TERMINAL 30 2021 ANNUAL SITE PERFORMANCE REPORT – YEAR 2

Terminal 30 Site

February 2024

Port of Seattle

AECOM

2021 Annual Terminal 30 Site Performance Report

Port of Seattle
Terminal 30 Site

Project number: 60681370

February 2024

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Revision History

Revision	Revision date	Details	Authorized	Name	Position

Distribution List

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Table of Contents

Tables

Figures

Appendices

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
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 CRETE from January through August 2021 and by AECOM from September through December 2021. This represents the second year of monitoring, referenced as Year 2 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 2, 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 2 included product thickness gauging at 17 wells and product removal at 10 wells across the site (Figure 3, Table 6). Groundwater monitoring was completed at 6 wells in Year 2 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 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 are collected from two dedicated sampling ports on the treatment system. The influent port is located upstream of the thermal oxidizer and captures vapor concentrations prior to treatment. The effluent port is located on

[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.

the downstream side of the oxidizer and captures vapor concentrations after treatment is complete. Samples are collected with laboratory-provided summa canisters, which when opened create a negative pressure, drawing the sample stream into the sample canister. Tubing is utilized to connect the sampling port to the sample canister.

Data from the vapor samples are used to evaluate oxidizer performance and destruction efficiencies, which are calculated by comparing the pre- and post-treatment concentrations of total petroleum hydrocarbons (TPH) and volatile organic compounds (VOC) including benzene, toluene, ethylbenzene, and total xylenes (BTEX) . 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 just below the measured bottom of free product (the targeted level) to remove free product and water. Prior to 2021 drum vacuum was used for free product removal and was later switched to vacuum truck methods due to increased efficiency by applying a greater vacuum that is typically capable of removing fluids (oil and water) more rapidly from the target wells. Free product removal activities completed during 2021 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 are field filtered using a 0.45-micron in-line disposable filters, but no samples were submitted for dissolved analyses this year. 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 wells listed below were not required to be sampled during this reporting period:

- 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
- Performance Monitoring Well MW-89: between 130 and 190 minutes after low-low tide
- Shoreline Water Quality Monitoring Wells (MW-84A, MW-85A, MW-86B, 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:

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

- Several monitoring wells (MW-36, MW-36A, MW-93, and RW-1) had LNAPL present during baseline sampling and have been monitored for LNAPL on a monthly basis since sampling was initiated. The CMP requires LNAPL monitoring to be performed quarterly until four consecutive quarters of LNAPL thicknesses <0.01 feet (ft) are achieved, at which time monitoring can be discontinued. While monitoring continued at these four wells through the end of the reporting period, four quarters of LNAPL thickness <0.01 ft was achieved in wells MW-36A and MW-93 in January and August 2021, respectively.
- MW-39A and MW-89 are required by the CMP to be treated as recovery wells until LNAPL measurements <0.01 ft are recorded for four consecutive quarters, at which time they can be transitioned to Performance Monitoring Wells and are no longer monitored for LNAPL. While MW-89 and MW-39A achieved four quarters of LNAPL thickness <0.01 ft in October 2020 and August 2021, respectively, field staff continued to monitor both wells on a monthly basis through the end of Year 2.
- The CMP does not require LNAPL gauging outside of recovery and sampling events. When the recovery schedule was reduced from monthly to bimonthly in November 2020, the LNAPL gauging schedule was maintained on a monthly basis.
- LNAPL recovery events were to be executed on a bimonthly schedule throughout the reporting period, but conflicts resulted in a quarterly schedule during the second half of the year. Events occurred in January, March, May, August, and November.
- Matrix spike/ matrix spike duplicate (MS/MSD) samples were not collected during the April sampling event. Precision and accuracy of the data was assessed by other laboratory quality control samples and found to be acceptable. Further discussion is included in Section 5.5.
- Field duplicate and MS/MSD samples were not collected during the October sampling event. Precision and accuracy of the data was assessed by other laboratory quality control samples and found to be acceptable. Further discussion is included in Section 5.5.
- MW-38, which was found to have a below-grade obstruction that prevented sampling on September 18, 2020, was decommissioned on May 6, 2021. Decommissioning activities are documented in CRETE's decommissioning report dated May 11, 2021 (CRETE, 2021). The well has been removed from the interior monitoring well network and a replacement was determined to be unnecessary as nearby MW-93 can sufficiently represent the region.

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 2. The AS/SVE system requires routine system maintenance, which was performed by Port of Seattle Marine Maintenance staff (Marine Maintenance). The system also requires routine performance monitoring and adjustments to achieve optimal VOC removal and destruction. CRETE performed biweekly checks of the system from January through August 2021. AECOM assumed responsibilities of the system in September and performed weekly checks from September through December 2021. These visits included visual inspections, performance analysis via gauge and flow meter readings, and the collection of vapor samples to confirm compliance with PSCAA requirements.

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

3.1 System Operation and Maintenance

The data from the weekly and biweekly system performance inspections conducted by CRETE and AECOM in 2021 are available in Table 4. The work performed during these inspections included recording flow rates, operating temperatures, pressure and vacuum levels, and VOC concentrations in the oxidizer influent and effluent. Routine maintenance activities were 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. Copies of the field forms completed during the routine inspections are included in Appendix A.

The SVE system had operated for over 15,420 hours by the end of Year 2 (Table 4). It ran for 8,000 hours during this reporting period, for an operation rate of 91%. There was no significant maintenance needed on either the SVE or oxidizer systems during Year 2.

The AS system had operated for a total of 3,693 hours at the end of Year 2, 3,181 of which occurred during Year 2. This accounts for a 36% operational rate for this reporting period but is also 86% of the total operation of the system to date. Prior to 2021, and not including for the 5 months of shutdown due to the coronavirus disease, the AS system was only operational 6.7% of the time. Factors affecting system operation and Year 2 maintenance are described below in Section 3.4.

3.2 System Performance – Field Data

During routine inspections, CRETE and AECOM used a photoionization detector (PID) to monitor vapor concentrations at the oxidizer inlet and outlet to track removal rates and estimate destruction efficiency. VOC removal rates are calculated with the SVE flowrate and the influent VOC concentration. 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 0.9 (December 1, 2021) to 35.2 pounds (lb) per day (February 2, 2021) (see Table 4 and Figure 5). A rate of 0.6 lb/day was recorded on October 28, 2021, but as noted in Table 4 it was taken shortly after an extended shutdown and is likely not a representative reading. Figure 6 shows the cumulative VOC mass removal to the end of the reporting period and the potential beginnings of an asymptotic leveling out of VOC removal. In the three months of 2019 after system startup the average VOC removal was 423 lb/month. In the seven months of operation in 2020 the system averaged removals of 552 lb/month. In this reporting period of 2021, the average removals were 47% lower at 280 lb/month (twelve months of operation). 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 8,918 lb

The PSCAA permit sets thresholds for the oxidizer destruction efficiency and SVE blower flowrate. The destruction efficiency requirements are applied to the laboratory results, but the field data are used to monitor operation between sampling events. The destruction efficiency must be at least 97% if the influent concentration is between 200 and 2,000 parts per million by volume (ppmv) TPH. If the TPH concentration is less than 200 ppmv, then the destruction efficiency requirement reduces to ≥90%. Finally, if the oxidizer inlet concentration of TPH is below 10 ppmv, the destruction efficiency requirements are waived altogether. All data in the reporting period passed these thresholds with an overall

average of 98% TPH destruction (Puget Sound Clean Air Agency, 2019). As shown in Table 4, with the exception of December 20, 2021, all measurements in the reporting period were below 200 ppmv TPH and only required 90% destruction. On December 10, the influent was measured at 399.3 ppmv TPH, and the destruction efficiency was measured at 100%.

The SVE flowrate is not permitted to exceed 375 standard cubic feet per minute (scfm), and all data in the reporting period were below this limit (Puget Sound Clean Air Agency, 2019). The system operated with flow rates between 223 scfm (June 16, 2021) and 264 scfm (November 23, 2021) in this reporting period, with an average of 245 scfm (Table 4).

3.3 Soil Vapor Gas Sampling

Soil gas samples were collected on a monthly basis by CRETE from January 2021 to August 2021, and by AECOM from September 2021 to December 2021. This was done to demonstrate compliance with PSCAA destruction efficiency requirements and to ensure that the vapor treatment system was performing as designed (Puget Sound Clean Air Agency, 2019). Gas samples were collected at both the thermal oxidizer inlet and outlet in 1-liter summa cannisters. 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 destruction efficiency of the oxidizer is calculated by comparing the inlet and outlet TPH concentrations. The PSCAA permit requirements are outlined above in Section 3.2.

Soil vapor samples were collected by CRETE on: 01/12/2021, 02/17/2021, 03/23/2021, 04/29/2021, 05/20/2021, 06/16,2021, 07/20/2021 and 08/27/2021. Samples were collected by AECOM on 09/30/2021, 10/21/2021, 11/18,2021 and 12/22/2021. Vapor sampling field forms were produced by CRETE and are provided in Appendix B. The analytical data for all samples are presented in Table 5 and are incorporated, with field data, in Figure 5 and Figure 6.

The destruction efficiency in 2021 ranged from 96.6% (April 19, 2021) to 99.4% (February 17, 2021) with an average of 98.5% as summarized in Table 5. This is well above the 90% threshold for concentrations of TPH below 200 ppmv, which included samples from all monitoring events, except January 12, 2021. On that day influent TPH was 225.9 ppmv and its destruction efficiency was 99.1%, still meeting the associated requirement of 97%.

Laboratory results for the influent samples indicate that 2,677 lb of TPH were extracted from the subsurface in 2021, and 7,371 lb were extracted cumulatively from startup through the end of Year 2. These values are 20% and 17% lower, respectively, than the totals calculated with adjusted field data (Table 4). In the three months of operation in 2019 after system startup the average lab-analyzed TPH removal was 604 lb/month. In the seven months of operation in 2020 the system averaged removals of 412 lb/month. In this reporting period of 2021, the average removals were 46% lower at 223 lb/month (twelve months of operation).

The PSCAA permit dictates that a control device for extracted soil vapor is not needed once non-treated removal rates drop below contaminant of concern (COC) thresholds for two consecutive months (see Table 5). These thresholds, with the exception of TPH (2.74 lb/day), have been met for all COCs since system startup. TPH extraction rates have been below the 2.74 lb/day threshold since October 21, 2021.

3.3.1 Quality Assurance

Laboratory reports and chain-of-custody forms are provided in Appendix C. 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.

3.4 System Maintenance

As included in Table 4, the major system maintenance activities performed during Year 2 are summarized below. Note that the thermal oxidizer was updated to a catalytic oxidizer on March 19, 2020, and has been operating as such to date.

- Air sparge system:
  - Turned off from April 19, 2021, to May 4, 2021, due to an observed oil leak in the compressor. The air sparge gasket was repaired and system restarted after the repair.
  - Turned off from June 15, 2021, to July 24, 2021, due to compressor malfunction. The compressor was sent offsite for servicing and reinstalled once repaired.
  - The pressure switch on the air sparge system had historically caused shutdowns due to false high pressure faults. In Table 4 CRETE noted that the bleed valve on the air sparge compressor was opened all the way up on August 26 in an attempt to relieve pressure on the system. The attempt was not successful. AECOM tried closing it all the way down on November 5 but this did not resolve the issue either. Between the end of September (when AECOM assumed control) and November 17, 2021 (when a replacement pressure switch was installed by Marine Maintenance), the sparge system was operational just 18% of the time. The replacement of the pressure switch resolved the false alarms, and the system ran without issue through the end of the reporting period.

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. At that time, the product gauging frequency was maintained on a monthly schedule. This made the December 2020 event the first gauge-only monitoring event, and this schedule was maintained for the duration of the reporting period. CRETE completed combination recovery and gauging events in January, March, May, and August, with AECOM completing one additional event in November. CRETE also completed gauge-only events in February, April, and June. Events in July and October were missed due to scheduling conflicts and made up the following month. Field forms for all events are included in Appendix E.

4.1 Free Product Gauging

As shown in Figure 7 and Figure 8, LNAPL thickness in 2021 was stable or decreasing until the end of the year when an increase was observed. 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.

- MW-35 LNAPL thickness ranged from 0.0-0.42 ft (11/11/21 and 4/15/21, respectively). This is down from a historical max of 0.52 ft on 10/8/20.
- MW-36 LNAPL thickness was measured at 0.0 ft every visit of 2021 with the exception of 8/12/21 at 0.02 ft. This is down from a historical max of 1.0 ft on 6/19/20.
- MW-59 LNAPL thickness ranged from 0.0-0.86 ft (2/12/21 and 6/10/21, respectively). This is down from a historical max of 2.19 ft on 1/9/20. There was no LNAPL encountered in this well in the six months from September 2020-February 2021.
- RW-1 LNAPL thickness ranged from 0.04-0.27 ft (2/12/21 and 8/12/21, respectively). This is down from a historical max of 0.59 ft on 6/19/20.
- RW-12 LNAPL thickness ranged from 0.05-0.31 ft (3/5/21 and 8/12/21, respectively). This is down from a historical max of 0.78 ft on 3/12/20 and 5/16/20.
- RW-101 LNAPL thickness was measured at 0.0 ft every visit of 2021 with the exception of 6/10/21 at 0.01 ft. This is down from a historical max of 0.09 ft on 7/8/20.
- RW-103 LNAPL thickness ranged from 0.23-0.87 ft (5/13/21 and 2/12/21, respectively). This is down from a historical max of 1.74 ft on 9/10/20.
- RW-104 LNAPL thickness was measured at 0.0 ft every visit of 2021 with the exception of 11/11/21 at 0.01 ft. LNAPL had not been encountered in RW-104 prior to 2021.
- RW-106 LNAPL thickness ranged from 0.58-1.19 ft (6/10/21 and 2/12/21 respectively). This is down from a historical max of 1.55 ft on 9/10/20.
- RW-107 LNAPL thickness ranged from 0.02-1.00 ft (11/11/21 and 2/12/21, respectively). This is down from a historical max of 2.49 on 10/8/20.
- RW-110 LNAPL thickness ranged from 0.0-0.48 (1/15/21 and 8/12/21, respectively). The prior historical max had been 0.46 ft on 7/28/20.

LNAPL was measured for, but not encountered in, the following wells during 2021:

- MW-36A (historical max 0.04 ft during baseline sampling on 10/16/19)
- MW-39A (historical max of 0.35 ft on 5/16/20)
- MW-89 (historical max of 2.39 ft during baseline sampling on 10/16/21)
- MW-93 (historical max of 1.04 ft during baseline sampling on 10/16/21)
- RW-102 (historical max of <0.01 ft on 10/8/20)

- RW-105 (LNAPL has never been encountered)
- RW-108 (LNAPL has never been encountered)
- RW-109 (LNAPL has never been encountered)
- LNAPL thickness was also measured at each groundwater sampling well during the groundwater sampling events (discussed in Section 5).

4.2 Free Product Removal

LNAPL removal activities transitioned from monthly to a bi-monthly schedule starting November 2020. LNAPL removal was conducted 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 gauging in October 2019. Approximately 225 gallons of free product were removed in the 5 bi-monthly events executed in Year 2. Approximately 735 gallons of free product have been removed since removals began in January 2020. These volumes are approximations due to the difficulties inherent in measuring a precise volume from the holding tank of 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 month to month and there were no clear trends in LNAPL removal from Year 2. The average removal volume was 45 gallons per event, with a range of 24-78 gallons (Table 6). The maximum removal occurred in August and the minimum was in May. The average removal volume for 2021 was less than the 2020 average of 51 gallons per event, over 10 events. Figure 10 shows the cumulative LNAPL recovery since system startup, and the steady slope over 2021 indicates that recovery volumes are not yet tapering off. 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 Year 1, two wells (MW-36A and MW-89) qualified to be removed from the free product recovery program (Table 6). CRETE and AECOM continued to monitor them on a monthly basis through the end of Year 2. During Year 2, two additional wells (MW-39A and MW-93) qualified to be removed from the free product recovery program but were also monitored on a monthly basis through the end of the year. Compliance wells MW-35, MW-36, MW-59, and RW-1 all had free product detections during Year 2 and will continue to be monitored as recovery wells until a year has passed since the last detection occurred. MW-36 only had one detection during 2021 (0.02 ft on August 12, 2021) and appears close to meeting the criterion for termination. MW-35, MW-59, and RW-1 all consistently had free product present during monitoring events.

5. Groundwater Sampling

During the Year 2 reporting period, two groundwater performance monitoring events were conducted. The performance monitoring events were completed on April 03, 2021, by CRETE (the semiannual event for performance wells within AS/SVE system radius of influence) and on October 14, 2021, by AECOM (the annual event for performance wells both within and downgradient of the AS/SVE system radius of influence). 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.

This section provides an overview of groundwater sampling activities at the wells shown on Figure 3 and Figure 4. The Interior Monitoring Wells and CPOC wells were not sampled during this reporting period per the CMP schedule. 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 RW-11A, and MW-89. The fall annual sampling event included Performance Monitoring Wells RW-11A, MW-89, MW-36A, MW-39A, RW-9, and MW-42. The 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 on Table 8 and Figure 4. TPH-Dx data are also shown on Figure 11. Copies of Year 2 field notes are included in Appendix F and Year 2 laboratory reports are provided in Appendix G.

Per the CMP, MW-39A, MW-59, and MW-89 have been LNAPL recovery wells but qualify for performance sampling once four consecutive quarters of gauging data are collected without free product detection (Table 2, Note 2). As shown in Table 6, MW-89 qualified for performance monitoring in October of 2020 and MW-39A qualified in September of 2021. Monitoring Well MW-59 continued to have free product detected >0.01 in Year 2 and was not sampled during the reporting period. Wells with detectable free product are not sampled, as the presence of free product is assumed to indicate TPH concentrations above site cleanup goals. 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 3,000 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, neither of the samples taken during the April 2021 event (RW-11A and MW-89) were found to have COC concentrations above CULs.

During the October 2021 event, total TPH-Dx was detected above the REL of 2,085 µg/L in MW-39A (3,520 µg/L). It was detected above the CUL of 500 µg/L in MW-89 (675 µg/L) and RW-9 (1,590 µg/L). These were the only COCs measured above the CULs during the October 2021 event.

Due to the presence of LNAPL, there were no baseline analytical data for MW-39A. During Year 1 sampling, TPH-Dx was the only COC measured (2,270 µg/L) in exceedance of the CULs and the REL.

MW-89 COC concentrations have not exceeded any CUL since September 2020 (550 µg/L TPH-Dx). It has not exceeded site CULs for any other COC.

RW-9 concentrations exceeded the TPH-Dx CUL in 2019 (1,200 µg/L) but not in 2020 (450 µg/L). It has not been above site CULs for any other COC.

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

During the baseline sampling event, MW-42 exceeded cleanup level for both TPH-Gx and benzene. All COCs were measured below CULs during the September 2020 event (620 and 5.2 µg/L, respectively, for TPH-Gx and benzene) and again during the October 2021 event (248 µg/L and 1.31 µg/L, respectively).

5.2 Interior Monitoring Wells

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. Per the CMP these wells were not sampled during Year 2, but prior results are summarized in Table 8. The interior monitoring wells will be sampled again in the fall of 2022 (Tables 2 and 3).

5.3 CPOC Monitoring Wells

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. Per the CMP these wells were not sampled during Year 2, but prior results are summarized in Tables 9 and 10. The CPOC monitoring wells will be sampled again in the fall of 2022 (Tables 2 and 3).

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 2021 samples were hand delivered to Friedman & Bruya Inc. located in Seattle, Washington. The October 2021 samples were shipped to Apex Laboratories, LLC located in Tigard, Oregon. Laboratory reports were reviewed and reporting flags, when applicable, were accepted; these are included in Tables 8-10. An MS/MSD was not performed for either sampling event in 2021. Precision and accuracy were assessed during data validation using the LCS/LCSD results and were acceptable in each case. A field duplicate was not sampled during the October 2021 event. Sampling precision was assessed during data validation using the laboratory duplicate results and the RPD was comparable. Per the Summary Data Quality Reviews in Appendix H, laboratory quality assurance metrics were achieved for this project, the MRLs met the project needs for all COCs, and all data were determined to be usable.

6. Conclusion

This report presents the results of the second year of compliance monitoring at the T30 Cleanup site. Key take-aways from the Year 2 reporting period include:

- As calculated with biweekly PID data from the field (Table 4), the AS/SVE system extracted over 3,363 lb TPH during the reporting period, for a cumulative total of 8,918 lb TPH removed since system startup. These values are slightly lower as calculated with monthly laboratory data (Table 5), which show the system extracted over 2,677 lb TPH during the reporting period and 7,377 lb TPH cumulatively. Extraction was achieved while staying within the limits of the PSCAA permit for SVE flowrate and oxidizer destruction efficiency. While significant COC removal from the subsurface was achieved in Year 2, the monthly average mass removal rates for Year 2 were 46% lower than those of Year 1.
- LNAPL recovery events recovered an estimated 224 gallons of free product during the reporting period, for a cumulative total of 734 gallons since removal activities began (Table 6). Estimated removal volumes in Year 2 were about 12% lower than those of Year 1 (45 vs 51 gallons per event).
- Groundwater TPH-Dx was measured above the REL at MW-39A, but that was the only IHS measured above its CUL in 2021 (Table 8). Concentrations were below the REL in two additional wells (MW-89 and RW-9), and below the CUL in the three remaining wells sampled (MW-36A, MW-42, and RW-11A). Free product was still present in MW-59 at the end of the year, preventing sampling.
- The SVE and oxidizer systems were successfully monitored and maintained through the reporting period (Table 4). The AS system was also successfully monitored and maintained through the reporting period, but due to equipment failures operation was limited. Following a pressure switch replacement in November, the system ran continuously for the last 1.5 months of the year.
- For the first time since system startup, in October of 2021, mass removal rates in the non-treated SVE system vapor dropped below the PSCAA's COC thresholds that require a control device to be in use. They remained below these thresholds through the end of the reporting period and will continue to be monitored.
- The cleanup actions demonstrate significant mass recovery in soil vapor and free product removal and decreasing IHS concentrations in several monitoring wells. Similar cleanup actions will continue into Year 3.

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, but several changes are recommended to be made to the monitoring tasks per CMP directives:

- Terminate free product monitoring at MW-36A, MW-39A, MW-89, and MW-93, based on CMP guidance, as free product has not been detected in any of these monitoring wells in at least four consecutive quarters.
- Terminate free product monitoring at RW-101, -102, -104, -105, -108, and -109, based on CMP guidance, as free product has not been detected in these recovery wells in at least four consecutive quarters.

6.2 Recommended AS/SVE Adjustments for Year 3

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]. Two performance wells continued to exceed RELs during 2021 (MW-39A and MW-59) and the system continued to extract acceptable COC concentrations through the reporting period. Continued operation of the AS/SVE system is planned for Year 3 (2022). The following are recommendations to improve AS/SVE performance:

- Continue to monitor, analyze, and improve AS compressor operation (e.g., runtime and total flow).
- Reinstate air sparge pulsing between the five zones per the system design.
- Monitor influent vapor concentrations and evaluate vapor emission control alternatives.
- Troubleshoot water entrapment in the SVE piping/manifold to improve vapor extraction performance.

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 Years 3 and 4. 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.

[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.

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

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

Well Network	Compliance Monitoring Phase		
	Baseline Sampling	Performance Monitoring*	Confirmational Monitoring
Groundwater Sampling (See Note 1)			
Performance Monitoring Wells – Within (MW-59, RW-11A, MW-89**[b])**	Single Event - **Sampled: 10/2019** (NWTPH-G/BTEX, NWTPH-Dx)	Every 6 Months - **Sampled: 4/2020, 9/2020, 4/2021, & 10/2021** (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** (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** (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** (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** (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

PORT OF SEATTLE - TERMINAL 30
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

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
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.

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
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.

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
10/28/2021	14:15	7,309.8	14,112.7	587.6	7.0	80.0	2.0	60	263.6	28.6	26,389	664	0.5	365	99	0.6	4.4	8,669.8	SVE Blower off from 10/21/2021 until 10/28/2021. Could be result of low PID measurement. PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
11/5/2021	14:30	7,502.7	14,305.6	595.7	8.0	84.0	2.0	55	263.3	50.6	46,689	681	6.6	4,823	90	1.1	8.9	8,678.7	PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
11/11/2021	21:21	7,654.1	14,457.0	602.0	6.3	86.0	1.5	54	227.5	109.7	101,221	680	2.5	1,827	98	2.1	13.1	8,691.8	PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
11/18/2021	12:30	7,807.8	14,610.7	608.4	6.4	86.0	1.5	50	228.4	47.6	103,250	686	1.0	1,020	99	2.1	13.6	8,705.3	Collected lab gas samples. Replacement AS Compressor pressure switch installed on 11/17/21 by Marine Maintenance.
11/23/2021	16:30	7,932.0	14,734.9	613.5	5.2	86.0	2.0	50	263.7	87.5	189,798	682	0.9	918	100	4.5	23.3	8,728.6	No new PAH alarms since the pressure switch replacement.
12/1/2021	15:55	8,122.9	14,925.8	621.5	8.0	85.0	1.5	55	227.6	19.4	42,081	652	1.1	1,122	97	0.9	6.9	8,735.5	No new PAH alarms since the pressure switch replacement.
12/10/2021	14:15	8,337.3	15,140.2	630.4	8.9	86.0	1.5	50	228.4	399.3	866,129	676	0.0	0	100	17.8	158.9	8,894.4	No new PAH alarms since the pressure switch replacement.
12/17/2021	15:17	8,499.7	15,302.6	637.2	6.8	88.0	1.5	50	227.7	42.5	92,188	676	0.6	612	99	1.9	12.8	8,907.2	No new PAH alarms since the pressure switch replacement.
12/22/2021	12:15	8,616.9	15,419.8	642.1	4.9	90.0	1.5	50	227.0	55.3	**109,700**	682	0.7	1,250	99	**2.2**	10.9	8,918.1	Collected lab gas samples. No new PAH alarms since the pressure switch replacement.

Footnotes:

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

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

2. On 12/03/20, the blower hour meter was reset after an extended power outage and changeover to generator power.

3. The TPH concentration is the sum of APH EC5-8 aliphatics, APH EC9-12 aliphatics, and APH EC9-10 aromatics. If one of these was not detected, a conservative approach of 1x the reporting limit was used in the calculation.

4. For dates with laboratory data, the Total VOC Concentration equals the laboratory TPH concentration. For dates without laboratory data, the Total VOC Concentration is calculated by adjusting the PID measurement with a correction factor. This correction factor is calculated by dividing the laboratory-measured TPH concentration from the most recent sampling event by the field-collected PID measurement from the same day.

5. Removal rates are calculated via:

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

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

6. Unless otherwise indicated, all data from before 9/30/2021 was collected by CRETE and was not reviewed or validated by AECOM.

7. Destruction efficiency is calculated with the Total VOC Oxidizer Outlet Concentration and the Total VOC Oxidizer Inlet Concentration. The PSCAA permit dictates that:

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

a) ≥98.5% control efficiency if inlet TPH ≥2,000 ppmv, measured as hexane or its equivalent; or

b) ≥97% control efficiency if inlet TPH ≥200 ppmv and <2,000 ppmv, measured as hexane or its equivalent; or

c) ≥90% control efficiency if inlet TPH <200 ppmv, measured as hexane or its equivalent; or

d) ≤10 ppmv at the outlet of the control device, measured as hexane or its equivalent.

8. The PSCAA permit states that: *The minimum operating temperature at the fire box of the thermal oxidizer shall be at least 1,400°F, on an hourly average.* When the thermal oxidizer was retrofitted to a catalytic oxidizer on 3/19/20, the minimum operating temperature became 600°F. The hourly requirement is met by the shut-down alarm programmed if the temperature drops below the permitted threshold.

9. This calculation was revised by AECOM to use the mass removal rate from the single day's data rather than the average with the previous visit as CRETE had done.

Abbreviations, Symbols, and Notes:

-- = not analyzed or not applicable
ΔP = Differential Pressure
H_2O = Water
Hr = Hour
^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.
Blue values indicate data collected by CRETE but input by AECOM, or calculated by AECOM with data previously collected by CRETE.

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

	SVE Field Data			Laboratory Oxidizer Influent Results						Mass Removal[3]							Laboratory Oxidizer Effluent Results							
	Calculated			Calculated						Calculated							Calculated						Calculated	
Date	Cumulative SVE Blower Runtime[1] (Days)	Period SVE Blower Runtime[1] (Days)	SVE Inlet Vapor Flow Rate[1] (scfm)	TPH[2] ($\mu g/m^3$)	TPH[7,8] (ppmv)	Benzene ($\mu g/m^3$)	Toluene ($\mu g/m^3$)	Ethyl-benzene ($\mu g/m^3$)	Total Xylenes ($\mu g/m^3$)	TPH[2,9] (lbs/day)	Benzene[9] (lbs/day)	Toluene[9] (lbs/day)	Ethyl-benzene[9] (lbs/day)	Total Xylene[9] (lbs/day)	TPH Period Mass Removed (lb)	TPH Cumulative Mass Removed (lb)	TPH[2] ($\mu g/m^3$)	TPH[7,8] (ppmv)	Benzene ($\mu g/m^3$)	Toluene ($\mu g/m^3$)	Ethyl-benzene ($\mu g/m^3$)	Total Xylenes ($\mu g/m^3$)	TPH Destruction Efficiency[4,8] (%)	Comments
10/23/2019	34.03	34.03	185	796,500	194.8	160	7,200	170	500	13.23	0.0027	0.120	0.003	0.008	450.1	450.1	4,590	1.1	210	150	4	18	99.4	SVE was started on 9/19/2019.
11/27/2019	63.12	29.10	308	917	0.2	1	58	1	4	18.04	--	--	--	--	525.0	975.1	1,705	0.4	130	64	1.5	4.5	99.7	Lab Data is questionable and not used in calculations. See Note 5.
12/23/2019	89.13	26.00	260	1,381,000	337.7	320	770	54	96	32.24	0.0075	0.018	0.001	0.002	838.3	1,813.3	1,125	0.3	18	57	1.3	3.9	99.9	
1/15/2020	112.13	23.00	229	188,970	46.2	23	730	17	51	3.89	0.0005	0.015	0.000	0.001	89.6	1,902.9	340	0.1	2.6	60	1.4	4.2	99.8	
2/11/2020	139.18	27.05	232	94,970	23.2	12	730	17	51	1.98	0.0003	0.015	0.000	0.001	53.7	1,956.5	1,090	0.3	2.6	150	3.5	10.5	98.9	
3/12/2020	169.00	29.83	220	641	0.2	1	62	1	4	3.36	--	--	--	--	100.3	2,056.8	515	0.1	0.96	57	1.3	3.9	99.7	Inlet concentration lab data suspect. Need to re-sample upon start up. Lab data not used in calculations. See Note 5.
8/26/2020	189.43	20.43	134	2,101,500	513.9	260	680	97	251	25.26	0.0031	0.008	0.001	0.003	516.0	2,572.9	6,570	1.6	11	660	15	45	99.7	System was off line March 24 - August 17, 2020 due to the Covid 19 Pandemic
9/29/2020	223.18	33.75	243.2	1,460,900	357.2	120	680	56	118	31.94	0.0026	0.015	0.001	0.003	1,078.1	3,650.9	9,570	2.3	11	660	15	45	99.3	
10/27/2020	249.87	26.69	263.1	394,000	96.3	270	16,000	370	1,120	9.32	0.0064	0.378	0.009	0.026	248.7	3,899.7	5,250	1.3	4.5	260	6.1	18.1	98.7	
11/18/2020	272.09	22.22	264.0	452,000	110.5	140	8,100	190	560	10.73	0.0033	0.192	0.005	0.013	238.5	4,138.1	14,400	3.5	12	680	16	47	99.0[5]	
12/16/2020	295.75	23.66	229.5	1,151,000	281.5	73	2,600	61	181	23.75	0.0015	0.054	0.001	0.004	561.8	4,699.9	9,170	2.2	4.8	280	6.5	31.5	99.2	
1/12/2021	321.72	25.98	227.7	924,000	225.9	86	3,000	69	209	18.92	0.0018	0.061	0.001	0.004	491.4	5,191.3	8,570	2.1	4.8	280	9.1	53.3	99.1	
2/17/2021	352.59	30.86	230.7	566,950	138.6	50	720	28	50	11.76	0.0010	0.015	0.001	0.001	363.1	5,554.4	3,160	0.8	50.0	720	28	50	99.4	
3/23/2021	384.49	31.91	227.3	563,000	137.7	140	8,500	200	590	11.51	0.0029	0.174	0.004	0.012	367.2	5,921.6	10,850	2.7	5.8	340	32	83	98.1	
4/19/2021	408.29	23.80	227.0	641,000	156.7	140	8,300	190	570	13.09	0.0029	0.169	0.004	0.012	311.4	6,233.0	21,570	5.3	4.8	280	59	217	96.6	AS blower shut down due to oil leak.
5/20/2021	435.64	27.35	227.0	420,900	102.9	17	680	24	47	8.59	0.0003	0.014	0.000	0.001	235.0	6,468.0	7,010	1.7	1.5	87	69	233	98.3	AS blower restarted on 5/4/21 with repaired oil gasket.
6/16/2021	459.92	24.27	222.7	421,000	102.9	140	8,100	190	560	8.43	0.0028	0.162	0.004	0.011	204.6	6,672.6	5,250	1.3	4.5	260	6.1	18.1	98.8	AS system down since 6/15/21 for blower servicing.
7/19/2021	492.40	32.48	223.1	257,000	62.8	150	8,700	200	600	5.15	0.0030	0.175	0.004	0.012	167.4	6,840.1	5,700	1.4	5.1	300	6.9	20.9	97.8	AS system down since 6/15/21 for blower servicing.
8/26/2021	530.34	37.94	225.7	251,000	61.4	150 U	8,900 U	200 U	610 U	5.09	0.0030	0.181	0.004	0.012	193.2	7,033.3	4,070	1.0	4.8 U	280 U	6.5 U	19.5 U	98.4	AS system restarted 7/24/21. PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
9/30/2021	559.72	29.38	228.5	269,500 J	65.9	83 U	4,900 U	110 U	340 U	5.54	0.0017	0.101	0.002	0.007	162.7	7,196.0	3,030	0.7	1.9 U	110 U	2.6 U	7.7 U	98.9	AECOM takes over system operation. See Footnote 6. SVE and Oxidizer running smoothly. PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
10/21/2021	580.61	20.90	229.7	108,510 J	26.5	6.0	340 U	10	24 U	2.24	0.0001	0.007	0.000	0.000	46.8	7,242.9	1,900	0.5	1.9 U	110 U	2.5 U	7.5 U	98.2	PAH alarms continue to shut down the AS system. Malfunctioning pressure switch likely cause.
11/18/2021	608.37	27.75	228.4	103,250 J	25.2	7.5	340 U	11 J	24 UJ	2.12	0.0002	0.007	0.000	0.000	58.9	7,301.7	1,020	0.2	1.9 U	110 U	2.6 U	7.9 U	99.0	SVE and Oxidizer running smoothly with the exception of SVE downtime 10/21-10/28. Replacement AS Compressor pressure switch installed on 11/17/21 by Marine Maintenance. AS system running smoothly since.
12/22/2021	642.08	33.71	227.0	109,700 U	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.

Year-end Cumulative Mass Removed (lb/yr)[9]:	2019	**1233**	0	4	0	0
	2020	**2650**	0.4	16.5	0.4	1.3
	2021	**2358**	0.6	31.5	0.7	2.2
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.

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

8. The PSCAA permit dictates that:
At all times during operation of the SVE system, the abatement device shall meet the following requirements, as applicable:
a) ≥98.5% control efficiency if inlet TPH ≥2,000 ppmv, measured as hexane or its equivalent; or
b) ≥97% control efficiency if inlet TPH ≥200 ppmv and <2,000 ppmv, measured as hexane or its equivalent; or
c) ≥90% control efficiency if inlet TPH <200 ppmv, measured as hexane or its equivalent; or
d) ≤10 ppmv at the outlet of the control device, measured as hexane or its equivalent.
9. The PSCAA permit dictates the following. Values in excess of the permit are indicated with bold formatting.
The owner or operator may operate the SVE system without the control device when inlet sampling data from two or mor e consecutive 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

PORT OF SEATTLE - TERMINAL 30

Table 6

LNAPL Gauging and Recovery Results

Date	Time of Fieldwork	Tidal Position		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]			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]
				(Gal)	(Gal)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(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	<0.01	<0.01
02/13/2020	NM	---	---	21.3	68	NM	NM	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
03/12/2020	NM	---	---	48.4	116.4	NM	NM	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
05/16/2020	NM	---	---	20	136.4	NM	NM	0.04	---	0.00	---	0.35	---
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[B]	---	0.04	<0.01
09/10/2020	NM	---	---	16.4	375.8	NM	NM	0.00	---	0.00	---	TRACE	TRACE
10/08/2020	15:30-21:51	20:24	14:24	35.1	410.9	0.52	0.00	0.00	---	0.00	---	0.00	---
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	44.3	734.2	0.00	---	0.00	---	0.00	---	0.00	---

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]	Initial LNAPL Thickness	Final LNAPL Thickness[H]
Date	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(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	<0.01	<0.01	0.03	0.01[B]	0.71	0.03[B]	0.02	<0.01
02/13/2020	0.23	0.10	<0.01	<0.01	<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	<0.01	<0.01	0.05	<0.01	0.78	0.08[B]	0.03	<0.01
05/16/2020	1.06	---	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	0.00	---

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

Date	RW-102		RW-103		RW-104		RW-105		RW-106		RW-107	
	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)	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)
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	0.02	0.00

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

Date	RW-108		RW-109		RW-110	
	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)	Initial LNAPL Thickness (Ft)	Final LNAPL Thickness[H] (Ft)
Baseline[J]	0.00	---	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	---
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

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.

PORT OF SEATTLE - TERMINAL 30

Table 7

LNAPL Gauging Results in Monitoring Wells

Date	Time of Fieldwork	Tidal Position		MW-35	MW-38[B]	MW-42	MW-45A	MW-46B	MW-54	MW-58A	MW-64
		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)
Baseline[C]	NA	---	---	NM	0.0	0.0	0.0	0.0	NM	0.0	NM
10/8/2020[D]	NM	---	---	0.52[E]	NA	NA	NA	NA	NM	NA	NM

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

Date	MW-84A LNAPL Thickness (Ft)	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	0.0
10/8/2020[D]	NA	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

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.

PORT OF SEATTLE - TERMINAL 30
Table 8
Performance and Interior Monitoring Well 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**
		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
	MW-59	10/17/19	Well not sampled due to free product encountered									
		4/11/20	Well not sampled due to 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 due to free product encountered									
		10/14/21	Well not sampled due to free product encountered									
	MW-89	10/18/19	Well not sampled due to 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
	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
	MW-36A	10/17/19	Well not sampled due to 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
	MW-39A	10/17/19	Well not sampled due to 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
	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
Interior Wells	**RW-1**	10/17/19	Well not sampled due to free product encountered									
		9/19/20	Well not sampled due to free product encountered									
	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
	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 due to 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

Notes:

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

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

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

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

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

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

Abbreviations and Formatting:

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

PORT OF SEATTLE - TERMINAL 30
Table 9
CPOC and Shoreline Water Qaulity Monitoring Well 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
	MW-46B	10/16/19	1500	380 [b]	150 [b]	250 U	150 [b]	100 U	1 U	1 U	1 U	3 U
		9/18/20	1300	250 U	81 [b]	250 U	81 [b]	110	1 U	1 U	1 U	3 U
	MW-58A	10/17/19	1900	610 [b]	280 [b]	250 U	280 [b]	360	1 U	1 U	1 U	3 U
		9/24/20	3000	320 [b]	420	250 U	420	390	1 U	1 U	1 U	4.7
	MW-86B	10/17/19	1500	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
	MW-92	10/16/19	5200	1100 [b]	120 [b]	250 U	120 [b]	250	1 U	1 U	1.2	3 U
		9/18/20	4800	720 [b]	75 [b]	250 U	75 [b]	200	1 U	1 U	1 U	3 U
Shoreline Water Quality Wells	MW-84A	10/17/19	1100	250 U	410 [b]	250 U	410 [b]	100 U	1 U	1 U	1 U	3 U
	MW-85A	10/18/19	130 [b]	250 U	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U
		10/18/19 DUP	130 [b]	250 U	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U
	MW-87A	10/18/19	420 [b]	570 [b]	50 U	250 U	250 U	100 U	1 U	1 U	1 U	3 U

Notes :

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

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

Abbreviations/formatting

BOLD = result was detected above the CUL

BOLD = result was detected above the REL

ug/L = micrograms per liter

CPOC = Conditional Point of Compliance

CUL = cleanup level

GW = groundwater

REL = remediation level

SGC = silica gel cleanup

U - not detected above the laboratory reporting limit

PORT OF SEATTLE - TERMINAL 30
Table 10
CPOC and Shoreline Water Qaulity Monitoring Well Groundwater Analytical Data - PAH

Well Type	Well ID	Sample Date	Naphth-alene (µg/L)	Acenaph-thylene (µg/L)	Acenaph-thene (µg/L)	Fluorene (µg/L)	Phen-anthrene (µg/L)	Anthracene (µg/L)	Fluoran-thene (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] fluoran-thene (µg/L)	Benzo[k] fluoran-thene (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	0.036	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
	MW-46B	10/16/19	0.1 U	0.01 U	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	0.012	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
	MW-58A	10/17/19	0.96	0.10	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	0.22	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
	MW-86B	10/17/19	0.1 U	0.053	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	0.057	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	0.050	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
	MW-92	10/16/19	0.1 U	0.012	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	0.01 U	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
Shoreline Water Quality Wells	MW-84A	10/17/19	0.1 U	0.56	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	0.38	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	0.01 U	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 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 Identification	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)	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	--	9.37	8.65	--	0	64.04	17.8	6.47	1.03	6.6	0.03	-33
					10/14/21	--	9.70	8.32	--	0	70.16	21.20	7.42	128.00	7.3	0.97	27
					04/14/22	--	9.38	8.64	--	0	60.42	15.79	6.66	1.21	3.6	2.58	49
	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	Well not sampled due to free product encountered within the preceding two quarters											
					04/14/22	Well not sampled due to free product encountered within the preceding two quarters											
	MW-89	20	17.91	--	10/18/19	--	--	--	--	--	--	--	--	--	--	--	--
					04/11/20	--	--	--	--	--	--	--	--	--	--	--	--
					09/29/20	--	--	--	--	--	--	--	--	--	--	--	--
					04/03/21	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	--	9.87	8.04	--	--	69.69	20.94	4.37	4.56	38.1	3.6	460
					04/15/22	--	10.22	7.69	--	--	64.92	18.29	4.72	1.50	4.8	7.43	150
	RW-9	--	--	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	--	9.33	--	--	--	73.87	23.26	7.13	1.10	5.1	0	-107
	MW-36A	20.5	NM	NM	10/17/19	Well not sampled due to free product encountered											
					09/19/20	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	--	10.05	--	--	--	66.52	19.18	7.73	2.61	12.8	0.54	-318
	MW-39A	20.5	NM	NM	10/17/19	Well not sampled due to free product encountered											
					09/19/20	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	--	9.4	--	--	--	68.79	20.44	7.25	1.12	3.8	0.13	-142
	MW-42	--	--	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--
					10/14/21	---	10.08	--	--	0	67.12	19.51	-168	1.87	1.4	0.3	7.55
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											
	RW-5A	20	18.07	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--
	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	--	--	--	--	--	--	--	--	--	--	--	--
CPOC Wells	MW-45A	20.1	--	16.52	10/21/19	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--
	MW-46B	20.3	--	16.07	10/16/19	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--
	MW-58A	25	NM	NM	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--
					09/24/20	--	--	--	--	--	--	--	--	--	--	--	--
	MW-86B	20	18.28	--	10/17/19	--	--	--	--	--	--	--	--	--	--	--	--
					09/24/20	--	--	--	--	--	--	--	--	--	--	--	--
	MW-92	20	NM	NM	10/16/19	--	--	--	--	--	--	--	--	--	--	--	--
					09/18/20	--	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--	--

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

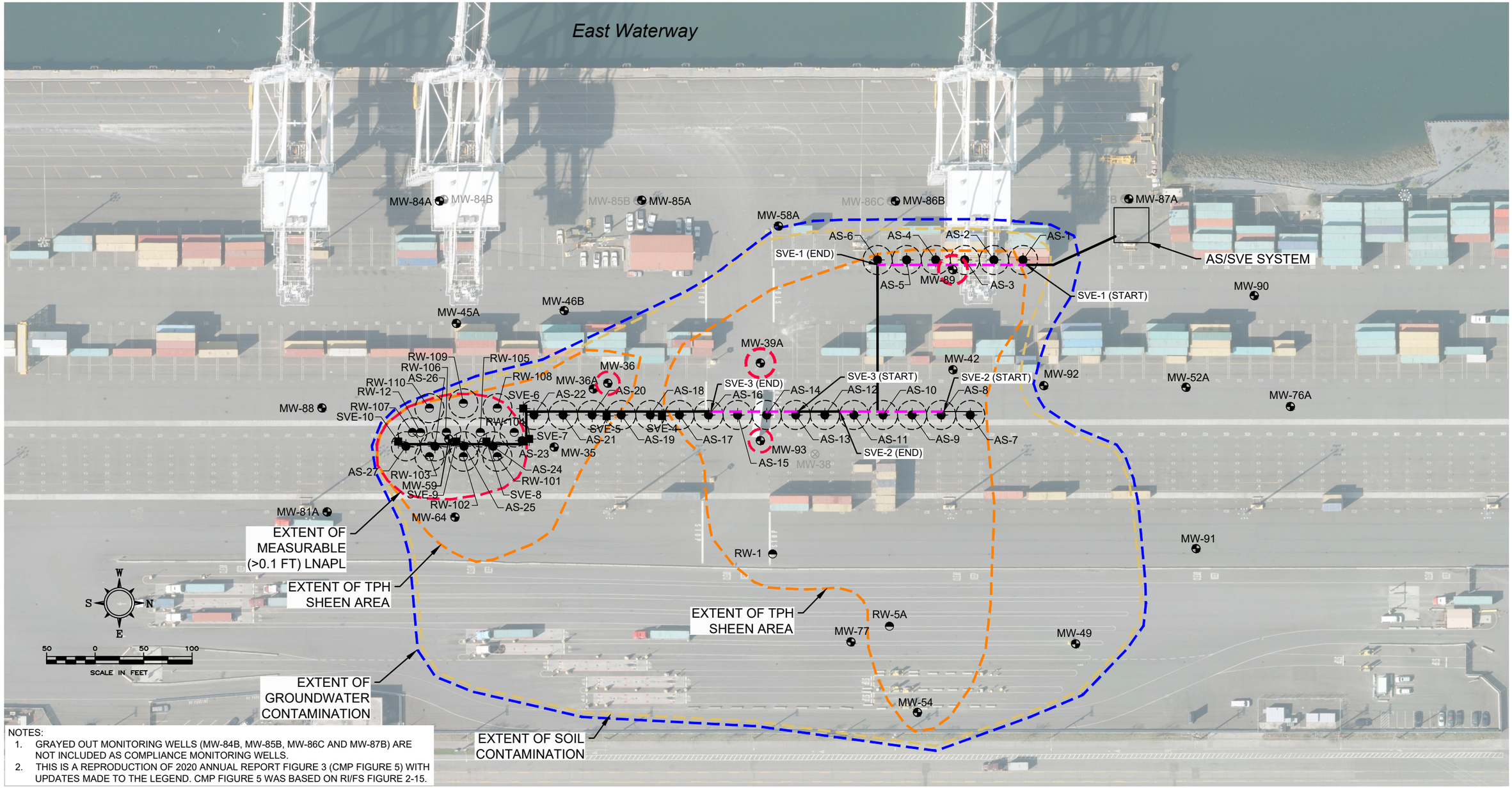
AECOM

SITE LOCATION

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



NOTES:
1. GRAYED OUT MONITORING WELLS (MW-84B, MW-85B, MW-86C AND MW-87B) ARE NOT INCLUDED AS COMPLIANCE MONITORING WELLS.
2. 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)

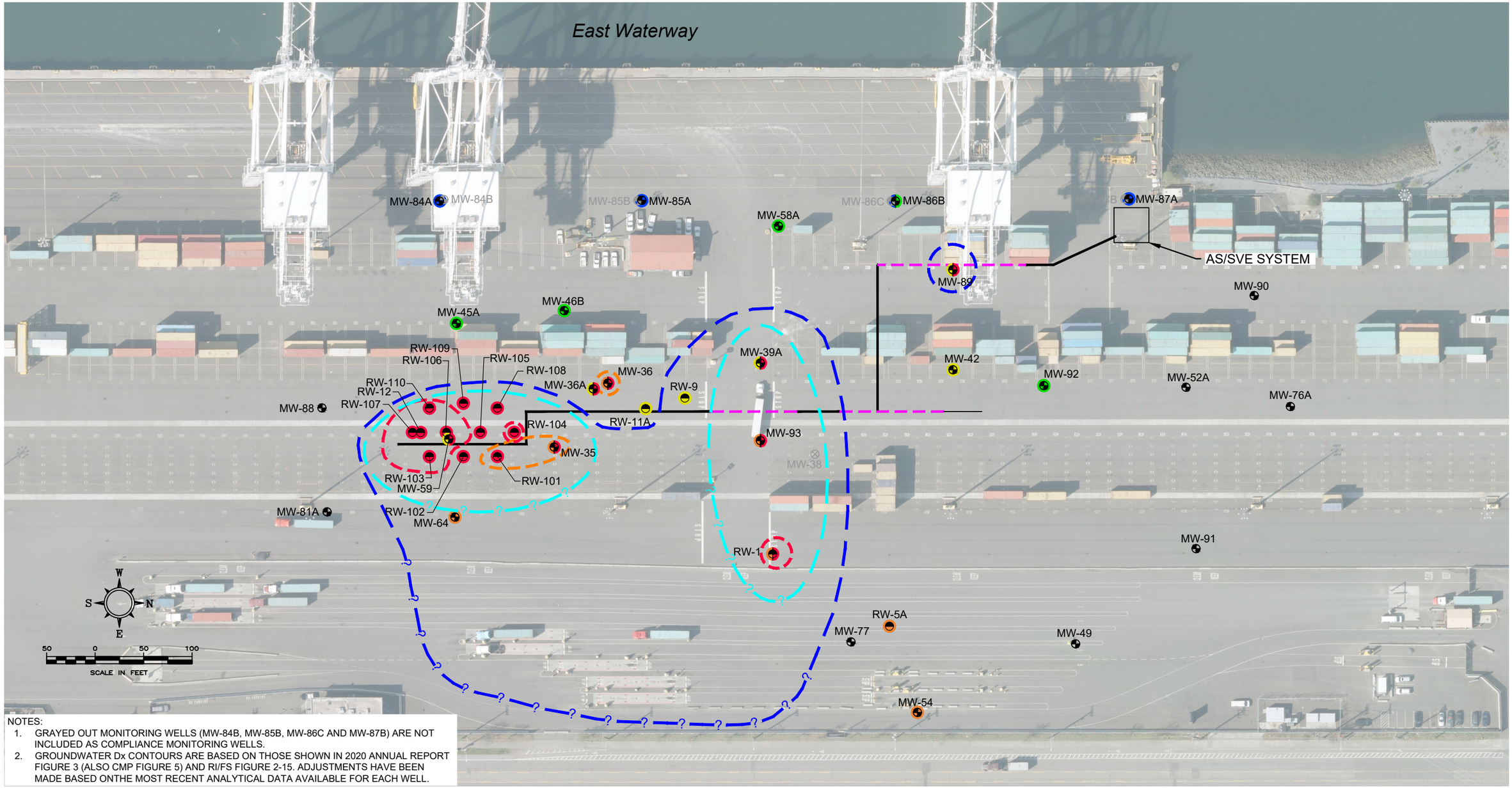
AECOM

BASELINE EXTENT OF IMPACTS AND LOCATION OF CLEANUP ACTION

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 2

K:\Port_of_Seattle\2023\Fig 2 Baseline Extent of Impacts and Location of Cleanup Action.dwg May 03, 2023 - 6:28am



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 2021)[2]
- EXTENT OF GROUNDWATER Dx CONTAMINATION ABOVE CUL (OCT 2021)[2]
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) ON NOV 11, 2021
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) IN 2021 (PRIOR TO NOV 11, 2021)

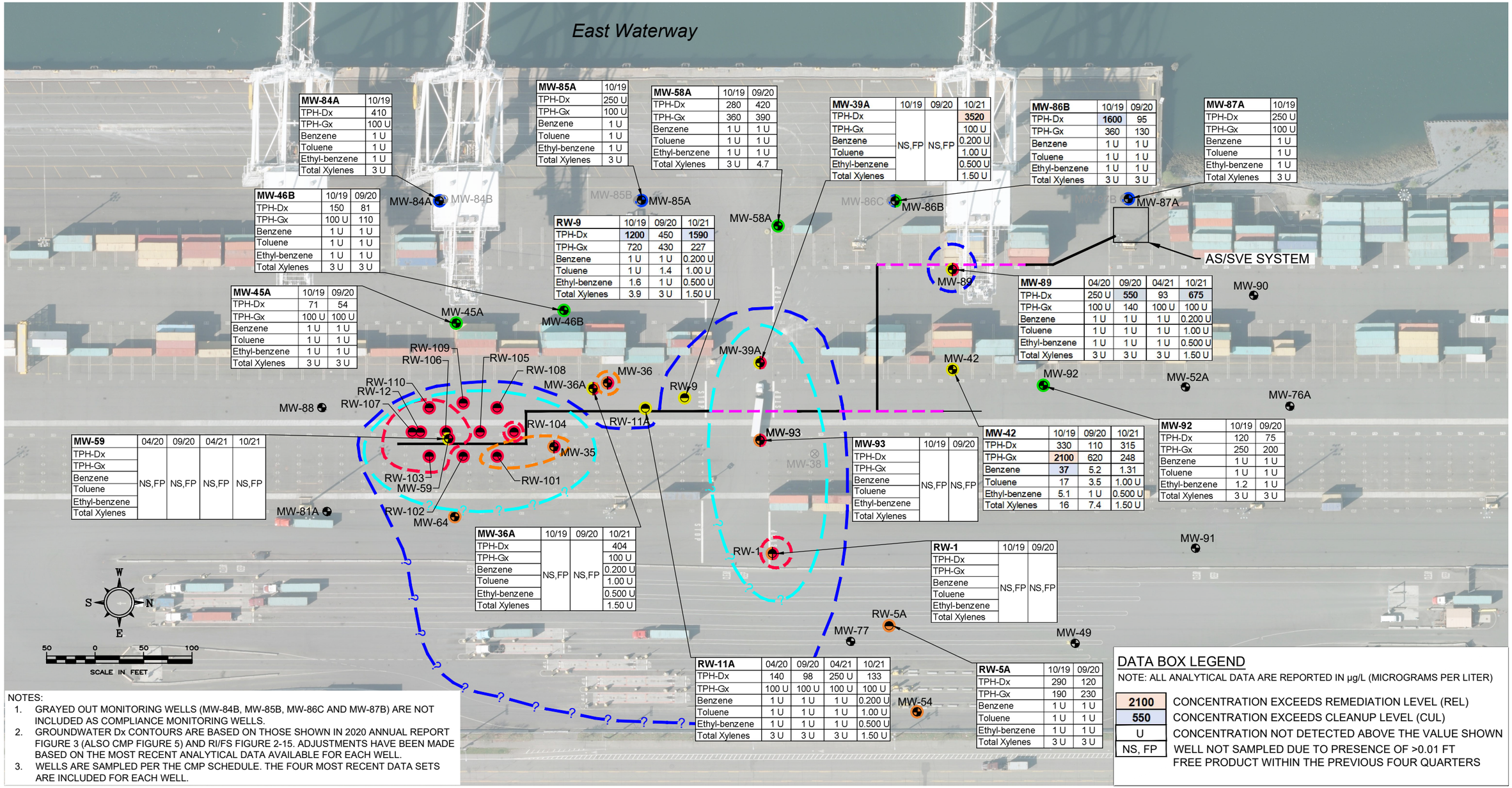
AECOM

COMPLIANCE MONITORING NETWORK WITH FINAL 2021 GROUNDWATER CONDITIONS

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 3

K:\Port_of_Seattle\2023\Fig 3 Compliance Monitoring Network with Final 2021 GW Conditions.dwg May 03, 2023 - 1:05pm



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
TPH-Dx	280	420
TPH-Gx	360	390
Benzene	1 U	1 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	4.7

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

MW-86B	10/19	09/20
TPH-Dx	**1600**	95
TPH-Gx	360	130
Benzene	1 U	1 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	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
TPH-Dx	150	81
TPH-Gx	100 U	110
Benzene	1 U	1 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	3 U

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

MW-89	04/20	09/20	04/21	10/21
TPH-Dx	250 U	**550**	93	**675**
TPH-Gx	100 U	140	100 U	100 U
Benzene	1 U	1 U	1 U	0.200 U
Toluene	1 U	1 U	1 U	1.00 U
Ethyl-benzene	1 U	1 U	1 U	0.500 U
Total Xylenes	3 U	3 U	3 U	1.50 U

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

MW-59	04/20	09/20	04/21	10/21
TPH-Dx	NS,FP	NS,FP	NS,FP	NS,FP
TPH-Gx				
Benzene				
Toluene				
Ethyl-benzene				
Total Xylenes				

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

MW-93	10/19	09/20
TPH-Dx	NS,FP	NS,FP
TPH-Gx		
Benzene		
Toluene		
Ethyl-benzene		
Total Xylenes		

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

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

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

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

RW-5A	10/19	09/20
TPH-Dx	290	120
TPH-Gx	190	230
Benzene	1 U	1 U
Toluene	1 U	1 U
Ethyl-benzene	1 U	1 U
Total Xylenes	3 U	3 U

NOTES:
1. GRAYED OUT MONITORING WELLS (MW-84B, MW-85B, MW-86C AND MW-87B) ARE NOT INCLUDED AS COMPLIANCE MONITORING WELLS.
2. GROUNDWATER Dx CONTOURS ARE BASED ON THOSE SHOWN IN 2020 ANNUAL REPORT FIGURE 3 (ALSO CMP FIGURE 5) AND RI/FS FIGURE 2-15. ADJUSTMENTS HAVE BEEN MADE BASED ON THE MOST RECENT ANALYTICAL DATA AVAILABLE FOR EACH WELL.
3. WELLS ARE SAMPLED 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)
550	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 2021)²
- EXTENT OF GROUNDWATER Dx CONTAMINATION ABOVE CUL (OCT 2021)²
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) ON NOV 11, 2021
- EXTENT OF MEASURABLE LNAPL (>0.01 FT) IN 2021 (PRIOR TO NOV 11, 2021)

AECOM

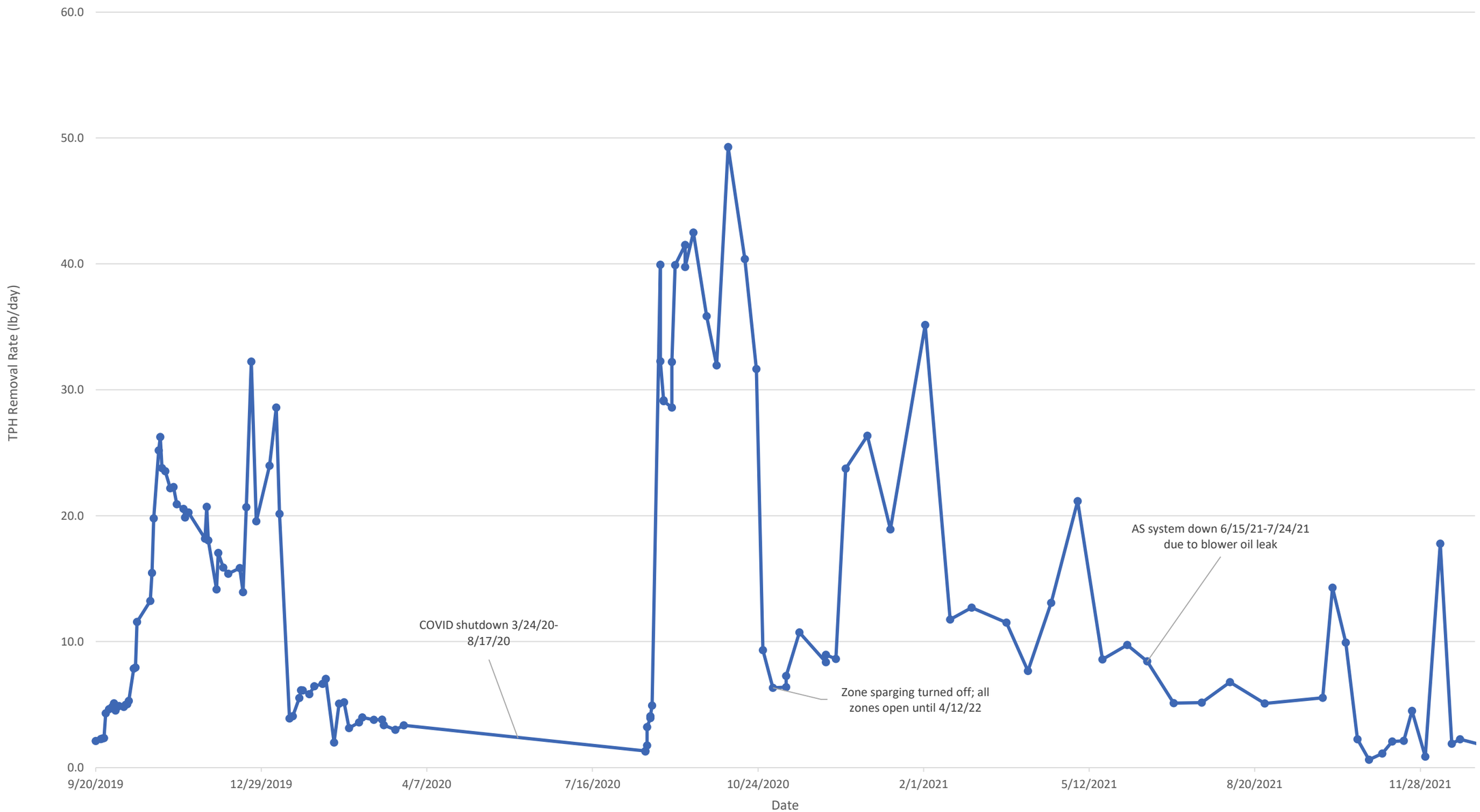
END OF 2021 COMPLIANCE MONITORING ANALYTICAL RESULTS

PORT OF SEATTLE
TERMINAL 30 CLEANUP ACTION
SEATTLE, WASHINGTON

FIGURE 4

K:\Port_of_Seattle\2023\Fig 4 End of 2021 Compliance Monitoring Analytical Results.dwg May 25, 2023 - 6:42am

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

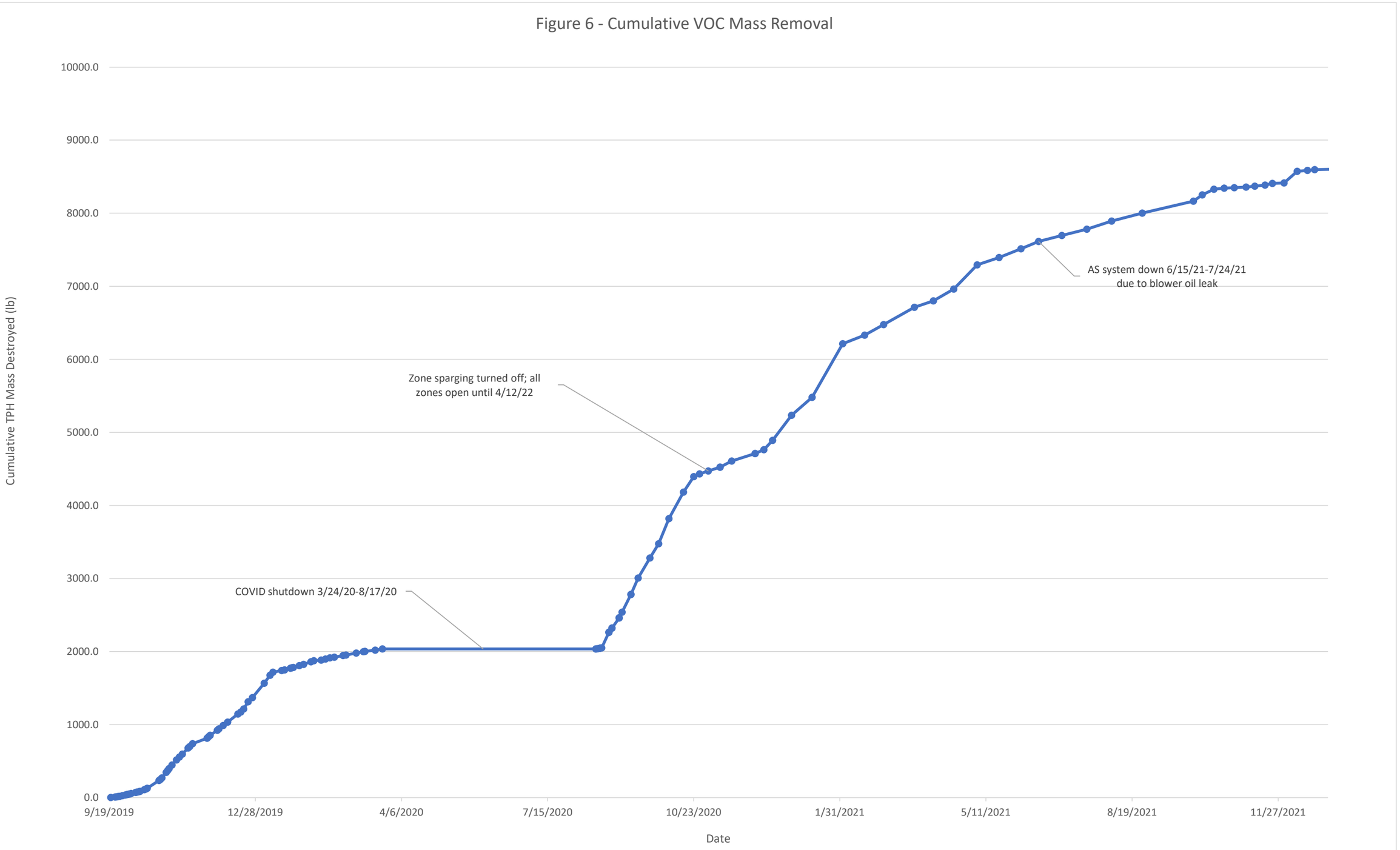


Figure 7 - LNAPL Thickness in Recovery Wells

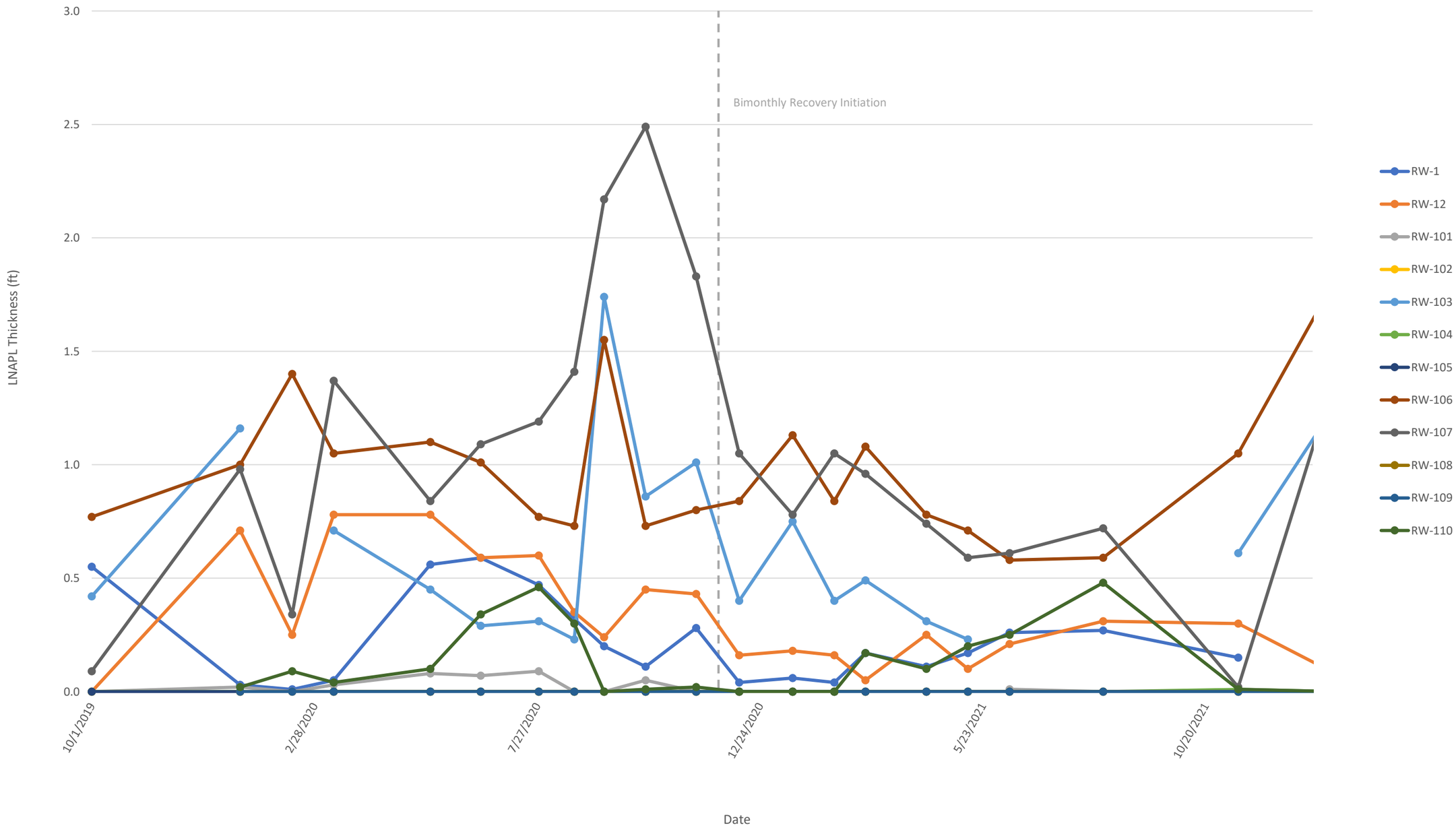


Figure 8 - LNAPL Thickness in Monitoring Wells

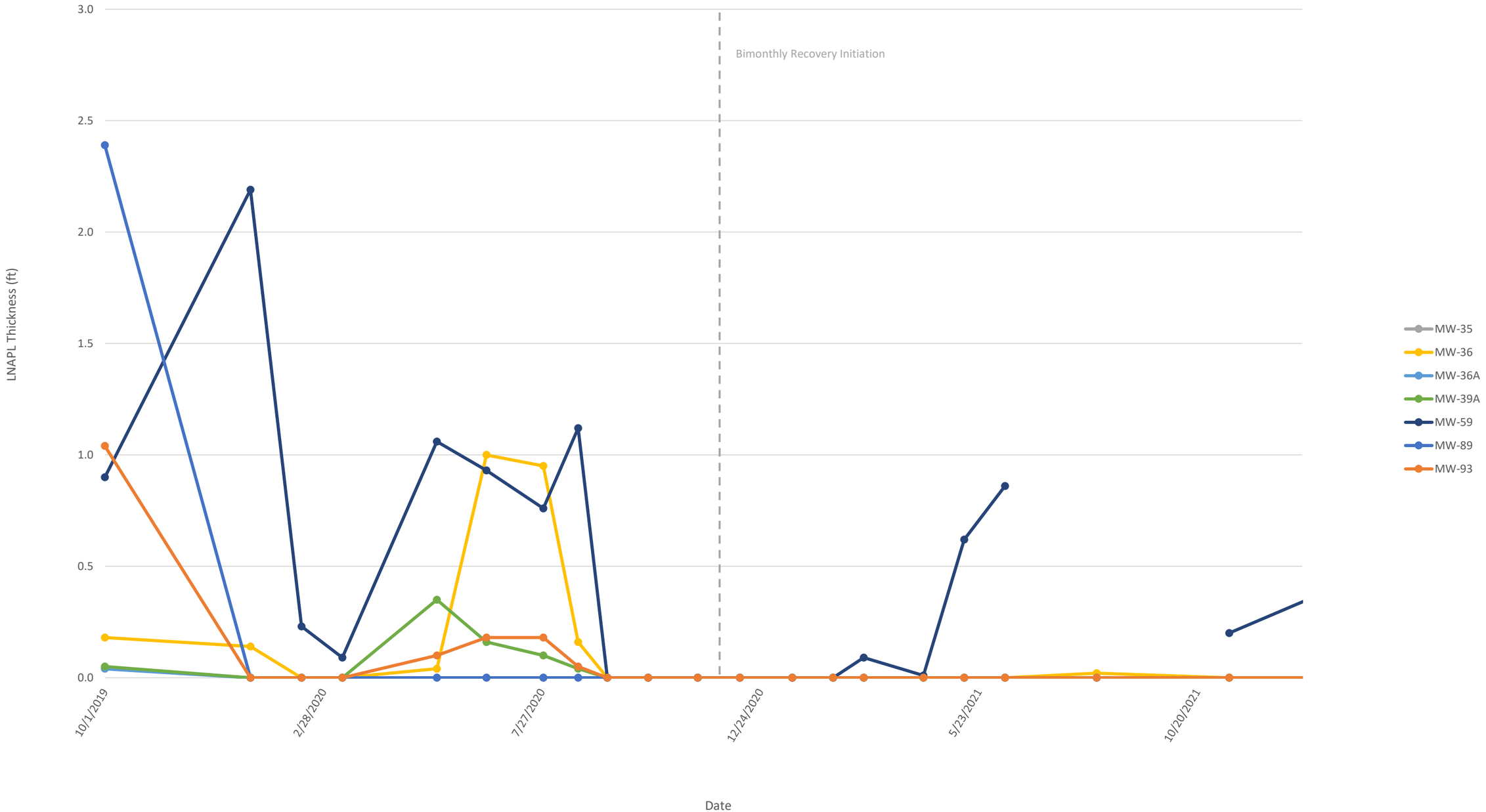


Figure 9 - LNAPL Recovery Volumes

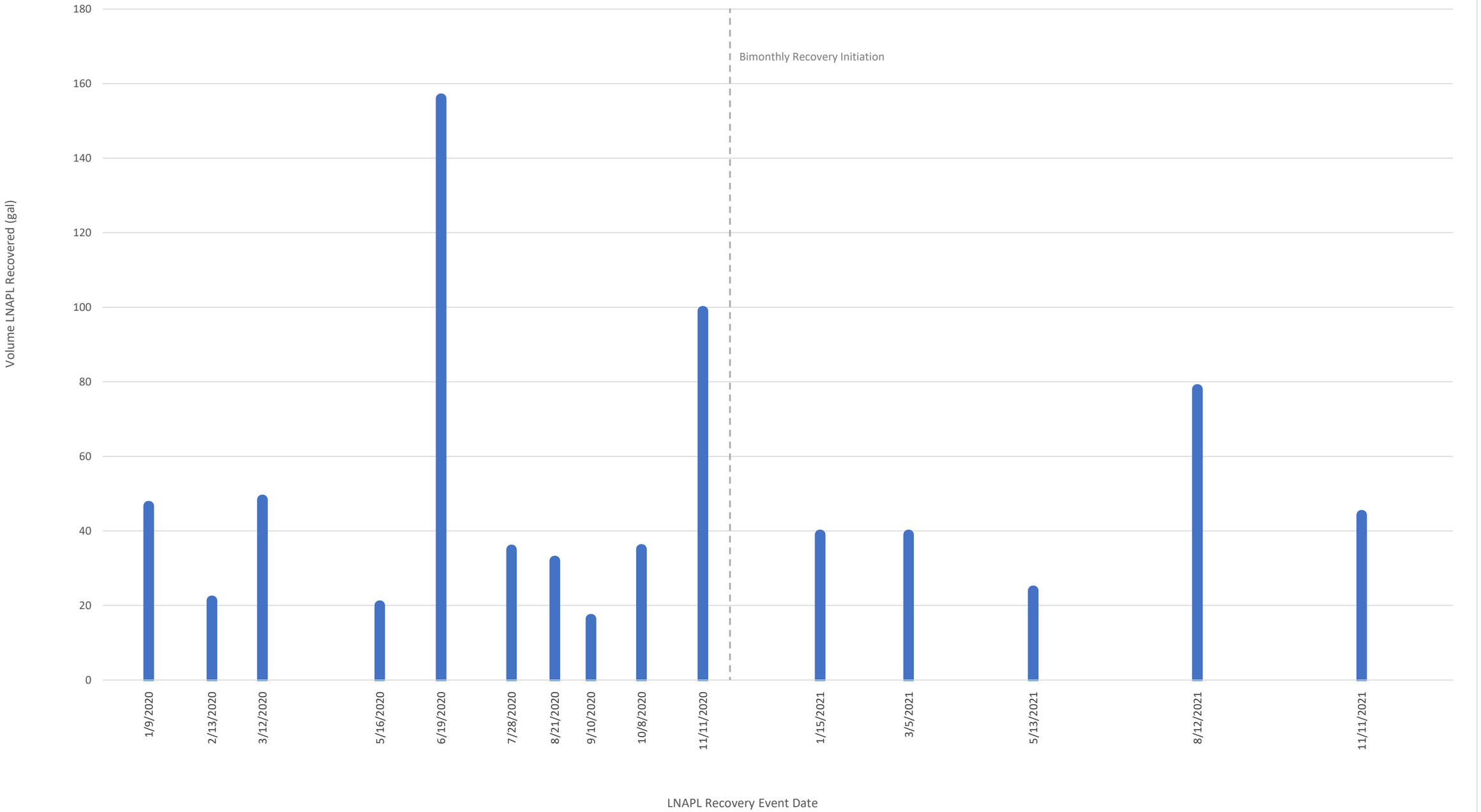


Figure 10 - Cumulative LNAPL Recovery Volume

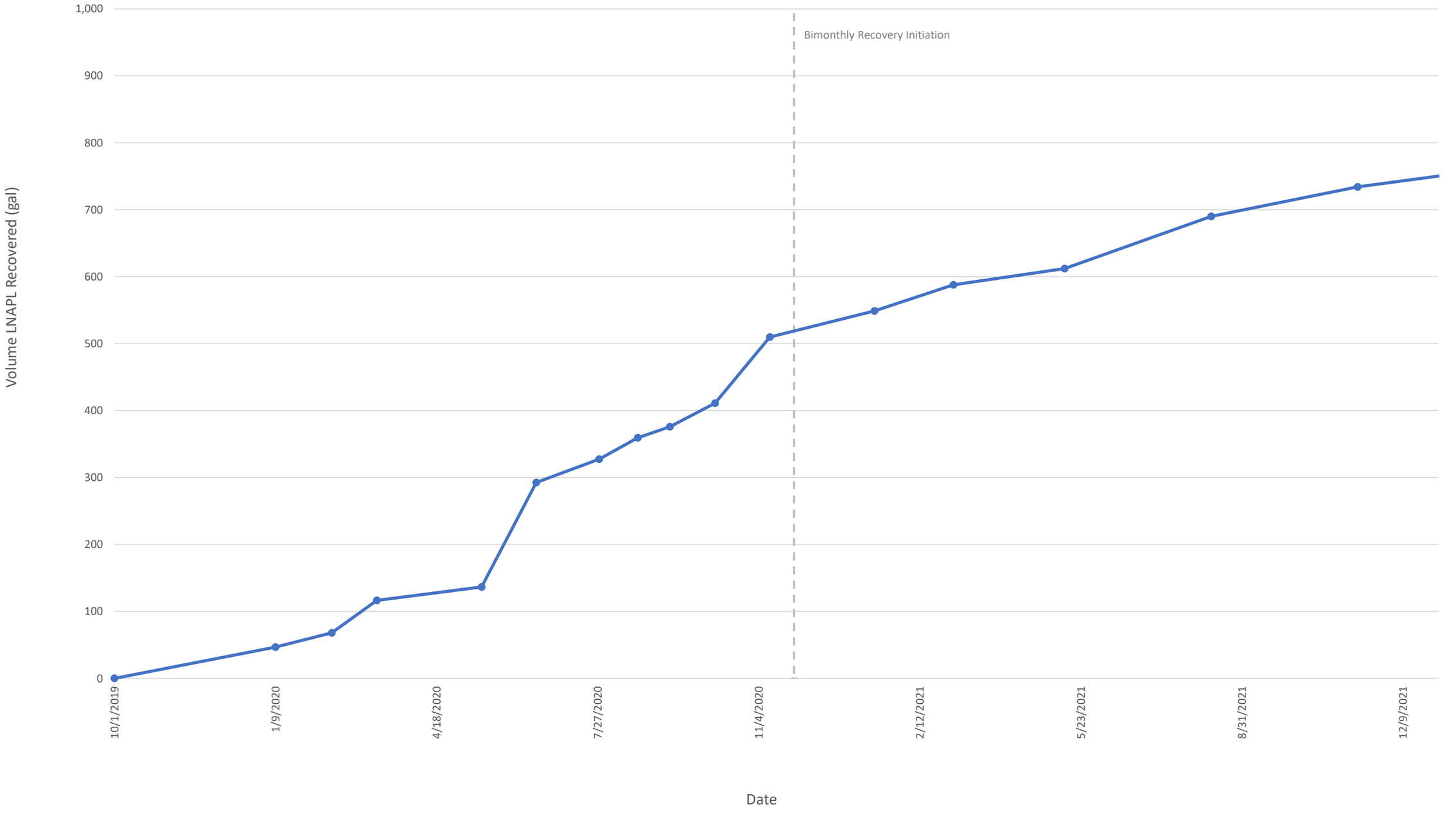
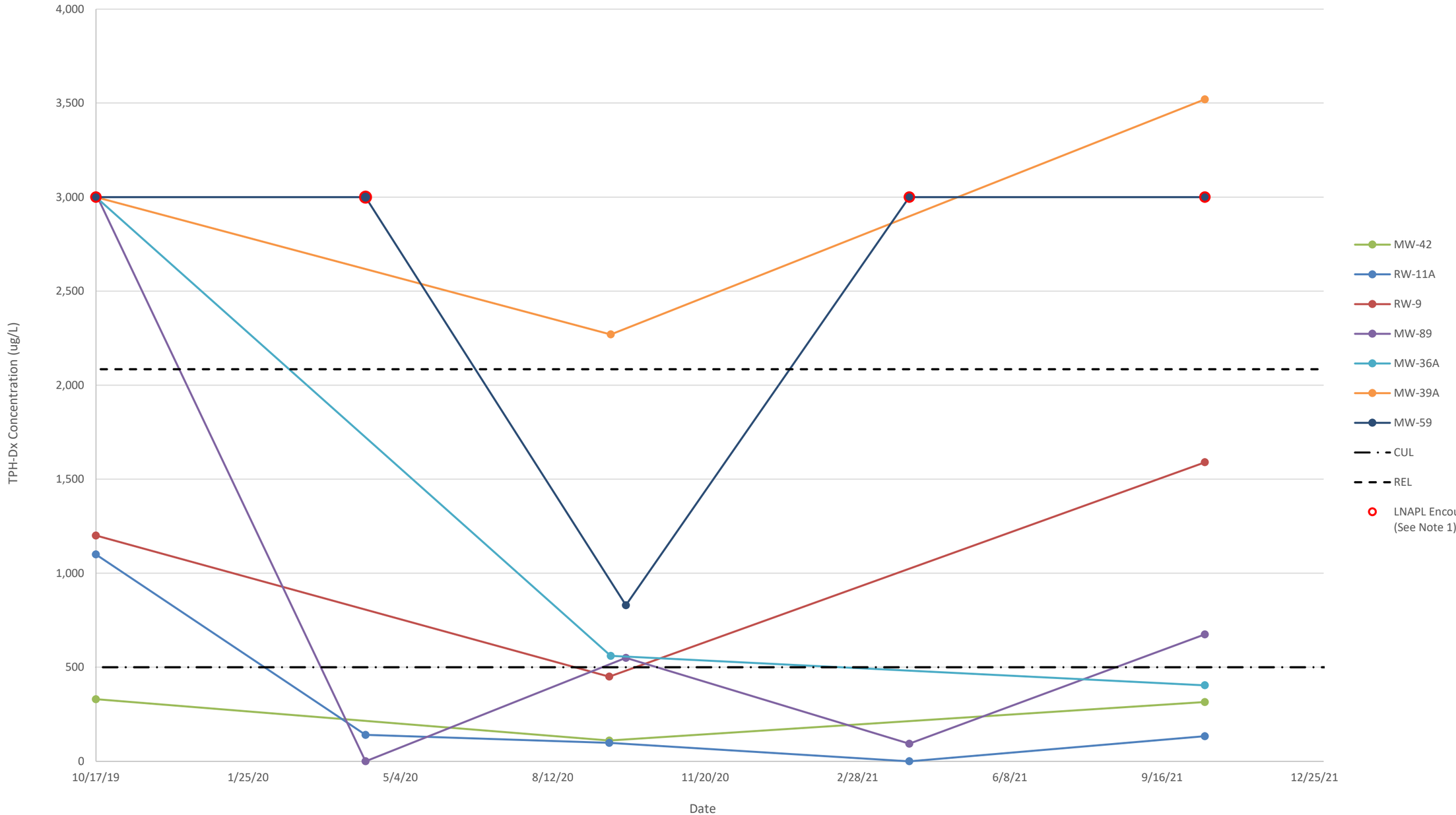


Figure 11 - Performance Monitoring Well TPH-Dx Concentrations



Notes:

1. Wells with free product present at the time of sampling are shown with a TPH concentration of 3,000 µg/L. This value is used only to represent free product and does not reflect actual TPH concentrations.

Appendix A

O&M Field Forms

NOTE: Field notes from CRETE O&M visits between 5/20/21 and 9/30/21 were unavailable for inclusion in this report. The data in Table 4 indicates this includes visits on 6/4/21, 6/16/21, 7/2/21, 7/19/21, 8/5/21, and 8/26/21.

PORT OF SEATTLE - TERMINAL 30
SVE System Startup Adjustment Data

Date:	2.2.2021	2.2.2021				Design Parameters
Watch Time:	0905-0928	0952-0955				
System Time:		-1047				
System Location						
SVE Discharge VOC (ppm)	163.7	—				
SVE Discharge LEL (%) (CH4)	0	—				<25
Oxygen (%) H_2S / CO (ppm) 1.0 / 0	18.4	—				
SVE System Inlet Vacuum (" H_2O)	85	78				
SVE System Inlet ΔP (" H_2O)	1.5	1-1.5				
Oxidizer Discharge VOC (ppm)	steady 0.6 (max 4.2)	—				<10
HSVE-1 Vacuum (" H_2O)	16	16				
HSVE-1 Flow (SCFM)	78	77				75
HSVE-2 Vacuum (" H_2O)	36	37				
HSVE-2 Flow (SCFM)	78	75				75
HSVE-3 Vacuum (" H_2O)	47	46				
HSVE-3 Flow (SCFM)	78	74				75
SVE-4 Vacuum (" H_2O)	89	80				
SVE-4 Flow (SCFM)	10	<6 TW				25
SVE-5 Vacuum (" H_2O)	86-87	84				
SVE-5 Flow (SCFM)	8-9	<6 TTW				20
SVE-6 Vacuum (" H_2O)	76	77				
SVE-6 Flow (SCFM)	<6 W	<6 W				30
SVE-7 Vacuum (" H_2O)	72	78				
SVE-7 Flow (SCFM)	10	14				18~19
SVE-8 Vacuum (" H_2O)	85	82				
SVE-8 Flow (SCFM)	<6 W	<6 W				18~19
SVE-9 Vacuum (" H_2O)	* 96	90				
SVE-9 Flow (SCFM)	<6 TW	<6				18~19
SVE-10 Vacuum (" H_2O)	78	76-80				
SVE-10 Flow (SCFM)	8	8 TW				18~19
Oxidizer Inlet Temp. (deg F)	105-106	101-102				
SVE Manifold Temp. (deg F)	≤50	<50				
SVE Blower Hours	1423.9	1424.7				
Discharge H_2S / CO (ppm)	1.0 / 33	—				
NOTES:						
Discharge 0% / LEL% (CH4)	16.1 / 0%	—				

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

Pre-adjustments

Throttled SVE-6, -8 back a lot

other SVE adjustments

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	2.2.2021				
Watch Time:	0853 - 0857				
Screen Time:	0947-0950				
Oxidizer System Location					
Inlet Temperature (°F)	104-105				
Burner Chamber Temperature (°F)	669				
Discharge Temperature (°F)	647				
Inlet Limit Controller Temperature (°F)	673				
Outlet Limit Controller Temperature (°F)	648				
Process Fan Valve Position (Open/Closed)	OPEN				
Dilution Valve Position (%)	0.0				
Combustion Valve Position (%)	8.0 ↓↑				
Process Blower Runtime (Hours)	8239				
Combustion Fan Runtime (Hours)	8239				
Burner Runtime (Hours)	8231				
Processing Vapors Runtime (Hours)	8221				
Panel Temperature (°F)	61				
Flame Signal (Volts)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)	<0				
Propane Tank A Level (%) CLOSEST	~58 RP ~55				
Propane Tank B Level (%) FURTHEST	~58				
NOTES:					

Notes:

1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	2.2.21				
Watch Time:	0858-0901				
Screen Time:	0947-				
SVE/AS System Location					
SVE Blower Speed (Hertz)	54.0				
SVE Blower Runtime (Hours)	1423.8				
SVE Blower Filter Differential Pressure (" H_2O)	0.5				
SVE Blower Inlet Differential Pressure (" H_2O)	1.5				
SVE Blower Inlet Temperature (°F)	≤50				
SVE Blower Inlet Vacuum (" H_2O)	85				
SVE Blower Discharge Pressure (PSI)	0				
SVE Blower Discharge Temperature (°F)	105				
AS Blower Speed (Hertz)	48.0				
AS Blower Runtime (Hours)	1157.8				
AS Blower Pressure (PSI)	7.5				
AS Blower Flow (" H_2O)	0.5				
Sparge Zone 1 Operating Cycle - Open Interval(s)	OPEN/ON				
Sparge Zone 2 Operating Cycle - Open Interval(s)					
Sparge Zone 3 Operating Cycle - Open Interval(s)					
Sparge Zone 4 Operating Cycle - Open Interval(s)					
Sparge Zone 5 Operating Cycle - Open Interval(s)	↓				
Heat Exchanger Runtime (Hours)	1157.7				
Heat Exchanger Discharge Temperature (°F)	56				
Transfer Pump Runtime (Hours)	0.8				
Transfer Pump Discharge Pressure (PSI)	0				
Moisture Separator Level (% Full)					
Water Storage Tank Level (~~DTF~~, EJ TD from MP; inches)	13-14" Total				
NOTES:	Mostly water trace oil TD 82.75"				

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 2.2.2021

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	0930	7.5	4.4	100% OPEN	
AS-2	↓	7.5	1.4		
AS-3	0931	7.5	1.2		Water in flow meter
AS-4	↓	7	8.1		
AS-5		8	7.6		
AS-6	↓	7.5	9.0		
AS-7	0932	7.5	4.3		
AS-8	↓	7.5	2.7		
AS-9	0933	7.5	2.6		
AS-10	↓	7.5	2.5		
AS-11		8.0	5.0		
AS-12		7.5	3.1		
AS-13	↓	7.5	5.2		
AS-14	0934	7	3.6		
AS-15	↓	8	3.4		
AS-16		8	4.3		
AS-17		7.5	2.6		
AS-18		7.5	1.3		
AS-19	↓	8.5	5.1		
AS-20	0935	7.5	2.7		
AS-21	↓	7.5	<1		
AS-22		7.5	2.1		
AS-23		7.5	1		
AS-24		7	1.8		
AS-25		7.5	<1		
AS-26		8	2.5		
AS-27	↓	7.5	1.4	↓	

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	2.17.2021	~~2.17.21~~	3.2.2021		
Watch Time:	1254-1257		0824-0827		
Screen Time:	1349-1353		0919-0922		
Oxidizer System Location					
Inlet Temperature (°F)	107		100		
Burner Chamber Temperature (°F)	699		670		
Discharge Temperature (°F)	623		629		
Inlet Limit Controller Temperature (°F)	689		668		
Outlet Limit Controller Temperature (°F)	626		630		
Process Fan Valve Position (Open/Closed)	OPEN		OPEN		
Dilution Valve Position (%)	0.0		0.0		
Combustion Valve Position (%)	12.2		8.9		
Process Blower Runtime (Hours)	8485		8759		
Combustion Fan Runtime (Hours)	8485		8759		
Burner Runtime (Hours)	8477		8751		
Processing Vapors Runtime (Hours)	8466		8740		
Panel Temperature (°F)	72		65		
Flame Signal (Volts)	5.0		5.0		
Burner Chamber Inlet Differential Pressure (" H_2O)	<0		<0		
Propane Tank A Level (%) CLOSEST	58-59		30		
Propane Tank B Level (%) FURTHEST	59		62-63		
NOTES:	System re-started @ ~0800 this morning		AS OFF overnight		

Notes:
1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

PORT OF SEATTLE - TERMINAL 30

SVE/AS System Field Data Collection Form

Date:	2.17.21	3.2.2021			
Watch Time:	1258-1302	0830-0834 RS			
Screen Time:	1349-1354	0918-0925			
SVE/AS System Location					
SVE Blower Speed (Hertz)	54.0	54.0			
SVE Blower Runtime (Hours)	1668.8	1942.3			
SVE Blower Filter Differential Pressure (" H_2O)	0.5	0.5			
SVE Blower Inlet Differential Pressure (" H_2O)	1-1.5	1-1.5			
SVE Blower Inlet Temperature (°F) <50	~~80~~ RS	<50			
SVE Blower Inlet Vacuum (" H_2O)	80	79			
SVE Blower Discharge Pressure (PSI)	0	0			
SVE Blower Discharge Temperature (°F)	102	100			
AS Blower Speed (Hertz)	48.0	48.0			
AS Blower Runtime (Hours)	1366.0	1634.8			
AS Blower Pressure (PSI)	6.5	7.5			
AS Blower Flow (" H_2O)	0.5-1	0.5-1			
Sparge Zone 1 Operating Cycle - Open Interval(s)	OPEN	OPEN			
Sparge Zone 2 Operating Cycle - Open Interval(s)	↓	↓			
Sparge Zone 3 Operating Cycle - Open Interval(s)					
Sparge Zone 4 Operating Cycle - Open Interval(s)					
Sparge Zone 5 Operating Cycle - Open Interval(s)	↓	↓			
Heat Exchanger Runtime (Hours)	1365.8	1634.7			
Heat Exchanger Discharge Temperature (°F)	55	54			
Transfer Pump Runtime (Hours)	0.9	0.9			
Transfer Pump Discharge Pressure (PSI)	~~1.5~~ RS	0			
Moisture Separator Level (% Full)		~3/4 (75%)			
Water Storage Tank Level (DTF, TD from MP; inches) RS		≤24" Total Fluids			
NOTES:	AS bleeder is 20% open	AS OFF all night PAH alarm trips			

Notes:

1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

MP = notch @ manhole port

Adjusting AS P switch

TD 82.75"

PORT OF SEATTLE - TERMINAL 30
SVE System Startup Adjustment Data

Date:	2.17.2021	3.2.2021				Design Parameters
Watch Time:	1303-1313	0843-0913				
System Time:	~1403	0934-				
System Location						
SVE Discharge VOC (ppm)	~~43.0~~ RJ ←	52.4 ←	~~56.0~~ 56.4			
SVE Discharge LEL (%) H_2S/CO	1.0 / 2	0.0 / 55 ←	CO spike @ 55 ppm!			<25
Oxygen (%) / LEL %	15.2 / 0%	15.7 / 0				
SVE System Inlet Vacuum (" H_2O)	80	~~78~~ RJ 78				
SVE System Inlet ΔP (" H_2O)	0.5 (1-1.5)	0.5 / 1.5				
Oxidizer Discharge VOC (ppm)	0.7 (max: 3.2)	0.1 (max 11.7)				<10
HSVE-1 Vacuum (" H_2O)	16	14				
HSVE-1 Flow (SCFM)	78	76				75
HSVE-2 Vacuum (" H_2O)	32	30				
HSVE-2 Flow (SCFM)	77	76				75
HSVE-3 Vacuum (" H_2O)	43	40				
HSVE-3 Flow (SCFM)	76	75				75
SVE-4 Vacuum (" H_2O)	79	78				
SVE-4 Flow (SCFM)	8 MW	~6				25
SVE-5 Vacuum (" H_2O)	82	82				
SVE-5 Flow (SCFM)	6-12 (8)	~10				20
SVE-6 Vacuum (" H_2O)	~~56 NW~~ RJ	80 / 74				
SVE-6 Flow (SCFM)	<6 NW	<6 W				30
SVE-7 Vacuum (" H_2O)	82	88				
SVE-7 Flow (SCFM)	8.9	8-18 (11)				18~19
SVE-8 Vacuum (" H_2O)	~~88~~	85				
SVE-8 Flow (SCFM)	6	~6 NW				18~19
SVE-9 Vacuum (" H_2O)	~~<6 NW~~ RJ	91 / 88				
SVE-9 Flow (SCFM)	<6 NW	<6 NW				18~19
SVE-10 Vacuum (" H_2O)	88	~~88~~ RJ (88)				
SVE-10 Flow (SCFM)	6-14 (9)	6-25 (12)				18~19
Oxidizer Inlet Temp. (deg F)	102	100				
SVE Manifold Temp. (deg F)	<50	<50				
SVE Blower Hours	1669.1	1942.6				
Oxid. Dis. H_2S/CO	0.5 / 2	~~0.5~~ / ~~3~~ Measurements				
NOTES: 0.2 / LEL	16.1 / 0% (15.2)	Pre-Adjustments 19.1 / 0%				

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

SVE Discharge 56.4 ppm drifting

MW - minor water in meter
NW - no water

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 3.2.2021

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	0903	7.5	5.2	100% OPEN	PAH alarm tripping AS OFF since
AS-2	↓	7.5	1.6	↓	last night.
AS-3	↓	7.5	<1	↓	Adjusted AS Pressure Switch
AS-4	0904	7.5	6.3	↓	(increased P → turned
AS-5	↓	8.0	4.6	↓	clockwise)
AS-6	↓	7	5.3	↓	
AS-7	0905	7.5	2.2	↓	
AS-8	↓	7	<1	↓	
AS-9	↓	7.5	<1	↓	
AS-10	↓	7.5	1	↓	
AS-11	↓	8	2.8	↓	
AS-12	0906	7.5	1.8	↓	
AS-13	↓	7.5	3.7	↓	
AS-14	↓	7.0	2.0	↓	
AS-15	↓	7.5	1.8	↓	
AS-16	↓	7.5	3.2	↓	
AS-17	0908	7.5	<1	↓	
AS-18	↓	7.5	<1	↓	
AS-19	↓	8.5	5.2	↓	
AS-20	↓	7.5	2.3	↓	
AS-21	↓	7.0	<1	↓	
AS-22	↓	7.5	<1	↓	
AS-23	0909	7.5	<1	↓	
AS-24	↓	7	<1	↓	
AS-25	↓	7.5	2.2	↓	
AS-26	↓	7.5	<1	↓	
AS-27	↓	7	<1	↓	

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	3.23.2021	4.5.2021			
Watch Time:	1513-1518	1352-1355			
Screen Time:	1509-1513	1347-1350			
Oxidizer System Location					
Inlet Temperature (°F)	108-109	114			
Burner Chamber Temperature (°F)	659	670			
Discharge Temperature (°F)	641	638			
Inlet Limit Controller Temperature (°F)	673	663			
Outlet Limit Controller Temperature (°F)	640	645			
Process Fan Valve Position (Open/Closed)	OPEN	OPEN			
Dilution Valve Position (%)	0.0	0.0			
Combustion Valve Position (%)	10.5	7.1			
Process Blower Runtime (Hours)	9251	9525			
Combustion Fan Runtime (Hours)	~~9259~~ 9252	9526			
Burner Runtime (Hours)	9243	9517			
Processing Vapors Runtime (Hours)	9232	9506			
Panel Temperature (°F)	91	80			
Flame Signal (Volts)	5.0	5.0			
Burner Chamber Inlet Differential Pressure (" H_2O)	<0	<0			
Propane Tank A Level (%) CLOSEST	80	72			
Propane Tank B Level (%) FURTHEST	78	78			
NOTES:	Propane delivery earlier today				

Notes:

1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	3.23.2021	4.5.2021			
Watch Time:	1516-1523	1357-1403			
Screen Time:	~1514	~1347-1353			
SVE/AS System Location					
SVE Blower Speed (Hertz)	54.0	54.0			
SVE Blower Runtime (Hours)	2434.7	2709.1			
SVE Blower Filter Differential Pressure (" H_2O)	0.5	~0.5			
SVE Blower Inlet Differential Pressure (" H_2O)	1.5	~1.5			
SVE Blower Inlet Temperature (°F)	58	60			
SVE Blower Inlet Vacuum (" H_2O)	~~82-83~~	82-83			
SVE Blower Discharge Pressure (PSI)	~~100~~	0			
SVE Blower Discharge Temperature (°F)	109	114			
AS Blower Speed (Hertz)	48.0	48.0			
AS Blower Runtime (Hours)	1830.8	1989.4			
AS Blower Pressure (PSI)	6	6			
AS Blower Flow (" H_2O)	0.5-1	0.5-1			
Sparge Zone 1 Operating Cycle - Open Interval(s)	OPEN	OPEN			
Sparge Zone 2 Operating Cycle - Open Interval(s)	↓	↓			
Sparge Zone 3 Operating Cycle - Open Interval(s)	↓	↓			
Sparge Zone 4 Operating Cycle - Open Interval(s)	↓	↓			
Sparge Zone 5 Operating Cycle - Open Interval(s)	↓	↓			
Heat Exchanger Runtime (Hours)	1830.6	1989.2			
Heat Exchanger Discharge Temperature (°F)	60	61			
Transfer Pump Runtime (Hours)	0.9	1.0			
Transfer Pump Discharge Pressure (PSI)	0	0			
Moisture Separator Level (% Full)		~50-75%			
Water Storage Tank Level (DTF, TD from MP; inches)	83" TD up to 3" total fluids	TD 83" 17" fluids			
MP = notch in manhole NOTES:	Turned AS on @ ~1500 (PAH)	AS running continuously since 4/3/21 @ ~1915 AS bleeder partially open			

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:	3.23.2021	3.23.2021	4.5.2021 RF	4.5.2021		Design Parameters
Watch Time:	1528-1555	1620-1626	~~1404~~-RF	1404-1420		
System Time:	1518-	-1616		-1410		
System Location						
SVE Discharge VOC (ppm)	128.8↑	—		85.8 (max 86.1)	~~85.8 (86.1↑)~~ RJ	
SVE Discharge LEL (%)	0	—		RF 0	SVE Discharge H_2S 1.0	<25
Oxygen (%) H_2S 1-1.5 CO (0-1) 25 max	16.7-19.7	—	~~H_2S 0.0 (1.0 max) 16.4-16.8 CO 0.0 ~84 max~~ RF	18.7	CO 0 (1 max)	
SVE System Inlet Vacuum (" H_2O)	~~82~~ 84	84		82-83		
SVE System Inlet ΔP (" H_2O)	0.5/1.5	0.5/1.5		0.5/1.5		
Oxidizer Discharge VOC (ppm)	1.5 (31.5)	—	0.1 (~~13.5 max~~) RJ	0.1 (13.5 max)		<10
HSVE-1 Vacuum (" H_2O)	15	15		14		
HSVE-1 Flow (SCFM)	78-79	78-79		78		75
HSVE-2 Vacuum (" H_2O)	33	32		30		
HSVE-2 Flow (SCFM)	79	78		78		75
HSVE-3 Vacuum (" H_2O)	42	41		40		
HSVE-3 Flow (SCFM)	80	80		80		75
SVE-4 Vacuum (" H_2O)	~~≤6~~ RH (82)	85		83-84		
SVE-4 Flow (SCFM)	≤6	≤6		7-8 TW		25
SVE-5 Vacuum (" H_2O)	(66) 60-70	76-82 (78)		82 (82-88)		
SVE-5 Flow (SCFM)	<6	9-12 TW		10 (6-14)		20
SVE-6 Vacuum (" H_2O)	78-82 (78)	78-84 (82)		74 (62-80)		
SVE-6 Flow (SCFM)	<6	≤6		6 (<6-9) W		30
SVE-7 Vacuum (" H_2O)	78-82 (80)	84-92 (88)		67 (66-78)		
SVE-7 Flow (SCFM)	11	12-21 (12)		12		18~19
SVE-8 Vacuum (" H_2O)	91	90-91		89		
SVE-8 Flow (SCFM)	<6	≤6		<6 VTW		18~19
SVE-9 Vacuum (" H_2O)	64-66 (64)	78-81 (80)		93-94		
SVE-9 Flow (SCFM)	<6	≤6		<6		18~19
SVE-10 Vacuum (" H_2O)	90-100 (90)	80-98 (90)		70 (64-80)		
SVE-10 Flow (SCFM)	12	9-18 (10)		11 (9-13)		18~19
Oxidizer Inlet Temp. (deg F)	* 108 *	115		114		
SVE Manifold Temp. (deg F)	56	56		60		
SVE Blower Hours 1518/1528	2434.9	2435.8	RJ	60 * 2709.5		
↓ Discharge H_2S/CO	0.0/30	—		Oxid. Discharge H_2S 0.0 (1.0 max) CO 0.0 (84 max) O_2 16.4-16.8% LEL 0%		
NOTES: O_2/CH_4 LEL	16.7%/0%	—				

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

* May have mis-read data *

Pre-Adjustments

After SVE adjustments

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 8.23.2021					
Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	1606	7	4.2	100% OPEN	
AS-2	1607	6.5	<1		
AS-3	1607	6.5	≤1		
AS-4	↓	5.5	7.8		
AS-5		6.5	5.6		
AS-6	↓	6	7		
AS-7	1608	6.5	2.4		
AS-8	↓	6.5	1.2-1.4		
AS-9		6	1.4		
AS-10		6.5	1		
AS-11	↓	6.5	3		
AS-12	1608	6.5	2.2		
AS-13	1609	6.5	3.6		
AS-14	↓	5	2.1		
AS-15		6.5	2.1		
AS-16	↓	6.5	3.1		
AS-17	1610	6	<1		
AS-18	↓	6.5	<1		
AS-19		7	5.1		
AS-20		6	1.9		
AS-21		5.5	<1		
AS-22	↓	5.5	<1		
AS-23	1611	6-6.5	<1		No apparent flow
AS-24	↓	6	<1		↓
AS-25		5.5-6	<1		
AS-26		6-6.5	<1		
AS-27	↓	4.5-5	<1	↓	

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 4.5.2021

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	1433	7	3.6	100% OPEN	AS system continuously on since ~1915 4/3
AS-2	↓	6.5	<1	↓	AS pressure (blower @ 6psi)
AS-3	↓	6.5	<1	↓	↓
AS-4	↓	6	~~5~~ 8	↓	↓
AS-5	↓	6.5	6.8	↓	↓
AS-6	↓	6	7.5	↓	↓
AS-7	1434	6.5	2.6 ~~6.8~~	↓	↓
AS-8	↓	6.5	2.3	↓	↓
AS-9	↓	6.5	1.6	↓	↓
AS-10	1435	6.5	2.4	↓	↓
AS-11	↓	7.0	4.2	↓	↓
AS-12	↓	6.5	2.0	↓	↓
AS-13	↓	6.5	4.0 (2-4.2)	↓	↓
AS-14	1436	5.5	3.2	↓	↓
AS-15	↓	6.5	2.0	↓	↓
AS-16	↓	6.5	3.2	↓	↓
AS-17	1436	6	1.4	↓	↓
AS-18	1436	6.5	≤1	↓	↓
AS-19	1437	7	5.1	↓	↓
AS-20	↓	6-6.5	2.2	↓	↓
AS-21	↓	5.5	<1	↓	↓
AS-22	↓	6	1.6	↓	↓
AS-23	1439	6.5	≤1.6	↓	↓
AS-24	↓	6	≤2.1	↓	↓
AS-25	↓	6	<1	↓	↓
AS-26	↓	6.5	2.1	↓	↓
AS-27	↓	5	1.8	↓	↓

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AS bleeder valve partially open

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	4.19.2021	5.5.2021			
Watch Time:	1434-1438	0743-0746			
Screen Time:	1429-1433	0738-0741			
Oxidizer System Location					
Inlet Temperature (°F)	118	114-115			
Burner Chamber Temperature (°F)	677	697			
Discharge Temperature (°F)	631	623			
Inlet Limit Controller Temperature (°F)	699	686			
Outlet Limit Controller Temperature (°F)	627	627			
Process Fan Valve Position (Open/Closed)	OPEN	OPEN			
Dilution Valve Position (%)	0.0	0.0			
Combustion Valve Position (%)	9.8	12.1			
Process Blower Runtime (Hours)	9822	10198			
Combustion Fan Runtime (Hours)	9823	10198			
Burner Runtime (Hours)	9814	10189			
Processing Vapors Runtime (Hours)	9802	10178			
Panel Temperature (°F)	85	72			
Flame Signal (Volts)	5.0	5.0			
Burner Chamber Inlet Differential Pressure (" H_2O)	0-0.25	<0			
Propane Tank A Level (%) CLOSEST	74	58			
Propane Tank B Level (%) FURTHEST	76	62			
NOTES:	System re-start this morning	AS OFF ~18:38 5/4/21 (PAH Turned on ~0616 on 5/5/21			

Notes:
1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	4.19.2021	5.5.2021			
Watch Time:	1438–1448	0750-0757			
Screen Time:	1427-1438	0734-0746			
SVE/AS System Location					
SVE Blower Speed (Hertz)	54.0	54.0			
SVE Blower Runtime (Hours)	3005.7	3381.4			
SVE Blower Filter Differential Pressure (" H_2O)	0.25-0.5	0.5			
SVE Blower Inlet Differential Pressure (" H_2O)	1.5	1-1.5			
SVE Blower Inlet Temperature (°F)	68	62			
SVE Blower Inlet Vacuum (" H_2O)	78	82			
SVE Blower Discharge Pressure (PSI)	0	0			
SVE Blower Discharge Temperature (°F)	118	115			
AS Blower Speed (Hertz)	48.0	48.0			
AS Blower Runtime (Hours)	2201.5	2210.7			
AS Blower Pressure (PSI)	6.5-7	≤7			
AS Blower Flow (" H_2O)	0.5-1	0.5-1 (0.75)			
Sparge Zone 1 Operating Cycle - Open Interval(s)	OPEN	OPEN			
Sparge Zone 2 Operating Cycle - Open Interval(s)					
Sparge Zone 3 Operating Cycle - Open Interval(s)					
Sparge Zone 4 Operating Cycle - Open Interval(s)					
Sparge Zone 5 Operating Cycle - Open Interval(s)					
Heat Exchanger Runtime (Hours)	2201.3	2210.5			
Heat Exchanger Discharge Temperature (°F)	75	60-61			
Transfer Pump Runtime (Hours)	1.0	1.1			
Transfer Pump Discharge Pressure (PSI)	0 ~~6.5-7.0 RS~~	0			
Moisture Separator Level (% Full)	—	~20%			
Water Storage Tank Level (DTF, TD from MP; inches)	<1"	~~<2" RS~~ 3-4" (~3.5")			
NOTES:	AS oil leak? or spillage during oil changes?	AS bleeder slightly open Discontinuous layer on tank bottom (0-1" fluids)			

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:	4.19.2021	5.5.2021				Design Parameters
Watch Time:	1450-1515	0757-0817				
System Time:						
System Location						
SVE Discharge VOC (ppm)	83.2	134.6				
SVE Discharge LEL (%) CH_4	0	0				<25
Oxygen (%) / H_2S (ppm) / CO (ppm)	15-17 / 1.0 / 0	18.1 / 0.5 / 0				
SVE System Inlet Vacuum (" H_2O)	78	82				
SVE System Inlet ΔP (" H_2O)	0.25 / (1.5)	0.5 (1.5)				
Oxidizer Discharge VOC (ppm)	(0.7) (Peak 3.3)	1.0 (max 4.5)				<10
HSVE-1 Vacuum (" H_2O)	14	14				
HSVE-1 Flow (SCFM)	77	78				75
HSVE-2 Vacuum (" H_2O)	27	31				
HSVE-2 Flow (SCFM)	78	78				75
HSVE-3 Vacuum (" H_2O)	35	40				
HSVE-3 Flow (SCFM)	78	81				75
SVE-4 Vacuum (" H_2O)	80	84				
SVE-4 Flow (SCFM)	6-7	~10 W				25
SVE-5 Vacuum (" H_2O)	70-80 (74)	83				
SVE-5 Flow (SCFM)	6-15 (12)	7-19 (11)				20
SVE-6 Vacuum (" H_2O)	64-78 (70)	78-79				
SVE-6 Flow (SCFM)	6-12 (8) W	~6 W				30
SVE-7 Vacuum (" H_2O)	48	58				
SVE-7 Flow (SCFM)	15	14				18~19
SVE-8 Vacuum (" H_2O)	82	81				
SVE-8 Flow (SCFM)	~6W	≤6 W				18~19
SVE-9 Vacuum (" H_2O)	78-84 (80)	89				
SVE-9 Flow (SCFM)	~6 W	≤6 W				18~19
SVE-10 Vacuum (" H_2O)	56-66 (58)	~63				
SVE-10 Flow (SCFM)	12-13	11				18~19
Oxidizer Inlet Temp. (deg F)	119-120	116				
SVE Manifold Temp. (deg F)	69	61-62				
SVE Blower Hours	3006.1 @ 1503	3391.6 @ 0804				
Oxid. Discharge H_2S/CO	0.0/0 (max 25)	0.0/0 (max 18)				
NOTES: ↓ O_2/LEL(%)	15.0/0	16.0/0				

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 4.19.2021

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	1555	6.5	3.6	100% OPEN	After all readings, promptly
AS-2	↓	6	<1	↓	turned off AS @ 1600
AS-3	↓	6	1	↓	(possible AS blower oil leak).
AS-4	↓	5.5	7.4	↓	
AS-5	1556	6.5	6.7	↓	
AS-6	↓	6	7.2	↓	
AS-7	↓	6	3	↓	
AS-8	↓	6	<1	↓	
AS-9	↓	6	2.2	↓	
AS-10	↓	6.5	1.4	↓	
AS-11	↓	6.5	3.3	↓	
AS-12	1557	6.5	2	↓	
AS-13	↓	6.5	3.9	↓	
AS-14	↓	5	2.1	↓	
AS-15	↓	6-6.5	2.5	↓	
AS-16	↓	↓	3.3	↓	
AS-17	1558	5.5-6	<1	↓	
AS-18	↓	6-6.5	<1	↓	
AS-19	↓	6.5	5.1	↓	
AS-20	↓	6	1.9	↓	
AS-21	↓	5	<1	↓	
AS-22	↓	~~6~~ 5.5	<1	↓	
AS-23	1559	6	<1	↓	
AS-24	↓	6	<1	↓	
AS-25	↓	5.5	<1	↓	
AS-26	↓	6-6.5	<1	↓	
AS-27	↓	4.5	1.1	↓	

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 5/5/2021					
	Time: 0814-0816		Time: 0817-0819		
Location	Pressure (PSI)	Flow (SCFM)	Pressure (PSI)	Flow (SCFM)	Notes
AS-1	7.5	3.2			Valves 100% open
AS-2	7.5	<1			
AS-3	7.5	<1			
AS-4	7.5	6.4			
AS-5	7.5-8	5.9			
AS-6	7	7.3			
AS-7	7.5	2.6			
AS-8	7.5	<1			
AS-9	8	<1			
AS-10	7.5-8	<1			
AS-11	8	3.2			
AS-12	7.5	2.1			
AS-13	7.5	3.9			
AS-14	~~7.0~~ 7.5	1.9			
AS-15	7.5-8	1.9-2			
AS-16	7.5-8	3.5			
AS-17	~~7.5~~	~~<1 RJ~~	7.5	<1	Fm BP?
AS-18	~~7.5~~	~~<1 RJ~~	7.5	<1	Fm BP?
AS-19	~~8-8.5~~	~~5 RJ~~	8-8.5	5	
AS-20	~~7.5~~	~~1.8 RJ~~	7.5	1.8	
AS-21	~~7~~	~~<1 RJ~~	7	<1	
AS-22	~~7.5-8~~	~~<1 RJ~~	7.5-8	<1	Fm BP?
AS-23			8	<1	
AS-24			7-7.5	<1	
AS-25			7.5	<1	
AS-26			8	<1	
AS-27			7.5	<1	

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AS bleeder partially open
Fm BP? = Formation back pressure suspected
AS pressure ~~7.5 RJ~~ 6.5-7 (≤7 psi)

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	5.20.2021				
Watch Time:	0856-0859				
Screen Time:	0851-0854				
Oxidizer System Location					
Inlet Temperature (°F)	1116				
Burner Chamber Temperature (°F)	672				
Discharge Temperature (°F)	632				
Inlet Limit Controller Temperature (°F)	689				
Outlet Limit Controller Temperature (°F)	625				
Process Fan Valve Position (Open/Closed)	OPEN				
Dilution Valve Position (%)	0.0				
Combustion Valve Position (%)	11.1				
Process Blower Runtime (Hours)	10478				
Combustion Fan Runtime (Hours)	10479				
Burner Runtime (Hours)	10470				
Processing Vapors Runtime (Hours)	10458				
Panel Temperature (°F)	68				
Flame Signal (Volts)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)	<0				
Propane Tank A Level (%) CLOSEST	62				
Propane Tank B Level (%) FURTHEST	65				
NOTES:	Power loss Rem. Sys. OFF ~0211-0714 this morn.				

Notes:
1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	5.20.2021				
Watch Time:	0902-0908				
Screen Time:	0851-0857				
SVE/AS System Location					
SVE Blower Speed (Hertz)	54.0				
SVE Blower Runtime (Hours)	3661.9				
SVE Blower Filter Differential Pressure (" H_2O)	0.5				
SVE Blower Inlet Differential Pressure (" H_2O)	1.5				
SVE Blower Inlet Temperature (°F)	66				
SVE Blower Inlet Vacuum (" H_2O)	80				
SVE Blower Discharge Pressure (PSI)	0				
SVE Blower Discharge Temperature (°F)	116				
AS Blower Speed (Hertz)	48.0				
AS Blower Runtime (Hours)	2329.8				
AS Blower Pressure (PSI)	~6				
AS Blower Flow (" H_2O)	0.5-1				
Sparge Zone 1 Operating Cycle - Open Interval(s)	OPEN/ON				
Sparge Zone 2 Operating Cycle - Open Interval(s)	↓				
Sparge Zone 3 Operating Cycle - Open Interval(s)	↓				
Sparge Zone 4 Operating Cycle - Open Interval(s)	↓				
Sparge Zone 5 Operating Cycle - Open Interval(s)	↓				
Heat Exchanger Runtime (Hours)	2329.5				
Heat Exchanger Discharge Temperature (°F)	55-56				
Transfer Pump Runtime (Hours)	1.1				
Transfer Pump Discharge Pressure (PSI)	0				
Moisture Separator Level (% Full)	60-75%				
Water Storage Tank Level (DTF, TD from MP; inches)	1-1.5"				
NOTES:	P-switch adjusted up @ ~0115				

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:	5.20.2021					Design Parameters
Watch Time:	0909-0939					
System Time:						
System Location						
OK. ~~SVE~~ Discharge VOC (ppm) / CH_4 (ppm)	1.4 (17.7) / 0					
OK. ~~SVE~~ Discharge LEL (%) / O_2 %	0 / 15.1					<25
OK. ~~Oxygen (%)~~ H_2S / CO (ppm)	0.0-1.0 / 0-19					
SVE System Inlet Vacuum (" H_2O)	80					
SVE System Inlet ΔP (" H_2O)	F 0.5 / 1.5					
Oxidizer Discharge VOC (ppm)						<10
HSVE-1 Vacuum (" H_2O)	14					
HSVE-1 Flow (SCFM)	78					75
HSVE-2 Vacuum (" H_2O)	31					
HSVE-2 Flow (SCFM)	76					75
HSVE-3 Vacuum (" H_2O)	38					
HSVE-3 Flow (SCFM)	78					75
SVE-4 Vacuum (" H_2O)	82					
SVE-4 Flow (SCFM)	~10MW					25
SVE-5 Vacuum (" H_2O)	80					
SVE-5 Flow (SCFM)	6-18 (8)					20
SVE-6 Vacuum (" H_2O)	76-82 (78)					
SVE-6 Flow (SCFM)	6-12 (8)					30
SVE-7 Vacuum (" H_2O)	66-70 (67)					
SVE-7 Flow (SCFM)	19					18~19
SVE-8 Vacuum (" H_2O)	78-80					
SVE-8 Flow (SCFM)	<6W					18~19
SVE-9 Vacuum (" H_2O)	86 <6W RS					
SVE-9 Flow (SCFM)	RS <6W					18~19
SVE-10 Vacuum (" H_2O)	70-80 (72)					
SVE-10 Flow (SCFM)	12-16 (15)					18~19
Oxidizer Inlet Temp. (deg F)	177					
SVE Manifold Temp. (deg F)	66					
SVE Blower Hours	3662.5 @ 0934 WT					
SVE Disch. O_2 / LEL%	18.7 / 0%					
NOTES:						
SVE Dis. H_2S/CO (ppm)	1.5 / 0-1					

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

SVE Dis. VOC (ppm) - 72.9

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 5.20.2021

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	~~1000~~ 1002	7	≤1	100% OPEN	AS OFF 0211 to ~0840
AS-2	↓	6.5	≤1	↓	
AS-3		6.5	≤1		
AS-4		6-6.5	3.9		
AS-5		7	2		
AS-6	↓	6.5	2.8		
AS-7	1003	6.5-7	1		
AS-8	↓	6.5	1.6		
AS-9		7	≤1		
AS-10		7	2.3		
AS-11	↓	7	≤1		
AS-12	1004	7	2.2		
AS-13	↓	6.5	1.3		
AS-14		6.5	≤1		
AS-15		7	≤1		
AS-16	↓	7	1.1		
AS-17	1005	7	≤1		
AS-18	↓	6.5	≤1		
AS-19		7.5	5.1		
AS-20		7	≤1		
AS-21		6.5	≤1		
AS-22	↓	7	≤1		
AS-23	1006	6.5-7	≤1		
AS-24	↓	6	↓		
AS-25		6.5			
AS-26		7			
AS-27	↓	6.5	↓	↓	

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

Bleeder valve partially open.
Adjusted (increased) pressure switch @ 0715

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	9-30-21				
Watch Time:	1320				
Screen Time:	1305				
SVE/AS System Location					
SVE Blower Speed (Hertz)	54				
SVE Blower Runtime (Hours)	6640.2				
SVE Blower Filter Differential Pressure (" H_2O)	0.5				
SVE Blower Inlet Differential Pressure (" H_2O)	1.5				
SVE Blower Inlet Temperature (°F)	42°F				
SVE Blower Inlet Vacuum (" H_2O)	78				
SVE Blower Discharge Pressure (PSI)	1				
SVE Blower Discharge Temperature (°F)	114°F				
AS Blower Speed (Hertz)	52				
AS Blower Runtime (Hours)	2671.7				
AS Blower Pressure (PSI)	6.5				
AS Blower Flow (" H_2O)	0.9				
Sparge Zone 1 Operating Cycle - Open Interval(s)	100%				
Sparge Zone 2 Operating Cycle - Open Interval(s)					
Sparge Zone 3 Operating Cycle - Open Interval(s)					
Sparge Zone 4 Operating Cycle - Open Interval(s)					
Sparge Zone 5 Operating Cycle - Open Interval(s)					
Heat Exchanger Runtime (Hours)	2671.1				
Heat Exchanger Discharge Temperature (°F)					
Transfer Pump Runtime (Hours)	1.7				
Transfer Pump Discharge Pressure (PSI)	0				
Moisture Separator Level (% Full)	75%				
Water Storage Tank Level (DTF, TD from MP; inches)	57"				
NOTES:	Empty? Dirty sight glass water to TOC				

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

HS eff Temp: 69°F

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	9-30-21				
Watch Time:					
Screen Time:					
Oxidizer System Location					
Inlet Temperature (°F)	669°F				
Burner Chamber Temperature (°F)	1200°F				
Discharge Temperature (°F)	625°F				
Inlet Limit Controller Temperature (°F)	672				
Outlet Limit Controller Temperature (°F)	631				
Process Fan Valve Position (Open/Closed)	ON/Open				
Dilution Valve Position (%)	0				
Combustion Valve Position (%)	13.2				
Process Blower Runtime (Hours)	13456				
Combustion Fan Runtime (Hours)	13457				
Burner Runtime (Hours)	13447				
Processing Vapors Runtime (Hours)	13434				
Panel Temperature (°F)	74°F				
Flame Signal (Volts)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)	0				
Propane Tank A Level (%)	72				
Propane Tank B Level (%)	[redacted] 22				
NOTES:					

Notes:
1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:	9-30-29					Design Parameters
Watch Time:						
System Time:						
System Location						
SVE Discharge VOC (ppm)	56.0					
SVE Discharge LEL (%)						<25
Oxygen (%)						
SVE System Inlet Vacuum (" H_2O)	80 ★					
SVE System Inlet ΔP (" H_2O)						
Oxidizer Discharge VOC (ppm)	0.9					<10
HSVE-1 Vacuum (" H_2O)	14					
HSVE-1 Flow (SCFM)	78					75
HSVE-2 Vacuum (" H_2O)	34					
HSVE-2 Flow (SCFM)	74					75
HSVE-3 Vacuum (" H_2O)	43					
HSVE-3 Flow (SCFM)	74					75
SVE-4 Vacuum (" H_2O)	81					
SVE-4 Flow (SCFM)	water ~5					25
SVE-5 Vacuum (" H_2O)	82					
SVE-5 Flow (SCFM)	water ~10					20
SVE-6 Vacuum (" H_2O)	78					
SVE-6 Flow (SCFM)	10 water					30
SVE-7 Vacuum (" H_2O)	86					
SVE-7 Flow (SCFM)	17					18~19
SVE-8 Vacuum (" H_2O)	78					
SVE-8 Flow (SCFM)	water ~0					18~19
SVE-9 Vacuum (" H_2O)	84					
SVE-9 Flow (SCFM)	water ~0					18~19
SVE-10 Vacuum (" H_2O)	100					
SVE-10 Flow (SCFM)	20 Shaky					18~19
Oxidizer Inlet Temp. (deg F)	1676°F					
SVE Manifold Temp. (deg F)	64°F ★					
SVE Blower Hours	6640.2					
NOTES:						

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

10/6/21 T-30 Field Log

1415 BD arrives on site. Calls paul. Goes over HASP / Tailgate

Begins Taking System readings

- Alarm for AS compressor - shut off on 10/4 from PATH alarm @ 14:58

Will take system readings & PID readings as is, then turn system on & take another round.

1515 Take PID readings

↳ Talk To Cary about AS Blower Restart

1518 - Turn Blower Back ON.

1535 * While on site Propane Tanks get filled.

1550 - Take AS measurements. Lots of the flow gauges seem broken.

1600 - BD cleans up - calls paul for Any last min tasks.

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	10/6/21	10/6/21			
Watch Time:	1442	1520			
Screen Time:	1428				
SVE/AS System Location					
SVE Blower Speed (Hertz)	54	54			
SVE Blower Runtime (Hours)	6785.5	—			
SVE Blower Filter Differential Pressure (" H_2O)	0.5	0.5			
SVE Blower Inlet Differential Pressure (" H_2O)	1.5	1.5			
SVE Blower Inlet Temperature (°F)	65	65			
SVE Blower Inlet Vacuum (" H_2O)	78	78			
SVE Blower Discharge Pressure (PSI)	0	0			
SVE Blower Discharge Temperature (°F)	113	113			
AS Blower Speed (Hertz)	0	52			
AS Blower Runtime (Hours)	2700.4	2700.5			
AS Blower Pressure (PSI)		6.0			
AS Blower Flow (" H_2O)		1.0			
Sparge Zone 1 Operating Cycle - Open Interval(s)	-	-			
Sparge Zone 2 Operating Cycle - Open Interval(s)	-	-			
Sparge Zone 3 Operating Cycle - Open Interval(s)	-	-			
Sparge Zone 4 Operating Cycle - Open Interval(s)	-	-			
Sparge Zone 5 Operating Cycle - Open Interval(s)	-	-			
Heat Exchanger Runtime (Hours)	2699.8	-			
Heat Exchanger Discharge Temperature (°F)	?	?			
Transfer Pump Runtime (Hours)	1.7				
Transfer Pump Discharge Pressure (PSI)	0				
Moisture Separator Level (% Full)					
Water Storage Tank Level (DTF, TD from MP; inches)	81"				
NOTES:	AS Blower PPH Alarm @ 14:58 on 10/4				

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

PORT OF SEATTLE - TERMINAL 30

Oxidizer Field Data Collection Form

After turning on A Blower

Date:	10/4/21	10/4			
Watch Time:	1415	1520			
Screen Time:					
Oxidizer System Location					
Inlet Temperature (°F)	691	682			
Burner Chamber Temperature (°F)	689	697			
Discharge Temperature (°F)	630	634			
Inlet Limit Controller Temperature (°F)	662	683			
Outlet Limit Controller Temperature (°F)	630	633			
Process Fan Valve Position (Open/Closed)	Open	Open			
Dilution Valve Position (%)	0	0			
Combustion Valve Position (%)	~~Open~~ 10.4	13.1			
Process Blower Runtime (Hours)	13601.	-			
Combustion Fan Runtime (Hours)	13601	-			
Burner Runtime (Hours)	13660	-			
Processing Vapors Runtime (Hours)	13579	-			
Panel Temperature (°F)	86	92			
Flame Signal (Volts)	5.0	5			
Burner Chamber Inlet Differential Pressure (" H_2O)	0	0			
Propane Tank A Level (%)	40				
Propane Tank B Level (%)	0				
NOTES:					

Notes:

1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

PORT OF SEATTLE - TERMINAL 30

SVE System Data

After turning on [illegible] Blower

Date:	10/6/21	10/6				Design Parameters
Watch Time:	1451	1520				
System Time:						
System Location						
SVE Discharge VOC (ppm)						
SVE Discharge LEL (%)	160.85	144.8				<25
Oxygen (%)						
SVE System Inlet Vacuum (" H_2O)	78	78				
SVE System Inlet ΔP (" H_2O)	1.5	1.5				
Oxidizer Discharge VOC (ppm)	2.5	6.1				<10
HSVE-1 Vacuum (" H_2O)	18	18				
HSVE-1 Flow (SCFM)	78	78				75
HSVE-2 Vacuum (" H_2O)	33	33				
HSVE-2 Flow (SCFM)	74	74				75
HSVE-3 Vacuum (" H_2O)	41	41				
HSVE-3 Flow (SCFM)	75	75				75
SVE-4 Vacuum (" H_2O)	80	80				
SVE-4 Flow (SCFM)	0 Dirty & Bouncing	0 " "				25
SVE-5 Vacuum (" H_2O)	80	80				
SVE-5 Flow (SCFM)	~5 Dirty & Bouncing	5 " "				20
SVE-6 Vacuum (" H_2O)	76	76				
SVE-6 Flow (SCFM)	11	11				30
SVE-7 Vacuum (" H_2O)	86	86				
SVE-7 Flow (SCFM)	16	16				18~19
SVE-8 Vacuum (" H_2O)	77	77				
SVE-8 Flow (SCFM)	0 - water	0 " "				18~19
SVE-9 Vacuum (" H_2O)	80	80				
SVE-9 Flow (SCFM)	0 - water	" "				18~19
SVE-10 Vacuum (" H_2O)	97	97				
SVE-10 Flow (SCFM)	~15 bouncy	" "				18~19
Oxidizer Inlet Temp. (deg F)						
SVE Manifold Temp. (deg F)						
SVE Blower Hours	6785.5					
NOTES:						

Notes:

1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

AECOM

Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics. **This meeting is a daily refresher, not a full orientation.** Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: Bryan Darby **Phone Number:** 253-677-0787	
AECOM SH&E Rep. Name: **Phone Number:**	
Meeting Leader: BD	

Date: 10/4/21	**Project Name/Location:** T-30	**Project Number:** —

Today's Scope of Work:

Weekly OAM

Muster Point Location:	**First Aid Kit Location:**	**Fire Extinguisher Location:**	**Spill Kit Location:**
Car	Connex/Car	Inside Area	—

1. Required Topics

- [x] Fitness for Duty requirements, all sign in / sign out
- [x] Required training (incl. task specific) completed and current
- [x] SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
- [x] Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting
- [x] STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- [x] Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- [x] Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- [x] Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- [x] Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- [x] Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- [x] Required checklists/records available, understood (describe):
- [x] Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

Check ☑ as reviewed or mark ■ as not applicable

- [x] Biological/ Chemical / Electrical Hazards
- [x] Ergonomics - Lifting, Body Position
- [ ] Lock Out/ Tag Out
- [ ] Short Service Employees - visual identifier and mentor/ oversight assignment
- [x] Simultaneous/ Neighbouring Operations
- [x] Slip/ Trip/ Fall Hazards
- [ ] Specialized PPE Needs
- [ ] Traffic Control
- [ ] Waste Management/ Decontamination
- [ ] Weather Hazards / Heat Stress / Cold Stress
- [ ] Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- [ ] Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- [ ] Other Topics (describe/attach):
- [ ] Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:
—	—

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	**Signature**	**Date** 10/4/21 **Time** (at end of day / shift)
Bryan Darby		

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

AECOM

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

- The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
- The hazards & control measures associated with each task you are about to perform.
- The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
- That no tasks or work is to be performed without a hazard assessment.
- Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your Initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

- You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
- You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
- You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
- You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
Bryan Darby AECOM	BD	In & Fit 1415 BD	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	10/14/21				
Watch Time:	0903				
Screen Time:	0847				
SVE/AS System Location					
SVE Blower Speed (Hertz)	54	54			
SVE Blower Runtime (Hours)	6972.3	6972.3			
SVE Blower Filter Differential Pressure (" H_2O)		0.25			
SVE Blower Inlet Differential Pressure (" H_2O)	0.9	1.5			
SVE Blower Inlet Temperature (°F)		60°F			
SVE Blower Inlet Vacuum (" H_2O)	4.5	78			
SVE Blower Discharge Pressure (PSI)	5.5	0			
SVE Blower Discharge Temperature (°F)	~~60°F~~	109			
AS Blower Speed (Hertz)	52				
AS Blower Runtime (Hours)	2721.8				
AS Blower Pressure (PSI)	5.5				
AS Blower Flow (" H_2O)	0.9				
Sparge Zone 1 Operating Cycle - Open Interval(s)	-				
Sparge Zone 2 Operating Cycle - Open Interval(s)	-				
Sparge Zone 3 Operating Cycle - Open Interval(s)	-				
Sparge Zone 4 Operating Cycle - Open Interval(s)	-				
Sparge Zone 5 Operating Cycle - Open Interval(s)	-				
Heat Exchanger Runtime (Hours)	2721.1				
Heat Exchanger Discharge Temperature (°F)	60°F				
Transfer Pump Runtime (Hours)	1.7				
Transfer Pump Discharge Pressure (PSI)	0				
? Moisture Separator Level (% Full)					
Water Storage Tank Level (DTF, TD from MP; inches)	90"				
NOTES:					

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

PID # - 592908216

AECOM

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	10/14/21				
Watch Time:	0914				
Screen Time:	0905				
Oxidizer System Location					
Inlet Temperature (°F)	684				
Burner Chamber Temperature (°F)	684				
Discharge Temperature (°F)	636				
Inlet Limit Controller Temperature (°F)	685				
Outlet Limit Controller Temperature (°F)	636				
Process Fan Valve Position (Open/Closed)	Open				
Dilution Valve Position (%)	0				
Combustion Valve Position (%)	11.9				
Process Blower Runtime (Hours)	13787				
Combustion Fan Runtime (Hours)	13788				
Burner Runtime (Hours)	13788				
Processing Vapors Runtime (Hours)	13765				
Panel Temperature (°F)	71				
Flame Signal (Volts)	5				
Burner Chamber Inlet Differential Pressure (" H_2O)	0				
Propane Tank A Level (%)	57				
Propane Tank B Level (%)	45				
NOTES:	* Burner Chamber Diff Pressure - Supposed to be 0? Ask Cary could be bad switch				

Notes:
1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:	10/14/21					Design Parameters
Watch Time:						
System Time:						
System Location						
SVE Discharge VOC (ppm)	100.2					
SVE Discharge LEL (%)	–					<25
Oxygen (%)	–					
SVE System Inlet Vacuum (" H_2O)	78					
SVE System Inlet ΔP (" H_2O)	9.5					
Oxidizer Discharge VOC (ppm)	1.9					<10
HSVE-1 Vacuum (" H_2O)	16					
HSVE-1 Flow (SCFM)	79					75
HSVE-2 Vacuum (" H_2O)	32					
HSVE-2 Flow (SCFM)	75					75
HSVE-3 Vacuum (" H_2O)	75					
HSVE-3 Flow (SCFM)	43					75
SVE-4 Vacuum (" H_2O)	80					
SVE-4 Flow (SCFM)	0					25
SVE-5 Vacuum (" H_2O)	82					
SVE-5 Flow (SCFM)	5 - Bubbly					20
SVE-6 Vacuum (" H_2O)	73					
SVE-6 Flow (SCFM)	10 ~water					30
SVE-7 Vacuum (" H_2O)	88					
SVE-7 Flow (SCFM)	17					18~19
SVE-8 Vacuum (" H_2O)	78					
SVE-8 Flow (SCFM)	0 - water					18~19
SVE-9 Vacuum (" H_2O)	86					
SVE-9 Flow (SCFM)	0					18~19
SVE-10 Vacuum (" H_2O)	98					
SVE-10 Flow (SCFM)	15 - bouncy					18~19
? Oxidizer Inlet Temp. (deg F)						
? SVE Manifold Temp. (deg F)						
SVE Blower Hours	–					
NOTES:						

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date:					Equipment I.D. #
Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	0930	7	1.8	100%	
AS-2		6.5	8.5		
AS-3		6.5	0		
AS-4		6.5	13		
AS-5		7	28		
AS-6		6	4.6		
AS-7		6.5	2.2		
AS-8		6.5	1.5		
AS-9		6.5	0		
AS-10		7	2.3		
AS-11		7	2.7		
AS-12		6.75	1.2		
AS-13		6.5	1.6		
AS-14		6	2.8		
AS-15		6.75	1		
AS-16		7	1.2		
AS-17		7	0		
AS-18		6.5	0		
AS-19		7.5	5		
AS-20		6.5	1		
AS-21		6	0		
AS-22		6.5	0		
AS-23		6.5	2.8		
AS-24		6	0		
AS-25		6	0		
AS-26		7	0		
AS-27	0940	5.5	1.8		

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE Well Field Data Collection Form

Location	Date	Time	Vacuum (" H_2O)	Flow (SCFM)	LEL (%)	VOC (ppm)	Oxygen (%)	Notes
HSVE-1								
HSVE-2								
HSVE-3								
SVE-4								
SVE-5								
SVE-6								
SVE-7								
SVE-8								
SVE-9								
SVE-10								

Notes:

1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. % = Percent
4. ppm = parts per million

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 19935
Description MIniRae 3000
Calibrated 10/12/2021 12:14:03PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-908216
Location Seattle
Department

State Certified
Status Pass
Temp °C 16
Humidity % 44

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

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	100.1	100.0	0.00%	Pass

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

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100 PPM 304-402162466-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402162466-1		8/11/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Stethan Holmes

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 QC/ PACKING LIST

Description	RAE Systems MiniRAE 3000
Instrument ID	19935
Lamp Voltage	☑ 10.6 eV ☐ 11.7 eV ☐ 9.8 eV
Date Calibrated	12Oct2021

PINE
www.pine-environmental.com

Standard Items	**Prepared**	**QC check**	**Received by customer**	**Returned to Pine**
MiniRAE 3000 with carry case				
Rechargeable battery (installed)				
Protective rubber boot				
Manual				
Quick reference card				
Probe tip				
Charger/ adapter, or charger and cradle				
(2) Hydrophobic filters				
Alkaline adapter with (4) AA alkaline batteries installed				
ProCal calibration sheet				
Supporting Items				
100 ppm isobutylene calibration gas				
Gas regulator				
Tedlar bag				
Datalogging software				
Communications cable				
*100 ppm Isobutylene SDS				
✓ *Must match cylinder with setup*				
**SDS provided upon request*				
Spare alkaline battery pack				
_____Alkaline AA batteries				
_____				

Prepared by: JAW
QC checked by: _____
Date: 12Oct2021

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 10/21/21				Equipment I.D. # 48808	
Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	1435	~~0~~ 6	1.2	100% open	
AS-2		5	8.6		
AS-3		5	0		
AS-4		4.5	13		
AS-5		6	1.6		
AS-6		5	4.6		
AS-7		6	0		
AS-8		6	0		
AS-9		5	0		
AS-10		6	0		
AS-11		6.5	2.8		
AS-12		6	1.6		
AS-13		6	1.2		
AS-14		4	0		
AS-15		6	0		
AS-16		6	0		
AS-17		5	0		
AS-18		5.5	0		
AS-19		6.5	5.2		
AS-20		5	0		
AS-21		5	0		
AS-22		5	0		
AS-23		5.5	0		
AS-24		5	0		
AS-25		5	0		
AS-26		6	0		
AS-27		4	2.8		

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	10/21/21				
Watch Time:	1430				
Screen Time:					
SVE/AS System Location					
SVE Blower Speed (Hertz)	54.0				
SVE Blower Runtime (Hours)	7141.7				
SVE Blower Filter Differential Pressure (" H_2O)	0				
SVE Blower Inlet Differential Pressure (" H_2O)	~~781.5~~				
SVE Blower Inlet Temperature (°F)	100				
SVE Blower Inlet Vacuum (" H_2O)	~~1.5~~ 1878				
SVE Blower Discharge Pressure (PSI)	0				
SVE Blower Discharge Temperature (°F)	117				
AS Blower Speed (Hertz)	52.0				
AS Blower Runtime (Hours)	2764.5				
AS Blower Pressure (PSI)	5.0				
AS Blower Flow (" H_2O)	1				
Sparge Zone 1 Operating Cycle - Open Interval(s)	—				
Sparge Zone 2 Operating Cycle - Open Interval(s)	—				
Sparge Zone 3 Operating Cycle - Open Interval(s)	—				
Sparge Zone 4 Operating Cycle - Open Interval(s)	—				
Sparge Zone 5 Operating Cycle - Open Interval(s)	—				
Heat Exchanger Runtime (Hours)	2763.9				
Heat Exchanger Discharge Temperature (°F)	91				
Transfer Pump Runtime (Hours)	1.7				
Transfer Pump Discharge Pressure (PSI)	0.0				
Moisture Separator Level (% Full)	0				
Water Storage Tank Level (DTF, TD from MP; inches)	7"				
NOTES:					

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

AECOM

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	10/21/21				
Watch Time:	1425				
Screen Time:					
Oxidizer System Location					
Inlet Temperature (°F)	678				
Burner Chamber Temperature (°F)	680				
Discharge Temperature (°F)	629				
Inlet Limit Controller Temperature (°F)	691				
Outlet Limit Controller Temperature (°F)	633				
Process Fan Valve Position (Open/Closed)	Open				
Dilution Valve Position (%)	0.0				
Combustion Valve Position (%)	13.7 c/c				
Process Blower Runtime (Hours)	13957				
Combustion Fan Runtime (Hours)	13957				
Burner Runtime (Hours)	13947				
Processing Vapors Runtime (Hours)	13934				
Panel Temperature (°F)	92°				
Flame Signal (Volts)	5.0 V				
Burner Chamber Inlet Differential Pressure (" H_2O)	0.0				
Propane Tank A Level (%)	80 c/c				
Propane Tank B Level (%)	70 c/c				
NOTES:					

Notes:
1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:	10/21/21					Design Parameters
Watch Time:	1430					
System Time:						
System Location						
SVE Discharge VOC (ppm)	117.6					
SVE Discharge LEL (%)	—					<25
Oxygen (%)	—					
SVE System Inlet Vacuum (" H_2O)	76					
SVE System Inlet ΔP (" H_2O)	15					
Oxidizer Discharge VOC (ppm)	2.6					<10
HSVE-1 Vacuum (" H_2O)	14					
HSVE-1 Flow (SCFM)	75					75
HSVE-2 Vacuum (" H_2O)	30					
HSVE-2 Flow (SCFM)	74					75
HSVE-3 Vacuum (" H_2O)	38					
HSVE-3 Flow (SCFM)	74					75
SVE-4 Vacuum (" H_2O)	5 20					
SVE-4 Flow (SCFM)	80 5					25
SVE-5 Vacuum (" H_2O)	80					
SVE-5 Flow (SCFM)	10-15					20
SVE-6 Vacuum (" H_2O)	~~84~~ 78					
SVE-6 Flow (SCFM)	20 12					30
SVE-7 Vacuum (" H_2O)	84					
SVE-7 Flow (SCFM)	20					18~19
SVE-8 Vacuum (" H_2O)	76					
SVE-8 Flow (SCFM)	5					18~19
SVE-9 Vacuum (" H_2O)	82					
SVE-9 Flow (SCFM)	5 ~~100~~					18~19
SVE-10 Vacuum (" H_2O)	~~85~~ 75					
SVE-10 Flow (SCFM)	15-35					18~19
Oxidizer Inlet Temp. (deg F)	—					
SVE Manifold Temp. (deg F)	—					
SVE Blower Hours	—					
NOTES:						

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

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 48808
Description MiniRAE 3000
Calibrated 10/20/2021 12:06:20PM

Manufacturer Rae Systems
Model Number PGM 7320
Serial Number/ Lot Number 592-600846
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 50

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	100.1	100.0	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100 PPM 305-401882019-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	305-401882019-1		9/9/2024
SEA ULTRA ZERO AIR	SEA ULTRA ZERO AIR 20.9%	Gasco	31844	304-40189835-1		10/21/2024

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Stethan Holmes

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

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

AECOM

DATE 10/21/21

DAY | S | M | T | W | TH | F | S |

WEATHER	BRIGHT SUN	CLEAR	OVERCAST	RAIN	SNOW
TEMP	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

PROJECT MANAGER: Paul Kalivoda

PROJECT: T-30 P.O.S

JOB NO: 60667994

AECOM FIELD REP: A. Utter

SUB-CONTRACTORS ON SITE: —

EQUIPMENT ON SITE: PID

WORK PERFORMED:

1230 A. Utter arrives onsite, restarts AS system, begins O;M collection.

1321 ; 1329 Sampled Discharge - 102121 ; Inlet - 102121

Collected PID readings, head offsite to drop vacuum pump off w B.D.

1400 Continue collecting O+M readings

1440 Complete O+M readings, adjust pressure gauge bolt by turning it ~20 turns clockwise to try and reduce PAH alarms

1445 R.M. (P.O.S. SSA) arrives onsite to check in, heads offsite +/- 5 minutes.

1500 A.U. locks up site ; heads to main gate.

A Utter 10/21/21

BY TITLE

SHEET ____ OF ____

SAMPLE CHAIN OF CUSTODY

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

SAMPLERS (*signature*) A Utter

PROJECT NAME & ADDRESS: T-30 Port of Seattle

PO #

NOTES:

INVOICE TO

Page # 1 of 1

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

SAMPLE DISPOSAL
- ☒ Default: Clean after 3 days
- ☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
Inlet - 102121	2295	01	306	IA / (SG)	10/21/21	30	1329	5	1334		X		X			
Discharge - 102121	2305	01	280	IA / (SG)	10/21/21	27	1321	5	1325		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: A Utter	Anders Utter	AECOM	10/21/21	1530
Received by: Ty Ram	Ty Ram	PBI	10/21/21	15:30
Relinquished by:				
Received by:				

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

AECOM Daily Tailgate Meeting Summary

Section One

Project Name	Terminal-30 Port of Seattle
Project Number	60667994
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	System Location or Entrance Gate
Meeting date	10/21/2021
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Vehicles
Prepared by	Utter, Anders

Section Two

Attendees	Anders Utter
Location	Seattle
Tasks to be performed	AS/SVE System O&M weekly Maintenance
Hazards to be considered today	pressure, noise, motion, mechanical, electrical
Will there be Lone Workers?	Yes
Hierarchy of controls	elimination, substitution, engineering, administrativecontrols, ppe
Personal Protective Equipment	Task Specific: gloves, earprotection|Mandatory: safetyglasses, longpants, reflectivevest, workboots
High Risk Events	• Impact by vehicle or mobile equipment
Topic of the week	Frayed Electrical Cords - replace, mark out of service

Other topics discussed	
Mid day reviews	
End of the day Comments	
Hazards	• Mechanical • Motion • Noise • Pressure • Electrical

PORT OF SEATTLE - TERMINAL 30

AS Well Field Data Collection Form

Date: 8/28/21 Equipment I.D. # R19214

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	1430	7	0		
AS-2		6	8.6		
AS-3		6	0		
AS-4		6	13		
AS-5		7	1.6		
AS-6		6	4.6		
AS-7		6.5	1.5		
AS-8		6.5	0		
AS-9		6	0		
AS-10		7	0		
AS-11		7	2.6		
AS-12		6.5	1.4		
AS-13		6.5	1.2		
AS-14		5.5	0		
AS-15		7	0		
AS-16		7	0		
AS-17		6.5	0		
AS-18		6.5	0		
AS-19		7.5	5.2		
AS-20		6	1.0		
AS-21		6	0		
AS-22		6	0		
AS-23		6.5	0		
AS-24		6	0		
AS-25		6	0		
AS-26		7	0		
AS-27		5	1.8		

Notes:

1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AECOM

PORT OF SEATTLE - TERMINAL 30

Oxidizer Field Data Collection Form

Date:	10/28/21				
Watch Time:	1415				
Screen Time:					
Oxidizer System Location					
Inlet Temperature (°F)	668				
Burner Chamber Temperature (°F)	664				
Discharge Temperature (°F)	629				
Inlet Limit Controller Temperature (°F)	680				
Outlet Limit Controller Temperature (°F)	626				
Process Fan Valve Position (Open/Closed)	open				
Dilution Valve Position (%)	0.0				
Combustion Valve Position (%)	11.2				
Process Blower Runtime (Hours)	14125				
Combustion Fan Runtime (Hours)	14125				
Burner Runtime (Hours)	14115				
Processing Vapors Runtime (Hours)	14102				
Panel Temperature (°F)	78				
Flame Signal (Volts)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)	0.0				
Propane Tank A Level (%)	50				
Propane Tank B Level (%)	45				
NOTES:	alarm on 10/21/21 was not turned off until I arrived				

Notes:

1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE System Data

						Design Parameters
Date:	10/28/21					
Watch Time:	1415					
System Time:						
System Location						
SVE Discharge VOC (ppm)	20.4 / 28.6					
SVE Discharge LEL (%)	—					<25
Oxygen (%)	—					
SVE System Inlet Vacuum (" H_2O)	80					
SVE System Inlet ΔP (" H_2O)	2.0					
Oxidizer Discharge VOC (ppm)	0.0 / 0.5					<10
HSVE-1 Vacuum (" H_2O)	-18					
HSVE-1 Flow (SCFM)	80					75
HSVE-2 Vacuum (" H_2O)	-34					
HSVE-2 Flow (SCFM)	76					75
HSVE-3 Vacuum (" H_2O)	-44					
HSVE-3 Flow (SCFM)	76					75
SVE-4 Vacuum (" H_2O)	-84					
SVE-4 Flow (SCFM)	5-10					25
SVE-5 Vacuum (" H_2O)	5-10 ↕					
SVE-5 Flow (SCFM)	-85					20
SVE-6 Vacuum (" H_2O)	-80					
SVE-6 Flow (SCFM)	10					30
SVE-7 Vacuum (" H_2O)	-90					
SVE-7 Flow (SCFM)	15					18~19
SVE-8 Vacuum (" H_2O)	~~-90~~ -80					
SVE-8 Flow (SCFM)	~~15-30~~ 5					18~19
SVE-9 Vacuum (" H_2O)	~~-90~~ -90					
SVE-9 Flow (SCFM)	5					18~19
SVE-10 Vacuum (" H_2O)	~~15-30~~ 100					
SVE-10 Flow (SCFM)	~~-90~~ 15-30					18~19
Oxidizer Inlet Temp. (deg F)	—					
SVE Manifold Temp. (deg F)	—					
SVE Blower Hours	—					
NOTES:						

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

6.9
NS GTB

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	10/28/21				
Watch Time:	1475				
Screen Time:					
SVE/AS System Location					
SVE Blower Speed (Hertz)	54				
SVE Blower Runtime (Hours)	7309.8				
SVE Blower Filter Differential Pressure (" H_2O)	~~1.0~~ 0.5				
SVE Blower Inlet Differential Pressure (" H_2O)	2.0				
SVE Blower Inlet Temperature (°F)	60				
SVE Blower Inlet Vacuum (" H_2O)	80				
SVE Blower Discharge Pressure (PSI)	~~6.0~~ 0.0				
SVE Blower Discharge Temperature (°F)	110				
AS Blower Speed (Hertz)	52				
AS Blower Runtime (Hours)	2765.3				
AS Blower Pressure (PSI)	6.0				
AS Blower Flow (" H_2O)	1.0				
Sparge Zone 1 Operating Cycle - Open Interval(s)	—				
Sparge Zone 2 Operating Cycle - Open Interval(s)	—				
Sparge Zone 3 Operating Cycle - Open Interval(s)	—				
Sparge Zone 4 Operating Cycle - Open Interval(s)	—				
Sparge Zone 5 Operating Cycle - Open Interval(s)	—				
Heat Exchanger Runtime (Hours)	2764.7				
Heat Exchanger Discharge Temperature (°F)	60.0				
Transfer Pump Runtime (Hours)	1.7				
Transfer Pump Discharge Pressure (PSI)	0				
Moisture Separator Level (% Full)	0				
Water Storage Tank Level (DTF, TD from MP; inches)	6.9 DTB				
NOTES:					

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

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 R19214
Description MIniRAE 3000
Calibrated 10/25/2021 1:07:22PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-906004
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 46

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

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

Nom In Val / In Val	In Type	Out Val	Out Type	End As	Lft As	Dev%	Pass/Fail
100 / 100	PPM	100	PPM	100	100	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
SEA ISO 100 PPM 304-402150198-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402150198-1		6/23/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Jose Arroyo

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

Section One

Project Name	Terminal-30 Port of Seattle
Project Number	60667994
Project Manager	Paul Kalina
Project Manager Phone #	2063105097
Muster Point location	System Location or Entrance Gate
Meeting date	10/28/2021
Business Line	Environment
SH&E Manager	Tim Gilles
SH&E Manager Phone #	3128335991
First Aid Kit Location	Vehicles
Prepared by	Utter, Anders

Section Two

Attendees	Anders Utter
Location	Seattle
Tasks to be performed	Weekly O&M
Hazards to be considered today	noise, motion, mechanical, electrical
Will there be Lone Workers?	Yes
Hierarchy of controls	substitution, engineering, administrativecontrols, ppe
Personal Protective Equipment	Task Specific: gloves|Mandatory: hardhat, safetyglasses, longpants, reflectivevest, workboots
High Risk Events	• Impact by vehicle or mobile equipment • Contact with moving parts of machinery
Topic of the week	Have you got your red card - Stop Work Authority

Other topics discussed	
Mid day reviews	
End of the day Comments	
Hazards	• Mechanical • Motion • Noise • Electrical

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date:					Equipment I.D. #
Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1		7 | 9	1.4 | 3.8		
AS-2		6 | 8	0 | 0		Stuck
AS-3		6.5 | 8	0 | 0		Stuck
AS-4		6 | 7.5	0 | 0		Stuck
AS-5		7 | 8	2.6 | 6.8		
AS-6		6 | 8	4.6 | ~~4.6~~ 7.4		stuck
AS-7		7 | 8.5	1.0 | 4.6		bouncing
AS-8		6.5 | 8.5	0 | 2		
AS-9		6.5 | 8	0 | 2.2		Stuck
AS-10		7 | 8.5	0 | 1.4		
AS-11		7.5 | 9	2.6 | 2.6		Stuck
AS-12		7 | 8.5	2.2 | 3.2		
AS-13		6.5 | 8.5	2.2 | 5		Stuck
AS-14		5.5 | 7	0 | 4.2		
AS-15		7 | 8.5	1.0 | 3.6		-
AS-16		7 | 8.5	0 | 5.6		
AS-17		7 | 9	0 | 1.6		
AS-18		6.5 | 8.5	0 | 0		Stuck
AS-19		7.5 | 9	5.2 | 5.2		Stuck
AS-20		6.5 | 8	1.2 | 2.6		
AS-21		6 | 7.5	0 | 0		Stuck
AS-22		6 | 7.5	0 | 1.2		
AS-23		7 | 8.5	0 | 1.8		bouncing
AS-24		6.5 | 8	0 | 1.4		
AS-25		6.5 | 7.5	0 | 0		
AS-26		7 | 8.8	0 | 0		
AS-27		5.5 | 6.5	1.8 | 2.8		

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

Past Bleed valve shut off

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:						Design Parameters
Watch Time:						
System Time:						
System Location						
SVE Discharge VOC (ppm)	50.6					
SVE Discharge LEL (%)	—					<25
Oxygen (%)	—					
SVE System Inlet Vacuum (" H_2O)	—					
SVE System Inlet ΔP (" H_2O)	—					
Oxidizer Discharge VOC (ppm)	0.6					<10
HSVE-1 Vacuum (" H_2O)	24					
HSVE-1 Flow (SCFM)	80					75
HSVE-2 Vacuum (" H_2O)	34					
HSVE-2 Flow (SCFM)	76					75
HSVE-3 Vacuum (" H_2O)	44					
HSVE-3 Flow (SCFM)	76					75
SVE-4 Vacuum (" H_2O)	86					
SVE-4 Flow (SCFM)	5					25
SVE-5 Vacuum (" H_2O)	85					
SVE-5 Flow (SCFM)	16					20
SVE-6 Vacuum (" H_2O)	94 80					
SVE-6 Flow (SCFM)	13					30
SVE-7 Vacuum (" H_2O)	94					
SVE-7 Flow (SCFM)	17					18~19
SVE-8 Vacuum (" H_2O)	80					
SVE-8 Flow (SCFM)	0					18~19
SVE-9 Vacuum (" H_2O)	90					
SVE-9 Flow (SCFM)	0					18~19
SVE-10 Vacuum (" H_2O)	100					
SVE-10 Flow (SCFM)	15					18~19
Oxidizer Inlet Temp. (deg F)	—					
SVE Manifold Temp. (deg F)	—					
SVE Blower Hours	—					
NOTES:						

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

PID 13539
Instrument ID

AECOM

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	11/5/21				
Watch Time:	1430				
Screen Time:					
Oxidizer System Location					
Inlet Temperature (°F)	682				
Burner Chamber Temperature (°F)	681				
Discharge Temperature (°F)	632				
Inlet Limit Controller Temperature (°F)	682				
Outlet Limit Controller Temperature (°F)	633				
Process Fan Valve Position (Open/Closed)	Open				
Dilution Valve Position (%)	0.0				
Combustion Valve Position (%)	12.1				
Process Blower Runtime (Hours)	14317				
Combustion Fan Runtime (Hours)	14318				
Burner Runtime (Hours)	14308				
Processing Vapors Runtime (Hours)	14295				
Panel Temperature (°F)	78				
Flame Signal (Volts)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)	0.0				
Propane Tank A Level (%)	65				
Propane Tank B Level (%)	65				
NOTES:					

Notes:

1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	11/5/21				
Watch Time:	1430				
Screen Time:					
SVE/AS System Location					
SVE Blower Speed (Hertz)	54.0				
SVE Blower Runtime (Hours)	7502.7				
SVE Blower Filter Differential Pressure (" H_2O)	0.5				
SVE Blower Inlet Differential Pressure (" H_2O)	2.0				
SVE Blower Inlet Temperature (°F)	55				
SVE Blower Inlet Vacuum (" H_2O)	+84				
SVE Blower Discharge Pressure (PSI)	0				
SVE Blower Discharge Temperature (°F)	110				
AS Blower Speed (Hertz)	52.0				
AS Blower Runtime (Hours)	2822.2				
AS Blower Pressure (PSI)	6.5				
AS Blower Flow (" H_2O)	0.2				
Sparge Zone 1 Operating Cycle - Open Interval(s)	—				
Sparge Zone 2 Operating Cycle - Open Interval(s)	—				
Sparge Zone 3 Operating Cycle - Open Interval(s)	—				
Sparge Zone 4 Operating Cycle - Open Interval(s)	—				
Sparge Zone 5 Operating Cycle - Open Interval(s)	—				
Heat Exchanger Runtime (Hours)	2821.5				
Heat Exchanger Discharge Temperature (°F)	56.0				
Transfer Pump Runtime (Hours)	1.7				
Transfer Pump Discharge Pressure (PSI)	0				
Moisture Separator Level (% Full)	75 c/o				
Water Storage Tank Level (DTF, TD from MP; inches)	1.8ft TD				
NOTES:					

Notes:
1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

AECOM

INSTRUMENT QC/ PACKING LIST

Description	RAE Systems MiniRAE 3000
Instrument ID	13839
Lamp Voltage	☑ 10.6 eV ☐ 11.7 eV ☐ 9.8 eV
Date Calibrated	02 Nov 2021

PINE
www.pine-environmental.com

Standard Items	**Prepared**	**QC check**	**Received by customer**	**Returned to Pine**
MiniRAE 3000 with carry case				
Rechargeable battery (installed)				
Protective rubber boot				
Manual				
Quick reference card				
Probe tip				
Charger/ adapter, or charger and cradle				
(2) Hydrophobic filters				
Alkaline adapter with (4) AA alkaline batteries installed				
ProCal calibration sheet				
Supporting Items				
100 ppm isobutylene calibration gas				
Gas regulator				
Tedlar bag				
Datalogging software				
Communications cable				
*100 ppm Isobutylene SDS				
✓ *Must match cylinder with setup*				
**SDS provided upon request*				
Spare alkaline battery pack				
_____Alkaline AA batteries				
_____				

Prepared by: [signature]
QC checked by: [signature]
Date: 02/16/2021

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC

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 13839
Description MiniRae 3000
Calibrated 11/2/2021 12:58:34PM

Manufacturer Rae Systems
Model Number PGM-7320
Serial Number/ Lot Number 592-002600
Location Seattle
Department

State Certified
Status Pass
Temp °C 18
Humidity % 52

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	100.2	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 100 PPM 305-401882019-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	305-401882019-1		9/9/2024

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Stethan Holmes

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

Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics. **This meeting is a daily refresher, not a full orientation.** Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: Lance Mixon
Phone Number:

AECOM SH&E Rep. Name: Tim Giles
Phone Number:

Meeting Leader: Anders Utter

Date: 11/5/21	Project Name/Location: QTA / T-30	Project Number:

Today's Scope of Work:

QTA / T-30 O&M

Muster Point Location:	First Aid Kit Location:	Fire Extinguisher Location:	Spill Kit Location:

1. Required Topics

- [x] Fitness for Duty requirements, all sign in / sign out
- [x] Required training (incl. task specific) completed and current
- [x] SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
- [x] Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting
- [x] STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- [x] Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- [x] Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- [x] Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- [x] Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- [ ] Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- [ ] Required checklists/records available, understood (describe):
- [ ] Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

Check [x] as reviewed or mark [■] as not applicable

- [x] Biological/ Chemical / Electrical Hazards
- [x] Ergonomics - Lifting, Body Position
- [ ] [x] Lock Out/ Tag Out
- Short Service Employees - visual identifier and mentor/ oversight assignment
- [x] Simultaneous/ Neighbouring Operations
- [x] Slip/ Trip/ Fall Hazards
- [ ] [x] Specialized PPE Needs
- [ ] [x] Traffic Control
- [ ] [x] Waste Management/ Decontamination
- [x] Weather Hazards / Heat Stress / Cold Stress
- [ ] [x] Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- [ ] [x] Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- [ ] [ ] Other Topics (describe/attach):
- [ ] [ ] Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	Signature	Date / Time (at end of day / shift)
Anders Utter	A Utter	11/5/21

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

AECOM

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
Anders Utter AECOM	A Utter	In & Fit 0930 AU	Out & Fit
Greg Fridman AECOM	G Fridman	In & Fit 0945 GF	Out & Fit
Lucy Pantaleeff AECOM	Lucy Pantaleeff	In & Fit 0945 LP	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 11/11/2021				Equipment I.D. # 46548	
Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	2105	9	5		
AS-2		8.5	8.8		
AS-3		8.5	0		
AS-4		8	13		
AS-5		8.5	6		
AS-6		8	7.8		
AS-7		9	4.8		
AS-8		8.5	3.8		
AS-9		8.5	2.6		
AS-10		9	2.8		
AS-11		9.5	2.8		
AS-12		9	2.8		
AS-13		9	6		
AS-14		8	4.2		
AS-15		8.5	4.6		
AS-16		9	6		
AS-17		9	2		
AS-18		8.5	0		
AS-19		9.5	5.4		
AS-20		9	2.8		
AS-21		8	4.4		
AS-22		8	0		
AS-23		9	0		
AS-24		8	0		
AS-25		8.5	0		
AS-26		9	0		
AS-27		7.5	2.4		

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

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 46548
Description MiniRAE 3000 V2.22A
Calibrated 11/9/2021 6:35:10PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-928505
Location Seattle
Department

State Certified
Status Pass
Temp °C 19
Humidity % 41

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Range

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

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	101.50	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 100 PPM 304-402162466-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402162466-1		8/11/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Jose Arroyo

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

Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics. **This meeting is a daily refresher, not a full orientation**. Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: Karen McKon
Phone Number:

AECOM SH&E Rep. Name: Tim Gilles
Phone Number:

Meeting Leader: Anders Utter

Date: 11/11/21	Project Name/Location: T-30	Project Number:

Today's Scope of Work:

LNAPL Product Removal

Muster Point Location:	First Aid Kit Location:	Fire Extinguisher Location:	Spill Kit Location:
Security Gate	Connex	Connex	Connex

1. Required Topics

- [x] Fitness for Duty requirements, all sign in / sign out
- [x] Required training (incl. task specific) completed and current
- [x] SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
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- [x] Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- [x] Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- [x] Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- [x] Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- [ ] Required checklists/records available, understood (describe):
- [ ] Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

Check [x] as reviewed or mark [■] as not applicable

- [x] [ ] Biological/ Chemical / Electrical Hazards
- [x] [ ] Ergonomics - Lifting, Body Position
- [x] [ ] Lock Out/ Tag Out
- [ ] [ ] Short Service Employees - visual identifier and mentor/ oversight assignment
- [x] [ ] Simultaneous/ Neighbouring Operations
- [x] [ ] Slip/ Trip/ Fall Hazards
- [ ] [x] Specialized PPE Needs
- [x] [ ] Traffic Control
- [x] [ ] Waste Management/ Decontamination
- [x] [ ] Weather Hazards / Heat Stress / Cold Stress
- [x] [ ] Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- [ ] [x] Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- [ ] [ ] Other Topics (describe/attach):
- [ ] [ ] Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:
N/A	N/A

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	Signature	Date / Time (at end of day / shift)
Anders Utter	[signature]	Date 11/11/21 Time 2300

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

AECOM

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (Including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
Anders Utter AECOM		In & Fit AU 1530	Out & Fit
Al Leighaing - DH		In & Fit AL 1700	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 11/18/21 Equipment I.D. # 39946

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	12:55	7.0	1.4		
AS-2		6.5	8.4		
AS-3		6.5	0		
AS-4		6.5	0		
AS-5		7.0	4.0		
AS-6		6.5	4.5		
AS-7	12:51	7.0	0		
AS-8	~~8:44~~	6.5	2.4		
AS-9		6.5	0		
AS-10		7.0	0		
AS-11		7.5	2.6		
AS-12	12:52	7.0	1.8		
AS-13		6.5	1.6		
AS-14		6.0	1.0		
AS-15		7.0	1.2		
AS-16		7.0	0		
AS-17	12:54	7.0	1.5		
AS-18		6.5	0		
AS-19		7.5	0		
AS-20		6.5	0		
AS-21		6.5	0		
AS-22		6.5	0		
AS-23	12:53	7.0	1.4		burning gauge
AS-24		6.5	0		
AS-25		6.5	0		
AS-26		7.0	0		
AS-27		5.5	1.6		

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AECOM

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	11/18/21				
Watch Time:	2:45				
Screen Time:	21:44				
Oxidizer System Location					
Inlet Temperature (°F) panel bottom right	689				
Burner Chamber Temperature (°F)	686				
Discharge Temperature (°F) (outlet)	630				
Inlet Limit Controller Temperature (°F)	688				
Outlet Limit Controller Temperature (°F)	630				
Process Fan Valve Position (Open/Closed)	Open				
Dilution Valve Position (%)	0.0%				
Combustion Valve Position (%)	9.7%				
Process Blower Runtime (Hours)	14622				
Combustion Fan Runtime (Hours)	14623				
Burner Runtime (Hours)	14613				
Processing Vapors Runtime (Hours)	14600				
Panel Temperature (°F)	69				
Flame Signal (Volts) (panel bottleft)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)	0				
Propane Tank A Level (%)	60				
Propane Tank B Level (%)	55				
NOTES:					

Notes:
1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

	Date:					
	Watch Time:					
	Screen Time:					
	SVE/AS System Location					
HMI	SVE Blower Speed (Hertz) (VFD)	54.0				
HMI	SVE Blower Runtime (Hours)	7807.8				
	SVE Blower Filter Differential Pressure (" H_2O) (DPI-200)	0.5				
	SVE Blower Inlet Differential Pressure (" H_2O) (FI-200)	1.5				
	SVE Blower Inlet Temperature (°F) (TI-200)	50				
	SVE Blower Inlet Vacuum (" H_2O) (VI200)	~~55~~ 86				
	SVE Blower Discharge Pressure (PSI) PI-400	0				
	SVE Blower Discharge Temperature (°F) (TI400)	~~50~~ 106°				
HMI	AS Blower Speed (Hertz) (VFD)	52.0				
HMI	AS Blower Runtime (Hours) (Sparge Blower)	2887.1				
	AS Blower Pressure (PSI) (PI-501)	6.0				
	AS Blower Flow (" H_2O) (Sparge Air Filter... DPI-500)	0.1				
	Sparge Zone 1 Operating Cycle - Open Interval(s)	Open				
	Sparge Zone 2 Operating Cycle - Open Interval(s)					
	Sparge Zone 3 Operating Cycle - Open Interval(s)					
	Sparge Zone 4 Operating Cycle - Open Interval(s)					
	Sparge Zone 5 Operating Cycle - Open Interval(s)					
	Heat Exchanger Runtime (Hours)	2886.4				
	Heat Exchanger Discharge Temperature (°F) (TI500)	59°				
HMI	Transfer Pump Runtime (Hours) (MS Pump)	1.8				
	Transfer Pump Discharge Pressure (PSI) (PI-300)	0				
	Moisture Separator Level (% Full)	≈ 10%				
	Water Storage Tank Level (DTF, TD from MP; inches)					
	NOTES:					

Notes:

1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:						Design Parameters
Watch Time:	12:57					
System Time:						
System Location						
SVE Discharge VOC (ppm) PID	47.6	up Tedlar bag				
SVE Discharge LEL (%)	—					<25
Oxygen (%)	—					
SVE System Inlet Vacuum (" H_2O)						
SVE System Inlet ΔP (" H_2O)						
Oxidizer Discharge VOC (ppm) PID	1.0	w/o Tedl				<10
HSVE-1 Vacuum (" H_2O)	16					
HSVE-1 Flow (SCFM)	82					75
HSVE-2 Vacuum (" H_2O)	32					
HSVE-2 Flow (SCFM)	80					75
HSVE-3 Vacuum (" H_2O)	42					
HSVE-3 Flow (SCFM)	82					75
SVE-4 Vacuum (" H_2O)	86					
SVE-4 Flow (SCFM)	9~~8~~					25
SVE-5 Vacuum (" H_2O)	18					
SVE-5 Flow (SCFM)	—					20
SVE-6 Vacuum (" H_2O)	~~88~~ 84					
SVE-6 Flow (SCFM)	~~10~~12					30
SVE-7 Vacuum (" H_2O)	94					
SVE-7 Flow (SCFM)	15					18~19
SVE-8 Vacuum (" H_2O)	86					
SVE-8 Flow (SCFM)	—					18~19
SVE-9 Vacuum (" H_2O)	98					
SVE-9 Flow (SCFM)	9.5					18~19
SVE-10 Vacuum (" H_2O)	>Max					
SVE-10 Flow (SCFM)	20					18~19
Oxidizer Inlet Temp. (deg F)						
SVE Manifold Temp. (deg F)						
SVE Blower Hours						
NOTES:	Water line of oxidizer discharge Replaced	tubing for	pid/sample ports			

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

AECOM

AECOM

Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics. **This meeting is a daily refresher, not a full orientation.** Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: Karen Mixon
Phone Number:

AECOM SH&E Rep. Name: Tim Gillie
Phone Number:

Meeting Leader: Anders Utter

Date: 11/18/21	Project Name/Location: QTA + T-30	Project Number:

Today's Scope of Work:

Bi-weekly atm ; weekly ofm

Muster Point Location:	First Aid Kit Location:	Fire Extinguisher Location:	Spill Kit Location:
Varies			

1. Required Topics

- [x] Fitness for Duty requirements, all sign in / sign out
- [x] Required training (incl. task specific) completed and current
- [x] SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
- [x] Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting
- [x] STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- [x] Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- [x] Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- [x] Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- [x] Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- [x] Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- [ ] Required checklists/records available, understood (describe):
- [ ] Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

Check ☑ as reviewed or mark ■ as not applicable

☑	☐	Biological/ Chemical / Electrical Hazards
☑	☐	Ergonomics - Lifting, Body Position
☑	☐	Lock Out/ Tag Out
		Short Service Employees - visual identifier and mentor/ oversight assignment
☑	☐	Simultaneous/ Neighbouring Operations
☑	☐	Slip/ Trip/ Fall Hazards
☐	☑	Specialized PPE Needs
☐	☑	Traffic Control
☐	☑	Waste Management/ Decontamination
☐	☑	Weather Hazards / Heat Stress / Cold Stress
☐	☑	Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
☐	☑	Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
☐	☐	Other Topics (describe/attach):
☐	☐	Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:
NA	NA

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	Signature	Date / Time (at end of day / shift)
Anders Utter	A Utter	Date 11/18/21 Time 1430

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
Anders Utter AECOM	A Utter	In & Fit 0900 AU	Out & Fit
Lucy Pantelieff AECOM	Lucy Pantelieff	In & Fit 9:12 LP	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

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 39946
Description MiniRAE 3000
Calibrated 11/16/2021 12:08:24PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-920831
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 57

Calibration Specifications

Group # 1
Group Name ISOBUTYLENE
Stated Accy Pct of Reading

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

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	100.00	100.00	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 100 PPM 304-402162466-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402162466-1		8/11/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Stethan Holmes

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

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

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date:

Equipment I.D. # 24052

Location	~~Time~~ Pressure	~~Pressure~~ Flow (PSI)	~~Flow~~ (SCFM)	Valve Position (% Open/Closed)	Notes
AS-1	3.0	7.0			
AS-2	0	6.5			water in manifold
AS-3	0	6.5			
AS-4	13	6.5			water in manifold
AS-5	4.0	7.0			
AS-6	4.2	6.0			
AS-7	2.0	7.0			
AS-8	2.4	6.5			
AS-9	1.8	6.5			
AS-10	2.8	7.0			
AS-11	2.8	7.5			
AS-12	3.2	7.0			
AS-13	3.4	6.5			
AS-14	3.2	6.0			
AS-15	2.8	7.0			Bouncing
AS-16	3.0	7.0			
AS-17	2.0	7.0			
AS-18	0	6.5			
AS-19	5.4	7.5			
AS-20	2.4	6.5			
AS-21	0	6.5			
AS-22	0	6.5			
AS-23	1.4	7.0			
AS-24	2.4	6.0			
AS-25	0	6.0			
AS-26	0	7.0			
AS-27	3.2	5.5			

Notes:

1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AECOM

PORT OF SEATTLE - TERMINAL 30

SVE/AS System Field Data Collection Form

Date:	11/23/21				
Watch Time:	~~1630~~ 1711	1630			
Screen Time:	~~1801~~				
SVE/AS System Location					
SVE Blower Speed (Hertz)	54.0				
SVE Blower Runtime (Hours)	7932.0				
SVE Blower Filter Differential Pressure (" H_2O)	0.5				
SVE Blower Inlet Differential Pressure (" H_2O)	2.0				
SVE Blower Inlet Temperature (°F)	50				
SVE Blower Inlet Vacuum (" H_2O)	-86				
SVE Blower Discharge Pressure (PSI)	0				
SVE Blower Discharge Temperature (°F)	109				
AS Blower Speed (Hertz)	52.0				
AS Blower Runtime (Hours)	3011.4				
AS Blower Pressure (PSI)	6.0				
AS Blower Flow (" H_2O)	0.1				
Sparge Zone 1 Operating Cycle - Open Interval(s)	open				
Sparge Zone 2 Operating Cycle - Open Interval(s)					
Sparge Zone 3 Operating Cycle - Open Interval(s)					
Sparge Zone 4 Operating Cycle - Open Interval(s)					
Sparge Zone 5 Operating Cycle - Open Interval(s)					
Heat Exchanger Runtime (Hours)	3010.7				
Heat Exchanger Discharge Temperature (°F)	60.0				
Transfer Pump Runtime (Hours)	1.9				
Transfer Pump Discharge Pressure (PSI)	0				
Moisture Separator Level (% Full)	3/4	dirty-hard	to tell		
Water Storage Tank Level (DTF, TD from MP; inches)	3.4' ~~DTF~~				
NOTES:					

Notes:

1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

AECOM

PORT OF SEATTLE - TERMINAL 30

SVE System Data

Date:	11/23/21					Design Parameters
Watch Time:	1430					
System Time:						
System Location						
SVE Discharge VOC (ppm)	87.5					<25
SVE Discharge LEL (%)	—					
Oxygen (%)	—					
SVE System Inlet Vacuum (" H_2O)	86					<10
SVE System Inlet ΔP (" H_2O)	2.0					
Oxidizer Discharge VOC (ppm)	0.9	condensate in line				75
HSVE-1 Vacuum (" H_2O)	16					
HSVE-1 Flow (SCFM)	80+					75
HSVE-2 Vacuum (" H_2O)	34					
HSVE-2 Flow (SCFM)	80					75
HSVE-3 Vacuum (" H_2O)	46					
HSVE-3 Flow (SCFM)	80					25
SVE-4 Vacuum (" H_2O)	90					
SVE-4 Flow (SCFM)	5	dirty				20
SVE-5 Vacuum (" H_2O)	20					
SVE-5 Flow (SCFM)	0					30
SVE-6 Vacuum (" H_2O)	88					
SVE-6 Flow (SCFM)	14					18~19
SVE-7 Vacuum (" H_2O)	100					
SVE-7 Flow (SCFM)	17					18~19
SVE-8 Vacuum (" H_2O)	88					
SVE-8 Flow (SCFM)	0					18~19
SVE-9 Vacuum (" H_2O)	96					
SVE-9 Flow (SCFM)	200					18~19
SVE-10 Vacuum (" H_2O)	100+					
SVE-10 Flow (SCFM)	20					18~19
Oxidizer Inlet Temp. (deg F)	—					
SVE Manifold Temp. (deg F)	—					
SVE Blower Hours	—					
NOTES:						

Notes:

1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

AECOM

PORT OF SEATTLE - TERMINAL 30

Oxidizer Field Data Collection Form

Date:	11/23/21				
Watch Time:	~~1630~~ 1711				
Screen Time:	1801				
Oxidizer System Location					
Inlet Temperature (°F)	~~680~~ 683				
Burner Chamber Temperature (°F)	~~678~~ 682				
Discharge Temperature (°F)	628				
Inlet Limit Controller Temperature (°F)	679				
Outlet Limit Controller Temperature (°F)	627				
Process Fan Valve Position (Open/Closed)	Open				
Dilution Valve Position (%)	0.0				
Combustion Valve Position (%)	11.1				
Process Blower Runtime (Hours)	14746				
Combustion Fan Runtime (Hours)	14747				
Burner Runtime (Hours)	14737				
Processing Vapors Runtime (Hours)	14724				
Panel Temperature (°F)	71				
Flame Signal (Volts)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)	0.0				
Propane Tank A Level (%)	87				
Propane Tank B Level (%)	75				
NOTES:					

Notes:

1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

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Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics. **This meeting is a daily refresher, not a full orientation.** Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: Kaleb Mixon	
Phone Number:	
AECOM SH&E Rep. Name: Tim Gilles	
Phone Number:	
Meeting Leader: Anders Utter	

Date: 11/23/21 | **Project Name/Location:** GE & T-30 | **Project Number:**

Today's Scope of Work:

GE Weekly OTM + VIMS T-30 weekly OTM

Muster Point Location:	First Aid Kit Location:	Fire Extinguisher Location:	Spill Kit Location:

1. Required Topics

- [x] Fitness for Duty requirements, all sign in / sign out
- [x] Required training (incl. task specific) completed and current
- [x] SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
- [x] Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting
- [x] STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- [x] Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- [x] Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- [x] Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- [x] Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- [x] Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- [ ] Required checklists/records available, understood (describe):
- [ ] Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

Check [x] as reviewed or mark [■] as not applicable

- [x] [■] Biological/ Chemical / Electrical Hazards
- [x] [ ] Ergonomics - Lifting, Body Position
- [x] [ ] Lock Out/ Tag Out
- [ ] [x] Short Service Employees - visual identifier and mentor/ oversight assignment
- [x] [ ] Simultaneous/ Neighbouring Operations
- [x] [ ] Slip/ Trip/ Fall Hazards
- [ ] [x] Specialized PPE Needs
- [ ] [x] Traffic Control
- [ ] [x] Waste Management/ Decontamination
- [ ] [x] Weather Hazards / Heat Stress / Cold Stress
- [ ] [x] Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- [ ] [x] Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- [ ] [ ] Other Topics (describe/attach):
- [ ] [ ] Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:
N/A	N/A

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	Signature	Date / Time (at end of day / shift)
Anders Utter	A Utter	11/23/21 1730

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your Initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
Anders Vitter AECOM	A Vitter	In & Fit 0700 AM	Out & Fit 1730 AM
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

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 24052
Description MIniRae 3000
Calibrated 11/19/2021 7:44:27PM

Manufacturer Rae Systems
Model Number MiniRAE 3000
Serial Number/ Lot Number 592-910634
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 41

Calibration Specifications

Group # 1
Group Name VOC
Stated Accy Pct of Reading

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

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	104.20	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 100 PPM 305-401882019-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	305-401882019-1		9/9/2024

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Jose Arroyo

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

FIELD ACTIVITY LOG

PROJECT T30 COMPLETED BY Lucy Pantaleoff

JOB NO. 60666994 APPROVED BY _____

DAY & DATE Wednesday 12/1/21 SHEET OF

FIELD ACTIVITY SUBJECT:
DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TIME	
1500	Arrive on site. Notified PK upon arrival
1510	Take readings at HIM, SVE Blower, and AS Blower
1530	Take oxider readings. Took photos b/c having hard time finding all readings Missed Run times on these
1540	Started ~~read~~ pressure and flow reading at AS wells.
1555	Started pressure and flow readings at SVE wells.
1610	Took ~~effluent~~ Discharge and Oxidizer discharge PID readings (Eff / Infl). Could not get bags to inflate. Took readings directly from tubing. Forgot pump
1635	Call w/ Paul. I had take level in Tank. Went back found tape measure and took level. Tried to measure bottom up. Later realized probably should measure top down. (Put in tape until hit water)
1700	Left site.
	Missed propane levels

VISITORS ON SITE:	CHANGES FROM PLANS OR IMPORTANT DECISIONS:
NA	NA
WEATHER CONDITIONS: Cloudy 55°	**IMPORTANT TELEPHONE CALLS:**
PERSONNEL ON SITE:	

PORT OF SEATTLE - TERMINAL 30

SVE/AS System Field Data Collection Form

Date:	12/1/21			
Watch Time:	1513			
Screen Time:				
SVE/AS System Location				
SVE Blower Speed (Hertz) *VFD* bottom	54.0			
SVE Blower Runtime (Hours)	8122.9			
AS Blower Speed (Hertz) *VFD* sparge blower	52.0			
AS Blower Runtime (Hours) *Sparge Blower*	3207.2			
Transfer Pump Runtime (Hours) *MS Pump*	2.0			
SVE Blower Filter Differential Pressure (" H_2O) *DPI-200*	0.5	above the one below		
SVE Blower Inlet Differential Pressure (" H_2O) *F1-200*	1.5	on gray box behind SVE Blower Enclosure	SVE well heads	
SVE Blower Inlet Temperature (°F) *T1-200*	55	around	back of SVE wells	
SVE Blower Inlet Vacuum (" H_2O) *V1-200*	85	to left of SVE well heads		
SVE Blower Discharge Pressure (PSI) *P1-400*	10	Right at PID reading		
SVE Blower Discharge Temperature (°F) *T1-400*	122	far side next to PID reading		
AS Blower Pressure (PSI) P1-501	5.6	other side inside		
AS Blower Flow (" H_2O) DP1-500	1	other side outside		
Sparge Zone 1 Operating Cycle - Open Interval(s)	Open			
Sparge Zone 2 Operating Cycle - Open Interval(s)				
Sparge Zone 3 Operating Cycle - Open Interval(s)				
Sparge Zone 4 Operating Cycle - Open Interval(s)				
Sparge Zone 5 Operating Cycle - Open Interval(s)				
Heat Exchanger Runtime (Hours) sparge	3201.5			
Heat Exchanger Discharge Temperature (°F) *T1-500* sparge	72			
Transfer Pump Discharge Pressure (PSI) *P1-300*	0	far side near PID reading		
Moisture Separator Level (% Full)	10%			
Water Storage Tank Level (DTF, TD from MP; inches)				
NOTES:				

Notes:

1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	12/1/21				
Watch Time:	15:31				
Screen Time:	~~01:32~~ 12:25				
Oxidizer System Location					
Inlet Temperature (°F)	668				
Burner Chamber Temperature (°F)	652				
Discharge Temperature (°F)	622				
Inlet Limit Controller Temperature (°F)	688	"chart recorder"			
Outlet Limit Controller Temperature (°F)	623		↓		
Process Fan Valve Position (Open/Closed)	~~open~~ Open				
Dilution Valve Position (%)	0.0				
Combustion Valve Position (%)	16.9%				
Process Blower Runtime (Hours)					
Combustion Fan Runtime (Hours)					
Burner Runtime (Hours)		missed these			
Processing Vapors Runtime (Hours)					
Panel Temperature (°F)					
Flame Signal (Volts)	5.0	"Flame Display"			
Burner Chamber Inlet Differential Pressure (" H_2O)					
Propane Tank A Level (%)		Missed these			
Propane Tank B Level (%)					
NOTES:	PI-1 = 0 Gas Inlet Pressure gauge Flow on to p=0 PI-2 = 0				

Notes:

1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

3:37

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 12/1/21 Equipment I.D. # PID 039946

	Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
5	AS-1	15:51	7.2	3.0		bouncing
	AS-2		6.5	8.4		broken?, wet, hard to see
	AS-3		6.5	0		water in flow
	AS-4		5.8	129		broken
	AS-5		7.0	3.8		bouncing 3.8-4
	AS-6		6.5	3.5		
1	AS-7	15:41	7.8	2.1		~~broken flow?~~
	AS-8		6.6	2.3		broken flow gauge?
	AS-9		6.4	1.6		
	AS-10		7.0	1.8		
	AS-11		7.5	2.5		broken flow
2	AS-12	15:44	7.0	2.8		
	AS-13		6.6	~~3.5~~ 3.3		
	AS-14		5.7	3.0		bouncy flow gauge
	AS-15		7.0	2.4		
	AS-16		7.0	1.0		bouncy flow
4	AS-17	15:48	7.0	1.0		bouncing 0-1
	AS-18		6.5	1.0		broken?
	AS-19		7.5	5.0		
	AS-20		6.5	2.3		
	AS-21		6.3	0		broken flow?
	AS-22		6.5	0		1
3	AS-23	15:46	6.7	0		broken flow gauge?
	AS-24		6.2	1.6		
	AS-25		6.1	1.5		broken flow?
	AS-26		7.0	0		broken flow?
	AS-27		5.5	2.8		

Notes:

1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:	2/11/21					Design Parameters
Watch Time:	15:55					
System Time:						
System Location						
SVE Discharge VOC (ppm) *PID*	19.4					
SVE Discharge LEL (%)						<25
Oxygen (%)						
SVE System Inlet Vacuum (" H_2O)						
SVE System Inlet ΔP (" H_2O)						
Oxidizer Discharge VOC (ppm) *PID*	~~70~~ 1.1					<10
7 HSVE-1 Vacuum (" H_2O)	16					
HSVE-1 Flow (SCFM)	82					75
HSVE-2 Vacuum (" H_2O)	33					
HSVE-2 Flow (SCFM)	79					75
HSVE-3 Vacuum (" H_2O)	46					
HSVE-3 Flow (SCFM)	80					75
SVE-4 Vacuum (" H_2O)	92	bounding Pressure 90-~~95~~94				
SVE-4 Flow (SCFM)	6					25
SVE-5 Vacuum (" H_2O)	19					
SVE-5 Flow (SCFM)	0					20
6 SVE-6 Vacuum (" H_2O)	85	bouncing 84-90				
SVE-6 Flow (SCFM)	9.4					30
2 SVE-7 Vacuum (" H_2O)	~~87~~96	bouncing? 96-100				
SVE-7 Flow (SCFM)	20	water bouncing 10-45				18~19
5 SVE-8 Vacuum (" H_2O)	86	bouncing 86-90				
SVE-8 Flow (SCFM)	<9.2					18~19
4 SVE-9 Vacuum (" H_2O)	96	bouncing 96-100				
SVE-9 Flow (SCFM)	<9.2	stuck, water				18~19
3 SVE-10 Vacuum (" H_2O)	>100					
SVE-10 Flow (SCFM)	20	bouncing 20-30				18~19
Oxidizer Inlet Temp. (deg F)						
SVE Manifold Temp. (deg F)						
SVE Blower Hours						
NOTES:						

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 12/10/21 Equipment I.D. # 23463

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-7		7.0	2.4		
AS-8		6.5	2.6		
AS-9		7.0	2.2		
AS-10		7.0	2.2		
AS-11		7.5	2.8		
AS-12		7.0	3.2		
AS-13		7.0	3.4		
AS-14		6.0	3.0		
AS-15		7.0	2.6		
AS-16		7.0	1.6		
AS-23		7.0	0.0		
AS-24		6.5	1.8		
AS-25		6.5	1.8		
AS-26		7.0	0.0		
AS-27		6.0	2.2		
AS-17		7.5	0.0		
AS-18		6.5	1.2		
AS-19		7.5	5.2		
AS-20		6.5	2.4		
AS-21		6.5	0.0		
AS-22		6.5	0.0		
AS-1		7.0	3.4		
AS-2		6.5	8.8		
AS-3		6.5	0.0		
AS-4		7.0	13.0		
AS-5		7.0	4.0		
AS-6		6.5	4.4		

Notes:

1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:				
Watch Time:				
Screen Time:				
SVE/AS System Location				
SVE Blower Speed (Hertz) *VFD*	54.0			
SVE Blower Runtime (Hours)	8337.3			
Transfer Pump Runtime (Hours) *MS Pump*	2.2			
Sparge Blower Speed (Hertz) *VFD*	52.0			
AS Blower Runtime (Hours) *Sparge Blower*	3417.3			
Sparge Heat Exchanger Runtime (Hours)	3416.6			
Sparge Heat Exchanger Discharge Temperature (°F) *TI-500*	59			
AS Blower Pressure (PSI) PI-501	6.0			
AS Blower Flow (" H_2O) DPI-500	0.2			
SVE Blower Inlet Temperature (°F) *TI-200*	50			
SVE Blower Inlet Vacuum (" H_20) *VI-200*	86			
SVE Blower Filter Differential Pressure (" H_20) *DPI-200*	0.1			
SVE Blower Inlet Differential Pressure (" H_20) *FI-200*	1.5			
Transfer Pump Discharge Pressure (PSI) *PI-300*	0			
SVE Blower Discharge Pressure (PSI) *PI-400*	0			
SVE Blower Discharge Temperature (°F) *TI-400*	102			
Sparge Zone 1 Operating Cycle - Open Interval(s)	open			
Sparge Zone 2 Operating Cycle - Open Interval(s)				
Sparge Zone 3 Operating Cycle - Open Interval(s)				
Sparge Zone 4 Operating Cycle - Open Interval(s)				
Sparge Zone 5 Operating Cycle - Open Interval(s)				
Moisture Separator Level (% Full)	75 clo	dirty can't read		
Water Storage Tank Level (DTF, TD from MP; inches)	3'	at float warning		
NOTES:				

Notes:

1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent
5. DTF - Depth to Fluid, TD - Total Depth, MP - Measuring Point

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE System Data

Date:	12/10/21					Design Parameters
Watch Time:	1415					
System Time:						
System Location						
SVE Discharge VOC (ppm) *PID*	399.4					
SVE Discharge LEL (%)	—					<25
Oxygen (%)	—					
SVE System Inlet Vacuum (" H_2O)	—					
SVE System Inlet ΔP (" H_2O)	—					
Oxidizer Discharge VOC (ppm) *PID*	0.0					<10
HSVE-2 Vacuum (" H_2O)	32					
HSVE-2 Flow (SCFM)	86					75
HSVE-3 Vacuum (" H_2O)	44					
HSVE-3 Flow (SCFM)	86					75
SVE-4 Vacuum (" H_2O)	90					
SVE-4 Flow (SCFM)	0					25
SVE-5 Vacuum (" H_2O)	16					
SVE-5 Flow (SCFM)	0					20
SVE-7 Vacuum (" H_2O)	100+					
SVE-7 Flow (SCFM)	20					18~19
SVE-10 Vacuum (" H_2O)	100+					
SVE-10 Flow (SCFM)	20					18~19
SVE-9 Vacuum (" H_2O)	96					
SVE-9 Flow (SCFM)	0					18~19
SVE-8 Vacuum (" H_2O)	86					
SVE-8 Flow (SCFM)	0					18~19
SVE-6 Vacuum (" H_2O)	84					
SVE-6 Flow (SCFM)	10					30
HSVE-1 Vacuum (" H_2O)	16					
HSVE-1 Flow (SCFM)	84					75
Oxidizer Inlet Temp. (deg F)	—					
SVE Manifold Temp. (deg F)	—					
SVE Blower Hours	—					
NOTES:						

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

AECOM

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:					
Watch Time:					
Screen Time:					
Oxidizer System Location					
Inlet Temperature (°F)	675				
Burner Chamber Temperature (°F)	676				
Outlet Temperature (°F)	618				
Inlet Limit Controller Temperature (°F)	674				
Outlet Limit Controller Temperature (°F)	618				
Process Fan Valve Position (Open/Closed)	OPEN				
Dilution Valve Position (%)	0.0				
Combustion Valve Position (%)	14.6				
Process Blower Runtime (Hours)	15152				
Combustion Fan Runtime (Hours)	15153				
Burner Runtime (Hours)	15143				
Processing Vapors Runtime (Hours)	15130				
Panel Temperature (°F)	66				
Flame Signal (Volts)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)	0.0				
Propane Tank A Level (%)	70				
Propane Tank B Level (%)	65				
NOTES:					

Notes:

1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

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 23463
Description MiniRAE 3000
Calibrated 12/8/2021 12:15:53PM

Manufacturer	Rae Systems	**State Certified**	
Model Number	MiniRAE 3000	**Status**	Pass
Serial Number/ Lot Number	592-910325	**Temp °C**	15
Location	Seattle	**Humidity %**	50
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	100.2	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 100 PPM 304-402162466-1	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	304-402162466-1		8/11/2025

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Stethan Holmes

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

FIELD ACTIVITY LOG

PROJECT T-30 COMPLETED BY _____

JOB NO. _____ APPROVED BY _____

DAY & DATE 12/17/21 Friday SHEET 1 OF 1

FIELD ACTIVITY SUBJECT:
DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TIME	
13:40	Arrived on Site
14:48	HMI Readings
15:00	Oxidizer Readings
15:17	SVE Well readings, PIDs for Eff & Inf
15:35	AS well readings
15:40	Measure depth to fluid in Tank
16:15	Leave site to take equip back to office

VISITORS ON SITE:	CHANGES FROM PLANS OR IMPORTANT DECISIONS:
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
PERSONNEL ON SITE:	

SVE System Data

Date:	12/17/24						
Watch Time:	15:17						
System Time:							
System Location	PID 32876						Design Parameters
SVE Discharge VOC (ppm) *PID*	~~40~~ 942.5						
SVE Discharge LEL (%)							<25
Oxygen (%)							
SVE System Inlet Vacuum (" H_2O)							
SVE System Inlet ΔP (" H_2O)							
Oxidizer Discharge VOC (ppm) *PID*	0.6						<10
HSVE-2 Vacuum (" H_2O)	34						
HSVE-2 Flow (SCFM)	81						75
HSVE-3 Vacuum (" H_2O)	~~3~~ 45						
HSVE-3 Flow (SCFM)	82						75
SVE-4 Vacuum (" H_2O)	92	bouncing between 88-92					
SVE-4 Flow (SCFM)	9.6	dirty bouncing			0		25
SVE-5 Vacuum (" H_2O)	20						
SVE-5 Flow (SCFM)	0						20
SVE-7 Vacuum (" H_2O)	98	98 - >100					
SVE-7 Flow (SCFM)	20	0 - 20		water			18~19
SVE-10 Vacuum (" H_2O)	>100						
SVE-10 Flow (SCFM)	25	0~25					18~19
SVE-9 Vacuum (" H_2O)	100						
SVE-9 Flow (SCFM)	0						18~19
SVE-8 Vacuum (" H_2O)	92						
SVE-8 Flow (SCFM)	0	water					18~19
SVE-6 Vacuum (" H_2O)	84	84 - 90					
SVE-6 Flow (SCFM)	~~0.0~~ 11	water					30
HSVE-1 Vacuum (" H_2O)	16						
HSVE-1 Flow (SCFM)	84						75
Oxidizer Inlet Temp. (deg F)							
SVE Manifold Temp. (deg F)							
SVE Blower Hours							
NOTES:							

Notes:
1. ppm = Parts per Million
2. % = Percent
3. " H_2O = Inches of Water
4. SCFM = Standard Cubic Feet per Minute
5. deg F - degrees Fahrenheit

AECOM

PORT OF SEATTLE - TERMINAL 30
AS Well Field Data Collection Form

Date: 12/17/21 Equipment I.D. # 32876

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Notes
AS-7	1535	7.0	1.6		
AS-8		7.0	3.0		
AS-9		7.0	1.6		
AS-10		7.5	3.8		
AS-11		8.0	2.6		
AS-12	1536	7.5	2.6		
AS-13		7.0	3.2		
AS-14		6.0	2.8		
AS-15		7.5	2.2		to between 2.0-2.4
AS-16		~~6.5~~ 7.5	2.0		
AS-23	1538	7.0	0		
AS-24		6.5	2.4		
AS-25		6.5	1.4		
AS-26		7.5	0		
AS-27		6.0	1.2		
AS-17	1538	7.5	0		
AS-18		7.0	0		
AS-19		8.0	5.2		
AS-20		7.0	2.0		
AS-21		7.0	0		
AS-22		7.0	1.2		
AS-1	1539	7.5	2.6		
AS-2		7.0	8.5		
AS-3		7.0	0		water & particles
AS-4		7.0	13		
AS-5		6.5	3.6		3.4-3.6
AS-6		7.0	3.6		3.4-3.6

Notes:
1. " H_2O = Inches of Water
2. SCFM = Standard Cubic Feet per Minute
3. PSI = Pounds per Square Inch

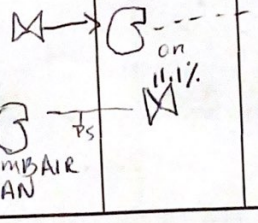
AECOM

PORT OF SEATTLE - TERMINAL 30
Oxidizer Field Data Collection Form

Date:	12/17/21				
Watch Time:	1500				
Screen Time:	1551				
Oxidizer System Location					
Inlet Temperature (°F)	678				
Burner Chamber Temperature (°F)	676				
Outlet Temperature (°F)	624				
Inlet Limit Controller Temperature (°F)	675				
Outlet Limit Controller Temperature (°F)	624				
Process Fan Valve Position (Open/Closed)	open				
Dilution Valve Position (%)	0				
Combustion Valve Position (%)	11.1				
Process Blower Runtime (Hours)	15315				
Combustion Fan Runtime (Hours)	15316				
Burner Runtime (Hours)	15306				
Processing Vapors Runtime (Hours)	15293				
Panel Temperature (°F)	66F				
Flame Signal (Volts)	5.0				
Burner Chamber Inlet Differential Pressure (" H_2O)					
Propane Tank A Level (%)	40				
Propane Tank B Level (%)	45				

Flow on top of fans
PI 1 = 0.5
PI 2 = 0

NOTES:



Notes:
1. °F = Degrees Fahrenheit
2. % = Percent
3. " H_2O = Inches of Water

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

Date:	12/17/24			
Watch Time:	1448			
Screen Time:	—			
SVE/AS System Location				
SVE Blower Speed (Hertz) *VFD*	54.0			
SVE Blower Runtime (Hours)	8499.7			
Transfer Pump Runtime (Hours) *MS Pump*	2.4			
Sparge Blower Speed (Hertz) *VFD*	52.0			
AS Blower Runtime (Hours) *Sparge Blower*	3580.6			
Sparge Heat Exchanger Runtime (Hours)	3579.8			
Sparge Heat Exchanger Discharge Temperature (°F) *TI-500*	61			
AS Blower Pressure (PSI) PI-501	6.0			
AS Blower Flow (" H_2O) DPI-500	1.0			
SVE Blower Inlet Temperature (°F) *TI-200*	<50			
SVE Blower Inlet Vacuum (" H_20) *VI-200*	88			
SVE Blower Filter Differential Pressure (" H_20) *DPI-200*	0.5			
SVE Blower Inlet Differential Pressure (" H_20) *FI-200*	1.5			
Transfer Pump Discharge Pressure (PSI) *PI-300*	0			
SVE Blower Discharge Pressure (PSI) *PI-400*	0			
SVE Blower Discharge Temperature (°F) *TI-400*	106			
Sparge Zone 1 Operating Cycle - Open Interval(s)				
Sparge Zone 2 Operating Cycle - Open Interval(s)				
Sparge Zone 3 Operating Cycle - Open Interval(s)				
Sparge Zone 4 Operating Cycle - Open Interval(s)				
Sparge Zone 5 Operating Cycle - Open Interval(s)				
Moisture Separator Level (% Full)				
Water Storage Tank Level (DTF, TD from MP; inches)	~~6.5~~ DTF=6.5ft			
NOTES:				

Notes:

1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent
5. DTF - Depth to Fluid, TD - Total Depth, MP - Measuring Point

AECOM

PORT OF SEATTLE - TERMINAL 30
SVE/AS System Field Data Collection Form

	Date: 12/22/21		
	Watch Time: 1215		
	Screen Time:		
SVE/AS System Location			
SVE Blower Speed (Hertz) *VFD*	54.0	Sparge Blower Speed (Hertz) *VFD*	52.0
SVE Blower Runtime (Hours)	8616.9	AS Blower Runtime (Hours) *Sparge Blower*	36984
Transfer Pump Runtime (Hours) *MS Pump*	2.5	Sparge Heat Exchanger Runtime (Hours)	3697.6
Sparge Heat Exchanger Discharge Temperature (°F) *TI-500*	66	Transfer Pump Discharge Pressure (PSI) *PI-300*	0.0
AS Blower Pressure (PSI) *PI-501*	5.5	SVE Blower Discharge Pressure (PSI) *PI-400*	0.0
AS Blower Flow (" H2O) *DPI-500*	0.1	SVE Blower Discharge Temperature (°F) *TI-400*	110
SVE Blower Inlet Temperature (°F) *TI-200*	50	Sparge Zone 1 Operating Cycle Open Interval(s)	open
SVE Blower Inlet Vacuum (" H_2O) *VI-200*	-90	Sparge Zone 2 Operating Cycle Open Interval(s)	
SVE Blower Filter Differential Pressure (" H_2O) *DPI-200*	0.5	Sparge Zone 3 Operating Cycle Open Interval(s)	
SVE Blower Inlet Differential Pressure (" H_2O) *FI-200*	1.5	Sparge Zone 4 Operating Cycle Open Interval(s)	
		Sparge Zone 5 Operating Cycle Open Interval(s)	
Oxidizer System Location			
Inlet Temperature (°F)	668	Process Blower Runtime (Hours)	15433
Burner Chamber Temperature (°F)	682	Combustion Fan Runtime (Hours)	15433
Outlet Temperature (°F)	628	Burner Runtime (Hours)	15423
Inlet Limit Controller Temperature (°F)	670	Processing Vapors Runtime (Hours)	15410
Outlet Limit Controller Temperature (°F)	625	Panel Temperature (oF)	73
Process Fan Valve Position (Open/Closed)	open	Flame Signal (Volts)	5.0
Dilution Valve Position (%)	0.0	Burner Chamber Inlet Differential Pressure (" H2O)	0.0
Combustion Valve Position (%)	8.1		
Moisture Separator Level (% Full)	75	Propane Tank A Level (%)	25
Water Storage Tank Level (DTF, TD from MP; inches)	23 DTW	Propane Tank B Level (%)	20
NOTES:	1.3 to low float 2.7 to high float		

Abbreviations:

1. " H_2O = Inches of Water
2. °F = Degrees Fahrenheit
3. PSI = Pounds per Square Inch
4. % = Percent
5. DTF - Depth to Fluid, TD - Total Depth, MP - Measuring Point

AECOM

PORT OF SEATTLE - TERMINAL 30

Field Tech: AU	Date: 12/22/21	Equipment I.D. #: 733746
SVE Discharge VOC (ppm) *PID*	55.3	
SVE Discharge LEL (%) —		
Oxygen (%) —		
SVE System Inlet Vacuum (" H_2O) —		
SVE System Inlet ΔP (" H_2O) —		
Oxidizer Discharge VOC (ppm) *PID*	0.7	

SVE Wells

Location	Time	Vacuum ("H2O)	Flow (SCFM)	Valve Position (% Open/Closed)	Location	Time	Vacuum ("H2O)	Flow (SCFM)	Valve Position (% Open/Closed)
HSVE-2		36	80	open	HSVE-10		100	15	open
HSVE-3		46	80		HSVE-9		100	0	
HSVE-4		94	0		HSVE-8		96	0	
HSVE-5		20	0		HSVE-6		90	10	
HSVE-7		100	20		HSVE-10		16	80	

AS Wells

Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)	Location	Time	Pressure (PSI)	Flow (SCFM)	Valve Position (% Open/Closed)
AS-7		6	2.4	open	AS-17		7.0	1.4	open
AS-8		6	3		AS-18		6.0	0	
AS-9		6	0		AS-19		7.0	5.2	
AS-10		6.5	1.8		AS-20		6.0	2.0	
AS-11		7	2.8		AS-21		6.0	0	
AS-12		7	3.0		AS-22		6.0	0	
AS-13		6.5	3.2		AS-1		7.0	3.2	
AS-14		5	3.0		AS-2		6.5	8.6	
AS-15		6.5	2.6		AS-3		6.5	0	
AS-16		6.5	1.8		AS-4		6.0	13	
AS-23		6.5	0		AS-5		7.0	3.8	
AS-24		6.0	0		AS-6		6.0	36	
AS-25		6.0	1.6		Notes:				
AS-26		6.5	0						
AS-27		5.0	0						

Abbreviations:

ppm = Parts per Million
% = Percent
deg F - degrees Fahrenheit

" H_2O = Inches of Water
SCFM = Standard Cubic Feet per Minute
PSI = Pounds per Square Inch

AECOM

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Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics. **This meeting is a daily refresher, not a full orientation**. Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: Loren Mixon
Phone Number:

AECOM SH&E Rep. Name: Tim Gilles
Phone Number:

Meeting Leader: A. Utter

Date: 12/22/21	Project Name/Location: GE + T-30	Project Number:

Today's Scope of Work:

Muster Point Location:	First Aid Kit Location:	Fire Extinguisher Location:	Spill Kit Location:
Mckinley / T-30 entrance	Lock box / Site	Lock Box / Site	N/A

1. Required Topics

- [x] Fitness for Duty requirements, all sign in / sign out
- [x] Required training (incl. task specific) completed and current
- [x] SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
- [x] Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting
- [x] STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- [x] Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- [x] Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- [x] Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- [x] Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- [x] Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- [ ] Required checklists/records available, understood (describe):
- [ ] Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

Check [x] as reviewed or mark [■] as not applicable

- [x] [ ] Biological/ Chemical / Electrical Hazards
- [x] [ ] Ergonomics - Lifting, Body Position
- [ ] [x] Lock Out/ Tag Out
- Short Service Employees - visual identifier and mentor/ oversight assignment
- [x] [ ] Simultaneous/ Neighbouring Operations
- [x] [ ] Slip/ Trip/ Fall Hazards
- [ ] [x] Specialized PPE Needs
- [ ] [x] Traffic Control
- [ ] [x] Waste Management/ Decontamination
- [ ] [x] Weather Hazards / Heat Stress / Cold Stress
- [ ] [x] Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- [ ] [x] Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- [ ] [ ] Other Topics (describe/attach):
- [ ] [ ] Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:
N/A	N/A

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	Signature	Date / Time (at end of day / shift)
Anders Utter	A Utter	12/22/21 1345

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

AECOM

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
Anders Utter AECOM	A Utter	In & Fit 1215 AU	Out & Fit 1345 AU
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

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 39946
Description MiniRAE 3000
Calibrated 12/20/2021 1:01:41PM

Manufacturer Rae Systems
Model Number PGM7320
Serial Number/ Lot Number 592-920831
Location Seattle
Department

State Certified
Status Pass
Temp °C 14
Humidity % 46

Calibration Specifications

Group # 1
Group Name ISOBUTYLENE
Stated Accy Pct of Reading

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

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.00 / 100.00	PPM	100.00	PPM	100.00	100.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date
SEA ISO 100 PPM 3054018408231	Isobutylene (C4H8) 100 PPM	Airgas	x02ai99cp342066	305-401840823 -1	8/10/2024

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Stethan Holmes

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

NOTE: Vapor sampling field forms for the sampling events on 9/30/21, 10/21/21, 11/18/21, and 12/22/21 are not included. However, sampling was completed in accordance with OMMP Section 6.2.

CRETE CONSULTING, INC.

Vapor Sampling - Field Form								
Project	Port of Seattle, Terminal 30							
Sampler	R. Jones							
Date and Start Time	1.12.2021							
Date and End Time	1.12.2021							
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	29.70							
Sample Port Type	Dedicated							
Leak Detection Method	NA							
Location ID	DISCHARGE-011221							
Surface Conditions	Raining, overcast, cool							
Sample Canister LAB ID	3257		Flow Controller LAB ID	111		Sample Canister Size	29-MC1LV 1 L	
Start Sample Time	0915	Start Pressure (" Hg)	29.5	End Sample Time	0924	End Pressure (" Hg)	1-1.5	
Analysis								
Purging Volumes and Purge Time								
Purge Vol (ml)	NA	Purge Rate (ml/min)	Open Valve	Time Required	Pump on RKI			
Leak Testing								
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	NA							
Sample Collection Notes/General Observations								
PID (PPM)	≤2.1,	RKI						
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)								
Start Time	NA		End Time					
Start Pressure (" Hg)			End Pressure (" Hg)					

CRETE CONSULTING, INC.

Soil Vapor Sampling - Field Form									
Project	Port of Seattle, Terminal 30								
Sampler	R. Jones								
Date and Start Time	1.12.2024 ~0935								
Date and End Time	1.12.2024 ~1000								
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	27.75								
Sample Port Type	Dedicated								
Leak Detection Method	NA								
Location ID	INLET-011221								
Surface Conditions	Raining, cool, overcast								
Sample Canister LAB ID	2434		Flow Controller LAB ID	02			Sample Canister Size	1L	
Start Sample Time	0942	Start Pressure (" Hg)	29	End Sample Time	0957		End Pressure (" Hg)	1-1.5	
Analysis									
Purging Volumes and Purge Time									
Purge Vol (ml)	N/A		Purge Rate (ml/min)	Open Valve		Time Required	Pump on RKI		
Leak Testing									
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A								
Sample Collection Notes/General Observations									
PID (PPM)	88.5	RKI @	~0940						
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)									
Start Time	NA			End Time					
Start Pressure (" Hg)				End Pressure (" Hg)					

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle, Terminal 30						
Sampler	R. Jones (Crete)						
Date and Start Time	2.17.2021 1325						
Date and End Time	2.17.2021 1339						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.40						
Sample Port Type	DEDICATED						
Leak Detection Method	N/A						
Location ID	DISCHARGE-021721						
Surface Conditions	Sunny, 40-50s°F, ~~Pa~~ No rain						
Sample Canister LAB ID	2436		Flow Controller LAB ID	102		Sample Canister Size	Silonite 1L MiniCan
Start Sample Time	1329	Start Pressure (" Hg)	30+	End Sample Time	1338	End Pressure (" Hg)	2
Analysis							
Purging Volumes and Purge Time							
Purge Vol (ml)	N/A	Purge Rate (ml/min)		Time Required			
Leak Testing							
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A						
Sample Collection Notes/General Observations							
PID (PPM)	0.7-3.0 ppm @ 1310						
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)							
Start Time		End Time					
Start Pressure (" Hg)		End Pressure (" Hg)					

CRETE CONSULTING, INC.

Vapor Sampling - Field Form									
Project	Port of Seattle, Terminal 30								
Sampler	R. Jones (Crete)								
Date and Start Time	02.17.2021 1339								
Date and End Time	02.17.2021 1352								
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.40								
Sample Port Type	DEDICATED								
Leak Detection Method	N/A								
Location ID	INLET-021721								
Surface Conditions	Mostly Sunny, 40-50s °F								
Sample Canister LAB ID	3341		Flow Controller LAB ID	35			Sample Canister Size	Silonite 1L MiniCan	
Start Sample Time	1341	Start Pressure (" Hg)	29.5	End Sample Time	1350		End Pressure (" Hg)	2	
Analysis									
Purging Volumes and Purge Time									
Purge Vol (ml)	N/A		Purge Rate (ml/min)				Time Required		
Leak Testing									
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A								
Sample Collection Notes/General Observations									
PID (PPM)	52.4	@ 1313							
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)									
Start Time	N/A			End Time					
Start Pressure (" Hg)				End Pressure (" Hg)					

2/17/2021 O&M + Gas Sampling

FIELD ENVIRONMENTAL INSTRUMENTS, INC.
www.fieldenvironmental.com

301 Brushton Avenue
Suite A
Pittsburgh PA 15221
800-393-4009 Toll Free
(412) 436-2600 Local
(412) 436-2616 Fax

RKI Multi-Gas Detector Calibration Certificate

			Reading %	Acceptable Range
Fresh Air Oxygen			18.0	(17.5% - 18.5%)

	Lot #	Expiration	Reading ppm	Acceptable Range
Cal Gas H2S	20-7690	12/03/22	10	(9 - 11)
Cal Gas CO	20-7690	12/03/22	50	(48 - 52)

	Lot #	Expiration	Reading %	Acceptable Range
Cal Gas Ch4 % LEL	20-7690	12/03/22	50	(48 - 52)
Cal Gas Ch4 %Vol				
Cal Gas				
Cal Gas VOC	20-7553	09/16/24	100	(98 - 102)

Model	GX6000
S/N	
Barcode	U90369X
Order #	449273

Pump Flow	506	(450 - 550)

Calibrated By: 0

Date of Calibration: 2/15/21 CD

All calibrations performed by FEI conform to manufacturer's specifications. Please report any issues within 24 hours of receiving equipment.
All calibration gas used is traceable to NIST. Additional documentation is available upon request.

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle, Terminal 30						
Sampler	R. Jones (crete)						
Date and Start Time	~~2.17.2021~~ 3.23.2021 1530						
Date and End Time	3.23.2021 1545						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.50" Hg (watch)						
Sample Port Type	DEDICATED						
Leak Detection Method	N/A						
Location ID	DISCHARGE-032321						
Surface Conditions	Mostly sunny, no precipitation, >50°F						
Sample Canister LAB ID	2296		Flow Controller LAB ID	# 07		Sample Canister Size	Silonite 1 Liter Minican
Start Sample Time	1534	Start Pressure (" Hg)	29.5	End Sample Time	1543	End Pressure (" Hg)	1
Analysis	~~TO15~~ BTEXN, APH						
Purging Volumes and Purge Time							
Purge Vol (ml)	N/A		Purge Rate (ml/min)		Time Required		
Leak Testing							
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A						
Sample Collection Notes/General Observations							
PID (PPM)	~1.5 a few minutes prior w/ RKI						
~~CH_4 (ppm RF~~							
CH_4 0%, 0.0 ppm H_2S							
CO_2 0 to 30 ppm, O_2 ≥ 16.7%							
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)							
Start Time			End Time				
Start Pressure (" Hg)			End Pressure (" Hg)				

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle, Terminal 30						
Sampler	K. Jones (Crete)						
Date and Start Time	3.23.2021 1550						
Date and End Time	3.23.2021 1605						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.45 (wrist-watch)						
Sample Port Type	DEDICATED						
Leak Detection Method	N/A						
Location ID	INLET-032321						
Surface Conditions	Mostly sunny, no precipitation, breezy, ~50°F						
Sample Canister LAB ID	3673		Flow Controller LAB ID	#109		Sample Canister Size	Silonite 1 Liter MiniCan
Start Sample Time	1555	Start Pressure (" Hg)	29.5	End Sample Time	1601	End Pressure (" Hg)	1
Analysis	BTEX (TO15), APH						
Purging Volumes and Purge Time							
Purge Vol (ml)	N/A		Purge Rate (ml/min)		Time Required		
Leak Testing							
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A						
Sample Collection Notes/General Observations							
PID (PPM)	128.8						
CH_4 (%)	0 %						
H_2S (ppm)	1-1.5						
O_2 (%)	16.7-19.2%						
CO_2 (ppm)	0-1 (up to ~~30~~ max.)						
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)							
Start Time			End Time				
Start Pressure (" Hg)			End Pressure (" Hg)				

As measured w/ RKI a few minutes prior

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Soil Vapor Sampling - Field Form								
Project	Port of Seattle, Terminal 30							
Sampler	R. Jones							
Date and Start Time	4.19.2021 1521							
Date and End Time	4.19.2021 (1533)							
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.20 (watch)							
Sample Port Type	Dedicated							
Leak Detection Method	N/A							
Location ID	INLET-041921 (Oxidizer Inlet / SVE discharge to Oxidizer)							
Surface Conditions	Sunny, low 80sF							
Sample Canister LAB ID	3344		Flow Controller LAB ID	117		Sample Canister Size	Silonite 1L MiniCan	
Start Sample Time	1523	Start Pressure (" Hg)	>30	End Sample Time	1531	End Pressure (" Hg)	1.5	
Analysis								

Purging Volumes and Purge Time					
Purge Vol (ml)	N/A	Purge Rate (ml/min)		Time Required	

Leak Testing	
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A

Sample Collection Notes/General Observations									
PID (PPM)	83.2	w	RKI @ 1515						

Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)			
Start Time		End Time	
Start Pressure (" Hg)		End Pressure (" Hg)	

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle, Terminal 30						
Sampler	R. Jones						
Date and Start Time	4.19.2021 1505						
Date and End Time	4.19.2021 ~~1522~~ 1521						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.20 (watch)						
Sample Port Type	Dedicated						
Leak Detection Method	N/A						
Location ID	DISCHARGE-041921 (oxidizer discharge)						
Surface Conditions	Sunny, ~70-80s F (low 80s F)						
Sample Canister LAB ID	3416		Flow Controller LAB ID	#35		Sample Canister Size	Silonite 1L PN 29-NC1LQT
Start Sample Time	1509	Start Pressure (" Hg)	29	End Sample Time	1520	End Pressure (" Hg)	1
Analysis							
Purging Volumes and Purge Time							
Purge Vol (ml)	N/A	Purge Rate (ml/min)		Time Required			
Leak Testing							
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A						
Sample Collection Notes/General Observations							
PID (PPM)	0.1 @ ~1500	w/ RKI					
Max (PPM)	3.3 max (peak)						
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)							
Start Time			End Time				
Start Pressure (" Hg)			End Pressure (" Hg)				

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle, Terminal 30						
Sampler	Rusty Jones (CRETE)						
Date and Start Time	5/20/2021 ~0915						
Date and End Time	5/20/2021 ~0930						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.10 in Hg per watch						
Sample Port Type	~~dedicated, for RS~~ dedicated sample port, new tubing						
Leak Detection Method	N/A						
Location ID	DISCHARGE-052021						
Surface Conditions	Partly sunny, ~60s F, very light rain previously						
Sample Canister LAB ID	3540		Flow Controller LAB ID	# 03		Sample Canister Size	1 liter PN 29-MC1LGT
Start Sample Time	0918	Start Pressure (" Hg)	29	End Sample Time	0926	End Pressure (" Hg)	1
Analysis							
Purging Volumes and Purge Time							
Purge Vol (ml)	—	Purge Rate (ml/min)	—	Time Required	—		
Leak Testing							
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A						
Sample Collection Notes/General Observations							
PID (PPM)	1.4 per RKI (O&M notes)						
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)							
Start Time	N/A	End Time	N/A				
Start Pressure (" Hg)	N/A	End Pressure (" Hg)	N/A				

CRETE CONSULTING, INC.

Vapor Sampling - Field Form								
Project	Port of Seattle, Terminal 30							
Sampler	Rusty Jones (CRETE)							
Date and Start Time	5/20/2021 ~0935							
Date and End Time	5/20/2021 ~1000							
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.15 inHg per Watch							
Sample Port Type	dedicated sample port, new tubing							
Leak Detection Method	N/A							
Location ID	INLET-052021							
Surface Conditions	Partly cloudy, 50-60s F, very light rain earlier today							
Sample Canister LAB ID	3230		Flow Controller LAB ID	#12		Sample Canister Size	1-liter PN 29-MC1LQT	
Start Sample Time	0940	Start Pressure (" Hg)	29.5	End Sample Time	0957	End Pressure (" Hg)	2	
Analysis								
Purging Volumes and Purge Time								
Purge Vol (ml)		Purge Rate (ml/min)		Time Required				
Leak Testing								
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	N/A							
Sample Collection Notes/General Observations								
PID (PPM)	72.9 per RKI prior							
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)								
Start Time	N/A		End Time	N/A				
Start Pressure (" Hg)	N/A		End Pressure (" Hg)	N/A				

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle, Terminal 30						
Sampler	R. Jones						
Date and Start Time	6.16.2021 1000						
Date and End Time	6.16.2021 1015						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)							
Sample Port Type	DEDICATED						
Leak Detection Method	N/A						
Location ID	INLET – 061621						
Surface Conditions	Sunny, no rain | dry						
Sample Canister LAB ID	8535		Flow Controller LAB ID	304		Sample Canister Size	Silonite 1L MiniCan
Start Sample Time	1007	Start Pressure (" Hg)	30	End Sample Time	1017	End Pressure (" Hg)	1
Analysis							
Purging Volumes and Purge Time							
Purge Vol (ml)		Purge Rate (ml/min)		Time Required			
Leak Testing							
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]							
Sample Collection Notes/General Observations							
PID (PPM)	133.3	w/ PID @ 0935					
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)							
Start Time			End Time				
Start Pressure (" Hg)			End Pressure (" Hg)				

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle, Terminal 30						
Sampler	R. Jones						
Date and Start Time	6.16.2021 0945						
Date and End Time	6.16.2021 1000						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.40						
Sample Port Type	DEDICATED						
Leak Detection Method	N/A						
Location ID	DISCHARGE - 061621						
Surface Conditions	Sunny, dry						
Sample Canister LAB ID	8532		Flow Controller LAB ID	242		Sample Canister Size	Silonite 1L Minican
Start Sample Time	0949	Start Pressure (" Hg)	30	End Sample Time	0957	End Pressure (" Hg)	0
Analysis							
Purging Volumes and Purge Time							
Purge Vol (ml)		Purge Rate (ml/min)		Time Required			
Leak Testing							
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]							
Sample Collection Notes/General Observations							
PID (PPM)	1.9 per PID @ 0920						
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)							
Start Time			End Time				
Start Pressure (" Hg)			End Pressure (" Hg)				

CRETE CONSULTING, INC.

Vapor Sampling - Field Form									
Project	Port of Seattle, Terminal 30								
Sampler	R. Jones								
Date and Start Time	7.19.2021 ~~1423~~ RS 1420								
Date and End Time	7.19.2021 ~~1434~~ RS 1435								
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)									
Sample Port Type	DEDICATED								
Leak Detection Method	N/A								
Location ID	DISCHARGE-071921								
Surface Conditions									
Sample Canister LAB ID	8531		Flow Controller LAB ID	256			Sample Canister Size	Silonite 1L MiniCan PN 29-M1-OLSV	
Start Sample Time	1423	Start Pressure (" Hg)	29+	End Sample Time	1434		End Pressure (" Hg)	2	
Analysis									
Purging Volumes and Purge Time									
Purge Vol (ml)		Purge Rate (ml/min)		Time Required					
Leak Testing									
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]									
Sample Collection Notes/General Observations									
PID (PPM)									
Canister cool to touch (not warm)									
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)									
Start Time			End Time						
Start Pressure (" Hg)			End Pressure (" Hg)						

CRETE CONSULTING, INC.

Vapor Sampling - Field Form									
Project	Port of Seattle, Terminal 30								
Sampler	R Jones								
Date and Start Time	7.19.2021 1435								
Date and End Time	7.19.2021 1445								
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)									
Sample Port Type	DEDICATED								
Leak Detection Method	N/A								
Location ID	INLET-071921								
Surface Conditions									
Sample Canister LAB ID	8535		Flow Controller LAB ID	302			Sample Canister Size	Silonite 1L MiniCan PN-MC10LSV	
Start Sample Time	1437	Start Pressure (" Hg)	30	End Sample Time	1444		End Pressure (" Hg)	1	
Analysis									

Purging Volumes and Purge Time					
Purge Vol (ml)		Purge Rate (ml/min)		Time Required	

Leak Testing	
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	

Sample Collection Notes/General Observations									
PID (PPM)									
SVE Discharge 128°F									

Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)			
Start Time		End Time	
Start Pressure (" Hg)		End Pressure (" Hg)	

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle T30						
Sampler	R. Jones						
Date and Start Time	8.26.2021 1435						
Date and End Time	8.26.2021 1450						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.10						
Sample Port Type	DEDICATED (Oxidizer Discharge)						
Leak Detection Method	N/A						
Location ID	DISCHARGE-082621						
Surface Conditions	Overcast, ~70°F, No rain						
Sample Canister LAB ID	3260		Flow Controller LAB ID	35		Sample Canister Size	1L
Start Sample Time	1439	Start Pressure (" Hg)	29	End Sample Time	1447	End Pressure (" Hg)	2
Analysis							
Purging Volumes and Purge Time							
Purge Vol (ml)		Purge Rate (ml/min)		Time Required			
Leak Testing							
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]							
Sample Collection Notes/General Observations							
PID (PPM)	0 w/ RKI prior to sampling						
Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)							
Start Time		End Time					
Start Pressure (" Hg)		End Pressure (" Hg)					

CRETE CONSULTING, INC.

Vapor Sampling - Field Form							
Project	Port of Seattle Terminal 30						
Sampler	R. Jones						
Date and Start Time	8.26.2021 1450						
Date and End Time	8.26.2021 1515						
Weather Barometric Pressure (in Hg) (attach copies of detailed weather reports)	30.10						
Sample Port Type	DEDICATED (Oxidizer Inlet)						
Leak Detection Method	N/A						
Location ID	INLET-082621						
Surface Conditions	Overcast, ~70°F, No rain						
Sample Canister LAB ID	~~229~~ RS 2433		Flow Controller LAB ID	229		Sample Canister Size	3 Liter Minican 1L
Start Sample Time	1500	Start Pressure (" Hg)	30	End Sample Time	1511	End Pressure (" Hg)	2
Analysis							

Purging Volumes and Purge Time					
Purge Vol (ml)		Purge Rate (ml/min)		Time Required	

Leak Testing	
Observation of Leak (bubbles) after 5 mins [if Yes, reinstall sample Vapor Pin and re-do leak testing]	

Sample Collection Notes/General Observations								
PID (PPM)	0.4	w/ FKI	immediately prior					

Shut-In Testing (minimum duration 5 minutes, system should maintain >10" of vacuum)			
Start Time		End Time	
Start Pressure (" Hg)		End Pressure (" Hg)	

PoS T30 8/26/2021

FIELD ENVIRONMENTAL INSTRUMENTS, INC.

www.fieldenvironmental.com

301 Brushton Ave
Suite A
Pittsburgh, PA 15221
Toll Free (800) 393-4
Local (412) 436-260(
Fax (412) 436-2616

RKI Multi-Gas Detector Calibration Certificate

	Lot #	Expiration	Reading %	Acceptable Range
Cal Gas Oxygen	20-7690	12/03/22	18.0	(17.5% - 18.5%)

	Lot #	Expiration	Reading ppm	Acceptable Range
Cal Gas H2S	20-7690	12/03/22	10	(9 - 11)
Cal Gas CO	20-7690	12/03/22	51	(48 - 52)
Cal Gas Ch4 % LEL	20-7690	12/03/22	50	(48 - 52)
Cal Gas Ch4 %Vol	N/A	N/A	N/A	
Cal Gas SO2	N/A	N/A	N/A	
Cal Gas CO2	N/A	N/A	N/A	
Cal Gas VOC	21-8065	07/09/25	100	(98 - 102)

Model	GX6000
S/N	52H0104501-
Barcode	u87334x
Order #	464167

Pump Flow: 550 — (300+)

Calibrated By: Don Redeen

Date of Calibration: 08/23/21

All calibrations performed by FEI conform to manufacturer's specifications. Please report any issues within 24 hours of receiving equipment.

All calibration gas used is traceable to NIST. Additional documentation is available upon request.

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.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

January 21, 2021

Rusty Jones, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

Dear Mr Jones:

Included are the results from the testing of material submitted on January 12, 2021 from the Port of Seattle Terminal 30, F&BI 101134 project. There are 10 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: Jamie Stevens
CTC0121R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on January 12, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle Terminal 30, F&BI 101134 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
101134 -01	DISCHARGE-011221
101134 -02	INLET-011221

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

The APH EC5-8 aliphatics range concentration for sample INLET-011221 exceeded the calibration range. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	DISCHARGE-011221	Client:	Crete Consulting
Date Received:	01/12/21	Project:	Port of Seattle Terminal 30, F&BI 101134
Date Collected:	01/12/20	Lab ID:	101134-01 1/15
Date Analyzed:	01/16/21	Data File:	011526.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	4,400
APH EC9-12 aliphatics	3,800
APH EC9-10 aromatics	<370

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	INLET-011221	Client:	Crete Consulting
Date Received:	01/12/21	Project:	Port of Seattle Terminal 30, F&BI 101134
Date Collected:	01/12/20	Lab ID:	101134-02 1/160
Date Analyzed:	01/16/21	Data File:	011528.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	810,000 ve
APH EC9-12 aliphatics	110,000
APH EC9-10 aromatics	<4,000

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30, F&BI 101134
Date Collected:	Not Applicable	Lab ID:	01-95 MB
Date Analyzed:	01/15/21	Data File:	011511.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<40
APH EC9-12 aliphatics	<50
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	DISCHARGE-011221	Client:	Crete Consulting
Date Received:	01/12/21	Project:	Port of Seattle Terminal 30, F&BI 101134
Date Collected:	01/12/21	Lab ID:	101134-01 1/15
Date Analyzed:	01/16/21	Data File:	011526.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<4.8	<1.5
Toluene	<280	<75
Ethylbenzene	9.1	2.1
m,p-Xylene	44	10
o-Xylene	9.3	2.1
Naphthalene	<3.9	<0.75

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	INLET-011221	Client:	Crete Consulting
Date Received:	01/12/21	Project:	Port of Seattle Terminal 30, F&BI 101134
Date Collected:	01/12/21	Lab ID:	101134-02 1/160
Date Analyzed:	01/16/21	Data File:	011528.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	86	27
Toluene	<3,000	<800
Ethylbenzene	<69	<16
m,p-Xylene	<140	<32
o-Xylene	<69	<16
Naphthalene	<42	<8

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30, F&BI 101134
Date Collected:	Not Applicable	Lab ID:	01-95 MB
Date Analyzed:	01/15/21	Data File:	011511.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	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: 01/21/21
Date Received: 01/12/21
Project: Port of Seattle Terminal 30, F&BI 101134

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

Laboratory Code: 101164-01 1/5.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	2,100	1,900	10
APH EC9-12 aliphatics	ug/m3	3,700	3,900	5
APH EC9-10 aromatics	ug/m3	1,900	2,000	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	80	70-130
APH EC9-12 aliphatics	ug/m3	67	109	70-130
APH EC9-10 aromatics	ug/m3	67	112	70-130

Date of Report: 01/21/21
Date Received: 01/12/21
Project: Port of Seattle Terminal 30, F&BI 101134

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

Laboratory Code: 101164-01 1/5.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	60	56	7
Toluene	ug/m3	<110	<110	nm
Ethylbenzene	ug/m3	63	67	6
m,p-Xylene	ug/m3	280	300	7
o-Xylene	ug/m3	210	230	9
Naphthalene	ug/m3	5.8	6.2	7

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	98	70-130
Toluene	ug/m3	51	100	70-130
Ethylbenzene	ug/m3	59	107	70-130
m,p-Xylene	ug/m3	120	95	70-130
o-Xylene	ug/m3	59	97	70-130
Naphthalene	ug/m3	71	81	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

101134

SAMPLE CHAIN OF CUSTODY

ME 01-12-21

Page # ____ of 1

Company ~~Report To~~ Crete Consulting, Inc.

~~Report To~~ Company Jones | Stevens

Address 108 S. Washington, Ste. 300

City, State, ZIP Seattle, WA 98104

Phone 832-330-1359 Email

SAMPLERS (*signature*) Rusty Jones R. Jones

PROJECT NAME & ADDRESS: Port of Seattle, Terminal 30

PO #

NOTES:

INVOICE TO

TURNAROUND TIME
- [x] Standard
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
DISCHARGE-011221	01	3257	111	IA / (SG)	1.12.21	29.5	0915	-1.5	0924		X		X			
INLET-011221	02	2434	02	IA / (SG)	1.12.21	29	0942	-1.5	0957		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	1.12.21	1108
Received by:	Nhan Phan	FB T	1-12-21	1108
Relinquished by:				
Received by:		Samples received at 18 °C		

FORMS\COC\COCTO-15.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

March 2, 2021

Jamie Stevens, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

Dear Ms Stevens:

Included are the results from the testing of material submitted on February 17, 2021 from the Port of Seattle, Terminal 30, F&BI 102267 project. There are 10 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: Rusty Jones
CTC0302R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on February 17, 2020 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle, Terminal 30, F&BI 102267 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
102267 -01	Discharge-021721
102267 -02	Inlet-021721

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

The APH EC5-8 aliphatics range concentration for sample Discharge-021721 exceeded the calibration range. In addition, APH EC5-8 aliphatics and APH EC9-12 aliphatics exceeded the calibration range in sample Inlet-021721. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Discharge-021721	Client:	Crete Consulting
Date Received:	02/17/21	Project:	Port of Seattle, Terminal 30
Date Collected:	02/17/21	Lab ID:	102267-01 1/4.7
Date Analyzed:	02/25/21	Data File:	022428.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	2,800 ve
APH EC9-12 aliphatics	240
APH EC9-10 aromatics	<120

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-021721	Client:	Crete Consulting
Date Received:	02/17/21	Project:	Port of Seattle, Terminal 30
Date Collected:	02/17/21	Lab ID:	102267-02 1/38
Date Analyzed:	02/25/21	Data File:	022429.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	490,000 ve
APH EC9-12 aliphatics	76,000 ve
APH EC9-10 aromatics	<950

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle, Terminal 30
Date Collected:	Not Applicable	Lab ID:	01-395 MB
Date Analyzed:	02/24/21	Data File:	022411.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<65
APH EC9-12 aliphatics	<30
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Discharge-021721	Client:	Crete Consulting
Date Received:	02/17/21	Project:	Port of Seattle, Terminal 30
Date Collected:	02/17/21	Lab ID:	102267-01 1/4.7
Date Analyzed:	02/25/21	Data File:	022428.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	1.7	0.52
Toluene	<89	<23
Ethylbenzene	<2	<0.47
m,p-Xylene	<4.1	<0.94
o-Xylene	<2	<0.47
Naphthalene	<1.2	<0.23

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Inlet-021721	Client:	Crete Consulting
Date Received:	02/17/21	Project:	Port of Seattle, Terminal 30
Date Collected:	02/17/21	Lab ID:	102267-02 1/38
Date Analyzed:	02/25/21	Data File:	022429.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	120	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	50	16
Toluene	<720	<190
Ethylbenzene	28	6.5
m,p-Xylene	<33	<7.6
o-Xylene	<17	<3.8
Naphthalene	<10	<1.9

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle, Terminal 30
Date Collected:	Not Applicable	Lab ID:	01-395 MB
Date Analyzed:	02/24/21	Data File:	022411.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	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: 03/02/21
Date Received: 02/17/21
Project: Port of Seattle, Terminal 30, F&BI 102267

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

Laboratory Code: 102326-02 1/6.2 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	500	470	6
APH EC9-12 aliphatics	ug/m3	190	170	11
APH EC9-10 aromatics	ug/m3	<150	<150	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	100	70-130
APH EC9-12 aliphatics	ug/m3	67	110	70-130
APH EC9-10 aromatics	ug/m3	67	109	70-130

Date of Report: 03/02/21
Date Received: 02/17/21
Project: Port of Seattle, Terminal 30, F&BI 102267

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

Laboratory Code: 102326-02 1/6.2 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<2	<2	nm
Toluene	ug/m3	<120	<120	nm
Ethylbenzene	ug/m3	<2.7	<2.7	nm
m,p-Xylene	ug/m3	<5.4	<5.4	nm
o-Xylene	ug/m3	<2.7	<2.7	nm
Naphthalene	ug/m3	<1.6	<1.6	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	105	70-130
Toluene	ug/m3	51	97	70-130
Ethylbenzene	ug/m3	59	108	70-130
m,p-Xylene	ug/m3	120	108	70-130
o-Xylene	ug/m3	59	109	70-130
Naphthalene	ug/m3	71	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. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

102267

SAMPLE CHAIN OF CUSTODY ME 02/17/21

Page # 1 of 1

Report To J. Stevens / R. Jones

Company Crete Consulting

Address 108 S. Washington, Ste. 800

City, State, ZIP Seattle, WA 98104

Phone _____ Email _____

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME & ADDRESS: Port of Seattle, Terminal 30

PO #

NOTES:

INVOICE TO

TURNAROUND TIME
- [x] Standard
- [ ] RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
DISCHARGE-021721	01	2436	102	IA / (SG)	2.17.21	30+	1329	2	1338		X		X			
INLET-021721	02	3344	35	IA / (SG)	↓	29.5	1341	2	1350		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	2.17.21	1503
Received by: [signature]	Ohah Phlm	FEBT	2/17/21	1503
Relinquished by:				
Received by:		Samples received at 16 °C		

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
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.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

March 31, 2021

Grant Hainsworth, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

Dear Mr Hainsworth:

Included are the results from the testing of material submitted on March 23, 2021 from the Port of Seattle Terminal 30, F&BI 103440 project. There are 11 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: Jamie Stevens, Rusty Jones
CTC0331R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on March 23, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle Terminal 30, F&BI 103440 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
103440 -01	DISCHARGE-032321
103440 -02	INLET-032321

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

APH EC5-8 aliphatics were detected in the MA-APH method blank at a level greater than one tenth the concentration detected in the samples. The data were flagged accordingly.

The MA-APH EC5-8 aliphatics concentration in sample INLET-032321 exceeded the calibration range. The data were qualified accordingly.

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	DISCHARGE-032321	Client:	Crete Consulting
Date Received:	03/23/21	Project:	Port of Seattle Terminal 30, F&BI 103440
Date Collected:	03/22/21	Lab ID:	103440-01 1/18
Date Analyzed:	03/27/21	Data File:	032629.D
Matrix:	Air	Instrument:	GCMS12
Units:	ug/m3	Operator:	bat

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

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	5,300 fb
APH EC9-12 aliphatics	5,100
APH EC9-10 aromatics	<450

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	INLET-032321	Client:	Crete Consulting
Date Received:	03/23/21	Project:	Port of Seattle Terminal 30, F&BI 103440
Date Collected:	03/22/21	Lab ID:	103440-02 1/450
Date Analyzed:	03/27/21	Data File:	032630.D
Matrix:	Air	Instrument:	GCMS12
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	480,000 ve fb
APH EC9-12 aliphatics	72,000
APH EC9-10 aromatics	<11,000

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30, F&BI 103440
Date Collected:	Not Applicable	Lab ID:	01-655 mb
Date Analyzed:	03/26/21	Data File:	032612.D
Matrix:	Air	Instrument:	GCMS12
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	130 lc
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	DISCHARGE-032321	Client:	Crete Consulting
Date Received:	03/23/21	Project:	Port of Seattle Terminal 30, F&BI 103440
Date Collected:	03/23/21	Lab ID:	103440-01 1/18
Date Analyzed:	03/27/21	Data File:	032629.D
Matrix:	Air	Instrument:	GCMS12
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	114	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<5.8	<1.8
Toluene	<340	<90
Ethylbenzene	32	7.3
m,p-Xylene	67	15
o-Xylene	16	3.7
Naphthalene	<2.4	<0.46

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	INLET-032321	Client:	Crete Consulting
Date Received:	03/23/21	Project:	Port of Seattle Terminal 30, F&BI 103440
Date Collected:	03/23/21	Lab ID:	103440-02 1/450
Date Analyzed:	03/27/21	Data File:	032630.D
Matrix:	Air	Instrument:	GCMS12
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<140	<45
Toluene	<8,500	<2,200
Ethylbenzene	<200	<45
m,p-Xylene	<390	<90
o-Xylene	<200	<45
Naphthalene	<33	<6.3

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30, F&BI 103440
Date Collected:	Not Applicable	Lab ID:	01-655 mb
Date Analyzed:	03/26/21	Data File:	032612.D
Matrix:	Air	Instrument:	GCMS12
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	106	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	<0.1	<0.02

Date of Report: 03/31/21
Date Received: 03/23/21
Project: Port of Seattle Terminal 30, F&BI 103440

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

Laboratory Code: 103478-01 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	780	870	11
APH EC9-12 aliphatics	ug/m3	280	310	10
APH EC9-10 aromatics	ug/m3	<140	<140	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	90	70-130
APH EC9-12 aliphatics	ug/m3	67	108	70-130
APH EC9-10 aromatics	ug/m3	67	94	70-130

Date of Report: 03/31/21
Date Received: 03/23/21
Project: Port of Seattle Terminal 30, F&BI 103440

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

Laboratory Code: 103478-01 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.8	<1.8	nm
Toluene	ug/m3	<100	<100	nm
Ethylbenzene	ug/m3	<2.4	<2.4	nm
m,p-Xylene	ug/m3	<4.8	<4.8	nm
o-Xylene	ug/m3	<2.4	<2.4	nm
Naphthalene	ug/m3	<1.4	<1.4	nm

Date of Report: 03/31/21
Date Received: 03/23/21
Project: Port of Seattle Terminal 30, F&BI 103440

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	96	70-130
Toluene	ug/m3	51	98	70-130
Ethylbenzene	ug/m3	59	98	70-130
m,p-Xylene	ug/m3	120	92	70-130
o-Xylene	ug/m3	59	96	70-130
Naphthalene	ug/m3	71	99	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

SAMPLE CHAIN OF CUSTODY

103440

03-23-21

Report To R. Jones, J. Stevens

Company Crete Consulting

Address 109 S. Washington, Ste. 300

City, State, ZIP Seattle, WA 98104

Phone _____ Email _____

SAMPLERS (*signature*) Rusty Jones R. Jones

PROJECT NAME & ADDRESS: Port of Seattle, Terminal 30

PO #

NOTES:

INVOICE TO

Page # 1 of 1

TURNAROUND TIME

☒ Standard

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☐ Default: Clean after 3 days

☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
DISCHARGE-032321	01	2296	07	IA / (SG)	3.23.21	29.5	1534	1	1543		X		X			
INLET-032321	02	3673	109	IA / (SG)	3.23.21	29.5	1555	1	1601		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	Crete Consulting	03/23/21	1659
Received by:		ERIC HOUM	F&B	3/23/21	1659
Relinquished by:					
Received by:			Samples received at 21 °C		

FORMS\COC\COCTO-15.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 27, 2021

Rusty Jones, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

Dear Mr Jones:

Included are the results from the testing of material submitted on April 19, 2021 from the Port of Seattle Terminal 30, F&BI 104327 project. There are 10 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: Jamie Stevens
CTC0427R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 19, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle Terminal 30, F&BI 104327 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
104327 -01	Discharge-041921
104327 -02	Inlet-041921

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

The APH EC9-12 aliphatics for sample Discharge-041921 and APH EC5-8 aliphatics concentration for sample Inlet-041921 exceeded the calibration range. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Discharge-041921	Client:	Crete Consulting
Date Received:	04/19/21	Project:	Port of Seattle Terminal 30, F&BI 104327
Date Collected:	04/19/21	Lab ID:	104327-01 1/15
Date Analyzed:	04/22/21	Data File:	042131.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	5,200
APH EC9-12 aliphatics	16,000 ve
APH EC9-10 aromatics	<370

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-041921	Client:	Crete Consulting
Date Received:	04/19/21	Project:	Port of Seattle Terminal 30, F&BI 104327
Date Collected:	04/19/21	Lab ID:	104327-02 1/440
Date Analyzed:	04/22/21	Data File:	042132.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	520,000 ve
APH EC9-12 aliphatics	110,000
APH EC9-10 aromatics	<11,000

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30, F&BI 104327
Date Collected:	Not Applicable	Lab ID:	01-823 MB
Date Analyzed:	04/21/21	Data File:	042116.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<75
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Discharge-041921	Client:	Crete Consulting
Date Received:	04/19/21	Project:	Port of Seattle Terminal 30, F&BI 104327
Date Collected:	04/19/21	Lab ID:	104327-01 1/15
Date Analyzed:	04/22/21	Data File:	042131.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<4.8	<1.5
Toluene	<280	<75
Ethylbenzene	59	14
m,p-Xylene	180	42
o-Xylene	37	8.6
Naphthalene	2.3	0.43

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Inlet-041921	Client:	Crete Consulting
Date Received:	04/19/21	Project:	Port of Seattle Terminal 30, F&BI 104327
Date Collected:	04/19/21	Lab ID:	104327-02 1/440
Date Analyzed:	04/22/21	Data File:	042132.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	105	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<140	<44
Toluene	<8,300	<2,200
Ethylbenzene	<190	<44
m,p-Xylene	<380	<88
o-Xylene	<190	<44
Naphthalene	<120	<22

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30, F&BI 104327
Date Collected:	Not Applicable	Lab ID:	01-823 MB
Date Analyzed:	04/21/21	Data File:	042116.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	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	<0.1	<0.02

Date of Report: 04/27/21
Date Received: 04/19/21
Project: Port of Seattle Terminal 30, F&BI 104327

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

Laboratory Code: 104370-01 1/4.8 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	460	500	8
APH EC9-12 aliphatics	ug/m3	190	200	5
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	99	70-130
APH EC9-12 aliphatics	ug/m3	67	122	70-130
APH EC9-10 aromatics	ug/m3	67	104	70-130

Date of Report: 04/27/21
Date Received: 04/19/21
Project: Port of Seattle Terminal 30, F&BI 104327

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

Laboratory Code: 104370-01 1/4.8 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.5	<1.5	nm
Toluene	ug/m3	<90	<90	nm
Ethylbenzene	ug/m3	<2.1	<2.1	nm
m,p-Xylene	ug/m3	<4.2	<4.2	nm
o-Xylene	ug/m3	<2.1	<2.1	nm
Naphthalene	ug/m3	1.5	1.5	0

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	102	70-130
Ethylbenzene	ug/m3	59	93	70-130
m,p-Xylene	ug/m3	120	97	70-130
o-Xylene	ug/m3	59	101	70-130
Naphthalene	ug/m3	71	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. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

L04327

SAMPLE CHAIN OF CUSTODY 04-19-21

Page # 1 of 1

Report To Crete Consulting / R. Jones / J. Stevens
Company Crete Consulting
Address 108 S. Washington, Ste. 300
City, State, ZIP Seattle, WA 98144
Phone _____ Email _____

SAMPLERS (signature) Rusty Jones R Jones	
PROJECT NAME & ADDRESS Port of Seattle, Terminal 30	PO #
NOTES:	INVOICE TO

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

SAMPLE DISPOSAL
☐ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
DISCHARGE-041921	01	3416	35	IA / (SG)	4.19.21	29	1509	1	1520		X		X			
INLET-041921	02	3344	117	IA / (SG)	4.19.21	>30	1523	1.5	1531		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	4.19.21	1603
Received by:	JOE MOHAMMED	FSBI	04/19/21	1636
Relinquished by:				
Received by:				

Samples received at 18 °C

FORMS\COC\COCTO-15.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

June 1, 2021

Jamie Stevens, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

Dear Ms Stevens:

Included are the results from the testing of material submitted on May 20, 2021 from the Port of Seattle Terminal 30, F&BI 105383 project. There are 10 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
CTC0601R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on May 20, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle Terminal 30, F&BI 105383 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
105383 -01	Discharge-052021
105383 -02	Inlet-052021

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:	Discharge-052021	Client:	Crete Consulting
Date Received:	05/20/21	Project:	Port of Seattle Terminal 30
Date Collected:	05/20/21	Lab ID:	105383-01 1/4.6
Date Analyzed:	05/24/21	Data File:	052416.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	2,400
APH EC9-12 aliphatics	4,500 ve
APH EC9-10 aromatics	<110

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-052021	Client:	Crete Consulting
Date Received:	05/20/21	Project:	Port of Seattle Terminal 30
Date Collected:	05/20/21	Lab ID:	105383-02 1/36
Date Analyzed:	05/24/21	Data File:	052418.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	108	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	310,000 ve
APH EC9-12 aliphatics	110,000 ve
APH EC9-10 aromatics	<900

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30
Date Collected:	Not Applicable	Lab ID:	01-1145 MB
Date Analyzed:	05/24/21	Data File:	052410.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	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:	Discharge-052021	Client:	Crete Consulting
Date Received:	05/20/21	Project:	Port of Seattle Terminal 30
Date Collected:	05/20/21	Lab ID:	105383-01 1/4.6
Date Analyzed:	05/24/21	Data File:	052416.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<1.5	<0.46
Toluene	<87	<23
Ethylbenzene	69	16
m,p-Xylene	200	45
o-Xylene	33	7.5
Naphthalene	1.8	0.34

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Inlet-052021	Client:	Crete Consulting
Date Received:	05/20/21	Project:	Port of Seattle Terminal 30
Date Collected:	05/20/21	Lab ID:	105383-02 1/36
Date Analyzed:	05/24/21	Data File:	052418.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	17	5.2
Toluene	<680	<180
Ethylbenzene	24	5.5
m,p-Xylene	<31	<7.2
o-Xylene	<16	<3.6
Naphthalene	<9.4	<1.8

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30
Date Collected:	Not Applicable	Lab ID:	01-1145 MB
Date Analyzed:	05/24/21	Data File:	052410.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3	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: 06/01/21
Date Received: 05/20/21
Project: Port of Seattle Terminal 30, F&BI 105383

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

Laboratory Code: 105383-01 1/4.6 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	2,400	2,300	4
APH EC9-12 aliphatics	ug/m3	4,500	4,600	2
APH EC9-10 aromatics	ug/m3	<110	<110	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	91	70-130
APH EC9-12 aliphatics	ug/m3	67	117	70-130
APH EC9-10 aromatics	ug/m3	67	87	70-130

Date of Report: 06/01/21
Date Received: 05/20/21
Project: Port of Seattle Terminal 30, F&BI 105383

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

Laboratory Code: 105383-01 1/4.6 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.5	<1.5	nm
Toluene	ug/m3	<87	<87	nm
Ethylbenzene	ug/m3	69	70	1
m,p-Xylene	ug/m3	200	200	0
o-Xylene	ug/m3	33	33	0
Naphthalene	ug/m3	1.8	1.9	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	90	70-130
Toluene	ug/m3	51	91	70-130
Ethylbenzene	ug/m3	59	83	70-130
m,p-Xylene	ug/m3	120	84	70-130
o-Xylene	ug/m3	59	88	70-130
Naphthalene	ug/m3	71	76	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

105383

SAMPLE CHAIN OF CUSTODY ME 05-20-21

Report To R. Jones / J. Stevens
Company Crete Consulting
Address 108 S. Washington, Ste 300
City, State, ZIP Seattle, WA 98104
Phone _____ Email _____

SAMPLERS (signature) Rusty Jones R Jones
PROJECT NAME & ADDRESS: Port of Seattle, Terminal 30
PO #
NOTES:
INVOICE TO

Page # 1 of 1

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
DISCHARGE-052021	01	3540	03	IA / (SG)	5.20.21	29	0918	1	0926		X		X			0918-0926
INLET-052021	02	3230	12	IA / (SG)	5.20.21	29.5	0940	2	0957		X		X			0940-0957
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

Samples received at 18 °C

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: R. Jones	Rusty Jones	Crete Consulting, Inc.	5/20/2021	1154
Received by: Ann Wilbruya	Ann Wilbruya	F&B	5/20/21	1154
Relinquished by:				
Received by:				

FORMS\COC\COCTO-15.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

June 23, 2021

Jamie Stevens, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Ms Stevens:

Included are the results from the testing of material submitted on June 16, 2021 from the Port of Seattle, Terminal 30, F&BI 106258 project. There are 10 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: Rusty Jones
CTC0623R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 16, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle, Terminal 30, F&BI 106258 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
106258 -01	Discharge-061621
106258 -02	Inlet-061621

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

The APH EC5-8 aliphatics concentration in sample Inlet-061621 exceeded the calibration range of the instrument. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Discharge-061621	Client:	Crete Consulting
Date Received:	06/16/21	Project:	Port of Seattle, Terminal 30
Date Collected:	06/16/21	Lab ID:	106258-01 1/14
Date Analyzed:	06/17/21	Data File:	061635.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	1,900
APH EC9-12 aliphatics	3,000
APH EC9-10 aromatics	<350

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-061621	Client:	Crete Consulting
Date Received:	06/16/21	Project:	Port of Seattle, Terminal 30
Date Collected:	06/16/21	Lab ID:	106258-02 1/430
Date Analyzed:	06/17/21	Data File:	061636.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	330,000 ve
APH EC9-12 aliphatics	80,000
APH EC9-10 aromatics	<11,000

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle, Terminal 30
Date Collected:	Not Applicable	Lab ID:	01-1219 MB
Date Analyzed:	06/16/21	Data File:	061614.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<75
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Discharge-061621	Client:	Crete Consulting
Date Received:	06/16/21	Project:	Port of Seattle, Terminal 30
Date Collected:	06/16/21	Lab ID:	106258-01 1/14
Date Analyzed:	06/17/21	Data File:	061635.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<4.5	<1.4
Toluene	<260	<70
Ethylbenzene	<6.1	<1.4
m,p-Xylene	<12	<2.8
o-Xylene	<6.1	<1.4
Naphthalene	<1.5	<0.28

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Inlet-061621	Client:	Crete Consulting
Date Received:	06/16/21	Project:	Port of Seattle, Terminal 30
Date Collected:	06/16/21	Lab ID:	106258-02 1/430
Date Analyzed:	06/17/21	Data File:	061636.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<140	<43
Toluene	<8,100	<2,100
Ethylbenzene	<190	<43
m,p-Xylene	<370	<86
o-Xylene	<190	<43
Naphthalene	<110	<21

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle, Terminal 30
Date Collected:	Not Applicable	Lab ID:	01-1219 MB
Date Analyzed:	06/16/21	Data File:	061614.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	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	<0.1	<0.02

Date of Report: 06/23/21
Date Received: 06/16/21
Project: Port of Seattle, Terminal 30, F&BI 106258

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

Laboratory Code: 106243-01 1/5.6 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	<420	<420	nm
APH EC9-12 aliphatics	ug/m3	<140	<140	nm
APH EC9-10 aromatics	ug/m3	<140	<140	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	87	70-130
APH EC9-12 aliphatics	ug/m3	67	107	70-130
APH EC9-10 aromatics	ug/m3	67	95	70-130

Date of Report: 06/23/21
Date Received: 06/16/21
Project: Port of Seattle, Terminal 30, F&BI 106258

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

Laboratory Code: 106243-01 1/5.6 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.8	<1.8	nm
Toluene	ug/m3	<110	<110	nm
Ethylbenzene	ug/m3	<2.4	<2.4	nm
m,p-Xylene	ug/m3	8.1	8.0	1
o-Xylene	ug/m3	2.7	2.7	0
Naphthalene	ug/m3	<1.5	<1.5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	84	70-130
Toluene	ug/m3	51	86	70-130
Ethylbenzene	ug/m3	59	76	70-130
m,p-Xylene	ug/m3	120	80	70-130
o-Xylene	ug/m3	59	82	70-130
Naphthalene	ug/m3	71	88	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

SAMPLE CHAIN OF CUSTODY

106258

ME 06/16/21

Report To Rusty Jones / J. Stevens

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) R. Jones	
PROJECT NAME & ADDRESS Port of Seattle, Terminal 30	PO #
NOTES:	INVOICE TO

Page # 1 of 1

TURNAROUND TIME
- X Standard
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Default: Clean after 3 days
- ☐ Archive (Fee may apply)

SAMPLE INFORMATION / ANALYSIS REQUESTED

Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
DISCHARGE-061621	01	8532	242	IA / (SG)	6.16.21	30	0949	0	0957		X		X			
INLET-061621	02	8535	304	IA / (SG)	↓	30	1002	1	1012		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG											Samples received at 22 °C	

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	6.16.21	1108
Received by: Will Radford	Will Radford	FSBI	6/16/21	11:08
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
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.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

July 28, 2021

Rusty Jones, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Jones:

Included are the results from the testing of material submitted on July 20, 2021 from the Port of Seattle Terminal 30, F&BI 107307 project. There are 10 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: Jamie Stevens
CTC0728R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on July 20, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle Terminal 30, F&BI 107307 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
107307 -01	Discharge-071921
107307 -02	Inlet-071921

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:	Discharge-071921	Client:	Crete Consulting
Date Received:	07/20/21	Project:	Port of Seattle Terminal 30
Date Collected:	07/20/21	Lab ID:	107307-01 1/16
Date Analyzed:	07/22/21	Data File:	072224.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	3,100
APH EC9-12 aliphatics	2,200
APH EC9-10 aromatics	<400

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-071921	Client:	Crete Consulting
Date Received:	07/20/21	Project:	Port of Seattle Terminal 30
Date Collected:	07/20/21	Lab ID:	107307-02 1/460
Date Analyzed:	07/23/21	Data File:	072225.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	190,000
APH EC9-12 aliphatics	56,000
APH EC9-10 aromatics	<11,000

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30
Date Collected:	Not Applicable	Lab ID:	01-1599 MB
Date Analyzed:	07/22/21	Data File:	072210.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
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:	Discharge-071921	Client:	Crete Consulting
Date Received:	07/20/21	Project:	Port of Seattle Terminal 30
Date Collected:	07/20/21	Lab ID:	107307-01 1/16
Date Analyzed:	07/22/21	Data File:	072224.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	87	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<5.1	<1.6
Toluene	<300	<80
Ethylbenzene	<6.9	<1.6
m,p-Xylene	<14	<3.2
o-Xylene	<6.9	<1.6
Naphthalene	<4.2	<0.8

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Inlet-071921	Client:	Crete Consulting
Date Received:	07/20/21	Project:	Port of Seattle Terminal 30
Date Collected:	07/20/21	Lab ID:	107307-02 1/460
Date Analyzed:	07/23/21	Data File:	072225.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<150	<46
Toluene	<8,700	<2,300
Ethylbenzene	<200	<46
m,p-Xylene	<400	<92
o-Xylene	<200	<46
Naphthalene	<120	<23

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle Terminal 30
Date Collected:	Not Applicable	Lab ID:	01-1599 MB
Date Analyzed:	07/22/21	Data File:	072210.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	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: 07/28/21
Date Received: 07/20/21
Project: Port of Seattle Terminal 30, F&BI 107307

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

Laboratory Code: 107346-01 1/5.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	1,200	1,100	9
APH EC9-12 aliphatics	ug/m3	<150	<150	nm
APH EC9-10 aromatics	ug/m3	<150	<150	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	77	70-130
APH EC9-12 aliphatics	ug/m3	67	97	70-130
APH EC9-10 aromatics	ug/m3	67	93	70-130

Date of Report: 07/28/21
Date Received: 07/20/21
Project: Port of Seattle Terminal 30, F&BI 107307

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

Laboratory Code: 107346-01 1/5.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.9	<1.9	nm
Toluene	ug/m3	<110	<110	nm
Ethylbenzene	ug/m3	<2.6	<2.6	nm
m,p-Xylene	ug/m3	<5.1	<5.1	nm
o-Xylene	ug/m3	<2.6	<2.6	nm
Naphthalene	ug/m3	<1.5	<1.5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	80	70-130
Toluene	ug/m3	51	90	70-130
Ethylbenzene	ug/m3	59	73	70-130
m,p-Xylene	ug/m3	120	83	70-130
o-Xylene	ug/m3	59	86	70-130
Naphthalene	ug/m3	71	91	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

107307

SAMPLE CHAIN OF CUSTODY

ME 07-20-21

Page # 1 of 1

Report To R. Jones, J. Stevens

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones	
PROJECT NAME & ADDRESS Port of Seattle, Terminal 30	PO #
NOTES:	INVOICE TO

TURNAROUND TIME
- [X] Standard
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
DISCHARGE-071921	01	8531	256	IA / (SG)	7.20.21	29	1423	2	1434		X		X			
INLET-071921	02	8535	302	IA / (SG)	↓	30	1437	1	1444		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												Samples received at 23 °C
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	7/20/21	1532
Received by: HONG NGUYEN	HONG NGUYEN	FBT	✓	✓
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
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.
Arina Podnozova, B.S.
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3012 16th Avenue West
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(206) 285-8282
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www.friedmanandbruya.com

September 1, 2021

Rusty Jones, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Jones:

Included are the results from the testing of material submitted on August 27, 2021 from the Port of Seattle, Terminal 30, F&BI 108450 project. There are 10 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
CTC0901R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 27, 2020 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle, Terminal 30, F&BI 108450 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
108450 -01	Discharge-082621
108450 -02	Inlet-082621

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:	Discharge-082621	Client:	Crete Consulting
Date Received:	08/27/21	Project:	Port of Seattle, Terminal 30, F&BI 108450
Date Collected:	08/26/21	Lab ID:	108450-01 1/15
Date Analyzed:	08/27/21	Data File:	082723.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	2,000
APH EC9-12 aliphatics	1,700
APH EC9-10 aromatics	<370

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-082621	Client:	Crete Consulting
Date Received:	08/27/21	Project:	Port of Seattle, Terminal 30, F&BI 108450
Date Collected:	08/26/21	Lab ID:	108450-02 1/470
Date Analyzed:	08/27/21	Data File:	082724.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	180,000
APH EC9-12 aliphatics	59,000
APH EC9-10 aromatics	<12,000

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle, Terminal 30, F&BI 108450
Date Collected:	Not Applicable	Lab ID:	01-1868 MB
Date Analyzed:	08/27/21	Data File:	082711.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3
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:	Discharge-082621	Client:	Crete Consulting
Date Received:	08/27/21	Project:	Port of Seattle, Terminal 30, F&BI 108450
Date Collected:	08/26/21	Lab ID:	108450-01 1/15
Date Analyzed:	08/27/21	Data File:	082723.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

Compounds:	Concentration ug/m3	ppbv
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:	Inlet-082621	Client:	Crete Consulting
Date Received:	08/27/21	Project:	Port of Seattle, Terminal 30, F&BI 108450
Date Collected:	08/26/21	Lab ID:	108450-02 1/470
Date Analyzed:	08/27/21	Data File:	082724.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<150	<47
Toluene	<8,900	<2,300
Ethylbenzene	<200	<47
m,p-Xylene	<410	<94
o-Xylene	<200	<47
Naphthalene	<120	<23

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Port of Seattle, Terminal 30, F&BI 108450
Date Collected:	Not Applicable	Lab ID:	01-1868 MB
Date Analyzed:	08/27/21	Data File:	082711.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	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: 09/01/21
Date Received: 08/27/21
Project: Port of Seattle, Terminal 30, F&BI 108450

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

Laboratory Code: 108455-01 1/5.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	<440	470	nm
APH EC9-12 aliphatics	ug/m3	540	560	4
APH EC9-10 aromatics	ug/m3	<150	<150	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	91	70-130
APH EC9-12 aliphatics	ug/m3	67	121	70-130
APH EC9-10 aromatics	ug/m3	67	106	70-130

Date of Report: 09/01/21
Date Received: 08/27/21
Project: Port of Seattle, Terminal 30, F&BI 108450

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

Laboratory Code: 108455-01 1/5.9 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.9	<1.9	nm
Toluene	ug/m3	<110	<110	nm
Ethylbenzene	ug/m3	<2.6	<2.6	nm
m,p-Xylene	ug/m3	<5.1	<5.1	nm
o-Xylene	ug/m3	<2.6	<2.6	nm
Naphthalene	ug/m3	<1.5	<1.5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	107	70-130
Toluene	ug/m3	51	106	70-130
Ethylbenzene	ug/m3	59	103	70-130
m,p-Xylene	ug/m3	120	107	70-130
o-Xylene	ug/m3	59	106	70-130
Naphthalene	ug/m3	71	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. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

108450

SAMPLE CHAIN OF CUSTODY

ME 08/27/21

Page # 1 of 1

Report To R. Jones, J. Stevens

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (*signature*) Rusty Jones R. Jones

PROJECT NAME & ADDRESS: Port of Seattle, Terminal 30

PO #

NOTES:

INVOICE TO

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
				~~IA / SG~~												25
DISCHARGE-082621	01	3260	35	IA / (SG)	8/26/21	29	1439	2	1447		X		X			
INLET-082621	02	2433	229	IA / (SG)	8/26/21	30	1500	2	1511		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												Samples received at 19 °C
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	8.27.21	1059
~~Received by:~~	Michel Erdich	FLRm	8/27/21	1059.
Relinquished by:				
Received by:				

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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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October 11, 2021

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 30, 2021 from the NA (Non-PO), AECOM PN 60667994.3, F&BI 109593 project. There are 10 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
NAA1011R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 30, 2020 by Friedman & Bruya, Inc. from the NA (Non-PO), AECOM PN 60667994.3, F&BI 109593 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
109593 -01	Discharge-090321
109593 -02	Inlet-090321

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

The APH EC5-8 aliphatics concentration in sample Inlet-090321 exceeded the calibration range of the instrument. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Discharge-090321	Client:	AECOM
Date Received:	09/30/21	Project:	60667994.3, F&BI 109593
Date Collected:	09/30/21	Lab ID:	109593-01 1/5.9
Date Analyzed:	10/04/21	Data File:	100425.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	2,200
APH EC9-12 aliphatics	680
APH EC9-10 aromatics	<150

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-090321	Client:	AECOM
Date Received:	09/30/21	Project:	60667994.3, F&BI 109593
Date Collected:	09/30/21	Lab ID:	109593-02 1/260
Date Analyzed:	10/05/21	Data File:	100426.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	210,000 ve
APH EC9-12 aliphatics	53,000
APH EC9-10 aromatics	<6,500

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	60667994.3, F&BI 109593
Date Collected:	Not Applicable	Lab ID:	01-2212 MB
Date Analyzed:	10/04/21	Data File:	100411a.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	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:	Discharge-090321	Client:	AECOM
Date Received:	09/30/21	Project:	60667994.3, F&BI 109593
Date Collected:	09/30/21	Lab ID:	109593-01 1/5.9
Date Analyzed:	10/04/21	Data File:	100425.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	90	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<1.9	<0.59
Toluene	<110	<29
Ethylbenzene	<2.6	<0.59
m,p-Xylene	<5.1	<1.2
o-Xylene	<2.6	<0.59
Naphthalene	<1.5	<0.29

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Inlet-090321	Client:	AECOM
Date Received:	09/30/21	Project:	60667994.3, F&BI 109593
Date Collected:	09/30/21	Lab ID:	109593-02 1/260
Date Analyzed:	10/05/21	Data File:	100426.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<83	<26
Toluene	<4,900	<1,300
Ethylbenzene	<110	<26
m,p-Xylene	<230	<52
o-Xylene	<110	<26
Naphthalene	<68	<13

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	60667994.3, F&BI 109593
Date Collected:	10/04/21	Lab ID:	01-2212 MB
Date Analyzed:	10/04/21	Data File:	100411a.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	90	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.32	<0.1
Toluene	<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: 10/11/21
Date Received: 09/30/21
Project: NA (Non-PO), AECOM PN 60667994.3, F&BI 109593

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

Laboratory Code: 109556-01 1/5.2 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	780	770	1
APH EC9-12 aliphatics	ug/m3	340	350	3
APH EC9-10 aromatics	ug/m3	<130	<130	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	87	70-130
APH EC9-12 aliphatics	ug/m3	67	116	70-130
APH EC9-10 aromatics	ug/m3	67	95	70-130

Date of Report: 10/11/21
Date Received: 09/30/21
Project: NA (Non-PO), AECOM PN 60667994.3, F&BI 109593

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

Laboratory Code: 109556-01 1/5.2 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	1.8	<1.7	nm
Toluene	ug/m3	<98	<98	nm
Ethylbenzene	ug/m3	2.6	2.6	0
m,p-Xylene	ug/m3	7.8	7.9	1
o-Xylene	ug/m3	3.0	3.0	0
Naphthalene	ug/m3	3.2	3.4	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	97	70-130
Toluene	ug/m3	51	98	70-130
Ethylbenzene	ug/m3	59	90	70-130
m,p-Xylene	ug/m3	120	95	70-130
o-Xylene	ug/m3	59	96	70-130
Naphthalene	ug/m3	71	72	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

SAMPLE CHAIN OF CUSTODY

109593

09-30-21

Report To Paul Kalina

Company AECOM

Address 1111 3rd Ave Suite 1600

City, State, ZIP Seattle, WA 98101

Phone 206-438-2700 Email ~~[illegible]~~ paul.kalina@aecom.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: P.O.S T-30

PO #

NOTES:

INVOICE TO

Page # 1 of 1

TURNAROUND TIME
- [x] Standard
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	~~Tab~~ CAN ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
Discharge - 093021	3259	01	303	IA / (SG)	9/30/21	28	1440	5	1445		X		X			
Inlet - 093021	2295	02	280	IA / (SG)	9/30/21	29	1455	5	1500		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Bryan Darby	AECOM	9-30-21	1700
Received by:	Eric Lauer	FB	9/30/21	1700
Relinquished by:				
Received by:		Samples received at 18 °C		

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Fax (206) 283-5044

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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fbi@isomedia.com
www.friedmanandbruya.com

November 1, 2021

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 21, 2021 from the NA (Non-PO), AECOM PN 60667994.3, F&BI 110427 project. There are 10 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
AEC1101R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 21, 2021 by Friedman & Bruya, Inc. from the AECOM NA (Non-PO), AECOM PN 60667994.3, F&BI 110427 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
110427 -01	Inlet-102121
110427 -02	Discharge-102121

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

The concentration of APH EC5-8 aliphatics and APH EC9-12 aliphatics in sample Inlet-102121 exceeded the calibration range of the instrument. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-102121	Client:	AECOM
Date Received:	10/21/21	Project:	60667994.3, F&BI 110427
Date Collected:	10/21/21	Lab ID:	110427-01 1/18
Date Analyzed:	10/23/21	Data File:	102233.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	81,000 ve
APH EC9-12 aliphatics	27,000 ve
APH EC9-10 aromatics	510

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Discharge-102121	Client:	AECOM
Date Received:	10/21/21	Project:	60667994.3, F&BI 110427
Date Collected:	10/21/21	Lab ID:	110427-02 1/5.8
Date Analyzed:	10/23/21	Data File:	102232.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	90	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	1,200
APH EC9-12 aliphatics	560
APH EC9-10 aromatics	<140

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	60667994.3, F&BI 110427
Date Collected:	Not Applicable	Lab ID:	01-2391 MB
Date Analyzed:	10/22/21	Data File:	102210.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	83	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:	Inlet-102121	Client:	AECOM
Date Received:	10/21/21	Project:	60667994.3, F&BI 110427
Date Collected:	10/21/21	Lab ID:	110427-01 1/18
Date Analyzed:	10/23/21	Data File:	102233.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	6.0	1.9
Toluene	<340	<90
Ethylbenzene	10	2.4
m,p-Xylene	<16	<3.6
o-Xylene	<7.8	<1.8
Naphthalene	<4.7	<0.9

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Discharge-102121	Client:	AECOM
Date Received:	10/21/21	Project:	60667994.3, F&BI 110427
Date Collected:	10/21/21	Lab ID:	110427-02 1/5.8
Date Analyzed:	10/23/21	Data File:	102232.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<1.9	<0.58
Toluene	<110	<29
Ethylbenzene	<2.5	<0.58
m,p-Xylene	<5	<1.2
o-Xylene	<2.5	<0.58
Naphthalene	<1.5	<0.29

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	60667994.3, F&BI 110427
Date Collected:	Not Applicable	Lab ID:	01-2391 MB
Date Analyzed:	10/22/21	Data File:	102210.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	84	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: 11/01/21
Date Received: 10/21/21
Project: NA (Non-PO), AECOM PN 60667994.3, F&BI 110427

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

Laboratory Code: 110450-01 1/6.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	640	630	2
APH EC9-12 aliphatics	ug/m3	2,800	2,800	0
APH EC9-10 aromatics	ug/m3	<170	<170	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	110	70-130
APH EC9-12 aliphatics	ug/m3	67	111	70-130
APH EC9-10 aromatics	ug/m3	67	96	70-130

Date of Report: 11/01/21
Date Received: 10/21/21
Project: NA (Non-PO), AECOM PN 60667994.3, F&BI 110427

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

Laboratory Code: 110450-01 1/6.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	2.6	2.6	0
Toluene	ug/m3	<130	<130	nm
Ethylbenzene	ug/m3	<2.9	<2.9	nm
m,p-Xylene	ug/m3	9.8	10	2
o-Xylene	ug/m3	4.1	4.0	2
Naphthalene	ug/m3	<1.8	<1.8	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	84	70-130
m,p-Xylene	ug/m3	120	91	70-130
o-Xylene	ug/m3	59	95	70-130
Naphthalene	ug/m3	71	97	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

110427

SAMPLE CHAIN OF CUSTODY

ME 10/21/21

Page # 1 of 1

Report To Paul Kalina

Company AECOM

Address 1111 3rd Ave Suite 1600

City, State, ZIP Seattle WA

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

SAMPLERS (*signature*) A Utter

PROJECT NAME & ADDRESS: T-30 Port of Seattle

PO #:

NOTES:

INVOICE TO:

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

SAMPLE DISPOSAL
- ☒ Default: Clean after 3 days
- ☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	~~Lab~~ CAN ID	~~Canister~~ LAB ID 10/21	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
Inlet - 102121	2295	~~01~~ 01	306	IA / (SG)	10/21/21	30	1329	5	1334		X		X			
Discharge - 102121	2309	~~01~~ 02	280	IA / (SG)	10/21/21	27	1321	5	1325		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: A Utter	Anders Utter	AECOM	10/21/21	1530
Received by: Nghan	Nghan	PBI	10/21/21	1530
Relinquished by:				
Received by:				

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

FORMS\COC\COCTO-15.DOC

Samples received at 9 °C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 2, 2021

Paul Kalina, Project Manager
AECOM
1111 3rd Ave, Suite 1600
Seattle, WA 98101

Dear Mr Kalina:

Included are the results from the testing of material submitted on November 18, 2021 from the NA (Non-PO), AECOM PN 60667994.3, F&BI 111351 project. There are 12 pages included in this report.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
AEC1202R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 18, 2021 by Friedman & Bruya, Inc. from the AECOM NA (Non-PO), AECOM PN 60667994.3, F&BI 111351 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
111351 -01	Discharge-111821
111351 -02	Inlet-111821

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:	Discharge-111821	Client:	AECOM
Date Received:	11/18/21	Project:	60667994.3, F&BI 111351
Date Collected:	11/18/21	Lab ID:	111351-01 1/6.1
Date Analyzed:	11/23/21	Data File:	112227.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	80	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	720
APH EC9-12 aliphatics	<150
APH EC9-10 aromatics	<150

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-111821	Client:	AECOM
Date Received:	11/18/21	Project:	60667994.3, F&BI 111351
Date Collected:	11/18/21	Lab ID:	111351-02 1/18
Date Analyzed:	11/23/21	Data File:	112228.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	103	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	74,000 ve
APH EC9-12 aliphatics	7,800
APH EC9-10 aromatics	<450

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Inlet-111821	Client:	AECOM
Date Received:	11/18/21	Project:	60667994.3, F&BI 111351
Date Collected:	11/18/21	Lab ID:	111351-02 1/270
Date Analyzed:	11/24/21	Data File:	112323.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	87	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	95,000
APH EC9-12 aliphatics	<6,700
APH EC9-10 aromatics	<6,700

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	60667994.3, F&BI 111351
Date Collected:	Not Applicable	Lab ID:	01-2595 MB
Date Analyzed:	11/22/21	Data File:	112212.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	81	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:	Discharge-111821	Client:	AECOM
Date Received:	11/18/21	Project:	60667994.3, F&BI 111351
Date Collected:	11/18/21	Lab ID:	111351-01 1/6.1
Date Analyzed:	11/23/21	Data File:	112227.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	87	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<1.9	<0.61
Toluene	<110	<30
Ethylbenzene	<2.6	<0.61
m,p-Xylene	<5.3	<1.2
o-Xylene	<2.6	<0.61
Naphthalene	<1.6	<0.3

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Inlet-111821	Client:	AECOM
Date Received:	11/18/21	Project:	60667994.3, F&BI 111351
Date Collected:	11/18/21	Lab ID:	111351-02 1/18
Date Analyzed:	11/23/21	Data File:	112228.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	122	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	7.5	2.3
Toluene	<340	<90
Ethylbenzene	11 J	2.5 J
m,p-Xylene	<16 J	<3.6 J
o-Xylene	<7.8 J	<1.8 J
Naphthalene	<2.4 J	<0.46 J

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Inlet-111821	Client:	AECOM
Date Received:	11/18/21	Project:	60667994.3, F&BI 111351
Date Collected:	11/18/21	Lab ID:	111351-02 1/270
Date Analyzed:	11/24/21	Data File:	112323.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<86	<27
Toluene	<5,100	<1,300
Ethylbenzene	<120	<27
m,p-Xylene	<230	<54
o-Xylene	<120	<27
Naphthalene	<71	<13

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	60667994.3, F&BI 111351
Date Collected:	Not Applicable	Lab ID:	01-2595 MB
Date Analyzed:	11/22/21	Data File:	112212.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	88	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<0.32	<0.1
Toluene	<19	<5
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	<0.13	<0.025

Date of Report: 12/02/21
Date Received: 11/18/21
Project: NA (Non-PO), AECOM PN 60667994.3, F&BI 111351

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

Laboratory Code: 111360-01 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	530	560	6
APH EC9-12 aliphatics	ug/m3	<140	<140	nm
APH EC9-10 aromatics	ug/m3	<140	<140	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	93	70-130
APH EC9-12 aliphatics	ug/m3	67	106	70-130
APH EC9-10 aromatics	ug/m3	67	87	70-130

Date of Report: 12/02/21
Date Received: 11/18/21
Project: NA (Non-PO), AECOM PN 60667994.3, F&BI 111351

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

Laboratory Code: 111360-01 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.8	<1.8	nm
Toluene	ug/m3	<100	<100	nm
Ethylbenzene	ug/m3	<2.4	<2.4	nm
m,p-Xylene	ug/m3	<4.8	<4.8	nm
o-Xylene	ug/m3	<2.4	<2.4	nm
Naphthalene	ug/m3	<1.4	<1.4	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	112	70-130
Toluene	ug/m3	51	115	70-130
Ethylbenzene	ug/m3	59	110	70-130
m,p-Xylene	ug/m3	120	114	70-130
o-Xylene	ug/m3	59	119	70-130
Naphthalene	ug/m3	71	104	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

111351

SAMPLE CHAIN OF CUSTODY

ME

11/18/21

Page # 1 of 1

Report To Paul Kalina ; Anders Utter

Company AECOM

Address 1111 3rd Ave Suite 1600

City, State, ZIP Seattle WA 98101

Phone 206-438-2700 Email Paul.Kalina@aecom.com
Anders.Utter@aecom.com

SAMPLERS (*signature*) AU Utter

PROJECT NAME & ADDRESS: T-30 Port of Seattle

PO #: NA (NON-PO)

NOTES: AECOM PN 60667994.3

INVOICE TO: Added PO 212

TURNAROUND TIME
- ☑ Standard
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Default: Clean after 3 days
- ☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
Discharge -111821	01	8525	01	IA / (SG)	11/18/21	29	1318	5	1324		X		X			
Inlet -111821	02	8533	111	IA / (SG)	11/18/21	29	1327	5	1333		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: AU Utter	Anders Utter	AECOM	11/18/21	1602
Received by:	Eric Dan	F&B	11/18/21	1602
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

January 10, 2022

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 22, 2021 from the NA (Non-PO), AECOM PN 60667994.3, F&BI 112448 project. There are 10 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
AEC0110R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on December 22, 2021 by Friedman & Bruya, Inc. from the AECOM NA (Non-PO), AECOM PN 60667994.3, F&BI 112448 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AECOM
112448 -01	Inlet-122221
112448 -02	Discharge-122221

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:	Inlet-122221	Client:	AECOM
Date Received:	12/22/21	Project:	NA (Non-PO), AECOM PN 60667994.3, F&BI 112448
Date Collected:	01/05/22	Lab ID:	112448-01 1/175
Date Analyzed:	01/06/22	Data File:	010524.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	97,000
APH EC9-12 aliphatics	8,300
APH EC9-10 aromatics	<4,400

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Discharge-122221	Client:	AECOM
Date Received:	12/22/21	Project:	NA (Non-PO), AECOM PN 60667994.3, F&BI 112448
Date Collected:	01/05/22	Lab ID:	112448-02 1/5.7
Date Analyzed:	01/05/22	Data File:	010523.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	970
APH EC9-12 aliphatics	<140
APH EC9-10 aromatics	<140

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	NA (Non-PO), AECOM PN 60667994.3, F&BI 112448
Date Collected:	Not Applicable	Lab ID:	02-011 MB
Date Analyzed:	01/05/22	Data File:	010510.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	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:	Inlet-122221	Client:	AECOM
Date Received:	12/22/21	Project:	NA (Non-PO), AECOM PN 60667994.3, F&BI 112448
Date Collected:	01/05/21	Lab ID:	112448-01 1/175
Date Analyzed:	01/06/22	Data File:	010524.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<56	<17
Toluene	<3,300	<870
Ethylbenzene	<76	<17
m,p-Xylene	<150	<35
o-Xylene	<76	<17
Naphthalene	<46	<8.7

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Discharge-122221	Client:	AECOM
Date Received:	12/22/21	Project:	NA (Non-PO), AECOM PN 60667994.3, F&BI 112448
Date Collected:	01/05/21	Lab ID:	112448-02 1/5.7
Date Analyzed:	01/05/22	Data File:	010523.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3	ppbv
Benzene	<1.8	<0.57
Toluene	<110	<28
Ethylbenzene	<2.5	<0.57
m,p-Xylene	<5	<1.1
o-Xylene	<2.5	<0.57
Naphthalene	<1.5	<0.28

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AECOM
Date Received:	Not Applicable	Project:	NA (Non-PO), AECOM PN 60667994.3, F&BI 112448
Date Collected:	Not Applicable	Lab ID:	02-011 MB
Date Analyzed:	01/05/22	Data File:	010510.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	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: 01/10/22
Date Received: 12/22/21
Project: NA (Non-PO), AECOM PN 60667994.3, F&BI 112448

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

Laboratory Code: 112506-01 1/5.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	460	<430	nm
APH EC9-12 aliphatics	ug/m3	<140	<140	nm
APH EC9-10 aromatics	ug/m3	<140	<140	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	84	70-130
APH EC9-12 aliphatics	ug/m3	67	114	70-130
APH EC9-10 aromatics	ug/m3	67	107	70-130

Date of Report: 01/10/22
Date Received: 12/22/21
Project: NA (Non-PO), AECOM PN 60667994.3, F&BI 112448

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

Laboratory Code: 112506-01 1/5.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Benzene	ug/m3	<1.8	<1.8	nm
Toluene	ug/m3	<110	<110	nm
Ethylbenzene	ug/m3	<2.5	<2.5	nm
m,p-Xylene	ug/m3	<5	<5	nm
o-Xylene	ug/m3	<2.5	<2.5	nm
Naphthalene	ug/m3	<1.5	<1.5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/m3	43	91	70-130
Toluene	ug/m3	51	93	70-130
Ethylbenzene	ug/m3	59	97	70-130
m,p-Xylene	ug/m3	120	100	70-130
o-Xylene	ug/m3	59	100	70-130
Naphthalene	ug/m3	71	98	70-130

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

SAMPLE CHAIN OF CUSTODY

112448

12-22-21

Page # 1 of 1

Report To Paul Keating
Company AECOM
Address 1111 3rd Ave Suite 1600
City, State, ZIP Seattle WA
Phone 206 438 2700 Email Paul.keating@aecom.com

SAMPLERS (*signature*) A Utter

PROJECT NAME & ADDRESS: T-30 Port of Seattle

PO #:

NOTES:

INVOICE TO: AECOM

TURNAROUND TIME
☑ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☑ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	~~Flow~~ lab Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
Inlet-122221	201	3412	01	IA / (SG)	12/22/21	30	1253	5	1301		X		X			
Discharge-122221	203	2436	02	IA / (SG)	12/22/21	30	1247	5	1253		X		X			
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: A Utter	Anders Utter	AECOM	12/22/21	1415
Received by:	Ann W Bruya	F&B	12/22	1415
Relinquished by:				
Received by:		Samples received at 17°C		

FORMS\COC\COCTO-15.DOC

Appendix D

Vapor Sampling Summary

Data Quality Review Reports

NOTE: Data Quality Review Reports from the eight sets of CRETE vapor samples collected between January and August 2021 are not included in this report.

AECOM
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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 – August 2021		
From	Chelsey Cook, Chemist Lucy Panteleeff, Chemist		
Date	January 6, 2022		

The summary data quality review of two vapor samples collected on August 26, 2021, 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, total xylenes, and naphthalene (BTEX+N) 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. For this report, the sample identifications (IDs) do not include the sampling date suffixes (-082621). The following samples are associated with Friedman & Bruya, Inc. laboratory group 108450:

Sample ID	Laboratory ID
Discharge-082621	108450 -01
Inlet-082621	108450 -02

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 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.

AECOM

Summary Data Quality Review
Port of Seattle - T 30
Vapor Sampling – August 2021
Laboratory Group: 108450

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

Samples were analyzed for APHs and BTEX+N 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 a sample from an unrelated project. Results were comparable.

6. Reporting Limits - Acceptable

Overall Assessment of Data

The data reported in this laboratory group are considered to be usable for meeting project objectives. The completeness for Friedman & Bruya, Inc. laboratory group 108450 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
No data were qualified in association with laboratory group 108450.					

AECOM
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Memorandum

To	Paul Kalina, Project Manager	Info	FINAL
Subject	Summary Data Quality Review Port of Seattle – T-30 Vapor Sampling – September 2021		
From	Chelsey Cook, Chemist Lucy Panteleeff, Chemist		
Date	January 6, 2022		

The summary data quality review of two vapor samples collected on September 30, 2021, 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, total xylenes, and naphthalene (BTEX+N) 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. For this report, the sample identifications (IDs) do not include the sampling date suffixes (-093021). The following samples are associated with Friedman & Bruya, Inc. laboratory group 109593:

Sample ID	Laboratory ID
Discharge-090321	109593 -01
Inlet-090321	109593 -02

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 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.

AECOM

Summary Data Quality Review
Port of Seattle - T 30
Vapor Sampling- September 2021
Laboratory Group: 109593

Sample Receipt

Upon receipt by the laboratory, the sample container information was compared to the chain-of-custody (COC). The laboratory logged the date suffixes on both samples incorrectly as -090321, when they should have been logged as -093021.

Organic Analyses

Samples were analyzed for APHs and BTEX+N 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 a sample from an unrelated project. Results were comparable.

6. Reporting Limits - Acceptable

7. Other Items of Note:

   APHs by MA-APH – The laboratory noted that the result for APH EC5-8 aliphatics in Inlet exceeded the calibration range of the instrument and was flagged 've'. The result for APH EC5-8 aliphatics in Inlet was qualified as estimated and flagged 'J' based on the calibration exceedance.

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 109593 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
Inlet-090321	109593 -02	APH EC5-8 aliphatics	210,000 ve	ug/m^3	210,000 J

AECOM
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Memorandum

To	Paul Kalina, Project Manager	Info	FINAL
Subject	Summary Data Quality Review Port of Seattle – T-30 Vapor Sampling – October 2021		
From	Chelsey Cook, Chemist Lucy Panteleeff, Chemist		
Date	January 6, 2022		

The summary data quality review of two vapor samples collected on October 21, 2021, 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, total xylenes, and naphthalene (BTEX+N) 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. For this report, the sample identifications (IDs) do not include the sampling date suffixes (-102121). The following samples are associated with Friedman & Bruya, Inc. laboratory group 110427:

Sample ID	Laboratory ID
Inlet-102121	110427-01
Discharge-102121	110427-02

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 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.

AECOM

Summary Data Quality Review
Port of Seattle - T 30
Vapor Sampling – October 2021
Laboratory Group: 110427

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

Samples were analyzed for APHs and BTEX+N 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 a sample from an unrelated project. Results were comparable.

6. Reporting Limits - Acceptable

7. Other Items of Note:

   APHs by MA-APH – The laboratory noted that the results for APH EC5-8 aliphatics and APH EC9-12 aliphatics in Inlet exceeded the calibration range of the instrument and were flagged 've'. The results for APH EC5-8 aliphatics and APH EC9-12 aliphatics in Inlet were qualified as estimated and flagged 'J' based on these calibration exceedances.

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 110427 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
Inlet-102121	110427-01	APH EC5-8 aliphatics	81,000 ve	ug/m^3	81,000 J
Inlet-102121	110427-01	APH EC9-12 aliphatics	27,000 ve	ug/m^3	27,000 J

AECOM

Memorandum

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206 438 2700 tel
866 495 5288 fax

To	Paul Kalina, Project Manager	Info	FINAL
Subject	Summary Data Quality Review Port of Seattle – T-30 Vapor Sampling – November 2021		
From	Chelsey Cook, Chemist Lucy Panteleeff, Chemist		
Date	January 5, 2022		

The summary data quality review of two vapor samples collected on November 18, 2021, 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, total xylenes, and naphthalene (BTEX+N) 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. For this report, the sample identifications (IDs) do not include the sampling date suffixes (-111821). The following samples are associated with Friedman & Bruya, Inc. laboratory group 111351:

Sample ID	Laboratory ID
Discharge-111821	111351 -01
Inlet-111821	111351 -02

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 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.

AECOM

Summary Data Quality Review
Port of Seattle - T 30
Vapor Sampling – November 2021
Laboratory Group: 111351

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

Samples were analyzed for APHs and BTEX+N by the methods identified in the introduction of this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable

3. Surrogates – Acceptable

4. Internal Standard – Acceptable except as noted below:

   VOCs by Method TO-15 – The laboratory noted that the internal standard associated with ethylbenzene, m,p-xylene, o-xylene, and naphthalene in Inlet recovered above the control limits. The sample was re-analyzed at a dilution with elevated reporting limits; therefore, the results were reported from the initial analysis with the failing internal standard. The results for ethylbenzene, m,p-xylene, o xylene, and naphthalene were qualified as estimated and flagged 'J' or 'UJ' based on this internal standard result.

5. Laboratory Control Sample (LCS) – Acceptable

6. Laboratory Duplicate – Acceptable

   General – Laboratory duplicates were performed using a sample that was not associated with this laboratory group. Results were comparable.

7. Reporting Limits - Acceptable

8. Other Items of Note:

   APHs by MA-APH – The result for APH EC5-8 aliphatics in Inlet exceeded the calibration range of the instrument and was flagged 've' by the laboratory. The sample was re-analyzed at a dilution and the result was within the calibration range of the instrument. The result for APH EC-5 aliphatics was reported from the dilution of Inlet and APH EC5-8 aliphatics in the initial analysis of Inlet was flagged 'DNR' for "Do Not Report." The results for APH EC9-12 aliphatics and APH EC9-10 aromatics were reported from the initial analysis of Inlet and were flagged 'DNR' in the dilution of Inlet.

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 111351 is 100%.

AECOM

Summary Data Quality Review
Port of Seattle - T 30
Vapor Sampling – November 2021
Laboratory Group: 111351

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
Inlet-111821	111351-02	Ethylbenzene	11 J	ug/m^3	11 J
Inlet-111821	111351-02	m,p-Xylene	16 U	ug/m^3	16 UJ
Inlet-111821	111351-02	o-Xylene	7.8 U	ug/m^3	7.8 UJ
Inlet-111821	111351-02	Naphthalene	2.4 U	ug/m^3	2.4 UJ
Inlet-111821	111351-02	APH EC5-8 aliphatics	74,000	ug/m^3	DNR
Inlet-111821	111351-02	APH EC9-12 aliphatics	6700 U	ug/m^3	DNR
Inlet-111821	111351-02	APH EC9-10 aromatics	6700 U	ug/m^3	DNR

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Memorandum

To	Paul Kalina, Project Manager	Info	Draft
Subject	Summary Data Quality Review Port of Seattle – T-30 Vapor Sampling – December 2021		
From	Amelia McArthur, Chemist Lucy Panteleeff, Chemist		
Date	June 14, 2022		

The summary data quality review of two vapor samples collected on December 22, 2021, 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, total xylenes, and naphthalene (BTEX+N) 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. For this report, the sample identifications (IDs) do not include the sampling date suffixes (-122221). The following samples are associated with Friedman & Bruya, Inc. laboratory group 112448:

Sample ID	Laboratory ID
Inlet-122221	112448 -01
Discharge-122221	112448 -02

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 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.

AECOM

Summary Data Quality Review
Port of Seattle - T 30
Vapor Sampling – December 2021
Laboratory Group: 112448

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

Samples were analyzed for APHs and BTEX+N by the methods identified in the introduction of this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable

3. Surrogates – Acceptable

4. Internal Standard – Acceptable

5. Laboratory Control Sample (LCS) – Acceptable

6. Laboratory Duplicate – Acceptable

   General – Laboratory duplicates were performed using a sample that was not associated with this laboratory group. Results were comparable.

7. Reporting Limits – Acceptable

   The reporting limits for analytes in methods MA-APH and BTEX+N reported as not detected in samples 112448 -01 and 112448 -02 were elevated due to a dilution required for high concentrations of target analytes.

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 112448 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
Data were not qualified for 112448 during this data validation.					

Appendix E

LNAPL Gauging and Recovery Field Notes

Port of Seattle Terminal 30
LNAPL Removal Event 11 (January 15, 2021)

		First Removal								Post Removal				Second Removal					End of Day				
Location	Time of Gaging	Initial Depth to LNAPL (Feet TOC)	Initial Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Estimated LNAPL Removed [5] (Gallons)	Estimated Water Removed [5] (Gallons)	Estimated Total Fluid Removal (Gallons)	Time of Gaging	Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Estimated LNAPL Removed [5] (Gallons)	Estimated Water Removed [5] (Gallons)	Estimated Total Fluid Removal (Gallons)	Time of Gaging	End of Day Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time Lapse Since Extraction (minutes)
MW-35	1029	8.79	9.07	0.28	18	1025-1045	**MINOR EMU.**	<2	<2	1058	NL	12.99	---	---	---	---	---	---	1541	8.82	8.85	0.03	296
MW-36	0759	NL	9.22	---	30	0834-0904	0	5.0	5.0	0915	NL	9.71	---	---	---	---	---	---	---	---	---	---	---
MW-36A	0753	NL	9.98	---	30	0801-0831	0	20.5	20.5	0916	NL	10.17	---	---	---	---	---	---	---	---	---	---	---
MW-39A	0911	NL	8.69	---	30	0953-1023	0	35.2	35.2	1040	NL	8.68	---	---	---	---	---	---	---	---	---	---	---
MW-59	1004	NL	8.74	---	30	1250-1320	0	6.6	6.6	1405	NL	8.72	---	---	---	---	---	---	---	---	---	---	---
MW-89 [3]	1446	NL	9.40	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-93	0906	NL	8.91	---	30	0916-0946	0	57.4	57.4	0955	NL	8.86	---	---	---	---	---	---	---	---	---	---	---
RW-1	1218	8.04	8.10	0.06	60	1238-1338	NA	9.8	9.8	1342	11.80	11.81	0.01	7 [13]	1344-1351	NA	NA	NA	1602	8.63	8.65	0.02	131
RW-12	0930	8.93	9.10	0.18	40	1200-1240	~1.5	29.5	31.0	1309	9.75	9.76	0.01	---	---	---	---	---	1556	9.02	9.04	0.02	196
RW-101	1121	NL	8.00	---	30	1148-1218	0	6.6	6.6	1223	NL	8.73	---	---	---	---	---	---	---	---	---	---	---
RW-102	0937	NL	8.43	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-103	0950	8.12	8.87	0.75	60	1038-1143	NA	NA	NA	1149	NL	8.54	---	---	---	---	---	---	1545	7.90	8.12	0.22	243
RW-104	0921	NL	7.89	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-105	1018	NL	8.67	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-106	0810	8.11	9.24	1.13	60	0855-0955	NA	NA	NA	0959	NL	8.84	---	---	---	---	---	---	1553	8.02	8.75	0.73	358
RW-107	0739	8.30	9.08	0.78	60	0750-0850	NA	NA	NA	0901	NL	8.51	---	30 [10]	1405-1434	NA	NA	NA	1549	8.29	8.51	0.22	75
RW-108	0819	NL	8.60	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-109	0825	NL	8.82	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-110	0832	NL	8.72	---	30	1001-1031	**~0**	NA	NA	1052	NL	8.80	---	---	---	---	---	---	---	---	---	---	---
DRUM VACUUM ESTIMATED TOTALS:							**~1.5**	**156.1**	**157.6**														
VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS[9]:							**NA**	**<=1234**	**~1234**														
COMBINED APPROXIMATED TOTALS:							**>=1.5**	**~1390.1**	**~1391.6**														
COMBINED APPROXIMATED TOTALS IN VACUUM TRUCK (INCLUDING HOLDING TANK)[11]:							**>=4.5**	**<=1495.5**	**~1500**														
COMBINED APPROXIMATED TOTALS A MEASURED BY DH							**39**	**---**	**~1853**														

Notes:
1. Feet TOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. Groundwater measurements taken at 1446. Low Tide at 1256.
4. NL = LNAPL not detected using interface probe.
5. Total removals calculated from drum volumes from each well post-recovery at each well.
6. NA - Not Available (not able to detect)
7. TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.
8. MW-35 total depth tagged at 13.90-ft TOC.
9. DH Vacuum Truck removal volumes only (stick measured in vac truck tank).
10. RW-107 was additionally extracted at for 30-minutes prior to site departure to remove recharged oil.
11. Approximately 3-gallons of oil and 275-gallons of water in the holding tank prior to removal.
12. EMU. - Emulsified
13. Additional time conducted at well prior to demobilization to skim 0.01-ft LNAPL out of well.

Blues wells extracted by Marine Maintenance with drum vacuum.
Red wells extracted by DH Environmental with vacuum truck.

Port of Seattle Terminal 30
LNAPL Monitoring (February 12, 2021)

Location	Time of Gaging	Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Estimated LNAPL in Well (Gallons)	Notes
MW-35	9:16	8.69	8.75	0.06	0.01	
MW-36	9:29	NL	8.95	NL	---	
MW-36A	9:25	NL	9.65	NL	---	
MW-39A	9:55	NL	8.90	NL	---	
MW-59	8:24	NL	8.79	NL	---	
MW-89[3]	10:07	NL	9.78	NL	---	
MW-93	9:53	NL	9.10	NL	---	
RW-1	9:37	8.08	8.11	0.03	0.04	
RW-12	8:15	8.92	8.95	0.03	0.04	
RW-101	9:02	NL	7.54	NL	---	
RW-102	8:46	NL	8.08	NL	---	
RW-103	9:09	7.80	8.67	0.87	0.57	
RW-104	8:59	NL	7.58	NL	---	
RW-105	8:49	NL	8.30	NL	---	
RW-106	8:19	7.96	9.15	1.19	0.79	
RW-107	8:07	8.23	9.23	1.00	0.66	
RW-108	8:37	NL	8.35	NL	---	
RW-109	8:33	NL	8.63	NL	---	
RW-110	8:29	8.60	8.79	0.19	0.13	1st re-appearance of LNAPL since 8/2020

Notes:
1. Feet TOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. Groundwater measurements taken at 10:07. Low tide at 11:48. Well not gauged during optimal low tide window.

Port of Seattle Terminal 30
LNAPL Removal Event 12 (March 5, 2021)

					First Removal		Post Removal				Second Removal					End of Day				
Location	Time of Gaging	Initial Depth to LNAPL (Feet TOC)	Initial Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Time of Gaging	Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Pre-Removal Depth to LNAPL (Feet TOC)	Pre-Removal Depth to Water (Feet TOC)	Estimated LNAPL Removed (Gallons)	Time of Gaging	End of Day Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time Lapse Since Extraction (minutes)
MW-35	1205	8.64	8.74	0.1	~5	DRIES RAPIDLY	NA	NA	NA	NA	---	---	---	---	---	13:14	NL	8.76	---	NA
MW-36	7:50	NL	8.90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-36A	7:49	NL	9.71	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-39A	7:53	NL	8.99	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-59	1000	8.55	8.64	0.09	20	1100-1122	11:23	NL	9.40	---	---	---	---	---	---	13:06	NL	8.89	---	104
MW-89 [3]	11:35	NL	9.52	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-93	8:00	NL	9.25	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-1	1224	8.09	8.16	0.17	40	1226-1306	13:10	9.68	9.69	0.01	20	1357-1417	9.09	9.11	NA	NA	NA	NA	NA	NA
RW-12	738	9.03	9.08	0.05	20	0826-0846	9:04	NL	10.12	---	20	1315-1335	9.20	9.23	NA	NA	NA	NA	NA	NA
RW-101	8:52	NL	7.64	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-102	8:54	NL	8.33	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-103	9:11	8.21	8.70	0.49	60	0954-1054	11:01	NL	8.53	---	---	---	---	---	---	NA	NA	NA	NA	NA
RW-104	8:09	NL	7.73	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-105	8:13	NL	8.53	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-106	7:26	8.10	9.18	1.08	60	0849-0949	9:54	NL	8.65	---	20	1335-1355	8.29	8.49	NA	NA	NA	NA	NA	NA
RW-107	7:15	8.35	9.31	0.96	60	0726-0826	8:35	NL	8.83	---	20	1255-1315	8.50	8.82	NA	NA	NA	NA	NA	NA
RW-108	9:29	NL	8.63	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-109	9:24	NL	8.99	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-110	9:06	8.85	9.02	0.17	40	1126-1206	12:09	NL	9.06	---	---	---	---	---	---	13:02	NL	8.82	---	56
DRUM VACUUM ESTIMATED TOTALS:							**NA**													
VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS[9]:							**~1400**													
COMBINED APPROXIMATED TOTALS:							**~1400**													
COMBINED APPROXIMATED TOTALS IN VACUUM TRUCK (INCLUDING HOLDING TANK)[11]:							**~2015**													
COMBINED APPROXIMATED TOTALS A MEASURED BY DH on 3/8/2021:							**~2083**													

Notes:
1. Feet TOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. Groundwater measurements taken at 1135. Low Tide at 0256, Lower low tide at 1554.
4. NL = LNAPL not detected using interface probe.
5. For drum vaccuumed wells, total removals calculated from drum volumes from each well post-recovery at each well.
6. NA - Not Available (not able to detect or measure)
7. TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.
8. MW-35 total depth tagged at 13.90-ft TOC.
9. DH Vacuum Truck removal volumes only (stick measured in vac truck tank).

Blues wells extracted by Marine Maintenance with drum vacuum.
Red wells extracted by DH Environmental with vacuum truck.

Port of Seattle Terminal 30
LNAPL Monitoring (April 15, 2021)

Location	Time of Gaging	Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Estimated LNAPL in Well (Gallons)	Notes
MW-35	16:59	8.67	9.09	0.42	0.07	
MW-36	16:39	NL	9.15	---	---	
MW-36A	16:40	NL	10.19	---	---	
MW-39A	16:44	NL	10.84	---	---	
MW-59	17:54	9.18	9.19	0.01	0.00	
MW-89[3]	16:33	NL	11.19	---	---	
MW-93	16:47	NL	10.70	---	---	
RW-1	18:35	8.78	8.89	0.11	0.17	
RW-12	18:13	9.43	9.68	0.25	0.38	
RW-101	17:29	NL	8.03	---	---	
RW-102	17:26	NL	8.63	---	---	
RW-103	17:37	8.38	8.69	0.31	0.20	
RW-104	17:48	NL	7.93	---	---	
RW-105	17:44	NL	8.81	---	---	
RW-106	17:57	8.50	9.28	0.78	0.51	
RW-107	18:16	8.78	9.52	0.74	0.49	
RW-108	18:23	NL	8.85	---	---	
RW-109	17:13	NL	9.05	---	---	
RW-110	17:14	9.10	9.20	0.10	0.07	

Notes:
1. Feet TOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. Groundwater measurements taken at 16:33. Low tide at 13:45. Well not gauged during optimal low tide window due to limited site access.
4. NL = LNAPL not detected using interface probe.
5. MW-35 total depth previously tagged at 13.90-ft TOC.

Port of Seattle Terminal 30
LNAPL Removal Event 13 (May 13, 2021)

					First Removal				Post Removal				Second Removal					Third Removal					End of Day				
Location	Time of Gaging	Initial Depth to LNAPL (Feet TOC)	Initial Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Estimated Total Fluid Removal (Gallons)	Time of Gaging	Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Time of Gaging	Pre-Removal Depth to LNAPL (Feet TOC)	Pre-Removal Depth to Water (Feet TOC)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Pre-Removal Depth to LNAPL (Feet TOC)	Pre-Removal Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time of Gaging	End of Day Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time Lapse Since Extraction (minutes)
MW-35	16:29	8.88	8.92	0.04	UNTIL DRY	1927-1933	NA	19:34	NL	13.65	0	---	---	---	---	---	---	---	---	---	---	20:31	NL	10.18	0.00	57
MW-36	17:41	NL	9.27	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-36A	17:39	NL	9.91	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-39A	17:50	NL	9.94	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-59	16:37	9.00	9.62	0.62	30	1727-1757	NA	17:59	NL	9.90	0.00	---	---	---	---	---	---	---	---	---	---	20:17	NL	9.26	0.00	258
MW-89 [3]	15:56	NL	10.68	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-93	17:55	NL	9.99	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-1	19:40	8.88	9.05	0.17	20	1943-2003	NA	20:03	10.58	10.60	0.02	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-12	No Initial Gauging Data				30	1613-1643	NA	16:53	10.47	10.57	0.10	10	2012-2022	20:07	9.69	9.82	20:23	5 minutes	10.63	10.67	0.04	20:39	NL	12.00	0.00	16
RW-101	**Container on well - Not accessible**																									
RW-102	16:24	NL	8.54	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-103	16:17	8.36	8.59	0.23	20	1833-1853	NA	18:54	NL	9.04	0.00	---	---	---	---	---	---	---	---	---	---	20:18	NL	8.55	0.00	84
RW-104	18:05	NL	8.17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-105	17:07	NL	8.76	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-106	17:30	8.95	9.66	0.71	30	1758-1828	NA	18:29	NL	9.47	0.00	---	---	---	---	---	---	---	---	---	---	20:12	NL	8.66	0.00	103
RW-107	16:01	8.75	9.34	0.59	30	1645-1715	NA	17:19	NL	9.33	0.00	10	2022-2032	20:10	8.90	9.31	---	---	---	---	---	20:35	NL	9.15	0.00	25
RW-108	16:59	NL	8.74	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-109	16:51	NL	9.03	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-110	16:41	9.08	9.28	0.20	20	1858-1718	NA	17:20	NL	9.51	0.00	---	---	---	---	---	---	---	---	---	---	20:24	NL	9.20	0.00	184
VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS[9]:							**676**																			
COMBINED APPROXIMATED TOTALS IN VACUUM TRUCK (INCLUDING HOLDING TANK)[10]:							**839**																			
COMBINED APPROXIMATED TOTALS A MEASURED BY DH on 5/14/2021							**930 (24 is oil)**																			

Notes:
1. Feet TOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. Groundwater measurements taken at 16:37. Low Tide at 12:39.
4. NL = LNAPL not detected using interface probe.
5. For drum vacuumed wells, total removals calculated from drum volumes from each well post-recovery at each well.
6. NA - Not Available (not able to detect or measure)
7. TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.
8. MW-35 total depth tagged at 13.90-ft TOC.
9. DH Vacuum Truck removal volumes only (stick measured in vac truck tank).
10. Approximately 163-gallons of oily water (total fluids) in the holding tank prior to removal. 839-gallons total fluids as measured on-site by field crew.

Red wells extracted by DH Environmental with vacuum truck.

RW-107: Saw 69% LNAPL recovery (0.59-ft to 0.41-ft) in 2:51-hours after initial pumpout.

5/17/2021

DH Environmental - Vac Truck Volume Estimator

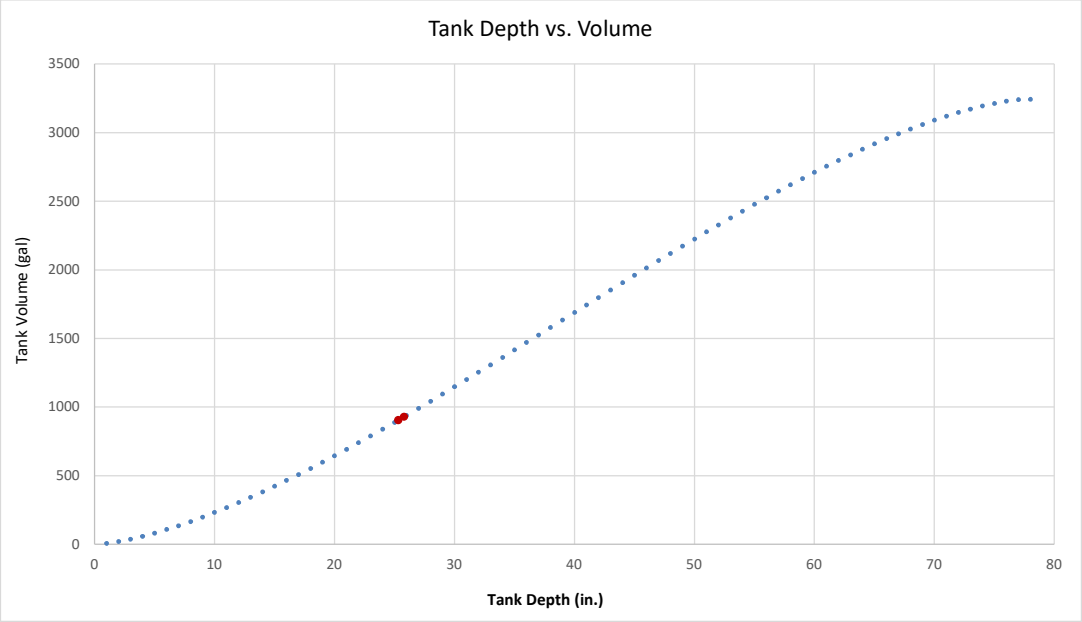
Project: Port of Seattle, T30 Product Recovery
Date: 5/13/2021

Rush-Overland Manufacturing
Stick Chart
Tank Volume Versus Liquid Depth

Tank Diameter (in.)	78
Tank Length, includes straight flanges (in.)	138
Shell Thickness (in.)	0.25
Total Tank Volume (gal)	2900
Volume In Each Head (gal)	172
Total Volume (gal)	3244
distance from lip of access hatch to top of tank (in):	4.8
distance from lip of access hatch to top of tank (ft):	0.40

LNAPL Volume Calculator

depth to product (from lip of access hatch; ft):	4.75
Depth to water (from lip of access hatch; ft):	4.79
depth to product (from lip of access hatch; in):	57
Depth to water (from lip of access hatch; in):	57.48
combined depth product + water (in.):	25.8
depth of water (in.):	25.32
volume at product thickness (gal)	930.00
volume at water thickness (gal)	905.63
Product Volume (gal)	**24.37**
Water volume (gal)	**905.63**



Inch	Gallons
1	7.37
2	20.93
3	38.48
4	59.24
5	82.76
6	108.72
7	136.89
8	167.08
9	199.15
10	232.94
11	268.37
12	305.31
13	343.68
14	383.39
15	424.37
16	466.54
17	509.83
18	554.18
19	599.53
20	645.82
21	692.99
22	740.98
23	789.75
24	839.23
25	889.38
26	940.16
27	991.5
28	1043.37
29	1095.72
30	1148.5
31	1201.66
32	1255.16
33	1308.96
34	1363.01
35	1417.27
36	1471.68
37	1526.22
38	1580.84
39	1635.48
40	1690.12
41	1744.7
42	1799.18
43	1853.53
44	1907.68
45	1961.61
46	2015.27
47	2068.61
48	2121.58
49	2174.15
50	2226.26
51	2277.88
52	2328.94
53	2379.41
54	2429.24
55	2478.37
56	2526.75
57	2574.34
58	2621.08

59	2666.9
60	2711.76
61	2755.59
62	2798.33
63	2839.91
64	2880.27
65	2919.32
66	2956.99
67	2993.18
68	3027.8
69	3060.75
70	3091.9
71	3121.1
72	3148.19
73	3172.96
74	3195.15
75	3214.37
76	3230.06
77	3241.06
78	3244

Port of Seattle Terminal 30
LNAPL Monitoring (June 10, 2021)

Location	Time of Gaging	Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Estimated LNAPL in Well (Gallons)	Notes
MW-35	16:18	9.01	9.03	0.02		
MW-36	16:09	NL	9.93	---		Trace product on probe
MW-36A	16:12	NL	9.87	---		
MW-39A	16:00	NL	10.10	---		Trace product on probe
MW-59	16:47	9.14	10.00	0.86		Biological growth or debris in well/probe.
MW-89[3]	15:55	NL	10.58	---		
MW-93	16:04	NL	9.97	---		
RW-1	17:29	8.89	9.15	0.26		
RW-12	16:59	9.54	9.75	0.21		
RW-101	16:36	8.50	8.51	0.01		1st time with product since 11/2020
RW-102	Inaccessible due to container on well.					
RW-103	Inaccessible due to container on well.					
RW-104	16:29	NL	8.35	---		
RW-105	16:26	NL	8.81	---		
RW-106	16:51	8.53	9.11	0.58		
RW-107	17:03	8.82	9.43	0.61		
RW-108	17:25	NL	8.80	---		
RW-109	17:20	NL	9.06	---		
RW-110	17:15	9.12	9.37	0.25		

Notes:
1. Feet TOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. Groundwater measurements taken at 15:55. Low tide at 11:40.
4. NL = LNAPL not detected using interface probe.
5. MW-35 total depth previously tagged at 13.90-ft TOC.

Port of Seattle Terminal 30
LNAPL Removal Event 14 (August 12, 2021)

					First Removal			Post Removal				End of Day				
Location	Time of Gaging	Initial Depth to LNAPL (Feet TOC)	Initial Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Estimated Total Fluid Removal (Gallons)	Time of Gaging	Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time of Gaging	End of Day Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time Lapse Since Extraction (minutes)
MW-35	17:50	9.18	9.20	0.02	Until Dry	20:01-20:10	NA	20:11	NL	13.35	0.00	---	---	---	---	---
MW-36	18:08	9.35	9.37	0.02	20	20:22-20:42	NA	20:39	NL	12.15	0.00	---	---	---	---	---
MW-36A	17:59	NL	9.90	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-39A	19:19	NL	9.69	TRACE	---	---	---	---	---	---	---	---	---	---	---	---
MW-59	**Container on well - Not accessible**															
MW-89 [3]	17:15	NL	10.33	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-93	19:26	NL	9.75	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-1	20:22	9.03	9.30	0.27	25	20:49-21:14	NA	21:17	13.49	13.59	0.10	---	---	---	---	---
RW-12	16:31	9.61	9.92	0.31	40	17:31-18:11	NA	18:14	15.50	15.51	0.01	20:09	10.25	10.39	0.19	115
RW-101	17:43	NL	8.51	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-102	**Container on well - Not accessible**															
RW-103	**Container on well - Not accessible**															
RW-104	18:27	NL	8.55	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-105	17:03	NL	8.85	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-106	16:47	8.58	9.17	0.59	40	19:10-19:50	NA	19:53	NL	9.46	0.00	20:26	NL	8.94	0.00	33
RW-107	16:28	8.89	9.61	0.72	40	16:45-17:25	NA	17:33	9.13	9.15	0.02	20:16	9.06	9.69	0.60	73
RW-108	17:36	NL	8.87	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-109	16:56	NL	9.13	---	---	---	---	---	---	---	---	---	---	---	---	---
RW-110	16:52	9.16	9.64	0.48	40	18:22-19:02	NA	19:09	NL	9.49	0.00	20:22	9.38	9.41	0.03	163
HOLDING TANK VOLUME PRIOR TO REMOVALS[9]:							**870**									
COMBINED APPROXIMATED TOTALS IN VACUUM TRUCK (INCLUDING HOLDING TANK)[10]:							**1635**									
COMBINED APPROXIMATED TOTALS A MEASURED BY DH on 8/12-13/2021							**1733 (78 is oil)**									

Notes:
1. Feet TOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. Groundwater measurements taken at 17:15. Low Tide at 14:11.
4. NL = LNAPL not detected using interface probe.
5. For drum vacuumed wells, total removals calculated from drum volumes from each well post-recovery at each well.
6. NA - Not Available (not able to detect or measure)
7. TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.
8. MW-35 total depth tagged at 13.85-ft TOC.
9. Approximately 871-gallons of oily water (total fluids) in the holding tank prior to removal.
10. Approximately 1635-gallons in vacuum truck as measured immediately after recovery event (stick gauged).

Red wells extracted by DH Environmental with vacuum truck.

RW-107: Saw 83% LNAPL recovery (0.72-ft to 0.60-ft) in 2:51-hours after initial pump out.

6/2/2022

DH Environmental - Vac Truck Volume Estimator

Project: Terminal 30
Date: 8/12/2021

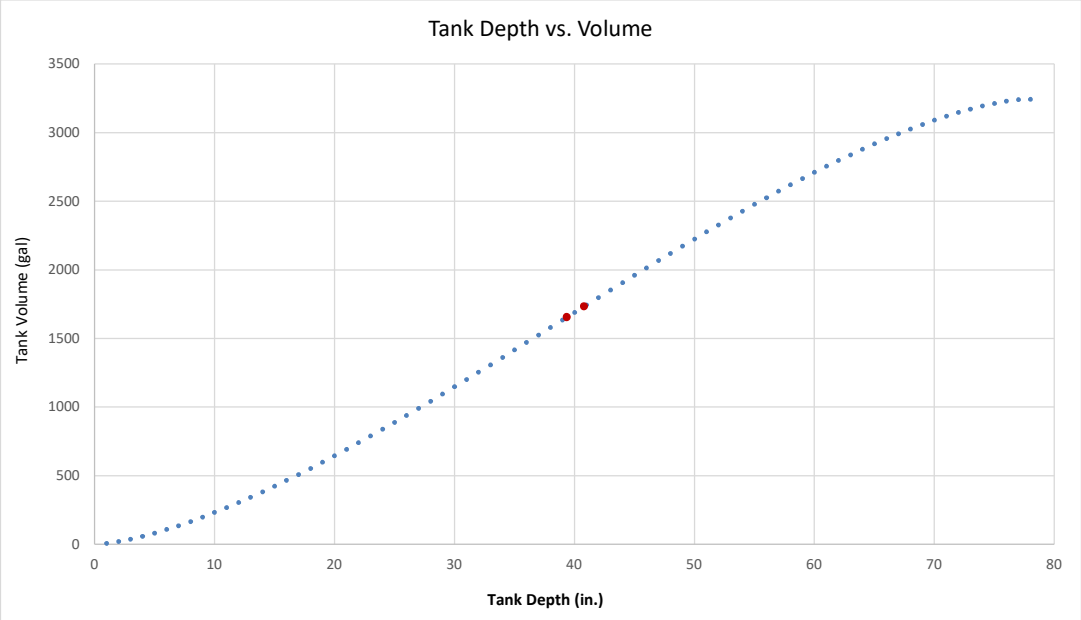
Inch	Gallons
1	7.37
2	20.93
3	38.48
4	59.24
5	82.76
6	108.72
7	136.89
8	167.08
9	199.15
10	232.94
11	268.37
12	305.31
13	343.68
14	383.39
15	424.37
16	466.54
17	509.83
18	554.18
19	599.53
20	645.82
21	692.99
22	740.98
23	789.75
24	839.23
25	889.38
26	940.16
27	991.5
28	1043.37
29	1095.72
30	1148.5
31	1201.66
32	1255.16
33	1308.96
34	1363.01
35	1417.27
36	1471.68
37	1526.22
38	1580.84
39	1635.48
40	1690.12
41	1744.7
42	1799.18
43	1853.53
44	1907.68
45	1961.61
46	2015.27
47	2068.61
48	2121.58
49	2174.15
50	2226.26
51	2277.88
52	2328.94
53	2379.41
54	2429.24
55	2478.37
56	2526.75
57	2574.34
58	2621.08

Rush-Overland Manufacturing
Stick Chart
Tank Volume Versus Liquid Depth

Tank Diameter (in.)	78
Tank Length, includes straight flanges (in.)	138
Shell Thickness (in.)	0.25
Total Tank Volume (gal)	2900
Volume In Each Head (gal)	172
Total Volume (gal)	3244
distance from lip of access hatch to top of tank (in):	4.8
distance from lip of access hatch to top of tank (ft):	0.40

LNAPL Volume Calculator

depth to product (from lip of access hatch; ft):	3.5
Depth to water (from lip of access hatch; ft):	3.62
depth to product (from lip of access hatch; in):	42
Depth to water (from lip of access hatch; in):	43.44
combined depth product + water (in.):	40.8
depth of water (in.):	39.36
volume at product thickness (gal)	1,733.78
volume at water thickness (gal)	1,655.15
Product Volume (gal)	**78.63**
Water volume (gal)	**1,655.15**



59	2666.9
60	2711.76
61	2755.59
62	2798.33
63	2839.91
64	2880.27
65	2919.32
66	2956.99
67	2993.18
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70	3091.9
71	3121.1
72	3148.19
73	3172.96
74	3195.15
75	3214.37
76	3230.06
77	3241.06
78	3244

Port of Seattle Terminal 30 LNAPL Removal Event (November 11, 2021)

		First Removal						Post Removal				Second Removal					Third Removal					End of Day				
Location	Time of Gaging	Initial Depth to LNAPL (Feet TOC)	Initial Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Estimated Total Fluid Removal (Gallons)	Time of Gaging	Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Time of Gaging	Pre-Removal Depth to LNAPL (Feet TOC)	Pre-Removal Depth to Water (Feet TOC)	LNAPL Extraction Duration (Minutes)	Extraction Start/End Times (Approx.)	Pre-Removal Depth to LNAPL (Feet TOC)	Pre-Removal Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time of Gaging	End of Day Depth to LNAPL (Feet TOC)	Depth to Water (Feet TOC)	LNAPL Thickness (Feet)	Time Lapse Since Extraction (minutes)
MW-35	1800	NL	8.82	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1800	NL	8.82	---	---
MW-36	1810	NL	9.15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1810	NL	9.15	---	---
MW-36A	1830	NL	9.45	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1830	NL	9.45	---	---
MW-39A	1805	NL	9.06	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1805	NL	9.06	---	---
MW-59	1700	8.15	8.35	0.20	20	1900-1920	NM	1905	NL	9.05	---	---	---	---	---	---	---	---	---	---	---	1905	NL	9.05	---	125
MW-89 [3]	1925	NL	9.40	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1925	NL	9.40	---	---
MW-93	1838	NL	9.30	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1838	NL	9.30	---	---
RW-1	1845	8.63	8.78	0.15	20	2020-2040	NM	2110	NL	9.90	---	---	---	---	---	---	---	---	---	---	---	2030	NL	9.90	---	30
RW-12	1530	9.35	9.65	0.3	40	1600-1640	NM	1900	9.41	9.42	0.01	10	2050-2100	2105	9.41	9.42	---	---	---	---	---	2050	NL	10.11	---	250
RW-101	1642	NL	7.95	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1642	NL	7.95	---	---
RW-102	1610	NL	8.33	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1610	NL	8.33	---	---
RW-103	1605	8.26	8.87	0.61	60	1650-1750	NM	1910	8.31	8.32	0.01	10	2105-2115	2120	8.31	8.32	---	---	---	---	---	2120	NL	8.67	---	300
RW-104	1725	8.11	8.12	0.01	20	1930-1950	NM	1952	NL	9.76	---	---	---	---	---	---	---	---	---	---	---	1952	NL	9.76	---	147
RW-105	1700	NL	8.91	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1700	NL	8.91	---	---
RW-106	1635	8.25	9.30	1.05	60	1755-1855	NM	1910	NL	8.87	---	---	---	---	---	---	---	---	---	---	---	1910	NL	8.87	---	275
RW-107	1525	9.04	9.06	0.02	20	1530-1550	NM	1605	NL	9.94	---	---	---	---	---	---	---	---	---	---	---	1605	NL	9.94	---	80
RW-108	1800	NL	8.39	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1800	NL	8.39	---	---
RW-109	1755	NL	8.61	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1755	NL	8.61	---	---
RW-110	1750	8.87	8.88	0.01	20	1955-2015	NM	1926	NL	8.92	---	---	---	---	---	---	---	---	---	---	---	1926	NL	8.92	---	176
VACUUM TRUCK MEASURED AND APPROXIMATED TOTALS[9]:							**NM**																			
COMBINED APPROXIMATED TOTALS IN VACUUM TRUCK (INCLUDING HOLDING TANK)[10]:							**2122**																			
COMBINED APPROXIMATED TOTALS A MEASURED BY DH on 11/12/2021							**2102.51**																			

Notes:
1. Feet TOC = Feet below top of well casing.
2. LNAPL = Light Non-Aqueous Phase Liquid
3. Groundwater measurements taken at throughout the evening
4. NL = LNAPL not detected using interface probe.
5. For drum vacuumed wells, total removals calculated from drum volumes from each well post-recovery at each well.
6. NA - Not Available (not able to detect or measure)
7. TRACE, MINOR, VERY TRACE - Indications of LNAPL present, but no accurate measurement or below measurable amount.
8. MW-35 total depth tagged at 13.90-ft TOC.
9. DH Vacuum Truck removal volumes only (stick measured in vac truck tank).
10. Approximately 163-gallons of oily water (total fluids) in the holding tank prior to removal.

Red wells extracted by DH Environmental with vacuum truck.

DH Environmental - Vac Truck Volume Estimator

Project: Terminal 30
Date: 11/11/2021

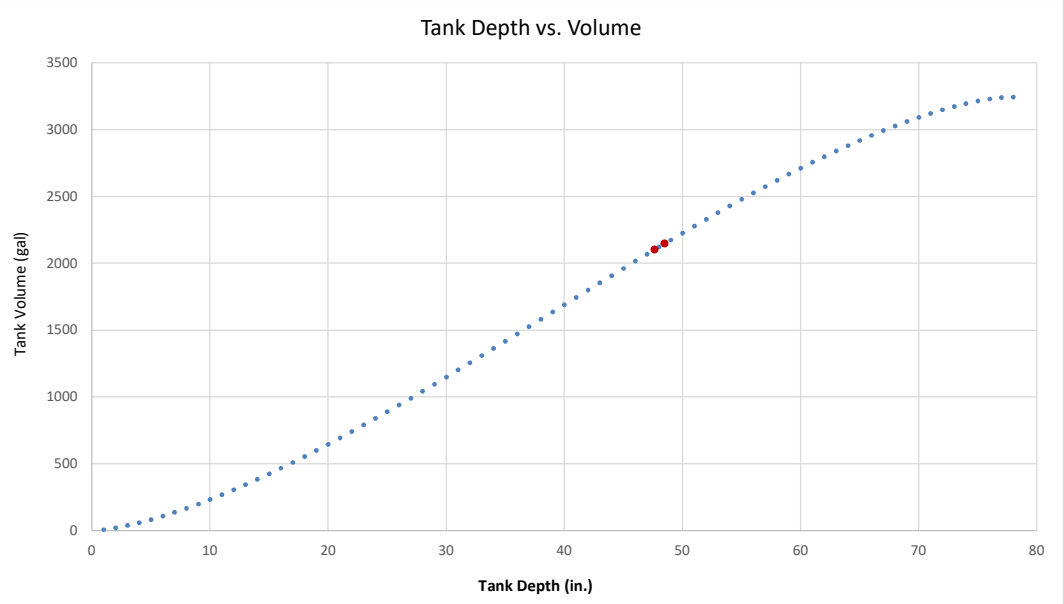
Inch	Gallons
1	7.37
2	20.93
3	38.48
4	59.24
5	82.76
6	108.72
7	136.89
8	167.08
9	199.15
10	232.94
11	268.37
12	305.31
13	343.68
14	383.39
15	424.37
16	466.54
17	509.83
18	554.18
19	599.53
20	645.82
21	692.99
22	740.98
23	789.75
24	839.23
25	889.38
26	940.16
27	991.5
28	1043.37
29	1095.72
30	1148.5
31	1201.66
32	1255.16
33	1308.96
34	1363.01
35	1417.27
36	1471.68
37	1526.22
38	1580.84
39	1635.48
40	1690.12
41	1744.7
42	1799.18
43	1853.53
44	1907.68
45	1961.61
46	2015.27
47	2068.61
48	2121.58
49	2174.15
50	2226.26
51	2277.88
52	2328.94
53	2379.41
54	2429.24
55	2478.37
56	2526.75
57	2574.34
58	2621.08

Rush-Overland Manufacturing
Stick Chart
Tank Volume Versus Liquid Depth

Tank Diameter (in.)	78
Tank Length, includes straight flanges (in.)	138
Shell Thickness (in.)	0.25
Total Tank Volume (gal)	2900
Volume In Each Head (gal)	172
Total Volume (gal)	3244
distance from lip of access hatch to top of tank (in):	4.8
distance from lip of access hatch to top of tank (ft):	0.40

LNAPL Volume Calculator

depth to product (from lip of access hatch; ft):	2.86
Depth to water (from lip of access hatch; ft):	2.93
depth to product (from lip of access hatch; in):	34.32
Depth to water (from lip of access hatch; in):	35.16
combined depth product + water (in.):	48.48
depth of water (in.):	47.64
volume at product thickness (gal)	2,146.81
volume at water thickness (gal)	2,102.51
Product Volume (gal)	**44.30**
Water volume (gal)	**2,102.51**



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73	3172.96
74	3195.15
75	3214.37
76	3230.06
77	3241.06
78	3244

Appendix F

Groundwater Sampling

Field Forms

Port of Seattle, Terminal 30
4/3/21 Semi-Annual GW Sampling R. Jones
1550 At Crete office. Gather field equipment and supplies
1614 Departing Crete office for Terminal 30 (T30).
~1621 Arrive at T30
1625 Arrive at well-field.

Equipment List

- LDPE and silcone tubing, nitrile gloves
- Geotech GeoPump peristaltic pump (Field# U92068X)
- Heron Instruments H.OIL oil/water interface meter (SN 01-7584, Field# U93314X)
- Horiba U-52 WQM ~~(2Fut~~ RJ (Field# U70497X)

See separate calibration data sheet.

1630-1650 At MW-59 to gage and sampled
*DTP ~9.00, *DTW ~9.04 ft BTOC
* Difficulty obtaining accurate DTP and DTW measure, due to emulsified oil (?) or aerated water/oil or something (moving interface). (SVE/AS remediation system has been OFF for >24 hours) R
No sample due to LNAPL present.
1655 At RW-11A, setup to micro-purge and sample.
See separate GWS forms for all wells.
1750 Sample time for RW-11A-0421 RJ
~1800 Setting up on MW-89 (tiday influenced well) (optimal window ~130 minutes post LLT)
Today's LLT is -0.9ft @ 1622
1840 Sample time for MW-89-0421 (collected duplicate DUP-0421, time stamp 1700)
1850 Pack up GWS equipment and supplies, consolidate purge IDW to Remediation System holding tank (~11-12 liters total). RJ
~1859-1910 Power up and turn on Remediation System post-GW sampling activities. RJ
~1917 Making way off Terminal 30. RJ
~1930 At Crete office to unload all equipment and supplies. RJ
HOLD ONTO SAMPLES OVER WEEKEND ON ICE.

R. Jones 4/3/2021

PAGE NOT USED

R. Jones 4/3/21

P.S T30 4/3 GWS

FIELD ENVIRONMENTAL INSTRUMENTS, INC.
www.fieldenvironmental.com

301 Brushton Ave
Suite A
Pittsburgh, PA 15221
Toll Free (800) 393-4009
Local (412) 436-2600
Fax (412) 436-2616

	Lot #	Expiration
Horiba Auto-Cal Solution	7005360	6/2/2022

		Reading	Acceptable Range
Cal Standard PH 4 @ 25°		4.00	(3.96 - 4.04)
Cal Standard Conductivity		Reading ms/cm: 4.48	(4.31 - 4.58)
Cal Standard Turbidity	0 NTU	Reading NTU: 0.0	(-2 - +2)
	100 NTU	100.0	(95 - 105)

	Reading mg/L
Dissolved Oxygen 100% Saturation	9.40
0% Saturation	0.00

	Lot #	Expiration	Reading	Acceptable Range
Cal Standard PH 7 @ 25°	7912260.00	12/1/2021	7.00	(6.93 - 7.07)
Cal Standard PH 10 @ 25°	7911113.00	11/1/2021	10.00	(9.9 - 10.1)

	Temp °	Relative Reading	Acceptable Range
Check Standard ORP	20.0	220.0	(+/- 15mV)

☑ ORP pin in place

*Solutions provided by LabChem (412-826-5230)

Model	U-52-2
S/N	
Sonde	U89744X
Barcode	U70497X
Order #	452552

Calibrated By: Don Redeen

Date of Calibration: 4/1/2021

All calibrations performed by FEI conform to manufacturer's specifications. Please report any issues within 24 hours of receiving equipment.
All calibration solutions used are traceable to NIST. Additional documentation is available upon request.

SITE ID: Port of Seattle, Terminal 30 **WELL ID:** MW-59

Groundwater Sampling Field Data Sheet

Project Number: Semi-Annual GW Sampling, April 2021 Date: 4/3/2021

Casing Diameter (in)	Screened Interval (ft BGS)	Recommended Flow Rate for Well
2		
Total Depth of Well (ft BTOC) — NM —	Purge Equipment	Sample Equipment
Initial Static Water from (ft BTOC) ~9.04	Depth of Sample Intake (ft BTOC)	Analytical Equipment
Product Level from (ft BTOC) ~9.00	Total Time Purged	Additional Details *Aerated water or emulsified oil causing trouble obtaining accurate Depth to water & oil measurements.*
Length of Water Column (ft)	Pump Setting	
1 Well Volume (gal)		

Time	Depth to Water (ft BTOC)	Flow Rate (mL/min)	Temp (°C)	SpC (ms/cm)	ORP (mV)	DO (mg/L)	pH (S.U.)	Turbidity (NTU)
1635	~9.04	—	Not Sampled (LNAPL present)					

Sample ID: Not Sampled	Sample Date: ~~4/3/2021~~ AJ	Sample Time:
Observations: *Difficulty obtaining accurate DTP and DTW readings (aerated or emulsified water/oil in well → inconsistent)		
Analytical Parameters:		
Disposition of Purged Water:	Sampler Name & Date R. Jones 4/3/2021	

SITE ID: Port of Seattle Terminal 30 **WELL ID:** RW-11A

Groundwater Sampling Field Data Sheet

Project Number: Semi-Annual GW Sampling, April 2021 Date: 4/3/2021

Casing Diameter (in)	Screened Interval (ft BGS)	Recommended Flow Rate for Well
4		≤150 mL/min
Total Depth of Well (ft BTOC)	**Purge Equipment**	**Sample Equipment**
19.82 (reported)	GeoPump peristaltic pump	New LDPE + silicone tubing
Initial Static Water from (ft BTOC)	**Depth of Sample Intake (ft BTOC)**	**Analytical Equipment**
9.37	~2-3 ft from bottom	Horiba U-52 w/QM
Product Level from (ft BTOC)	**Total Time Purged**	**Additional Details**
— No Product —	33+ minutes	
Length of Water Column (ft)	**Pump Setting**	
10.45		
1 Well Volume (gal)		
~1.78		

Time	Depth to Water (ft BTOC)	Flow Rate (mL/min)	Temp (°C)	SpC (ms/cm)	ORP (mV)	DO (mg/L)	pH (S.U.)	Turbidity (NTU)	TDS (g/L)
1715	9.37	Begin micropurge. Filling flow cell.						RF	—
1720	Re-start micropurge. Mitigate leaky flow cell.							RF	—
1724	9.70	Decreasing ~250	18.06	1.09	-58	1.42	6.58	17.8	0.689
1728	9.79	≤200	18.03	1.02	-39	0.40	6.53	11.8	0.649
1732	9.84	Decreasing	17.93	1.01	-26	0.24	6.50	4.1	0.649
1736	9.85	150-200	17.88	1.01	-20	0.15	6.47	4.6	0.648
1740	9.87	↓	17.85	1.02	-20	0.10	6.48	4.8	0.652
1744	9.89		17.82	1.03	-29	0.05	6.48	6.0	0.657
1748	9.91		17.80	1.03	-33	0.03	6.47	6.6	0.658

Sample ID:	Sample Date:	Sample Time:
RW-11A-0421	4.3.2021	1750
Observations:		
Analytical Parameters:	BTEX/TPH-Gx, TPH-Dx w/ SGC	
Disposition of Purged Water:	**Sampler Name & Date**	
Clear, no appreciable odors	K. Jones 4.3.21	

SITE ID: Port of Seattle Terminal 30 **WELL ID:** MW-89

Groundwater Sampling Field Data Sheet

Project Number: Semi-Annual GW Sampling, April 2021 Date: 4.3.2021

Casing Diameter (in)	Screened Interval (ft BGS)	Recommended Flow Rate for Well
2		
Total Depth of Well (ft BTOC)	**Purge Equipment**	**Sample Equipment**
19.89	GeoPump peristaltic pump	new LDPE + silicone tubing
Initial Static Water from (ft BTOC)	**Depth of Sample Intake (ft BTOC)**	**Analytical Equipment**
10.42	~17.00 (approx.)	Horiba U-52 WQM
Product Level from (ft BTOC)	**Total Time Purged**	**Additional Details**
— No product —	26+ minutes	
Length of Water Column (ft)	**Pump Setting**	
9.47		
1 Well Volume (gal)		
~1.6		

Time	Depth to Water (ft BTOC)	Flow Rate (mL/min)	Temp (°C)	SpC (ms/cm)	ORP (mV)	DO (mg/L)	pH (S.U.)	Turbidity (NTU)	TDS (g/L)
18.12	10.42	Begin micropurge. Filling flow cell.							—
1814	10.65	~275	19.33	2.49	132	4.97	4.02	51.3	1.61
1818	10.76	Decreasing	19.96	2.57	245	4.11	4.03	42.5	1.64
1822	10.60	≤175	20.05	2.56	296	3.96	4.02	31.7	1.64
1826	10.68	↓	20.07	2.54	318	3.81	4.05	15.9	1.62
1830	10.69	↓	20.12	2.51	328	3.65	4.07	7.9	1.60
1834	10.69	↓	20.15	2.48	339	3.54	4.10	6.0	1.59
1838	10.70	↓	20.13	2.47	348	3.61	4.12	3.9	1.58

Sample ID: MW89-0421	Sample Date: 4.3.2021	Sample Time: 1840
Observations: DUP-0421 collected duplicate of MW-89-0421 (used 1700 as time)		
Analytical Parameters: BTEX/TPH-G, TPH-Dx w/ SGC		
Disposition of Purged Water: Clear, no appreciable odors	Sampler Name & Date: R. Jones 4.3.21	

SAMPLE CHAIN OF CUSTODY

Page # 1 of 1

Report To R. Jones, J. Stevens

Company Crete Consulting

Address 108 S. Washington, Ste. 300

City, State, ZIP Seattle, WA 98104

Phone ______ Email ______

SAMPLERS (signature) Rusty Jones R. Jones	
PROJECT NAME Port of Seattle, Terminal 30	PO #
REMARKS	INVOICE TO

TURNAROUND TIME
☒ Standard Turnaround
☐ RUSH ______
Rush charges authorized by: ______

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Archive Samples
☐ Other ______

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM					Notes
RW-11A-0421		4/3/2021	1750	WATER	4		X	X	X								with SGC
MW-89-0421		↓	1840	↓	4		X	X	X								↓
DUP-0421		↓	1700	↓	4		X	X	X								↓

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	4/5/21	1314
Received by: [signature]	Nhan Phan	F&BI	4/5/21	1314
Relinquished by:				
Received by:				

AECOM

DATE 10/14/21

DAY | S | M | T | W | (TH) | F | S |

WEATHER	BRIGHT SUN	CLEAR	(OVERCAST)	RAIN	SNOW
TEMP	To 32	32-50	(50-70)	70-85	85 up
WIND	Still	(Moder)	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

PROJECT MANAGER: Paul Calina

PROJECT: T-30 P.O.S

JOB NO.:

AECOM FIELD REP: A. Utter

SUB-CONTRACTORS ON SITE: N/A

EQUIPMENT ON SITE: X2 Heriba X2 P-pump X2 o/w Interface X1 P.I.D

WORK PERFORMED:

0730 AU, BD arrive onsite, conduct daily HTS meeting, safety observation: working during longshore man operation. use proper mitigation to block job site

0800 Arrive at MW-89, meet Jeff Hidalgo (SSA marine)

0810 Setup on MW-89 begin purging.

0839 Sampled MW-89-1021 @ 0839 5 bottles

0900 Begin system OM, see field form for values

1000 offsite until evening sampling event.

1515 Arrive @ site shut down system

1600 Locate wells to sample.

1620 P.K. calls to discuss system alarms. C.B & G.F. join to troubleshoot

1645 BD gets up on MW-39A

1700 AU sets up on MW-42

1735 Sampled MW-42-1021 @ 1735

1725 Sampled MW-39A @ 1725

1755 Setup on RW-9 & RW-11A

1839 Sampled RW-11-1021 @ 1839

1840 Sampled RW-9-1021 @ 1840

1900 setup on MW-36A & MW-59

1905 MW-59 contains product, will not sample.

1933 Sampled MW-36A-1021 @ 1933

1950 Dump purge water ~ 10.25 gallons, restart AS/SVE System & head offsite Notify P.K of departure

Note: o/w interface did not register product However when probe was brought up there was visual product on the body of the probe. Could be from well casing having product caked on.

BY TITLE

SHEET ____ OF ____

AECOM

Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics. **This meeting is a daily refresher, not a full orientation.** Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: Karen Mixon
Phone Number:

AECOM SH&E Rep. Name: Tim Giles
Phone Number:

Meeting Leader: Anders Utter

Date: 10/14/21	Project Name/Location:	Project Number:

Today's Scope of Work:

GWM - T-30

Muster Point Location:	First Aid Kit Location:	Fire Extinguisher Location:	Spill Kit Location:
System	Cornet	Cornet	Cornet

1. Required Topics

- [x] Fitness for Duty requirements, all sign in / sign out
- [x] Required training (incl. task specific) completed and current
- [x] SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
- [x] Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting
- [x] STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- [x] Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- [x] Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- [x] Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- [x] Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- [x] Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- [x] Required checklists/records available, understood (describe):
- [ ] Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

Check [x] as reviewed or mark [■] as not applicable

- [x] [ ] Biological/ Chemical / Electrical Hazards
- [x] [ ] Ergonomics - Lifting, Body Position
- [x] [ ] Lock Out/ Tag Out
- Short Service Employees - visual identifier and mentor/ oversight assignment
- [x] [ ] Simultaneous/ Neighbouring Operations
- [x] [ ] Slip/ Trip/ Fall Hazards
- [ ] [x] Specialized PPE Needs
- [ ] [x] Traffic Control
- [ ] [x] Waste Management/ Decontamination
- [ ] [x] Weather Hazards / Heat Stress / Cold Stress
- [ ] [x] Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- [ ] [x] Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- [ ] [ ] Other Topics (describe/attach):
- [ ] [ ] Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:
NA	NA

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	Signature	Date / Time (at end of day / shift)
Anders Utter	A Utter	Date 10/14/21 Time 2000

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
Anders Utter AECOM	AU	In & Fit 0730 AU	Out & Fit 2000 AU
Bryan Dabb AECOM	BD	In & Fit 0730 BD	Out & Fit 2000 BD
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

GROUNDWATER SAMPLING LOG

AECOM

PROJECT NAME T-3c
PROJECT NO.
DATE 10/14/21

WELL NO. 39A
SAMPLED BY BD
WEATHER

WELL INFORMATION			
DEPTH TO WATER	9.40	(ft) TOC	
DEPTH OF WELL	20	(ft)	
WELL DIAMETER	2"	(inches)	
FEET OF WATER	10.20		
WELL CONDITION	Good		
PUMP ADJUSTMENT	12'	(ft)	NOTE: Only on Shallow Wells

Comments

Instrument ID 25341 Horiba U-52
Instrument ID 40206 Solinst IP (200ft)

PURGE DATA									
START PURGE TIME: 1645									
TIME	1650	1655	1700	1705	1710	1715	1720	1725	
DTW (Ft-TOC)									
FLOW RATE (mL/min)									
TEMPERATURE (°C)	20.57	20.52	20.31	20.32	20.39	20.43	20.45	20.44	
CONDUCTIVITY (uS/cm)	1.13	1.14	1.12	1.12	1.12	1.12	1.12	1.12	
D. O. (mg/L)	2.08	0.88	0.53	0.31	0.09	0	0.12	0.13	
pH (units) (units)	6.94	7.00	7.08	7.10	7.13	7.18	7.23	7.25	
ORP (mv)	-98	-113	-125	-129	-133	-137	-141	-142	
TURBIDITY (NTU)	96.7	72.2	39.0	22.4	13.9	6.7	2.7	3.8	

PURGE DATA Continued from Above									
TIME									
DTW (Ft-TOC)									
FLOW RATE (mL/min)									
TEMPERATURE (°C)									
CONDUCTIVITY (uS/cm)									
D. O. (mg/L)									
pH (units) (units)									
ORP (mv)									
TURBIDITY (NTU)									
PURGE AND SAMPLE EQUIPT:	Dedicated QED pump								

SAMPLE NUMBER	SAMPLE TIME	ANALYSIS	CONTAINER	# BOTTLES	PRESERVATIVE
MW-39A-1021	1725	NWTPH-G/BTEX, NWTPH-Dx	1 L AMBER	2	HCl
			40 mL VOA	3	HCl

ADDITIONAL INFORMATION:

TOC=Top of well casing
wl.prot.=top of well protector
Turbidity: Less than 5 NTU or +/- 10%
DO: +/-10%
Sp Cond: +/- 3%
Temp: +/- 3%
pH: +/- 0.1 standard units
ORP: +/- 10 millivolts

Additional comments:

GROUNDWATER SAMPLING LOG

AECOM

PROJECT NAME T-30 | WELL NO. RW-9
PROJECT NO. | SAMPLED BY BD
DATE 10/14/21 | WEATHER

WELL INFORMATION			
DEPTH TO WATER	9.33	(ft) TOC	
DEPTH OF WELL	20'	(ft)	
WELL DIAMETER	6"	(inches)	
FEET OF WATER	10.67		
WELL CONDITION	OK - buried in Pit		
PUMP ADJUSTMENT	17'	(ft)	NOTE: Only on Shallow Wells

Comments

Instrument ID 25341 Horiba U-52
Instrument ID 40206 Solinst IP (200 ft)

PURGE DATA													
START PURGE TIME:	1800												
TIME		1805	1810	1815	1820	1825	1830	1835	1840				
DTW	(Ft-TOC)	9.33											
FLOW RATE	(mL/min)	150	150	150	150	150	150	150					
TEMPERATURE	(°C)	20.08	21.60	22.81	23.15	23.14	23.20	23.24	23.26				
CONDUCTIVITY	(uS/cm)	1.14	1.11	1.10	1.10	1.10	1.10	1.10	1.10				
D. O.	(mg/L)	1.52	0.53	0.14	0	0	0	0	0				
pH (units)	(units)	7.17	6.97	7.00	6.99	7.06	7.10	7.13	7.13				
ORP	(mv)	-73	-81	-89	-91	-99	-102	-106	-107				
TURBIDITY	(NTU)	50.7	43.8	30.8	28.3	18.6	10.8	4.4	5.1				
PURGE DATA Continued from Above													
TIME													
DTW	(Ft-TOC)												
FLOW RATE	(mL/min)												
TEMPERATURE	(°C)												
CONDUCTIVITY	(uS/cm)												
D. O.	(mg/L)												
pH (units)	(units)												
ORP	(mv)												
TURBIDITY	(NTU)												
PURGE AND SAMPLE EQUIPT:		Dedicated QED pump											

BD 10/14/21

SAMPLE NUMBER	SAMPLE TIME	ANALYSIS	CONTAINER	# BOTTLES	PRESERVATIVE
RW-9-1021	1840	NWTPH-G/BTEX, NWTPH-Dx	1 L Amber	2	HCl
			40 mL VOA	3	HCl

ADDITIONAL INFORMATION:

TOC=Top of well casing
wl.prot.=top of well protector
Turbidity: Less than 5 NTU or +/- 10%
DO: +/-10%
Sp Cond: +/- 3%
Temp: +/- 3%
pH: +/- 0.1 standard units
ORP: +/- 10 millivolts

Additional comments:

GROUNDWATER SAMPLING LOG

AECOM

PROJECT NAME T-30
PROJECT NO.
DATE 10/14/21

WELL NO. MW-59
SAMPLED BY BD
WEATHER

WELL INFORMATION			
DEPTH TO WATER	9.29	(ft) TOC	
DEPTH OF WELL	20'	(ft)	
WELL DIAMETER	2"	(inches)	
FEET OF WATER			
WELL CONDITION	Good		
PUMP ADJUSTMENT	12'	(ft)	NOTE: Only on Shallow Wells

Comments

Instrument ID 25341 Horiba U-52
Instrument ID 40206 Solinst IP (200 Ft)

PURGE DATA													
START PURGE TIME: 1916													
TIME		1915											
DTW	(Ft-TOC)												
FLOW RATE	(mL/min)	150											
TEMPERATURE	(°C)	19.44											
CONDUCTIVITY	(uS/cm)	0											
D. O.	(mg/L)	26.16											
pH (units)	(units)	7.33											
ORP	(mv)	-50											
TURBIDITY	(NTU)	227											
PURGE DATA Continued from Above													
TIME													
DTW	(Ft-TOC)												
FLOW RATE	(mL/min)												
TEMPERATURE	(°C)												
CONDUCTIVITY	(uS/cm)												
D. O.	(mg/L)												
pH (units)	(units)												
ORP	(mv)												
TURBIDITY	(NTU)												
PURGE AND SAMPLE EQUIPT:		Dedicated QED pump											

SAMPLE NUMBER	SAMPLE TIME	ANALYSIS	CONTAINER	# BOTTLES	PRESERVATIVE
MW-59-1021		NWTPH-G/BTEX, NWTPH-Dx			

ADDITIONAL INFORMATION:

TOC=Top of well casing
wl.prot.=top of well protector
Turbidity: Less than 5 NTU or +/- 10%
DO: +/-10%
Sp Cond: +/- 3%
Temp: +/- 3%
pH: +/- 0.1 standard units
ORP: +/- 10 millivolts

Additional comments:

Product Detected Stop purging.

9.35 product – 10.70 water

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 10/12/2021 3:58:03PM

Manufacturer Solinst
Model Number N/A
Serial Number/ Lot Number 312227
Location Seattle
Department

State Certified
Status Pass
Temp °C 16
Humidity % 44

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 Stethan Holmes

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 QC/ PACKING LIST

Description	Solinst 122 Oil/ Water Interface Meter
Instrument ID	402206
Cable length	200 FT
Cable unit of measure	☐ Metric ☑ Imperial
Date Prepared	12 Oct 2021

PINE
www.pine-environmental.com

Standard Items	**Prepared**	**QC check**	**Received by customer**	**Returned to Pine**
(2) 9V Alkaline battery, spare	✓	✓		
Optional Items				
Carry case	✓	✓		
Tape guide	✓	✓		
Instructions	✓			
ProCal Inspection Report	✓	✓		

Prepared by: SGW
QC checked by: AA
Date: 12 OCT 2021

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC.

Solinst® Interface Meter Operating Instructions

Model 122

Operating Principle

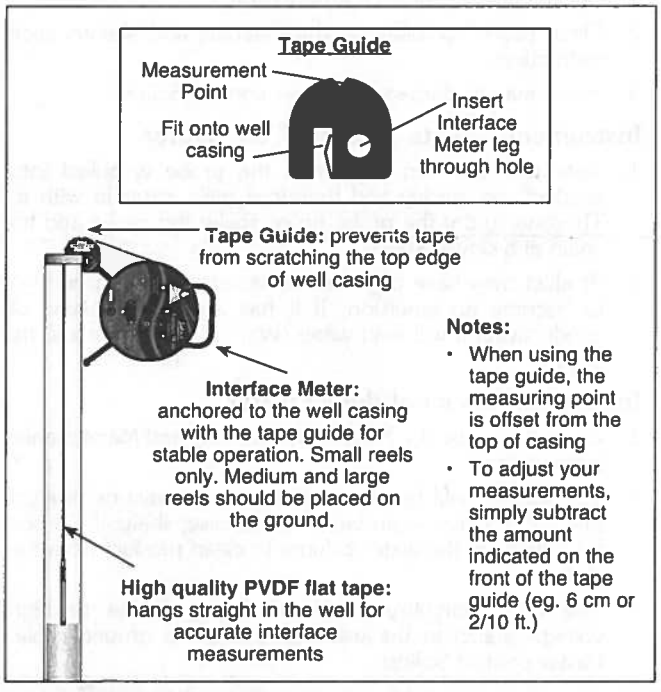
The Solinst Model 122 Interface Meter has a narrow 5/8" (16 mm) diameter probe and uses laser-marked PVDF flat tape. It is certified to CSA Standards, for use in hazardous locations Class 1, Div. 1, Groups C & D T3C, and is ATEX certified under directive 94/9/EC, as II 3 G Ex ic IIB T4 Gc. It has an infra-red circuit which detects the presence of a liquid. A conductivity circuit differentiates between conductive liquid (water) and non-conductive liquid (LNAPL or DNAPL product).

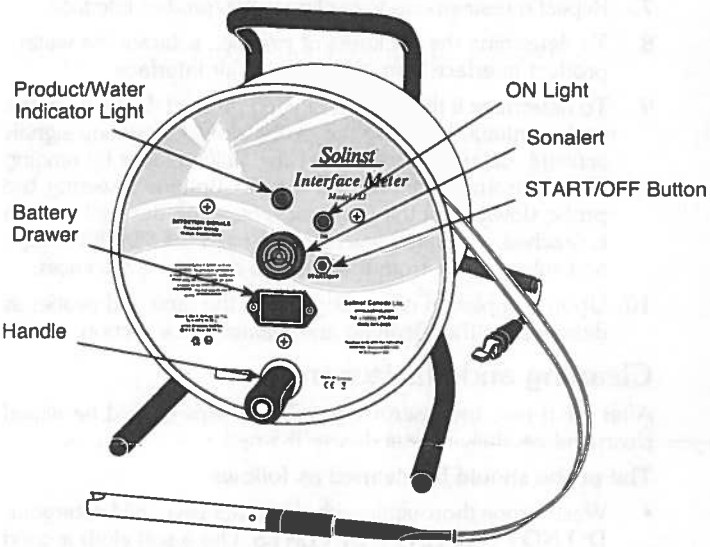
Equipment Check

Before beginning any measurements, check the electronics and battery condition by pushing the 'START/OFF' button. Five quick beeps with the green light flashing, indicates that the meter is functional. A flashing green light every second indicates the meter is on. It will automatically turn off after 5 minutes to preserve battery life.

Using the Tape Guide

1. The tape guide has been designed to: improve accuracy when reading interface measurements; to prevent the laser-marked PVDF flat tape being cut by well casing; and to allow the tape and probe to hang straight from the side of the well.
2. If interface measurements are being taken in a 2" dia well, then simply fit the small end of the tape guide onto the edge of the well casing.
3. Insert the leg of the Interface Meter into the hole on the Tape Guide (small reels only).
4. Once inserted, rest the Interface Meter on the side of the well casing.





Field Measurements

IMPORTANT

1. To meet safety requirements and to protect the electronics from damage, always ground the meter by attaching the grounding clip to the metal well casing or to a suitable ground rod.
2. Push the 'START/OFF' button. Five brief tones and green light indicate that the meter is functional and the flashing green light indicates that the meter is on. The meter automatically turns off after 5 minutes. Press the 'START/OFF' button as necessary during operation to turn the meter back on.
3. Place the slotted part of the tape guide onto the edge of the well casing. Lay the Interface Meter laser-marked PVDF flat tape into the groove on the top of the tape guide. Measurements are read at the V-notch on the tape guide.

Note: When using the tape guide, remember to subtract the compensation factor stamped onto the side of the guide from each measurement.

4. A steady tone and red light indicates a non-conductive liquid (e.g. product). An intermittent tone and red light indicates a conductive liquid (e.g. water).
5. For floating product (LNAPL), take the air/product interface measurement on the way into the liquid, and the water/product interface on the way up. When passing through product into water, some product may adhere to the probe sensors due to surface tension. Therefore, when water is detected below product, the probe should be raised and lowered rapidly in a short vertical motion to remove any product that may have been carried down with the probe.

Continued overleaf...

6. The water/product interface should then be measured as the probe is raised very slowly back up. Once the interface is detected the probe can be raised and lowered in small increments to precisely determine the interface.
7. Repeat measurements to confirm water/product interface.
8. To determine the thickness of product, subtract the water/product interface from the product/air interface.
9. To determine if there is any sinking product (DNAPL) in the well, continue lowering the probe slowly. If steady signals activate, determine the top of the sinking layer by reading directly from the PVDF flat tape. Continue lowering the probe slowly until the tape slackens when the well bottom is reached. Read the level directly from the PVDF flat tape and subtract one from the other to determine thickness.
10. Upon completion of readings clean the tape and probe; as described in the Cleaning and Maintenance section.

Cleaning and Maintenance

After each use, the laser-marked PVDF tape should be wiped clean and carefully rewound onto the reel.

The probe should be cleaned as follows:

- Wash probe thoroughly with a non-abrasive mild detergent. **DO NOT USE ANY SOLVENTS**. Use a soft cloth around the pins on the end of the probe to remove all product. Use the brush provided to remove all product from inner part of the probe.

  USE LUKE-WARM, NOT HOT WATER. DAMAGE TO THE PROBE MAY RESULT.
- Rinse probe thoroughly with distilled water, wipe dry.
- Return the probe to the holder.

Other suitable cleaning method:

- Steam clean the PVDF flat tape only.

Battery Replacement

Push the battery drawer in and up and then release. The battery drawer should eject slightly, allowing it to be pulled out. Replace the 9V alkaline battery.

Other General Tips:

1. The probe should be cleaned after each use.
2. Always use the grounding cable.
3. Do not drop probe: damage to probe tip may result.
4. If battery is weak, the start tone will not sound, and flashing "green" light will be off. Replace the 9V alkaline battery.
5. Where possible, use a Solinst tape guide to protect the tape from scraping on well casing.
6. Before storage, make sure the meter is turned off. If the Interface Meter is going to be stored for longer than two months, the 9V alkaline battery should be removed to avoid potential leakage.
7. The meter can be checked by placing the probe in distilled (non-conductive) water or pure phase product, for example lamp oil (**avoid bright sunlight during testing and resting the probe on the bottom of the container**). A steady tone and light should be observed.
8. To maintain Intrinsic Safety Certifications, do not splice the tape.

Note: In rare circumstances it is possible that the 122 might sound when directed toward sunlight, and not in a liquid. This is normal and does not affect proper operation in a monitoring well.

Troubleshooting

When instrument is turned 'ON' there is a solid red light (no tone)

1. Indicates a connection issue. Contact Solinst for further troubleshooting options.

Instrument will not turn 'ON' (no starting tone)

1. Replace the battery
2. Check the polarity of the battery in the drawer: make sure the + and - on the battery and the drawer match. The probe may be harmed by a reversed battery.
3. ON/OFF button could be faulty. Contact Solinst.

When instrument is turned 'ON', it immediately sounds product tone or intermittent water tone

1. Probe sensor may be dirty. Clean according to Cleaning and Maintenance instructions.
2. Water may have leaked into the probe. Carefully, remove the probe, keeping the wires connected. Dry out the probe, wipe and inspect the o-ring, replace if necessary and/or lubricate with silicone. To avoid any nicks, make sure the wires are tucked back into the probe body when replacing the probe. See Probe Replacement Instructions.
3. Tape may be damaged. Clean the tape and look for any cuts or nicks. If necessary, replace the damaged tape. To maintain the 122 Intrinsic Safety rating, do not splice or repair a damaged tape. Contact Solinst for assistance.
4. The reel or probe circuitry could be damaged. Contact Solinst.

Instrument does not detect liquid

1. Check battery. Replace if necessary.
2. Clean probe tip following the Cleaning and Maintenance instructions.
3. Probe may be damaged. Please contact Solinst.

Instrument detects "Product" as "Water"

1. Note that this can happen if the probe is pulled into product too quickly and therefore pulls water in with it. Thoroughly dry the probe tip or shake the probe and try again at a slower speed.
2. Product may have degraded or is now disturbed enough to become an emulsion. If it has a detectable level of conductivity, it will read water. Wait for it to settle and try again.

Instrument does not detect water

1. Clean the probe tip. Follow the Cleaning and Maintenance instructions.
2. The water could be pure and non-conductive or product may be coating the probe, in which case, shake the probe for a while in the water column to clean product from the probe.
3. The probe circuitry could be damaged due to high voltage (static) in the well. Always use a ground cable. Please contact Solinst.

For further information contact: Solinst Canada Ltd.
Fax: +1 (905) 873-1992; (800) 516-9081 Tel: +1 (905) 873-2255; (800) 661-2023
35 Todd Road, Georgetown, Ontario Canada L7G 4R8
Web Site: www.solinst.com E-mail: instruments@solinst.com

Solinst®

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 25341
Description Horiba U-52
Calibrated 10/12/2021 1:27:09PM

Manufacturer Horiba
Model Number U-5000
Serial Number/ Lot Number S3DY69D0
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 43

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	7.19	7.00	0.00%	Pass
4.00 / 4.00	PH	4.00	PH	3.93	4.00	0.00%	Pass

Group # 2
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
0.00 / 0.00	NTU	0.00	NTU	0.00	0.00	0.00%	Pass
800.00 / 800.00	NTU	800.00	NTU	736.00	800.00	0.00%	Pass

Group # 3
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
0.718 / 0.718	ms/cm	0.718	ms/cm	0.716	0.718	0.00%	Pass
5.000 / 5.000	ms/cm	5.000	ms/cm	4.860	5.000	0.00%	Pass
80.000 / 80.000	ms/cm	80.000	ms/cm	79.700	80.000	0.00%	Pass
0.000 / 0.000	ms/cm	0.000	ms/cm	0.000	0.000	0.00%	Pass

Group # 4
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	246.00	240.00	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 25341
Description Horiba U-52
Calibrated 10/12/2021 1:27:09PM

Group # 5
Group Name Temperature DO 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
18.00 / 18.00	degrees C	9.47	mg/L	7.42	9.47	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 AUTOCAL 21150206	SEA AUTOCAL AMCO Clear	GFS	8483	21150206		5/31/2022
SEA COND 0.718 - 0GJ991	Conductivity solution 0.718 mS/cm	AquaPhoenix Scientific	conductivity 0.718 mS/cm	0GJ991		10/30/2021
SEA COND 5 - 0GJ993	Conductivity solution 5.0 mS/cm	AquaPhoenix Scientific	conductivity 5.0 mS/cm	0GJ993		10/30/2021
SEA COND 80 - 0GJ1012	Conductivity solution 80.0 mS/cm	AquaPhoenix Scientific	conductivity 80.0 mS/cm	0GJ1012		10/30/2021
SEA NTU 800 U52 0GJ184	SEA 800 NTU for Horiba U52 and YSI only	AquaPhoenix Scientific	33039	0GJ184		10/31/2021
SEA ORP 240 1GC715	240 mV ORP Solution	AquaPhoenix Scientific	32001	1GC715		12/31/2021
SEA PH4 1GC758	pH 4 Buffer Solution	AquaPhoenix Scientific	32017	1GC758		3/30/2023
SEA PH7 1GD151	pH 7 Buffer Solution	AquaPhoenix Scientific	32025	1GD151		4/30/2023

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Jose Arroyo

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 25341
Description Horiba U-52
Calibrated 10/12/2021 1:27:09PM

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 29744
Description Horiba U-52 Display
Calibrated 10/12/2021 1:34:29PM

Manufacturer	Horiba	**State Certified**	
Model Number	U-5000	**Status**	Pass
Serial Number/ Lot Number	D6B3MVYP	**Temp °C**	17
Location	Seattle	**Humidity %**	43
Department			

Calibration Specifications

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

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

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

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Jose Arroyo

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

INSTRUMENT QC/ PACKING LIST

Description	Horiba U-52/ U-53
Sonde ID#	25341
Display ID#	29744
Date Calibrated	10-12-21

PINE
www.pine-environmental.com

Standard Items	Prepared	QC check	Received by customer	Returned to Pine
Horiba U-52/ 53 w/ 6 ' cable and display w/ case	✓	✓		
Manual	✓	✓		
Quick reference card	✓	✓		
(4) C Alkaline batteries	✓	✓		
Probe Guard	✓	✓		
Calibration cup (clear)	✓	✓		
Sample cup (Black)	✓	✓		
Flow cell	✓	✓		
• Cell body	✓	✓		
• Center window	✓	✓		
• Base and black bottom	✓	✓		
• O-ring cover	✓	✓		
• Threaded ring	✓	✓		
• (2) black O-rings	✓	✓		
• (1) red O-ring	✓	✓		
• 2 of each black barb sizes (1/4, 3/8, and 1/2)	✓	✓		
D.O. probe reconditioning kit	✓	✓		
330 internal pH reference solution (1)	✓	✓		
250 ml Autocal solution	✓	✓		
ProCal calibration sheet	✓	✓		
Optional Items				
U-50 Data Collection Software	✓	✓		
USB Cable	✓	✓		

Prepared by: JA
QC checked by: JAR
Date: 10-12-21

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC

GROUNDWATER SAMPLING LOG

AECOM

PROJECT NAME T-30
PROJECT NO.
DATE 10/14/21

WELL NO. MW-42
SAMPLED BY AH
WEATHER Overcast

WELL INFORMATION		
DEPTH TO WATER	10.08	(ft) TOC
DEPTH OF WELL	20	(ft)
WELL DIAMETER	2	(inches)
FEET OF WATER	9.92	
WELL CONDITION	Fair c/2 bolts	
PUMP ADJUSTMENT		(ft) NOTE: Only on Shallow Wells

Comments
intake 12' 5-20' screen
Hydrocarbon odor

Instrument ID 41955 Solinst IP (200 ft)
~~Horiba # 27762~~ Instrument ID 48409
↳ Horiba U-53

PURGE DATA													
START PURGE TIME:	1707												
TIME	1713	1718	1723	1728	1733	1738							
DTW (Ft-TOC)	10.88	10.79	〃	〃	〃	〃							
FLOW RATE (mL/min)	175	170	〃	〃	〃	〃							
TEMPERATURE (°C)	19.91	19.75	19.69	19.62	19.50	19.51							
CONDUCTIVITY (uS/cm)	1.98	1.93	1.92	1.91	1.89	1.87							
D. O. (mg/L)	0.81	0.47	0.40	0.33	0.34	0.30							
pH (units) (units)	-150	-158	-162	-166	-167	-168							
ORP (mv)	7.55	7.56	7.55	7.54	7.55	7.55							
TURBIDITY (NTU)	40.5	33.6	4.39	4.34	4.14	4.40							
PURGE DATA Continued from Above													
TIME													
DTW (Ft-TOC)													
FLOW RATE (mL/min)													
TEMPERATURE (°C)													
CONDUCTIVITY (uS/cm)													
D. O. (mg/L)													
pH (units) (units)													
ORP (mv)													
TURBIDITY (NTU)													
PURGE AND SAMPLE EQUIPT:	Dedicated QED pump												

← Uttoz 10-14-21

SAMPLE NUMBER	SAMPLE TIME	ANALYSIS	CONTAINER	# BOTTLES	PRESERVATIVE
MW-42-1021	1735	NWTPH-G/BTEX, NWTPH-Dx	1 L	2	
			VOA	3	

ADDITIONAL INFORMATION:

TOC=Top of well casing
w/ prot.=top of well protector
Turbidity: Less than 5 NTU or +/- 10%
DO: +/-10%
Sp Cond: +/- 3%
Temp: +/- 3%
pH: +/- 0.1 standard units
ORP: +/- 10 millivolts

Additional comments:

GROUNDWATER SAMPLING LOG

AECOM

PROJECT NAME T-30
PROJECT NO.
DATE 10/14/21

WELL NO. RW-11A
SAMPLED BY An
WEATHER Overcast

WELL INFORMATION			
DEPTH TO WATER	9.70	(ft) TOC	
DEPTH OF WELL	20	(ft)	
WELL DIAMETER		(inches)	
FEET OF WATER			
WELL CONDITION	Poor		
PUMP ADJUSTMENT		(ft)	NOTE: Only on Shallow Wells

Comments
intake 12'

Instrument ID 41955 Solinst IP (200A
Instrument ID 48409 Horiba U-52

PURGE DATA													
START PURGE TIME:		1804											
TIME		1809	1814	1819	1824	1827	1830	1833	1836				
DTW	(Ft-TOC)	10.03	10.10	10.15	"	"	"	"	"				
FLOW RATE	(mL/min)	185	"	"	170	"	"	"	"				
TEMPERATURE	(°C)	21.92	22.10	22.07	21.70	21.65	21.63	21.33	21.20				
CONDUCTIVITY	(uS/cm)	1.27	1.27	1.27	1.28	1.28	1.28	1.28	1.28				
D. O.	(mg/L)	1.64	1.45	1.07	1.34	1.19	1.08	1.02	0.97				
pH (units)	(units)	7.33	7.35	7.37	7.38	7.39	7.39	7.41	7.42				
ORP	(mv)	31	22	19	20	21	23	24	27				
TURBIDITY	(NTU)	47.5	45.3	43.2	16.4	10.4	7.7	7.9	7.3				
PURGE DATA Continued from Above													
TIME													
DTW	(Ft-TOC)												
FLOW RATE	(mL/min)												
TEMPERATURE	(°C)												
CONDUCTIVITY	(uS/cm)												
D. O.	(mg/L)												
pH (units)	(units)												
ORP	(mv)												
TURBIDITY	(NTU)												
PURGE AND SAMPLE EQUIPT:		Dedicated QED pump											

Uttz 10.14.21

SAMPLE NUMBER	SAMPLE TIME	ANALYSIS	CONTAINER	# BOTTLES	PRESERVATIVE
RW-11A - 1021	1839	NWTPH-G/BTEX, NWTPH-Dx			

ADDITIONAL INFORMATION:
TOC=Top of well casing
wl.prot.=top of well protector
Turbidity: Less than 5 NTU or +/- 10%
DO: +/-10%
Sp Cond: +/- 3%
Temp: +/- 3%
pH: +/- 0.1 standard units
ORP: +/- 10 millivolts

Additional comments:

GROUNDWATER SAMPLING LOG

AECOM

PROJECT NAME T-30
PROJECT NO.
DATE 10/14/21

WELL NO. MW-36A
SAMPLED BY
WEATHER

WELL INFORMATION			
DEPTH TO WATER	10.05	(ft) TOC	
DEPTH OF WELL	20	(ft)	
WELL DIAMETER	2	(inches)	
FEET OF WATER	9.95		
WELL CONDITION			
PUMP ADJUSTMENT		(ft)	NOTE: Only on Shallow Wells

Comments
intake 12'

Instrument ID 41955 Solinst IP (200 ft)
Instrument ID 48409 Horiba U-52

PURGE DATA													
START PURGE TIME:	1905												
TIME	1910	1913	1916	1919	1921	1924	1927	1930					
DTW (Ft-TOC)													
FLOW RATE (mL/min)													
TEMPERATURE (°C)	19.33	19.45	19.41	19.38	19.25	19.22	19.24	19.15					
CONDUCTIVITY (uS/cm)	2.63	2.63	2.63	2.63	2.62	2.62	2.61	2.61					
D. O. (mg/L)	0.57	0.49	0.48	0.50	0.52	0.52	0.53	0.54					
pH (units) (units)	7.70	7.70	7.71	7.72	7.73	7.73	7.73	7.73					
ORP (mv)	-250	-262	-263	-287	-304	-308	-314	-318					
TURBIDITY (NTU)	25.5	24.1	19.0	17.4	15.6	15.2	13.9	12.8					
PURGE DATA Continued from Above													
TIME													
DTW (Ft-TOC)													
FLOW RATE (mL/min)													
TEMPERATURE (°C)													
CONDUCTIVITY (uS/cm)													
D. O. (mg/L)													
pH (units) (units)													
ORP (mv)													
TURBIDITY (NTU)													
PURGE AND SAMPLE EQUIPT:	Dedicated QED pump												

10-14-21

SAMPLE NUMBER	SAMPLE TIME	ANALYSIS	CONTAINER	# BOTTLES	PRESERVATIVE
MW-36A-1021	1933	NWTPH-G/BTEX, NWTPH-Dx			

ADDITIONAL INFORMATION:
TOC=Top of well casing
wl.prot.=top of well protector
Turbidity: Less than 5 NTU or +/- 10%
DO: +/-10%
Sp Cond: +/- 3%
Temp: +/- 3%
pH: +/- 0.1 standard units
ORP: +/- 10 millivolts

Additional comments:

GROUNDWATER SAMPLING LOG

AECOM

PROJECT NAME T-30 | WELL NO. MW-89
PROJECT NO. | SAMPLED BY Au BD
DATE 10/14/21 | WEATHER Overcast

WELL INFORMATION			
DEPTH TO WATER	9.87	(ft) TOC	
DEPTH OF WELL	20'	(ft)	
WELL DIAMETER	2	(inches)	
FEET OF WATER	10.13		
WELL CONDITION	O/2 bolts		
PUMP ADJUSTMENT	12'	(ft)	NOTE: Only on Shallow Wells

Comments

Instrument ID ~~41955~~ 41955 Solinst I
Instrument ID 48409 Horiba U-52

PURGE DATA													
START PURGE TIME: 0810													
TIME		0815	0820	0825	0830	0833	0836	0839					
DTW	(Ft-TOC)	10.10	10.05	10.01	10.01	10.01							
FLOW RATE	(mL/min)	125	125	125	125	125							
TEMPERATURE	(°C)	20.11	20.99	20.92	20.93	20.95	20.94	20.94					
CONDUCTIVITY	mS/cm	4.60	4.56	4.56	4.54	4.54	4.55	4.56					
D. O.	(mg/L)	4.01	3.75	3.69	3.70	3.53	3.59	3.60					
pH (units)	(units)	4.28	4.30	4.32	4.34	4.35	4.34	4.37					
ORP	(mv)	417	427	433	444	450	456	460					
TURBIDITY	(NTU)	137	127	105	84.2	68.1	39.0	38.1					

BD 10/14/21

PURGE DATA Continued from Above													
TIME													
DTW	(Ft-TOC)												
FLOW RATE	(mL/min)												
TEMPERATURE	(°C)												
CONDUCTIVITY	(uS/cm)												
D. O.	(mg/L)												
pH (units)	(units)												
ORP	(mv)												
TURBIDITY	(NTU)												
PURGE AND SAMPLE EQUIPT:		Dedicated QED pump											

SAMPLE NUMBER	SAMPLE TIME	ANALYSIS	CONTAINER	# BOTTLES	PRESERVATIVE
MW-89-1021	0839	NWTPH-G/BTEX, NWTPH-Dx	1 L Amber	2	HCl
			40 mL VOA	3	HCl

ADDITIONAL INFORMATION:

TOC=Top of well casing
wl.prot.=top of well protector
Turbidity: Less than 5 NTU or +/- 10%
DO: +/-10%
Sp Cond: +/- 3%
Temp: +/- 3%
pH: +/- 0.1 standard units
ORP: +/- 10 millivolts

Additional comments: trace hydrocarbon odor on o/w interface probe

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 48409
Description Horiba U-52
Calibrated 10/12/2021 1:21:30PM

Group # 5
Group Name Temperature DO 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
16.00 / 16.00	degrees C	9.87	mg/L	10.71	9.87	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 AUTOCAL 21150206	SEA AUTOCAL AMCO Clear	GFS	8483	21150206		5/31/2022
SEA COND 0.718 - 0GJ991	Conductivity solution 0.718 mS/cm	AquaPhoenix Scientific	conductivity 0.718 mS/cm	0GJ991		10/30/2021
SEA COND 5 - 0GJ993	Conductivity solution 5.0 mS/cm	AquaPhoenix Scientific	conductivity 5.0 mS/cm	0GJ993		10/30/2021
SEA COND 80 - 0GJ1012	Conductivity solution 80.0 mS/cm	AquaPhoenix Scientific	conductivity 80.0 mS/cm	0GJ1012		10/30/2021
SEA NTU 800 U52 0GJ184	SEA 800 NTU for Horiba U52 and YSI only	AquaPhoenix Scientific	33039	0GJ184		10/31/2021
SEA ORP 240 1GC715	240 mV ORP Solution	AquaPhoenix Scientific	32001	1GC715		12/31/2021
SEA PH4 1GC758	pH 4 Buffer Solution	AquaPhoenix Scientific	32017	1GC758		3/30/2023
SEA PH7 1GD151	pH 7 Buffer Solution	AquaPhoenix Scientific	32025	1GD151		4/30/2023

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Jose Arroyo

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 48409
Description Horiba U-52
Calibrated 10/12/2021 1:21:30PM

Manufacturer Horiba
Model Number U-5000
Serial Number/ Lot Number 44LWXGFN
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 43

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	5.86	7.00	0.00%	Pass
4.00 / 4.00	PH	4.00	PH	3.98	4.00	0.00%	Pass

Group # 2
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
0.00 / 0.00	NTU	0.00	NTU	1.20	0.00	0.00%	Pass
800.00 / 800.00	NTU	800.00	NTU	656.00	800.00	0.00%	Pass

Group # 3
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
0.718 / 0.718	ms/cm	0.718	ms/cm	0.701	0.718	0.00%	Pass
5.000 / 5.000	ms/cm	5.000	ms/cm	4.960	5.000	0.00%	Pass
80.000 / 80.000	ms/cm	80.000	ms/cm	79.600	80.000	0.00%	Pass
0.000 / 0.000	ms/cm	0.000	ms/cm	0.000	0.000	0.00%	Pass

Group # 4
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	300.00	240.00	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 48409
Description Horiba U-52
Calibrated 10/12/2021 1:21:30PM

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 29762
Description Horiba U-50 Display
Calibrated 10/12/2021 1:33:55PM

Manufacturer Horiba
Model Number U-5000
Serial Number/ Lot Number 4H00F29T
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 43

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	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Jose Arroyo

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 QC/ PACKING LIST

Description	Horiba U-52/ U-53
Sonde ID#	48409
Display ID#	29762
Date Calibrated	10-12-21

PINE
www.pine-environmental.com

Standard Items	**Prepared**	**QC check**	**Received by customer**	**Returned to Pine**
Horiba U-52/ 53 w/ 6 ' cable and display w/ case				
Manual				
Quick reference card				
(4) C Alkaline batteries				
Probe Guard				
Calibration cup (clear)				
Sample cup (Black)				
Flow cell				
• Cell body				
• Center window				
• Base and black bottom				
• O-ring cover				
• Threaded ring				
• (2) black O-rings				
• (1) red O-ring				
• 2 of each black barb sizes (1/4, 3/8, and 1/2)				
D.O. probe reconditioning kit				
330 internal pH reference solution (1)				
250 ml Autocal solution				
ProCal calibration sheet				
Optional Items				
U-50 Data Collection Software				
USB Cable				

Prepared by: JA
QC checked by: [signature]
Date: 10-12-21

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC

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 41955
Description Solinst IP (200 ft)
Calibrated 10/12/2021 12:32:58PM

Manufacturer Solinst
Model Number
Serial Number/ Lot Number 311597
Location Seattle
Department

State Certified
Status Pass
Temp °C 17
Humidity % 44

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 Stethan Holmes

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 QC/ PACKING LIST

Description	Solinst 122 Oil/ Water Interface Meter
Instrument ID	41955
Cable length	200ft
Cable unit of measure	☐ Metric ☑ Imperial
Date Prepared	12Oct2021

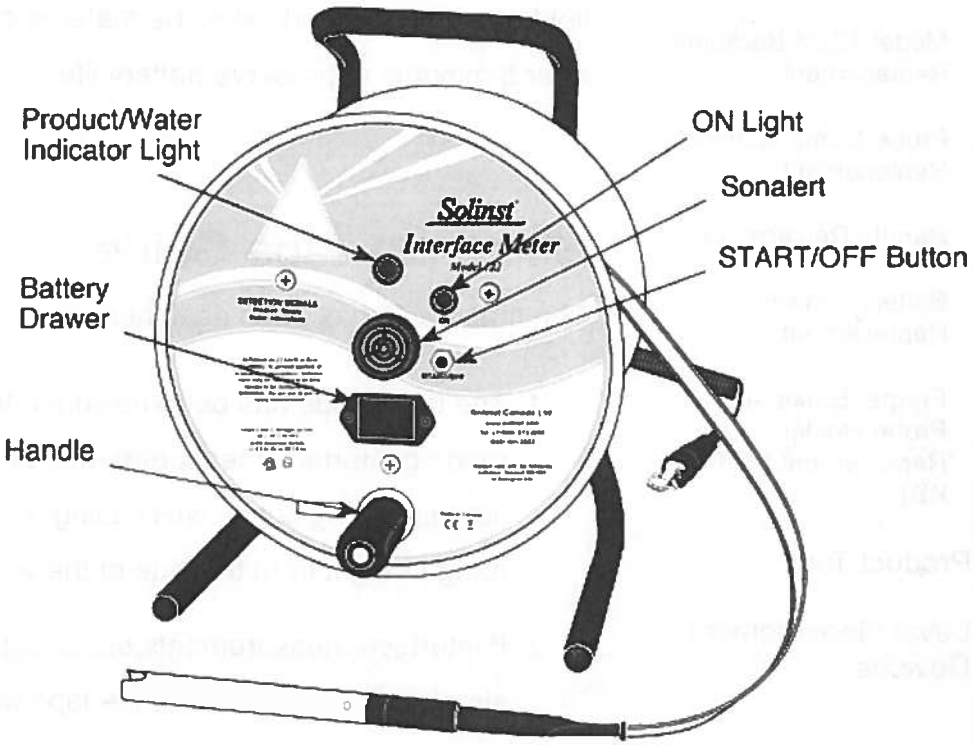
PINE
www.pine-environmental.com

Standard Items	**Prepared**	**QC check**	**Received by customer**	**Returned to Pine**
(2) 9V Alkaline battery, spare	✓	✓		
Optional Items				
Carry case	✓	✓		
Tape guide	✓	✓		
Instructions	✓	✓		
ProCal Inspection Report	✓	✓		

Prepared by: SGH
QC checked by: SA
Date: 12Oct2021

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC.

122 Interface Meter: Operating Instructions



CSA Standards, for use in hazardous locations Class 1, Div. 1, Groups C & D T3C, and is ATEX certified under directive 94/9/EC, as II 3 G Ex ic IIB T4 Gc. It has an infra-red circuit which detects the presence of a liquid. A conductivity circuit differentiates between conductive liquid (water) and non-conductive liquid (LNAPL or DNAPL product).

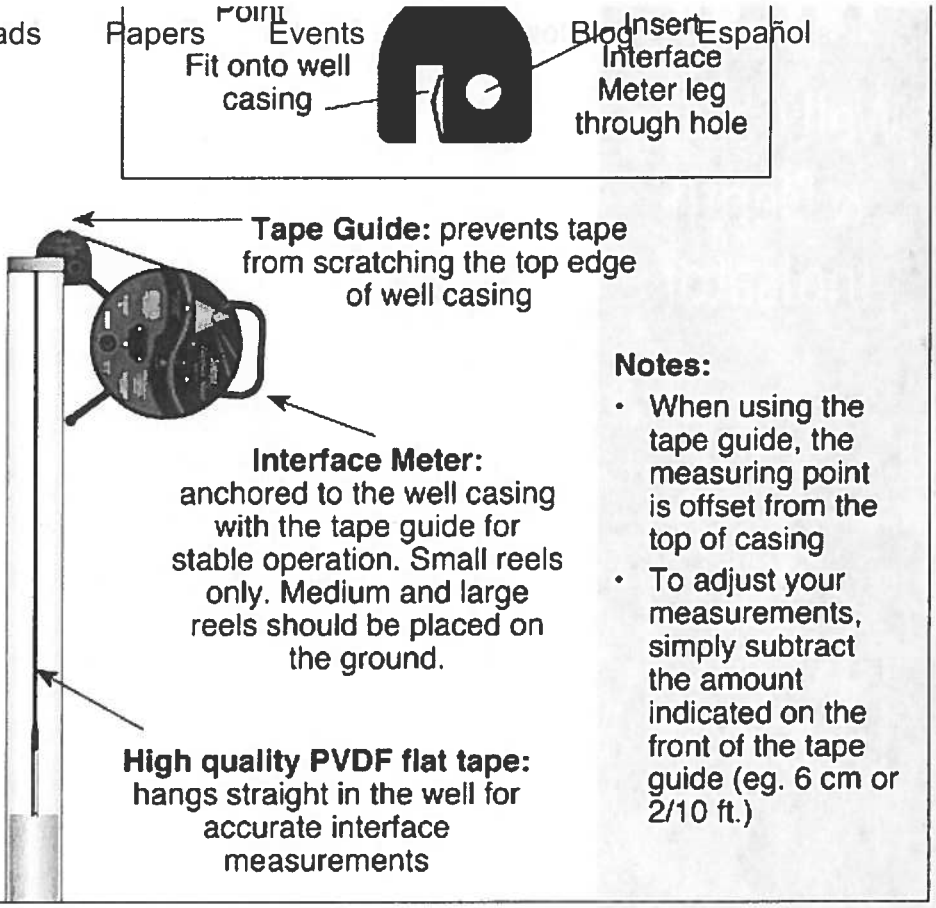
Equipment Check

Before beginning any measurements, check the electronics and battery condition by pushing the 'START/OFF' button. Five quick beeps with the green light flashing, indicates that the meter is functional. A flashing green light every second indicates the meter is on. It will automatically turn off after 5 minutes to preserve battery life.

Using the Tape Guide

The tape guide has been designed to:

1. The tape guide has been designed to: improve accuracy when reading interface measurements; to prevent the laser-marked PVDF flat tape being cut by well casing; and to allow the tape and probe to hang straight from the side of the well.
2. If interface measurements are being taken in a 2" dia well then simply fit the small end of the tape guide onto the edge of the well casing.
3. Insert the leg of the Interface Meter into the hole on the Tape Guide (small reels only).
4. Once inserted, rest the Interface Meter on the side of the well casing.



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.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 12, 2021

Rusty Jones, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

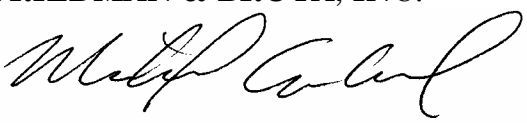
Dear Mr Jones:

Included are the results from the testing of material submitted on April 5, 2021 from the Port of Seattle Terminal 30, F&BI 104069 project. There are 6 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: Jamie Stevens
CTC0412R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 5, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Port of Seattle Terminal 30, F&BI 104069 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
104069 -01	RW-11A-0421
104069 -02	MW-89-0421
104069 -03	DUP-0421

All quality control requirements were acceptable.

Date of Report: 04/12/21
Date Received: 04/05/21
Project: Port of Seattle Terminal 30, F&BI 104069
Date Extracted: 04/07/21
Date Analyzed: 04/07/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
RW-11A-0421 104069-01	<1	<1	<1	<3	<100	74
MW-89-0421 104069-02	<1	<1	<1	<3	<100	77
DUP-0421 104069-03	<1	<1	<1	<3	<100	77
Method Blank 01-604 MB	<1	<1	<1	<3	<100	74

Date of Report: 04/12/21
Date Received: 04/05/21
Project: Port of Seattle Terminal 30, F&BI 104069
Date Extracted: 04/06/21
Date Analyzed: 04/08/21

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-0421 104069-01	<50	<250	81
MW-89-0421 104069-02	93	<250	83
DUP-0421 104069-03	88	<250	83
Method Blank 01-785 MB2	<50	<250	89

Date of Report: 04/12/21
Date Received: 04/05/21
Project: Port of Seattle Terminal 30, F&BI 104069

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 104044-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria
Benzene	ug/L (ppb)	50	<1	96	96	50-150
Toluene	ug/L (ppb)	50	<1	87	82	50-150
Ethylbenzene	ug/L (ppb)	50	<1	82	82	50-150
Xylenes	ug/L (ppb)	150	<3	81	81	50-150
Gasoline	ug/L (ppb)	1,000	<100	89	89	53-117

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	104	65-118
Toluene	ug/L (ppb)	50	94	72-122
Ethylbenzene	ug/L (ppb)	50	91	73-126
Xylenes	ug/L (ppb)	150	89	74-118
Gasoline	ug/L (ppb)	1,000	99	69-134

Date of Report: 04/12/21
Date Received: 04/05/21
Project: Port of Seattle Terminal 30, F&BI 104069

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample 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	112	128	63-142	13

Data Qualifiers & Definitions

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

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

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

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

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

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

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

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

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

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

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

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

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

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

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

104069

SAMPLE CHAIN OF CUSTODY

ME 04/05/21

UW1/E03

Page # 1 of 1

Report To R. Jones, J. Stevens

Company Crete Consulting

Address 108 S. Washington, Ste. 300

City, State, ZIP Seattle, WA 98104

Phone _____ Email _____

SAMPLERS (*signature*) Rusty Jones R. Jones

PROJECT NAME: Port of Seattle, Terminal 30

PO #

REMARKS

INVOICE TO

TURNAROUND TIME
- [X] Standard Turnaround
- [ ] RUSH _____

Rush charges authorized by: _____

SAMPLE DISPOSAL
- [ ] Dispose after 30 days
- [ ] Archive Samples
- [ ] Other _____

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM					Notes
						ANALYSES REQUESTED											
RW-11A-0421	01A-D	4/3/2021	1750	WATER	4		X	X	X								with SGC
MW-89-0421	02	↓	1840	↓	4		X	X	X								↓
DUP-0421	03	↓	1700	↓	4		X	X	X								↓
													Samples received at 2 °C				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	4/5/21	1314
Received by:	Nhan Phan	FEBI	4/5/21	1314
Relinquished by:				
Received by:				

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

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

Wednesday, November 17, 2021

Paul Kalina
AECOM-Seattle
710 2nd Ave #1000
Seattle, WA 98104

RE: A1J0665 - Port of Seattle - T 30 - [none]

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A1J0665, which was received by the laboratory on 10/16/2021 at 9:50:00AM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: DAuvil@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	3.6 degC	Cooler #2	4.3 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Darrell Auvil, Client Services Manager

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-89-1021	A1J0665-01	Water	10/14/21 08:39	10/16/21 09:50
MW-39A-1021	A1J0665-02	Water	10/14/21 17:25	10/16/21 09:50
MW-42-1021	A1J0665-03	Water	10/14/21 17:45	10/16/21 09:50
RW-9-1021	A1J0665-04	Water	10/14/21 18:40	10/16/21 09:50
RW-11A-1021	A1J0665-05	Water	10/14/21 18:39	10/16/21 09:50
MW-36A-1021	A1J0665-06	Water	10/14/21 19:33	10/16/21 09:50
Trip Blank	A1J0665-07	Water	10/14/21 00:00	10/16/21 09:50

Apex Laboratories

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Darrell Auvil, Client Services Manager

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

ANALYTICAL CASE NARRATIVE

Work Order: A1J0665

Amended Report Revision 1:

Additional NW-TPH Dx with Silica Gel Analysis-

This report supersedes all previous reports.

The final report has been amended to include NW-TPH Dx with Silica Gel cleanup, to all samples.

Darrell Auvil
Project Manager
11/16/2021

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-89-1021 (A1J0665-01)				**Matrix: Water**		**Batch: 21J0739**		
Diesel	**0.827**	---	0.0833	mg/L	1	10/21/21 23:29	NWTPH-Dx LL	**F-11**
Oil	**0.334**	---	0.167	mg/L	1	10/21/21 23:29	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 87 %*		*Limits: 50-150 %*	*1*	*10/21/21 23:29*	*NWTPH-Dx LL*	
MW-39A-1021 (A1J0665-02)				**Matrix: Water**		**Batch: 21J0739**		
Diesel	**2.87**	---	0.0784	mg/L	1	10/21/21 23:50	NWTPH-Dx LL	**F-11**
Oil	**1.76**	---	0.157	mg/L	1	10/21/21 23:50	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 74 %*		*Limits: 50-150 %*	*1*	*10/21/21 23:50*	*NWTPH-Dx LL*	
MW-42-1021 (A1J0665-03)				**Matrix: Water**		**Batch: 21J0739**		
Diesel	**4.78**	---	0.0825	mg/L	1	10/22/21 00:10	NWTPH-Dx LL	
Oil	ND	---	0.165	mg/L	1	10/22/21 00:10	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 74 %*		*Limits: 50-150 %*	*1*	*10/22/21 00:10*	*NWTPH-Dx LL*	
RW-9-1021 (A1J0665-04)				**Matrix: Water**		**Batch: 21J0739**		
Diesel	**6.36**	---	0.0748	mg/L	1	10/22/21 00:30	NWTPH-Dx LL	
Oil	ND	---	0.150	mg/L	1	10/22/21 00:30	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 62 %*		*Limits: 50-150 %*	*1*	*10/22/21 00:30*	*NWTPH-Dx LL*	
RW-11A-1021 (A1J0665-05)				**Matrix: Water**		**Batch: 21J0739**		
Diesel	**1.23**	---	0.0816	mg/L	1	10/22/21 00:51	NWTPH-Dx LL	
Oil	ND	---	0.163	mg/L	1	10/22/21 00:51	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 77 %*		*Limits: 50-150 %*	*1*	*10/22/21 00:51*	*NWTPH-Dx LL*	
MW-36A-1021 (A1J0665-06)				**Matrix: Water**		**Batch: 21J0739**		
Diesel	**2.61**	---	0.0889	mg/L	1	10/22/21 01:11	NWTPH-Dx LL	
Oil	ND	---	0.178	mg/L	1	10/22/21 01:11	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 75 %*		*Limits: 50-150 %*	*1*	*10/22/21 01:11*	*NWTPH-Dx LL*	

Apex Laboratories

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Darrell Auvil, Client Services Manager

APEX LABORATORIES

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-89-1021 (A1J0665-01)				**Matrix: Water**		**Batch: 21K0639**		
Diesel	**0.410**	---	0.0889	mg/L	1	11/15/21 23:31	NWTPH-Dx/SGC	**F-11**
Oil	**0.265**	---	0.178	mg/L	1	11/15/21 23:31	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 82 %*		*Limits: 50-150 %*	*1*	*11/15/21 23:31*	*NWTPH-Dx/SGC*	
MW-39A-1021 (A1J0665-02)				**Matrix: Water**		**Batch: 21K0639**		
Diesel	**1.98**	---	0.0816	mg/L	1	11/15/21 23:52	NWTPH-Dx/SGC	**F-11**
Oil	**1.54**	---	0.163	mg/L	1	11/15/21 23:52	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 79 %*		*Limits: 50-150 %*	*1*	*11/15/21 23:52*	*NWTPH-Dx/SGC*	
MW-42-1021 (A1J0665-03)				**Matrix: Water**		**Batch: 21K0639**		
Diesel	**0.315**	---	0.0748	mg/L	1	11/16/21 00:13	NWTPH-Dx/SGC	**F-20**
Oil	ND	---	0.150	mg/L	1	11/16/21 00:13	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 77 %*		*Limits: 50-150 %*	*1*	*11/16/21 00:13*	*NWTPH-Dx/SGC*	
RW-9-1021 (A1J0665-04)				**Matrix: Water**		**Batch: 21K0639**		
Diesel	**1.59**	---	0.0825	mg/L	1	11/16/21 00:35	NWTPH-Dx/SGC	
Oil	ND	---	0.165	mg/L	1	11/16/21 00:35	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 76 %*		*Limits: 50-150 %*	*1*	*11/16/21 00:35*	*NWTPH-Dx/SGC*	
RW-11A-1021 (A1J0665-05)				**Matrix: Water**		**Batch: 21K0639**		
Diesel	**0.133**	---	0.0784	mg/L	1	11/16/21 00:56	NWTPH-Dx/SGC	**F-11**
Oil	ND	---	0.157	mg/L	1	11/16/21 00:56	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 74 %*		*Limits: 50-150 %*	*1*	*11/16/21 00:56*	*NWTPH-Dx/SGC*	
MW-36A-1021 (A1J0665-06)				**Matrix: Water**		**Batch: 21K0639**		
Diesel	**0.404**	---	0.0833	mg/L	1	11/16/21 01:17	NWTPH-Dx/SGC	
Oil	ND	---	0.167	mg/L	1	11/16/21 01:17	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 73 %*		*Limits: 50-150 %*	*1*	*11/16/21 01:17*	*NWTPH-Dx/SGC*	

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Darrell Auvil, Client Services Manager

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APEX LABORATORIES

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-89-1021 (A1J0665-01)				**Matrix: Water**		**Batch: 21J0639**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	10/19/21 13:20	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*116 %*	*Limits: 50-150 %*	*1*	*10/19/21 13:20*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*116 %*	*50-150 %*	*1*	*10/19/21 13:20*	*NWTPH-Gx (MS)*	
MW-39A-1021 (A1J0665-02RE1)				**Matrix: Water**		**Batch: 21J0683**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	10/20/21 10:29	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*117 %*	*Limits: 50-150 %*	*1*	*10/20/21 10:29*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*116 %*	*50-150 %*	*1*	*10/20/21 10:29*	*NWTPH-Gx (MS)*	
MW-42-1021 (A1J0665-03RE1)				**Matrix: Water**		**Batch: 21J0683**		
Gasoline Range Organics	**0.248**	---	0.100	mg/L	1	10/20/21 11:50	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*111 %*	*Limits: 50-150 %*	*1*	*10/20/21 11:50*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*106 %*	*50-150 %*	*1*	*10/20/21 11:50*	*NWTPH-Gx (MS)*	
RW-9-1021 (A1J0665-04RE1)				**Matrix: Water**		**Batch: 21J0683**		
Gasoline Range Organics	**0.227**	---	0.100	mg/L	1	10/20/21 10:56	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*118 %*	*Limits: 50-150 %*	*1*	*10/20/21 10:56*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*111 %*	*50-150 %*	*1*	*10/20/21 10:56*	*NWTPH-Gx (MS)*	
RW-11A-1021 (A1J0665-05)				**Matrix: Water**		**Batch: 21J0639**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	10/19/21 14:15	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*115 %*	*Limits: 50-150 %*	*1*	*10/19/21 14:15*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*115 %*	*50-150 %*	*1*	*10/19/21 14:15*	*NWTPH-Gx (MS)*	
MW-36A-1021 (A1J0665-06RE1)				**Matrix: Water**		**Batch: 21J0683**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	10/20/21 11:23	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*116 %*	*Limits: 50-150 %*	*1*	*10/20/21 11:23*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*114 %*	*50-150 %*	*1*	*10/20/21 11:23*	*NWTPH-Gx (MS)*	
Trip Blank (A1J0665-07)				**Matrix: Water**		**Batch: 21J0639**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	10/19/21 12:53	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*112 %*	*Limits: 50-150 %*	*1*	*10/19/21 12:53*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*116 %*	*50-150 %*	*1*	*10/19/21 12:53*	*NWTPH-Gx (MS)*	

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Darrell Auvil, Client Services Manager

Apex Laboratories, LLC
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503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

ANALYTICAL SAMPLE RESULTS

BTEX Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-89-1021 (A1J0665-01)				**Matrix: Water**		**Batch: 21J0639**		
Benzene	ND	---	0.200	ug/L	1	10/19/21 13:20	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	10/19/21 13:20	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	10/19/21 13:20	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	10/19/21 13:20	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*111 %*	*Limits:* *80-120 %*	*1*	*10/19/21 13:20*	*EPA 8260D*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*10/19/21 13:20*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*95 %*	*80-120 %*	*1*	*10/19/21 13:20*	*EPA 8260D*	
MW-39A-1021 (A1J0665-02RE1)				**Matrix: Water**		**Batch: 21J0683**		
Benzene	ND	---	0.200	ug/L	1	10/20/21 10:29	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	10/20/21 10:29	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	10/20/21 10:29	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	10/20/21 10:29	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*109 %*	*Limits:* *80-120 %*	*1*	*10/20/21 10:29*	*EPA 8260D*	
Toluene-d8 (Surr)			*97 %*	*80-120 %*	*1*	*10/20/21 10:29*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*90 %*	*80-120 %*	*1*	*10/20/21 10:29*	*EPA 8260D*	
MW-42-1021 (A1J0665-03RE1)				**Matrix: Water**		**Batch: 21J0683**		
Benzene	**1.31**	---	0.200	ug/L	1	10/20/21 11:50	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	10/20/21 11:50	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	10/20/21 11:50	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	10/20/21 11:50	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*103 %*	*Limits:* *80-120 %*	*1*	*10/20/21 11:50*	*EPA 8260D*	
Toluene-d8 (Surr)			*97 %*	*80-120 %*	*1*	*10/20/21 11:50*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*89 %*	*80-120 %*	*1*	*10/20/21 11:50*	*EPA 8260D*	
RW-9-1021 (A1J0665-04RE1)				**Matrix: Water**		**Batch: 21J0683**		
Benzene	ND	---	0.200	ug/L	1	10/20/21 10:56	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	10/20/21 10:56	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	10/20/21 10:56	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	10/20/21 10:56	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*106 %*	*Limits:* *80-120 %*	*1*	*10/20/21 10:56*	*EPA 8260D*	
Toluene-d8 (Surr)			*97 %*	*80-120 %*	*1*	*10/20/21 10:56*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*90 %*	*80-120 %*	*1*	*10/20/21 10:56*	*EPA 8260D*	

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Darrell Auvil, Client Services Manager

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Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

ANALYTICAL SAMPLE RESULTS

BTEX Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
RW-11A-1021 (A1J0665-05)				**Matrix: Water**		**Batch: 21J0639**		
Benzene	ND	---	0.200	ug/L	1	10/19/21 14:15	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	10/19/21 14:15	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	10/19/21 14:15	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	10/19/21 14:15	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*110 %*	*Limits:* *80-120 %*	*1*	*10/19/21 14:15*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*10/19/21 14:15*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*94 %*	*80-120 %*	*1*	*10/19/21 14:15*	*EPA 8260D*	
MW-36A-1021 (A1J0665-06RE1)				**Matrix: Water**		**Batch: 21J0683**		
Benzene	ND	---	0.200	ug/L	1	10/20/21 11:23	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	10/20/21 11:23	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	10/20/21 11:23	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	10/20/21 11:23	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*109 %*	*Limits:* *80-120 %*	*1*	*10/20/21 11:23*	*EPA 8260D*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*10/20/21 11:23*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*89 %*	*80-120 %*	*1*	*10/20/21 11:23*	*EPA 8260D*	
Trip Blank (A1J0665-07)				**Matrix: Water**		**Batch: 21J0639**		
Benzene	ND	---	0.200	ug/L	1	10/19/21 12:53	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	10/19/21 12:53	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	10/19/21 12:53	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	10/19/21 12:53	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*110 %*	*Limits:* *80-120 %*	*1*	*10/19/21 12:53*	*EPA 8260D*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*10/19/21 12:53*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*98 %*	*80-120 %*	*1*	*10/19/21 12:53*	*EPA 8260D*	

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ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 21J0739 - EPA 3510C (Fuels/Acid Ext.)									Water			
Blank (21J0739-BLK1)			Prepared: 10/21/21 07:01		Analyzed: 10/21/21 22:07							
NWTPH-Dx LL												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 85 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS (21J0739-BS1)			Prepared: 10/21/21 07:01		Analyzed: 10/21/21 22:28							
NWTPH-Dx LL												
Diesel	0.430	---	0.0800	mg/L	1	0.500	---	86	36-132%	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 92 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS Dup (21J0739-BSD1)			Prepared: 10/21/21 07:01		Analyzed: 10/21/21 22:48							**Q-19**
NWTPH-Dx LL												
Diesel	0.406	---	0.0800	mg/L	1	0.500	---	81	36-132%	6	30%	
Surr: o-Terphenyl (Surr)			*Recovery: 92 %*		*Limits: 50-150 %*		*Dilution: 1x*					

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ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 21K0639 - EPA 3510C (Fuels/Acid Ext.) w/Silica Gel Column									Water			
Blank (21K0639-BLK1)				Prepared: 10/21/21 07:01		Analyzed: 11/15/21 22:26						
NWTPH-Dx/SGC												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 77 %*	*Limits: 50-150 %*		*Dilution: 1x*						
LCS (21K0639-BS1)				Prepared: 10/21/21 07:01		Analyzed: 11/15/21 22:48						
NWTPH-Dx/SGC												
Diesel	0.401	---	0.0800	mg/L	1	0.500	---	80	36-132%	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 85 %*	*Limits: 50-150 %*		*Dilution: 1x*						
LCS Dup (21K0639-BSD1)				Prepared: 10/21/21 07:01		Analyzed: 11/15/21 23:09						**Q-19**
NWTPH-Dx/SGC												
Diesel	0.380	---	0.0800	mg/L	1	0.500	---	76	36-132%	5	30%	
Surr: o-Terphenyl (Surr)			*Recovery: 87 %*	*Limits: 50-150 %*		*Dilution: 1x*						

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ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: Port of Seattle - T 30	
710 2nd Ave #1000	Project Number: [none]	Report ID:
Seattle, WA 98104	Project Manager: Paul Kalina	A1J0665 - 11 17 21 1718

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 21J0639 - EPA 5030B												**Water**
Blank (21J0639-BLK1)			Prepared: 10/19/21 09:30		Analyzed: 10/19/21 12:26							
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery:*	*111 %*	*Limits:*	*50-150 %*		*Dilution:*	*1x*				
1,4-Difluorobenzene (Sur)			*115 %*		*50-150 %*			*"*				
LCS (21J0639-BS2)			Prepared: 10/19/21 09:30		Analyzed: 10/19/21 11:59							
NWTPH-Gx (MS)												
Gasoline Range Organics	0.508	---	0.100	mg/L	1	0.500	---	102	80-120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery:*	*106 %*	*Limits:*	*50-150 %*		*Dilution:*	*1x*				
1,4-Difluorobenzene (Sur)			*105 %*		*50-150 %*			*"*				
Duplicate (21J0639-DUP1)			Prepared: 10/19/21 11:45		Analyzed: 10/19/21 13:48							
QC Source Sample: MW-89-1021 (A1J0665-01)												
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery:*	*116 %*	*Limits:*	*50-150 %*		*Dilution:*	*1x*				
1,4-Difluorobenzene (Sur)			*118 %*		*50-150 %*			*"*				

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ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 21J0683 - EPA 5030B												**Water**
Blank (21J0683-BLK1)			Prepared: 10/20/21 08:00		Analyzed: 10/20/21 10:02							
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery:*	*110 %*	*Limits:*	*50-150 %*		*Dilution:*	*1x*				
1,4-Difluorobenzene (Sur)			*115 %*		*50-150 %*			*"*				
LCS (21J0683-BS2)			Prepared: 10/20/21 08:00		Analyzed: 10/20/21 09:34							
NWTPH-Gx (MS)												
Gasoline Range Organics	0.533	---	0.100	mg/L	1	0.500	---	107	80-120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery:*	*104 %*	*Limits:*	*50-150 %*		*Dilution:*	*1x*				
1,4-Difluorobenzene (Sur)			*104 %*		*50-150 %*			*"*				
Duplicate (21J0683-DUP1)			Prepared: 10/20/21 08:40		Analyzed: 10/20/21 12:45							
QC Source Sample: Non-SDG (A1J0727-02)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery:*	*112 %*	*Limits:*	*50-150 %*		*Dilution:*	*1x*				
1,4-Difluorobenzene (Sur)			*114 %*		*50-150 %*			*"*				

Apex Laboratories

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ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

QUALITY CONTROL (QC) SAMPLE RESULTS

BTEX Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 21J0639 - EPA 5030B												**Water**
Blank (21J0639-BLK1)			Prepared: 10/19/21 09:30 Analyzed: 10/19/21 12:26									
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*109 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*100 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*99 %*		*80-120 %*			*"*				
LCS (21J0639-BS1)			Prepared: 10/19/21 09:30 Analyzed: 10/19/21 11:25									
EPA 8260D												
Benzene	20.0	---	0.200	ug/L	1	20.0	---	100	80-120%	---	---	
Toluene	18.9	---	1.00	ug/L	1	20.0	---	94	80-120%	---	---	
Ethylbenzene	20.3	---	0.500	ug/L	1	20.0	---	102	80-120%	---	---	
Xylenes, total	62.0	---	1.50	ug/L	1	60.0	---	103	80-120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*101 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*97 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*89 %*		*80-120 %*			*"*				
Duplicate (21J0639-DUP1)			Prepared: 10/19/21 11:45 Analyzed: 10/19/21 13:48									
QC Source Sample: MW-89-1021 (A1J0665-01)												
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Xylenes, total	ND	---	1.50	ug/L	1	---	ND	---	---	---	30%	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*110 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*99 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*92 %*		*80-120 %*			*"*				
Matrix Spike (21J0639-MS1)			Prepared: 10/19/21 11:45 Analyzed: 10/19/21 22:24									
QC Source Sample: Non-SDG (A1J0571-17)												
EPA 8260D												

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Darrell Auvil, Client Services Manager

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

QUALITY CONTROL (QC) SAMPLE RESULTS

BTEX Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 21J0639 - EPA 5030B												**Water**
Matrix Spike (21J0639-MS1)			Prepared: 10/19/21 11:45 Analyzed: 10/19/21 22:24									
QC Source Sample: Non-SDG (A1J0571-17)												
Benzene	20.6	---	0.200	ug/L	1	20.0	0.110	103	79-120%	---	---	
Toluene	22.0	---	1.00	ug/L	1	20.0	3.10	94	80-121%	---	---	
Ethylbenzene	23.1	---	0.500	ug/L	1	20.0	3.21	99	79-121%	---	---	
Xylenes, total	86.0	---	1.50	ug/L	1	60.0	22.5	106	79-121%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 101 %*		*Limits: 80-120 %*				*Dilution: 1x*			
Toluene-d8 (Surr)			*95 %*		*80-120 %*				*"*			
4-Bromofluorobenzene (Surr)			*87 %*		*80-120 %*				*"*			

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ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

QUALITY CONTROL (QC) SAMPLE RESULTS

BTEX Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 21J0683 - EPA 5030B												**Water**
Blank (21J0683-BLK1)			Prepared: 10/20/21 08:00 Analyzed: 10/20/21 10:02									
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*110 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*101 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*96 %*		*80-120 %*			*"*				
LCS (21J0683-BS1)			Prepared: 10/20/21 08:00 Analyzed: 10/20/21 09:02									
EPA 8260D												
Benzene	18.8	---	0.200	ug/L	1	20.0	---	94	80-120%	---	---	
Toluene	17.9	---	1.00	ug/L	1	20.0	---	89	80-120%	---	---	
Ethylbenzene	18.9	---	0.500	ug/L	1	20.0	---	95	80-120%	---	---	
Xylenes, total	57.4	---	1.50	ug/L	1	60.0	---	96	80-120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*100 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*97 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*86 %*		*80-120 %*			*"*				
Duplicate (21J0683-DUP1)			Prepared: 10/20/21 08:40 Analyzed: 10/20/21 12:45									
QC Source Sample: Non-SDG (A1J0727-02)												
Benzene	ND	---	0.200	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Xylenes, total	ND	---	1.50	ug/L	1	---	ND	---	---	---	30%	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*108 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*100 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*91 %*		*80-120 %*			*"*				
Matrix Spike (21J0683-MS1)			Prepared: 10/20/21 12:35 Analyzed: 10/20/21 14:33									
QC Source Sample: Non-SDG (A1J0752-01)												
EPA 8260D												
Benzene	20.6	---	0.200	ug/L	1	20.0	ND	103	79-120%	---	---	

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Darrell Auvil, Client Services Manager

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ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

QUALITY CONTROL (QC) SAMPLE RESULTS

BTEX Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 21J0683 - EPA 5030B							**Water**					
Matrix Spike (21J0683-MS1)			Prepared: 10/20/21 12:35 Analyzed: 10/20/21 14:33									
QC Source Sample: Non-SDG (A1J0752-01)												
Toluene	19.5	---	1.00	ug/L	1	20.0	ND	97	80-121%	---	---	
Ethylbenzene	20.8	---	0.500	ug/L	1	20.0	ND	104	79-121%	---	---	
Xylenes, total	63.3	---	1.50	ug/L	1	60.0	ND	106	79-121%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 101 %*			*Limits: 80-120 %*			*Dilution: 1x*			
Toluene-d8 (Surr)			*97 %*			*80-120 %*			*"*			
4-Bromofluorobenzene (Surr)			*86 %*			*80-120 %*			*"*			

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Darrell Auvil, Client Services Manager

APEX LABORATORIES

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503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle
710 2nd Ave #1000
Seattle, WA 98104

Project: **Port of Seattle - T 30**
Project Number: **[none]**
Project Manager: **Paul Kalina**

Report ID:
A1J0665 - 11 17 21 1718

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 21J0739							
A1J0665-01	Water	NWTPH-Dx LL	10/14/21 08:39	10/21/21 07:01	960mL/2mL	1000mL/2mL	1.04
A1J0665-02	Water	NWTPH-Dx LL	10/14/21 17:25	10/21/21 07:01	1020mL/2mL	1000mL/2mL	0.98
A1J0665-03	Water	NWTPH-Dx LL	10/14/21 17:45	10/21/21 07:01	970mL/2mL	1000mL/2mL	1.03
A1J0665-04	Water	NWTPH-Dx LL	10/14/21 18:40	10/21/21 07:01	1070mL/2mL	1000mL/2mL	0.94
A1J0665-05	Water	NWTPH-Dx LL	10/14/21 18:39	10/21/21 07:01	980mL/2mL	1000mL/2mL	1.02
A1J0665-06	Water	NWTPH-Dx LL	10/14/21 19:33	10/21/21 07:01	900mL/2mL	1000mL/2mL	1.11

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup

Prep: EPA 3510C (Fuels/Acid Ext.) w/Silica Gel Column

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 21K0639							
A1J0665-01	Water	NWTPH-Dx/SGC	10/14/21 08:39	10/21/21 07:01	900mL/2mL	1000mL/2mL	1.11
A1J0665-02	Water	NWTPH-Dx/SGC	10/14/21 17:25	10/21/21 07:01	980mL/2mL	1000mL/2mL	1.02
A1J0665-03	Water	NWTPH-Dx/SGC	10/14/21 17:45	10/21/21 07:01	1070mL/2mL	1000mL/2mL	0.94
A1J0665-04	Water	NWTPH-Dx/SGC	10/14/21 18:40	10/21/21 07:01	970mL/2mL	1000mL/2mL	1.03
A1J0665-05	Water	NWTPH-Dx/SGC	10/14/21 18:39	10/21/21 07:01	1020mL/2mL	1000mL/2mL	0.98
A1J0665-06	Water	NWTPH-Dx/SGC	10/14/21 19:33	10/21/21 07:01	960mL/2mL	1000mL/2mL	1.04

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 21J0639							
A1J0665-01	Water	NWTPH-Gx (MS)	10/14/21 08:39	10/19/21 11:45	5mL/5mL	5mL/5mL	1.00
A1J0665-05	Water	NWTPH-Gx (MS)	10/14/21 18:39	10/19/21 11:45	5mL/5mL	5mL/5mL	1.00
A1J0665-07	Water	NWTPH-Gx (MS)	10/14/21 00:00	10/19/21 11:45	5mL/5mL	5mL/5mL	1.00
Batch: 21J0683							
A1J0665-02RE1	Water	NWTPH-Gx (MS)	10/14/21 17:25	10/20/21 08:40	5mL/5mL	5mL/5mL	1.00
A1J0665-03RE1	Water	NWTPH-Gx (MS)	10/14/21 17:45	10/20/21 08:40	5mL/5mL	5mL/5mL	1.00
A1J0665-04RE1	Water	NWTPH-Gx (MS)	10/14/21 18:40	10/20/21 08:40	5mL/5mL	5mL/5mL	1.00
A1J0665-06RE1	Water	NWTPH-Gx (MS)	10/14/21 19:33	10/20/21 08:40	5mL/5mL	5mL/5mL	1.00

BTEX Compounds by EPA 8260D

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Darrell Auvil, Client Services Manager

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503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

SAMPLE PREPARATION INFORMATION

BTEX Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 21J0639							
A1J0665-01	Water	EPA 8260D	10/14/21 08:39	10/19/21 11:45	5mL/5mL	5mL/5mL	1.00
A1J0665-05	Water	EPA 8260D	10/14/21 18:39	10/19/21 11:45	5mL/5mL	5mL/5mL	1.00
A1J0665-07	Water	EPA 8260D	10/14/21 00:00	10/19/21 11:45	5mL/5mL	5mL/5mL	1.00
Batch: 21J0683							
A1J0665-02RE1	Water	EPA 8260D	10/14/21 17:25	10/20/21 08:40	5mL/5mL	5mL/5mL	1.00
A1J0665-03RE1	Water	EPA 8260D	10/14/21 17:45	10/20/21 08:40	5mL/5mL	5mL/5mL	1.00
A1J0665-04RE1	Water	EPA 8260D	10/14/21 18:40	10/20/21 08:40	5mL/5mL	5mL/5mL	1.00
A1J0665-06RE1	Water	EPA 8260D	10/14/21 19:33	10/20/21 08:40	5mL/5mL	5mL/5mL	1.00

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ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

F-11	The hydrocarbon pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component.
F-20	Result for Diesel is Estimated due to overlap from Gasoline Range Organics or other VOCs.
Q-19	Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.

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ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

" " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

Apex Laboratories

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ORELAP ID: **OR100062**

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories, LLC
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ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Darrell Auvil, Client Services Manager

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ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

APEX LABS
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

CHAIN OF CUSTODY Lab # A1J0665 COC 1 of 1

Company: AECOM Project Mgr: Paul Kalina Project Name: Terminal-30 P.O.5 Project #:
Address: 1111 3rd Ave Suite 1600 Seattle WA 98101 Phone: 206-438-2700 Email: Paul.kalina@AECOM.com PO #
Sampled by: A. Utter B. Derby
Site Location: OR (WA) CA AK ID

ANALYSIS REQUEST

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-Dx	NWTPH-Gx	8260 BTEX
MW-87-1021		10/14/21	0839	GW	5	X	X	X
MW-37A-1021		10/14/21	1725			X	X	X
MW-42-1021			1745			X	X	X
RW-9-1021			1840			X	X	X
RW-11A-1021			1839			X	X	X
MW-36A-1021			1933			X	X	X
~~MW-59-1021~~						X	X	X

Other analyses listed (none marked): NWTPH-HCID, 8260 RBDM VOCs, 8260 Halo VOCs, 8260 VOCs Full List, 8270 SIM PAHs, 8270 Semi-Vols Full List, 8082 PCBs, 8081 Pest, RCRA Metals (8), Priority Metals (13), Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS. TCLP, TCLP Metals (8), Archive

Normal Turn Around Time (TAT) = 10 Business Days ✓

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ____

SPECIAL INSTRUCTIONS:

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date: 10/15/21	Signature: [signature] Date: 10/16	Signature: [signature] Date: 10/16	Signature: [signature] Date: 10/16/21
Printed Name: Anders Utter Time: 0845	Printed Name: Petr Khodakovskiy Time: 4:00 am	Printed Name: Petr Khodakovskiy Time: 9:50 am	Printed Name: Anastasia Time: 0950
Company: AECOM	Company: Evergreen	Company: Evergreen	Company: Apex Labs

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

AECOM-Seattle	Project: **Port of Seattle - T 30**	
710 2nd Ave #1000	Project Number: **[none]**	**Report ID:**
Seattle, WA 98104	Project Manager: **Paul Kalina**	**A1J0665 - 11 17 21 1718**

APEX LABS COOLER RECEIPT FORM

Client: AECOM Element WO#: A1J0665

Project/Project #: Terminal-30 P.O.S

Delivery Info:

Date/time received: 10/16/21 @ 950 By: AKK

Delivered by: Apex____Client____ESS____FedEx____UPS____Swift____Senvoy____SDS____Other Evergreen

Cooler Inspection Date/time inspected: 10/16/21 @ 950 By: AKK

Chain of Custody included? Yes Y No _____ Custody seals? Yes_____ No Y

Signed/dated by client? Yes Y No _____

Signed/dated by Apex? Yes Y No _____

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	3.6	4.3					
Received on ice? (Y/N)	Y	Y					
Temp. blanks? (Y/N)	Y	Y					
Ice type: (Gel/Real/Other)	Real	Real					
Condition:	Melty	Melty					

Cooler out of temp? (Y/N) Possible reason why: _____

Green dots applied to out of temperature samples? Yes/No

Out of temperature samples form initiated? Yes/No

Sample Inspection: Date/time inspected: 10/18/21 @ 1410 By: MAS

All samples intact? Yes X No ___ Comments: _____

Bottle labels/COCs agree? Yes ___ No X Comments: MW-42-1021: time on containers reads 1735. 2 trip blanks provided but not listed on COC

COC/container discrepancies form initiated? Yes ___ No X

Containers/volumes received appropriate for analysis? Yes X No ___ Comments: _____

Do VOA vials have visible headspace? Yes X No ___ NA ___

Comments MW-42-1021: 1/3 headspace. Trip blank: 1/2 headspace

Water samples: pH checked: Yes X No ___ NA ___ pH appropriate? Yes X No ___ NA ___

Comments: _____

Additional information: TB # 2453

Labeled by: MAS Witness: [signature] Cooler Inspected by: AKK

Appendix H

Groundwater Sampling Summary

Data Quality Review Reports

NOTE: A data quality review report from the groundwater samples CRETE collected in April 2021 is not included in this report.

AECOM
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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 Groundwater Sampling		
From	Chelsey Cook, Chemist Lucy Panteleeff, Chemist		
Date	November 18, 2021		

The summary data quality review of six groundwater samples and 1 trip blank collected on October 14, 2021, has been completed. The samples were analyzed at Apex Laboratories, LLC (Apex) located in Tigard, Oregon for selected volatile organic compounds (VOCs) 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 and NWTPH-Dx (diesel-range and motor oil-range TPH) without silica gel cleanup. 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 (-1021). The following samples are associated with Apex laboratory group A1J0665:

Sample ID	Laboratory ID	Requested Analyses
MW-89-1021	A1J0665-01	VOCs, NWTPH-Gx, NWTPH-Dx
MW-39A-1021	A1J0665-02	VOCs, NWTPH-Gx, NWTPH-Dx
MW-42-1021	A1J0665-03	VOCs, NWTPH-Gx, NWTPH-Dx
RW-9-1021	A1J0665-04	VOCs, NWTPH-Gx, NWTPH-Dx
RW-11A-1021	A1J0665-05	VOCs, NWTPH-Gx, NWTPH-Dx
MW-36A-1021	A1J0665-06	VOCs, NWTPH-Gx, NWTPH-Dx
Trip Blank	A1J0665-07	VOCs, NWTPH-Gx

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 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 temperatures were recorded. The laboratory noted that the sample time on the container label for MW-42 was different than the COC. This sample time was correctly logged in according to the COC. The coolers were received at temperatures within the EPA-recommended limits of greater than 0°C and less than or equal to 6°C.

Organic Analyses

Samples were analyzed for VOCs 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)

   General – MS/MSDs were performed using samples from unrelated projects. Accuracy and precision were assessed using LCS/LCSD and/or laboratory duplicate results.

6. Laboratory Duplicate - Acceptable

   BTEX by EPA 8260D – A laboratory duplicate was performed using MW-89. Results were comparable.

   Gasoline-range TPH by NWTPH-Gx – A laboratory duplicate was performed using MW-89. Results were comparable.

7. Reporting Limits - Acceptable

8. Other Items of Note:

   Diesel-range and Motor Oil-range TPH by NWTPH-Dx – The laboratory noted that the diesel-range hydrocarbon patterns in MW-89, MW-39A, and RW-11A indicated possible weathered diesel, mineral oil, or a contribution from a related component. No qualifiers were assigned based on these qualitative observations.

The laboratory noted that the result for diesel in MW-42 is estimated due to overlap from gasoline range TPHs or other VOCs. No qualifiers were assigned based on these qualitative observations.

Overall Assessment of Data

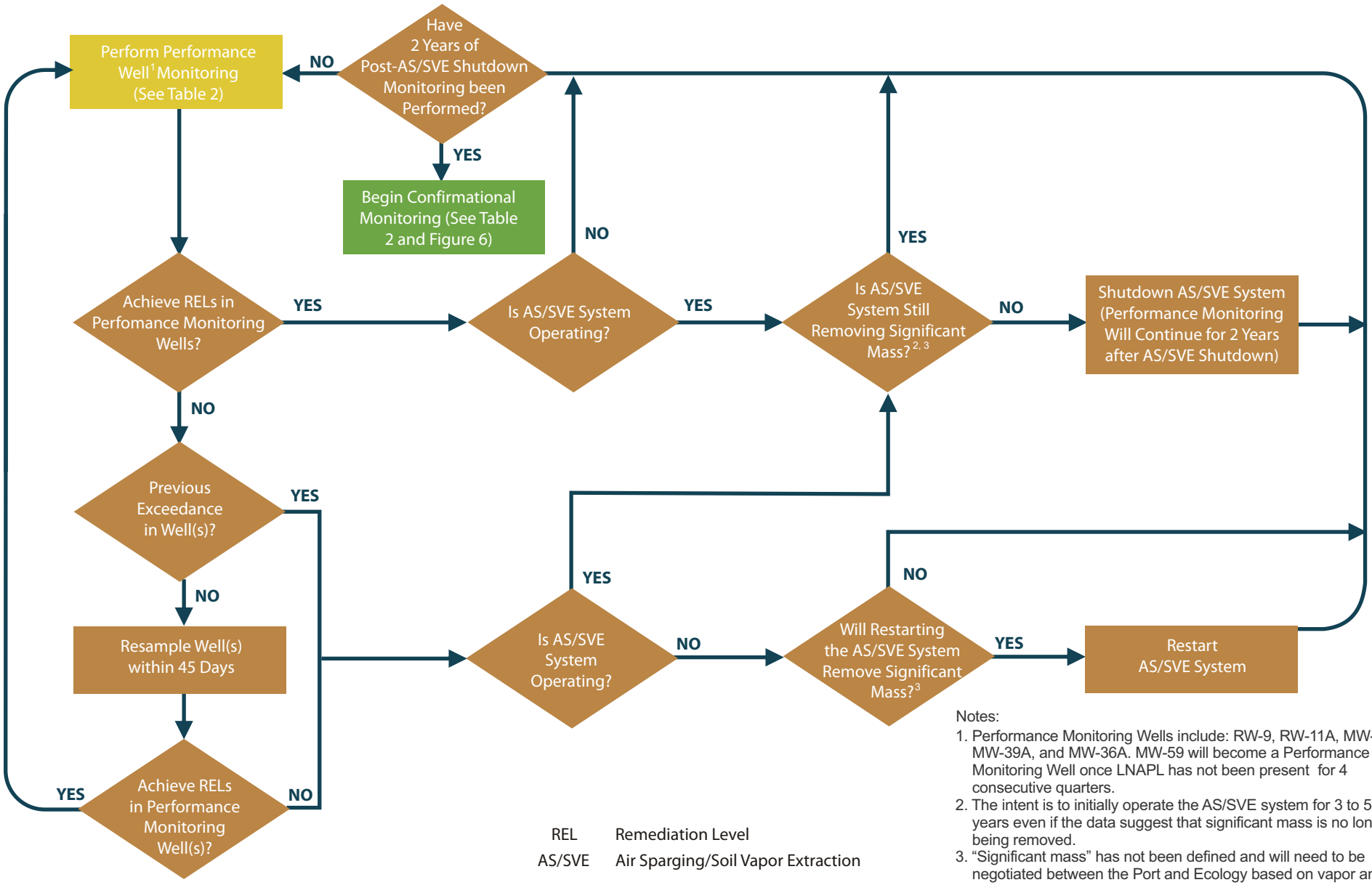
The data reported in this laboratory group are considered to be usable for meeting project objectives. The completeness for Apex laboratory group A1J0665 is 100%.

Table 1. Summary of Qualified Data

Sample ID	Lab ID	Analyte	Result	Units	Final Result
No data qualifiers were assigned to the results reported in laboratory group A1J0665 during validation.					

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.

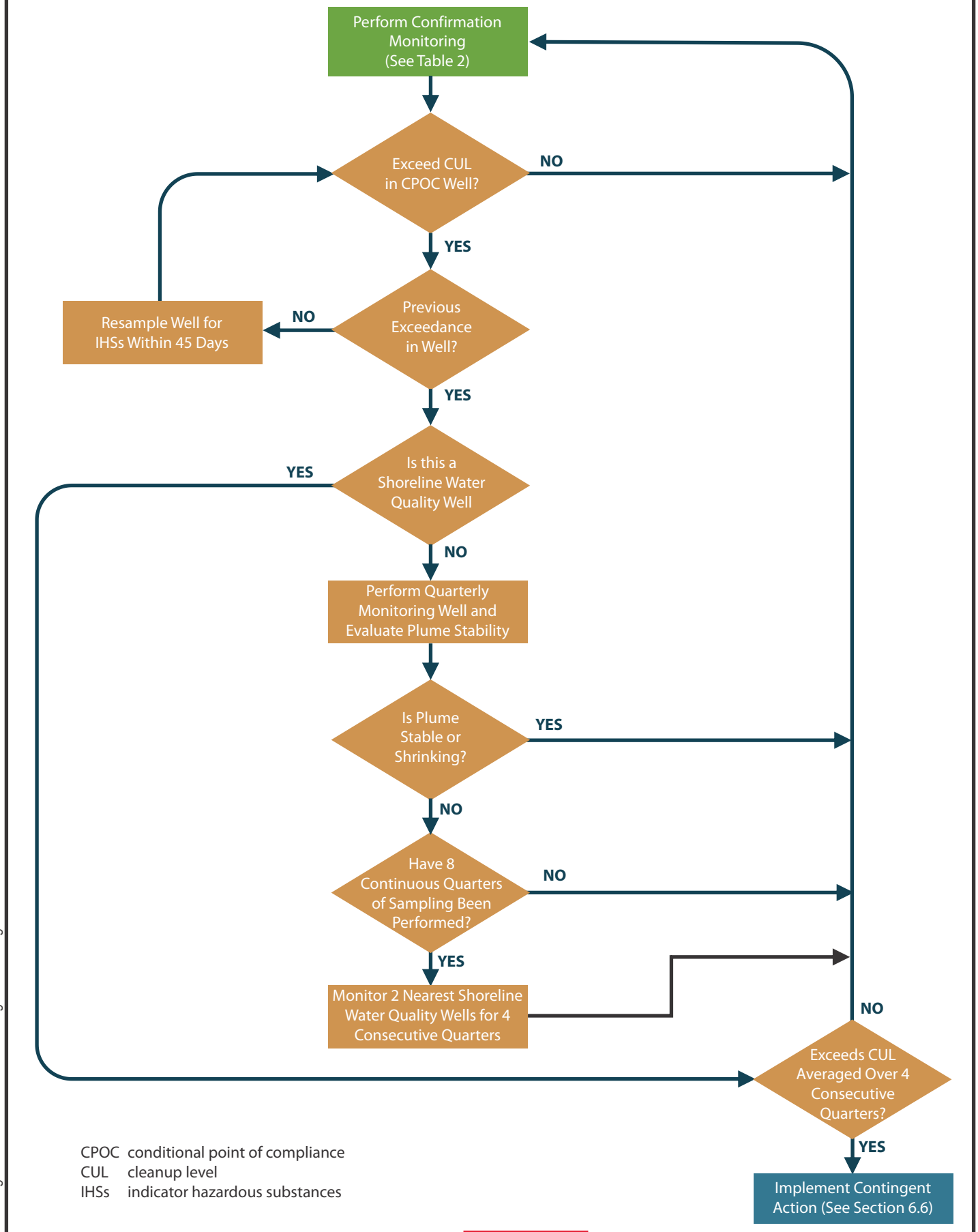
CRETE CONSULTING, INC.

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**