). This is down from a historical max of 2.49 ft on 10/8/20.
- RW-110 LNAPL thickness ranged from 0.0-0.05 (multiple occasions and 7/27/23, respectively). This is down from a prior historical max of 0.46 ft on 7/28/20.

During the 2023 LNAPL gauging and recovery events, LNAPL was measured for, but not encountered in, the following wells:

- RW-104 (historical max of .01 ft on 11/11/21). This well was retired from regular gauging following the April 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 4 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 91 gallons of free product were removed in the four events executed in Year 4. This was down from 115 gallons over five events in 2022. Approximately 940 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 varies from event to event, and there were no clear trends in LNAPL removal from Year 4. The average removal volume was 23 gallons per event, with a range of 12-34 gallons (Table 6). The maximum removal occurred in June and the minimum was in September. The average removal volume for 2023 matched the 2022 average of 23 gallons per event. 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 2023, only RW-104 met these termination requirements and it was retired from regular gauging following the April event.

5. Groundwater Sampling

During Year 4, two groundwater performance monitoring events were conducted. The first performance monitoring event was completed on April 13, 2023, for the performance wells within AS/SVE system radius of influence. The second was on October 12, 2023, and included the performance wells both within and downgradient of the AS/SVE system radius of influence. The interior wells, CPOC wells, and shoreline wells were not scheduled for sampling this year. 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. 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.

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

Per Tables 2 and 3, the spring semiannual sampling event included Performance Monitoring Wells MW-59, RW-11A, and MW-89. The fall annual sampling event included all Performance Monitoring Wells: MW-59, RW-11A, MW-89, MW-36A, MW-39A, RW-9, and MW-42. These seven Performance Monitoring 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. Groundwater results are summarized in Table 8 and on Figure 4. TPH-Dx data are also shown on Figure 11. Copies of Year 4 sampling field notes are included in Appendix F and laboratory reports are provided in Appendix G.

Per the CMP, a LNAPL gauging well qualifies for sampling once four consecutive quarters of gauging data are collected with product thickness detected <0.01 ft (Table 2, Note 2). The presence of free product is assumed to indicate TPH concentrations above site cleanup goals. As shown in Table 6, MW-59 continued to have free product detected >0.01 in Year 4 and was not sampled during the reporting period. On Figure 11, wells with free product encountered during sampling, or those not sampled due to recent LNAPL encounters, are shown with an arbitrary TPH-Dx concentration of 3,900 micrograms per liter (µg/L). This value is used only to represent free product and does not reflect actual TPH concentrations in these wells.

As shown in Table 8 and Figure 4, no samples taken during 2023 were found to have COC concentrations above CULs.

RW-11A had a TPH-Dx concentration above the CUL during baseline sampling (1,100 µg/L) but has not had a concentration in excess of the CUL since. It has not been above site CULs for any other COC.

MW-89 COC concentrations have not exceeded any CUL since the TPH-Dx rebound in October 2021. It has not exceeded site CULs for any other COC.

RW-9 concentrations exceeded the TPH-Dx CUL in 2019 (1,200 µg/L), stayed below in 2020 (450 µg/L), and rebounded above again in 2021 (1,590 µg/L). In 2022 it fell back below to 200 µg/L and stayed below in 2023 (230 µg/L). It has not been above site CULs for any other COC.

MW-36A had free product present during baseline sampling and was not sampled until September 2020. At that event TPH-Dx was measured in excess of the CUL (560 µg/L). Results in 2021 were below the CUL (404 µg/L), and they stayed below in 2022 (180 µg/L) and 2023 (130 µg/L). It has not been above site CULs for any other COC.

MW-39A had free product present during baseline sampling and was not sampled until September 2020. At that event TPH-Dx was measured in excess of both the CUL and REL (2,270 µg/L). TPH-Dx levels rose further during the 2021 sampling (3,520 µg/L). Results in 2022 dropped down below the CUL, at 110 µg/L, and stayed below in 2023 as non-detect.

MW-42 exceeded cleanup levels for both TPH-Gx and benzene during the baseline sampling. All COCs were measured below CULs during the September 2020 and October 2021 events. This trend continued through 2022 and 2023.

5.2 Interior Monitoring Wells

No Interior wells were sampled in 2023. 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 2024, in accordance with their biannual schedule.

5.3 CPOC Monitoring Wells

No CPOC wells were sampled in 2023. 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 2024, in accordance with their biannual schedule. See Table 9 and Table 10 for historical data.

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 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 it’s 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 October 2023 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. Conclusions

This report presents the results of the fourth year of compliance monitoring at the T-30 Cleanup site. Key take-aways from the Year 4 reporting period include:

- Water accumulation in the SVE manifold and moisture separator was successfully reduced with the addition of new hoses and adjustment of vacuum levels in Year 4, and the SVE and AS systems were both successfully operated and maintained through the reporting period (Table 4).
- The SVE system removed COC mass from the subsurface in Year 4 at a lower rate than the prior year. 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 78 lb TPH during the reporting period, for a cumulative total of 9,960 lb TPH removed since system startup. These values are lower when calculated with quarterly laboratory data (Table 5), which show the system extracted over 73 lb TPH during the reporting period and 7,781 lb TPH since system startup.
- LNAPL recovery events were reduced from a bimonthly to a quarterly schedule in Year 4 but this did not result in a significant change in the volume of product recovered per event. An average of 22.6 gal was recovered per event in Year 4, compared with 22.9 gal per event in Year 3. This value had decreased with each successive year of system operation, as shown on Figure 10. An estimated 91 gallons of free product were recovered during the reporting period, and a cumulative total of 849 gallons have been recovered since removal activities began (Table 6).
- COCs were not measured above the CUL or REL at any well sampled in Year 4 (Table 8). Free product was still present in MW-59 and RW-1, which prevented sampling of those wells. The CMP recommends that the system be operated until all Performance Monitoring Wells, including MW-59, have fallen below the RELs, or the system is no longer significantly removing contaminant mass.

6.1 CMP Modifications and Recommendations

Data collected from the performance monitoring wells were evaluated and used to make decisions regarding AS/SVE system operation. The flow chart in Figure 5 of the CMP (included for reference in Appendix I) provides guidance on decision making criteria. There are no planned modifications or recommendations to the CMP.

6.2 Recommended AS/SVE Adjustments for Year 5

As stated in the Cleanup Action Plan (CAP), the overall goal of the AS/SVE system is to reduce contaminant mass in the sheen area and downgradient of the sparge wells. The AS/SVE system is not intended to reduce contaminant concentrations in groundwater upgradient of the AS/SVE system. The AS/SVE system will be operated until performance monitoring wells within and downgradient of the AS/SVE field zones (RW-9, RW-11A, MW-42, MW-39A, MW-36A, MW-59, and MW-89) achieve RELs, or if the AS/SVE system is no longer significantly removing contaminant mass[4]. No CUL exceedances were observed in Year 4, but the continued presence of LNAPL at the southern edge of the wellfield (and in Performance Monitoring Well MW-59) was observed. Continued operation of the AS/SVE system and recovery of LNAPL is planned again for Year 5 (2024). The following recommended performance adjustments will also be evaluated and/or implemented:

- Continue to monitor LNAPL recovery volumes and evaluate alternative recovery methods.
- Continue to monitor, analyze, and improve AS compressor operation (e.g., runtime and total flow). Fine-tune the zone pulsing schedule to focus on areas of concern for dissolved-phase COCs (e.g., Zone 5).
- Continue to monitor and manage SVE system water production to improve vapor extraction performance and reduce equipment wear.

[4] The statement “the AS/SVE system is no longer significantly removing contaminant mass” has not been defined. This standard will need to be negotiated, if necessary, at a future time. This could involve analysis of vapor extraction concentrations, groundwater dissolved oxygen concentrations, performance well groundwater concentrations, or other similar measure.

- Continue to evaluate conditions in Performance Monitoring Well MW-59, which will currently qualify for sampling with one additional month with an LNAPL thickness <0.01 ft.

6.3 Schedule and Reporting

The groundwater monitoring frequencies are provided on Tables 2 and 3. The monitoring schedule will be adjusted as needed based on the performance of the AS/SVE system and timeline of monitoring wells achieving COC remediation levels. Free product will be gauged at least quarterly until termination criteria are achieved. Schedule revisions will be documented in quarterly progress reports.

Annual reports will continue to be prepared for Year 5. Reports will be submitted to Ecology following the end of the annual monitoring cycle.

After 5 years of system operation, an evaluation report will be prepared that will include a summary of the five preceding annual reports and discussions about longer term trends in the groundwater data. The CMP will be reviewed and updated by addendum (with Ecology review) if changes to the monitoring program are appropriate.

7. 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.

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.

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.

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

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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** (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** (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** (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** (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** (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.

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TABLE 3
Compliance Monitoring Schedule

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

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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 (^oF)	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.
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.

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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 (^oF)	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
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.
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.

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 (^oF)	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
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.
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.

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 (^oF)	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
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.
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.

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

Date	Time	Operating Parameters								Mass Removal						Mass Removal			Comments/Notes
			Calculated								Calculated			Calculated		Calculated			
		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 (^oF)	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)	
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 vacuum 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	1010.7	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	1022.7	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	1037.5	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	1052.4	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	1066.3	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	1079.1	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	1092.8	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	1108.7	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	1121.5	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	1134.3	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	1147.2	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	1163.2	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	1175.1	11.9	48.0	0.5	61	129.0	1.5	3,178	--	--	--	--	0.0	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	1188.5	13.4	36.0	0.4	59	115.3	1.6	3,389	--	--	--	--	0.0	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	1202.5	14.0	30.0	0.4	56	115.3	1.4	2,966	--	--	--	--	0.0	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	1222.4	19.8	30.0	0.4	50	115.3	0.8	1,695	--	--	--	--	0.0	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	1237.3	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	1250.2	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.

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.

Abbreviations, Symbols, and Notes:

-- = not analyzed or not applicable
ΔP = Differential Pressure
H_2O = Water
Hr = Hour
^oF = 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.

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 (^oF)	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. 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.

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

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Table 4
AS/SVE and Oxidizer Operational Data

		Operating Parameters								Mass Removal						Mass Removal			
			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 (°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

5. Removal rates are calculated via:

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

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.

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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 U	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.

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	0.1	3.3	0.1	0.2
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:

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

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

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.

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

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:
$\mu g/m^3$ = 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

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Table 6
LNAPL Gauging and Recovery Results

Date	Time of Fieldwork	Tidal Position		Average DTW	Period Product Removed[L]	Cumulative Product Removed	MW-35[K,M]		MW-36[M]		MW-36A[M]		MW-39A	
		Time of Nearest Low Tide[F]	Time of Nearest High Tide[F]	(FT)	(Gal)	(Gal)	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)	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)
Baseline[J]	NA	---	---	---	NA	NA	NM	---	0.18	---	0.04	---	0.05	---
01/09/2020	NM	---	---	---	46.7	46.7	NM	NM	0.14	0.00	<0.01	---	<0.01	---
02/13/2020	NM	---	---	---	21.3	68	NM	NM	0.00	---	<0.01	---	<0.01	---
03/12/2020	NM	---	---	---	48.4	116.4	NM	NM	0.00	---	<0.01	---	<0.01	---
05/16/2020	NM	---	---	---	20	136.4	NM	NM	0.04	0.00	0.00	---	0.35	0.00
06/19/2020	NM	---	---	---	156	292.4	NM	NM	1.00	0.01	0.00	---	0.16	<0.01
07/28/2020	NM	---	---	---	35	327.4	NM	NM	0.95	<0.01	0.00	---	0.10	0.01
08/21/2020	NM	---	---	---	32	359.4	NM	NM	0.16	0.00	<0.01	---	0.04	<0.01
09/10/2020	NM	---	---	---	16.4	375.8	NM	NM	0.00	---	0.00	---	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	---
11/11/2020	07:50-14:45	05:48	12:18	---	99	509.9	0.19	DRY	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	---
01/15/2021	07:53-16:02	07:42	15:06	---	39	548.9	0.28	0.00	0.00	---	0.00	---	0.00	---
2/12/2021[C,I]	08:07-10:07	11:49	06:09	---	NA	548.9	0.06	---	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	---
4/15/2021[C]	16:33-18:35	20:42	13:54	---	NA	587.9	0.42	---	0.00	---	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	---
6/10/2021[C]	15:05-17:29	18:36	11:48	---	NA	611.9	0.02	---	0.00	---	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	---
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	---
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	---
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	---
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	---
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	---
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	---
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	---
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	---
09/08/2022	16:40-17:49	22:47	17:13	9.53	11.14	800.24	TRACE	---	0.00	---	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]
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
12/08/2022	16:51-20:30	22:55	15:45	8.79	48.55	848.79	0.03	---	NA[O]	NA[O]	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
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
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
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
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
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
07/27/2023[C]	16:38-17:02	18:31	14:31	9.27	NA	915.63	TRACE	---	NA	NA	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
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
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
11/9/2023[C]	18:22-1851	20:58	14:10	8.90	NA	927.33	0.00	---	NA	NA	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

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

	MW-59		MW-89		MW-93[M]		RW-1[M]		RW-12			RW-101	
	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]	Initial LNAPL Thickness	Final LNAPL Thickness[H]
Date	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft BTOC)	(Ft)	(Ft)
Baseline[J]	0.90	---	2.39	---	1.04	---	0.55	---	0.00	---	---	0.02	---
01/09/2020	2.19	0.00	<0.01[A]	---	<0.01	---	0.03	0.01[B]	0.71	0.03[B]	---	0.02	<0.01
02/13/2020	0.23	0.10[B]	<0.01	---	<0.01	---	0.01	<0.01	0.25	0.03[B]	---	<0.01	NM
03/12/2020	0.09	<0.01	<0.01	---	<0.01	---	0.05	<0.01	0.78	0.08[B]	---	0.03	<0.01
05/16/2020	1.06	0.00	0.00	---	0.10	0.00	0.56	0.22[B]	0.78	0.05[B]	---	0.08	---
06/19/2020	0.93	<0.01	0.00	---	0.18	<0.01	0.59	0.08[B]	0.59	0.00	---	0.07[B]	0.05[B]
07/28/2020	0.76	0.01	0.00	---	0.18	0.00	0.47	0.02[B]	0.60	0.00	---	0.09	0.00
08/21/2020	1.12	<0.01	0.00	---	0.05	<0.01	0.32	0.01[B]	0.35	0.02[B]	---	0.00	---
09/10/2020	0.00	NM	0.00	---	TRACE	TRACE	0.20	<0.01	0.24	0.02[B]	---	0.00	---
10/08/2020	<0.01	0.00	0.00	---	0.00	---	0.11	0.01B	0.45	0.02[B]	---	0.05	0.00
11/11/2020	0.00	---	0.00	---	0.00	---	0.28	0.09[B]	0.43	NM	---	<0.01	0.00
12/10/2020[C]	0.00	---	0.00	---	0.00	---	0.04	---	0.16	---	---	0.00	---
01/15/2021	0.00	---	0.00	---	0.00	---	0.06	0.01[B]	0.18	0.01[B]	---	0.00	---
2/12/2021[C,I]	0.00	---	0.00	---	0.00	---	0.03	---	0.03	---	---	0.00	---
03/05/2021	0.09	0.00	0.00	---	0.00	---	0.17	0.01[B]	0.05	0.00	---	0.00	---
4/15/2021[C]	0.01	---	0.00	---	0.00	---	0.11	---	0.25	---	---	0.00	---
05/13/2021	0.62	0.00	0.00	---	0.00	---	0.17	0.02[B]	>0.10	0.00	---	WI	WI
6/10/2021[C]	0.86	---	0.00	---	0.00	---	0.26	---	0.21	---	---	0.01	---
08/12/2021	WI	WI	0.00	---	0.00	---	0.27	0.1[B]	0.31	0.01[B]	---	0.00	---
11/11/2021[G]	0.20	0.00	0.00	---	0.00	---	0.15	0.00	0.30	0.00	9.40	0.00	---
1/18/2022[C]	0.39	---	NM	NM	0.00	---	NM	NM	0.07	---	8.26	0.00	---
02/17/2022	1.36	0.00	0.00	---	0.00	---	0.06	0.01	0.05	0.01	9.15	0.00	---
4/14/2022[C]	0.00	---	0.00	---	0.00	---	0.03	---	0.06	---	9.04	0.00	---
05/12/2022	0.00	---	0.00	---	0.00	---	0.08	<0.01	0.09	0.00	9.50	0.00	---
6/20/2022[C]	0.12	---	0.00	---	0.00	---	0.08	---	0.01	---	9.20	0.00	---
07/14/2022	0.00	---	0.00	---	0.00	---	0.09	0.00	0.13	0.00	9.46	0.00	---
08/11/2022[C]	0.00	---	0.00	---	0.00	---	0.06	---	0.17	---	9.43	0.00	---
09/08/2022	0.19	0.01	0.00	---	0.00	---	0.10	0.01	0.32	TRACE	9.57	0.00	---
10/13/2022[C]	0.00	---	NA[O]	NA[O]	NA[O]	NA[O]	0.06	---	0.29	---	9.73	NA[O]	NA[O]
11/10/2022[C]	0.00	---	NA	NA	NA	NA	0.07	---	0.33	---	9.18	NA	NA
12/08/2022	0.05	0.00	NA	NA	NA	NA	0.04	0.00	0.38	<0.01	9.27	NA	NA
01/12/2023[C]	0.21	---	NA	NA	NA	NA	0.03	---	0.06	---	8.12	NA	NA
02/09/2023[C]	0.00	---	NA	NA	NA	NA	0.05	---	0.07	---	8.83	NA	NA
03/09/2023	0.00	---	NA	NA	NA	NA	0.02	0.00	0.09	0.00	8.91	NA	NA
04/13/2023[C]	0.00	---	NA	NA	NA	NA	0.03	---	0.07	---	9.09	NA	NA
05/11/2023[C]	0.00	---	NA	NA	NA	NA	0.09	---	0.06	---	8.81	NA	NA
06/19/2023	0.00	---	NA	NA	NA	NA	0.02	0.00	0.10	0.00	9.26	NA	NA
07/27/2023[C]	0.00	---	NA	NA	NA	NA	0.07	---	0.18	---	9.68	NA	NA
08/10/2023[C]	0.00	---	NA	NA	NA	NA	0.08	---	0.31	---	8.82	NA	NA
09/14/2023	0.00	---	NA	NA	NA	NA	0.09	0.00	0.04	0.00	9.47	NA	NA
10/12/2023[C]	0.00	---	NA	NA	NA	NA	0.06	---	0.21	---	10.09	NA	NA
11/9/2023[C]	0.00	---	NA	NA	NA	NA	0.05	---	0.30	---	9.11	NA	NA
12/14/2023	0.00	---	NA	NA	NA	NA	0.05	0.00	0.25	0.00	8.67	NA	NA

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Table 6
LNAPL Gauging and Recovery Results

	RW-102		RW-103		RW-104		RW-105		RW-106			RW-107		
	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]	Initial LNAPL Thickness	Final LNAPL Thickness[H]	DTW[Q]
Date	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft BTOC)	(Ft)	(Ft)	(Ft BTOC)
Baseline[J]	0.00	---	1.16	---	0.00	---	0.00	---	1.00	---	---	0.98	---	---
01/09/2020	0.00	NM	1.16	<0.01	0.00	NM	0.00	NM	1.00	<0.01	---	0.98	<0.01	---
02/13/2020	WI	WI	WI	WI	NM	NM	NM	NM	1.40	<0.01	---	0.34	0.09[B]	---
03/12/2020	0.00	NM	0.71	0.01[B]	0.00	NM	0.00	NM	1.05	0.06[B]	---	1.37	<0.01	---
05/16/2020	0.00	---	0.45	0.01[B]	0.00	---	0.00	---	1.10	0.00	---	0.84	0.00	---
06/19/2020	0.00	---	0.29	0.01[B]	0.00	---	0.00	---	1.01	0.00	---	1.09	0.27[B]	---
07/28/2020	0.00	---	0.31[B]	---	0.00	---	0.00	---	0.77	<0.01	---	1.19	<0.01	---
08/21/2020	0.00	---	0.23	0.01[B]	0.00	---	0.00	---	0.73	0.00	---	1.41	0.00	---
09/10/2020	0.00	---	1.74	0.00	0.00	---	0.00	---	1.55	0.00	---	2.17	0.00	---
10/08/2020	<0.01[B]	---	0.86	0.00	0.00	---	0.00	---	0.73	0.00	---	2.49	NM	---
11/11/2020	0.00	---	1.01	0.00	0.00	---	0.00	---	0.80	0.00	---	1.83	0.00	---
12/10/2020[C]	0.00	---	0.40	---	0.00	---	0.00	---	0.84	---	---	1.05	---	---
01/15/2021	0.00	---	0.75	0.00	0.00	---	0.00	---	1.13	0.00	---	0.78	0.00	---
2/12/2021[C,I]	0.00	---	0.87	---	0.00	---	0.00	---	1.19	---	---	1.00	---	---
03/05/2021	0.00	---	0.49	0.00	0.00	---	0.00	---	1.08	0.00	---	0.96	0.00	---
4/15/2021[C]	0.00	---	0.31	---	0.00	---	0.00	---	0.78	---	---	0.74	---	---
05/13/2021	0.00	---	0.23	0.00	0.00	---	0.00	---	0.71	0.00	---	0.59	0.00	---
6/10/2021[C]	WI	WI	WI	WI	0.00	---	0.00	---	0.58	---	---	0.61	---	---
08/12/2021	WI	WI	WI	WI	0.00	---	0.00	---	0.59	0.00	---	0.72	0.02[B]	---
11/11/2021[G]	0.00	---	0.61	0.00	0.01	0.00	0.00	---	1.05	0.00	8.50	0.02	0.00	9.02
1/18/2022[C]	NM	NM	1.29	---	0.00	---	0.00	---	1.85	---	7.37	1.45	---	7.65
02/17/2022	0.00	---	NM	NM	0.00	---	0.00	---	0.92	0.02	8.09	0.65	0.02	8.44
4/14/2022[C]	0.00	---	0.60	---	0.00	---	0.00	---	1.12	---	8.13	0.80	---	8.41
05/12/2022	0.00	---	0.29	0.00	0.00	---	0.00	---	0.38	0.00	8.64	0.75	0.00	8.87
6/20/2022[C]	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---	8.76	0.00	---	9.03
07/14/2022	0.00	---	0.27	0.00	0.00	---	0.00	---	0.82	0.00	8.50	0.61	0.00	8.82
08/11/2022[C]	0.00	---	0.00	---	0.00	---	0.00	---	0.05	---	9.03	0.49	---	9.34
09/08/2022	0.00	---	0.00	---	0.00	---	0.00	---	0.04	0.01	9.15	0.49	0.37[N]	9.44
10/13/2022[C]	NA[O]	NA[O]	0.00	---	0.00	---	NA[O]	NA[O]	0.01	---	9.27	0.41	---	9.57
11/10/2022[C]	NA	NA	0.28	---	0.00	---	NA	NA	2.09	---	7.24	0.18	---	8.61
12/08/2022	NA	NA	0.15	0.00	0.00	---	NA	NA	0.32	0.00	8.52	0.44	0.00	8.77
01/12/2023[C]	NA	NA	0.00	---	0.00	---	NA	NA	0.00	---	7.52	0.32	---	8.02
02/09/2023[C]	NA	NA	0.00	---	0.00	---	NA	NA	0.05	---	8.36	0.37	---	8.72
03/09/2023	NA	NA	0.00	---	0.00	---	NA	NA	0.10	0.01	8.51	0.55	0.10	8.81
04/13/2023[C]	NA	NA	0.40	---	0.00	---	NA	NA	0.54	---	8.12	0.66	---	8.38
05/11/2023[C]	NA	NA	0.24	---	NA[O]	NA[O]	NA	NA	1.06	---	7.70	0.60	---	9.44
06/19/2023	NA	NA	0.00	---	NA	NA	NA	NA	0.01	0.00	8.92	0.19	0.70[P]	9.22
07/27/2023[C]	NA	NA	0.19	---	NA	NA	NA	NA	0.74	---	8.99	0.59	---	9.23
08/10/2023[C]	NA	NA	0.00	---	NA	NA	NA	NA	0.02	---	8.25	0.64	---	8.76
09/14/2023	NA	NA	0.00	---	NA	NA	NA	NA	0.05	0.00	9.04	0.73	0.00	9.52
10/12/2023[C]	NA	NA	0.00	---	NA	NA	NA	NA	0.27	---	9.83	0.66	---	9.96
11/9/2023[C]	NA	NA	0.00	---	NA	NA	NA	NA	0.01	---	8.81	0.56	---	9.05
12/14/2023	NA	NA	0.00	---	NA	NA	NA	NA	0.03	0.00	8.41	0.55	0.00	8.48

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Table 6
LNAPL Gauging and Recovery Results

Date	RW-108 Initial LNAPL Thickness (Ft)	RW-108 Final LNAPL Thickness[H] (Ft)	RW-109 Initial LNAPL Thickness (Ft)	RW-109 Final LNAPL Thickness[H] (Ft)	RW-110 Initial LNAPL Thickness (Ft)	RW-110 Final LNAPL Thickness[H] (Ft)
Baseline[J]	0.00	---	0.00	---	0.02	---
01/09/2020	0.00	NM	0.00	NM	0.02	<0.01
02/13/2020	0.00	NM	0.00	NM	0.09	<0.01
03/12/2020	0.00	NM	0.00	NM	0.04	<0.01
05/16/2020	0.00	---	0.00	---	0.10	0.00
06/19/2020	0.00	---	0.00	---	0.34	0.00
07/28/2020	0.00	---	0.00	---	0.46	<0.01
08/21/2020	0.00	---	0.00	---	0.30	0.00
09/10/2020	0.00	---	0.00	---	0.00	---
10/08/2020	0.00	---	0.00	---	0.01	<0.01
11/11/2020	0.00	---	0.00	---	0.02	0.00
12/10/2020[C]	0.00	---	0.00	---	0.00	---
01/15/2021	0.00	---	0.00	---	0.00	---
2/12/2021[C,I]	0.00	---	0.00	---	0.19	---
03/05/2021	0.00	---	0.00	---	0.17	0.00
4/15/2021[C]	0.00	---	0.00	---	0.10	---
05/13/2021	0.00	---	0.00	---	0.20	0.00
6/10/2021[C]	0.00	---	0.00	---	0.25	---
08/12/2021	0.00	---	0.00	---	0.48	0.00
11/11/2021[G]	0.00	---	0.00	---	0.01	0.00
1/18/2022[C]	0.00	---	0.00	---	0.00	---
02/17/2022	0.00	---	0.00	---	0.02	Trace
4/14/2022[C]	0.00	---	0.00	---	0.00	---
05/12/2022	0.00	---	0.00	---	0.00	---
6/20/2022[C]	0.00	---	0.00	---	0.00	---
07/14/2022	0.00	---	0.00	---	0.00	---
08/11/2022[C]	0.00	---	0.00	---	0.00	---
09/08/2022	0.00	---	0.00	---	0.00	---
10/13/2022[C]	NA[O]	NA[O]	NA[O]	NA[O]	0.00	---
11/10/2022[C]	NA	NA	NA	NA	0.00	---
12/08/2022	NA	NA	NA	NA	0.00	---
01/12/2023[C]	NA	NA	NA	NA	0.00	---
02/09/2023[C]	NA	NA	NA	NA	0.00	---
03/09/2023	NA	NA	NA	NA	0.00	---
04/13/2023[C]	NA	NA	NA	NA	0.01	---
05/11/2023[C]	NA	NA	NA	NA	0.00	---
06/19/2023	NA	NA	NA	NA	0.00	---
07/27/2023[C]	NA	NA	NA	NA	0.05	---
08/10/2023[C]	NA	NA	NA	NA	0.00	---
09/14/2023	NA	NA	NA	NA	0.00	---
10/12/2023[C]	NA	NA	NA	NA	0.00	---
11/9/2023[C]	NA	NA	NA	NA	0.00	---
12/14/2023	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.

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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]	NA	---	---	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	NA	NA	NA	NA	NM	NA	NM	NA
6/20/2022[F]	09:38	05:25	10:07	NA	NA	NA	NA	NA	NA	NA	NA	0.0	NA
10/13/2022[D]	17:33	19:11	14:04	0.02	0.00	NA	NA	NA	NA	0.0	NA	0.0	NA

Abbreviations, Symbols, and Formatting:

Ft = Feet
LNAPL = Light Non-Aqueous Phase Liquid
NM = Not Measured
NA = Well not intended to be gauged/vacuumed
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.

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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]	NA	NA	NA	NA	NA	NA	NA
6/20/2022[F]	NA	NA	NA	NA	NA	NA	NA
10/13/2022[D]	NA	NA	NA	NA	NA	NA	NA

Abbreviations, Symbols, and Formatting:
Ft = Feet
LNAPL = Light Non-Aqueous Phase Liquid
NM = Not Measured
NA = Well not intended to be gauged/vacuumed
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

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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
	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									
	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

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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 cont'd)	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
	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
	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
	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
	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

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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
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									
	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
	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

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

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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
	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
	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
	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
	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
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

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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
	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
	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
	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
	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
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
	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							
	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
	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	9.60	--	--	0	69.3	20.7	6.98	--	1,276	3.50	0.09	-144.6
	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	7.00	--	1,440	3.52	0.17	-136.1
	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	3.04	0.18	-164.3
	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	1.53	0.28	-171.0

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)
Interior Wells	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							
	RW-5A	20	18.07	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/13/22	ND	8.88	9.19	--	0	61.88	16.6	6.80	--	878	60	0.20	-138.6
	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	103.8	0.68	-71.6
CPOC Wells	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	6.45	0.19	-95.1
	MW-46B	20.3	--	16.07	10/16/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/13/22	ND	10.64	--	5.43	0	63.9	17.7	6.71	--	1,080	6.45	1.01	-63.5
CPOC Wells Cont'd	MW-58A	25	NM	NM	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/24/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/19/22	ND	11.02	--	--	0	66.6	19.2	6.76	--	1,157	17.5	0.12	-124.2
	MW-86B	20	18.28	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/24/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/19/22	ND	12.48	5.8	--	0	65.5	18.6	7.13	--	1,917	1.07	0.15	-116.8
	MW-92	20	NM	NM	10/16/19	--	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--	--
					10/13/22	ND	9.93	--	--	0	64.0	17.8	6.60	--	933	253.1	0.20	-132.6
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:

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.

This table was initially 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
Ft = Feet
Gal = Gallon
LNAPL = Light Non-Aqueous Phase Liquid
mg/L = milligram per liter
MP = monitoring point
mV = millivolt
NM = Not Measured
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

Figures

SITE LOCATION

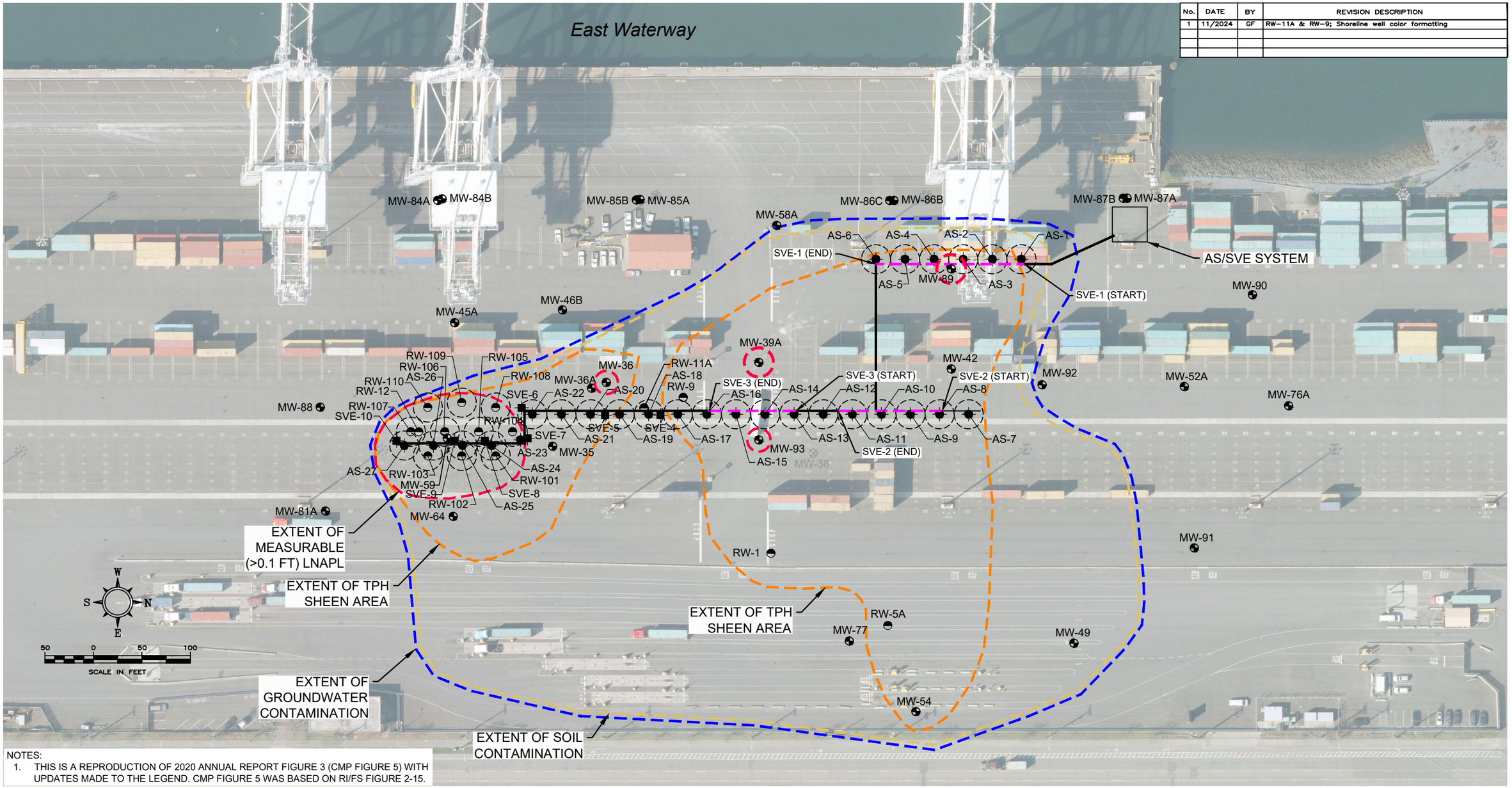
MAY 2022

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)

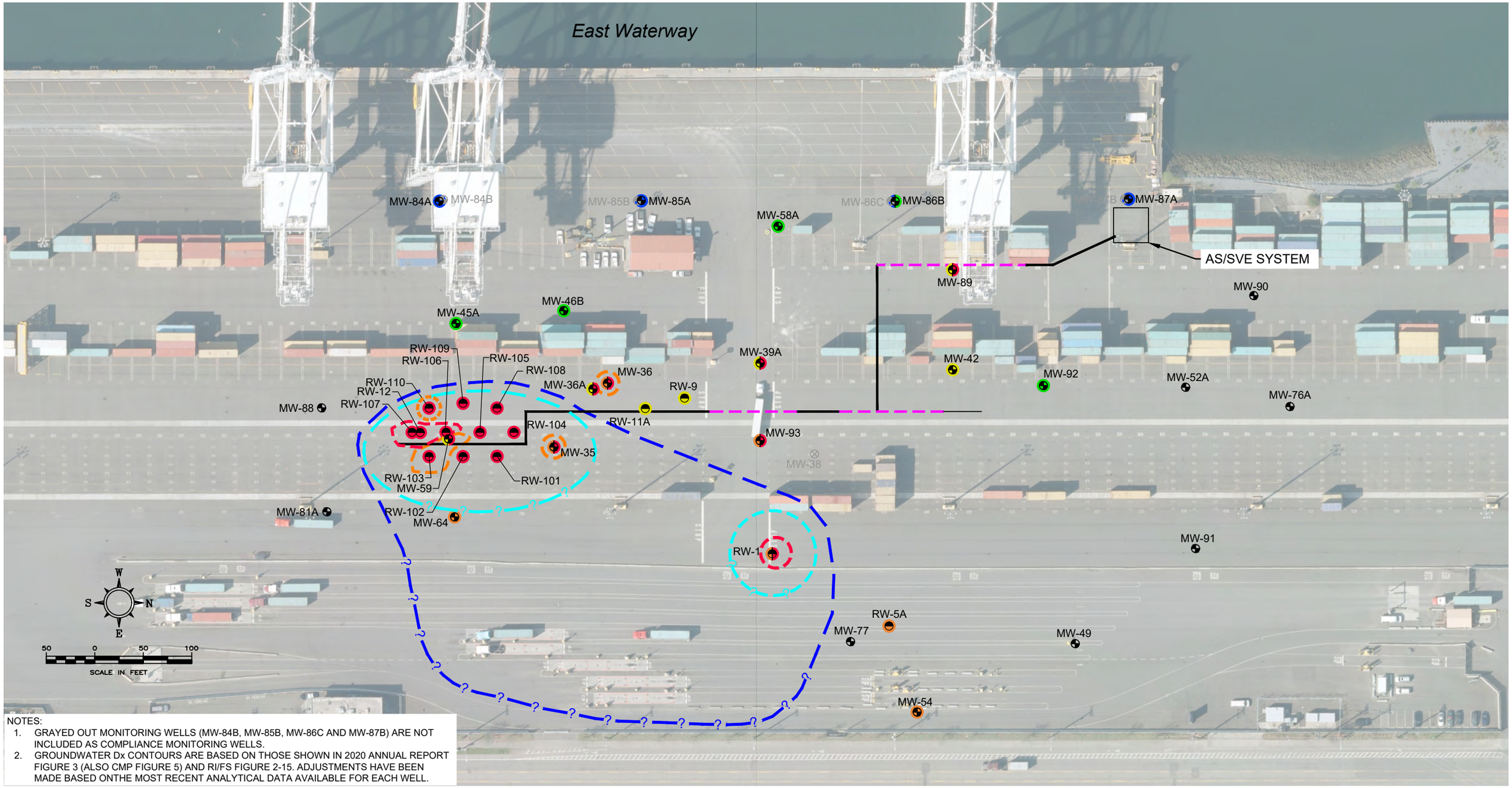
AECOM

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



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.

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 (OCT 2023)[2]
- EXTENT OF GROUNDWATER Dx CONTAMINATION ABOVE CUL (OCT 2023)[2]
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) ON DEC 14, 2023
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) IN 2023 (PRIOR TO DEC 14, 2023)

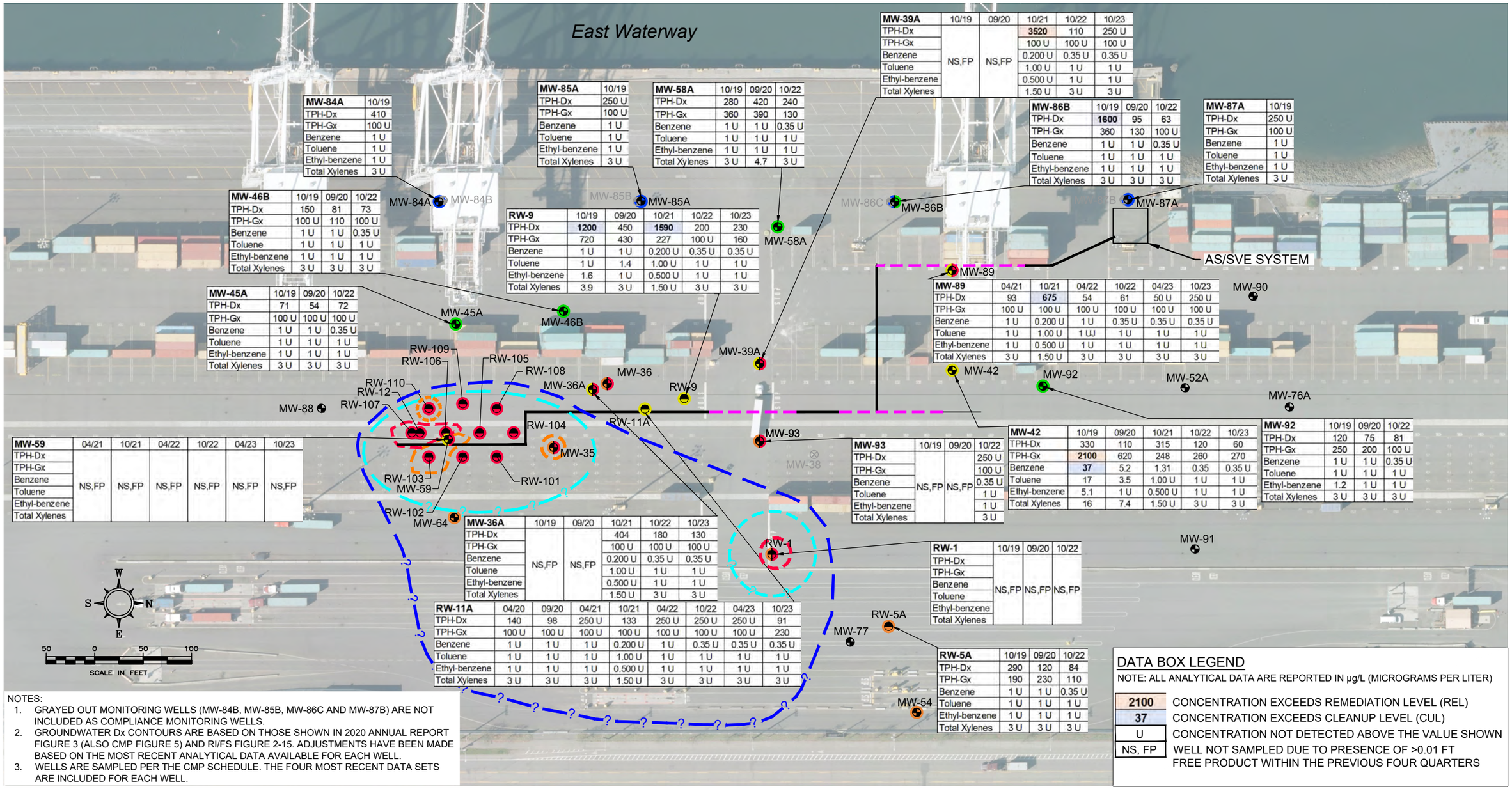
AECOM

COMPLIANCE MONITORING NETWORK WITH FINAL 2023 GROUNDWATER CONDITIONS

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 3

K:\Port_of_Seattle\202x\Fig 3 Compliance Monitoring Network with Final 2023 GW Conditions.dwg Aug 16, 202x – 2:02pm



MW-84A	10/19
TPH-Dx	410
TPH-Gx	100 U
Benzene	1 U
Toluene	1 U
Ethyl-benzene	1 U
Total Xylenes	3 U

MW-85A	10/19
TPH-Dx	250 U
TPH-Gx	100 U
Benzene	1 U
Toluene	1 U
Ethyl-benzene	1 U
Total Xylenes	3 U

MW-58A	10/19	09/20	10/22
TPH-Dx	280	420	240
TPH-Gx	360	390	130
Benzene	1 U	1 U	0.35 U
Toluene	1 U	1 U	1 U
Ethyl-benzene	1 U	1 U	1 U
Total Xylenes	3 U	4.7	3 U

MW-39A	10/19	09/20	10/21	10/22	10/23
TPH-Dx	NS,FP	NS,FP	**3520**	110	250 U
TPH-Gx			100 U	100 U	100 U
Benzene			0.200 U	0.35 U	0.35 U
Toluene			1.00 U	1 U	1 U
Ethyl-benzene			0.500 U	1 U	1 U
Total Xylenes			1.50 U	3 U	3 U

MW-86B	10/19	09/20	10/22
TPH-Dx	**1600**	95	63
TPH-Gx	360	130	100 U
Benzene	1 U	1 U	0.35 U
Toluene	1 U	1 U	1 U
Ethyl-benzene	1 U	1 U	1 U
Total Xylenes	3 U	3 U	3 U

MW-87A	10/19
TPH-Dx	250 U
TPH-Gx	100 U
Benzene	1 U
Toluene	1 U
Ethyl-benzene	1 U
Total Xylenes	3 U

MW-46B	10/19	09/20	10/22
TPH-Dx	150	81	73
TPH-Gx	100 U	110	100 U
Benzene	1 U	1 U	0.35 U
Toluene	1 U	1 U	1 U
Ethyl-benzene	1 U	1 U	1 U
Total Xylenes	3 U	3 U	3 U

RW-9	10/19	09/20	10/21	10/22	10/23
TPH-Dx	**1200**	450	**1590**	200	230
TPH-Gx	720	430	227	100 U	160
Benzene	1 U	1 U	0.200 U	0.35 U	0.35 U
Toluene	1 U	1.4	1.00 U	1 U	1 U
Ethyl-benzene	1.6	1 U	0.500 U	1 U	1 U
Total Xylenes	3.9	3 U	1.50 U	3 U	3 U

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

MW-45A	10/19	09/20	10/22
TPH-Dx	71	54	72
TPH-Gx	100 U	100 U	100 U
Benzene	1 U	1 U	0.35 U
Toluene	1 U	1 U	1 U
Ethyl-benzene	1 U	1 U	1 U
Total Xylenes	3 U	3 U	3 U

MW-59	04/21	10/21	04/22	10/22	04/23	10/23
TPH-Dx	NS,FP	NS,FP	NS,FP	NS,FP	NS,FP	NS,FP
TPH-Gx						
Benzene						
Toluene						
Ethyl-benzene						
Total Xylenes						

MW-36A	10/19	09/20	10/21	10/22	10/23
TPH-Dx	NS,FP	NS,FP	404	180	130
TPH-Gx			100 U	100 U	100 U
Benzene			0.200 U	0.35 U	0.35 U
Toluene			1.00 U	1 U	1 U
Ethyl-benzene			0.500 U	1 U	1 U
Total Xylenes			1.50 U	3 U	3 U

RW-11A	04/20	09/20	04/21	10/21	04/22	10/22	04/23	10/23
TPH-Dx	140	98	250 U	133	250 U	250 U	250 U	91
TPH-Gx	100 U	100 U	100 U	100 U	100 U	100 U	100 U	230
Benzene	1 U	1 U	1 U	0.200 U	1 U	0.35 U	0.35 U	0.35 U
Toluene	1 U	1 U	1 U	1.00 U	1 U	1 U	1 U	1 U
Ethyl-benzene	1 U	1 U	1 U	0.500 U	1 U	1 U	1 U	1 U
Total Xylenes	3 U	3 U	3 U	1.50 U	3 U	3 U	3 U	3 U

MW-93	10/19	09/20	10/22
TPH-Dx	NS,FP	NS,FP	250 U
TPH-Gx			100 U
Benzene			0.35 U
Toluene			1 U
Ethyl-benzene			1 U
Total Xylenes			3 U

MW-42	10/19	09/20	10/21	10/22	10/23
TPH-Dx	330	110	315	120	60
TPH-Gx	**2100**	620	248	260	270
Benzene	**37**	5.2	1.31	0.35	0.35 U
Toluene	17	3.5	1.00 U	1 U	1 U
Ethyl-benzene	5.1	1 U	0.500 U	1 U	1 U
Total Xylenes	16	7.4	1.50 U	3 U	3 U

MW-92	10/19	09/20	10/22
TPH-Dx	120	75	81
TPH-Gx	250	200	100 U
Benzene	1 U	1 U	0.35 U
Toluene	1 U	1 U	1 U
Ethyl-benzene	1.2	1 U	1 U
Total Xylenes	3 U	3 U	3 U

RW-1	10/19	09/20	10/22
TPH-Dx	NS,FP	NS,FP	NS,FP
TPH-Gx			
Benzene			
Toluene			
Ethyl-benzene			
Total Xylenes			

RW-5A	10/19	09/20	10/22
TPH-Dx	290	120	84
TPH-Gx	190	230	110
Benzene	1 U	1 U	0.35 U
Toluene	1 U	1 U	1 U
Ethyl-benzene	1 U	1 U	1 U
Total Xylenes	3 U	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 PER THE CMP SCHEDULE. THE FOUR MOST RECENT DATA SETS ARE INCLUDED FOR EACH WELL.

DATA BOX LEGEND

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

2100	CONCENTRATION EXCEEDS REMEDIATION LEVEL (REL)
37	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-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 (OCT 2023)[2]
- EXTENT OF GROUNDWATER Dx CONTAMINATION ABOVE CUL (OCT 2023)[2]
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) ON DEC 14, 2023
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) IN 2023 (PRIOR TO DEC 14, 2023)

AECOM

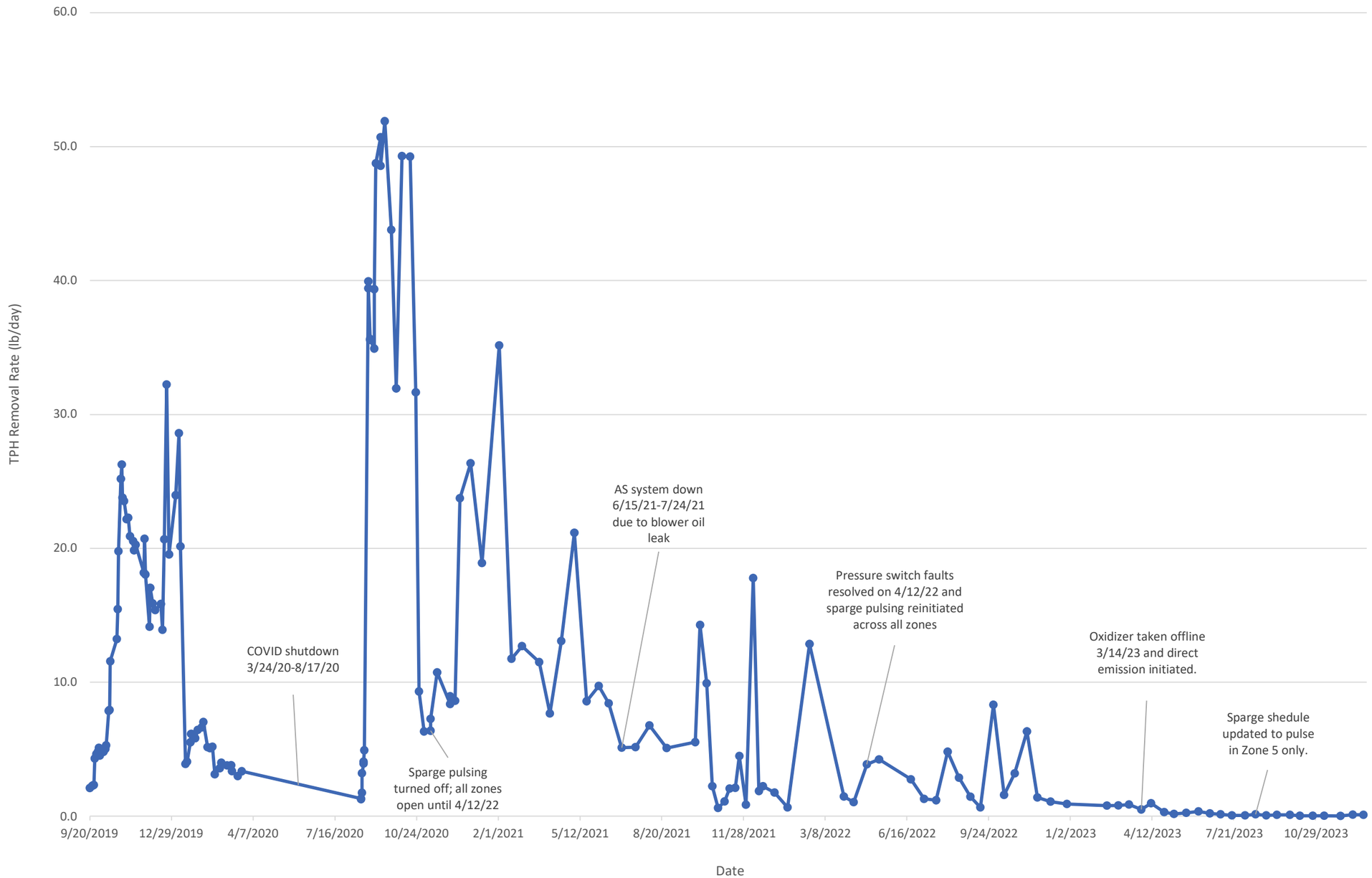
END OF 2023 COMPLIANCE MONITORING ANALYTICAL RESULTS

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 4

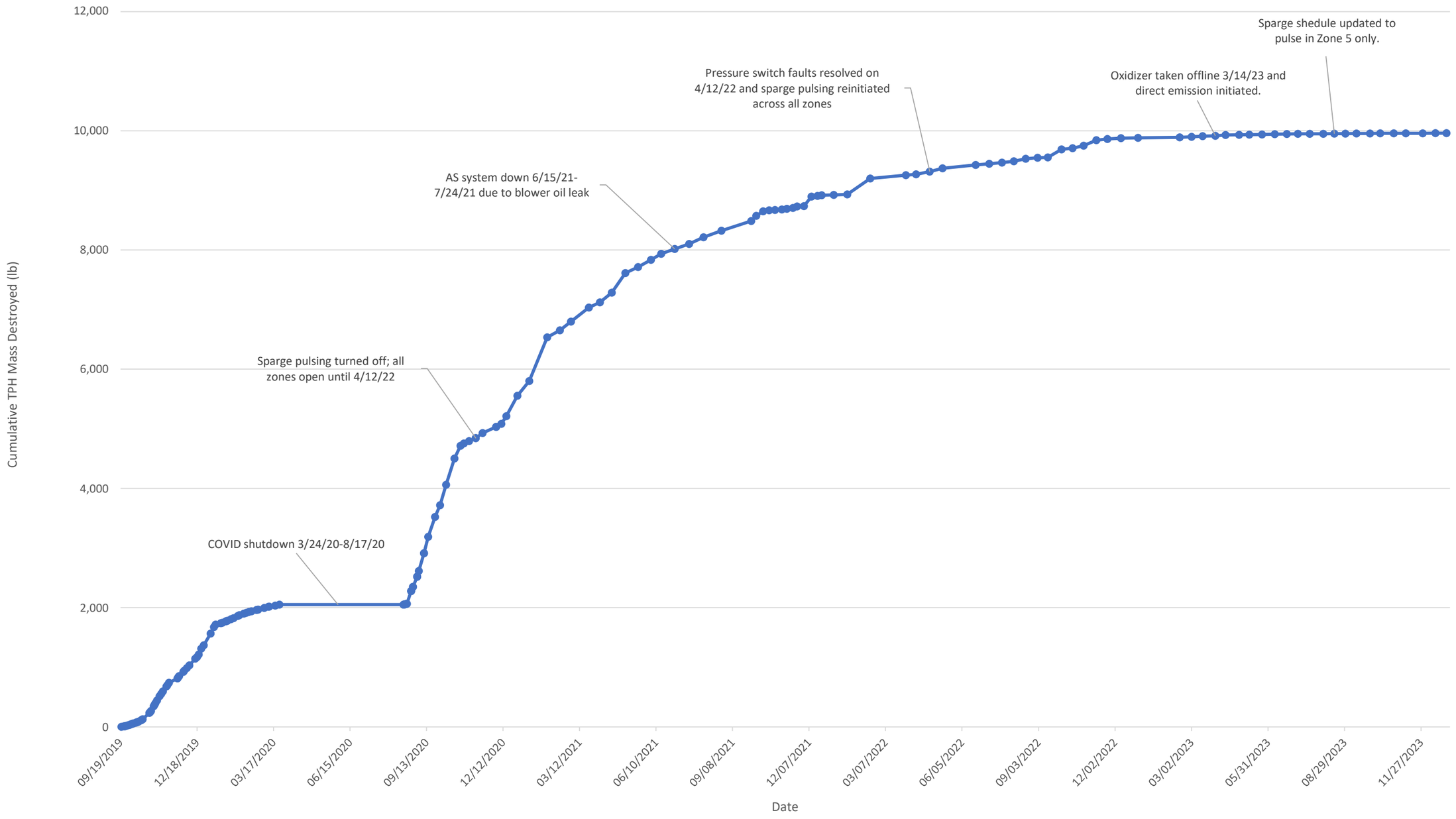
K:\Port_of_Seattle\2024\Fig 4 End of 2023 Compliance Monitoring Analytical Results.dwg Aug 19, 2024 - 6:13am

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

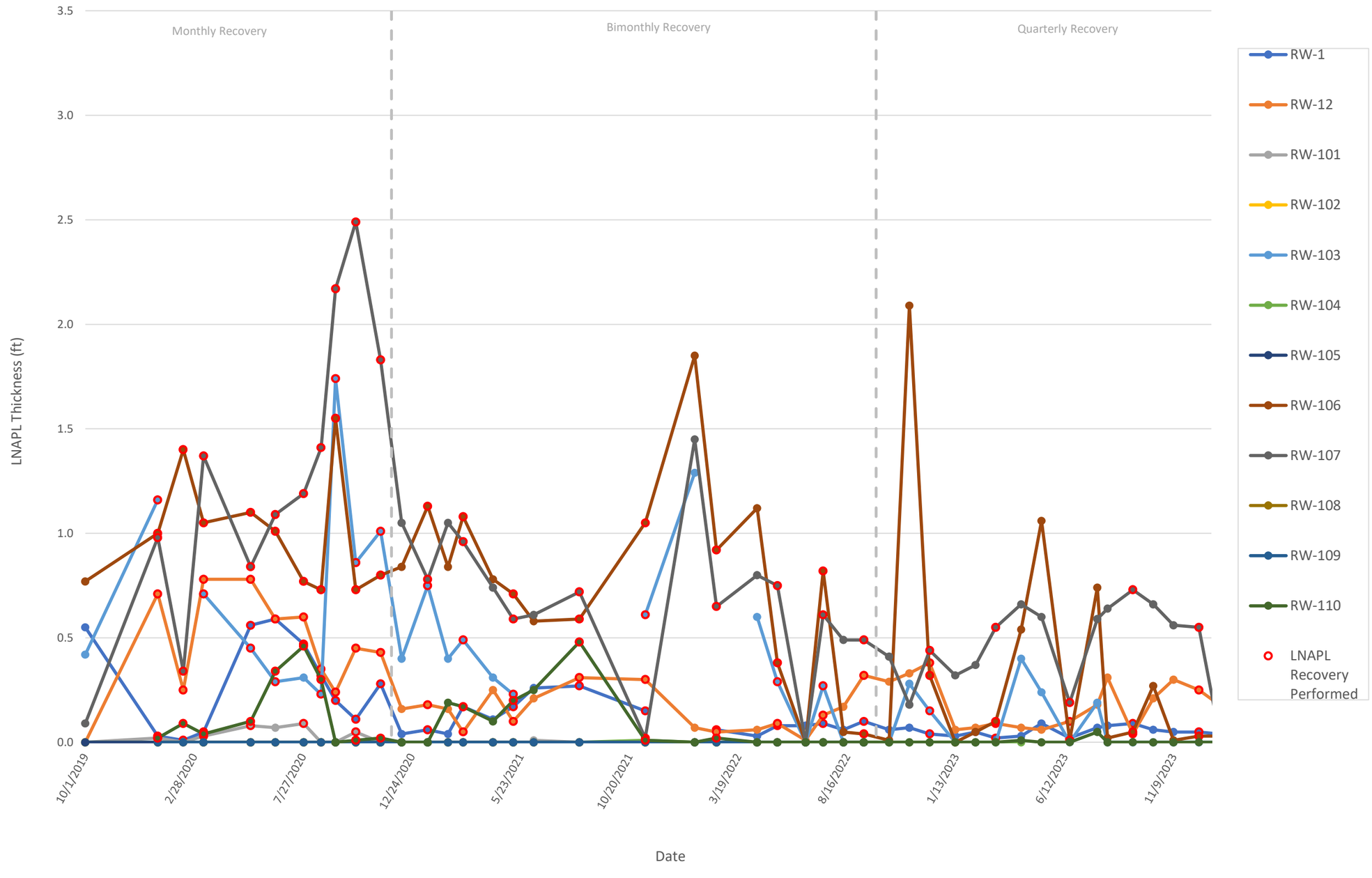


Figure 8 - LNAPL Thickness in Monitoring Wells

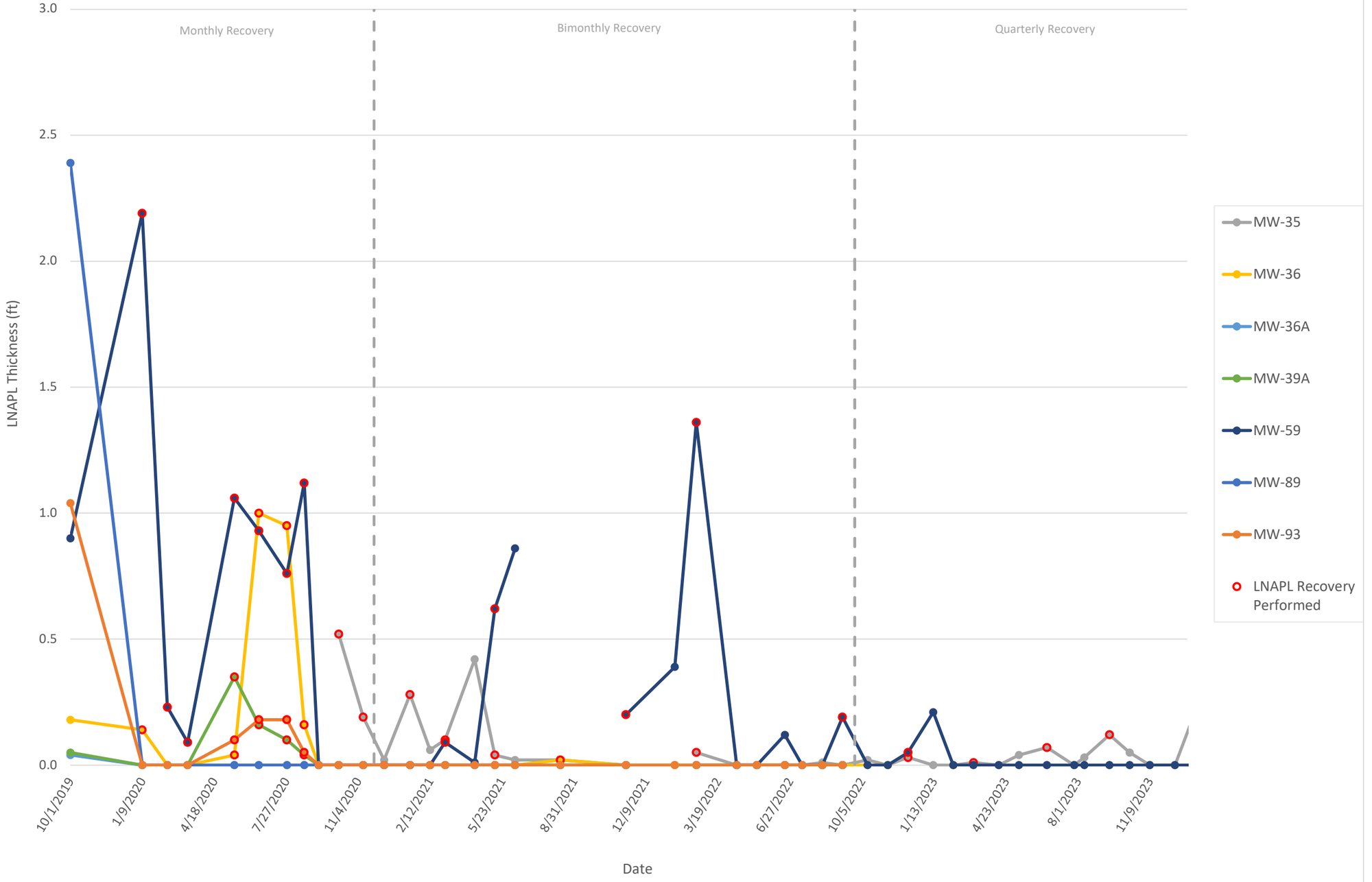


Figure 9 - LNAPL Recovery Volumes

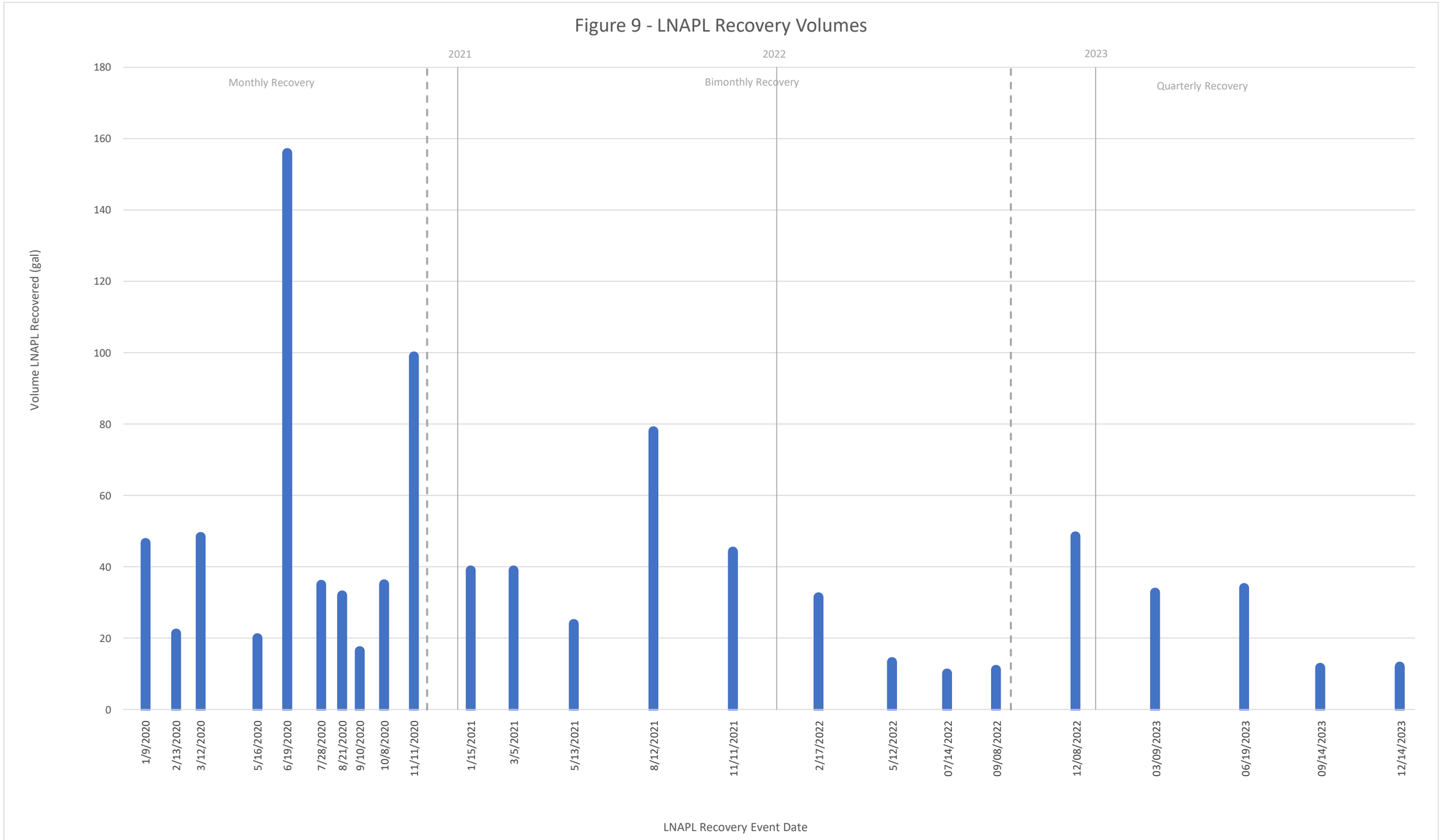


Figure 10 - Cumulative LNAPL Recovery Volume

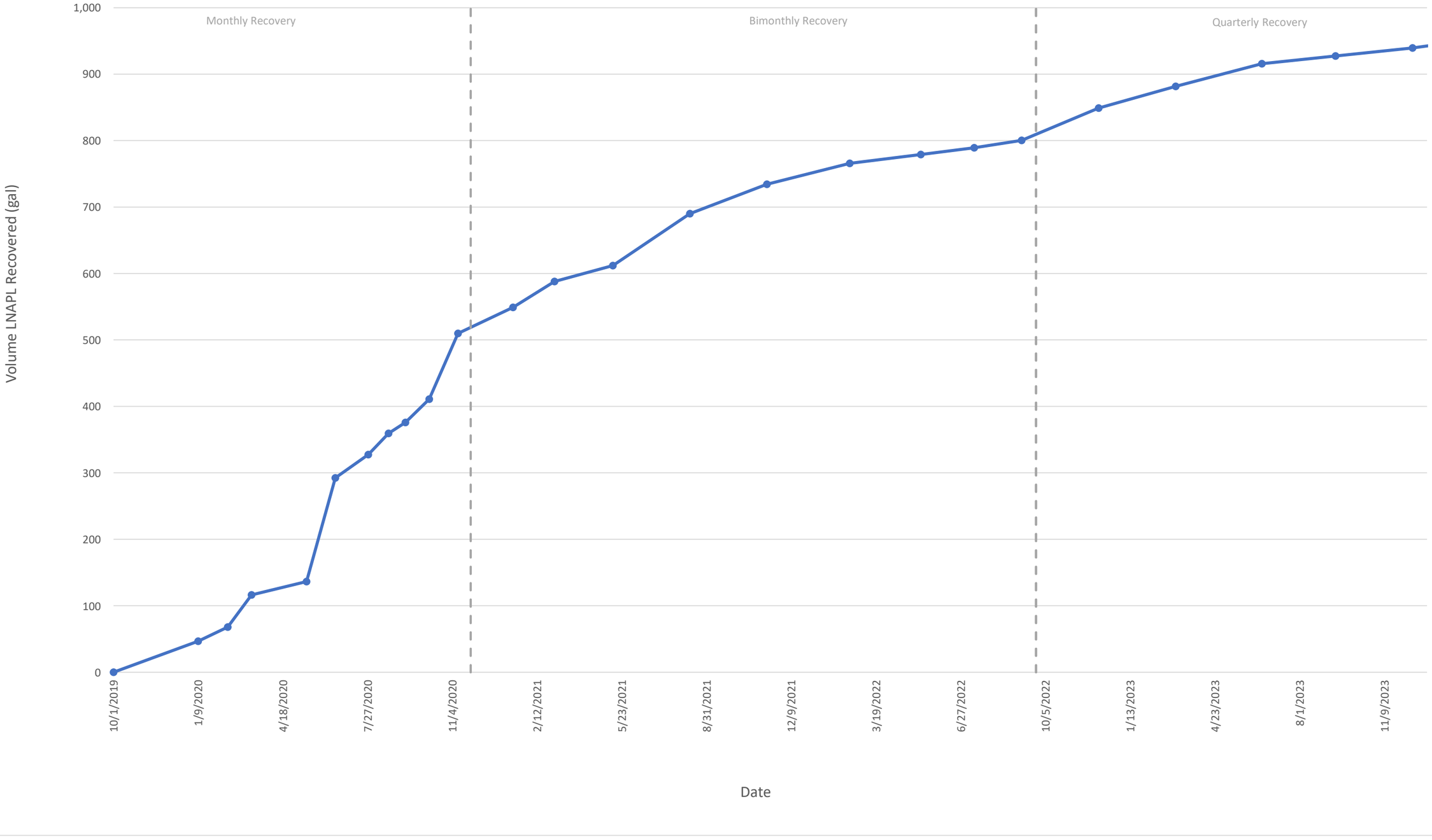
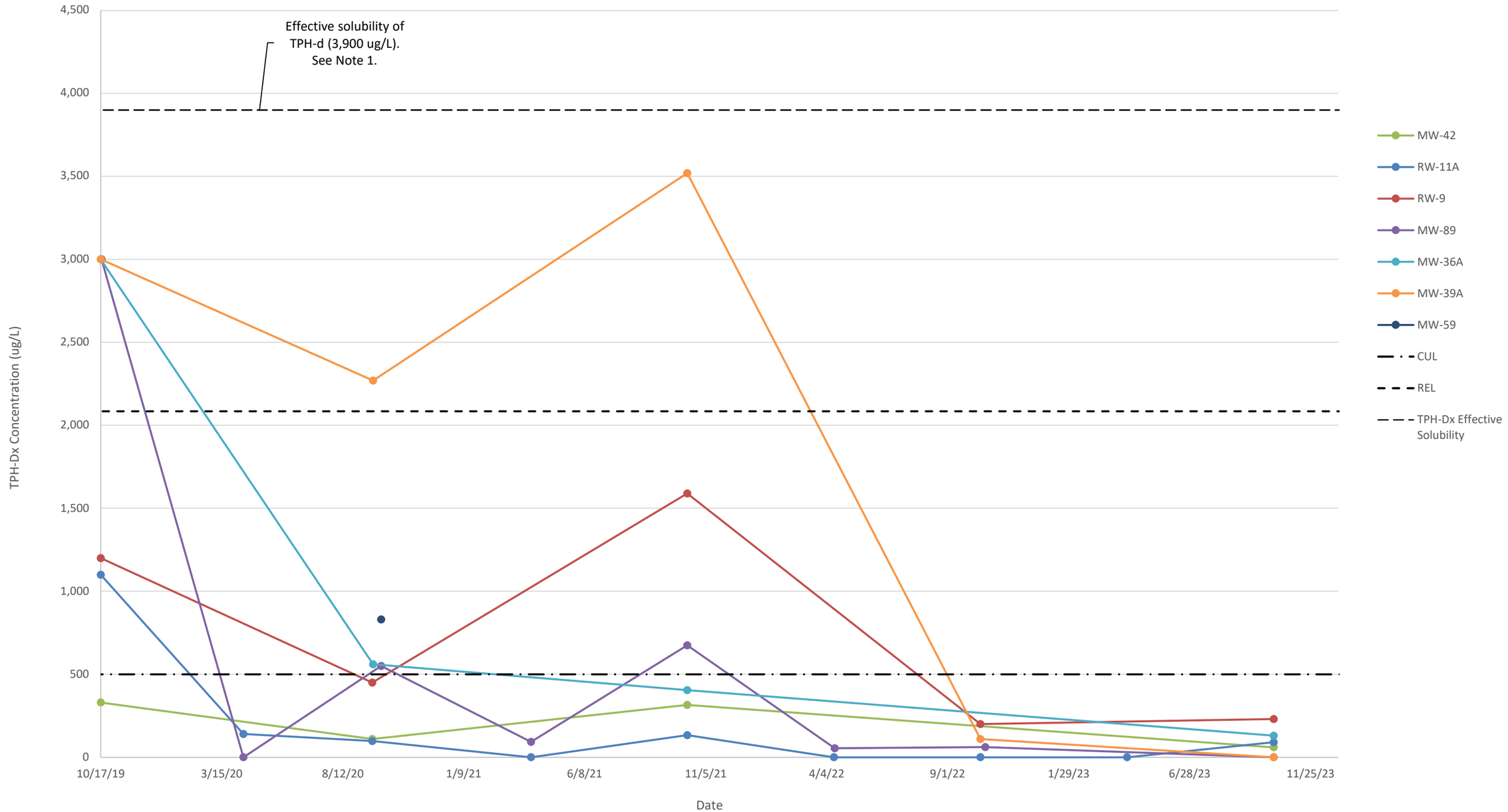


Figure 11 - Performance Monitoring Well TPH-Dx Concentrations



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.

Appendices

Appendix A

O&M Field Forms

DAILY FIELD LOG

Project Information Page 1 of 3

Project Name:	T-30	Location:	SODO
Project/Task No.:		Weather:	
Date:	1/25/23	Personnel:	GF, CB

Observations

	Time	Observation Description
1	0930	·GF onsite
2		·Safety Tailgate
3		·Scope: H2K system upgrades
4		Float switch replacement in VOT
5	0931	Mtg w/ MM re stack design
6	↳	·Power disconnected to system @ breaker. Locked out.
7	0945	·Test voltage at VFD confirmed no power
8		·Planned out wire install & sent confirmation to Randy @ H2K
9		He revised the VFD terminals for the ~~4~~ 81+ wires from 16
10		to 17.
11		·Added the following loads:
12		SVE:
13		81+ from VFD term 17 to 81+ terminal on terminal block
14		114 from VFD term 19 to 114 terminal on term block
15		AS:
16		81+ from VFD term 17 to 81+ term on term block
17		~~MM~~ 115 from VFD term 19 to 115 term on term block
18	1130	·Swapped the new thumb drive from H2K into the HMI port
19		in place of the old one
20		·Restored power
21		·Followed H2K instructions to reset the HMI/PLC. All went
22		as planned until the actual file upload step, which failed
23		after 10-15 min of loading
24	1200	·Marina & John arrived from MM, & C Brown from Recam.
25		Stack location/design options were discussed. John

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	
Project/Task No.:		Weather:	
Date:	1/25/23	Personnel:	GF, CB

Observations

	Time	Observation Description
1		proposed several good alternatives. #1 is to remove the flexible
2		pipe portion & add air piping from the rear flange. Do a quick
3		turn to the SVE blower housing & install stub pipe. Add
4		unistrut to the outside of the housing & clamp stub to
5		those. Alan
6		- John & Marina will run it by Silcox, who has to approve
7		it first. If they need anything from us they'll let us
8		know
9		• Discussed the maintenance checklist from the O&M
10		manual & made revisions to match the equipment on
11		site & staffing realities, see notes @ bottom.
12	**	→ check w/ Marina to see if MM has been greasing
13		both the blowers and motors monthly. The
14		checklist says to do the blowers weekly & the motors
15		annually. We are fine with both done monthly if
16		that is what has been done to date.
17		• Noticed that the Poly tank was askew & realized it
18		was floating in water in the 2° containment. It ripped
19		several of the earthquake anchor bolts out. Marina
20		got one of their vac trucks to come vac it out.
21	**	She will figure out how to repair the anchor bolts.
22	1300	Marina & John offsite
23		• Did a power cycle on the HMI & attempted the SD
24		drive upload again, but no luck. Same result.
25		• Helped CB take apart the KOT float switch. Got the

Comments / Site Activities / Personnel Tracking

New AECOM tasks: 1) check SVE & AS oil levels biweekly. Alert MM if they appear too high or low. 2) Quarterly, open up filter housing to empty water & inspect the filter. MM will replace as needed per our recommendation.

DAILY FIELD LOG

Project Information

Project Name:	T-20	Location:	
Project/Task No.:		Weather:	
Date:	1/25/23	Personnel:	GF, CB

Observations

	Time	Observation Description
1		Old float off + confirmed it had filled w/ water. Added
2		the new float in its place, but need some snap ring pliers
3		to complete the install.
4	1345	CB offsite
5		· Attempted one more HMI power cycle, but same result.
6		· Called Randy + left a VM w/ update, but he was
7		already done for the day.
8		· cleaned up, locked up.
9		⇒ Marina brought 1 new threaded ball valve for the
10		SVE manifold, didn't realize we needed more (5?).
11	~~1~~	Confirm count for her.
12	1430	· offsite. Will return in the AM to complete the
13		tasks.
14		
15		
16		
17		
18		
19		
20		
21		GF
22		1/25/23
23		
24		
25		

Comments / Site Activities / Personnel Tracking

Table 13 Terminal 30 SVE/AS Maintenance Schedule

Recommended Frequency	Task	Comment
Centrifugal Pump		
6 Months/Yearly	~~Disassemble,~~ inspect, and clean impeller housing, and rotor	May require service more often based on the site operating conditions. if needed after inspection
Yearly	Grease motor with NGLI #2, if applicable	N/A
Heat Exchanger		
As Needed	Cleaning and Inspection	Fan blades should be inspected for tightness.
		Coil fins that become flattened can be combed back into position.
		Inspect the entire heat exchanger and motor/fan assembly for loosened bolts, loose connections, broken components, rust spots, corrosion, fin/coil clogging, or external leakage. Make immediate repairs to all affected areas prior to restarting and operating the heat exchanger or its components.
6 to 9 Months	Grease blower motor bearings with NLGI #2 grease.	N/A
Air Sparge Blower		
Weekly Biweekly AECOM	Check sparge oil by opening lower side plug to see if there is enough oil.	Air sparge blower must be off.
After first 100 hours, 1,000 hours (monthly thereafter)	Sparge oil change. Use non-detergent SAE 40 oil or equivalent synthetic.	
Weekly Monthly	Grease sparge blower bearings with NLGI #2.	
Monthly	Check belt tension and wear.	

Recommended Frequency	Task	Comment
~~Yearly~~ Monthly	Grease motor with NLGI #2.	
SVE Blower		
~~Weekly~~ Biweekly AEcom	Check SVE oil by opening lower side plug to see if there is enough oil.	SVE blower must be off.
After first 100 hours, 1,000 hours (monthly thereafter)	SVE oil change. Use non-detergent SAE 40 oil or equivalent synthetic.	
~~Weekly~~ Monthly	Grease SVE blower bearings with NGLI #2.	* MM sticker is only on the motor. make sure the blower greasing has been on their list too
Monthly	Check belt tension and wear.	
~~Yearly~~ monthly	Grease motor with NGLI #2.	
Moisture Separator		
As Needed. Recommended to check monthly during blower oil changes.	Clean/Replace ~~demister~~ Prowick Filter	When differential pressure across the filter exceeds 15" of water. → AEcom will monitor & notify MM as needed
	Clean sump site glass, pump down switch.	As needed, depending on water quality. Recommend initial inspection after 6 months.

MM annual

AEcom quarterly

also check filter housing + empty water as needed! Quarterly basis

Table 14 Terminal 30 Oxidizer Maintenance Checklist

Component	Test	Frequency
Fan Mounting Bolts	Tightness	Quarterly
Fan Motor Bearings	Lubrication	Quarterly
Fan Motor Amperage	Windings	Quarterly
Electric Heater Amperage	Output	Quarterly
Dilution and Process Valves	Verify Valves Moves Freely	Monthly
Filter Inspection and Cleaning	Check for Congestion and Wash as Needed (Reusable)	Monthly
Instrumentation	Drain Condensate	Monthly
Temperature Controller	Accuracy	Annually
Electrical Wiring Terminals	Tightness	Semi-Annual
Flame Arrestor	Pressure Drop	Annually
Catalyst	Signs of Plugging or Discoloration	Annually
Chart Recorder	Download Data	Quarterly
Destruction Efficiency	Calculated	Monthly

Oxidizer going offline, no need to address

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	1/25/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Meeting Summary

Attendees	
Location	SODO
Tasks to be performed	H2K system upgrades Float switch replacement MM stack meeting
Hazards to be considered today	motion, electrical
Will there be Lone Workers?	No
Hierarchy of controls	engineering, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: longpants, reflectivevest, workboots
High Risk Events	
Topic of the week	Road Safety - speed, signs, awareness, distractions
Other topics discussed	

Hazards	• Motion • Electrical

End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here

DAILY FIELD LOG

Project Information Page 1 of 2

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	11/26/23	Personnel:	GF

Observations

	Time	Observation Description
1	0920	·onsite
2		·Scope: Complet KOT float replacement & HMI update.
3		·Safety tailgate. Pinch points & traffic
4		·called Randy at HJK & left a message. He will need to
5		try the update remotely & if it fails, we'll need to send the
6		HMI to him.
7		·completed install of the snap rings on the KOT rod
8		& reinstalled it. Confirmed the new float floats.
9	10:00	·Still waiting on Randy. killed time by adding the dewatering
10		ball valve to SVE-6 w/ the ave ball valve Marina got for
11		us.
12		- Had to replace the close nipple below the rotameter, which
13		I noticed had cracked/broken. Luckily plenty of
14		spares in the conex.
15	10:50	·Randy called back. Took a while, but we successfully
16		got the update completed.
17		·Asked about the oxidizer jumper wire & he recommended
18		disconnecting the wire(s) going from terminal 101 out
19		to the oxidizer & capping w/ a wire nut.
20	11:50	·Restarted the oxidizer
21		→ shut down due to a flame relay alarm. I'm not familiar
22		but was able to clear it & restart again
23	12:00	·SVE #5 kicked on
24		- Zone 5 active. Very little flow, ~1.5 scfm to AS-24 & -25
25		and 0 to the others

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	1/26/23	Personnel:	GF

Observations

	Time	Observation Description
1		- Lots of water in SVE-6, -8, -9, & -10.
2		-SVE-4 is consistently dirty water
3		-SVE-5 totally stuck. could swap in a bumper from
4		one of the HSVE rotometers as a stop-gap
5		-SVE-8 still seeing no flow
6		• Tripped several alarms to test the notifications but they
7		still appear to be malfunctioning. An error appeared
8		on the HMI referencing the emails & none were received.
9		→ Randy (HSE) already done for the day but I left
10		him a voicemail explaining.
11		• Tested the KOT floats & they work as intended.
12		• Cleaned up & locked up
13	1310	• Offsite
14		
15		
16		
17		
18		
19		
20		GF
21		1/26/23
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

Friedman, Gus

From: rcarlson@h2ktech.com
Sent: Monday, October 31, 2022 6:57 AM
To: Friedman, Gus
Subject: RE: Seattle Terminal-30 VFD questions

Gus,

See my responses to your questions below in RED. Let me know you have further questions or comments.

1. Is the system set up to be able to run without the oxidizer? If not, can that option be added in? We are actively considering switching to GAC, and have the potential to run the system without filtration in the near future. Yes, all you would have to do it put a jumper wire across terminals 81+ and 101 to simulate the Oxidizer is running. The SVE system won't know the difference and run just like it does with the oxidizer running. disconnect wires leaving cabinet to the oxidiz
2. Is the temp sensor at the sparge compressor feeding actual temp data to the PLC or just signaling when a high temp is triggered? If the former, can the temperatures be shown on the HMI? If you are referring to the SPARGE BLOWER TSH wired to terminals 162 and 163, that is just a switch. You would have to add a temp transmitter, analog PLC card, and programming to the PLC and HMI to view a real time Sparge temperature.
3. What triggers an "SVE/AS System Failed to Run" alarm? That must be an alarm triggered by the oxidizer control panel. You would have to talk to Intellishare directly to see what creates that alarm.
4. I'm not seeing any VFD failure alarms – is that correct? Is there a way to program in new alarms if the VFDs fail? If you need to know if the VFD's fail/fault, you would have to wire in the "VFD FAULT" output from the VFD to a spare PLC input. Then programming in the PLC and HMI would have to be done to accommodate that fault signal.
5. When is the heat exchanger set to run? What triggers operation? The HX will run after the SPARGE BLOWER has run for 10 seconds and no alarms in the system are active.

Regards,
Randy Carlson

Controls Manager
H2K Technologies
rcarlson@h2ktech.com | (o) 763-746-9900 x118 | (f) 763-746-9903
7550 Commerce St. Corcoran, MN 55340 | www.H2Ktech.com

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	1/26/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Gus Friedman;
Attendees (Visitors)	
Tasks to be performed	Complete KOT float install & HMI update
Hazards to be considered today	motion
Will there be Lone Workers?	Yes
Hierarchy of controls	ppe
Personal Protective Equipment	Task Specific: |Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Road Safety - speed, signs, awareness, distractions
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	All tasks completed safely and successfully
Hazards	• Motion

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	
Project/Task No.:		Weather	
Date:	1/27/23	Personnel:	GF

Observations

	Time	Observation Description
1	1700	·Onsite
2		·Scope: restart System & test email/text notifications
3		·Safety tailgate
4		·System OFF on arrival as expected. Randy (H2K) said
5		he thought he accidentally shut it down remotely.
6		· Email notifications seem to be working except they don't
7		if a phone number is also on the list. I tried mine with
8		just the area code and also with a 1 at the front,
9		but neither worked.
10	1715	· Restarted the oxidizer, but it faulted out during startup
11		with a "Dilution Valve not Open" fault
12	1720	· Restarted oxidizer again but it again faulted out
13		during the startup sequence, this time due to a
14		Flame relay issue. This are happened yesterday too
15	1723	· Restarted the oxidizer a third time, this one worked.
16	1730	- AS & SVE kicked on
17		- Zone 1 active. AS-2 & AS-3 are very sticky.
18		AS-1 has lots of debris in it. Air leak from top of AS-2.
19		- Recalled Rusty saying he would open up the big
20		ball valve @ the end of the manifold after long
21		shut downs. I did this & a surprising amount
22		of water came out, blasting to the Poly tank.
23	1755	· offsite
24		
25		GF 1/27/23

got emails for reset ✓

Comments / Site Activities / Personnel Tracking

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	1/27/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Gus Friedman;
Attendees (Visitors)	
Tasks to be performed	Restart system Check notifications
Hazards to be considered today	noise
Will there be Lone Workers?	Yes
Hierarchy of controls	ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Road Safety - speed, signs, awareness, distractions
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	All tasks completed safely and successfully
Hazards	• Noise

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	
Project/Task No.:		Weather:	
Date:	2/2/23	Personnel:	GF

Observations

	Time	Observation Description
1	0945	onsite
2		Scope: Resolve SVE/AS Failed to Run alarm & restart
3		System
4		Safety Tailgate
5	0950	· System OFF on arrival as expected, but the alarm
6		was no longer active, which was unexpected.
7		· Checked the KOT, & water level was at the bottom of
8		the sightglass, below the bottom float. Marina had
9		said she only pumped it to 1/2 or 1/4 full.
10		→ Cary's thought had been that the bottom float
11		might need to drop in order to clear the
12		alarm, which would be consistent with what
13		I'm seeing. Alarm says deactivated @ ~~9:30 on 1/31~~.
14		· Restarted oxidizer 12:09 on 1/31
15		· called Marina. She → Oxidizer alarm shows it triggered
16		left KOT ~50% and didn't at 9:30 on 1/31, likely while
17		do any further work Marina was here.
18	0956	· SVE & AS kicked on
19		· Maybe the pump auto-drained the KOT ~~around~~ at 12:09 &
20		the alarm auto-reset? The last time the poly tank
21		filled & got vac'd out, the KOT drained itself & we
22		didn't go through any of this.
23		· There is still a weird PLC banner notification appearing
24		on the HMI - "PLC-026: DEV002 - PLC Connection Timeout"
25	1003	· Closed AS bleed valve to try to trigger a VFD fault & test new alarms

Margin notes: HMI 1 hr ahead, so really 11:09 (beside lines 18–20); 5 sec on, 20 sec off (beside lines 22–23).

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	2/2/23	Personnel:	GF

Observations

	Time	Observation Description
1	1011	· AS VFD is pulling 11.4 Amps
2		· Zone 4 active. Not great airflow even w/ bleed closed
3		Flow Pressure
4		AS-17 4.4 9.0
5		AS-18 0 (not stuck) 9.5
6		AS-19 1.2 9.25
7		AS-20 1.7 9.5
8		AS-21 <1 10.25
9		AS-22 1.8 9.5
10	1040	· AS VFD is showing an A2010 fault, but it is
11		still on. There is no alarm showing on the HMI.
12		Not sure what happened.
13	1044	· reset HMI clock from 11:44 to 10:44.
14	1045	· Opened AS bleed back to 1 turn open. Zone 4
15		still active:
16		Flow Pressure
17		AS-17 2.9 8.0
18		AS-18 0.0 8.25
19		AS-19 1.1 8.0
20		AS-20 0.0 8.5
21		AS-21 0.0 8.75
22		AS-22 <1 8.0
23		· checked propane tanks, both ~60%
24	1055	· locked up, offsite
25		

GF 2/2/23

Comments / Site Activities / Personnel Tracking

Zones updated. Settings on arrival:
1: 17:00-22:30
2: 22:00-03:30 4: 07:30-12:30
3: 03:00-08:00 5: 12:00-17:30

Updated settings:
1: 03:00-08:00
2: 07:30-12:30 4: 17:00-22:30
3: 12:00-17:30 5: 22:00-03:30

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	2/2/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	Downtown Seattle
Attendees (Workers)	Gus Friedman;
Attendees (Visitors)	
Tasks to be performed	Clear alarm and restart system
Hazards to be considered today	noise
Will there be Lone Workers?	Yes
Hierarchy of controls	ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Preventing Texting Injuries - Ergonomics, habits
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	All tasks completed safely and successfully
Hazards	• Noise

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	2/16/23	Personnel:	GF, AB

Observations

	Time	Observation Description
1	1515	· GF, AB onsite
2		· Scope: biweekly O+M; rotameter repairs; dewatering
3		upgrades
4		· Safety Tailgate
5		· System ON in zone 3. Marina + DH vac'd out
6		the tank this AM and got the system restarted
7		at 10:30
8		· O+M readings collected
9		→ Influent 9.4 ppmv
10		→ Effluent 0.3 ppmv
11		* Replace SVE influent vac gauge w/ 0-150" H_2O?
12		We have been maxing out the existing 0-100" gauge.
13		* Replace AS-14 rotameter? Hard to read due to opaqueness.
14		* Transfer pump keeps turning on for ~1 second at
15		a time, seemingly randomly. The VAT level is
16		below the bottom float. I've noticed this the past
17		few visits.
18	1630	· Added dewatering valves to SVE-5, -7, & -9. Need to
19		add one to SVE-4 still.
20		· SVE-9 was full of dark brown/black viscous product,
21		~2 gal worth. Once drained & turned back on, it
22		immediately refilled with dirty water. We drained &
23		cycled it twice more, removing ~4 gal water in
24		addition to the product. Then gate up.
25		· SVE-6 & -8 were both full of water & refilled almost

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-20	Location:	
Project/Task No.:		Weather:	
Date:	2/16/23	Personnel:	GF, AB

Observations

	Time	Observation Description
1		immediately after getting pumped dry.
2		· Called C Brown to discuss. He recommended
3		- keep SVE-9 open if it's removing product. Unexpected,
4		but good big-picture
5		- close down wells just producing water + low on PIDs.
6		Did this for SVE-6 & -8. Did not seem to impact
7		overall voc levels. Dilution valve cracked to bring tot voc under 100.
8		- look into the transfer pump. Don't want to burn it out.
9		· Turned the control to OFF @ 17:20 to see if the
10		KOT fills at all. It should, given current trends
11		& the water in the manifold.
12	1800	AB offsite for the night
13	1830	· KOT has risen to 25% full.
14		- Removed float assembly from sightglass, then turned
15		pump back to auto. With the high float down,
16		raising the low float caused the pump to turn on,
17		which shouldn't happen. It wasn't consistent
18		though, so even weirder. Reducing it back in the
19		sightglass caused it to kick on again, as the
20		bottom float was floating. Might need more
21		troubleshooting in the AM to get it figured out.
22	1845	· Cleaned up, locked up.
23	1850	· GF offsite
24		GF
25		2/16/23

Comments / Site Activities / Personnel Tracking

AS & SVE Manifold Readings

Date: 2/16/23 | Time: 1530

Field Tech(s): GE, AB | Equipment I.D. #:

SVE Wells

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Dewater (Gal)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Dewater (Gal)	PID (ppmv)	Comments
HSVE-2	29	76	10	–	14.5	✓	SVE-10	76	20	100	–	8.7	bouncing
HSVE-3	34	72	10	–	9.3	✓	SVE-9	76	0	|	2.25	0.1	water, dirty, stuck?
SVE-4	76	16	100	0.5	10.5	bouncing, dirty	SVE-8	81	0	| →0	0.5	0.1	water
SVE-5	74 18	14 0	|	–	7.4	stuck on arrival, 18" H_2O & 0 flow	SVE-6	79	16	| →∞	0.5	0.4	water
SVE-7	64	22	|	0.25	17.4	bouncing, water	HSVE-1	12	72	10	–	1.5	✓

Notes:
Added dewatering valves to SVE-5, 7 & -9
SVE-4 dewatering water was clear but yellow shiny black flakes & a slight sheen.
SVE-9 dewatering water was black and had odor – appears to be product

AS Wells

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	8.0	2.8	100	✓	AS-1				
AS-13	7.5	4.9	|	✓	AS-2				
AS-14	7.5	7.0	|	opaque plastic	AS-3				
AS-15	7.5	1.9	|	bouncing 1–2.2	AS-4				
AS-16	7.5	3.0	|	✓	AS-5				
Zone 5					AS-6				
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

SVE/AS & Oxidizer System Data Collection Form

Date: 2/16/23	Field Tech(s): GF AB		
Actual Time: 1530	AS/SVE HMI Time: 1530		
SVE/AS System			
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - *VFD*	42/16.9/62.5	AS Blower VFD Setpoints (Hertz/Amps/Torque %) - *VFD*	52/9.2/79.0 HMI
SVE Blower Runtime (Hours)	15942.0	AS Blower Runtime (Hours) - *Sparge Blower*	9514.0 HMI
Transfer Pump Runtime (Hours) - *MS Pump*	4.7	AS Heat Exchanger Runtime (Hours)	9511.1
Sparge Zone 1 Time Span(s) Operational:	0300 - 0800 HMI	Sparge Zone 4 Time Span(s) Operational:	1700 - 2230 HMI
Sparge Zone 2 Time Span(s) Operational:	0730 - 1230	Sparge Zone 5 Time Span(s) Operational:	2200 - 0330
Sparge Zone 3 Time Span(s) Operational:	1200 - 1730	Sparge Zone Active:	3
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.0	SVE Blower Filter Differential Pressure (" H2O) - *DPI-200*	0
AS Blower Discharge Pressure (PSI) - *PI-501*	6.25	SVE Blower Inlet Differential Pressure (" H2O) - *FI-200*	1.5
AS Bleed Valve (# turns open) -	1	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	64	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	9.8
SVE Blower Inlet Temperature (°F) - *TI-200*	50	SVE Blower Discharge Temperature (°F) - *TI-400*	100
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	100	SVE Blower Dilution Valve (# turns open) -	0
Oxidizer System			
Oxidizer Inlet Differential Pressure (" H2O) - *FI-1*	0.20	Combustion Valve Position (%)	9.2
Inlet Temperature (°F)	680	Process Blower Runtime (Hours)	22794
Burner Chamber Temperature (°F)	676	Combustion Fan Runtime (Hours)	22794
Outlet Temperature (°F)	656	Burner Runtime (Hours)	22782
Inlet Limit Controller Temperature (°F)	673	Processing Vapors Runtime (Hours)	22764
Outlet Limit Controller Temperature (°F)	650	Panel Temperature (°F)	68
Process Fan Valve Position (Open/Closed)	OPEN	Flame Signal (Volts)	5.0
Dilution Valve Position (%)	0.0		
SVE Discharge PID (ppmv)	9.4	Oxidizer Discharge PID (ppmv)	0.3
Other Components			
Knockout Tank Level (Sightglass % Full)[1]	0%	Propane Tank A Level (%)	85
Water Depth in Storage Tank[2] (DTF/WD (calc in ft))	6.8 / 0.12	Propane Tank B Level (%)	80
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. Calculate the water depth by measuring DTF from the MP and then subtracting that from 6.92 ft (DTB).

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 2/15/2023 2:16:21PM

Manufacturer	Solinst	**State Certified**	
Model Number	Pump	**Status**	Pass
Serial Number/ Lot Number	na	**Temp °C**	17
Location	Seattle	**Humidity %**	31
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 38726
Description MiniRAE 3000
Calibrated 2/15/2023 2:37:42PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-920494
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 31

Calibration Specifications

Group # 1
Group Name VOC
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	100.0	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 100PPM 304-402235157-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066			11/16/2025

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

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	2/16/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	Seattle
Attendees (Workers)	Bragg, Austin;Friedman, Gus;
Attendees (Visitors)	
Tasks to be performed	Biweekly O&M Rotameter & dewatering repairs
Hazards to be considered today	pressure, motion, mechanical
Will there be Lone Workers?	No
Hierarchy of controls	elimination, engineering, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Preventing Texting Injuries - Ergonomics, habits
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	
Hazards	• Mechanical • Motion • Pressure

DAILY FIELD LOG

Project Information

Page ____ of ____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	46° Cloudy
Date:	3/2/23	Personnel:	Austin Bragg

Observations

	Time	Observation Description
1	0715	arrived on-site; had trouble opening locks
2	~~0730~~	began taking readings on SVE system
3	1534	completed daily tailgate
4	1713	Began taking manifold readings
5	1737	Began de-watering rotometers - Having
6		trouble w/peri pump; also do not have
7		correct tool to open up rotometer caps
8		that don't have a valve - talked to Paul
9		and we decided to skip dewatering of
10		rotometers this time
11	1750	Began taking PID readings
12	1812	Adjusted SVE-4 & SVE-5 to hit ideal
13		vacuum levels; adjusted SVE-8 & 9 to hit
14		ideal vac levels - however float is stuck
15		so I could not read flow
16		SVE-9 100% open — rotometers with
17		SVE-8 10% open — water in them
18		SVE-5 100% open —
19		SVE-4 30% open —
20	~~0820~~	
21	1820	Cleaning up; offsite @ 6:20
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

AS & SVE Manifold Readings

Date: 3/2/23 | Time: 1714

Field Tech(s): AS | Equipment I.D. #:

SVE Wells

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Dewater (Gal)	PID (ppmv)	Comments
HSVE-2	32	74	10	-	12.2	no water
HSVE-3	38	70	10	-	2.1	no water
SVE-4	78	18	100	-	1.4	vac: 69 flow: 12
SVE-5	~~70~~ 76	0	100	-	1.5	vac: 69 flow: 15
SVE-7	71	16	100	-	1.8	no water

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Dewater (Gal)	PID (ppmv)	Comments
SVE-10	~~74~~ 72	22	100	-	1.5	no water
SVE-9	78	0	100	-	0.7	vac: 68 flow: 0 -sto
SVE-8	~~68~~ 66	0	75	-	1.2	vac: 72 flow: ~~0~~ - stuck
SVE-6	70	16	16	-	1.4	no water
HSVE-1	14	70	10	-	3.3	no water

Notes:

AS Wells

Well ID	Pressure (PSIG)	Flow (SCFMG)	Valve Pos. (% Open)	Comments
Zone 2				
AS-7	0.5		100	
AS-8				
AS-9				
AS-10				
AS-11				
Zone 3				
AS-12	6.5	2.5	100	
AS-13	6.0	0.75		
AS-14	5.5	0		
AS-15	6.0	0.75		
AS-16	6.0	1		
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				
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/AS & Oxidizer System Data Collection Form

Date: 3/2/23	Field Tech(s): AB		
Actual Time: 1544	AS/SVE HMI Time: 1544		
SVE/AS System			
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD:	42.0Hz/17.1A/63%	AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD:	52.0Hz/9.2A/79.3%
SVE Blower Runtime (Hours):	16189.6	AS Blower Runtime (Hours) - Sparge Blower:	9761.4
Transfer Pump Runtime (Hours) - AFS Pump:	5.5	AS Heat Exchanger Runtime (Hours):	9758.4
Sparge Zone 1 Time Span(s) Operational:	0300-0800	Sparge Zone 4 Time Span(s) Operational:	1700-2230
Sparge Zone 2 Time Span(s) Operational:	0730-1230	Sparge Zone 5 Time Span(s) Operational:	2200-0330
Sparge Zone 3 Time Span(s) Operational:	1200-1730	Sparge Zone Active:	3
AS Blower Intake Pressure (" H2O) - DPI-500:	1.2	SVE Blower Filter Differential Pressure (" H2O) - DPI-200:	0
AS Blower Discharge Pressure (PSI) - PI-501:	6.5	SVE Blower Inlet Differential Pressure (" H2O) - FI-200:	1.5
AS Bleed Valve (# turns open) -	1	Transfer Pump Discharge Pressure (PSI) - PI-300:	1
AS Heat Exchanger Discharge Temp (°F) - TI-500:	56°	SVE Blower Discharge Pressure (" H_2O) - PI-400:	9.8
SVE Blower Inlet Temperature (°F) - TI-200:	50°	SVE Blower Discharge Temperature (°F) - TI-400:	100
SVE Blower Inlet Vacuum (" H_2O) - VI-200:	100	SVE Blower Dilution Valve (# turns open) -	0
Oxidizer System			
Oxidizer Inlet Differential Pressure (" H2O) - FI-1:	0.15	Combustion Valve Position (%):	13.4%
Inlet Temperature (°F):	674	Process Blower Runtime (Hours):	23043
Burner Chamber Temperature (°F):	640	Combustion Fan Runtime (Hours):	23044
Outlet Temperature (°F):	625	Burner Runtime (Hours):	23032
Inlet Limit Controller Temperature (°F):	662	Processing Vapors Runtime (Hours):	23014
Outlet Limit Controller Temperature (°F):	639	Panel Temperature (°F):	66°
Process Fan Valve Position (Open/Closed):	open	Flame Signal (Volts):	5.0V
Dilution Valve Position (%):	0.0%		
SVE Discharge PID (ppmv):	9.6	Oxidizer Discharge PID (ppmv):	0.9
Other Components			
Knockout Tank Level (Sightglass % Full)[1]:	0%	Propane Tank A Level (%):	50%
Water Depth in Storage Tank[2] (DTF/WD (calc in ft)):		Propane Tank B Level (%):	42%
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. Calculate the water depth by measuring DTF from the MP and then subtracting that from 6.92 ft (DTB).

AECOM

T-30 Field Notes
3/14/2023
Field Staff: GF, CB, John Gibson (POS)

- 0815 - GF on site, meet J Gibson
  - Scope: Construct new SVE emission stack, install jumper wire to take oxidizer offline. Misc O&M tasks.
  - Safety tailgate. JG will be using a power saw and drill for construction. Power disconnected to the oxidizer and blowers but retained at the GFCI for power tools. Panel locked out by GF. Crane operated training underway outside the fenced area.
  - Zone 1 is on on arrival, everything running smoothly. Air leak observed from the top of the AS-2 rotameter. AS-1 rotameter is full of crud.
  - Several other rotameters are stuck in the up position from prior operation. AS 8, 10, 11, 16, 27, 19.
  - Knockout tank is at the low float level, but that is where the transfer pump has been keeping it due to its abnormal operation.
  - Storage tank is 2 ft full. <1 ft est left until the LAH float trips.
  - LAH alarm shows as having tripped on the 8th at 9:50 am. DH vacced it during product recovery on the 9th – fortuitous.
- 0830 - System shut down. All breakers OFF except main power for use of the outlet. Cabinet locked out.
- 0845 – SVE repairs. Sve-4,5,&7 need lower stoppers replaced.
  - Replaced all 3 and cleaned out the rotameters.
  - SVE-4 pipe clamp bolt was seized and needed to be broken to make the repairs. Need to get a replacement.
  - Dewatering ball valve added to SVE-4 deadleg.
- 1000 - CSB onsite. Brief safety tailgate.
- 1015 – Wiring investigations
  - 81+ wire going to the ox was on terminal 103 in the main control cabinet. Jumper needs to go from front 101 to back 103 (though any 81+ terminal would probably work)
  - Confirmed wiring with CSB using volt meter and ohms test. 81+ working has 24v DC coming from the main control cabinet. 101 wire likely completes circuit back from the oxidizer, indicating operation or not.
- 1115 John offsite, stack completed. Looks great.
  - Added dewatering valve to sve-4
  - Installed jumper wire with labels
- 1145 restarted system. Fired right up.
  - Left oxidizer breaker off.
- 1200 - Troubleshooted transfer pump. It was turning on as soon as the bottom float lifted at all, even though the top float was down. Once we took the float assembly out of the sightglass it was not reproducible. Rather it worked reliably as designed. After reinstalling the assembly in the sightglass it operated as desired with the previously observed problems resolved. We didn't change anything, so need to keep an eye on it.

    - SVE-4 seems to be bringing in a lot of water, even with the valve barely open and vacuum down in the 50-60 range.
    - Total vacuum was reading ~96
- 12:45 locked up, offsite

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	3/14/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Brown, Cary;John Gibson;Friedman, Gus;
Attendees (Visitors)	
Tasks to be performed	SVE stack construction
Hazards to be considered today	pressure, noise, motion, electrical
Will there be Lone Workers?	No
Hierarchy of controls	elimination, administrativecontrols, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Eye_Wellness
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	All tasks completed safely and successfully
Hazards	• Motion • Noise • Pressure • Electrical

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	45 cloudy
Date:	3/15/23	Personnel:	GF

Observations

	Time	Observation Description
1	1500	GF onsite
2		•Scope: Biweekly O&M; IA vapor sampling
3		Safety Tailgate
4		•System ON on arrival. Zone 3 active.
5		Start taking down system readings
6		→ Eff PID @ 2.6 ppmv
7	1600	• Combined SVE vac >100" WC, the gauge's limit. Cracked
8		the dilution valve to bring it under 100.
9		• SVE rotameters appear to have much less water in
10		them than previously observed.
11		• The transfer pump is not kicking itself on at the
12		wrong times anymore
13		• Storage tank is nearly to the LAHH float. ~0.33 ft left
14		to spare. A little less than 2 ft to go until the LAHH.
15		Current water depth was 2.92 ft, so ~ 3/5 full from the
16		LAHH.
17	1615	• Collected SVE effluent vapor sample SVE-Eff-031523
18		• Recorded SVE header PIDs. #SVE-2 once again the
19		winner @ 172 ppmv (next highest was 2.3 ppmv).
20		• Tried to adjust header vacuums below water extraction
21		thresholds.
22		- SVE-7 thru -10 were above the ~70" WC target. For
23		some reason, turning them off + on again dropped them
24		all below that mark even though they end up back at
25		the % open they started at. Odd.

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	45 cloudy
Date:	3/15/23	Personnel:	GF

Observations

	Time	Observation Description
1		• Dewatering valve assembly added to SVE-10. Now all vertical
2		wells have them. No apparent need on the horizontal wells.
3		• Tubing added to the existing dewatering drain valves at the
4		base of the deadlegs. This setup is easier to dewater from
5		as the hose was hard to snake down the ball valve to
6		the base of the deadleg. The ball valves are still useful
7		needed to clear water out of the rotameters themselves.
8		• SVE-7 was the main source of water today. It kept refilling
9		until I dropped the vac down to ~62" wc, at which
10		point it stayed dry
11		• SVE-10 had dirty/emulsified water in the deadleg &
12		rotameter. It continued to be in the rotameter even after
13		dewatering & dropping the vac down to 60" wc.
14		• SVE-8 kept OFF, but deadleg dewatered.
15		• ~8 gal total extracted from deadlegs
16	1015	• Spoke w/ P Kalina & agreed to change the effluent SVE
17		discharge samples from the previous nomenclature
18		"Inlet-mmddyy" (inlet to oxidizer) to new nomenclature
19		"SVE-Eff-mmddyy".
20		• Cleaned up & locked up.
21	1840	• GF offsite
22		
23		
24		GF 3/15/23
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30

AS & SVE Manifold Readings

Date: 3/15/23 | Time: 1536

Field Tech(s): GF | Equipment I.D. #:

SVE Wells

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Dewater (Gal)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Dewater (Gal)	PID (ppmv)	Comments
HSVE-2	~~29.0~~ ~~34.5~~	74	10	1/8	~~17.2~~ ~~1.5~~	✓	SVE-10	73	18, 7-30 range	100	1/4	2.3	bouncing. dirty water ~~water~~ extracted
HSVE-3	34.0	69	10	1/8	2.3	✓	SVE-9	80	0	100	1/4	0.4	dirty
SVE-4	56.0	9	~~10~~ 5	1/4	1.6	✓	SVE-8	–	–	0	~~1~~ 1/2	–	off to minimize water production
SVE-5	73.0	13	~~100~~	1/4	1.5	✓	SVE-6	74	14	5	1/4	0.7	✓
SVE-7	74.0	16	100	~~1.0~~ 5.0	1.7	bouncing, ~~dry~~ some water	HSVE-1	12	70	16	~~1~~ 1/2	1.5	✓

Notes:

SVE-7 kept refilling w/ water until vac was dropped to ~62 "wc.
SVE-10 rotameter was fully w/ emulsified water even after deadleg emptied & vac dropped to 60 "wc. All deadlegs pumped dry.

AS Wells

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	7.0	2.4	100	✓	AS-1				
AS-13	7.25	4.5	|	✓	AS-2				
AS-14	7.0	3.0	|	✓	AS-3				
AS-15	7.0	1.2	|	✓	AS-4				
AS-16	7.5	3.1	|	✓	AS-5				
Zone 5					AS-6				
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

SVE/AS & Oxidizer System Data Collection Form

Date: 3/15/23	Field Tech(s): GT		
Actual Time: 1536	AS/SVE HMI Time: 1535		
SVE/AS System			
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - *VFD*	42.0/20.1/73.5	AS Blower VFD Setpoints (Hertz/Amps/Torque %) - *VFD*	52.0/9.1/77.8
SVE Blower Runtime (Hours)	16495.7	AS Blower Runtime (Hours) - *Sparge Blower*	10067.5
Transfer Pump Runtime (Hours) - *MS Pump*	6.6	AS Heat Exchanger Runtime (Hours)	10064.4
Sparge Zone 1 Time Span(s) Operational:	0300-0800	Sparge Zone 4 Time Span(s) Operational:	1700-2230
Sparge Zone 2 Time Span(s) Operational:	0730-1230	Sparge Zone 5 Time Span(s) Operational:	2200-0330
Sparge Zone 3 Time Span(s) Operational:	1200-1530	Sparge Zone Active:	3
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.25	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.25
AS Blower Discharge Pressure (PSI) - *PI-501*	6.0	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.5
AS Bleed Valve (# turns open) -	1.0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	~~100~~ 0
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	70	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	2.4
SVE Blower Inlet Temperature (°F) - *TI-200*	52	SVE Blower Discharge Temperature (°F) - *TI-400*	110
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	98	SVE Blower Dilution Valve (# turns open) -	barely cracked to keep vac ~100 (gauge limit)
Oxidizer System			
Oxidizer Inlet Differential Pressure (" H2O) - *FI-1*		Combustion Valve Position (%)	
Inlet Temperature (°F)		Process Blower Runtime (Hours)	
Burner Chamber Temperature (°F)		Combustion Fan Runtime (Hours)	
Outlet Temperature (°F)		Burner Runtime (Hours)	
Inlet Limit Controller Temperature (°F)		Processing Vapors Runtime (Hours)	
Outlet Limit Controller Temperature (°F)		Panel Temperature (°F)	
Process Fan Valve Position (Open/Closed)		Flame Signal (Volts)	
Dilution Valve Position (%)			
SVE Discharge PID (ppmv)	12.6	Oxidizer Discharge PID (ppmv)	
Other Components			
Knockout Tank Level (Sightglass % Full)[1]	30 (50 on departure)	Propane Tank A Level (%)	65
Water Depth in Storage Tank[2] (DTF/WD (calc in ft))	4.0 / 2.92	Propane Tank B Level (%)	60
NOTES:			

Oxidizer offline

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. Calculate the water depth by measuring DTF from the MP and then subtracting that from 6.92 ft (DTB).

Water Depth to LAH: 3.26
" LAHH: 4.76
} to bottom of float. Not sure how much it has to float to trigger.

AECOM

AECOM

T-30 Summa Can Vapor Sampling Field Form

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

Date: 3/15/23 Field Personnel: GF

Weather: 45 cloudy Weather Barometric Pressure (in Hg): 30

Sample ID: SVE-EFF-031523 (INLET/DISCHARGE-mmddyy)

Sample Port Description: SVE discharge pipe

Conditions at Sample Port:

Pressure (~~PSI~~)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
2.4" WC	110	12.6	16496.7

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	15:59-16:07	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]
0990	242	1L	30	Sample Start: 1615	3/15/23	5.0
Analyses Requested: TO15-BTEX; APH				Sample End: 1620	3/15/23	

[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:

✓ New sample nomenclature since the oxidizer is now offline. No longer "Inlet", now "SVE-EFF".

SAMPLE CHAIN OF CUSTODY

Report To Gus Friedman & Paul Kerlin
Company AECOM
Address 1111 3rd Ave #1600
City, State, ZIP Seattle, WA 98101
Phone 2065344784 Email gus.friedman@aecom.com
paul.kerlin@aecom.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: T-30

PO #

NOTES:

INVOICE TO: Paul Kerlin

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	8015 BTEX	Notes
SVE-EFF-031523		9990	242	IA / (SG)	3/15/23	30	1615	5	1620				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:	Gus Friedman	AECOM	3/16/23	1610
Received by: Wesley Ebel	Wesley Ebel	FBI	3/16/23	1610
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 46330
Description Solinst Pump
Calibrated 3/14/2023 12:11:14PM

Manufacturer	Solinst	**State Certified**	
Model Number	Pump	**Status**	Pass
Serial Number/ Lot Number	na	**Temp °C**	16
Location	Seattle	**Humidity %**	40
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 R11309
Description MiniRae 3000
Calibrated 3/14/2023 1:04:37PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-000171
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
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	100.10	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 304-402235157-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066			11/16/2025

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

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	3/15/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Gus Friedman;
Attendees (Visitors)	
Tasks to be performed	Biweekly O&M 1Q vapor sampling
Hazards to be considered today	pressure, noise, motion, mechanical
Will there be Lone Workers?	Yes
Hierarchy of controls	ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Eye_Wellness
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	All tasks completed safely and successfully
Hazards	• Mechanical • Motion • Noise • Pressure

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	3/30/23	Personnel:	GF, AB, LC

Observations

	Time	Observation Description
1	1100	· GF, LC, AB on site
2		· Scope: 1Q O+M
3		· Safety tailgate. Traffic, trips, noise
4		· Start taking down system readings. Zone 2 active. Storage
5		tank level is just at the bottom of the low float.
6	1145	· GF forgot the vapor pump at the office. Offsite to get
7		it while AB + LC continue on site
8		→ Zone 2 runtime extended + Zone 3 delayed to give extra
9		time to get down readings
10	1215	· GF onsite again. AB & LC working on dewatering the SVE
11		lines
12		→ Not much water present in the rotameters, consistent
13		w/ deminished water production the last two visits
14		→ SVE-16 showing emulsified water in the rotameter.
15		· Checked mag gauges @ SVE. Both needed slight adjustments
16		to zero. Both passed QC w/ digital manometer
17		· Checked AS pressure gauges.
18		- AS-25 read ½ PSI low
19		- AS-21 & 22 read ½ PSI low
20		- AS-1 read ½ PSI high; AS-6 read ½ PSI low
21		· Checked AS rotameters
22		- AS-2 had an air leak due to bad O-ring. Replaced
23		the O-ring + resolved the leak. ~~Ended up~~ replacing whole
24		- AS-1 had lots of debris in it. Rotem. rotameter
25		was hard to read + we replaced the whole thing.

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	3/30/23	Personnel:	GF, AS, LC

Observations

	Time	Observation Description					
1	1515	System turned OFF + locked out for Megger readings.					
2		~~AS Compressor~~					
3		Winding Resistance (Ohms)			Insulation Resistance (Mega Ohms)		
4		~~B+O~~	O+Y	B+Y	G+B	G+O	G+Y
5	AS	1.68	~~1.66~~ 1.66	1.66	0.14	0.15	0.16
6	SVE	0.92	0.92	0.92	0.12	0.14	0.15
7							
8	1545	• Tested float switches in poly tank + KOT. All work.					
9	~~1600~~	• Scrubbed out KOT sightglass					
10	1000	• System turned back on					
11		• KOT manually pumped down from ~30% to 0					
12		• w/in 10 min, KOT was back to 30%. SVE-4, 7, 9, & 10					
13		all showing water in rotameters					
14		- SVE-9 was already barely open. Adjusted to 0% open.					
15		→ production slowed but still visible. KOT @ 50%					
16		• Dewatering initiated.					
17		- ½ gal dirty grey water from SVE-10					
18		- 1 gal water from SVE-7					
19		- 2.5 gal from SVE-9. It would pump dry, then as soon					
20		as vac ~~reached~~ re-established + we cleared the rotameter					
21		w/the ¼-in ball valve, it would refill with water. Reproduced					
22		several times					
23		→ Ultimately resolved by lifting the hose several (2?) extra					
24		feet up btw wellfield + manifold. End setpoints were					
25		77" WC and hovering 0-7 scfm. Low flow maybe					

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-36	Location:	Seattle
Project/Task No.:		Weather:	
Date:	3/30/23	Personnel:	GF, AB, LC

Observations

	Time	Observation Description
1		because wellfield lateral is full of water?
2	1648	VOT @ ~55%, so water production has logically
3		stopped. Seems like it had something to do with the
4		system downtime? If wasn't producing anything
5		like this prior.
6	1705	GF, LC, AB offsite
7		
8		
9		
10		
11		
12		
13		
14		GF
15		3/30/23
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

SVE/AS & Oxidizer System Data Collection Form

Date: 3/30/23	Field Tech(s): AB, LC, GF		
Actual Time: 11:34	AS/SVE HMI Time: 11:33		
SVE/AS System			
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - *VFD*	42.0/17.5/64.3%	AS Blower VFD Setpoints (Hertz/Amps/Torque %) - *VFD*	52.0/9.3/80.2%
SVE Blower Runtime (Hours)	16850.3	AS Blower Runtime (Hours) - *Sparge Blower*	10422.1
Transfer Pump Runtime (Hours) - *MS Pump*	6.7	AS Heat Exchanger Runtime (Hours)	10418.8
Sparge Zone 1 Time Span(s) Operational:	0300 - 0800	Sparge Zone 4 Time Span(s) Operational:	1700 - 2230
Sparge Zone 2 Time Span(s) Operational:	0730 - 1230	Sparge Zone 5 Time Span(s) Operational:	2200 - 0300
Sparge Zone 3 Time Span(s) Operational:	1200 - 1730	Sparge Zone Active:	2
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0
AS Blower Discharge Pressure (PSI) - *PI-501*	7	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.5
AS Bleed Valve (# turns open) -	1	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	62°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	2.6
SVE Blower Inlet Temperature (°F) - *TI-200*	58°	SVE Blower Discharge Temperature (°F) - *TI-400*	111°
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	96	SVE Blower Dilution Valve (# turns open) -	0
Oxidizer System			
Oxidizer Inlet Differential Pressure (" H2O) - *FI-1*	N/A	Combustion Valve Position (%)	N/A
Inlet Temperature (°F)		Process Blower Runtime (Hours)	
Burner Chamber Temperature (°F)		Combustion Fan Runtime (Hours)	
Outlet Temperature (°F)		Burner Runtime (Hours)	
Inlet Limit Controller Temperature (°F)		Processing Vapors Runtime (Hours)	
Outlet Limit Controller Temperature (°F)		Panel Temperature (°F)	
Process Fan Valve Position (Open/Closed)		Flame Signal (Volts)	
Dilution Valve Position (%)			
SVE Discharge PID (ppmv)	7.3	Oxidizer Discharge PID (ppmv)	
Other Components			
Knockout Tank Level (Sightglass % Full)[1]	30%	Propane Tank A Level (%)	65
Water Depth in Storage Tank[2] (DTF/WD (calc in ft))	3.5 / 3.42	Propane Tank B Level (%)	56
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. Calculate the water depth by measuring DTF from the MP and then subtracting that from 6.92 ft (DTB).

AECOM

3.42

PORT OF SEATTLE - TERMINAL 30

AS & SVE Manifold Readings

Date: | Time:

Field Tech(s): | Equipment I.D. #:

SVE Wells

Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Dewater (Gal)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	Dewater (Gal)	PID (ppmv)	Comments
HSVE-2	19	75	10	0.25	6.4	Particulates in water	SVE-10	61	15	20	0.5	0.3	water had odor and brownish color
HSVE-3	36	79	10	0	0.1	✓	SVE-9	74	8	50	0.25	0.3	✓
SVE-4	62	10	20	0.5	0	Particulates in water	SVE-8	-	-	0	0	-	✓
SVE-5	67	10	100	0.125	0	✓	SVE-6	56	14	10	0.5	0.7	✓
SVE-7	64	12	30	1.5	0	✓	HSVE-1	14	74	10	0.5	1.0	✓

Notes:

AS Wells

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	7.5	5	100	✓	AS-17				
AS-8	7	1.8	100	✓	AS-18				
AS-9	7.5	1	100	✓	AS-19				
AS-10	7.5	0	100	not stuck, true 0	AS-20				
AS-11	7.5	3.8	100	✓	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				
Zone 5					AS-6				
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

T-30 Quarterly O&M Checklist

REGULAR TASKS

System ON:

- [✓] Test poly tank floats switches
- [✓] Test KO tank float switches
- [✓] Confirm mag gauges w/ a manometer gauges good
- [✓] 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:

- [✓] Zero out mag gauges minor adjustments made
- [X] Check SVE vac gauges for zeroing
- [✓] Scrub out KOT sightglass
- [✓] Megger test SVE & AS motors
- [ ] ~~Confirm mag gauges w/ a manometer~~
- [✓] 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
- [✓] Exercise all valves (open valves normally closed and then return to original position)

EXTRA TASKS

- [X] Pilot test a new SVE air hose -- need a hot water kettle?
- [ ] ~~Replace SVE inlet mag gauge with better range (0-2? 0-5?)~~ done already
- [X] Troubleshoot SVE-8?

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 3/27/2023 8:30:13PM

Manufacturer	Solinst	**State Certified**	
Model Number	Pump	**Status**	Pass
Serial Number/ Lot Number	na	**Temp °C**	19
Location	Seattle	**Humidity %**	29
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 JUSTIN THOMPSON

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 R

P

Pine Environmental Services, Inc.

Instrument ID	13814
Description	MiniRae 3000
Calibrated	3/28/2023 7:59:51PM
Manufacturer	Rae Systems
Model Number	PGM-7320
Serial Number/ Lot Number	592-901083
Location	Seattle
Department	

State

Hu

Calibration Specifications

Group #	1
Group Name	Isobutylene
Stated Accy	Pct of Reading

Range
Reading
Plus

Nom In Val / In Val	In Type	Out Val	Out Type	End A
100.0 / 100.0	PPM	100.0	PPM	100.8

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Ser Lo
SEA ISO 100PPM 304-402321612-1	Isobutylene (C4H8) 100 PPM	Airgas	31721	30 -1

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated JUSTIN THOMPSON

All instruments are calibrated by Pine Environmental Services LLC specifications, but it is the customer's responsibility to calibrate and mai manufacturer's specifications and/or the customer's o

Notify Pine Environmental Services LLC of any defect within 2
Please call 800-301-9663 for Technical As

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	3/30/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Bragg, Austin;Celovsky, Lillian;Friedman, Gus;
Attendees (Visitors)	
Tasks to be performed	1Q O&M
Hazards to be considered today	pressure, noise, motion, mechanical
Will there be Lone Workers?	No
Hierarchy of controls	elimination, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Spring_Pause_2023
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	All tasks completed safely and successfully!
Hazards	• Mechanical • Motion • Noise • Pressure

DAILY FIELD LOG

Project Information Page 1 of 2

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	4/11/23	Personnel:	GF

Observations

	Time	Observation Description
1	1645	GF onsite
2		• Scope: ~~Gate~~ Biweekly O+M
3		• Safety tailgate: slips trips; pressurized system
4		• System ON on arrival. Zones 3 & 4 active, transitioning
5		to zone 4. Zone 3 extended & Zone 4 delayed for
6		O+M.
7		- SVE vac is v high, well above the 100 "wc max of
8		the gauge. Dilution valve was left closed last visit.
9		• Combined PID measured at 14.4 ppmv
10		→ majority from HSVE-2 again. Highest flow & concentration
11		(84 scfm + 15.9 ppmv)
12		• Transfer pump was doing the weird pulsing thing again
13		whenever the low float triggered. Took out the float
14		assembly & tested it & it behaved as designed. Re-installed
15		it & it seemed to have resolved.
16		• Storage tank 1.67 ft full - DH must have come by to
17		vac it out. 557 gal left to the LAH float.
18	1730	• SVE dewatered. 1/2 gal or less from each well, but the
19		SVE-9 water was a murky tan color due to product.
20		→ prior to dewatering adjusted vac levels to desired:

	Vac	Flow	Valve Pos.	Comments
HSVE-2	10	82	10	✓ ref. clear
HSVE-3	34	70	25	"
SVE-4	64	6	10	"
SVE-5	69	6	100	"

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information Page 2 of 2

Project Name:	T-30	Location:	
Project/Task No.:		Weather:	
Date:	4/11/23	Personnel:	GF

Observations

	Time	Observation Description				
1		~~Vapor~~ Vac	Vac	Flow	Valve Pos	Comments
2		SVE-7	20	10	10	well filled w/ another ½ gal water while optimizing, prior to final settings.
3		SVE-10	53	9	10	✓ rot. clear. rot. clear.
4		SVE-9	76	6	10	float just bounce. valve barely open. worried about high vac.
5		SVE-8	–	–	0	–
6		SVE-6	64	11	~~08~~ 5	✓ rot clear. valve barely open due to high vac.
7		HSVE-1	14	76	25	✓ rot clear
8		Dilution valve (turns open): 1 turn				
9		Total vac (in wc): 86				
10		• AS blower valve is 2.25" ID steel, female threads				
11	1915	• Swapped new rotameters in for AS-13 & -15.				
12	**	⇒ only 2 spare rotameters left. order a few more				
13		• SVE manifold has held steady. Still no water in				
14		the rotameters. Total vac @ 86" wc. Vol ~10% full.				
15	**	• Should adjust zone runs so that Zone 5 is during the				
16		day for monitoring. Theory being it has the most product				
17		left in the dissolved phase to be sparged.				
18	1945	• Cleared up				
19		• System shut down in advance of GWM				
20		⇒ control cabinet locked out so no one can restart it.				
21		Power still on.				
22	2000	• locked up, offsite				
23						
24				GF		
25				4/11/23		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 4/11/23	Field Tech(s): CF		Actual Time: 1718
PID ID:	Weather: 52, Sun		HMI Time: 1715
SVE/AS Control Panel			
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - *VFD*	42.0/20.9/76.9% HMI	Sparge Zone 1 Time Span(s) Operational:	0300 - 0800 HMI
SVE Blower Runtime (Hours)	52.0/48.8/74.2% HMI	Sparge Zone 2 Time Span(s) Operational:	0730 - 1230 HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.4 HMI	Sparge Zone 3 Time Span(s) Operational:	1200 - 1730 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - *VFD*	17/41.8 HMI	Sparge Zone 4 Time Span(s) Operational:	1700 - 2230 HMI
AS Blower Runtime (Hours) - *Sparge Blower*	10713.7 HMI	Sparge Zone 5 Time Span(s) Operational:	2200 - 0330 HMI
AS Heat Exchanger Runtime (Hours)	10710.4 HMI	Sparge Zone Active:	3 - runtime extended d 24 delayed for O&M
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	70.0	SVE Blower Dilution Valve (# turns open)	0
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.4
AS Blower Discharge Pressure (PSI) - *PI-501*	6.25	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	~~1200~~ 55	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	2.1
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	>100	SVE Blower Discharge Temperature (°F) - *TI-400*	122
Knockout Tank Level (Sightglass % Full)[1]	0		
SVE Discharge PID (ppmv)	14.4	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)	-	Water Depth in Storage Tank[4] (ft)	1.67
Water Volume in Storage Tank[5] (gal)	445.3	Gal to LtH	557.3

NOTES:
SVE VFD had fault code A2010 active. System still running

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. Calculate WD by measuring DTF from the tank rim and subtract from 6.92 ft (DTB). WD at the low float trigger = 3.76 ft. WD at the high float trigger = 4.26 ft.
5. WD*266.67 gal/ft = gal in storage tank (2000 gal; 7.25' dia x 7.5' H)

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Manifold Readings

Date:	4/11/23	Time:	1742
Field Tech(s):	GF	PID ID:	15961
Weather:	52 Sun	Pump ID:	

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	29	84	25	✓	SVE-10	52	8	10	✓
HSVE-3	41	77	25	✓	SVE-9	91	6	100	brown oily residue covering rotameter
SVE-4	80	9	10	✓	SVE-8	–	–	0	well closed to limit water production
SVE-5	85	10	100	lots of water, float bouncing	SVE-6	70	12	10	✓ ~~float stuck, needs new~~ disregard
SVE-7	70	14	10	minor water	HSVE-1	14	72	25	✓

Notes:

PID and Dewatering

Well ID	PID (ppmv)	Dewater (Gal)	Final valve pos	Comments	Well ID	PID (ppmv)	Dewater (Gal)	Final valve pos	Comments
HSVE-2	15.9	3/8	see field log	clear H_2O	SVE-10	0.5	1/2	See field log	groging H_2O w/ black sediments / chunks
HSVE-3	1.0	3/8	~~water~~ log	clear H_2O	SVE-9	0.5	1/2		murky tan water. only 1/2 gal bot rotameter was full
SVE-4	0.4	3/8		clear H_2O	SVE-8	MA OK	–		well off
SVE-5	0.4	1/4		clear H_2O	SVE-6	0.8	1/2		clear H_2O
SVE-7	0.5	1/2		clear H_2O	HSVE-1	1.6	1/2	clear H_2O	

Notes: Dilution valve

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	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	7.25	2.5	100	✓	AS-1				
AS-13	7.0	?		float stuck; rotam replaced	AS-2				
AS-14	6.75	3.4		float bouncing	AS-3				
AS-15	7.0	2.0		sticky float; rotam replaced	AS-4				
AS-16	7.0	3.9		✓	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

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 4/10/2023 6:09:57PM

Manufacturer	Solinst	**State Certified**	
Model Number	Pump	**Status**	Pass
Serial Number/ Lot Number	na	**Temp °C**	20
Location	Seattle	**Humidity %**	39
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

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	4/11/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Gus Friedman;
Attendees (Visitors)	
Tasks to be performed	Biweekly O&M
Hazards to be considered today	pressure, noise, motion
Will there be Lone Workers?	Yes
Hierarchy of controls	ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Prevent_Distracted_Driving
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	
Hazards	• Motion • Noise • Pressure

DAILY FIELD LOG

Project Information

Page 1 of 1

Project Name	T-30	Location	Port of Seattle
Project/Task No.		Weather	55° sunny
Date	4/27/23	Personnel	AB

Observations

	Time	Observation Description
1	1245	on-site, system on - began taking readings
2		Scope: biweekly O&M
3		zone 5 is active
4	1342	SVE discharge PID = 6.0 ppmv
5	1402	Initial vac & flow reading taken from
6		AS zone & SVE manifold - taking pre-
7		dewatering PID readings
8	1423	Began dewatering
9	1508	dewatering complete - began taking manifold
10		readings
11	1540	finishing up and closing down
12	1545	off-site
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: 4/27/23	Field Tech(s): AB		Actual Time: 1309
PID ID: 048423	Weather: 55° sunny		HMI Time: 1309
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	17464.5 HMI	Sparge Zone 1 Time Span(s) Operational:	1700 - 2230 HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.4 HMI	Sparge Zone 2 Time Span(s) Operational:	2200 - 0330 HMI
AS Blower Runtime (Hours) - *Sparge Blower*	11036.2 HMI	Sparge Zone 3 Time Span(s) Operational:	0300 - 0800 HMI
AS Heat Exchanger Runtime (Hours)	11032.8 HMI	Sparge Zone 4 Time Span(s) Operational:	0730 - 1230 HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0 Hz / 15.4A / 562	Sparge Zone 5 Time Span(s) Operational:	1200 - 1730 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0 Hz / 9.9A / 867 HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	85°F	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.5	SVE Blower Filter Differential Pressure (" H2O) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1	SVE Blower Inlet Differential Pressure (" H2O) - *FI-200*	0.8
AS Blower Discharge Pressure (PSI) - *PI-501*	6.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	6
SVE Blower Inlet Temperature (°F) - *TI-200*	70°F	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	76	SVE Blower Discharge Temperature (°F) - *TI-400*	112°F
Knockout Tank Level (Sightglass % Full)[1]	50		
SVE Discharge PID (ppmv)	6.0	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)	1.75
Water Volume in Storage Tank[5] (gal)	466.725	Spare Volume to LAH float[6] (gal)	536.075
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: 4/27	Time: 1402
Field Tech(s): AB	PID ID: 048423
Weather: 55° 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	79	25	15.0		SVE-10	47	13	10	1.0	
HSVE-3	24	54	25	1.9		SVE-9	57	2*	100	1.1	*Float stuck - appears to be due to product inside rota
SVE-4	42	10	10	3.4		SVE-8	0	0	0	5.3	closed
SVE-5	0	0	0	4.7	closed	SVE-6	48	11	10	0.7	
SVE-7	20	11	10	0.6		HSVE-1	10	54	25	0.9	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	76

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:	4/27	Time:	1423
Field Tech(s):	~~AB~~	Pump ID:	410
Weather:	55° Sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/4	clear H_2O	SVE-10	1/2	Brown muddy water
HSVE-3	1/3	clear H_2O	SVE-9	1/2	brown muddy water, could only be pumped out when red valve on back was open
SVE-4	1/2	mostly clear H_2O w/ some black particulates	SVE-8	2	half clear, ~~left~~ half brown and cloudy H_2O - opened to dewater used
SVE-5	1	opened to dewater - initially clear, then brown H_2O	SVE-6	2/3	clear H_2O
SVE-7	1/2	Clear H_2O	HSVE-1	1/3	clear H_2O

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date: 4/27/23	Time: 1510
Field Tech(s): AB	Weather: Sunny 56°

****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	19	79	25		SVE-10	46	11	16	
HSVE-3	23	54	25		SVE-9	60	*0	100	*stuck
SVE-4	44	6	10		SVE-8	0	0	0	closed
SVE-5	0	0	0	closed	SVE-6	53	12	10	
SVE-7	28	11.5	20		HSVE-1	9	54	25	

Dilution Valve		
	# Turns Open:	1.25
	Vacuum ("H2O):	80

Notes:

Abbreviations:
% = Percent
" H_2O = Inches of water
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	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	7.5	1.2	100						
AS-24	7.25	1.8		* Float bouncing					
AS-25	6.75	?		Float ~~not~~ Stuck bobbing					
AS-26	7.75	?		1					
AS-27	8.0	1.6							

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

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 4/26/2023 6:33:16PM

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

State Certified
Status Pass
Temp °C 20
Humidity % 38

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 48423
Description MiniRAE 3000
Calibrated 4/26/2023 6:48:40PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-921123
Location Seattle
Department

State Certified
Status Pass
Temp °C 20
Humidity % 38

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	100.2	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 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 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

Project Name	T-30	Location	Port of Seattle
Project/Task No	60681370	Weather	Sunny 60°
Date	5/9/23	Personnel	AB

Observations

	Time	Observation Description
1	1415	on-site, system running
2		scope: biweekly O&M), safety tailgate
3	1425	Began taking readings of SVE system
4		Sparge zone B active
5	1456	Taking SVE discharge PID: 3.2 ppmv
6	1509	Taking manifold readings
7	1526	SVE-5 & SVE-8 closed - taking zone readings
8	1540	Taking SVE pre-dewatering PID readings
9	1605	Dewatering
10	1631	Wells dewatered besides SVE-5 & SVE-8 (closed)
11		Taking post dewatering readings
12	1645	Called Gus to discuss readings
13		I cracked open SVE-4 from 10% to 20%
14		& vac went from 34 → 48 and there's now
15		water in rotometer
16	1736	Adjusted wells for water production & flow
17		Wrapped up and heading out
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 5/9/23	Field Tech(s): AB		Actual Time: 14:32
PID ID: 040423	Weather: 60° Sunny		HMI Time: 14:30
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	17752.3 HMI	Sparge Zone 1 Time Span(s) Operational:	1700-2230 HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.4 HMI	Sparge Zone 2 Time Span(s) Operational:	2200-0330 HMI
AS Blower Runtime (Hours) - *Sparge Blower*	11324.0 HMI	Sparge Zone 3 Time Span(s) Operational:	0300-0800 HMI
AS Heat Exchanger Runtime (Hours)	11320.5 HMI	Sparge Zone 4 Time Span(s) Operational:	0730-1230 HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0 Hz/16.3A/60% HMI	Sparge Zone 5 Time Span(s) Operational:	1200-1730 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0 Hz/9.8A/84.9% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	80°	SVE Blower Dilution Valve (# turns open)	0
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.5	SVE Blower Filter Differential Pressure (" H2O) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1	SVE Blower Inlet Differential Pressure (" H2O) - *FI-200*	0.85
AS Blower Discharge Pressure (PSI) - *PI-501*	7.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	70°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	2.8
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	82	SVE Blower Discharge Temperature (°F) - *TI-400*	112°
Knockout Tank Level (Sightglass % Full)[1]	80%		
SVE Discharge PID (ppmv)	3.2	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)	1.75
Water Volume in Storage Tank[5] (gal)	466.73	Spare Volume to LAH float[6] (gal)	536.07
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

*each tick on pole is 6 in.

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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	8.0	1.2	100						
AS-24	7.5	2.5		Float bouncing					
AS-25	7.0	1.5							
AS-26	8.25	?		Float stuck					
AS-27	8.0	1.8							

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: 5/9/23	Time: 1512
Field Tech(s): AB	PID ID: 048423
Weather: 61° 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	23	88	50	10.9		SVE-10	53	13	25	2.6	
HSVE-3	27	56	50	2.9		SVE-9	63	6	100	2.1	
SVE-4	~~0~~ 34	Ø	10	1.7	~~closed~~ Float stuck	SVE-8	Ø	Ø	Ø	4.9	closed
SVE-5	Ø	Ø	Ø	10.5	*closed PID fluctuating between 10.1-10.9	SVE-6	59	12	10	2.3	
SVE-7	48	12	10	4.1		HSVE-1	10	57	50	1.7	

Dilution Valve	# Turns Open:	0
	Vacuum ("H2O):	82

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

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

Date: 5/9/23	Time: 1405
Field Tech(s): AB	Pump ID: 46330
Weather: 61° Sunny	

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	~~Ø~~	No water coming out	SVE-10	1/4	Brownish water
HSVE-3	1/4	clear H_2O	SVE-9	1/2	Had to open red valve to pull water - water is brown
SVE-4	1/2	Particulates came out at first then clear H_2O	SVE-8	—	*closed
SVE-5	—	*closed	SVE-6	1/2	clear H_2O
SVE-7	1/2	clear H_2O	HSVE-1	1/4	clear H_2O

Notes:

Abbreviations: Gal = gallons

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

Date: 5/9/23	Time: ~~AM~~ 1637
Field Tech(s): AB	Weather: 60° 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	24	74	50		SVE-10	46	14	10	Float bobbing
HSVE-3	32	64	60		SVE-9	56	~~60~~ 6	100	Float stuck
SVE-4	54	17	25	Float bobbing	SVE-8	Ø	Ø	0	closed
SVE-5	26	6	10		SVE-6	62	14	25	
SVE-7	35 ~~600~~	14	20	Opened more and too much water back came in - brought back down	HSVE-1	~~5~~ 10	55	30	
Dilution Valve	# Turns Open:	0							
	Vacuum ("H2O):	82							

Notes:

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

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DAILY FIELD LOG

Project Information Page _____ of _____

Project Name:	T30	Location:	Port of Seattle
Project/Task No.:		Weather:	66° sunny
Date:	5/24/23	Personnel:	AB

Observations

	Time	Observation Description
1	1335	on-site, system on, gate unlocked upon
2		arrival!?
3		Safety tailgate
4		Scope: biweekly O&M
5	1355	Taking readings of HMI
6	1405	Taking system readings
7	1430	Taking PID reading for SVE discharge
8		↳ 4.5 ppmv
9	1438	Began taking manifold readings
10	1457	Taking zone readings
11	1502	Begin taking manifold PID readings
12	1520	Start dewatering
13	1617	Finished dewatering - start adjusting
14		vac & flow
15		Adjusted SVE-9 from 100% → 75% and water
16		production stopped for a minute, then started again
17		Water production limited @ 10% open
18		Tried opening SVE-8, but water appeared @ 10%.
19		Kept it closed
20		Tried opening SVE-6 and water appeared @ 25%.
21		Minimal water @ 10%.
22		Tried opening SVE-7, no water until 30%.
23		Adjusting accordingly
24	1650	Closing down & heading to office to
25		drop off pine equipment - leaving site @ 1700

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information Page _____ of _____

Project Name:	T30	Location:	Port of Seattle
Project/Task No.:		Weather:	66° sunny
Date:	5/24/23	Personnel:	AB

Observations

	Time	Observation Description
1	1335	on-site, system on, gate unlocked upon
2		arrival!?
3		Safety tailgate
4		Scope: biweekly O&M
5	1355	Taking readings of HMI
6	1405	Taking system readings
7	1430	Taking PID reading for SVE discharge
8		↳ 4.5 ppmv
9	1438	Began taking manifold readings
10	1457	Taking zone readings
11	1502	Begin taking manifold PID readings
12	1520	Start dewatering
13	1617	Finished dewatering - start adjusting
14		vac & flow
15		Adjusted SVE-9 from 100% → 75% and water
16		production stopped for a minute, then started again
17		Water production limited @ 10% open
18		Tried opening SVE-8, but water appeared @ 10%.
19		Kept it closed
20		Tried opening SVE-6 and water appeared @ 25%.
21		Minimal water @ 10%.
22		Tried opening SVE-7, no water until 30%.
23		Adjusting accordingly
24	1650	Closing down & heading to office to
25		drop off pine equipment - leaving site @ 1700

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 5/24/23	Field Tech(s): AB		Actual Time: 1355
PID ID: 648423	Weather: 66° sunny		HMI Time: 1352
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	18107.7 HMI	Sparge Zone 1 Time Span(s) Operational:	1700-2230 HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.4 HMI	Sparge Zone 2 Time Span(s) Operational:	2200-0330 HMI
AS Blower Runtime (Hours) - *Sparge Blower*	11679.4 HMI	Sparge Zone 3 Time Span(s) Operational:	0300-0800 HMI
AS Heat Exchanger Runtime (Hours)	11675.7 HMI	Sparge Zone 4 Time Span(s) Operational:	0730-1230 HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0 Hz/16.9A/62.2%	Sparge Zone 5 Time Span(s) Operational:	1200-1730 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0 Hz/9.8A/85.3% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	88°	SVE Blower Dilution Valve (# turns open)	Ø
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.0
AS Blower Discharge Pressure (PSI) - *PI-501*	7.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	Ø
SVE Blower Inlet Temperature (°F) - *TI-200*	72°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	2.7
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	85	SVE Blower Discharge Temperature (°F) - *TI-400*	117°
Knockout Tank Level (Sightglass % Full)[1]	<25%		
SVE Discharge PID (ppmv)	4.5	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)	1.9
Water Volume in Storage Tank[5] (gal)	506.73	Spare Volume to LAH float[6] (gal)	496.07
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

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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	6	100	
AS-24	7.5	>13	|	
AS-25	7	1.3	|	
AS-26	8	12.8	|	
AS-27	8	1.7	↓	

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

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PORT OF SEATTLE - TERMINAL 30

SVE Manifold Readings (1 of 3)

Date:	5/24/23	Time:	1442
Field Tech(s):	AB	PID ID:	048423
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	26	86	25	8.6		SVE-10	48	13	15	2.1	Float bobbing
HSVE-3	33	68	25	2.2		SVE-9	66	Ø	100	1.6	Float stuck lots of water
SVE-4	64	18	15	2.1	Float bobbing	SVE-8	Ø	Ø	Ø	9.1	closed
SVE-5	18	Ø	10	2.6	Float stuck	SVE-6	Ø	Ø	Ø	5.8	closed
SVE-7	25	13	15	1.9		HSVE-1	9	58	15	2.4	

Dilution Valve	# Turns Open:	0
	Vacuum ("H2O):	85

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:	5/24/23	Time:	1520
Field Tech(s):	AB	Pump ID:	410
Weather:	66° Sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/4	clear H_2O	SVE-10	1/2	muddy brown water
HSVE-3	1/8	clear H_2O	SVE-9	1/2	muddy brown water coming out in small sections & not continuous
SVE-4	1/3	Brown water with LOTS of particulates	SVE-8	0	*closed
SVE-5	1/4	clear H_2O	SVE-6	1/3	clear H_2O *closed
SVE-7	1/2	clear H_2O with black particulates	HSVE-1	1/4	Clear H_2O

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date:	5/24/23	Time:	1617
Field Tech(s):	AB	Weather:	66° 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	23	85	30		SVE-10	58	21	20	Float bobbing opened slightly
HSVE-3	36	71	90	vac gauge bobbing	SVE-9	68	—	10	Float stuck Adjusted to lessen water prod.
SVE-4	40	8	15	Float Slightly Stuck	SVE-8	—	—	—	closed
SVE-5	46	8	15	Float bobbing	SVE-6	14	8	10	opened to 10%.
SVE-7	Ø	11	20	vac zero? not sure why opened 5%.	HSVE-1	12	68	25	opened from 15% to 25%.

Dilution Valve	# Turns Open:	0
	Vacuum ("H2O):	85

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.:	60681370	Weather:	69° cloudy
Date:	6/8/23	Personnel:	AB

Observations

	Time	Observation Description
1	1306	on-site, safety tailgate, system on upon arrival
2		Scope: biweekly O&M
3	1321	Taking SVE system readings
4	1353	Effluent PID reading initially read 2.7 ppmv
5		then began to dip to 2.2 after 30 seconds
6		Taking another reading @ 3.2 ppmv, then
7		started to dip again - recalibrating PID
8		PID after zeroing out: 3.0 ppmv
9		↳ still dipping after reading to 1.4 ppmv
10		1.0 after removing bag and putting it back on
11		Taking third reading w/PID: 3.6 ppmv
12		↳ dipping to 0.6 after 90 seconds
13	1408	Moving on to zone readings
14	1414	Talked to Gus - turning PID off & on again
15		and taking another reading
16		↳ Fluctuating between 2.2ppmv - 2.4 ppmv
17	1421	Taking manifold readings
18	1421	Taking pre-dewatering PID readings from manifold
19	1446	Had to zero out PID again
20	1456	Tedlar bag broke - looking for replacement
21	1513	After talking to Gus, I'm going to take PID
22		readings without bag straight into PID from well
23		PID taking 60 seconds to return to 0
24	1543	Taking effluent PID without bag: 6.1 ppmv
25	1559	Begin dewatering

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T30	Location:	Port of Seattle
Project/Task No.:	60681370	Weather:	69° cloudy
Date:	6/6/23	Personnel:	AB

Observations

	Time	Observation Description
1	1634	Began taking post dewatering readings
2	1657	Adjusted valves to increase flow without
3		water production
4		HSVE-2: no change
5		HSVE-3: 10% increase
6		SVE-4: 5% increase
7		SVE-5: no change
8		SVE-7: 5% increase
9		SVE-10: 10% increase
10		SVE-9: 5% increase
11		SVE-8: remained closed
12		SVE-6: 5% increase
13		HSVE-1: 10% increase
14	1703	Closing down and wrapping up
15	1710	Called Gus to go over changes
16	1717	Leaving for 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: 6/8/23	Field Tech(s): AB		Actual Time: 1324
PID ID: 901089	Weather: 69° cloudy		HMI Time: 1321
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	18465.6 HMI	Sparge Zone 1 Time Span(s) Operational:	1700-2230 HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.5 HMI	Sparge Zone 2 Time Span(s) Operational:	2200-0830 HMI
AS Blower Runtime (Hours) - *Sparge Blower*	12037.3 HMI	Sparge Zone 3 Time Span(s) Operational:	0300-0800 HMI
AS Heat Exchanger Runtime (Hours)	12033.5 HMI	Sparge Zone 4 Time Span(s) Operational:	0730-1230 HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0Hz/15.7A/57.5% HMI	Sparge Zone 5 Time Span(s) Operational:	1200-1730 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0Hz/9.8A/45.5% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	91°	SVE Blower Dilution Valve (# turns open)	0
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.5	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.1
AS Blower Discharge Pressure (PSI) - *PI-501*	7.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	75°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	2.9
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	79	SVE Blower Discharge Temperature (°F) - *TI-400*	118°
Knockout Tank Level (Sightglass % Full)[1]	55%		
SVE Discharge PID (ppmv)	6.1	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)	—	WD in Storage Tank[4] (ft)	2
Water Volume in Storage Tank[5] (gal)	533.4	Spare Volume to LAH float[6] (gal)	469.4
NOTES: Effluent PID: 2.3 w/ bag 6.1 w/o			

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	1.2	100	Float bobbing
AS-24	7.5	>13		Float high
AS-25	7	1.3		Float bobbing
AS-26	8.25	12.8		
AS-27	8	1.6		Float bobbing

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:	6/8/23	Time:	1422
Field Tech(s):	AB	PID ID:	601089
Weather:	69° 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	23	82	30	10.9	7.2 w/bag 10.9 w/o	SVE-10	55	13	20	3.8	Float bobbing a lot
HSVE-3	33	74	90	3.9	2.3 w/bag 3.9 w/o	SVE-9	39	–	10	3.3	Float stuck
SVE-4	34	9	15	4.3	Minimal H_2O Float bobbing	SVE-8	–	–	0	8.8	
SVE-5	50	12	15	5.5	medium amount of H_2O Float bobbing	SVE-6	41	9	10	2.6	minimal H_2O
SVE-7	4	11	20	3.2		HSVE-1	12	69	25	4.1	

Dilution Valve	# Turns Open:	0
	Vacuum ("H2O):	79

Notes: SVE-4 PID: 1.9 w/bag 4.3 w/o SVE-5 PID: 1.9 w/bag 5.5 w/o

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:	6/8/23	Time:	1559
Field Tech(s):	AB	Pump ID:	463300
Weather:	69° Sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/4	Clear H_2O	SVE-10	0	
HSVE-3	1/4	clear H_2O	SVE-9	3/4	Started clear H_2O brown H_2O at end
SVE-4	1/2	clear H_2O	SVE-8	1/2	Clear H_2O
SVE-5	3/4	Clear H_2O	SVE-6	3/4	Clear H_2O rotometer has H_2O
SVE-7	1/8	Clear H_2O	HSVE-1	1/4	Clear H_2O

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date:	6/6/23	Time:	1639
Field Tech(s):	AB	Weather:	69° 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	22	82	30		SVE-10	51	14	30	Float bobbing; opened 5%.
HSVE-3	34	74	100	trace H_2O; opened fully	SVE-9	56	—	15	Float stuck opened 5%.
SVE-4	40	12	20	Float bobbing; opened 5%.	SVE-8	—	—	—	closed
SVE-5	48	14	15	Float bobbing; minimal H_2O	SVE-6	50	12	15	opened 5%
SVE-7	9	11	25	Tried opening slightly H_2O increased a lot	HSVE-1	13	77	35	opened 10%.

Dilution Valve	# Turns Open:	0
	Vacuum ("H2O):	79

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 6/7/2023 4:46:00PM

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

State Certified
Status Pass
Temp °C 25
Humidity % 30

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 801089
Description MIniRae 3000_FIRMWARE 2.22A
Calibrated 6/7/2023 5:07:52PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-602191
Location Seattle
Department

State Certified
Status Pass
Temp °C 25
Humidity % 30

Calibration Specifications

Group # 1
Group Name isobutylene
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
100.00 / 100.00	PPM	100.00	PPM	100.10	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 304-402321612-1	Isobutylene (C4H8) 100 PPM	Airgas	31721	304-402321612-1		12/29/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

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DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:	60681370	Weather:	70° sunny
Date:	6/22/23	Personnel:	AB

Observations

	Time	Observation Description
1	1530	on-site, safety tailgate, system on
2		Scope: biweekly O&M and summa can sampling
3		Setting up summa can sampling
4	1421	Finished summa can sampling, doing
5		regular O&M now
6	1450	PID @ effluent: 4.9 ppmv
7	1508	No water in any of rotometers
8		↳ small amount of oily product in SVE-9
9		rotometer - taking PID readings
10	1529	Begin dewatering
11	1413	Dewatering complete - taking post-
12		dewatering readings
13	1417	O&M complete, closing down - calling Gus
14		to debrief
15	1430	Heading to lab to drop off samples
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: 6/22/23	Field Tech(s): AB		Actual Time: 1427
PID ID: 047530	Weather: 70° sunny		HMI Time: 1424
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	8799.3 HMI	Sparge Zone 1 Time Span(s) Operational:	1700-2230 HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.6 HMI	Sparge Zone 2 Time Span(s) Operational:	2200-0330 HMI
AS Blower Runtime (Hours) - *Sparge Blower*	12371.1 HMI	Sparge Zone 3 Time Span(s) Operational:	0300-0800 HMI
AS Heat Exchanger Runtime (Hours)	12367.2 HMI	Sparge Zone 4 Time Span(s) Operational:	0730-1230 HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/15.6/57.4% HMI	Sparge Zone 5 Time Span(s) Operational:	1200-1730 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/9.7/83.9% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	91°	SVE Blower Dilution Valve (# turns open)	0
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.75	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.1
AS Blower Discharge Pressure (PSI) - *PI-501*	7.25	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	70°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	2.9
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	79	SVE Blower Discharge Temperature (°F) - *TI-400*	116°
Knockout Tank Level (Sightglass % Full)[1]	< 25%		
SVE Discharge PID (ppmv)	4.9	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)	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

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	8.0	1.3	100	
AS-24	7.5	>13		Float high
AS-25	7.0	1.3		
AS-26	8.5	12.8		
AS-27	8.0	1.7		

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:	6/22/23	Time:	1421
Field Tech(s):	AB	PID ID:	047530
Weather:	70° 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	26	71	30	13.4		SVE-10	57	16	20	2.4	Float bobbing
HSVE-3	37	72	90	6.1		SVE-9	59	—	10	1.8	Float stuck and oily
SVE-4	44	12	15	4.0		SVE-8	—	—	0	—	Closed
SVE-5	52	12	15	4.6	Float bobbing	SVE-6	52	13	10	2.3	Float stuck & bobbing
SVE-7	12	9	20	2.2		HSVE-1	15	78	25	2.7	

Dilution Valve	# Turns Open:	0
	Vacuum ("H2O):	79

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:	6/22/23	Time:	1530
Field Tech(s):	AB	Pump ID:	46330
Weather:	70° sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/2	clear H_2O	SVE-10	1/2	clear H_2O
HSVE-3	1/4	clear H_2O	SVE-9	1/2	brown oily H_2O
SVE-4	1/2	clear H_2O	SVE-8	Ø	
SVE-5	3/4	clear H_2O	SVE-6	2/3	clear H_2O
SVE-7	1/2	clear H_2O	HSVE-1	1/3	clear H_2O

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date:	6/22/23	Time:	1415
Field Tech(s):	AB	Weather:	70° 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	26	71	30		SVE-10	35	11	20	
HSVE-3	37	72	90		SVE-9	86	–	10	Float stuck; oily residue
SVE-4	42	11	15		SVE-8	–	–	0	
SVE-5	49	15	15	Float bobbing	SVE-6	51	11	10	
SVE-7	10	9	20		HSVE-1	15	78	25	

Dilution Valve	# Turns Open:	0
	Vacuum ("H2O):	74

Notes:

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

AECOM

Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 47530
Description RAE MiniRAE 3000
Calibrated 6/21/2023 2:44:36PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-918777
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 49

Calibration Specifications

Group # 1
Group Name Isobutylene
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	99.9	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 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 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 th 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 6/21/2023 2:28:14PM

State Certified

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

Status Pass
Temp °C 19
Humidity % 49

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

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Please call 800-301-9663 for Technical Assistance

SAMPLE CHAIN OF CUSTODY

Report To Paul Kalina & Gus Friedman
Company AECOM
Address 1111 3rd Ave Ste 1600
City, State, ZIP Seattle WA 98101
Phone 206-438-2100 Email paul.kalina@aecom.com
gus.friedman@aecom.com

SAMPLERS (*signature*) Austin Bragg

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 BTEXN	TO15 cVOCs	APH	Helium	TO15 GBTEX	Notes
~~TBG~~ SVE-EFF-062223		3390	111	IA / (SG)	6/22/23	30.0	1405	5.0	1412						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	6/22/23	4:45P
Received by:		Eric Howard	F&B	6/22/23	1645
Relinquished by:					
Received by:					

FORMS\COC\COCTO-15.DOC

DAILY FIELD LOG

Project Information Page 1 of 3

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	7/5/23	Personnel:	GF, LC

Observations

	Time	Observation Description
1	1100	GF & LC onsite. Port closed to normal activity
2		• Safety tailgate. Much reduced traffic risk, pinch points,
3		slips-trips, motion hazards.
4		• Scope: 2Q O&M + replacement part installs
5		• System ON on arrival in Zone 4. Normal runtime
6		goes to 12:30 with Zone 5 kicking on at 12:00.
7		~~Also~~ Temporarily adjusted to maintain Zone 4
8		throughout O&M
9	1115	• Began taking down system readings
10		• SVE-9 has mahogany-brown liquid (small amt) sloshing
11		around.
12		• SVE-5 is quite dirty, SVE-4 less so
13		• Took PID readings but everything came in really high.
14		Effluent @ 40.1; HSVE-2 @ 73, most others in the
15	1230	teens. Called Larry (PINE) & requested a replacement.
16	1330	• Tate (Pine) dropped off the replacement PID. ~~Seems~~
17		Worked consistent with past measurements here.
18		3.4 ppmv @ effluent; 88 ppmv @ HSVE-2.
19		• Installed camlock adapter at AS blowoff valve
20		• Added brace to AS-1 & -2 rotameters w/ small piece of
21		unistrut. New rotameters are taller than old ones.
22		• Built 1 new sawhorse for SVE hoses
23	1430	• Connected new hose to AS blowoff & swapped it in
24		for SVE-6 @ the stub-up. Opened blowoff to blow laterals.
25		• Started dewatering

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	7/5/23	Personnel:	GF LC

Observations

	Time	Observation Description
1		• When AS hose was disconnected from stub up, it was
2		slightly pressurized. 3/4 gal pumped from
3		deadleg & no additional water visibly pulling in.
4		• AS hose moved to SVE 6 & let run for a few minutes.
5		When disconnected, was quite pressurized & hose popped
6		back. Quickly after water started coming up out
7		of the stub up
8		• Same thing as above happened at SVE-8, and -9.
9	1500	• System shut down to work on SVE hoses. Replaced
10		hoses for SVE-1, 6, 9, and 10. Left SVE-8 disconnected
11		temporarily since it is closed down. Used
12		new camlock fittings where possible (need sockets style
13		on both ends) and swapped over old ones as needed.
14	Installed new saw horses to loop new hoses over	-Ordered the wrong type for the spare camlocks/extras
15		needed for installs - plug type, not sockets.
16		-used electric water kettle to soften hoses for
17		camlock removal/install
18		→ should get petroleum jelly for installs in
19		remaining new hoses.
20		• Cleaned out KOT sightglass
21		• Opened particulate filter. Transferred water, ~1gal,
22		from the case. Filter appears in fine condition. Rusted
23		portions observed + photographed in inner wall of
24		the filter case
25	1640	- Took megger readings. Shut down power.

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	7/5/23	Personnel:	GF, LC

Observations

	Time	Observation Description
1		• Out of time for the day. Will return another day
2		to complete SVE hose replacements & do the
3		SVE rotameter repairs.
4		• Cleaned up. Disposed of old air hoses. Stored
5		remaining new hose in the Conex.
6	1700	- GF & LC offsite
7		
8		
9		
10		
11		
12		
13		7/5/23
14		GF
15		
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Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 7/5/23	Field Tech(s): GF & LC		Actual Time: 1123
PID ID:	Weather:		HMI Time: 1117
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	19105.1 HMI	Sparge Zone 1 Time Span(s) Operational:	1700 - ~~1~~2230 HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.6 HMI	Sparge Zone 2 Time Span(s) Operational:	2200 - 0330 HMI
AS Blower Runtime (Hours) - *Sparge Blower*	12676.9 HMI	Sparge Zone 3 Time Span(s) Operational:	0300 - 0800 HMI
AS Heat Exchanger Runtime (Hours)	12672.8 HMI	Sparge Zone 4 Time Span(s) Operational:	0730 - 1230 HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0 Hz / 15.3A / 56.2 % HMI	Sparge Zone 5 Time Span(s) Operational:	1200 - 1730 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0 Hz / 9.5* A / 82.2 %	Sparge Zone Active:	4
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	56 96°F	SVE Blower Dilution Valve (# turns open)	1 turn
AS Blower Intake Pressure (" H2O) - *DPI-500*	2" H2O	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1 turn	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	1.2
AS Blower Discharge Pressure (PSI) - *PI-501*	7.0 psi	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	69°F	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.0
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	78	SVE Blower Discharge Temperature (°F) - *TI-400*	120°F
Knockout Tank Level (Sightglass % Full)[1]	75%		
SVE Discharge PID (ppmv)	~~0.1~~ 3.4 GF	Treated Vapor Discharge PID (ppmv)[2]	N/A
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	NM	SVE Compressor Oil Level[3] (% full sightglass)	NM
DTF in Storage Tank (ft)	X	WD in Storage Tank[4] (ft)	2in = 0.17 ft
Water Volume in Storage Tank[5] (gal)	4445 gal	Spare Volume to LAH float[6] (gal)	958.35 gal

NOTES:
* AS motor full load amps 9.6 @ 460 V. SVE is 18.8 @ 460V.

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

TEST: turn off valve bleed to test VFD trip

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	7.5	3.4	50%	
AS-8					AS-18	7.5	0.0	100%	
AS-9					AS-19	7.5	0.0	100%	
AS-10					AS-20	7.0	~~1.5~~ 1.2	100%	
AS-11					AS-21 5.0		0.0	100%	gauge reads
					AS-22	7.0	1.6	100%	gauge reads -1/2 psi
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 (1 of 3)

Date: 7/5/23	Time: 1215
Field Tech(s): LC GF	PID ID: ~~31590~~ 40222
Weather: Partly sunny 75°F	

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.

Initial **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	60	25	~~73.2~~ 48.9	✓	SVE-10	52	16	25	~~14.0~~ 1.2	bouncing
HSVE-3	32	72	100	~~19.2~~ 2.9	✓	SVE-9	56	6	15	~~HI. LC 1.10~~ 2.8	brown fluid in manifold bouncing
SVE-4	32	14	20	~~17.1~~ 1.9	✓	SVE-8	0	0	0	~~HIGH~~ 10.9	closed, ~~PID taken and was very~~ ~~weight~~ reading equilibrium pipe air.
SVE-5	46	13	20	~~17.6~~ 2.4	bouncing	SVE-6	48	13	20	~~15.4~~ 1.1	bouncing
SVE-7	14	10	20	~~9.5~~ 1.0	bouncing	HSVE-1	14	78	25	~~28.0~~ 1.6	✓

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	78

Notes:
1st PID used gave elevated readings for all measurements. Replacement PID gave readings similar to historical.

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: 7/5/23		Time:	
Field Tech(s): GF, LC		Pump ID:	
Weather:			

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	—	Not attempted, ran out of time	SVE-10	—	Not attempted, ran out of time
HSVE-3	—		SVE-9	1/4	brown/tan, product
SVE-4	—		SVE-8	0	—
SVE-5	—		SVE-6	3/4	clear H_2O. Float sticky/ rod crooked?
SVE-7	—		HSVE-1	1/4	clear H_2O

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date: 7/5/23	Time:
Field Tech(s): GF, LC	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					SVE-10				
HSVE-3				No	SVE-9				
SVE-4				Changes	SVE-8				
SVE-5					SVE-6				
SVE-7					HSVE-1				

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

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): GF LC
Date: 7/5/23 1640

Equipment ID: Megger T1306

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	
	1.70	1.69	1.70	0.12	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	
	0.084 u	0.84 u ~~0.00~~	0.84 u ~~0.00~~	0.14	0.14	0.14	

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 6/30/2023 1:42:14PM

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

State Certified
Status Pass
Temp °C 24
Humidity % 48

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 40222
Description RAE MiniRAE 3000+
Calibrated 7/5/2023 3:45:59PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-920963
Location Seattle
Department

State Certified
Status Pass
Temp °C 26
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	100.0	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 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 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

1st PID

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 36590
Description MiniRAE 3000
Calibrated 6/30/2023 1:34:25PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-918212
Location Seattle
Department

State Certified
Status Pass
Temp °C 24
Humidity % 48

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Range
Range Acc % 0.0000
Reading Acc % 0.0000
Plus/Minus 3.00

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	100.10	100.00	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 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 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 Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	7/5/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Celovsky, Lillian;Friedman, Gus;
Attendees (Visitors)	
Tasks to be performed	2Q O&M Replacement part installs
Hazards to be considered today	pressure, noise, motion, mechanical
Will there be Lone Workers?	No
Hierarchy of controls	elimination, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Hearing Protection - Stay away from noise, max exposure, use of PPE
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	
Hazards	• Mechanical • Motion • Noise • Pressure

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	SODO Seattle
Project/Task No.:		Weather:	
Date:	7/7/23	Personnel:	GF, SC

Observations

	Time	Observation Description
1	1300	GF & SC onsite
2		- Scope: cont'd 2e odm. replace SVE hoses, clean/
3		repair / replace rotameters, inspect gauges
4		- Safety tailgate: pinch points, hotwater
5		- Zone 2 active on arrival. VFD (sparge) read 8.8 A
6		indicating capacity to decrease bleed valve. FLA = 9.6A.
7		Bleed had been 1 turn open; decreased to 3/4 turn &
8		VFD amps increased to 9.3A.
9	13 15	- Shut system down. collected SVE hose equipment. started
10		water to bo. 1
11		- While waiting, cleaned SVE rotameters.
12		- SVE-9: Dirty but all components looked in good shape
13		- SVE-4: Known bad float. Float & guide rod replaced.
14		Slightly dirty & cleaned. Cracked end cap replaced.
15		- SVE-5: Dirty but components looked good cleaned
16		- SVE-10: Same. cleaned.
17		⇒ SVE-6 could still use a cleaning. All others look clear
18		- Removed camlocks from several old hoses. Added camlocks
19		to complete 2 new hoses. Used hot water & petroleum
20		jelly to help get camlocks into the new hoses. Not easy
21		to do, & jelly didn't help much. Water almost seemed
22		to make the hoses gummier.
23		- Couldn't get the 3rd fitting on the SVE-10 hose on more
24		than ~1.5". Called C Brown to discuss. He said if firmly
25		in place & secured w/ band clamp, probably fine. We

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	
Project/Task No.:		Weather:	
Date:	7/7/23	Personnel:	GF, SC

Observations

	Time	Observation Description
1		took his advice & installed it as-was.
2		- The hose GF installed a few months ago without
3		cutting to size was much easier to work with than
4		the brand new hose. If we revisit these in a few
5		months maybe we can get camlocks fully inserted.
6		• Attempted to dewater the SVE-6 lateral, as the hose
7		had visibly collected water since the 7/5 visit.
8		- could not get the stub up cap off. Likely glued
9		as CBrown believed.
10		- could not get the large-dia LDPE tubing around
11		the elbow from the camlock. Had success with
12		large d.a silicone tubing, but couldn't get any water
13		up with it. Either wasn't deep enough or there
14		wasn't sufficient water in the lateral.
15	**	→ Tapping the cap with a port tubing could be inserted
16		into would work. Could just plug it when not
17		in use.
18		• Replaced AS-23 & -24 rotameters (Zone 5)
19	**	→Need to order more replacements. 3 more for
20		Zone 5 and at least 2 for Zone 2 & total?
21		• Replaced SVE inlet vac gauge. Old one was reading
22		6" WC at rest. New one is to 140" WC, not 100.
23	1615	• SC offsite for the day
24		• System restarted. New hoses at 1, 6, 8, 9, & 10.
25		still need to replace 7, 5, 4, 3, & 2.

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	7/7/23	Personnel:	GF, SC

Observations

	Time	Observation Description
1		- SVE-5 started pulling in water @ 50" wc vac
2		after ~10 min
3		- Realized SVE-7 didn't have a hose on it. Temp
4		fixed by moving the SVE-8 (closed) hose over.
5		Will move back when the rest of the hoses are
6		made up.
7		- Noticed a wobble in the SVE-4 rotameter.
8	1643	- System off to fix SVE-4 rotameter. Had to swap the
9		upper & lower metal guards ⊗. One slips along the
10		rod (upper) & the other does not (lower)
11	1900	System restarted
12		- could only get flow to SVE-9 by throttling
13		#SVE-1 & -3 back to 50 cfm. Even with that,
14		not sure it will sustain.
15		• AS bleed valve/VFD testing:
16		- w/ 1 turn open & zone 2 active, 9.9 A & 85.7%
17		- w/ 0 turn open & zone 2 active, 10.9 A & 96.1 %
18		→ Ran for 10 min w/ valve closed & had no faults.
19		The motor nameplate lists FLA at 19.2/9.6 for
20		230/460 V.
21	1930	• Bleed valve returned to 1 turn open. Amps back to
22		9.0.
23		• Next visit should do a leak check @ SVE manifold
24		w/ soapy spray.
25		• Replaced broken J-plug in RW-5A

Comments / Site Activities / Personnel Tracking

2000 · Cleaned up & loaded up. GF offsite

GF
7/7/23

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	7/7/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Catlin, Suzanne;Friedman, Gus;
Attendees (Visitors)	
Tasks to be performed	Continued 2Q O&M. Equipment repairs & replacements
Hazards to be considered today	pressure, noise, motion
Will there be Lone Workers?	No
Hierarchy of controls	elimination, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Hearing Protection - Stay away from noise, max exposure, use of PPE
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	
Hazards	• Motion • Noise • Pressure

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	75° sunny
Date:	7/19/23	Personnel:	AB

Observations

	Time	Observation Description
1	1159	Arriving on-site, system on upon arrival
2		Safety tailgate, scope: biweekly O&M
3	1215	Began SVE system data collection
4	1256	PID reading at effluent: 2.6 ppmv
5		Taking zone readings
6		Taking manifold readings and PID
7	1340	Begin de-watering
8	1417	Taking post dewater readings
9	1429	Calling GDS to discuss readings
10	1445	Wrapped up and dropping off pine
11		equipment at office
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Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 7/19/23	Field Tech(s): AB		Actual Time: 1227
PID ID: 041923	Weather: 75° sunny		HMI Time: 1222
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	19433.7 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.6 HMI	Sparge Zone 2 Time Span(s) Operational:	0200-0530, 1000-1330 1800-2130 HMI
AS Blower Runtime (Hours) - *Sparge Blower*	13006.3 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	13001.2 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0Hz/17.0A/62.7 HMI	Sparge Zone 5 Time Span(s) Operational:	2100-0230, 0500-1030 1300-1830 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0Hz/8.9A/75.1 HMI	Sparge Zone Active:	2
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*	2.0	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	.45
AS Blower Discharge Pressure (PSI) - *PI-501*	6.75	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	76°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	2.7
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	72	SVE Blower Discharge Temperature (°F) - *TI-400*	124°
Knockout Tank Level (Sightglass % Full)[1]	45%		
SVE Discharge PID (ppmv)	2.6	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)	133.35	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	7.5	4.5	100	
AS-8	7.5	713		
AS-9	7.5	<1		
AS-10	8.0	<1		
AS-11	7.75	9.0		
Zone 4				
AS-17				
AS-18				
AS-19				
AS-20				
AS-21				
AS-22				
Zone 3				
AS-12				
AS-13				
AS-14				
AS-15				
AS-16				
Zone 1				
AS-1				
AS-2				
AS-3				
AS-4				
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 (1 of 3)

Date:	7/19/23	Time:	1304
Field Tech(s):	AB	PID ID:	04842 3
Weather:	75° 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	18	14	50	3.1		SVE-10	67	10-25	75	1.0	
HSVE-3	22	41	50	2.4		SVE-9	66	0	40	0.5	Float stuck Product in rotc
SVE-4	61	13.5	50	3.1		SVE-8					
SVE-5	40	2-10	40	3.5	*Float bobbing	SVE-6	71	10-25	50	0.7	Float bobbing
SVE-7	17	13	50	0.7		HSVE-1	8	40	40	1.9	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	72

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:	7/19/23	Time:	1340
Field Tech(s):	AB	Pump ID:	4/6330
Weather:	75° sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/2	clear H_2O	SVE-10	3/4	clearish H_2O
HSVE-3	1/2	clear H_2O	SVE-9	1/8	Brown H_2O & remnants of product
SVE-4	1/2	clear H_2O with some bits of product	SVE-8	—	—
SVE-5	1/2	clear H_2O	SVE-6	1/2	clear H_2O
SVE-7	1/2	clear H_2O	HSVE-1	1/2	clear H_2O

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date:	7/19/23	Time:	1417
Field Tech(s):	AB	Weather:	75° 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	14	50		SVE-10	67	0-25	75	Float bobbing
HSVE-3	22	41	50		SVE-9	66	-	40	Float stuck
SVE-4	61	14	50		SVE-8				
SVE-5	40	0-12	40	Float bobbing	SVE-6	70	0-15	50	Float bobbing
SVE-7	16	12.5	50		HSVE-1	8	39	40	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	72

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 7/18/2023 2:07:25PM

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

State Certified
Status Pass
Temp °C 24
Humidity % 38

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 48423
Description MiniRAE 3000
Calibrated 7/18/2023 1:52:07PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-921123
Location Seattle
Department

State Certified
Status Pass
Temp °C 24
Humidity % 38

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	100.2	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 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 *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

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	75, sun
Date:	8/4/23	Personnel:	GF

Observations

	Time	Observation Description
1	1345	· GF onsite
2		· Scope: biweekly O&M
3		Safety tailgate: traffic, sun, pinchpoint hazards
4		· System ON on arrival. Zone 5 active.
5		- SVE looks good, no significant water in rotameters.
6		water visible in hoses (on stub up side) of
7		SVE-1, -2, -3, -5, (-6), and -9.
8		- water visible in hoses on manifold side of SVE-5,
9		-6, and -9.
10		→ loops seem to be working to keep water out of
11		manifold, but laterals must be filling. No good
12		way to pump them out currently. Did my best
13		by opening the valves to 100% but in most/all cases
14		this was inefficient @ best w/ the new hurdle of the
15		saw horses.
16		* Biggest impact is at #SVE-2, which would have much
17		greater flow if we could open it up more. Diff btw
18		40 & 70 scfm.
19		→ SVE-9 not getting flow even @ 100% open, 60" WC
20		· closed down AS bleed to test outcome. Compressor pressure
21		hovered ~10 PSI & flows @ manifold increased at the 3
22		wells getting air. PRV actively discharging. Successfully
23		ran for 1.5 hrs. Then tested in Zone 2, & only ran
24		for 6 min before faulting out (A2010, then F0009)*.
25		Only restarted by hitting the exit button. Never sent a

Comments / Site Activities / Personnel Tracking

* A2010 = Motor Temp alarm; F0009 = Motor overtemp Fault

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	80 Sun
Date:	8/4/23	Personnel:	GF

Observations

	Time	Observation Description
1		notification but I thought we added that ability in? Gave
2		it 15 min but it never sent. Took photos documenting its
3		fault conditions.
4		→ restored in Zone 2 & observed amps at 10.8A. Switched
5		back to Zone 5 and amps were the same, so not
6		sure what caused the fault. Nevertheless, took Zone 2
7		offline & adjusted Zone 5 to 3 hrs on, 2 hrs off.
8		(3)(2)(3)(2)(3)(2)(3)(2)(2)(2). Started that cycle @ 1725.
9		• In Zone 5, AS-23 & -24 don't get flow even w/ pressure
10		up to 9/9.5.
11		• Put transfer pump in Hand to move KOT water to Poly
12		tank.
13	1500	• Cleaned up, locked up, ~~off~~ site.
14		
15		
16		
17		GF
18		8/4/23
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 6/4/23	Field Tech(s): GF		Actual Time: 1400
PID ID:	Weather: 80 Sun		HMI Time:
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	14815.2 HMI	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	7.6 HMI	Sparge Zone 2 Time Span(s) Operational:	0200-0530; 1000-1330 1500-2130 HMI → OFF
AS Blower Runtime (Hours) - *Sparge Blower*	13466.9 HMI	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	13462.6 HMI	Sparge Zone 4 Time Span(s) Operational:	—
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/14.1/51.3 HMI	Sparge Zone 5 Time Span(s) Operational:	0500-1030; 1300-1830; 2100-0230 HMI → 00:00-03:00, 05:00-08:00, 10:00-13:00, 15:00-18:00, 20:00-23:00
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/9.1/77.4 HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	102°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	2.0	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5
AS Bleed Valve (# turns open)	1.0 → 0 @ EOD	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.8
AS Blower Discharge Pressure (PSI) - *PI-501*	6.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	85	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.0
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	52	SVE Blower Discharge Temperature (°F) - *TI-400*	120
Knockout Tank Level (Sightglass % Full)[1]	50		
SVE Discharge PID (ppmv)	1.9	Treated Vapor Discharge PID (ppmv)[2]	N/A
Other Components			
AS Compressor Oil Level[3] (% full sightglass)	NM	SVE Compressor Oil Level[3] (% full sightglass)	NM
DTF in Storage Tank (ft)	-	WD in Storage Tank[4] (ft)	0.25
Water Volume in Storage Tank[5] (gal)	666.68	Spare Volume to LAH float[6] (gal)	936.12
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

8/4/23
GF

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				
				@1700, switched to test. Compr @ 10 PSI @1706, A2010 overload fault. 13.6A?
Zone 3				
AS-12				@1720, reads F0004. "Exit" cleared the fault & auto-restarted.
AS-13				Amps steady ~10.6.
AS-14				@1725, switched back to Zone 5. Amps
AS-15				still up at 10.9A. Pressure @ 0 PSI.
AS-16				
AS-23	7.0	0	100	My valves closed →
AS-24	6.5	0		
AS-25	5.0	0		
AS-26	7.5	2		
AS-27	7.5	2.2		

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	~15:40		~1700	

PSI	SCFMG	PSI	SCFMG
9.25	0	9.5	0 (compressor
8.75	0	9.5	0 gauge @ 9.5 PSI,
7.25	3.5	7.5	3.6 PRV active
9.5	4.4	9.5	3.2
9.5	5.8	9.5	5.0

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: 8/4/23	Time: 1500
Field Tech(s): GTF	PID ID: 024604
Weather: 80 Sun	

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	42	20	1.8	✓	SVE-10	50	20	30	1.7	large bounce
HSVE-3	26	48	20	1.6	✓	SVE-9	42	0	10	1.2	product residue in rotameter
SVE-4	43	16	15	1.7	✓	SVE-8	—	—	0	—	closed
SVE-5	42	7	15	3.3	miner water, bouncing	SVE-6	54	18	20	0.7	large bounce, miner water
SVE-7	22	17	20	1.0	✓	HSVE-1	10	34	15	1.3	✓

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	52

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: 8/4/23	Time: 1720
Field Tech(s): GF	Weather: 80 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	23	40	20	water in hose @ stub up but not getting over the hump	SVE-10	43	17 bouncing	15	good
HSVE-3	20	36	20	"	SVE-9	46	0	10	dark brown product water @ stub up
SVE-4	48	17	20	"	SVE-8	0	0	0	—
SVE-5	44	7 bouncing	10	"	SVE-6	42	19	50	good
SVE-7	36	21	~~80~~	all good	HSVE-1	9	50	20	good
Dilution Valve		# Turns Open:	1						
		Vacuum ("H2O):	54						

Notes:

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

AECOM

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

Date: 8/4/23		Time: 1500	
Field Tech(s): GF		Pump ID: 46330 Schinst 410	
Weather: 80 Sun			

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-1 ~~HSVE-2~~	0.5	Clear water. w/ valve 100% open, only gets to ~20" wc. water can't overcome the loop.	SVE-10	1/4	Clear H_2O. opening valve from 30→100% had little effect. Stayed at 50" wc, minor H_2O visible in hose @ stick up
HSVE-3	~~5~~ 3/4	~~Clear water~~, slight ~~sheen~~ Clear water. 34" wc @ 100% open, big increase in flow (60 scfm). Lots of H_2O @ stub up, trickling over hump.	SVE-9	3/4	Clear water in deadleg, but brown product in hose/lateral. 58" wc @ 100%, nearly pulling water over the hump. slug
SVE-4	0.5	Clear H_2O. 46" wc @ 100% open, no change to flow. Minor H_2O left in hose, Not close to hump.	SVE-8	N/A	—
SVE-5	1.5	Clear water. 52" wc @ 100% open. Enough to get small amts over the hump. Lots left in hose on stickup side. Vac only dropped @ ~10% open, to 45" wc	SVE-6	5/8	Clear water, slight sheen, 50" wc at 100% open. Min. water visible in hose @ end.
SVE-7	0.5	Clear H_2O. ~~36~~ 27" wc @ 100% open. No water in hose.	~~HSVE-1~~ HSVE-2		Clear water. 33" wc @ 100% open & able to suck water over the hump. Not sure how? At least 36" ~~long~~ of ~60" above lateral. *

Notes:
@ end of pumping, water visible in hoses @ stick up of SVE-1, -2, -3, -5, -9 and -10. All clear except SVE-9, which is dark brown. No water clearly getting over the hump.

Abbreviations: Gal = gallons

*@ 25 PSI & 50 scfm, there is minor visible water getting over the hump anymore.

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 8/3/2023 1:06:58PM

Manufacturer	Solinst	**State Certified**	
Model Number	Pump	**Status**	Pass
Serial Number/ Lot Number	na	**Temp °C**	27
Location	Seattle	**Humidity %**	36
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

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	8/4/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Meeting Summary

Attendees	Gus Friedman
Location	SODO
Tasks to be performed	Bi-weekly o&m
Hazards to be considered today	pressure, noise, motion, chemical
Will there be Lone Workers?	No
Hierarchy of controls	elimination, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	
Topic of the week	Stinging_Insects

Other topics discussed	
Hazards	• Motion • Noise • Pressure • Chemical

End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here

DAILY FIELD LOG

Project Information Page 1 of 2

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	80 Sun
Date:	8/9/23	Personnel:	GF

Observations

	Time	Observation Description
1	1600	GF on site
2		• Scope: restart system as needed / inspect AS VFD fault.
3		• Tailgate: slips, trips, Sun hazards
4		• SUE ON on arrival, but AS ~~AS heat exchange~~ is OFF.
5		- AS VFD reads F0009, motor overtemp, the same code as last visit (Friday). Rendy W/ M&K activated the alarm in the programming this morning, resulting in the notification
9		* VFD parameters @ time of fault ([PAR] → [04] → [0404 through 0409])
11		• 834 rpm, 16.7 Hz, 670 V, 13.6 A, 69.6 %
12		* F0009 is set by parameter 3504, which is programmed to 0, the default setting
14		2003 (max current) = $1.6 \cdot I_{2N} = 1.6 \cdot 9.6 = 15.36$ (this was set at 22, not sure why)
15		9906 (motor nominal current, I_{2N}) = 9.6 A
16		- Par 2003 changed from 22 to 15.4
17		after talking w/ C Brown
18	1720	• System restarted
19		- 10.5 PSI @ compressor
20		- 8.5-10 PSI @ manifold
21	1735	- Flows: 1.5/2.0/1.0/1.3/1.4 all 100% open
22		* AS-25, -26, -27 need new rotameters.
23		• PRV is discharging hot air, not insignificant flow
24		• Heat exchanger screen needs cleaning
25		• Sparge VFD reading ~~[illegible]~~ 11.1 A

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	80 F sun
Date:	8/9/23	Personnel:	GF

Observations

	Time	Observation Description
1	1741	• Flows: 1.5/3.0/1.9/1.5/2.1
2		⇒ maybe takes a bit to ramp up? Amps still 11.1
3		• opened bleed valve ½ turn.
4		- Amps dropped to 10.8
5		- Flows: 1.0/2.5/1.7/1.3/1.9
6		⇒ leaving it like this & we'll see how it does
7		• SVE rotameters are clear of water, but it is
8		visible in a number of the hoses (1, 2, 3, 4, 5, 9)
9		⇒ NOT 6, 7, or 10, all of which are getting good
10		flow (15-20 scfm)
11		⇒ SVE-9 hose water is black. Valve is 100% open
12		but not getting any flow.
13		⇒ SVE-8 still closed due to water & no flow
14	1748	~~[illegible]~~ sparge VFD down to 10.7 A.
15		Locked up
16	1755	GF offsite
17		
18		
19		
20		
21		GF
22		8/9/23
23		
24		
25		

Comments / Site Activities / Personnel Tracking

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	8/8/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Gus Friedman;
Attendees (Visitors)	
Tasks to be performed	System restart, VFD alarm inspection
Hazards to be considered today	pressure, motion
Will there be Lone Workers?	No
Hierarchy of controls	elimination, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Stinging_Insects
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	
Hazards	• Motion • Pressure

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	82° sunny
Date:	8/17/23	Personnel:	AB

Observations

	Time	Observation Description
1	1225	Arrived on site, system on upon arrival
2		Safety tailgate, scope: biweekly O&M
3		MS Pump, sparge blower, and heat exchanger
4		all say "stopped" - Active alarm reading
5		"Sparge blower TAH exists at 13:57 on 8/15/23"
6		Alarm reset and system back on running
7	1255	Begin SVE system data collection
8	1330	SVE Discharge PID: 5.1 ppmV
9		Taking manifold & zone readings
10		Taking PID readings
11	1437	Begin dewatering
12	1516	Taking final SVE final manifold readings
13		Calling Gus to discuss readings
14	1540	Cleaning up & closing down
15		
16		
17		
18		
19		
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21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 8/17/23	Field Tech(s): AB		Actual Time: 1300
PID ID: 051267	Weather: 82° Sunny		HMI Time: 1255
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	20122.0 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.6 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	13484.1 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	13479.7 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/13.5/48.2% HMI	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	52.0/11.0/96.7% HMI	Sparge Zone Active:	—
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	86°	SVE Blower Dilution Valve (# turns open)	1.5
AS Blower Intake Pressure (" H2O) - *DPI-500*	0	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*	0.5
AS Blower Discharge Pressure (PSI) - *PI-501*	0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	86°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.2
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	46	SVE Blower Discharge Temperature (°F) - *TI-400*	117°
Knockout Tank Level (Sightglass % Full)[1]	50%		
SVE Discharge PID (ppmv)	5.1	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)	0.5
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

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				
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:	8/17/23	Time:	1344
Field Tech(s):	AB	PID ID:	05 12 67
Weather:	83° 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	22	36	50	4.9		SVE-10	35	10-20	30	3.6	Float bobbing
HSVE-3	24	26	40	6.1	vacuum gauge fluctuating	SVE-9	41	—	100	2.5	Float stuck
SVE-4	32	13	30	4.8		SVE-8	—	—	—	—	Closed
SVE-5	35	4	30	9.3	Float bobbing	SVE-6	52	17	75	2.0	
SVE-7	42	18	90	4.8		HSVE-1	9	38	40	3.2	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	46

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:	8/17/23	Time:	1435
Field Tech(s):	AB	Pump ID:	46330
Weather:	82° sunny		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/2	clear H_2O	SVE-10	1/2	clear H_2O
HSVE-3	1/2	clear H_2O	SVE-9	2/3	clear H_2O ending with product at end of pumping
SVE-4	1/2	clear H_2O	SVE-8	—	closed
SVE-5	1/2	clear H_2O	SVE-6	1/2	clear H_2O
SVE-7	1/2	clear H_2O	HSVE-1	1/3	clear H_2O

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date:	8/17/23	Time:	1525
Field Tech(s):	AB	Weather:	88° 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	24	36	50		SVE-10	36	10-20	30	Float bobbing
HSVE-3	25	26	40	Vacuum gauge bobbing	SVE-9	41	–	100	Float stuck
SVE-4	32	13	30		SVE-8	–	–	–	
SVE-5	34	0	30	Float stuck	SVE-6	52	17	75	
SVE-7	42	18	90		HSVE-1	7	38	40	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	46

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 8/16/2023 3:17:45PM

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

State Certified
Status Pass
Temp °C 29
Humidity % 37

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 51267
Description RAE MiniRAE 3000_FIRMWARE_2.22A
Calibrated 8/16/2023 1:23:17PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-601348
Location Seattle
Department

State Certified
Status Pass
Temp °C 27
Humidity % 41

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	100.3	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 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 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

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	71° cloudy
Date:	8/30/23	Personnel:	GF, LC

Observations

	Time	Observation Description
1	0845	• GF & LC onsite
2		• Scope: biweekly O+M; tap + thread test SVE- Stub-up
3		dewatering.
4		• Safety tailgate: slips trips, traffic,
5		• System ON (SVE), but AS is an off-cycle. Zone 5 will
6		come on @ 10:00.
7		• Lots of water in rotameters SVE-5 + 9
8		• Lots of water in hoses SVE-1, -2, -4, + -10
9		→ why is there water in the above rotameters but not
10		their associated hoses?
11		• Effluent PID: 2.
12	1020	• Dewatering SVE manifold
13		→ after opening ball valves to clear SVE-5 & -9
14		rotameters, observed water in the hoses at the
15		stub-ups that there wasn't any before.
16	1100	• Tapped & threaded SVE-5. 3/4" plug.
17		- water visible at bottom of pipe through tapped hole
18		- only ~ 0.75 gal initially able to pump out. Then
19		messed with the double ball valve + opening up the
20		well more. The first time, vac dropped to 0 while
21		pumping out as it was open to atmosphere & the well
22		was somewhat throttled back. Adjusting for those,
23		we got water back visible in the hose. Playing with
24		that, the water trapped out into the lateral, but came
25		back up once vac hit 30 in wc.

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	67 Sun
Date:	8/30/23	Personnel:	GF, LC

Observations

	Time	Observation Description
1		- Pumped out lateral again, this time w/ well fully
2		open, resulting in a 20" WC vac. Removed an
3		additional 2.75 gal for a tot of 3.5 gal.
4		- Plugged sump up port & dumped the bucket.
5		- ~~drank~~ water very quickly (~1 l/min) returned to
6		the hose as the well was 100% open & vac
7		was high (40" WC). Started pumping again
8		& got another 1.75 gal. Opened & closed the
9		port a few times to surge the water & got
10		more to show in the hose. Started pumping again.
11		Particulates observed in water. .75 gal further
12		removed. Grand total 6 gal removed. No
13		more water came up after even w/ surging.
14		End of testing @ 12:00.
15		• Pipe measurements:
16		- bot of lateral to bot of outlet: 2.7 ft = 32.4"
17		- bot of outlet to top of hose cap: 2.8 ft = 33.6"
18		** Ideally, lateral is now mostly clear. DTW at last
19		gauging event was 8-9 ft, giving us, conservatively,
20		5.5 ft from water surface to bottom of pipe at the
21		lateral. 5.5 ft = 66" wc.
22		→ SVE-5 is 100% open & running at 42" wc. If it is
23		clear of water next visit (in the lateral), that's good
24		indication the theory held.
25		• If we expand the lateral dewatering to the other wells,

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	67 Sun
Date:	8/30/23	Personnel:	GF, LC

Observations

	Time	Observation Description
1		it would be nicest to use a ball valve instead of the plug. If the BV can't accomodate the tubing, then a nipple, coupling, and plug combo would be best to avoid over-use of tapped threads & risk cross-threading.
2		
3		
4		
5	1215	• Took final SVE manifold readings. LC offsite
6		• Cleaned up & loaded up.
7	1300	• GF offsite
8		
9		
10		
11		
12		
13		
14		
15		
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17		
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19		
20		
21		
22		
23		
24		
25		

3/4" Sch 40 PVC BVs at home depot had ample room to fit tubing through. Can we assume Sch 80 would be the same?

GF
8/30/23

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 8/30/23	Field Tech(s): LC GF		Actual Time: 0922
PID ID:	Weather:		HMI Time: 0915
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	20429.1 HMI	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	7.6	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	13653.8 HMI	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	13649.2 HMI	Sparge Zone 4 Time Span(s) Operational:	—
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/13.9/50.6 HMI	Sparge Zone 5 Time Span(s) Operational:	12-3, 5-8, 10-13, 15-18, 20-22 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0/10.6/93.2 HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	86	SVE Blower Dilution Valve (# turns open)	1.5
AS Blower Intake Pressure (" H2O) - *DPI-500*	3	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*	0.5
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
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*	50	SVE Blower Discharge Temperature (°F) - *TI-400*	106
Knockout Tank Level (Sightglass % Full)[1]	60		
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)	0.42
Water Volume in Storage Tank[5] (gal)	111.1	Spare Volume to LAH float[6] (gal)	891.7
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	9.5	5.0	100						
AS-24	8.5	5.5	100						
AS-25	8.5	3.0	98	reads -1/2 psi (added 0.5 to reading)					
AS-26	9.5	3.8	98						
AS-27	9.0	5.8	100						

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: 8/30/23	Time: 1000
Field Tech(s): LC GF	PID ID: 39880
Weather: Cloudy 60°F	

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	36	25	2.5	✓	SVE-10	38	15	25	9.8	bouncing
HSVE-3	28	26	25	5.2	✓	SVE-9	44	5	95	5.5	water/product
SVE-4	40	15	25	3.4	bouncing	SVE-8	0	0	0	—	closed
SVE-5	40	5	5	6.6	water	SVE-6	54	21	60	2.4	bouncing water
SVE-7	47	18	65	6.0	✓	HSVE-1	12	36	~~45~~ 25	LC 2.9	✓
Dilution Valve		# Turns Open: 1.5			✓						
		Vacuum ("H2O): 50									

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: 8/30/23	Time: 1020
Field Tech(s): LC GF	Pump ID: 46330
Weather: Cloudy 60°F	

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	0.5	✓	SVE-10	0.1	very little water water observed in hose
HSVE-3	0.5	✓	SVE-9	0.5	product water cleared from rotometer
SVE-4	0.75	✓	SVE-8	—	closed
SVE-5	0.5	water cleared from rotometer	SVE-6	0.5	water cleared from rotometer
SVE-7	0.5	✓	HSVE-1	0.5	✓

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date: 8/30/23	Time: ~~0900~~ 1240
Field Tech(s): LC GF	Weather: Cloudy 60°F

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	24	33	25	✓ water in hose	SVE-10	27	15	25	✓
HSVE-3	32	~~36~~ 33	25	vac & flow bouncing water in hose	SVE-9	48	0	100	oily residue in rotameter. float not stuck. water in hose
SVE-4	35	12	20	✓ water in hose	SVE-8	–	–	0	–
SVE-5	41	15	100	rotameter walls opaque w/ a grey-ish film	SVE-6	45	15	70	✓
SVE-7	40	18	100	✓	HSVE-1	12	35	25	✓ water in hose

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	43

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 39880
Description MiniRAE 3000
Calibrated 8/25/2023 4:58:38PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-920683
Location Seattle
Department

State Certified
Status Pass
Temp °C 26
Humidity % 49

Calibration Specifications

Group # 1
Group Name VOC
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	63.5	100.8	0.80%	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 304-402570647-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402570647-1		10/31/2026

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 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 46330
Description Solinst Pump
Calibrated 8/28/2023 1:38:11PM

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

State Certified
Status Pass
Temp °C 25
Humidity % 45

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

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Please call 800-301-9663 for Technical Assistance

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	8/30/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Car
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Celovsky, Lillian;Friedman, Gus;
Attendees (Visitors)	
Tasks to be performed	Biweekly O&M
Hazards to be considered today	pressure, motion
Will there be Lone Workers?	No
Hierarchy of controls	elimination, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Regulatory_Inspections
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	
Hazards	• Motion • Pressure

DAILY FIELD LOG

Project Information

Project Name:	T-30 O+M (biweekly)	Location:	Terminal 30
Project/Task No.:	60681370	Weather:	Cloudy 65°F
Date:	9/12/23	Personnel:	LC

Observations

	Time	Observation Description
1	0900	Arrive on site. Note terminal is very busy.
2		extra caution taken when driving to site.
3	0920	start taking readings from #M1 and completing
4		tasks
5	1000	While PIDs were taken on SVE wells, PID seemed
6		to be reading very high even with ambient air.
7		Did some troubleshooting - switched out Tedlar bag
8		- on/off PID
9		- send ambient air through
10		Tedlar + PID
11		Troubleshooting seemed to fix the high readings.
12	1055	start dewatering and clearing out rotometers of
13		SVE wells. Water does not seem to be re-entering
14		rotometers, product seen in SVE-9
15	1130	Finish final tasks. & Inspect hoses and observe
16		water + moisture in ~~most of it~~ LC all hoses but
17		not as much getting over the saddle horses.
18		System seems stable
19	1200	Leave site. Take caution when leaving
20		terminal.
21		
22		LC
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 9/12/23	Field Tech(s): L. CELOVSKY		Actual Time: 0923
PID ID: 051267	Weather: CLOUDY 60°F		HMI Time: 0916
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	20739.8 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	~~13829.8~~ LC 7.7 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	13834.6 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	13829.8 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0 / 13.4 / 48.2	Sparge Zone 5 Time Span(s) Operational:	12-3, 5-8, 10-13, 15-18, 20-22 HMI
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52.0 / 10.4 / 91.0	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	90°F	SVE Blower Dilution Valve (# turns open)	1.5
AS Blower Intake Pressure (" H2O) - *DPI-500*	6.0" H_2O	SVE Blower Filter Differential Pressure (" H20) - *DPI-200*	0.5 " H_2O
AS Bleed Valve (# turns open)	0.5	SVE Blower Inlet Differential Pressure (" H20) - *FI-200*	0.5 " H_2O
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5 psi	Transfer Pump Discharge Pressure (PSI) - *PI-300*	1.0 psi
SVE Blower Inlet Temperature (°F) - *TI-200*	68 °F	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.4 " H_2O
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	46 " H_2O	SVE Blower Discharge Temperature (°F) - *TI-400*	102°F
Knockout Tank Level (Sightglass % Full)[1]	40%		
SVE Discharge PID (ppmv)	3.7 ppmv	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)	6.34	WD in Storage Tank[4] (ft)	0.58
Water Volume in Storage Tank[5] (gal)	154.69	Spare Volume to LAH float[6] (gal)	848.11
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	5.0	100	
AS-24	8.5	5.5	100	
AS-25	8.5	3.0	95	reads -0.5psi
AS-26	9.5	4.6	95	
AS-27	8.5	6.6	100	

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: 9/12/23	Time: 0955
Field Tech(s): LC	PID ID: 051267
Weather: Overcast 60°F	

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	34	25	7.3	✓	SVE-10	28	12	20	10.0 LC ~~19.0~~	water in rotometer
HSVE-3	26	38	25	13.7	✓	SVE-9	36	5	98	4.2	water + product in rotometer
SVE-4	36	13	15	8.6	bouncing, water in rotameter	SVE-8	0	0	0	—	shut off
SVE-5	38	8	100	14.9	bouncing lots of water in rotometer	SVE-6	54	17	50	0.8	bouncing, water in rotometer
SVE-7	40	17	95	9.9	slight bouncing, minimal water in rot.	HSVE-1	12	36	25	1.8	✓

Dilution Valve		
# Turns Open: 1.5		
Vacuum ("H2O): 46		

Notes:
After taking PID of SVE-6, PID readings were high, played around with tedlar bag and PID to be able to recreate readings. Seemed to work.

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: 9/12/23	Time: 1055
Field Tech(s): LC	Pump ID: 46330
Weather: cloudy 60°F	

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	0.5	✓	SVE-10	0.5	rotometer cleared
HSVE-3	0.25	✓	SVE-9	0.75	product in water, rotometer cleared
SVE-4	0.5	rotometer cleared, large brown flakes in water	SVE-8	—	shut off, no dewatering
SVE-5	0.75	rotometer cleared	SVE-6	0.25	water cleared from rotometer
SVE-7	0.5	little water but rotometer still cleared	HSVE-1	0.5	✓

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date: 9/12/23	Time: 1120
Field Tech(s): LC	Weather: Cloudy 60°F

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	24	32	25	Stable	SVE-10	28	18	25	Stable
HSVE-3	26	38	25	Stable	SVE-9	42	5	100	Stable
SVE-4	26	11	15	Stable	SVE-8	—	—	—	— shut off
SVE-5	40	9	95	Still bounces but no water	SVE-6	42	16	70	Stable
SVE-7	40	20	95	Stable	HSVE-1	12	34	30	Stable

Dilution Valve		
	# Turns Open:	1.5
	Vacuum ("H2O):	42

Notes: little to no water entering rotometers after clearing during dewatering.

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 51267
Description RAE MiniRAE 3000_FIRMWARE_2.22A
Calibrated 9/11/2023 6:14:49PM

Manufacturer	Rae Systems	**State Certified**	
Model Number	PGM7320	**Status**	Pass
Serial Number/ Lot Number	592-601348	**Temp °C**	25
Location	Seattle	**Humidity %**	42
Department			

Calibration Specifications

Group #	1	**Range Acc %**	0.0000
Group Name	Isobutylene	**Reading Acc %**	3.0000
Stated Accy	Pct of Reading	**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	100.0	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 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 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

Project Name:	T-30 O+M (biweekly)	Location:	Terminal 30
Project/Task No.:	60681370	Weather:	Cloudy 65°F
Date:	9/12/23	Personnel:	LC

Observations

	Time	Observation Description
1	0900	Arrive on site. Note terminal is very busy.
2		extra caution taken when driving to site.
3	0920	start taking readings from #M1 and completing
4		tasks
5	1000	While PIDs were taken on SVE wells, PID seemed
6		to be reading very high even with ambient air.
7		Did some troubleshooting - switched out Tedlar bag
8		- on/off PID
9		- send ambient air through
10		Tedlar + PID
11		Troubleshooting seemed to fix the high readings.
12	1055	start dewatering and clearing out rotometers of
13		SVE wells. Water does not seem to be re-entering
14		rotometers, product seen in SVE-9
15	1130	Finish final tasks. & Inspect hoses and observe
16		water + moisture in ~~most of it~~ LC all hoses but
17		not as much getting over the saddle horses.
18		System seems stable
19	1200	Leave site. Take caution when leaving
20		terminal.
21		
22		LC
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 51267
Description RAE MiniRAE 3000_FIRMWARE_2.22A
Calibrated 9/11/2023 6:14:49PM

Manufacturer	Rae Systems	**State Certified**	
Model Number	PGM7320	**Status**	Pass
Serial Number/ Lot Number	592-601348	**Temp °C**	25
Location	Seattle	**Humidity %**	42
Department			

Calibration Specifications

Group #	1	**Range Acc %**	0.0000
Group Name	Isobutylene	**Reading Acc %**	3.0000
Stated Accy	Pct of Reading	**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	100.0	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 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 Dzung Pham

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DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	60° cloudy
Date:	9/28/23	Personnel:	AB

Observations

	Time	Observation Description
1	1135	on-site; system on upon arrival; safety tailgate
2		Scope: biweekly O&M, Summa can sampling
3	1150	Begin taking HMI & System readings
4	1230	Summa can sampling - gauge reading 12
5		when I took it out of the box
6	1300	Summa can sample, tedlar sample, and
7		initial PID reading complete
8		PID: 4.9 ppmv
9		Thunderstorm coming in - going to run
10		Summa can samples to the lab while
11		storm passes
12	1421	Back on-site from dropping off air
13		samples - proceeding with rest of system
14		readings and PID readings
15	1509	Begin dewatering rotometers
16	1554	Dewatering complete - taking final readings
17		then calling Gus
18	1610	Talked with Gus - SVE 7's flow increased
19		significantly after dewatering
20		Begin closing up
21	1615	off-site
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 9/28/23	Field Tech(s): AB		Actual Time: 1208
PID ID: 43994	Weather: 60° cloudy		HMI Time: 1201
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	21125.0 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.7 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	14059.1 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	14054.2 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/13.7/49.4% HMI	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	52.0/10.6/93.0% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	91°	SVE Blower Dilution Valve (# turns open)	1.5
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.75	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*	0.4
AS Blower Discharge Pressure (PSI) - *PI-501*	9.25	Transfer Pump Discharge Pressure (PSI) - *PI-300*	3
SVE Blower Inlet Temperature (°F) - *TI-200*	65°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.4
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	47	SVE Blower Discharge Temperature (°F) - *TI-400*	103°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	4.9	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
Water Volume in Storage Tank[5] (gal)	266.7	Spare Volume to LAH float[6] (gal)	736.1

NOTES:

2 ticks

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				
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:

No active zones @ 14:22

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:	9/28/23	Time:	1426
Field Tech(s):	AB	PID ID:	43994
Weather:	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	28	22	25	3.0		SVE-10	33	15	15	5.9	
HSVE-3	32	36	20	9.5		SVE-9	40	—	100	5.6	Brown H_2O in rota Float stuck
SVE-4	46	—	10	3.7	Float and rod disconnected	SVE-8	←	—	0	—	
SVE-5	38	20	100	6.8	H_2O in rota	SVE-6	41	12	100	2.7	
SVE-7	41	19	100	2.6		HSVE-1	18	34	25	3.2	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	43

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:	9/28/23	Time:	1512
Field Tech(s):	AB	Pump ID:	410
Weather:	Rain		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/2	clear H_2O	SVE-10	1/2	clear H_2O; had to open red valve for H_2O to flow
HSVE-3	1/4	clear H_2O	SVE-9	3/4	Brown H_2O w/bits of product
SVE-4	1/2	clear H_2O	SVE-8	—	closed
SVE-5	1/3	Clear H_2O	SVE-6	1/2	Clear H_2O
SVE-7	1/3	Clear H_2O	HSVE-1	1/2	clear H_2O

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date:	9/28/23	Time:	1550
Field Tech(s):	AB	Weather:	59° 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	26	32	25		SVE-10	30	15	15	
HSVE-3	32	36	20		SVE-9	40	—	100	Float stuck Brown H_2O
SVE-4	44	—	10	roto off axis	SVE-8	—	—	0	closed
SVE-5	39	11	100	H_2O in roto	SVE-6	38	11	100	
SVE-7	43	58	100		HSVE-1	15	35	25	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	43

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 9/27/2023 5:32:46PM

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

State Certified
Status Pass
Temp °C 19
Humidity % 59

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 *Larry Lorenzano*

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 43994
Description MiniRAE 3000
Calibrated 9/27/2023 5:30:06PM

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

State Certified
Status Pass
Temp °C 19
Humidity % 63

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	103.0	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

SAMPLE CHAIN OF CUSTODY

Page # 1 of 1

Report To Paul Kalina & Gus Friedman
Company AECOM
Address 1111 3rd Ave Ste 1600
City, State, ZIP Seattle WA 98101
Phone 206-438-2700 Email paul.kalina@aecom.com gus.friedman@aecom.com

SAMPLERS (signature) Auto Bruya
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 BTEXN	TO15 cVOCs	APH	$CO_2/CH_4/O_2$ ~~Helium~~	TO15 GBTEX	Notes
SVE-EFF-092823		225		IA / (SG)	9/28/23	30.0	1313	5.0	1320				X		X	
SVE-EFF-092823		N/A, tedlar bag		IA / (SG)	9/28/23	N/A	1320	N/A	1321					X		
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:				
Received by:	ANHPHAN	FSB	09/28/23	13:59
Relinquished by:				
Received by:				

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

DAILY FIELD LOG

Project Information

Page 1 of 1

Project Name:	T-30	Location:	SODO
Project/Task No:		Weather:	59° rain
Date:	10/10/23	Personnel:	GF, SC

Observations

	Time	Observation Description
1	9:45	· GF & SC onsite
2		· Stage: 30 O&M
3		· Safety tailgate: crane practice is active. Keep cars parked a reasonable difference & don't walk outside
4		System enclosure without looking up first
5		
6		· System off on arrival, Zone 5 active
7		· 26.6 SCFM total going through zone 5. Bleed
8		valve 1/2 turn open. Discharge pressure @ 95 PSI
9		w/ Amps @ 10.6 (FLA = 9.4) + torque @ 93%.
10		· Collected AS & SVE readings
11		· Replaced rotameters @ AS-25, -26, and -27
12		· Pumped out the SVE-5 lateral
13	**	· → have Marina buy 10 3/4" PVC close nipples +
14		ball valves
15	13:00	· Shut system down for meggers, testing, repairs
16		· Fixed SVE-4 rotameter (rod got cockeyed)
17		· Replaced SVE-5 bottom bumper + o-ring (smashed)
18	14 15	· Took meggers.
19		· Scrubbed sight glass
20		· empties particulate filter housing (minimal accumulation)
21		· Drained poly tank 2° containment
22		· Kept system OFF for GWM. SC put LOTO on cabinet.
23		· Next time, clean SVE-9, brace AS hoses w/ strut
24	**	· Have marina order 3 - 2-3/4" bushings + 3 - 2" ball valves.
25	1515	· SC offsite
	1610	· GF offsite (took Gabion call + caught up on notes)

Comments / Site Activities / Personnel Tracking

GF 10/10/23

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 10/10/23	Field Tech(s): GF, SG		Actual Time: 1022
PID ID: 029604	Weather: 59° rain		HMI Time: 1015
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	21410.2	Sparge Zone 1 Time Span(s) Operational:	—
Transfer Pump Runtime (Hours) - *MS Pump*	7.7	Sparge Zone 2 Time Span(s) Operational:	—
AS Blower Runtime (Hours) - *Sparge Blower*	14824.4	Sparge Zone 3 Time Span(s) Operational:	—
AS Heat Exchanger Runtime (Hours)	14219.2	Sparge Zone 4 Time Span(s) Operational:	—
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42/13.5A/48.9%	Sparge Zone 5 Time Span(s) Operational:	12:00 – 3:00 5:00 – 8:00
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	52/10.6A/93%	Sparge Zone Active: 5	10:00 – 13:00 ~~13:00 – 16:00~~ 20:00 – 22:00
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	71	SVE Blower Dilution Valve (# turns open)	1.5
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.9	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*	0.5
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0.0
SVE Blower Inlet Temperature (°F) - *TI-200*	61.0	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.4
SVE Blower Inlet Vacuum (" H_2O) - *VI-200*	48.0	SVE Blower Discharge Temperature (°F) - *TI-400*	96.0
Knockout Tank Level (Sightglass % Full)[1]	15		
SVE Discharge PID (ppmv)	1.5	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)	133.4	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
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	10.1	6.5	100	
AS-24	9.4	6.5		
AS-25	9.5	2.6		
AS-26	10.4	5.4		
AS-27	9.0	7.2		

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				

10:15

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: 10/10/23	Time:
Field Tech(s): GP, SC	PID ID: 029604
Weather: 59 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

Water in SVE hose?	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Well ID	Vacuum ("H2O)	Flow (SCFMG)	Valve Pos. (% Open)	PID (ppmv)	Comments	Water in SVE hose?
Y	HSVE-2	24	31	50	0.2	✓	SVE-10	32	16.5	40	1.3	✓	N
Y	HSVE-3	31	36	40	2.9	✓	SVE-9	37	0	100	1.3	lots of water dirty rotometer	N
Y	SVE-4	43	N/M	30	0.8	rotometer rod displaced	SVE-8	—	—	0	— 29	well closed	N
N	SVE-5	38	10	100	2.4	lots of water bouncing	SVE-6	40	14	60	0.7	water	N
N	SVE-7	40	17	100	0.9	✓	HSVE-1	14	34	40	0.5	✓	Y
Dilution Valve			# Turns Open:		1.5								
			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
SVE Manifold Readings (2 of 3)

Date: 10/10/23	Time:
Field Tech(s): GF, SC	Pump ID:
Weather: 59 rain	

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	small 0.75 0.75 2.75-2.75 0.40 1.15 gal		SVE-10	0-0.4 0.40 gal	
HSVE-3	0.75-1.2: 0.45 gal		SVE-9	0.4-1.5= 0.9 gal	
SVE-4	1.2-1.75 = 0.55 gal		SVE-8	1.5-1.0= 0.1 gal	
SVE-5	1.75-2.15= 0.40 gal 4.10 gal	2.75-4 = 1.25 0-2.45 = 2.45 .40 4.10	SVE-6	1.6-1.9 0.3 gal	
SVE-7	2.15-2.5 0.35 gal		HSVE-1	1.9-2.36= 0.45 gal	

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date: 10/10/23	Time:
Field Tech(s): GF, SC	Weather: 59° 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	NM	NM	100		SVE-10	NM	NM	No change	
HSVE-3	↓	↓	100		SVE-9	↓	↓	↓	
SVE-4	↓	↓	No change		SVE-8	↓	↓	↓	
SVE-5	↓	↓	↓		SVE-6	↓	↓	↓	
SVE-7	↓	↓	↓		HSVE-1	↓	↓	↓	
Dilution Valve		# Turns Open:	1.5						
		Vacuum ("H2O):							

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): GF, SC
Date: 10/10
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	
	1.68	1.69	1.68	0.13	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	
	0.81	0.80	0.80	0.12	0.13	0.13	

AECOM

Field Tech(s): GF SC

Date: 10/10/23

T-30 Quarterly O&M Checklist

REGULAR TASKS

System ON:

- [ ] Zero out mag gauges
- [ ] Confirm mag gauges w/ a manometer
- [ ] 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:

- [ ] Test poly tank float switches
- [ ] Test KO tank float switches
- [ ] Check SVE vac gauges for zeroing
- [x] Scrub out KOT sightglass
- [x] 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

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

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 10/10/2023 11:23:04AM

Manufacturer	Solinst	**State Certified**	
Model Number	Pump	**Status**	Pass
Serial Number/ Lot Number	na	**Temp °C**	19
Location	Seattle	**Humidity %**	55
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 29604
Description RAE MiniRAE 3000
Calibrated 10/10/2023 10:45:40AM

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

State Certified
Status Pass
Temp °C 18
Humidity % 59

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	100.6	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 PPM 302-402445936-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	302-402445936-1		7/28/2026

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 Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	10/10/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Car
Prepared by	Friedman, Gus

Meeting Summary

Attendees	Friedman, Gus;Catlin, Suzanne;
Location	SODO
Tasks to be performed	Quarterly O&M (3Q)
Hazards to be considered today	pressure, noise, motion, mechanical, electrical
Will there be Lone Workers?	No
Hierarchy of controls	elimination, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	
Topic of the week	Hearing Conservation

Other topics discussed	
Hazards	• Mechanical • Motion • Noise • Pressure • Electrical

End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here

DAILY FIELD LOG

Project Information Page 1 of ____

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	10/20/23	Personnel:	GF

Observations

	Time	Observation Description
1	1715	GF onsite
2		Scope: Take gas measurements w/ GEM5000
3		CH_4 CO_2 O_2
4		0.0 1.8 19.6
5		
6		SVE & AS on in zone 5
7		~~Well~~ Well flow Vac/Pressure
8		SVE-1 28 20
9		-2 52 26
10		-3 50 33
11		SVE-4 9 28
12		-5 7 30
13		-6 13 33
14		-7 17 30
15		-8 OFF
16		-9 0 36
17		-10 10 30
18		AS-23 5 10
19		-24 5 925
20		-25 2.5 9.0
21		-26 4.5 10.25
22		-27 5.5 9.0
23	1730	GF offsite
24		
25		GF 10/20/23

SVE

PKS

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	46° sunny
Date:	10/26/23	Personnel:	AB

Observations

	Time	Observation Description
1	1126	on-site, system on upon arrival, safety tailgate
2		Scope: biweekly O&M
3		Taking HMI readings
4	1202	Taking zone reading while active
5		Taking rest of system readings
6	1235	SVE effluent PID: 1.6 ppmv
7		Begin taking manifold readings
8	1308	PID battery died while taking PID
9		readings of manifold - changing battery
10	1330	Begin dewatering
11	1346	Solinust pump external battery also dead
12		After attempting to fix it, I called Pine
13		and they are bringing me a spare
14	1428	Got a working battery - begin dewatering
15	1441	Solinist pump not turning on halfway
16		thru dewatering - moving on to post
17		dewatering readings
18	1450	Calling Gus to discuss how I should adjust
19		valve positions
20	1515	Adjusted valves per convo w/Gus
21		Closing down
22	1522	Leaving site - dropping off equipment at
23		office
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 10/26/23	Field Tech(s): AB		Actual Time: 1156
PID ID: 43994	Weather: 46° sunny		HMI Time: 1149
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	21731.6 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.8 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	14411.9 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	14406.6 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/12.7/45.6% HMI	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	52.0/10.6/93.8% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	72°	SVE Blower Dilution Valve (# turns open)	1.5
AS Blower Intake Pressure (" H2O) - *DPI-500*	1.75	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*	0.4
AS Blower Discharge Pressure (PSI) - *PI-501*	9.25	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	59°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.8
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	36	SVE Blower Discharge Temperature (°F) - *TI-400*	90°
Knockout Tank Level (Sightglass % Full)[1]	85%		
SVE Discharge PID (ppmv)	1.6	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
Water Volume in Storage Tank[5] (gal)	266.7	Spare Volume to LAH float[6] (gal)	736.1
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	5-6	100	float bobbing
AS-24	9	5.5-6.5		
AS-25	8.75	3.5		
AS-26	10.25	4.5-5		
AS-27	9	6		

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:	10/26/23	Time:	1240
Field Tech(s):	AB	PID ID:	43994
Weather:	46° 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	27	51	100	2.7		SVE-10	29	6-16	50	3.0	Float bobbing
HSVE-3	34	50		4.7		SVE-9	35	—	100	2.4	Float stuck
SVE-4	30	16		1.8	Float broken off rod	SVE-8	—	—	0	—	
SVE-5	30	23		2.1		SVE-6	28	6	100	0.4	Float Stuck
SVE-7	27	37		0.2		HSVE-1	18-20	30	50	0.8	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	36

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: 10/26/23	Time: 1330
Field Tech(s): AB	Pump ID: 46330
Weather: 47° sunny	

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2			SVE-10	1/2	clear H_2O w/odor
HSVE-3			SVE-9	1/4	muddy H_2O
SVE-4			SVE-8	-	closed
SVE-5			SVE-6	1/2	clear H_2O
SVE-7			HSVE-1	1/2	clear H_2O

Notes: Pump not functioning while trying to dewater SVE-7

Abbreviations: Gal = gallons

AECOM

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

Date: 10/26/23	Time: 1500
Field Tech(s): AB	Weather: 46° 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	26	47	100		SVE-10	27	10-20	50	Float bobbing
HSVE-3	32	46	↓		SVE-9	34	–	100	Float stuck
SVE-4	27	–	↓	Float broken off rod	SVE-8	–	–	0	
SVE-5	26	21*	↓	*float bobbing, water pushing down	SVE-6	30	12	100	
SVE-7	25	15	↓		HSVE-1	22	54	100	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	36

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 10/25/2023 4:34:40PM

State Certified
Status Pass
Temp °C 19
Humidity % 40

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

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 *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 43994
Description MiniRAE 3000
Calibrated 10/23/2023 6:46:21PM

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

State Certified
Status Pass
Temp °C 18
Humidity % 46

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	98.0	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 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-3C	Location:	Port of Seattle
Project/Task No.:		Weather:	48° cloudy
Date:	11/9/23	Personnel:	AB

Observations

	Time	Observation Description
1	1155	arrived on-site, system on upon arrival, safety tailgate
2		Scope: biweekly O&M
3	1233	When taking HMI readings, Sparge blower and heat
4		exchanger both off/stopped - no alarms
5		On the phone w/Gus and Cary to decide
6		if Sparge is broken - sparge is functional
7	1255	Taking system readings
8		PID for effluent : 1.4 ppmv
9	1323	Taking SVE readings and PID readings
10	1357	Begin dewatering
11	1445	Dewatering done - taking final readings
12		Calling Gus before to discuss
13	1508	Adjusting valve positions to observe changes
14		in flow and vacuum
15	1525	System functioning well - closing down
16	1580	Leaving site for office
17		
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 11/9/23	Field Tech(s): AZ		Actual Time: 1255
PID ID: 43994	Weather: 48° cloudy		HMI Time: 1347
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	22067.8 HMI	Sparge Zone 1 Time Span(s) Operational:	— HMI
Transfer Pump Runtime (Hours) - *MS Pump*	7.8 HMI	Sparge Zone 2 Time Span(s) Operational:	— HMI
AS Blower Runtime (Hours) - *Sparge Blower*	141607.9 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	141602.3 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/12.1/42.7% HMI	Sparge Zone 5 Time Span(s) Operational:	0000-0300, 0500-0800 1000-1300, 1500-1800, 2000-2300
AS Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	0/0/0 HMI	Sparge Zone Active:	—
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	76°	SVE Blower Dilution Valve (# turns open)	1.5
AS Blower Intake Pressure (" H2O) - *DPI-500*	0	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*	0.4
AS Blower Discharge Pressure (PSI) - *PI-501*	0	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	56°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	4.0
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	30	SVE Blower Discharge Temperature (°F) - *TI-400*	84°
Knockout Tank Level (Sightglass % Full)[1]	75%		
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
Water Volume in Storage Tank[5] (gal)	266.7	Spare Volume to LAH float[6] (gal)	736.1

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				
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:

No zone5 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:	11/9	Time:	1323
Field Tech(s):	AB	PID ID:	43994
Weather:	49° 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	26	46	100	1.9		SVE-10	24	17	50	2.4	Float bobbing
HSVE-3	32	48		3.0		SVE-9	35	–	100	2.2	Float stuck
SVE-4	24	–		1.4	Float off rod	SVE-8	–	–	0	–	
SVE-5	25	19		2.4	Float bobbing	SVE-6	22	10-15	100	0.7	
SVE-7	25	23		1.1	Float bobbing	HSVE-1	16	61	100	1.1	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	30

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:	11/9	Time:	1357
Field Tech(s):	AB	Pump ID:	46330
Weather:	49° cloudy		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	1/2	clear	SVE-10	1/2	Clear, open red valve to get all water out
HSVE-3	1/4	clear	SVE-9	1/8	Brown, oily
SVE-4	1/2	clear	SVE-8	–	well closed
SVE-5	1/2	clear	SVE-6	1/2	clear
SVE-7	1/2	clear	HSVE-1	1/2	Clear

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date:	11/9	Time:	1445
Field Tech(s):	AB	Weather:	49° 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	25	45	100		SVE-10	21	15	50	
HSVE-3	32	44			SVE-9	34	—	100	
SVE-4	22	—		Float broken	SVE-8	—	—	—	closed
SVE-5	26	10-15		Float bobbing	SVE-6	26	10-15	100	
SVE-7	27	10-30		Float bobbing	HSVE-1	16	60	100	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	30

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 11/8/2023 2:06:35PM

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

State Certified
Status Pass
Temp °C 18
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

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	SODO
Project/Task No.:		Weather:	38° F cloud
Date:	11/29/23	Personnel:	GF

Observations

	Time	Observation Description
1	1430	• GF onsite
2		• Scope: Repair SVE-4 rotameter; made dewatering
3		improvements
4		• safety tailgate - slips trips, pinch points
5		• System ON on arrival.
6		- SVE-9 rotameter very dirty
7		- SVE-10 rot. has a weird black gradient bot to top
8		- SVE-4 rod is loose off-center
9		• started work on dewatering after shutting system
10		down. One stub up was previously drilled & tapped.
11		All 9 others drilled & tapped for 3/4" NPT, Sch 80
12		nipple & ball valves added to all ten.
13	1620	• SVE-4 repair. Not sure how the rod came undone again,
14		none of the other parts appear off. Rod re-aligned &
15		rotameter replaced.
16		• SVE-7 rotameter repair - noticed the bottom rod
17		bumper was smashed down. Rotameter removed & bumper
18		& O-ring replaced. All good.
19	1700	• System restarted. All looks very good except we aren't
20		getting flow from SVE-9, which is where we still have
21		product.
22		- tested some tweaks & breakthru pressure is ~~>60~~ >70 in wc.
23		We've been running ~30 in wc to reduce water production.
24		• Pumped 4 gal from SVE-9 lateral
25		• Pumped 2 gal from SVE-4 lateral

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	38° cloudy
Date:	11/29/23	Personnel:	GF

Observations

	Time	Observation Description
1	~~XX~~	• Empties ~~m~~ 8" water from the poly tank 2° containment
2		• Pumped 1 gal from SVE-3 lateral (to drum)
3		• Pumped 1 gal from SVE-2 lateral (to drum)
4		• Pumped SVE-9 dead leg (½ - ¾ gal). No other
5		rotameters got water during the prior tinkering.
6		• SVE-6 & -10 floats were stuck at bottom but
7		bottom bumpers appear fine on each. A good smack
8		released them
9	~~X~~ *	• SVE-10 has a really strong bounce in the float. Smacking
10		the bumper multiple times per second. Need to
11		keep an eye on the bumper. Pump out lateral
12		next time?
13	* *	• The 4-in to 2-in threaded bushings Narina got were only
14		threaded on the 2-in & slip on the 4. Need 3 of the
15		right kind.
16	1800	• GF offsite. System ~~left~~ ON. Gates locked.
17		
18		
19		
20		GF
21		11/29/23
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	11/29/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Car
Prepared by	Friedman, Gus

Shift Summary

Location	Terminal 30 Seattle
Attendees (Workers)	Gus Friedman;
Attendees (Visitors)	
Tasks to be performed	Dewatering upgrades SVE 4 repair
Hazards to be considered today	pressure, motion
Will there be Lone Workers?	No
Hierarchy of controls	elimination, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Cold Weather PPE
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	
Hazards	• Motion • Pressure

DAILY FIELD LOG

Project Information

Page _____ of _____

Project Name:	T-30	Location:	Port of Seattle
Project/Task No.:		Weather:	36° cloudy
Date:	11/29/23	Personnel:	AB

Observations

	Time	Observation Description
1	0950	Arrived on-site, system on upon arrival, safety tailgate
2		Scope: biweekly O&M
3	1010	Taking HMI & system readings
4	1017	SVE discharge PID: 0.8 ppmv
5		Taking zone readings
6	1122	Taking manifold readings and PID readings
7	1200	Begin dewatering
8	1240	Taking final readings and calling Gus
9	1305	Talked w/ Gus - heading back to office
10		to drop off equipment
11	1310	off-site
12		
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: 11/29/23	Field Tech(s): AB		Actual Time: 1023
PID ID: 2762	Weather: 36° cloudy		HMI Time: 1114
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	22543.9 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*	14884.4 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	14878.6 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/12.2/43.0 HMI	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	52.0/10.7/94.3 HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	59°	SVE Blower Dilution Valve (# turns open)	1.5
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*	0.4
AS Blower Discharge Pressure (PSI) - *PI-501*	9.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	3
SVE Blower Inlet Temperature (°F) - *TI-200*	450°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	4
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	30	SVE Blower Discharge Temperature (°F) - *TI-400*	73°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	0.8	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)	1.5
Water Volume in Storage Tank[5] (gal)	400.05	Spare Volume to LAH float[6] (gal)	602.75
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

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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	5.0	100	
AS-24	9.25	5.0		
AS-25	9.5	2.0		
AS-26	10.25	4.5		
AS-27	9.0	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:	11/29/23	Time:	1123
Field Tech(s):	AB	PID ID:	27621
Weather:	36° 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	23	46	100	0.6		SVE-10	22	21	50	1.2	
HSVE-3	32	48		1.9		SVE-9	34	–	106	0.7	Float stuck
SVE-4	24	–		1.0	Float rod disconnected	SVE-8	–	–	0	–	
SVE-5	29	12		2.2		SVE-6	34	36	100	0.1	
SVE-7	24	14		0.3		HSVE-1	16	58	100	1.1	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	30

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:	11/29/23	Time:	1200
Field Tech(s):	AB	Pump ID:	46330
Weather:	36° cloudy		

SVE Dewatering

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

Notes:

Abbreviations: Gal = gallons

AECOM

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

Date: 11/29/23	Time: 1245
Field Tech(s): AB	Weather: 36° 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	21	46	100		SVE-10	20	12	50	
HSVE-3	32	50			SVE-9	32	–	100	Float stuck
SVE-4	22	–		float rod disconnected	SVE-8	—	—	0	closed
SVE-5	24	5			SVE-6	19	5	100	
SVE-7	24	15			HSVE-1	15	59	100	

Dilution Valve	# Turns Open:	1.5
	Vacuum ("H2O):	27

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 27621
Description RAE MiniRAE 3000 V2.22A
Calibrated 11/27/2023 6:27:16PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-913341
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 36

Calibration Specifications

Group # 1
Group Name VOC
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	103.5	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 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 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 46330
Description Solinst Pump
Calibrated 11/28/2023 4:57:21PM

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

State Certified
Status Pass
Temp °C 17
Humidity % 35

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 Warren Baxter

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DAILY FIELD LOG

Project Information Page _____ of _____

Project Name:	T30	Location:	Port of Seattle
Project/Task No.:		Weather:	45° cloudy
Date:	12/14/23	Personnel:	AB

Observations

	Time	Observation Description
1	1115	Arrived on-site; safety tailgate, system on upon
2		arrival - scope: biweekly O&M
3	1135	Taking HMI readings
4	1150	Begin taking system readings
5	1215	Taking zone readings
6		SVE discharge PID: 3.46 ppmv
7	1235	Taking vac & PID readings from wells
8	1330	Begin dewatering
9	1409	Taking post dewatering readings
10	1420	Calling Gus to discuss readings
11	1435	Heading to the office to drop equipment
12	1530	Back on-site, vac truck already here
13	1625	Port traffic has cleared - begin gauging
14		RW-107
15	2036	Recovery event complete - had to vac RW-107
16		three times - vacumming poly tank
17	2113	Leaving site
18		
19		
20		
21		
22		
23		
24		
25		

Comments / Site Activities / Personnel Tracking

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 12/14/23	Field Tech(s): AB		Actual Time: 1150
PID ID: 36590	Weather: 45° cloudy		HMI Time: 1240
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	22902.7 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*	15093.2 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	15087.2 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/13.4/48.5% HMI	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	52.0/10.6/93.4% HMI	Sparge Zone Active:	5
SVE/AS System Settings & Readings			
AS Heat Exchanger Discharge Temp (°F) - *TI-500*	69°	SVE Blower Dilution Valve (# turns open)	1
AS Blower Intake Pressure (" H2O) - *DPI-500*	2.25	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*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	50° >	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.6
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	412	SVE Blower Discharge Temperature (°F) - *TI-400*	86°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	3.8	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)	1.5
Water Volume in Storage Tank[5] (gal)	400.05	Spare Volume to LAH float[6] (gal)	602.75
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	7.75	—	100	
AS-24	7.0	—		
AS-25	7.0	—		
AS-26	8.0	—		
AS-27	7.0	—		

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:	12/14/23	Time:	1235
Field Tech(s):	AB	PID ID:	365910
Weather:	45° 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	30	59	100	2.0		SVE-10	42	20	100	1.3	
HSVE-3	39	56	|	1.4		SVE-9	48	–	100	1.6	float stuck
SVE-4	39	11	|	1.0		SVE-8	–	–	0	–	closed
SVE-5	42	20	|	1.2	water in roto	SVE-6	44	17	100	1.9	
SVE-7	42	17	⊥	0.8		HSVE-1	14	63	50	1.2	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	42

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:	12/14/23	Time:	1330
Field Tech(s):	AB	Pump ID:	0444106
Weather:	45° cloudy		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	∅		SVE-10	1/2	brown, muddy
HSVE-3	< 1/4	Trace amounts of water	SVE-9	1/4	brown, muddy
SVE-4	1/4	clear w/bits of debris?	SVE-8	–	closed
SVE-5	1/2	clear	SVE-6	1/2	clear
SVE-7	1/4	clear	HSVE-1	1/2	clear

Notes:

Abbreviations: Gal = gallons

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

Date:	12/14/23	Time:	1415
Field Tech(s):	AB	Weather:	45° 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	31	60	100		SVE-10	40	17	100	Product in roto
HSVE-3	39	57	1		SVE-9	50	—	100	product in roto
SVE-4	43	16	1		SVE-8	—	—	0	
SVE-5	52	43	1		SVE-6	38	13	100	
SVE-7	41	20	1		HSVE-1	18	65	50	

Dilution Valve	# Turns Open:	1
	Vacuum ("H2O):	48

Notes:

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

AECOM

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
530 Pylon Drive
Raleigh, NC 27606
Phone: (919) 713-0008

Pine Environmental Services, Inc.

Instrument ID 36950
Description MIniRae 3000 V2.22A
Calibrated 12/12/2023 11:26:34AM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-918800
Location North Carolina
Department

State Certified
Status Pass
Temp °C 16
Humidity % 51

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	104.00	99.80	-0.20%	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

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
29 Washington Avenue, Unit A
Scarborough, ME 04074
Toll-free: (888) 779-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 44106
Description Solinst Pump
Calibrated 12/12/2023 5:48:40PM

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

State Certified
Status Pass
Temp °C 18
Humidity % 43

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 Warren Baxter

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DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	seattle
Project/Task No.:		Weather:	
Date:	12/27/23	Personnel:	GF, AB

Observations

	Time	Observation Description
1	11:00	• GF & AB on site
2		• System ON & looking good. Zone 5 active
3		• Safety tailgate. Traffic (busy today) pinch points, trips
4		• Scope: 4Q O&M w/ vapor sample
5		• SVE deck - SVE-5 & -10 floats are sticking, some debris
6		visible. SVE-9 dirty w/ product.
7		• AS rotameters have some water in them but look clear & good.
8		• SVE rotameters basically clear of water. SVE hoses w/
9		water present: 1, 2, 3, 4
10	11:39	• GF prepping Summa can. Initial vac for leak test is 30" Hg.
11	11:44	→ Summa gauge still at 30" Hg, leak test passed.
12		• Completes remaining std O&M tasks
13		- SVE-10 water is an emulsified opaque brown, diff from
14		what I'm used to seeing.
15		- No flow @ SVE-9 still
16		- water accumulation pretty minimal. Several sumps not
17		full. Got the most from the SVE-10 lateral (~2 gal)
18		SVE-2 & -3 hoses retained some water even after
19		pumping out the lateral
20		- Decreased flows at HSVE-1, -2, & -3 to bump flows @ to 50-60
21		the other wells, specifically SVE-4 & -5. Got them consistently
22		up to ~10 scfm.
23	~~XX~~	- the sample port tee at SVE-2 is loose, I think it's a
24		broken close nipple btw the tee and the bushing @ manifold.
25		I've emailed Marina asking for new ¼" NPT nipples.

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	12/27/23	Personnel:	GF, AB

Observations

	Time	Observation Description
1	1400	System shut down for BG maintenance
2		- tested alarms, poly tank low & high floats + KOT float
3	**	* All good. Did not received notifications (email HOK?)
4		- checked the particulate filter, looks good
5		- scrubbed the KOT & cleaned the rod & floats
6		- No manometer on site to QC the mag gauges
7		⇒ the influent flow gauge somehow has condensate
8		accumulated on the inside of the face plate. Tubing
9		has been kept disconnected for months now.
10		- Removed SVE-4 rotameter for cleaning + the bottom
11		nipple cracked in half. Removed the halves & replaced
12		the nipple. Cleaned & reinstalled the rotameter.
13		- Shut down power & took megger readings
14		- exercised all valves in piping
15		- checked three 5 pressure gauges. Ranged ~5-6 PSI.
16		No variance clear / significant enough to mark or
17		warrant a gauge replacement.
18		- checked SVE gauges. SVE-3 was ~3" wc @ rest & got
19		replaced. Several others appeared high but topped to
20		zero when tapped
21	1510	· System restarted
22		· Area cleaned up & gates locked up.
23	1520	· GF & AB offsite
24		
25		GF 12/27/23

Comments / Site Activities / Personnel Tracking

Field Tech(s): AB, GF

Date: 12/27/23

T-30 Quarterly O&M Checklist

REGULAR TASKS

System ON:

- [x] Zero out mag gauges
- [X] Confirm mag gauges w/ a manometer – no manometer on-site
- [x] 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:

- [x] Test poly tank float switches
- [x] Test KO tank float switches
- [x] Check SVE vac gauges for zeroing
- [x] Scrub out KOT sightglass
- [x] 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

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

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Data

Date: 12/27/23	Field Tech(s): AB, GF		Actual Time: 1115
PID ID: 41369	Weather: 53°F cloudy		HMI Time: 1208
SVE/AS Control Panel			
SVE Blower Runtime (Hours)	23212.7 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*	15273.3 HMI	Sparge Zone 3 Time Span(s) Operational:	— HMI
AS Heat Exchanger Runtime (Hours)	15267.1 HMI	Sparge Zone 4 Time Span(s) Operational:	— HMI
SVE Blower VFD Setpoints (Hertz/Amps/Torque %) - VFD	42.0/13.9/50.1% HMI	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	52.0/10.6/93.6% 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*	0.7
AS Blower Discharge Pressure (PSI) - *PI-501*	8.5	Transfer Pump Discharge Pressure (PSI) - *PI-300*	0
SVE Blower Inlet Temperature (°F) - *TI-200*	52°	SVE Blower Discharge Pressure (" H_2O) - *PI-400*	3.4
SVE Blower Inlet Vacuum (" H_20) - *VI-200*	48	SVE Blower Discharge Temperature (°F) - *TI-400*	90°
Knockout Tank Level (Sightglass % Full)[1]	0%		
SVE Discharge PID (ppmv)	1.9	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

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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	4.0	100	
AS-24	8.5	4.5	"	
AS-25	8.25	1.5	"	
AS-26	9.25	4.0	"	
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 (1 of 3)

Date:	12/27/23	Time:	1154
Field Tech(s):	AB, GF	PID ID:	41369
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	31	60	100	0.4		SVE-10	28	-	100	1.3	Float Stuck
HSVE-3	41	56	|	0.5		SVE-9	51	-	100	1.4	Float Stuck
SVE-4	40	10	|	0.5		SVE-8	-	-	Ø	-	closed
SVE-5	48	9	|	0.5		SVE-6	45	13	100	0.8	
SVE-7	45	21	|	0.4		HSVE-1	18	65	50	0.7	

Dilution Valve	# Turns Open:	1.2
	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
SVE Manifold Readings (2 of 3)

Date:	12/27/23	Time:	1220
Field Tech(s):	AB, GF	Pump ID:	044106
Weather:	35° cloudy		

SVE Dewatering

Well ID	Dewater (Gal)	Comments	Well ID	Dewater (Gal)	Comments
HSVE-2	Ø		SVE-10	1/2	very brown and muddy
HSVE-3	trace	clear	SVE-9	trace	small amount of brown water
SVE-4	1/3	clear w/bits of debris	SVE-8	–	closed
SVE-5	trace	clear	SVE-6	1/3	clear
SVE-7	1/2	clear	HSVE-1	1/3	clear w/bits of debris

Notes: 3/4 gal out of HSVE-1 lateral - clear H_2O
2 1/4 gal out of SVE-10 lateral - dirty brown H_2O

Abbreviations: Gal = gallons

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1/4 gal out of SVE-4 & HSVE-2
1 gal out of SVE-7

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

Date:	12/27/23	Time:	1325
Field Tech(s):	AB, GF	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	30	60	100		SVE-10	43	17-27	100	
HSVE-3	38	56			SVE-9	49	-	100	Float Stuck
SVE-4	39	7			SVE-8	-	-	0	closed
SVE-5	42	8			SVE-6	45	12	100	
SVE-7	41	12			HSVE-1	16	65	50	

Dilution Valve	# Turns Open:	1.2
	Vacuum ("H2O):	45

Notes:

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

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PORT OF SEATTLE - TERMINAL 30
Megger Testing of Motor Windings

Field Tech(s): AB, GP
Date: 12/27/23

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	
	1.63	1.61	1.61	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	
	0.85	0.85	0.85	0.12	0.12	0.12	

T-30 Summa Can Vapor Sampling Field Form

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

Date: 12/27/23 Field Personnel: AB, GF

Weather: 55° Cloudy Weather Barometric Pressure (in Hg): 29.80

Sample ID: SVE-EFF-122723 (INLET/DISCHARGE-mmddyy)

Sample Port Description: SVE Effluent

Conditions at Sample Port:

Pressure (PSI)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.4	90°F	1.9	23212.7

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	5 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]
2295	111	1L	30	Sample Start: 1157	12/27/23	5.0
Analyses Requested: TO15-BTEX, APH				Sample End: 1203	12/27/23	

[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 took Tedlar for CH_4, CO_2, O_2

SAMPLE CHAIN OF CUSTODY

Report To Paul Kalina, Gus Friedman
Company AECOM
Address 1111 3rd Ave Ste 1600
City, State, ZIP Seattle, WA 98101
Phone 206 438-2700 Email Paul.Kalina@aecom.com Gus.Friedman@aecom.com

SAMPLERS (*signature*) Gus F

PROJECT NAME & ADDRESS	PO #
Terminal 30	
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	TO15 cVOCs	APH	Helium	CH_4, CO_2, O_2	Notes
SVE-EFF-122723		2295	111	IA / (SG)	12/27/23	30	11:57	5	12:03		X		X			
SVE-EFF-122723		N/A: Tedlar	N/A	IA / (SG)	12/27/23	N/A	11:58	N/A	N/A						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

FORMS\COC\COCTO-15.DOC

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Gus F	Gus Friedman	AECOM	12/27/23	15:48
Received by:		ANHPHAN	FB	12/27/23	15:40
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 41369
Description MIniRae 3000
Calibrated 12/19/2023 12:29:16PM

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

State Certified
Status Pass
Temp °C 18
Humidity % 48

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	106.8	100.8	0.80%	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 *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 12/20/2023 12:53:08PM

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

State Certified
Status Pass
Temp °C 18
Humidity % 47

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 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

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: 3/15/23 Field Personnel: GF

Weather: 45 cloudy Weather Barometric Pressure (in Hg): 30

Sample ID: SVE-EFF-031523 (INLET/DISCHARGE-mmddyy)

Sample Port Description: SVE discharge pipe

Conditions at Sample Port:

Pressure (~~PSI~~)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
2.4" WC	110	12.6	16496.7

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	15:59-16:07	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]
0990	242	1L	30	Sample Start: 1615	3/15/23	5.0
Analyses Requested: TO15-BTEX; APH				Sample End: 1620	3/15/23	

[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:

✓ New sample nomenclature since the oxidizer is now offline. No longer "Inlet", now "SVE-EFF".

AECOM

T-30 Summa Can Vapor Sampling Field Form

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

Date: 6/22/23 Field Personnel: AB

Weather: 70 F Weather Barometric Pressure (in Hg): NM

Sample ID: SVE-EFF-062223 (INLET/~~DISCHARGE~~-mmddyy)

Sample Port Description: SVE Effluent

Conditions at Sample Port:

Pressure (PSI)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
2.9	116°	4.9	18799.3

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	✓	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]
3390	111	1L	30	Sample Start: 1405	6/22	5
Analyses Requested: TO15 GBTEX				Sample End: 1412	6/22	

[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:

AECOM

T-30 Summa Can Vapor Sampling Field Form

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

Date: 9/28/23 Field Personnel: AB

Weather: 60° cloudy Weather Barometric Pressure (in Hg): NM

Sample ID: SVE-EFF-092823 (INLET/~~DISCHARGE~~-mmddyy)

Sample Port Description: SVE effluent

Conditions at Sample Port:

Pressure (PSI)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.4	103°	4.9	21125.0

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]
225	NM	1L	-30	Sample Start: 1313	9/28	5
Analyses Requested: TO15 GRO/BTEX, APH				Sample End: 1320	9/28	

[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:

T-30 Summa Can Vapor Sampling Field Form

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

Date: 12/27/23 Field Personnel: AB, GF

Weather: 55° Cloudy Weather Barometric Pressure (in Hg): 29.80

Sample ID: SVE-EFF-122723 (INLET/DISCHARGE-mmddyy)

Sample Port Description: SVE Effluent

Conditions at Sample Port:

Pressure (PSI)	Temperature (°F)	VOCs via PID (ppmv)	SVE Runtime (hrs)
3.4	90°F	1.9	23212.7

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	5 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]
2295	111	1L	30	Sample Start: 1157	12/27/23	5.0
Analyses Requested: TO15-BTEX, APH				Sample End: 1203	12/27/23	

[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 took Tedlar for CH_4, CO_2, O_2

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

March 28, 2023

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 16, 2023 from the T-30, F&BI 303280 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
c: Gus Friedman
AEC0328R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 16, 2023 by Friedman & Bruya, Inc. from the AECOM T-30, F&BI 303280 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
303280 -01	SVE-Eff-031523

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-031523	Client:	AECOM
Date Received:	03/16/23	Project:	T-30, F&BI 303280
Date Collected:	03/15/23	Lab ID:	303280-01 1/15
Date Analyzed:	03/22/23	Data File:	032130.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	29,000
APH EC9-12 aliphatics	14,000
APH EC9-10 aromatics	<370

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30, F&BI 303280
Date Collected:	Not Applicable	Lab ID:	03-0663 MB
Date Analyzed:	03/21/23	Data File:	032112.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	79	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-031523	Client:	AECOM
Date Received:	03/16/23	Project:	T-30, F&BI 303280
Date Collected:	03/15/23	Lab ID:	303280-01 1/15
Date Analyzed:	03/22/23	Data File:	032130.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	107	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<4.8	<1.5
Toluene	<280	<75
Ethylbenzene	<6.5	<1.5
m,p-Xylene	<13	<3
o-Xylene	<6.5	<1.5
Naphthalene	<3.9	<0.75

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30, F&BI 303280
Date Collected:	Not Applicable	Lab ID:	03-0663 MB
Date Analyzed:	03/21/23	Data File:	032112.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	82	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.32	<0.1
Toluene	<19	<5
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	<0.26	<0.05

Date of Report: 03/28/23
Date Received: 03/16/23
Project: T-30, F&BI 303280

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 303269-01 1/4.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	<350	<350	nm
APH EC9-12 aliphatics	ug/m3	<120	<120	nm
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	71	70-130
APH EC9-12 aliphatics	ug/m3	67	94	70-130
APH EC9-10 aromatics	ug/m3	67	93	70-130

Date of Report: 03/28/23
Date Received: 03/16/23
Project: T-30, F&BI 303280

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 303269-01 1/4.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.5	<1.5	nm
Toluene	ug/m3	<89	<89	nm
Ethylbenzene	ug/m3	<2	<2	nm
m,p-Xylene	ug/m3	<4.1	<4.1	nm
o-Xylene	ug/m3	<2	<2	nm
Naphthalene	ug/m3	<1.2	<1.2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	83	70-130
Toluene	ug/m3	51	90	70-130
Ethylbenzene	ug/m3	59	79	70-130
m,p-Xylene	ug/m3	120	91	70-130
o-Xylene	ug/m3	59	93	70-130
Naphthalene	ug/m3	71	80	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 high; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

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

303275 GWB 3/16 303280

SAMPLE CHAIN OF CUSTODY

03/16/23

Page # 1 of 1

Report To Gus Friedman & Paul Kalina

Company AECOM

Address 1111 3rd Ave #1600

City, State, ZIP Seattle, WA 98101

Phone 206 343 4784 Email gus.friedman@aecom.com; paul.kalina@aecom.com

SAMPLERS (*signature*) Gus F

PROJECT NAME & ADDRESS T-30

PO #

NOTES:

INVOICE TO Paul Kalina

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 SIM BTEX	Notes
SVE-EFF-031523	01	9990	242	IA / (SG)	3/15/23	30	1615	5	1620				(X)		X	(X) APH per GF/PK 3/24/23 MG
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Gus F	Gus Friedman	AECOM	3/16/23	1610
Received by: Wesley Ead	Wesley Ead	FBI	3/16/23	1610
Relinquished by:				
Received by:		Samples received at 20 °C		

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

DW

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

July 5, 2023

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 22, 2023 from the T-30, F&BI 306367 project. There are 5 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Gus Friedman
AEC0705R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 22, 2023 by Friedman & Bruya, Inc. from the AECOM T-30, F&BI 306367 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
306367 -01	SVE-EFF-062223

The TO-15 gasoline range concentrations were quantified using a single point calibration at 80 ppbv.

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVE-EFF-062223	Client:	AECOM
Date Received:	06/22/23	Project:	T-30, F&BI 306367
Date Collected:	06/22/23	Lab ID:	306367-01 1/8.3
Date Analyzed:	06/29/23	Data File:	062832.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	109	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<2.7	<0.83
Toluene	<63	<17
Ethylbenzene	<3.6	<0.83
m,p-Xylene	<7.2	<1.7
o-Xylene	<3.6	<0.83
Gasoline Range Organics	12,000	3,000

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30, F&BI 306367
Date Collected:	Not Applicable	Lab ID:	03-1467 MB
Date Analyzed:	06/28/23	Data File:	062817.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	89	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
Gasoline Range Organics	<330	<80

Date of Report: 07/05/23
Date Received: 06/22/23
Project: T-30, F&BI 306367

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 306421-01 1/5.1 (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	8.4	8.2	2
o-Xylene	ug/m3	4.5	4.3	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	109	70-130
Toluene	ug/m3	51	107	70-130
Ethylbenzene	ug/m3	59	104	70-130
m,p-Xylene	ug/m3	120	97	70-130
o-Xylene	ug/m3	59	107	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.

306367

SAMPLE CHAIN OF CUSTODY

06/22/23

Page # 1 of 1

Report To Paul Kalina & Gus Friedman
Company AECOM
Address 1111 3rd Ave Ste 1600
City, State, ZIP Seattle WA 98101
Phone 206-438-2100 Email paul.kalina@aecom.com
gus.friedman@aecom.com

SAMPLERS (*signature*) Austin Bragg

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 BTEXN	TO15 cVOCs	APH	Helium	TO15 GBTEX	Notes
SVE TBG-EFF-062223	01	3390	111	IA / (SG)	6/22/23	30.0	1405	5.0	1412						X	
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

Samples received at 18 oC

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Austin Bragg	Austin Bragg	AECOM	6/22/23	4:45p
Received by:	Eric Glover	F&B	6/22/23	16:48p
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 Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

October 16, 2023

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 28, 2023 from the T-30, F&BI 309495 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
c: Gus Freidman
AEC1016R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 28, 2023 by Friedman & Bruya, Inc. from the AECOM T-30, F&BI 309495 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
309495 -01	SVE-EFF-092823
309495 -02	SVE-EFF-092823

Non-petroleum compounds identified in the air phase hydrocarbon (APH) ranges were subtracted per the MA-APH method.

Sample SVE-EFF-092823 was sent to Fremont Analytical 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-092823	Client:	AECOM
Date Received:	09/28/23	Project:	T-30, F&BI 309495
Date Collected:	09/28/23	Lab ID:	309495-01 1/7.4
Date Analyzed:	10/07/23	Data File:	100633.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	112	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	7,100
APH EC9-12 aliphatics	3,100
APH EC9-10 aromatics	<180

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30, F&BI 309495
Date Collected:	Not Applicable	Lab ID:	03-2319 MB
Date Analyzed:	10/06/23	Data File:	100612.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-092823	Client:	AECOM
Date Received:	09/28/23	Project:	T-30, F&BI 309495
Date Collected:	09/28/23	Lab ID:	309495-01 1/7.4
Date Analyzed:	10/07/23	Data File:	100633.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	112	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<2.4	<0.74
Toluene	<56	<15
Ethylbenzene	<3.2	<0.74
m,p-Xylene	<6.4	<1.5
o-Xylene	<3.2	<0.74

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	T-30, F&BI 309495
Date Collected:	Not Applicable	Lab ID:	03-2319 MB
Date Analyzed:	10/06/23	Data File:	100612.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	85	70	130

Compounds:	Concentration ug/m3	Concentration 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: 10/16/23
Date Received: 09/28/23
Project: T-30, F&BI 309495

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 310114-01 1/4.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	570	580	2
APH EC9-12 aliphatics	ug/m3	<120	<120	nm
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	85	70-130
APH EC9-12 aliphatics	ug/m3	67	105	70-130
APH EC9-10 aromatics	ug/m3	67	84	70-130

Date of Report: 10/16/23
Date Received: 09/28/23
Project: T-30, F&BI 309495

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 310114-01 1/4.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.6	<1.6	nm
Toluene	ug/m3	<37	<37	nm
Ethylbenzene	ug/m3	12	12	0
m,p-Xylene	ug/m3	6.4	6.1	5
o-Xylene	ug/m3	2.4	2.1	13

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	96	70-130
Toluene	ug/m3	51	106	70-130
Ethylbenzene	ug/m3	59	99	70-130
m,p-Xylene	ug/m3	120	104	70-130
o-Xylene	ug/m3	59	110	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.

309495

SAMPLE CHAIN OF CUSTODY 09/28/23

Report To Paul Kalina & Gus Friedman
Company AECOM
Address 1111 3rd Ave Ste 1600
City, State, ZIP Seattle WA 98101
Phone 206-438-2700 Email paul.kalina@aecom.com gus.friedman@aecom.com

SAMPLERS (*signature*) Austin Bragg

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 BTEXN	TO15 cVOCs	APH	CO_2/CH_4/O_2 Helium	TO15 GBTEX	Notes
SVE-EFF-092823	01	225		IA / (SG)	9/28/23	>30.0	1313	5.0	1320				X		X	
SVE-EFF-092823	02	N/A, tedlar bag		IA / (SG)	9/28/23	N/A	1326	N/A	1321					X		
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG							Samples received at 20 °C					
				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	9/28/23	13:59
Received by:	ANHPHAN	FSB	09/28/23	13:59
Relinquished by:				
Received by:				

FORMS\COC\COCTO-15.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

January 10, 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 December 27, 2023 from the Terminal 30 PN 60681370, F&BI 312443 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
c: Gus Friedman
AEC0110R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on December 27, 2023 by Friedman & Bruya, Inc. from the AECOM Terminal 30, F&BI 312443 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
312443 -01	SVE-EFF-122723
312443 -02	SVE-EFF-122723

Sample SVE-EFF-122723 was sent to Fremont Analytical for major gases analysis. The report is enclosed.

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-122723	Client:	AECOM
Date Received:	12/27/23	Project:	Terminal 30 PN 60681370
Date Collected:	12/24/23	Lab ID:	312443-01 1/7.9
Date Analyzed:	01/03/24	Data File:	010228.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
APH EC5-8 aliphatics	5,600
APH EC9-12 aliphatics	2,100
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:	Terminal 30 PN 60681370
Date Collected:	Not Applicable	Lab ID:	04-0043 mb
Date Analyzed:	01/02/24	Data File:	010211.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
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-122723	Client:	AECOM
Date Received:	12/27/23	Project:	Terminal 30 PN 60681370
Date Collected:	12/27/23	Lab ID:	312443-01 1/7.9
Date Analyzed:	01/03/24	Data File:	010228.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	<2.5	<0.79
Toluene	<60	<16
Ethylbenzene	<3.4	<0.79
m,p-Xylene	<6.9	<1.6
o-Xylene	<3.4	<0.79

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	Terminal 30 PN 60681370
Date Collected:	Not Applicable	Lab ID:	04-0043 mb
Date Analyzed:	01/02/24	Data File:	010211.D
Matrix:	Air	Instrument:	GCMS8
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: 01/10/24
Date Received: 12/27/23
Project: Terminal 30, F&BI 312443

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 312443-01 1/7.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	5,600	5,400	4
APH EC9-12 aliphatics	ug/m3	2,100	2,000	5
APH EC9-10 aromatics	ug/m3	<200	<200	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	84	70-130
APH EC9-12 aliphatics	ug/m3	67	94	70-130
APH EC9-10 aromatics	ug/m3	67	90	70-130

Date of Report: 01/10/24
Date Received: 12/27/23
Project: Terminal 30, F&BI 312443

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 312443-01 1/7.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<2.5	<2.5	nm
Toluene	ug/m3	<60	<60	nm
Ethylbenzene	ug/m3	<3.4	<3.4	nm
m,p-Xylene	ug/m3	<6.9	<6.9	nm
o-Xylene	ug/m3	<3.4	<3.4	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	88	70-130
Toluene	ug/m3	51	101	70-130
Ethylbenzene	ug/m3	59	96	70-130
m,p-Xylene	ug/m3	120	98	70-130
o-Xylene	ug/m3	59	101	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.

SAMPLE CHAIN OF CUSTODY

312443 — 12/27/23

Page # 1 of 1

Report To Paul Kalina, Gus Friedman

Company AECOM

Address 1111 3rd Ave Ste 1600

City, State, ZIP Seattle, WA 98101

Phone 206 438-2700 Email Paul.Kalina@aecom.com Gus.Friedman@aecom.com

SAMPLERS (*signature*) [signature]

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	TO15 cVOCs	APH	Helium	CH_4, CO_2, O_2	Notes
SVE-EFF-122723	01	2295	111	IA / (SG)	12/27/23	30	11:57	5	12:03		X		X			
SVE-EFF-122723	02	N/A. Tedlar	N/A	IA / (SG)	12/27/23	N/A	11:58	N/A	N/A						X	
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG					Samples received at 21 °C							
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	Gus Friedman	AECOM	12/27/23	15:48
Received by: [signature]	ANHPHAN	FSB	12/27/23	15:48
Relinquished by:				
Received by:				

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

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: 312443
Work Order Number: 2312580

January 02, 2024

Attention Michael Erdahl:

Fremont Analytical, Inc. received 1 sample(s) on 12/28/2023 for the analyses presented in the following report.

Major Gases by EPA Method 3C

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *01/02/2024*

CLIENT: Friedman & Bruya
Project: 312443
Work Order: 2312580

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2312580-001	SVE-EFF-122723	12/27/2023 11:58 AM	12/28/2023 2:02 PM

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

Original

Case Narrative

WO#: **2312580**
Date: **1/2/2024**

CLIENT: Friedman & Bruya
Project: 312443

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: **2312580**
Date Reported: **1/2/2024**

CLIENT: Friedman & Bruya
Project: 312443

Lab ID: 2312580-001 **Collection Date:** 12/27/2023 11:58:00 AM
Client Sample ID: **SVE-EFF-122723** **Matrix:** Air

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Major Gases by EPA Method 3C				Batch ID: R88656		Analyst: NR
Carbon Dioxide	1.39	0.0500		%	1	12/29/2023 2:47:00 PM
Carbon Monoxide	ND	0.0500		%	1	12/29/2023 2:47:00 PM
Methane	ND	0.0500		%	1	12/29/2023 2:47:00 PM
Nitrogen	78.1	0.0500		%	1	12/29/2023 2:47:00 PM
Oxygen	20.5	0.0500		%	1	12/29/2023 2:47:00 PM
Hydrogen	ND	0.0500		%	1	12/29/2023 2:47:00 PM
BTU	ND			BTU/ft^3	1	12/29/2023 2:47:00 PM

Work Order: 2312580
CLIENT: Friedman & Bruya
Project: 312443

QC SUMMARY REPORT

Major Gases by EPA Method 3C

Sample ID: **LCS-R88656** SampType: **LCS** Units: **%** Prep Date: **12/29/2023** RunNo: **88656**
Client ID: **LCSW** Batch ID: **R88656** Analysis Date: **12/29/2023** SeqNo: **1851798**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Carbon Dioxide	99.5	0.0500	100.0	0	99.5	70	130				
Carbon Monoxide	99.4	0.0500	100.0	0	99.4	70	130				
Methane	99.5	0.0500	100.0	0	99.5	70	130				
Nitrogen	100	0.0500	100.0	0	100	70	130				
Oxygen	99.7	0.0500	100.0	0	99.7	70	130				
Hydrogen	97.8	0.0500	100.0	0	97.8	70	130				

Sample ID: **2312580-001AREP** SampType: **REP** Units: **%** Prep Date: **12/29/2023** RunNo: **88656**
Client ID: **SVE-EFF-122723** Batch ID: **R88656** Analysis Date: **12/29/2023** SeqNo: **1851797**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Carbon Dioxide	1.42	0.0500						1.394	1.52	30	
Carbon Monoxide	ND	0.0500						0		30	
Methane	ND	0.0500						0		30	
Nitrogen	78.1	0.0500						78.14	0.0291	30	
Oxygen	20.5	0.0500						20.47	0.00690	30	
Hydrogen	ND	0.0500						0		30	
BTU	ND							0	0	30	

Fremont Analytical
An Alliance Technical Group Company

Sample Log-In Check List

Client Name:	FB	Work Order Number:	2312580
Logged by:	Clare Griggs	Date Received:	12/28/2023 2:02:00 PM

Chain of Custody

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

Log In

3.	Custody Seals present on shipping container/cooler? (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

2312580

Page # 1 of 1

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
Fremont

PROJECT NAME/NO.	PO #
312443	D-605

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	dissolved aluminum	ferrous iron	ferrous iron	dissolved gases	TOC					Notes
SVE-EFF-122723		12/27/2023	1158	vapor	1	x										

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	12/28/23	0713
Received by:		Ali Miller	FAI	12/28/23	1402
Relinquished by:					
Received by:					

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 2023		
From	Lucy Panteleeff, Chemist Jennifer Garner, Chemist		
Date	March 30, 2023		

The summary data quality review of one vapor sample collected on March 15, 2023, has been completed. The samples were analyzed at Friedman & Bruya, Inc. located in Seattle, Washington for aliphatic hydrocarbons (APHs) by Massachusetts Department of Environmental Protection Method MA-APH, and benzene, toluene, ethylbenzene, and total xylenes (BTEX), and naphthalene 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 303280:

Sample ID	Laboratory ID
SVE-Eff-031523	303280 -01

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/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 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 2022
Laboratory Group: 303280

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, BTEX, and naphthalene by the methods identified 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 were performed using samples from unrelated projects. Results were comparable.

6. Reporting Limits – Acceptable

   General – The reporting limits were raised for all analyses due to dilution and/or sample cannister pressure.

Overall Assessment of Data

The data reported in this laboratory group, as qualified, are considered to be usable for meeting project objectives. The completeness for Friedman & Bruya, Inc. laboratory group 303280 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 2023		
From	Amelia McArthur, Chemist Lucy Panteleeff, Chemist		
Date	August 9, 2023		

The summary data quality review of one vapor sample collected on June 22, 2023, has been completed. The sample was analyzed at Friedman & Bruya, Inc. located in Seattle, Washington for benzene, toluene, ethylbenzene, and total xylenes (BTEX) and gasoline-range TPH 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 306367:

Sample ID	Laboratory ID
SVE-EFF-062223	306367 -01

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 – June 2023
Laboratory Group: 306367

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 BTEX, and gasoline-range organics by EPA Method TO-15.

1. Holding Times – Acceptable

2. Blanks – Acceptable

3. Surrogates – Acceptable

4. Laboratory Control Sample (LCS) – Acceptable

5. Laboratory Duplicate – Acceptable

   General – Laboratory duplicates were performed using a sample from an unrelated project. Results were comparable.

6. Reporting Limits – Acceptable

   General – The reporting limits were raised for BTEX 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 306367 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 2023		
From	Amelia McArthur, Chemist Lucy Panteleeff, Chemist		
Date	November 1, 2023		

The summary data quality review of one vapor sample collected on September 28, 2023, 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 Fremont Analytical located in Seattle, Washington and analyzed for and gases carbon dioxide, methane, and oxygen 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 309495:

Sample ID	Laboratory ID	Requested Analyses
SVE-EFF-092823	309495 -01	APH, BTEX
SVE-EFF-092823	309495 -02	Carbon dioxide, Methane, Oxygen

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 – September 2023
Laboratory Group: 309495

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 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

   General – Laboratory duplicates were performed using a sample from an unrelated project. Results were comparable.

6. Reporting Limits – Acceptable

   General – The reporting limits were raised for C9-10 aromatics and BTEX 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 309495 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 2023		
From	Lucy Panteleeff, Chemist Jennifer B. Garner, Chemist		
Date	January 23, 2024		

The summary data quality review of one vapor sample collected on December 27, 2023, 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 Fremont Analytical located in Seattle, Washington and analyzed for and gases (carbon dioxide, methane, and oxygen) by EPA Method 3C. The laboratories 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 312443:

Sample ID	Laboratory ID	Requested Analyses
SVE-EFF-122723	312443 -01	APH, BTEX
SVE-EFF-122723	312443 -02	Carbon dioxide, Methane, Oxygen

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 – September 2023
Laboratory Group: 312443

Sample Receipt

Upon receipt by the laboratories, the sample container information was compared to the associated 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 where applicable

4. Laboratory Control Sample (LCS) – Acceptable

5. Laboratory Duplicate – Acceptable

   BTEX by EPA TO-15 – A laboratory duplicate was performed using SVE-EFF-122723. Results were comparable.

   APHs by MA-APH – A laboratory duplicate was performed using SVE-EFF-122723. Results were comparable.

   Gases by EPA 3C – A laboratory duplicate was performed using SVE-EFF-122723. 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 312443 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 12, 2023)

Closest Low Tide: 19:41

Closest High Tide: 12:11

Avg
7.91

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet	LNAPL Thickness (Feet)	Corrected DTW[1] (Feet BTOC)	Comments
MW-35	1720	--	8.24	0.00	8.24	--
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	1724	7.84	8.05	0.21	7.85	--
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	1755	7.60	7.63	0.03	7.60	Product dark & viscous on probe
RW-12	1751	8.12	8.18	0.06	8.12	--
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	1728	--	7.69	0.00	7.69	--
RW-104	1742	--	7.85	0.00	7.85	--
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	1749	--	7.52	0.00	7.52	--
RW-107	1730	8.00	8.32	0.32	8.02	--
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	1738	--	8.28	0.00	8.28	--

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 9, 2023)

Closest Low Tide: 13:33

Closest High Tide: 17:00

Avg
8.49

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW (Feet	Comments
MW-35	1655	--	8.46	0.00	8.46	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	1713	--	8.58	0.00	8.58	Odor
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	1736	7.95	8.00	0.05	7.95	Very strong odor
RW-12	1722	8.83	8.90	0.07	8.83	--
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	1704	--	8.35	0.00	8.35	--
RW-104	1732	--	8.10	0.00	8.10	--
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	1659	8.36	8.41	0.05	8.36	Strong odor
RW-107	1726	8.70	9.07	0.37	8.72	--
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	1728	--	9.02	0	9.02	--

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 9, 2023)

Avg DTW: 8.55

Nearest High Tide: 18:11

Nearest Low Tide: 12:17

	Initial Gauging					First Removal							Second Removal							Third 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 DTW (Feet 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)	Time Lapse Since Extraction (minutes)
MW-35	1657	8.37	8.38	0.01	8.37	20	2020	2040	2040	--	10.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	1721	--	8.56	0.00	8.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	1728	7.99	8.01	0.02	7.99	20	1920	1940	1940	--	11.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-12	1714	8.9	8.99	0.09	8.91	20	1800	1820	1820	--	11.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	1711	--	8.51	0.00	8.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-104	1702	--	8.16	0.00	8.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-105	*Removed from LNAPL monitoring protocol following 09/08/22 event*																														
RW-106	1706	8.5	8.6	0.1	8.51	20	1820	1840	1840	9.15	9.16	0.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-107	1652	8.78	9.33	0.55	8.81	60	1700	1800	1800	9.46	9.79	0.33	30	1840	1910	1910	9.91	10.24	0.33	30	1950	2010	2010	9.55	9.65	0.1	--	--	--	--	--
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	1718	--	9.11	0.00	9.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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):	**1400**
Estimated combined volume, measured by DH the following day (gal):	**1602.7**
--> Estimated product portion (gal):	**32.78**
--> Estimated water portion (gal):	**1569.92**

COMMENTS:

RW-107 not vac'd further as the three-vac threshold was reached.

RW-106 was not vac'd a second time due to time constraints.

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 measureme

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 (April 13, 2023)

Closest Low Tide: 1736

Closest High Tide: 1000

Avg
8.40

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW (Feet	Comments
MW-35	1836	8.55	8.55	<0.01; SHEEN	8.55	Water in monument
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	1824	--	8.79	0.00	8.79	Water in monument
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	1850	8.32	8.35	0.03	8.32	Thick product
RW-12	1812	9.09	9.16	0.07	9.09	--
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	1831	7.98	8.38	0.40	8.00	--
RW-104	1840	--	7.71	0.00	7.71	--
RW-105	*Removed from LNAPL monitoring protocol following 9/8/22 event*					
RW-106	1826	8.09	8.63	0.54	8.12	Monument full of sediment up to TOC
RW-107	1807	8.34	9.00	0.66	8.38	--
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	1843	8.63	8.64	0.01	8.63	Monument full of sediment nearly to TOC

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 11, 2023)

Closest Low Tide: 16:09

Closest High Tide: 8:41

Avg
8.43

Well ID	Time of Gauging	Depth to LNAPL (Feet BTOC)	Depth to Water (Feet BTOC)	LNAPL Thickness (Feet)	Corrected DTW (Feet	Comments
MW-35	18:38	8.51	8.55	0.04	8.51	Thick, globby beige substance on the probe when pulled up
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	18:20	--	8.34	0.00	8.34	--
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	18:46	8.46	8.55	0.09	8.47	Thick dark brown product consistent with prior observations
RW-12	18:14	8.81	8.87	0.06	8.81	--
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	18:24	7.70	7.94	0.24	7.71	--
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	18:16	7.64	8.70	1.06	7.70	--
RW-107	18:11	9.40	10.00	0.60	9.44	--
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	18.26	--	8.44	0.00	8.44	Well gauged several times & the probe never sensed product, but each time the probe came up coated with a petroleum-smelling brown residue.

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 19, 2023)

Avg DTW: 9.00

Closest Low Tide: 12:18 Closest High Tide: 5:05

	Initial Gauging					First Removal							Second Removal							Third 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)	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)
MW-35	9:05	8.79	8.86	0.07	8.79	20	11:08	11:29	11:30	--	9.97	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	9:10	--	8.95	0.00	8.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	9:15	8.5	8.52	0.02	8.50	20	11:42	12:02	12:04	--	9.45	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-12	8:47	9.25	9.35	0.10	9.26	20	9:15	0:35	9:37	--	10.60	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	8:57	--	8.90	0.00	8.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	8:55	8.92	8.93	0.01	8.92	20	10:36	10:55	10:57	--	9.35	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-107	8:45	9.21	9.40	0.19	9.22	20	8:55	9"15	9:17	9.41	10.07	0.66	50	9:40	10:30	10:30	9.27	9.9	0.63	60	12:19	13:19	13:20	9.65	10.35	0.70	--	--	--	--	--
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	8:54	--	9.44	0.00	9.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS

Estimated volume in vac truck after completion of LNAPL recovery (prior to holding tank) (gal):	**343.68**
Estimated volume in vac truck at end of day (including holding tank) (gal):	**850**
Estimated combined volume, measured by DH the following day (gal):	**855.48**
--> Estimated product portion (gal):	**34.06**
--> Estimated water portion (gal):	**821.42**

COMMENTS:

Unclear what happened at RW-107. Increased from an initial 0.19 ft thickness to 0.66 ft after a 20-min removal and then not substantially changing thereafter (0.63 ft and 0.70 ft) desite 2 more hours of recovery effort.

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 measureme

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 27, 2023)

Closest Low Tide: 18:31

Closest High Tide: 14:31

Avg
9.22

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	16:38	9.01	9.01	TRACE	9.01	Strong odor 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	16:42	--	9.68	0.00	9.68	--
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	17:02	8.91	8.98	0.07	8.91	Thick, dark residue on probe
RW-12	16:49	9.67	9.85	0.18	9.68	TPH 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	16:55	8.81	9.00	0.19	8.82	TPH odor; tan-colored droplets off of probe
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	16:44	8.95	9.69	0.74	8.99	TPH odor
RW-107	16:52	9.19	9.78	0.59	9.23	TPH odor; brown/tan-colored droplets off of probe
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	16:58	9.41	9.46	0.05	9.41	TPH odor; probe discolored brown

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 10, 2023)

Closest Low Tide: 20:11

Closest High Tide: 15:28

Avg
8.66

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	16:42	8.70	8.73	0.03	8.70	--
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	16:57	--	8.43	0.00	8.43	--
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	17:00	8.92	9.00	0.08	8.92	--
RW-12	16:49	8.80	9.11	0.31	8.82	--
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	16:47	--	8.35	0.00	8.35	--
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	16:45	8.25	8.27	0.02	8.25	--
RW-107	16:51	8.72	9.36	0.64	8.76	--
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	16:54	--	9.01	0.00	9.01	--

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 14, 2023)

Avg DTW: 9.08

Closest Low Tide: 23:58 Closest High Tide: 18:00

	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)	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	17:02	9.19	9.31	0.12	9.22	20	19:35	19:55	19:57	--	13.95; well pumped dry	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	17:37	--	7.50	0.00	7.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	17:28	9.09	9.18	0.09	9.11	20	20:10	20:30	20:31	--	11.65	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-12	17:20	9.46	9.50	0.04	9.47	20	17:55	18:15	18:17	9.98	10.03	0.05	20	18:45	19:05	19:05	--	11.85	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	16:55	--	9.05	0.00	9.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	17:08	9.03	9.08	0.05	9.04	20	18:15	18:36	18:42	9.22	9.27	0.05	20	19:05	19:25	19:26	--	9.64	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-107	16:40	9.32	10.05	0.73	9.52	60	16:55	17:55	17:59	--	9.00	0.00	--	--	--	--	--	--	--	20:00	9.63	10.26	0.63	2:05	86%	50	20:40	21:30	21:42	9.90	10.50	0.60
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	16:51	--	9.69	0.00	9.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS

Estimated volume in vac truck after completion of LNAPL recovery (prior to holding tank) (gal):	**509.83**
Estimated volume in vac truck at end of day (including holding tank) (gal):	**800**
Estimated combined volume, measured by DH the following day (gal):	**780**
--> Estimated product portion (gal):	**11.7**
--> Estimated water portion (gal):	**768.3**

COMMENTS:

0.73 ft initially in RW-107 was pumped to 0 ft in the first 60-min attempt. When gauged again 2 hours later it had rebounded back to 0.63 ft. The subsequent 50 -min vac only got the thickness back down to 0.60 ft.

MW-35 pumped dry during the initial 20-min vac.

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, 0.7321.

Port of Seattle Terminal 30 LNAPL Gauging Event (October 12, 2023)

Closest Low Tide: 23:01

Closest High Tide: 16:40

Avg
9.76

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	18:28	9.42	9.47	0.05	9.42	Odor observed
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	18:13	--	9.91	0.00	9.91	Odor observed
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	17:52	8.88	8.94	0.06	8.88	Odor observed & product on probe
RW-12	18:02	10.08	10.29	0.21	10.09	Odor observed & product on probe
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	18:19	--	9.70	0.00	9.70	No odor, no product observed
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	18:07	9.81	10.08	0.27	9.83	Odor observed & product on probe
RW-107	17:59	9.92	10.58	0.66	9.96	Odor observed & product on probe
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	18:17	--	10.25	0.00	10.25	No odor, no product observed

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 (November, 2023)

Closest Low Tide: 20:58

Closest High Tide: 14:10

Avg
8.88

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	1843	-	8.96	0.00	8.96	
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	1835	-	8.61	0.00	8.61	
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	1851	8.50	8.55	0.05	8.50	
RW-12	1825	9.09	9.39	0.30	9.11	
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	1828	-	8.69	0.00	8.69	
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	1834	8.81	8.82	0.01	8.81	
RW-107	1822	9.02	9.58	0.56	9.05	
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	1839	-	9.28	0.00	9.28	

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 14, 2023)

Avg DTW: 8.41 | Closest Low Tide: 23:58 | Closest High Tide: 16:20

	Initial Gauging					First Removal							Second Removal							Third 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)	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)	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	19:33	--	8.48	0.00	8.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	19:20	--	8.12	0.00	8.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	19:48	8.05	8.10	0.05	8.05	20	19:50	20:10	2010	--	9.96	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-12	16:55	8.65	8.90	0.25	8.67	20	17:41	18:01	18:01	--	10.68	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	17:00	--	8.20	0.00	8.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	18:07	8.41	8.44	0.03	8.41	20	19:06	19:26	19:27	--	8.84	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-107	16:25	8.45	9.00	0.55	8.48	60	16:42	17:40	17:45	8.8	9.45	0.65	60	18:05	19:03	19:05	9.05	9.7	0.65	20	2013	2027	2028	--	8.84	0.00	--	--	--	--	--	--	--	--	--	--	--	--
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	17:20	--	8.85	0.00	8.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS

Estimated volume in vac truck after completion of LNAPL recovery (prior to holding tank) (gal):	**645**
Estimated volume in vac truck at end of day (including holding tank) (gal):	**960**
Estimated combined volume, measured by DH the following day (gal):	**863.3**
--> Estimated product portion (gal):	**12.04**
--> Estimated water portion (gal):	**851.27**

COMMENTS:

Product thickness in RW-107 was measured at 0.65 ft immediately following the second round of vacuuming (19:05). An hour later, at 20:07, it was gauged again and the thickness had dropped to 0.10 ft. Thus the third round of vacuuming was set for just 20 minutes.

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).

Appendix F

Groundwater Sampling

Field Forms

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	50 cloudy
Date:	4/13/23	Personnel:	GF, LC

Observations

	Time	Observation Description
1	@1700	·GF & LC onsite
2		·Scope: Apr LNAPL gauging
3		Spring ~~GWM~~ GWM
4		·Safety tailgate. Motion, pinchpoints, product exposure.
5		· Distributed eq & PPE, got situated
6	1745	· Collected LNAPL readings.
7		- LNAPL present in 7 wells (-35, -1, -12, -103, -106, -107,
8		& -110)
9		- Issues w/ sediment fill in the monuments of -106 &
10		-110. Discuss future action w/ team. Maybe come out
11		w/ a trowel? What is proper disposal of dirt?
12	1900	· Investigated SVE wells to see the wellhead setup for
13		potential future maintenance.
14		- Tried to open SVE-4 thru 10, the vertical wells. Could
15		only get -10 open. Bolts on SVE-4 thru -9 were
16		secured too tightly. Would need some sort of pipe or
17		handle extender to get them open if needed
18		- Took photos of SVE-10. Looked to be 3 PVC reducing
19		bushings up to a mini ball valve w/ female threads.
20		Monument was in good shape
21	1930	· Started to get set up at MW-89 & RW-11A for
22		sampling.
23		- RW-11A w/ Dup (MW-100) sampled @ 2104
24		- MW-89 w/ MS/MSD sampled @ 2040
25	2150	· System restarted, no issues

Comments / Site Activities / Personnel Tracking

DAILY FIELD LOG

Project Information

Project Name:	T-30	Location:	Seattle
Project/Task No.:		Weather:	
Date:	4/13/23	Personnel:	GF, LC

Observations

	Time	Observation Description
1		• Checked on SVE. Total vac ~84 in wc. No obvious
2		water coming in through rotameters & all vac
3		levels looking good / similar to the end of last
4		o&M visit.
5		→ SVE-9 is the high one ~65" wc, but no
6		significant flow. Also no water production
7		through, so left it as is. Maybe need to
8		lower the HSVE flows to force air from
9		SVE-9?
10		→ Gave the above a shot. Lowered HSVE-1 & -3
11		to 60 scfm ea. This got the SVE-9
12		float to bounce but not stay up, so ~6 scfm.
13	SVE-5 water	→ Also observed SVE-5 bring in lots of
14	was a	water with its vac at just 50" wc. The
15	dirty brown,	vac wouldn't drop as I closed the valve
16	emulsified	down, so I left the well off to avoid
17		water production.
18		- overall vac was at 80" wc on departure
19		- SVE-9 was 100% open @ 65" wc.
20	2215	• locked up
21	2220	• offsite
22		
23		GF
24		4/13/23
25		

Comments / Site Activities / Personnel Tracking

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 4/13/2023
Weather: Cloudy 50°F

Well ID: MW-89
Sample ID: MW-89-0423 [Well ID-MMYY]
Well Cond.: good
Sampled by: LC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 10.20
Depth to Product (ft btoc): PNF
Product Thickness (ft): 0.0
Water Column (ft): 9.80
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): 15.0
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 1957

****Tidal well, sample 130-190 min after the low-low tide (1736)*****

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
2004	80	10.40	13.0	2594	5.49	3.71	-68.1	1.96	
2009	80	10.41	14.7	2539	5.10	3.69	-58.0	1.61	
2014	80	10.42	15.1	2512	5.55	3.70	-57.4	1.35	
2019	80	10.42	15.1	2502	5.10	3.70	-54.5	1.21	
2024	80	10.43	15.0	2464	5.46	3.70	-54.4	~~1.71~~	
2029	80	10.43	15.2	2439	5.57	3.70	-51.7	1.08	
2032	80	10.43	15.3	2425	5.47	3.71	-51.8	2.07	
2035	80	10.43	15.3	2417	5.43	3.71	-51.0	1.09	
2038	80	10.43	15.2	2406	5.43	3.71	-50.4	1.06	
							LC		

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-89-0423	2040	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	~~6~~ 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.

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

Mostly clear, no apparent odor or sheen

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:	034010
YSI:	043887
Interface Probe:	~~[illegible]~~ 40206
Turbidity:	214065

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 4/13/23
Weather: 50 cloudy

Well ID: RW-11A
Sample ID: RW-11A-0423 [Well ID-MMYY]
Well Cond.: okay, full of sediment
Sampled by: GF

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.40
Depth to Product (ft btoc) : —
Product Thickness (ft): 0
Water Column (ft): ~10.6
Water Volume in Well (gal)[1]: 6.95
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): ~14. couldn't get tubing any deeper due to twisting on casing
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 2024
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
2030	200	NM	16.6	1043	2.71	6.81	93.4	32.1	
2035	"	|	16.6	1046	2.73	6.81	96.1	28.3	
2040	"	|	16.6	1047	2.53	6.81	97.3	26.0	
2043	"	|	16.6	1046	2.51	6.79	97.4	20.1	
2046	"	|	16.6	1047	2.36	6.76	97.7	22.7	
2049	"	|	16.6	1049	2.91	6.79	97.3	20.9	
2052	"	|	16.6	1048	2.25	6.79	97.1	16.1	
2055	"	|	16.5	1051	2.20	6.79	97.2	14.0	
2058	"	|	16.6	1051	2.07	6.78	96.8	15.1	
2101	"	|	16.6	1051	2.16	6.78	96.6	15.6	
2104	—	SAMPLED							

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
RW-11A-0423	2104	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	x6	HCL
MW-100-0423 (Dup →)	2000	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)

water clear, odorless
DTW not measured - zip tied tubing to the WLM probe to get it to depth.

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:	19550
YSI:	43945
Interface Probe:	12726
Turbidity:	32784

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 4/13/23
Weather:

Well ID: MW-59
Sample ID: MW-59- [Well ID-MMYY]
Well Cond: —
Sampled by: —

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 8.79
Depth to Product (ft btoc) : —
Product Thickness (ft): 0
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): 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):
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: _____ 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

Well not sampled; LNAPL present within the last year (1/12/23 most recently)

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
		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)

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

SAMPLING EQUIPMENT MODELS & IDs

Pump:	
YSI:	
Interface Probe:	
Turbidity:	

Port of Seattle Terminal 30 -- LNAPL Gauging Event

Field Technician(s):	GF, LC	**Client:**	Port of Seattle
Date:	4/13/23	**Location:**	Terminal 30, Seattle
Project Number:	60681370	**Weather:**	50F cloudy
Closest High Tide:	1000	**Closest Low Tide:**	1736

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 ****	1836	8.55	8.55	0.01 SHEEN	monument had water
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 ****	1824	–	8.79	0	monument full of water
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	1850	8.32	8.35	0.03	✓ Thick product
RW-12	D 327	1812	9.09	9.16	0.07	✓
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	1831	7.98	8.38	0.40	✓
RW-104	D 318	1840	–	7.71	0	✓
RW-105	D 321	*Removed from LNAPL monitoring protocol following 09/08/22 event*				
RW-106	D 324	1826	8.09	8.63	0.54	monument full of sediment to TOC
RW-107	D 327	1807	8.34	9.00	0.66	✓
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	1843	8.63	8.64	0.01	sediments almost to TOC in monument

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.

304202

SAMPLE CHAIN OF CUSTODY 04/14/23

C3/VW3

Page # 1 of 1

Report To Paul Kalina, Gus Friedman

Company AECOM

Address 1111 3rd Ave ste 1600

City, State, ZIP Seattle, WA 98101

Phone 206-310-5697 Email Paul.kalina@aecom.com Gus.Friedman@aecom.com

SAMPLERS (*signature*) GCF

PROJECT NAME: T-30

PO #:

REMARKS 1 ug/L MRL for BTEX EPA 8260D

Project specific RLs? - Yes / No

INVOICE TO: Paul Kalina

TURNAROUND TIME
- [x] 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
RW-11A-0423	01A-G	4/13/23	2104	GW	7	X	X						X	X			
MW-100-0423	02 ↓	4/13/23	2000	GW	7	X	X						X	X			
MW-89-0423	03A-U	4/13/23	2040	GW	21	X	X						X	X			MS/MSD
Trip blank	04A-B			water	2												Added at lab (AP)
								Samples received at 3 °C									

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: GCF	Gus Friedman	AECOM	4/14/23	16:12
Received by:	ANHPHAN	F&B	04/14/23	10:12
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 32784
Description HACH 2100Q Turbidity meter
Calibrated 4/11/2023 2:53:38PM

Manufacturer HACH
Model Number 2100Q
Serial Number/ Lot Number 15030C040052
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 36

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	9.29	10.00	0.00%	Pass
20.00 / 20.00	NTU	20.00	NTU	18.20	20.00	0.00%	Pass
100.00 / 100.00	NTU	100.00	NTU	90.80	100.00	0.00%	Pass
800.00 / 800.00	NTU	800.00	NTU	764.00	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 43945
Description YSI Professional Plus
Calibrated 4/10/2023 3:48:30PM

Manufacturer YSI
Model Number Professional Plus
Serial Number/ Lot Number 18J102185
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 40

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	7.07	7.00	0.00%	Pass
4.00 / 4.00	PH	4.00	PH	4.06	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	10.08	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	1.410	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	238.00	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	%	102.10	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 19550
Description Pine Environmental Peristaltic Pump
Calibrated 4/11/2023 1:56:15PM

Manufacturer	Pine Environmental Services, Inc.	**State Certified**	
Model Number	Geo Pump	**Status**	Pass
Serial Number/ Lot Number	e11004437	**Temp °C**	19
Location	Seattle	**Humidity %**	37
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 43887
Description YSI Pro Plus
Calibrated 4/10/2023 4:18:00PM

Manufacturer YSI
Model Number Professional Plus
Serial Number/ Lot Number 18J103055
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 40

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	4.04	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	9.90	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	1.420	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	236.10	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	%	101.30	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 214065
Description HACH 2100Q Turbidity meter
Calibrated 4/11/2023 3:01:13PM

Manufacturer HACH
Model Number 2100Q
Serial Number/ Lot Number 22080D000271
Location Seattle
Department

State Certified NJ Cert#: 11034
Status Pass
Temp °C 19
Humidity % 36

Calibration Specifications

Group # 1
Group Name Turbidity
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 10.0000
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	9.65	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	99.60	100.00	0.00%	Pass
800.00 / 800.00	NTU	800.00	NTU	792.00	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 34010
Description Geo Pump
Calibrated 4/11/2023 1:54:52PM

Manufacturer Geotech
Model Number
Serial Number/ Lot Number n/a
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 37

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 40206
Description Solinst IP (200 ft)
Calibrated 4/11/2023 2:17:32PM

Manufacturer Solinst
Model Number N/A
Serial Number/ Lot Number 312227
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 36

Calibration Specifications

Group #
Group Name
Stated Accy
Range Acc %
Reading Acc %
Plus/Minus

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail

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 12726
Description Solinst Interface
Calibrated 4/11/2023 2:16:58PM

Manufacturer	Solinst	**State Certified**	
Model Number	Interface	**Status**	Pass
Serial Number/ Lot Number	009446-1	**Temp °C**	19
Location	Seattle	**Humidity %**	37
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

AECOM Daily Tailgate Meeting Summary

Project information

Project Name	T-30
Project Number	60681370
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	Clubhouse
Meeting date	4/13/2023
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Conex
Prepared by	Friedman, Gus

Shift Summary

Location	SODO
Attendees (Workers)	Friedman, Gus;Celovsky, Lillian;
Attendees (Visitors)	
Tasks to be performed	LNAPL gauging & GWM
Hazards to be considered today	motion, chemical
Will there be Lone Workers?	No
Hierarchy of controls	ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	

Topic of the week	Prevent_Distracted_Driving
Other topics discussed	
Mid day reviews	
End of the day comments.The supervisor confirms that the site is being left in a safe condition and work crew checked out as fit unless otherwise specified here	All tasks completed safely and successfully
Hazards	• Motion • Chemical

DAILY FIELD LOG

Project Information Page ____ of ____

Project Name:	T-30 GWM (annual)	Location:	Terminal 30
Project/Task No.:		Weather:	Clear 50s°F
Date:	10/12/23	Personnel:	LC SC

Observations

	Time	Observation Description
1	1715	LC arrives on site.
2	1720	SC arrives on site. Unlock conex but find keys
3		left in door & door left open. Not from AECOM.
4		Nothing appears missing or out of place
5	1730	Start gauging LNAPL in all LNAPL wells.
6	1900	Set up at wells to sample/purge. SC at
7		MW-42, LC at R-11A
8	1930	LC attempt to set up at MW-36A, spend
9		15 min trying to remove monument lid
10		w/ no success. Move on to next well
11	2045	LC sample RW-9 & take duplicate.
12		SC takes MS/MSD at MW-42
13	2100	SC successfully removes lid at MW-36A,
14		LC cleans up and works on COC/
15		cooler while SC samples MW-36A.
16	2148	Sample MW-36A.
17	2200	Dump purge water
18	2204	Turn system back on. Everything seems to
19		be running correctly
20	2210	Off site for Day.
21		
22		LC
23		
24		
25		

Comments / Site Activities / Personnel Tracking

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name:	T-30	Well ID:	RW-11A
Project Number:	60681370	Sample ID:	RW-11A- 1023 [Well ID-MMYY]
Date:	10/12/23	Well Condition:	good
Weather:	clear 50 °F	Sampled by:	LC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc):	10.01	Purge/Sample Method:	Low-Flow
Depth to Product (ft btoc) :	N/A	Purge/Sample Equipment:	Peristaltic Pump
Product Thickness (ft):	N/A	Total Well Depth (ft bgs):	20
Water Column (ft):	9.99	Screened Interval (ft bgs):	5-20
Water Volume in Well (gal)[1]:	6.55	Tubing Inlet Depth (ft bgs):	15
Inner Casing Diameter (Inch):	4	Sampling Tube Material:	LPDE
Inner Casing Material:	PVC		

PURGING INFORMATION

Start Purge Time: 1855 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
1859	100	10.09	20.4	861	1.02	6.82	-101.0	23.9	Yellow color
1904	100	10.19	21.0	867	0.38	6.81	-112.4	20.9	Strong HC odor
1909	100	10.21	20.6	866	0.24	6.80	-113.4	19.5	"
1914	100	10.24	20.8	866	0.18	6.81	-115.9	19.3	"
1917	100	10.26	20.8	668	0.14	6.81	-117.4	19.0	"
									LC

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
RW-11A-1023	1920	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%

COMMENTS & OBSERVATIONS: (slow recharge, turbidity, odor, sheen, PID readings)

Strong smell, yellow color, mostly clear.

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.

SAMPLING EQUIPMENT MODELS & IDs

Pump:	geotech 3847
YSI:	ProPlus 466682
Interface Probe:	Heron 036342
Turbidity:	Hach 216544

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 10/12/23
Weather: partly cloudy 57°

Well ID: MW-89
Sample ID: MW-89- 1023 [Well ID-MMYY]
Well Cond.:
Sampled by: SC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 10.03 @ 1127
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

****Tidal well, sample 130-190 min after the low-low tide (1230 - 1330)*****

PURGING INFORMATION

Start Purge Time: 1134
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
1139	100	10.15	20.1	3239	0.53	3.83	246.6	1.97	
1144	100	10.17	20.5	3234	0.42	3.84	263.7	2.02	
1149	100	10.18	20.2	3217	0.32	3.85	274.2	2.27	
1154	100	10.19	20.5	3204	0.26	3.86	282.4	2.23	
1159	100	10.20	20.5	3193	0.21	3.87	290.9	2.51	
1204	100	10.21	20.4	3181	0.19	3.86	295.8	2.45	
1209	100	10.21	20.1	3150	0.16	3.87	311.0	3.43	
1224	100	10.22	20.1	3133	0.15	3.88	316.9	3.28	
1234	100	10.22	20.2	3109	0.15	3.89	314.5	2.88	
									SC

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-89-1023	1240	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

SAMPLING EQUIPMENT MODELS & IDs

Pump:	049814 Peri
YSI:	Prof. Series 042132
Interface Probe:	
Turbidity:	Hach 2100Q

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 10/12
Weather: Clear 50 °F

Well ID: RW-9
Sample ID: RW-9- 1023 [Well ID-MMYY]
Well Condition: POOR-see notes
Sampled by: LC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 9.60
Depth to Product (ft btoc) : —
Product Thickness (ft): —
Water Column (ft): 10.4
Water Volume in Well (gal)[1]: ~~14.8~~ LC
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): LC ~~LPDE~~ 14.8
Sampling Tube Material: ~~LPDE~~ LDPE

PURGING INFORMATION

Start Purge Time: 2020
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
2022	120	9.59	19.9	1205	0.97	7.02	-113.1	4.73	strong odor
2027	120	9.60	20.6	1277	0.22	6.99	-129.2	3.81	"
2032	120	9.60	20.7	1280	0.14	6.98	-135.3	3.96	"
2037	120	9.60	20.7	1278	0.10	6.98	-141.7	3.60	"
2040	120	9.60	20.7	1276	0.09	6.98	-144.6	3.50	"
									LC

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
~~RW-9-1023 2045~~	2045	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)
- J-plug /well buried in dirt/sediment
- Strong HC odor, mostly clear
- DUP-1 taken

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:	3847
YSI:	4606902
Interface Probe:	0363A2
Turbidity:	216544

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name: T-30
Project Number: 60681370
Date: 10/12/23
Weather: 57 °F

Well ID: MW-36A
Sample ID: MW-36A- 1023 [Well ID-MMYY]
Well Condition: good
Sampled by: SC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc): 10.55 @ 2111
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): 15.5
Sampling Tube Material: LPDE

PURGING INFORMATION

Start Purge Time: 2119
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
2124	115	11.43	19.3	1449	0.46	7.06	-179.8	7.81	
2129	115	11.34	19.0	1453	0.37	7.03	-158.8	15.8	
2134	115	11.21	19.0	1447	0.20	7.03	-147.0	9.78	
2139	115	11.10	18.6	1447	0.17	7.01	-139.8	10.0	
2142	115	11.10	18.6	1440	0.16	7.00	-137.0	9.12	
2145	115	11.17	18.6	1440	0.17	7.00	-136.1	3.58	
									SC

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-36A-1023	2148	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:	
YSI:	
Interface Probe:	
Turbidity:	

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name:	T-30	Well ID:	MW-39A
Project Number:	60681370	Sample ID:	MW-39A- 1023 [Well ID-MMYY]
Date:	10/12/23	Well Condition:	
Weather:	clear 57°F	Sampled by:	

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc):	9.05@1951	Purge/Sample Method:	Low-Flow
Depth to Product (ft btoc) :	—	Purge/Sample Equipment:	Peristaltic Pump
Product Thickness (ft):	—	Total Well Depth (ft bgs):	20.5
Water Column (ft):	—	Screened Interval (ft bgs):	5-20
Water Volume in Well (gal)[1]:	—	Tubing Inlet Depth (ft bgs):	14
Inner Casing Diameter (Inch):	2	Sampling Tube Material:	LPDE
Inner Casing Material:	PVC		

PURGING INFORMATION

Start Purge Time: 2004 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
2009	100	9.15	19.8	970	0.37	6.80	-147.7	6.87	
2014	100	9.17	19.5	968	0.28	6.78	-152.1	5.09	
2019	100	9.18	19.6	971	0.22	6.78	-157.3	3.76	
2024	100	9.19	19.6	959	0.20	6.79	-160.9	3.94	
2027	100	9.20	19.5	945	0.18	6.79	-162.8	3.69	
2030	100	9.21	19.2	937	0.18	6.79	-164.3	3.04	
									SC

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-39A-1023	2034	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:	
YSI:	
Interface Probe:	
Turbidity:	

T-30 LOW-FLOW GROUND WATER SAMPLING FORM

Project Name:	T-30	Well ID:	MW-42
Project Number:	60681370	Sample ID:	MW-42- 1023 [Well ID-MMYY]
Date:	10/18/23	Well Condition:	good
Weather:	clear °F	Sampled by:	SC

PRE-PURGE INFORMATION

Initial Depth to Water (ft btoc):	9.00 @ 1850	Purge/Sample Method:	Low-Flow
Depth to Product (ft btoc) :	–	Purge/Sample Equipment:	Peristaltic Pump
Product Thickness (ft):	–	Total Well Depth (ft bgs):	Measured as 19.1 ft bgs on 10/13/22. Well construction log is missing.
Water Column (ft):	–	Screened Interval (ft bgs):	Unknown. Assumed to match other wells on site ~5-20 ft bgs
Water Volume in Well (gal)[1]:	-	Tubing Inlet Depth (ft bgs):	15
Inner Casing Diameter (Inch):	2	Sampling Tube Material:	LPDE
Inner Casing Material:	PVC		

PURGING INFORMATION

Start Purge Time: 1850 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
1901	100	10.03	19.4	1433	0.52	6.76	-135.7	7.38	
1906	100	10.04	19.3	1422	0.37	6.76	-152.9	4.15	
1911	100	10.07	19.2	1425	0.30	6.76	-161.2	4.06	
1916	100	10.07	19.0	1423	0.28	6.76	-168.6	5.98	
1919	100	10.08	19.1	1419	0.28	6.77	-171.0	1.53	
									SC

SAMPLING INFORMATION

Sample ID(s)	Sample time(s)	Analysis	Method	Container	No. of bottles	Preservative
MW-42-1023	1923	Gx/BTEX	NWTPH-G/BTEX	40 mL VOA	3/9	HCL
		Dx	NWTPH-Dx	500 mL Amber	1/3	–

REQUIRED STABILIZATION RANGES[2] MS/MSD

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:	Peri
YSI:	Pro Series
Interface Probe:	
Turbidity:	Hach

SAMPLE CHAIN OF CUSTODY

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

SAMPLERS (*signature*)

PROJECT NAME: T-30

PO #

REMARKS: 1 ug/L for BTEX 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~~ LC	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	NWTPH-Dx w/ silica gel	BTEX 8260D			Notes
RW-11A-1023		10/12/23	1920	GW	4	X	X	X					X	X			
MW-42-1023			1923		12												MS/MSD
MW-39A-1023			2034		4												
MW-89-1023			1240														
RW-9-1023			2045														
DUP-1			0000														
MW-36A-1023		↓	2148	↓	↓	↓	↓	↓					↓	↓			

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Suzanne Catlin	AECOM	10/13/23	8:35
Received by:	ANH PHAN	FBO	10/13/23	08:35
Relinquished by:				
Received by:				

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

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

April 24, 2023

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 14, 2023 from the T-30, F&BI 304202 project. There are 13 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 14, 2023 by Friedman & Bruya, Inc. from the AECOM T-30, F&BI 304202 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
304202 -01	RW-11A-0423
304202 -02	MW-100-0423
304202 -03	MW-89-0423
304202 -04	Trip Blank

All quality control requirements were acceptable.

Date of Report: 04/24/23
Date Received: 04/14/23
Project: T-30, F&BI 304202
Date Extracted: 04/17/23
Date Analyzed: 04/17/23

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
RW-11A-0423 304202-01	<100	93
MW-100-0423 304202-02	<100	103
MW-89-0423 304202-03	<100	103
Method Blank 03-778 MB	<100	106

Date of Report: 04/24/23
Date Received: 04/14/23
Project: T-30, F&BI 304202
Date Extracted: 04/17/23
Date Analyzed: 04/19/23

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-11A-0423 304202-01	<50	<250	119
MW-100-0423 304202-02	<50	<250	126
MW-89-0423 304202-03	<50	<250	132
Method Blank 03-908 MB	<50	<250	117

Date of Report: 04/24/23
Date Received: 04/14/23
Project: T-30, F&BI 304202
Date Extracted: 04/17/23
Date Analyzed: 04/17/23

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
RW-11A-0423 304202-01	780 x	<250	122
MW-100-0423 304202-02	700 x	<250	135
MW-89-0423 304202-03	410 x	<250	137
Method Blank 03-908 MB	<50	<250	130

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	RW-11A-0423	Client:	AECOM
Date Received:	04/14/23	Project:	T-30, F&BI 304202
Date Extracted:	04/17/23	Lab ID:	304202-01
Date Analyzed:	04/17/23	Data File:	041720.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	71	132
Toluene-d8	92	68	139
4-Bromofluorobenzene	109	62	136

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-100-0423	Client:	AECOM
Date Received:	04/14/23	Project:	T-30, F&BI 304202
Date Extracted:	04/17/23	Lab ID:	304202-02
Date Analyzed:	04/17/23	Data File:	041721.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	105	68	139
4-Bromofluorobenzene	114	62	136

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-89-0423	Client:	AECOM
Date Received:	04/14/23	Project:	T-30, F&BI 304202
Date Extracted:	04/17/23	Lab ID:	304202-03
Date Analyzed:	04/17/23	Data File:	041722.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	71	132
Toluene-d8	92	68	139
4-Bromofluorobenzene	117	62	136

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, F&BI 304202
Date Extracted:	04/17/23	Lab ID:	03-0745 mb
Date Analyzed:	04/17/23	Data File:	041707.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	71	132
Toluene-d8	104	68	139
4-Bromofluorobenzene	105	62	136

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

Date of Report: 04/24/23
Date Received: 04/14/23
Project: T-30, F&BI 304202

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

Laboratory Code: 304202-03 Matrix Spike

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	<100	99	98	50-150	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	96	70-130

Date of Report: 04/24/23
Date Received: 04/14/23
Project: T-30, F&BI 304202

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

Laboratory Code: 304202-03 (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	115	122	50-150	6

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	104	70-130

Date of Report: 04/24/23
Date Received: 04/14/23
Project: T-30, F&BI 304202

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

Laboratory Code: 304202-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	520	127	127	70-130	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	116	70-130

Date of Report: 04/24/23
Date Received: 04/14/23
Project: T-30, F&BI 304202

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

Laboratory Code: 304202-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	103	91	50-150	12
Toluene	ug/L (ppb)	10	<1	104	102	50-150	2
Ethylbenzene	ug/L (ppb)	10	<1	107	106	50-150	1
m,p-Xylene	ug/L (ppb)	20	<2	110	108	50-150	2
o-Xylene	ug/L (ppb)	10	<1	105	112	50-150	6
Naphthalene	ug/L (ppb)	10	<1	98	94	50-150	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	103	104	70-130	1
Toluene	ug/L (ppb)	10	113	103	70-130	9
Ethylbenzene	ug/L (ppb)	10	107	108	70-130	1
m,p-Xylene	ug/L (ppb)	20	102	110	70-130	8
o-Xylene	ug/L (ppb)	10	108	105	70-130	3
Naphthalene	ug/L (ppb)	10	99	104	70-130	5

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased high; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

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

304202

SAMPLE CHAIN OF CUSTODY 04/14/23

C3/VW3

Page # 1 of 1

Report To Paul Kalina, Gus Friedman

Company AECOM

Address 1111 3rd Ave ste 1600

City, State, ZIP Seattle, WA 98101

Phone 206-310-5697 Email Paul.kalina@aecom.com Gus.Friedman@aecom.com

SAMPLERS (*signature*) GCF

PROJECT NAME: T-30

PO #:

REMARKS 1 ug/L MRL for BTEX EPA 8260D

Project specific RLs? - Yes / No

INVOICE TO: Paul Kalina

TURNAROUND TIME
- [x] 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
RW-11A-0423	01A-G	4/13/23	2104	GW	7	X	X						X	X			
MW-100-0423	02 ↓	4/13/23	2000	GW	7	X	X						X	X			
MW-89-0423	03A-U	4/13/23	2040	GW	21	X	X						X	X			MS/MSD
Trip blank	04A-B			water	2												Added at lab (AP)
								Samples received at 3 °C									

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: GCF	Gus Friedman	AECOM	4/14/23	16:12
Received by:	ANHPHAN	F&B	04/14/23	10:12
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 Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

October 23, 2023

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 October 18, 2023 from the T-30, F&BI 310230 project. There are 17 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
AEC1023R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 18, 2023 by Friedman & Bruya, Inc. from the AECOM T-30, F&BI 310230 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
310230 -01	RW-11A-1023
310230 -02	MW-4Z-1023
310230 -03	MW-39A-1023
310230 -04	MW-89-1023
310230 -05	RW-9-1023
310230 -06	DUP-1
310230 -07	MW-36A-1023
310230 -08	Trip Blank

All quality control requirements were acceptable.

Date of Report: 10/23/23
Date Received: 10/18/23
Project: T-30, F&BI 310230
Date Extracted: 10/18/23
Date Analyzed: 10/18/23

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
RW-11A-1023 310230-01	230	113
MW-4Z-1023 310230-02	270	102
MW-39A-1023 310230-03	<100	104
MW-89-1023 310230-04	<100	102
RW-9-1023 310230-05	160	106
DUP-1 310230-06	200	107
MW-36A-1023 310230-07	<100	104
Method Blank 03-2246 MB	<100	97

Date of Report: 10/23/23
Date Received: 10/18/23
Project: T-30, F&BI 310230
Date Extracted: 10/19/23
Date Analyzed: 10/19/23

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 50-150)
RW-11A-1023 310230-01	91	<250	87
MW-4Z-1023 310230-02	60	<250	91
MW-39A-1023 310230-03	<50	<250	98
MW-89-1023 310230-04	<50	<250	106
RW-9-1023 310230-05	230	<250	99
DUP-1 310230-06	210	<250	93
MW-36A-1023 310230-07	130	<250	94
Method Blank 03-2449 MB	<50	<250	98

Date of Report: 10/23/23
Date Received: 10/18/23
Project: T-30, F&BI 310230
Date Extracted: 10/18/23
Date Analyzed: 10/18/23

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

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
RW-11A-1023 310230-01	12,000 x	680 x	99
MW-4Z-1023 310230-02	8,800 x	1,500 x	93
MW-39A-1023 310230-03	1,500 x	<250	105
MW-89-1023 310230-04	600 x	<250	116
RW-9-1023 310230-05	12,000 x	620 x	96
DUP-1 310230-06	11,000 x	590 x	93
MW-36A-1023 310230-07	4,800 x	<250	105
Method Blank 03-2449 MB	<50	<250	115

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	RW-11A-1023	Client:	AECOM
Date Received:	10/18/23	Project:	T-30, F&BI 310230
Date Extracted:	10/16/23	Lab ID:	310230-01
Date Analyzed:	10/16/23	Data File:	101628.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	78	126
Toluene-d8	98	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-4Z-1023	Client:	AECOM
Date Received:	10/18/23	Project:	T-30, F&BI 310230
Date Extracted:	10/16/23	Lab ID:	310230-02
Date Analyzed:	10/16/23	Data File:	101629.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	107	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-39A-1023	Client:	AECOM
Date Received:	10/18/23	Project:	T-30, F&BI 310230
Date Extracted:	10/16/23	Lab ID:	310230-03
Date Analyzed:	10/16/23	Data File:	101630.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	78	126
Toluene-d8	97	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

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-89-1023	Client:	AECOM
Date Received:	10/18/23	Project:	T-30, F&BI 310230
Date Extracted:	10/16/23	Lab ID:	310230-04
Date Analyzed:	10/16/23	Data File:	101631.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	78	126
Toluene-d8	94	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

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	RW-9-1023	Client:	AECOM
Date Received:	10/18/23	Project:	T-30, F&BI 310230
Date Extracted:	10/16/23	Lab ID:	310230-05
Date Analyzed:	10/16/23	Data File:	101632.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	78	126
Toluene-d8	89	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:	DUP-1	Client:	AECOM
Date Received:	10/18/23	Project:	T-30, F&BI 310230
Date Extracted:	10/16/23	Lab ID:	310230-06
Date Analyzed:	10/16/23	Data File:	101633.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	78	126
Toluene-d8	93	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:	MW-36A-1023	Client:	AECOM
Date Received:	10/18/23	Project:	T-30, F&BI 310230
Date Extracted:	10/16/23	Lab ID:	310230-07
Date Analyzed:	10/16/23	Data File:	101634.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	78	126
Toluene-d8	93	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, F&BI 310230
Date Extracted:	10/16/23	Lab ID:	03-2412 mb
Date Analyzed:	10/16/23	Data File:	101620a.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	78	126
Toluene-d8	95	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

Date of Report: 10/23/23
Date Received: 10/18/23
Project: T-30, F&BI 310230

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

Laboratory Code: 310230-02 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	270	108	105	50-150	3

Laboratory Code: Laboratory Control Sample

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

Date of Report: 10/23/23
Date Received: 10/18/23
Project: T-30, F&BI 310230

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

Laboratory Code: 310230-02 (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	<250	105	109	50-150	4

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	105	105	65-151	0

Date of Report: 10/23/23
Date Received: 10/18/23
Project: T-30, F&BI 310230

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

Laboratory Code: 310230-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	9,700	157 b	0 b	50-150	200 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	100	65-151

Date of Report: 10/23/23
Date Received: 10/18/23
Project: T-30, F&BI 310230

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

Laboratory Code: 310230-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	105	107	50-150	2
Toluene	ug/L (ppb)	10	<1	105	104	50-150	1
Ethylbenzene	ug/L (ppb)	10	<1	107	107	50-150	0
m,p-Xylene	ug/L (ppb)	20	<2	104	104	50-150	0
o-Xylene	ug/L (ppb)	10	<1	105	104	50-150	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	105	105	70-130	0
Toluene	ug/L (ppb)	10	105	104	70-130	1
Ethylbenzene	ug/L (ppb)	10	105	104	70-130	1
m,p-Xylene	ug/L (ppb)	20	102	101	70-130	1
o-Xylene	ug/L (ppb)	10	101	101	70-130	0

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

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

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

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

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

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

310230

SAMPLE CHAIN OF CUSTODY 10/13/23 C4/VW21

Page # 1 of 1

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

SAMPLERS (*signature*)

PROJECT NAME: T-30

PO #

REMARKS: 1 ug/L for BTEX EPA 8260D
Project specific RLs? - Yes / No

INVOICE TO: Paul Kalina

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	BTEX 8260D			Notes
RW-11A-1023	01 A-D	10/12/23	1920	GW	4	X	X	X					X	X			
MW-42-1023	02 A-L		1923		12												MS/MSD
MW-39A-1023	03 A-D		2034		4												
MW-89-1023	04		1240														
RW-9-1023	05		2045														
DUP-1	06		0000														
MW-36A-1023	07	↓	2148	↓	↓	↓	↓	↓					↓	↓			
Trip Blank	08 A-B	–	–	water	2												Added at lab
											Samples received at		4 °C				AP 10/13

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Suzanne Cathcart	AECOM	10/13/23	8:35
Received by:	ANH PHAN	FSO	10/13/23	08:35
Relinquished by:				
Received by:				

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

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 2023 Groundwater Sampling		
From	Chelsey Cook, Chemist Lucy Panteleeff, Chemist		
Date	May 3, 2023		

The summary data quality review of 3 groundwater samples collected on April 13, 2023, 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 (-0423). The following samples are associated with F&BI laboratory group 304202:

Sample ID	Laboratory Group	Laboratory ID	Requested Analyses
RW-11A-0423	304202	304202-01	BTEX, NWTPH-Gx, NWTPH-Dx
MW-100-0423 (Field Duplicate of RW-11A-0423)		304202-02	BTEX, NWTPH-Gx, NWTPH-Dx
MW-89-0423		304202-03	BTEX, NWTPH-Gx, NWTPH-Dx
Trip Blank		304202-04	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 inadvertently left off the COC and added by the laboratory. The trip blank was not analyzed. BTEX and gasoline-range TPH were not detected in the associated samples, therefore, data were not qualified based on the absence of trip blank results.

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

4. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – Acceptable

5. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable

   General – An MS/MSD was performed using MW-89 for all analyses. Results were acceptable.

6. Field Duplicate – Acceptable

   General – A field duplicate was submitted for RW-11A and identified as MW-100. 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 hydrocarbon patterns for all samples reported in laboratory group 304202 did not resemble the fuel standard used for quantitation. No qualifiers were assigned based on these qualitative observations.

AECOM

Summary Data Quality Review
Port of Seattle - T-30
April 2023 Groundwater Sampling
Laboratory Groups: 304202

Overall Assessment of Data

The data reported in this laboratory group, as qualified, are considered to be usable for meeting project objectives. The completeness for F&BI laboratory group 304202 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
No data qualifiers were assigned in association with laboratory group 304202.					

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 October 2023 Groundwater Sampling		
From	Amelia McArthur, Chemist Lucy Panteleeff, Chemist		
Date	November 1, 2023		

The summary data quality review of 7 groundwater samples collected on October 12, 2023, 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 (-1023). The following samples are associated with F&BI laboratory group 310230:

Sample ID	Laboratory ID	Requested Analyses
RW-11A-1023	310230 -01	BTEX, NWTPH-Gx, NWTPH-Dx
MW-42-1023	310230 -02	BTEX, NWTPH-Gx, NWTPH-Dx
MW-39A-1023	310230 -03	BTEX, NWTPH-Gx, NWTPH-Dx
MW-89-1023	310230 -04	BTEX, NWTPH-Gx, NWTPH-Dx
RW-9-1023	310230 -05	BTEX, NWTPH-Gx, NWTPH-Dx
DUP-1 (field duplicate of RW-9-1023)	310230 -06	BTEX, NWTPH-Gx, NWTPH-Dx
MW-36A-1023	310230 -07	BTEX, NWTPH-Gx, NWTPH-Dx
Trip Blank	310230 -08	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 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 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 inadvertently left off the COC and added by the laboratory. The trip blank was not analyzed.

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

4. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) – Acceptable

5. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable

   General –MS/MSDs were performed using MW-42 for all analyses. Results were acceptable except as noted below:

   NWTPH-Dx – The percent recoveries for diesel-range TPH in the MS (157%), the MSD (0%), and the relative percent difference (RPD) (200%) were outside control limits of 50-150% and 20%, respectively. The concentration of diesel-range TPH was greater than four times the spike concentration; therefore, no data were qualified based on the MS/MSD results.

6. Field Duplicate – Acceptable

   General – A field duplicate was submitted for RW-9 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 motor-oil-range hydrocarbon patterns for all samples reported in laboratory group 310230 did not resemble the fuel standard used for quantitation. No qualifiers were assigned based on these qualitative observations.

Overall Assessment of Data

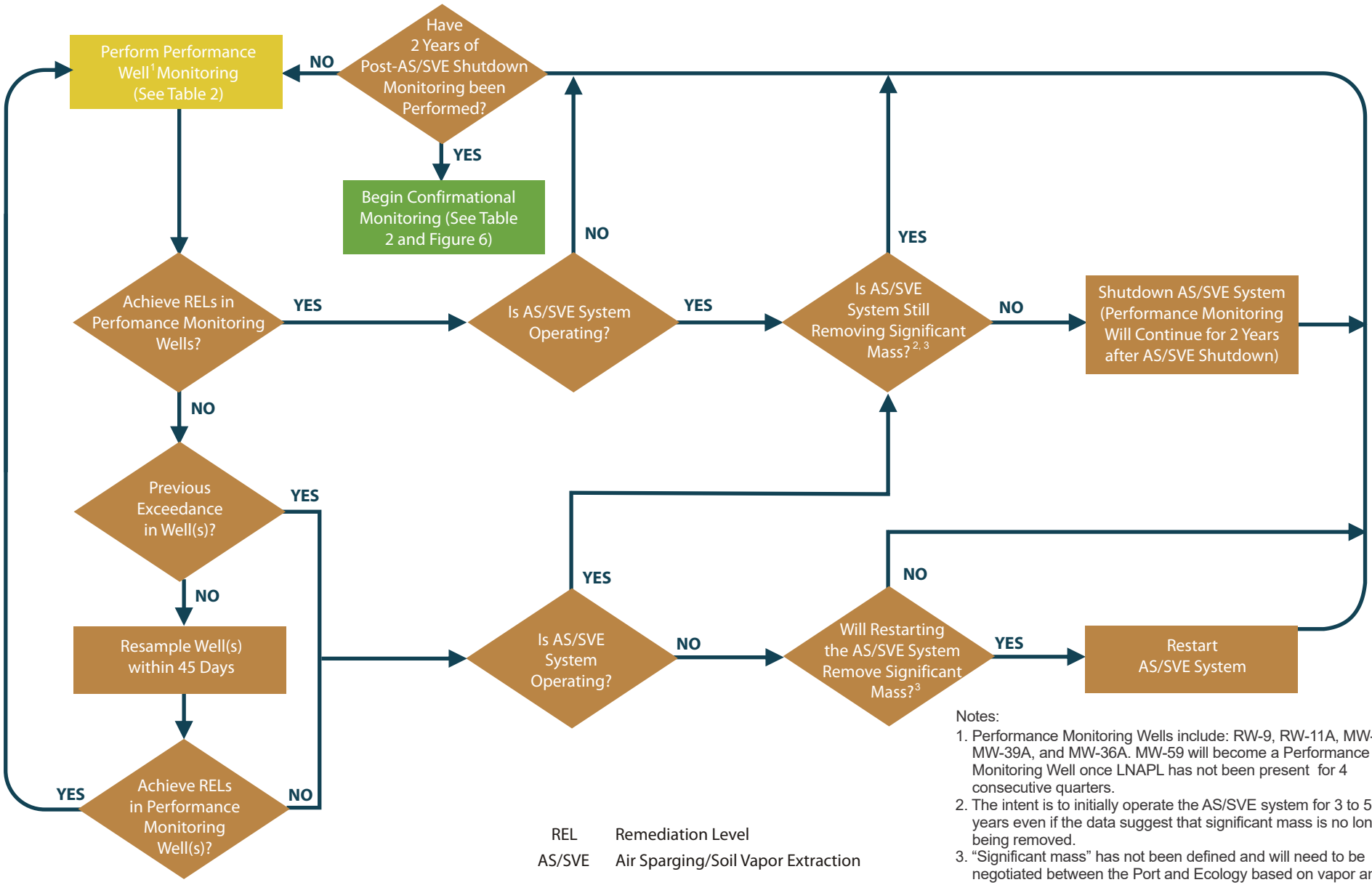
The data reported in this laboratory group, as qualified, are usable for meeting project objectives. The completeness for F&BI laboratory group 310230 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
No data qualifiers were assigned in association with laboratory group 310230.					

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.

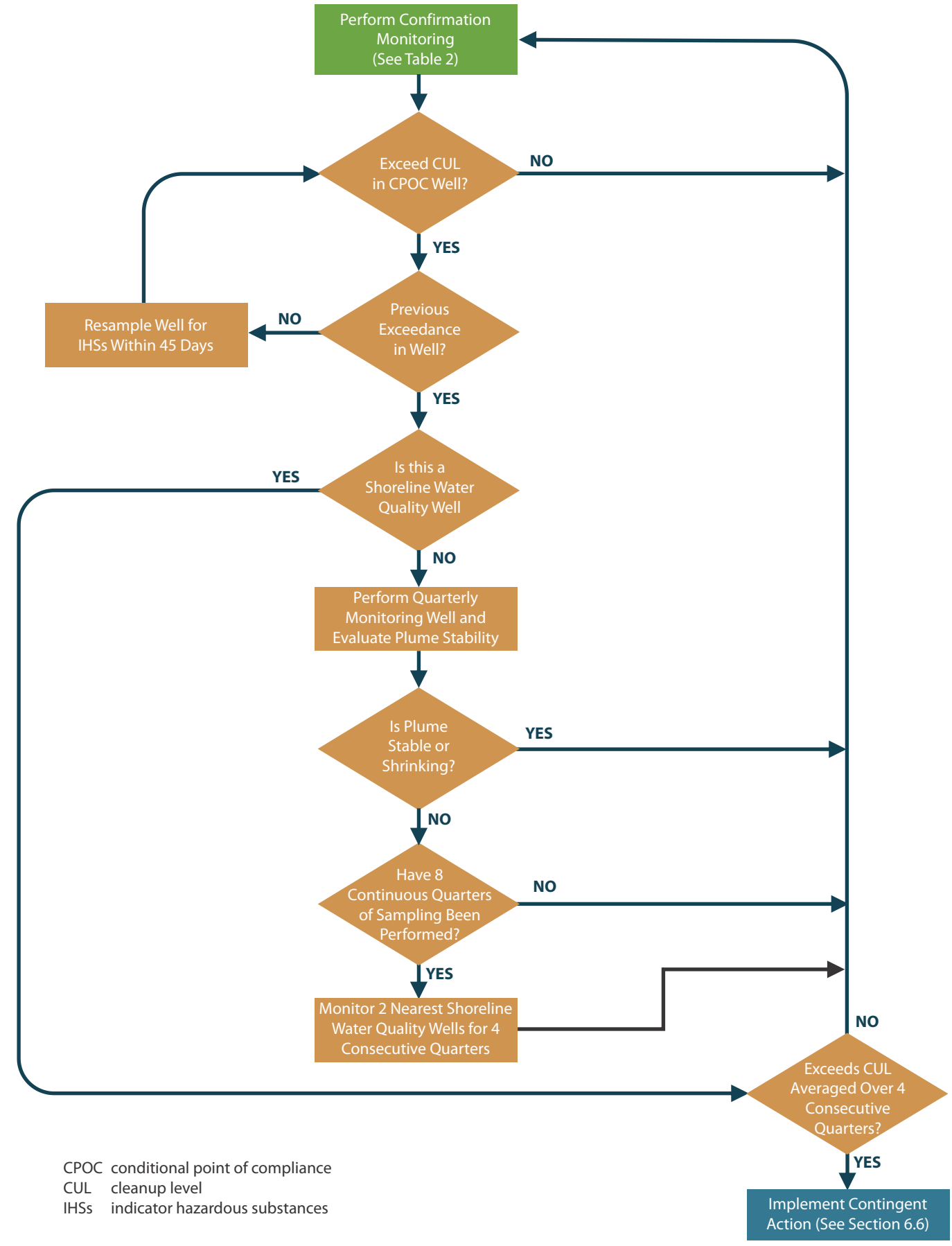
CRETE CONSULTING, INC.

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**