MOTT MACDONALD

Annual Compliance Monitoring Report Terminal 91 Tank Farm Affected Area

November 2020 to August 2021

Febuary 2022

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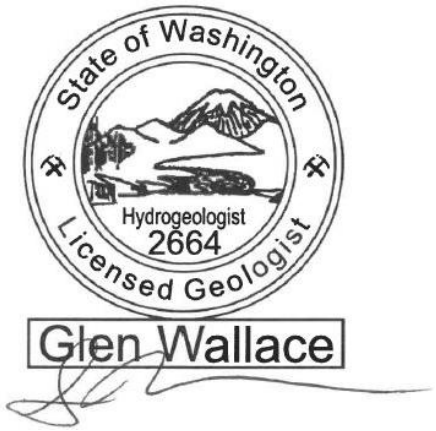
This report and Pacific Groundwater Group's work contributing to this report were reviewed by the undersigned and approved for release.



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1 Summary

1.1 Introduction and Purpose

Pacific Groundwater Group (PGG) has prepared this Annual Compliance Monitoring Report to document the groundwater compliance monitoring at the Terminal 91 (T-91) Tank Farm Affected Area (TFAA) (Figure 1). The TFAA is situated within the Port's T-91 Facility in Seattle, Washington (Figure 1).

This report has been prepared pursuant to Agreed Order No. DE-8938 (AO) between the Port of Seattle (Port) and Washington Department of Ecology (Ecology) and in accordance with the Model Toxics Control Act (MTCA) under Chapter 70.105D of the Revised Code of Washington (RCW) and Chapter 173-340 of the Washington Administrative Code (WAC).

The work summarized in this annual report was conducted from November 2020 through August 2021 in accordance with the Compliance Monitoring Plan (CMP) and Ecology-approved revisions (PES Environmental, Inc. (PES 2013b; PGG 2019). This was year five of Performance Monitoring as described in the CMP (PES 2013b). The scope of work for monitoring activities documented in this report is described in the following documents:

- Compliance Monitoring Plan, Terminal 91 Tank Farm Cleanup, Port of Seattle, Seattle, Washington. (CMP) (PES et al. 2013b) and
- Operations and Maintenance Plan, Terminal 91 Tank Farm Cleanup, Port of Seattle, Seattle, Washington. (O&M Plan) (PES et al. 2013c).

Compliance Monitoring currently includes groundwater monitoring and a water level snapshot annually in August, and quarterly light non-aqueous phase liquid (LNAPL) gauging quarterly. PES conducted groundwater monitoring at the TFAA through the construction phase and the first year of Performance Monitoring ending in August 2016. PGG continued the monitoring program beginning in November 2016. The CMP requirements for the annual report include:

- An overview of the current cleanup status identifying significant results and trends (Sections 1.2, 2.2, and 4.0);
- Water level contour maps using data from all groundwater monitoring wells sampled during each event (Section 3.2; Figure 1);
- Tabulated monitoring data and water table elevation data from the previous year (Figures 2 and 3, Tables 1 through 4); and
- A narrative discussion of data validation and a description of all data qualified or rejected (Section 4.4).

1.2 Key Results

Key results from November 2020-August 2021 (project year six) Performance Monitoring include:

- Groundwater flow directions are consistent with previous flow directions, suggesting a relatively stable groundwater flow setting along previously identified flow pathways.
- IHS concentrations at Conditional Point of Compliance (CPOC) wells remain below cleanup levels.

- Groundwater concentrations at non-CPOC wells are generally consistent with previous concentrations and some values exceed applicable cleanup levels.

2 Project Background

2.1 Background Information

Section 2 summarizes the general site history, subsurface conditions, and cleanup actions conducted between 2005 and 2014. The Construction Completion report and its references provide additional detail on the background and history of the TFAA (PES 2017).

2.1.1 Property Description and History

T-91 is located at 2001 West Garfield Street, Seattle, Washington and includes approximately 216 acres (Figure 1). The TFAA occupies approximately 17 acres in the central portion of T-91. The TFAA includes the Tank Farm Lease Parcel (TFLP) identified as “Tank Farm” within the TFAA on figures. The TFLP is a contiguous parcel approximately four acres in size located immediately north of the Magnolia Bridge. The TFAA is flat and paved or covered with buildings.

The TFLP is located at the north end of the TFAA. The environmental history of the TFLP includes the bulk petroleum tank farm present from the 1920s through 2005, and the dangerous waste treatment and storage operations conducted from 1980 through 1995. The aboveground portion of the tank farm, including the tanks, containment walls, and other aboveground piping and equipment, was demolished and removed in 2005 as part of an interim remedial action (Roth Consulting 2005). The final cleanup was performed in 2013-2015 and is described further in the construction completion report (PES 2017).

2.1.2 Subsurface Conditions

The geology, hydrogeology, and nature and extent of contamination are informed by investigations conducted at T-91 since 1988. The results of these investigations are detailed in the Remedial Investigation Summary Report (Roth 2007) and Final Cleanup Action Plan (Ecology 2010). The geology and hydrostratigraphy of the site are briefly summarized below.

2.1.3 Geology

Four lithologic units have been identified beneath the TFLP and adjacent areas. These four units in order of increasing depth include:

- The Shallow Sand Unit consists of fill material placed over shallow marine and tidal marsh deposits of Smith Cove during the early 1900s. It consists primarily of moderately to poorly sorted, fine- to medium-grained unconsolidated sand with laminations of silty sand and gravel lenses occurring locally. The Shallow Sand Unit extends vertically from just below the paved ground surface to between 15 and 20 feet below ground surface (ft bgs).
- The Silty Sand Unit consists of gray or olive, moderately sorted, fine- to medium-grained silty sand with traces of coarse sand, shell debris, and wood debris. This unit is interpreted to be native marsh, intertidal, and shallow marine sediments that formed the pre-fill surface in the Smith Cove Waterway and the adjacent tidelands. Beneath the TFLP and adjacent upland areas, the Silty Sand Unit generally occurs at depths of 15 to 20 ft bgs and varies from 20-ft thick beneath the BNSF rail yard east of the TFLP to 5-ft thick or less in the southwest corner of the TFLP. A gravel layer was found within the Silty Sand Unit in some locations and consists of moderately to poorly sorted, silty sandy gravel.
- The Deep Sand Unit directly underlies the Silty Sand Unit and consists primarily of poorly to moderately sorted, medium- to coarse-grained sand and gravelly sand, with only isolated

occurrences of silt. However, beneath the northern portion of the TFLP, the Deep Sand Unit is composed of only 6 to 8 ft of sand, gravelly sand, and sandy gravel with the remaining deeper portions of the unit characterized by interbedded silty sand and sand. The depth to the top of the Deep Sand Unit varies from approximately 25 ft bgs at the center of the TFLP to as much as 45 ft beneath the north end of Pier 90.

- The Silty Clayey Sand Unit underlies the Deep Sand Unit and consists of soft to stiff fine-grained sediments, primarily silty clay and clayey silt, with lesser amounts of silt and silty clayey sand. The top of the Silty Clayey Sand Unit is shallowest beneath the eastern portion of the TFLP, where it occurs as shallow as 42 ft bgs.

2.1.4 Hydrostratigraphy

Shallow Aquifer. The Shallow Aquifer is generally present in the Shallow Sand Unit and is separated from the Deep Confined Aquifer by the Silty Sand Unit that acts as an upper confining unit. Well water level data collected during routine monitoring show that the dominant unconfined groundwater flow direction is generally towards the south beneath the TFLP, TFAA, and piers, with flow locally to the southwest beneath Area of Concern (AOC) 11, located in the western portion of the TFAA. Water levels in the monitoring wells typically range between 3 and 10 ft bgs and generally correspond to seasonal variations in precipitation rates with the highest water levels observed during the wet season. The typical horizontal gradient beneath the TFLP is approximately 0.001 feet per foot (ft/ft).

Downward vertical gradients between the Shallow Aquifer and Deep Confined Aquifer are noted throughout the TFAA. Vertical gradients typically range from approximately 0.018 to 0.040 ft/ft, with vertical gradients decreasing to the south. Despite the presence of downward vertical gradients, significant downward movement of Shallow Aquifer groundwater under most of the TFAA is considered unlikely due to the low measured vertical permeability in the upper confining unit (Silty Sand Unit).

Tidal influence on Shallow Aquifer groundwater levels under the piers (reflected in higher tidal efficiency and lower time lag) is generally highest near the southern ends of the piers, decreasing progressively inland towards the bulkheads, that run east to west parallel to the shoreline. Tidal efficiencies are notably higher on Pier 91 than Pier 90 and in areas without bulkheads or significant silt locally within the Shallow Aquifer. Little tidal influence is evident in Shallow Aquifer wells at the south end of the TFLP.

Deep Confined Aquifer. The deep confined aquifer is present in the Deep Sand Unit. The tidally-averaged groundwater flow direction in the Deep Confined Aquifer beneath and shoreward (i.e., south) of the TFLP is toward the south. As in the Shallow Aquifer, water levels in the Deep Confined Aquifer respond to seasonal variations in precipitation rates with the highest water levels observed during the wet season. The typical horizontal gradient of the Deep Confined Aquifer is relatively constant at approximately 0.003 ft/ft beneath the TFAA.

Tidal influence on Deep Aquifer groundwater levels under the piers is similar to the Shallow Aquifer, with a higher influence near the southern ends of the piers. Time lags are generally shorter in the Deep Aquifer under the piers than in the Shallow Aquifer. Tidal influence is evident in Deep Aquifer wells in most of the TFLP; the shortest time lags are along the southern boundary of the TFLP and the longest time lags are in the north.

2.2 Cleanup Action Summary

The TFAA cleanup actions between 2005 and 2014 consisted of the cleanup action for the TFLP, the cleanup actions addressing secondary source areas and other potential future exposures, and the start of compliance monitoring (PES 2017).

2.2.1 Cleanup Action for the Tank Farm Lease Parcel

The primary objectives for the TFLP cleanup action are to prevent migration of Light Non-Aqueous Phase Liquid (LNAPL) from the TFLP source area and to prevent future surface product seeps from occurring (PES 2013). Specific actions include:

- Removing existing above-ground structures and the existing asphalt paving; re-moving the remaining subsurface utilities, structures, and tank bases that appear to be the source of the historic surface seeps; and removing highly contaminated soil encountered during the tank base removal process;
- Constructing a subsurface cutoff wall around the perimeter of the former tank farm;
- Installing an enhanced passive LNAPL recovery system; and
- Backfilling and grading the area, constructing a new asphalt cover over the area, and constructing new stormwater drainage improvements.

2.2.2 Actions for Secondary Source Areas and Potential Future Exposures

Actions taken to address secondary source areas and potential future exposures include:

- Institutional controls, such as health and safety requirements for site workers and addressing potential exposures when future land use changes are made, including a restrictive environmental covenant filed in 2017;
- Excavating LNAPL source areas at Solid Waste Management Unit (SWMU) 30;
- Cleaning and decommissioning underground fuel pipelines remaining in the TFAA;
- Implementing an MNA groundwater sampling program to confirm that natural attenuation processes continue to degrade chemicals in groundwater (see Section 2.2.3).

3 Compliance Groundwater Monitoring Activities

This section describes compliance monitoring from November 2020 through August 2021 including four LNAPL gauging events and one groundwater monitoring event. The results are described in Section 4.0. Field logs are included in Appendix A.

The compliance monitoring program is designed to assess how the cleanup action is affecting groundwater quality and to evaluate if cleanup levels continue to be achieved at the CPOC wells. The CPOC wells are located at the downgradient end of three groundwater flow paths, the Pier 90, Pier 91, and AOC 11 flow paths. Figure 1 shows well locations. Shallow aquifer CPOC wells include:

- CP-GP08 is located at the downgradient end of the Pier 90 flow path
- CP-GP09R and CP-GP10 are located at the downgradient end of the Pier 91 flow path
- CP-GP14 is the CPOC for the AOC 11 flow path

Deep aquifer CPOC wells include:

- PNO-MW-06B is located on the Pier 91 flow path
- CP-GP01B is located on the Pier 90 flow path

The groundwater performance monitoring program follows the schedule specified in the CMP. Consistent with the CMP, groundwater sampling shifted to a semi-annual schedule in 2018, and an annual schedule in 2019, with LNAPL gauging continuing on a quarterly basis. (PGG 2019; Ecology 2019). The monitoring well network and analyte list was updated for the current monitoring period based on the recommendations in the 2020 Annual Monitoring report and as approved by Ecology (PGG 2020, Ecology 2021).

3.1 LNAPL Monitoring

PGG collected LNAPL measurements at the east and west end of three LNAPL recovery trenches and at three monitoring wells (CP-107, CP-110, and PNO-MW104) on November 18, 2020; February 9, 2021; May 27, 2021; and August 26, 2021 (Figures 1 and 3, Table 1). The presence of LNAPL and the depth to water were measured from the surveyed top of casing (TOC) to the nearest 0.01 foot using an electronic oil-water interface probe. LNAPL recovery was not performed during this annual monitoring period due to LNAPL thicknesses less than 0.25 feet, as specified in the CMP and Operation and Maintenance Plan (OMP) (PES et al. 2013b, c). LNAPL thickness ranged from less than measurable (< 0.01 ft) to 0.24 feet.

3.2 Groundwater Level Monitoring

PGG conducted performance groundwater level monitoring in 45 of 46 active CMP monitoring wells[1] on August 26, 2021 (Table 2a, Figure 1). Water level elevations from 2016 to 2021 are summarized in Table 2b.

[1] The monument lid bolts at CP-GP03B were seized and the well could not be opened.

3.2.1 Groundwater Monitoring Well Redevelopment

No wells required redevelopment during this annual reporting period.

3.3 Groundwater Sampling and Analysis

CMP groundwater sampling was conducted on August 25 and 26, 2021 (Table 3). PGG monitored the wells for temperature, pH, specific conductance, visual turbidity, dissolved oxygen (DO), and oxidation-reduction potential (ORP).

PGG collected groundwater samples using low-flow sampling methods. A peristaltic pump and dedicated tubing were used for purging and sample collection. The groundwater was purged until parameters stabilized prior to sample collection. Samples were collected directly into laboratory-provided containers. Sample containers were placed in coolers with ice and chain of custody was maintained through delivery to OnSite Environmental.

Samples were submitted to Onsite Environmental Laboratory in Redmond, Washington (an Ecology-accredited laboratory) for analysis. Samples were analyzed for gasoline-range, diesel-range, and oil-range hydrocarbons using Northwest Total Petroleum Hydrocarbons-Gasoline (NWTPH-Gx), and Northwest Total Petroleum Hydrocarbons-diesel extended (NWTPH-Dx).

4 Compliance Monitoring Results

This section describes the results of the annual compliance groundwater monitoring event and four quarterly LNAPL gauging events.

4.1 LNAPL Measurements

Table 1a summarizes LNAPL measurements. As thicknesses were less than 0.25 feet, LNAPL recovery was not performed, consistent with the CMP and OMP (PES et al. 2013b, c). Key LNAPL observations include:

- LNAPL was intermittently detected in trench monitoring points with thicknesses from 0 to 0.06 ft.
- LNAPL was consistently detected in PNO-MW104 with thicknesses from 0.11 to 0.24 ft.
- CP-107 had measurable LNAPL thickness in August 2021 (0.01 ft); this appears to follow a seasonal trend with previous measurable thickness noted in August 2019.

LNAPL thickness appears to have a seasonal variation in observed thickness related to rising and falling water levels. LNAPL thickness measurements are typically the greatest in summer-fall events when water levels are the lowest (Figure 3). This is consistent with the expected LNAPL behavior in unconfined aquifers (Newell 1995).

4.2 Groundwater Elevations and Flow Direction

PGG conducted performance groundwater level monitoring on August 26, 2021, in all available and active CMP monitoring wells; UT-MW39-3 was previously decommissioned and CP-GP03BR had a seized monument lid that could not be opened on the snapshot date. Field water level forms are included in Appendix A.

Depth to water measurements are summarized in Table 2a. Table 2a also includes the calculated groundwater elevations, referenced to mean low-low water vertical datum (MLLW). The top-of-casing elevations in Table 2a include updated survey values from supplemental survey measurements in 2015 and 2016 at selected wells.

Shallow aquifer groundwater elevations were used to generate groundwater contours and evaluate the shallow aquifer flow direction (Figure 1 shows August 2021 contours). The shallow aquifer flow direction is to the south and is consistent with previous groundwater flow directions. No adjustments to the CMP are necessary due to changes in flow direction.

4.3 Groundwater Quality Monitoring

4.3.1 Field Parameters

PGG monitored groundwater for temperature, pH, specific conductance, visual turbidity, dissolved oxygen, and oxidation-reduction potential and August 2021 results are shown in Table 3.

4.3.2 Petroleum Hydrocarbons

The analytical results for total petroleum hydrocarbons and BTEX analyses are summarized in Table 3. The August 2021 laboratory analytical reports are included in Appendix A. Data trends for petroleum hydrocarbons are shown in Figures 2a through 2c.

In August 2021, cleanup levels were met at CPOC wells for NWTPH-G. CPOC well results were below cleanup levels for TPH-D and TPH-O except where lack of silica gel cleanup resulted in obvious outlier results. Results without silica gel cleanup are biased high and do not constitute exceedances. The CPOC wells include shallow aquifer wells CP-GP08, CP-GP09R, CP-GP10, and CP-GP14 and deep aquifer wells PNO-MW06B and CP-GP01B.

Key CPOC results included:

- No sampled wells had exceedances for TPH-G during the monitoring period.
- TPH-Dx analyses were conducted without silica gel cleanup and are biased high[2] (Section 4.4). The TPH-Dx results cannot be rigorously compared to the project cleanup levels because the analysis is not consistent with the CMP methodology. However, despite the upward bias, most CPOC TPH-Diesel and TPH-Oil concentrations were still below cleanup levels.

The data generally indicate continued compliance with site cleanup objectives. Gasoline concentrations were generally consistent with previous monitoring events with compliance at all CPOC wells. TPH-Dx interpretation is complicated by an upward bias from the analytical methods but were consistent with a heavily-weathered petroleum source area.

4.3.3 Data Trends

Figures 2a through 2c show data trends for gasoline-, diesel-, and oil-range hydrocarbons for site CPOC wells and wells generally north and south of the Magnolia Bridge. Table 4 provides a summary of the data from 2015 to August 2021. Data trends show generally decreasing concentrations or lack of detections at CPOC wells. None of the plotted trends showed an increasing trend in detected concentrations, though the data from some wells are noisy enough that the beginning of a trend may be hard to detect.

The data trends do not indicate action or changes to the CMP based on the current results.

4.4 Data Validation and Management

Data were reviewed using Stage 2 data validation consistent with EPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review (U.S. EPA 2016a, b). Data completeness, holding times, laboratory instrument calibrations, surrogate recoveries, matrix spike and matrix spike duplicates, laboratory control samples, quantitation limits, method blanks, field QC samples, and trip blanks were reviewed. No additional data qualifiers were added to data presented in this report and in the data package for Port database use. Data quality assurance review key points include:

- NWTPH-Dx analysis was conducted without silica gel cleanup during the sample extraction and preparation phase. Silica gel cleanup is specified in the CMP. Lack of silica gel cleanup for these results will bias the results high by an unquantified amount relative to prior results with the silica gel cleanup. These results have been flagged Z because they are not consistent with the CMP and are biased relative to the CMP method.
- Samples were analyzed within applicable holding times.

[2] Silica gel cleanup removes polar molecules from the sample extracts that elute in the TPH-Dx interval during analysis. Polar molecules may be present due to background conditions with high organic content, or as weathered degradation compounds. Weathered petroleum compounds generally have lower toxicity than fresh petroleum. Silica gel cleanup was incorporated into the CMP-specified analytical methods to provide the most representative samples for the Terminal 91 site conditions.

- Laboratory instrument calibrations, surrogate recoveries, matrix spike and matrix spike duplicates, and laboratory control samples were within the applicable quality assurance ranges.
- The relative percent differences for the field duplicates were within the recommended criteria of 20%.
- Laboratory control samples and matrix spike duplicates were within acceptable ranges.

The reviewed data are considered generally acceptable for the intended use with the exception of NWTPH-Dx results, which are biased high due to lack of silica gel cleanup during preparation. While the laboratory analytical work was otherwise correct, the NWTPH-D and NWTPH-O results with detections have been flagged Z indicating that the analysis does not conform to the CMP, and therefore the results are not representative of the analytical conditions for comparison to project objectives.

5 Compliance Monitoring Plan Deviations

In the last year, there were deviations from the CMP. Water levels were not measured at well CP-GP03BR due to a seized monument lid. NWTPH-Dx analyses did not include silica gel cleanup during sample extraction and preparation. There were no other deviations from the CMP during the monitoring period.

6 References

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Table 1a. 2021 LNAPL Monitoring Summary

Terminal 91

Well or Riser	Date	Easting	Northing	Top of Casing	LNAPL Top	LNAPL Bottom	LNAPL Thickness	*Groundwater Elevation (feet)
CP-107	11/18/2020	1258549.03	235217.38	17.70	5.32	5.32	0.00	12.38
CP-107	2/9/2021	1258549.03	235217.38	17.70	4.64	4.64	0.00	13.06
CP-107	5/27/2021	1258549.03	235217.38	17.70	5.83	5.83	0.00	11.87
CP-107	8/26/2021	1258549.03	235217.38	17.70	6.41	6.42	0.01	11.29
CP-107	11/17/2021	1258549.03	235217.38	17.70	4.92	4.92	0.00	12.78
CP-110	11/18/2020	1258545.20	235064.79	17.46	6.20	6.20	0.00	11.26
CP-110	2/9/2021	1258545.20	235064.79	17.46	5.64	5.65	0.01	11.82
CP-110	5/27/2021	1258545.20	235064.79	17.46	6.73	6.74	0.01	10.73
CP-110	8/26/2021	1258545.20	235064.79	17.46	7.18	7.18	0.00	10.28
CP-110	11/17/2021	1258545.20	235064.79	17.46	5.80	5.80	0.00	11.66
PNO-MW104	11/18/2020	1258507.67	234985.46	17.70	6.45	6.56	0.11	11.23
PNO-MW104	2/9/2021	1258507.67	234985.46	17.70	6.06	6.19	0.13	11.61
PNO-MW104	5/27/2021	1258507.67	234985.46	17.70	7.01	7.15	0.14	10.66
PNO-MW104	8/26/2021	1258507.67	234985.46	17.70	7.36	7.60	0.24	10.29
PNO-MW104	11/17/2021	1258507.67	234985.46	17.70	6.10	6.26	0.16	11.57
Trench 2E	11/18/2020	1258689.24	235172.27	21.43	10.54	10.54	0.00	10.89
Trench 2E	2/9/2021	1258689.24	235172.27	21.43	9.41	9.41	0.00	12.02
Trench 2E	5/27/2021	1258689.24	235172.27	21.43	10.24	10.24	0.00	11.19
Trench 2E	8/26/2021	1258689.24	235172.27	21.43	5.55	5.55	0.00	15.88
Trench 2E	11/17/2021	1258689.24	235172.27	21.43	10.35	10.35	0.00	11.08
Trench 2W	11/18/2020	1258614.92	235174.81	18.37	7.44	7.46	0.02	10.93
Trench 2W	2/9/2021	1258614.92	235174.81	18.37	6.36	6.36	0.01	12.01
Trench 2W	5/27/2021	1258614.92	235174.81	18.37	7.16	7.17	0.01	11.20
Trench 2W	8/26/2021	1258614.92	235174.81	18.37	5.52	5.53	0.01	12.84
Trench 2W	11/17/2021	1258614.92	235174.81	18.37	7.31	7.33	0.02	11.06
Trench 3E	11/18/2020	1258683.13	235311.86	19.29	8.35	8.37	0.02	10.94
Trench 3E	2/9/2021	1258683.13	235311.86	19.29	7.24	7.24	0.00	12.05
Trench 3E	5/27/2021	1258683.13	235311.86	19.29	8.05	8.06	0.01	11.24
Trench 3E	8/26/2021	1258683.13	235311.86	19.29	8.66	8.67	0.01	10.63
Trench 3E	11/17/2021	1258683.13	235311.86	19.29	7.02	7.06	0.04	12.26
Trench 3W	11/18/2020	1258607.59	235312.57	18.10	7.19	7.24	0.05	10.90
Trench 3W	2/9/2021	1258607.59	235312.57	18.10	6.04	6.05	0.01	12.06
Trench 3W	5/27/2021	1258607.59	235312.57	18.10	6.86	6.86	0.00	11.24
Trench 3W	8/26/2021	1258607.59	235312.57	18.10	7.46	7.48	0.02	10.64
Trench 3W	11/17/2021	1258607.59	235312.57	18.10	8.20	8.25	0.05	9.89
Trench 5E	11/18/2020	1258571.45	235310.84	16.51	4.45	4.45	0.00	12.06
Trench 5E	2/9/2021	1258571.45	235310.84	16.51	3.58	3.58	0.00	12.93
Trench 5E	5/27/2021	1258571.45	235310.84	16.51	4.93	4.93	0.00	11.58
Trench 5E	8/26/2021	1258571.45	235310.84	16.51	10.84	10.84	0.00	5.67
Trench 5E	11/17/2021	1258571.45	235310.84	16.51	4.03	4.04	0.01	12.48
Trench 5W	11/18/2020	1258516.23	235312.10	16.56	4.43	4.45	0.02	12.13
Trench 5W	2/9/2021	1258516.23	235312.10	16.56	3.55	3.56	0.01	13.01
Trench 5W	5/27/2021	1258516.23	235312.10	16.56	4.91	4.97	0.06	11.64
Trench 5W	8/26/2021	1258516.23	235312.10	16.56	7.78	7.78	0.00	8.78
Trench 5W	11/17/2021	1258516.23	235312.10	16.56	4.01	4.05	0.04	12.54

Notes:

LNAPL top and bottom measured as distance below top of riser pipe.

LNAPL thickness was measured twice in the field; reported values are the final measurement.

Table 1b. LNAPL Thickness Summary 2015-2021

Port of Seattle Terminal 91

Date	CP-107	CP-110	PNO-MW104	Trench 2E	Trench 2W	Trench 3E	Trench 3W	Trench 5E	Trench 5W
8/6/2015	0.00	0.00	0.23	0.00	0.00	0.00	0.03	0.00	0.07
9/15/2015	0.01	0.01	0.18	0.02	0.00	0.04	0.05	0.00	0.19
10/14/2015	0.00	0.00	0.21	0.04	0.17	0.07	0.07	0.01	0.11
11/12/2015	0.00	0.00	0.19	0.10	0.19	0.06	0.06	0.00	**0.70**
11/16/2015	0.00	0.00	0.15	0.03	0.02	0.04	0.02	--	0.03
2/8/2016	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.02
5/2/2016	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.09
8/15/2016	0.00	0.00	0.20	0.05	0.06	0.04	0.02	0.03	0.10
11/14/2016	0.00	0.00	0.04	0.01	0.01	0.01	0.02	0.02	0.04
2/13/2017	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.18
5/10/2017	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.06
8/15/2017	--	--	--	0.07	0.00	0.00	0.00	0.06	0.11
11/30/2017	0.00	0.00	0.11	0.04	0.07	0.12	0.05	0.08	0.06
2/15/2018	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.07
5/9/2018	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.06
8/15/2018	0.00	0.00	0.13	0.01	0.00	0.00	0.01	0.03	0.02
11/25/2018	0.00	0.00	0.06	0.02	0.03	0.03	0.04	0.02	0.03
2/21/2019	0.00	0.00	0.11	0.00	0.01	0.01	0.01	0.00	0.02
5/30/2019	0.00	0.00	0.08	0.00	--	0.01	0.00	0.00	0.04
8/22/2019	0.09	0.00	0.19	0.00	0.00	0.02	0.02	0.00	0.01
11/19/2019	0.00	0.00	0.10	0.01	0.02	0.05	0.05	0.02	0.02
2/26/2020	0.00	0.00	0.08	0.00	0.00	0.01	0.00	0.00	0.03
5/27/2020	--	--	--	--	0.00	0.00	0.00	0.00	0.03
8/7/2020	0.02	0.01	0.11	0.01	0.00	0.04	0.02	0.01	0.03
11/18/2020	0.00	0.00	0.11	0.00	0.02	0.02	0.05	0.00	0.02
2/9/2021	0.00	0.01	0.13	0.00	0.00	0.00	0.01	0.00	0.01
5/27/2021	0.00	0.01	0.14	0.00	0.01	0.01	0.00	0.00	0.06
8/26/2021	0.01	0.00	0.24	0.00	0.01	0.01	0.02	0.00	0.00
11/17/2021	0.00	0.00	0.16	0.00	0.02	0.04	0.05	0.01	0.04

Notes:

All measurements in feet.

Bold indicates thickness greater than the recovery threshold (0.25 feet).

Table 2a. 2021 Water Level Snapshot

Port of Seattle Terminal 91

Location	Aquifer	Northing	Easting	Top of Casing Elevation (ft)	Depth to Water (ft.)	Groundwater Elevation (ft)
B1-93	Shallow	235056.49	1259053.02	17.24	--	--
CP-103A	Shallow	234972.53	1258577.49	17.21	6.85	10.36
CP-104A	Shallow	235419.92	1258578.53	17.49	5.84	11.65
CP-104B	Deep	235426.99	1258578.29	17.39	6.06	11.33
CP-106A	Shallow	235301.93	1258919.04	18.11	6.97	11.14
CP-106B	Deep	235311.62	1258908.04	18.06	7.13	10.93
CP-107	Shallow	235217.38	1258549.03	17.70	6.41	11.29
CP-108A	Shallow	234962.68	1258931.98	17.19	6.79	10.40
CP-108B	Deep	234962.46	1258927.28	17.22	9.69	7.53
CP-110	Shallow	235064.79	1258545.20	17.46	7.18	10.28
CP-111	Shallow	234994.01	1258361.25	17.74	7.42	10.32
CP-112	Shallow	235347.29	1258424.51	17.40	5.96	11.44
CP-113	Shallow	235538.49	1258574.60	17.36	5.81	11.55
CP-114	Shallow	235478.73	1258827.05	17.17	6.35	10.82
CP-115A	Shallow	235411.43	1258723.96	17.74	6.12	11.62
CP-115B	Deep	235417.48	1258737.17	17.87	6.56	11.31
CP-121	Shallow	235478.45	1258668.95	17.91	6.07	11.84
CP-122B	Deep	235241.13	1258967.84	17.07	6.25	NA
CP-203B	Deep	234972.13	1258599.96	17.56	8.23	9.33
CP-205A	Shallow	235677.44	1258726.80	17.69	6.04	11.65
CP-205B	Deep	235682.02	1258725.15	17.72	6.28	11.44
CP-GP01A	Shallow	234783.17	1259137.77	17.79	8.62	9.17
CP-GP01B	Deep	234780.16	1259127.74	17.58	10.78	6.80
CP-GP02	Shallow	234870.33	1259056.83	17.52	7.80	9.72
CP-GP03AR	Shallow	234511.00	1258309.84	18.00	9.28	8.72
CP-GP03BR	Deep	234481.72	1258309.70	17.91	--	--
CP-GP04R	Shallow	234734.04	1258317.31	18.14	8.72	9.42
CP-GP05	Shallow	234925.88	1258075.23	17.75	8.29	9.46
CP-GP06	Shallow	234926.51	1257941.21	17.85	8.09	9.76
CP-GP07R	Shallow	234873.77	1258267.68	18.07	8.19	9.88
CP-GP08	Shallow	234457.14	1259008.14	17.27	8.49	8.78
CP-GP09R	Shallow	234287.95	1258417.29	17.67	8.90	8.77
CP-GP10	Shallow	234293.61	1258302.87	17.68	9.46	8.22
CP-GP11	Shallow	235153.12	1258319.95	16.98	7.42	9.56
CP-GP12	Shallow	235283.73	1258226.95	17.31	6.91	10.40
CP-GP13	Shallow	235085.87	1258020.07	16.45	7.00	9.45
CP-GP14	Shallow	234927.56	1257862.30	17.60	8.04	9.56
CP-PR-13	Shallow	235133.41	1258256.72	17.34	6.97	10.37
CP-W210	Shallow	234966.79	1258734.14	17.40	7.51	9.89
PNO-MW02	Shallow	234813.14	1258463.27	17.87	8.42	9.45
PNO-MW06A	Shallow	234773.72	1258421.89	18.21	8.79	9.42
PNO-MW06B	Deep	234764.07	1258421.79	18.17	10.61	7.56
PNO-MW101	Shallow	234996.10	1258273.01	17.72	7.68	10.04
PNO-MW103	Shallow	234472.89	1258453.46	17.53	8.76	8.77
PNO-MW104	Shallow	234985.46	1258507.67	17.70	7.41	10.29
UT-MW39-1	Shallow	235313.48	1258481.61	16.89	5.49	11.40

Notes:

NA - well not accessible at time of snap shot

Water level snapsont August 26, 2021

Table 2b. 2016-2021 Water Level Elevations

Port of Seattle Terminal 91

Date	B1-93	CP-103A	CP-104A	CP-104B	CP-106A	CP-106B	CP-107	CP-108A	CP-108B	CP-110	CP-111	CP-112	CP-113	CP-114	CP-115A	CP-115B
11/14/2016	11.85	11.71	13.80	12.77	13.16	12.52	12.85	11.97	11.03	11.63	11.12	12.68	13.55	13.09	13.70	12.91
2/13/2017	--	12.18	14.34	13.35	13.60	13.31	13.36	12.52	9.94	12.09	11.36	13.12	14.41	13.72	14.54	14.68
5/9/2017	12.05	11.73	13.70	12.97	12.91	12.88	13.13	11.97	7.29	11.69	10.96	12.83	13.71	13.01	13.82	12.85
8/15/2017	10.49	10.58	11.97	11.67	11.38	11.38	11.55	10.70	8.93	10.52	10.35	11.67	11.87	11.15	11.91	11.62
11/30/2017	11.60	11.56	13.34	12.54	12.82	12.47	12.61	11.72	10.82	11.49	11.34	12.54	13.30	12.69	13.42	12.72
5/9/2018	11.34	11.16	12.99	12.34	12.36	12.27	12.31	11.38	8.97	11.12	10.64	12.38	12.97	12.51	13.08	11.69
11/25/2018	10.37	10.58	11.80	11.45	11.63	11.16	11.45	10.74	9.27	10.50	10.60	11.58	11.69	11.02	11.24	11.90
5/29/2019	--	10.70	12.20	11.78	11.60	11.58	11.72	10.89	8.27	10.63	10.50	--	--	11.39	12.17	11.78
5/27/2020	10.67	10.85	12.46	11.91	11.79	11.55	11.93	10.94	7.70	10.78	10.49	12.00	12.38	11.69	12.48	11.95
8/26/2021		10.36	11.65	11.33	11.14	10.93	11.29	10.40	7.53	10.28	10.32	11.44	11.55	10.82	11.62	11.31

Date	CP-121	CP-122B	CP-203B	CP-205A	CP-205B	CP-GP01A	CP-GP01B	CP-GP02	CP-GP03AR	CP-GP03BR	CP-GP04R	CP-GP05	CP-GP06	CP-GP07R	CP-GP08	CP-GP09R
11/14/2016	13.90	12.44	10.48	13.79	13.30	10.65	10.18	11.16	10.33	7.33	10.37	11.35	10.71	10.60	9.98	9.86
2/13/2017	14.76	13.10	10.82	14.75	14.53	10.82	9.68	11.56	10.22	9.47	10.59	10.87	10.93	10.79	10.34	9.74
5/9/2017	14.03	12.84	9.62	13.95	13.84	10.00	6.41	10.98	8.75	3.57	9.80	9.73	10.10	10.32	9.66	8.31
8/15/2017	12.14	11.28	9.29	11.99	11.87	9.72	8.65	9.93	9.42	7.86	9.70	9.95	10.03	9.97	8.72	8.98
11/30/2017	13.67	12.23	10.54	13.57	13.47	10.48	10.28	10.81	10.12	12.97	10.43	10.64	10.87	10.36	9.90	9.32
5/9/2018	13.28	12.18	9.65	13.17	12.79	9.80	8.43	10.47	8.99	8.37	9.70	9.61	9.92	10.10	9.20	8.54
11/25/2018	11.98	10.92	9.60	11.81	11.58	10.03	--	9.99	9.89	8.69	10.06	10.31	10.33	10.14	9.02	9.52
5/29/2019	12.40	11.39	9.05	12.25	12.03	9.31	6.98	10.05	8.63	6.50	9.51	9.50	9.65	9.94	8.90	8.27
5/27/2020	12.70	--	8.98	12.57	12.17	9.63	7.54	10.14	9.03	4.27	9.63	9.62	9.83	9.98	9.08	8.72
8/26/2021	11.84	10.82	9.33	11.65	11.44	9.17	6.80	9.72	8.72	--	9.42	9.46	9.76	9.88	8.78	8.77

Date	CP-GP10	CP-GP11	CP-GP12	CP-GP13	CP-GP14	CP-PR-13	CP-W210	PNO-MW02	PNO-MW06A	PNO-MW06B	PNO-MW101	PNO-MW103	PNO-MW104	UT-MW39-1
11/14/2016	9.75	11.41	11.47	10.19	10.91	11.07	11.36	10.54	10.40	8.79	11.07	9.76	11.50	12.69
2/13/2017	9.45	11.56	11.54	7.44	10.67	11.25	13.71	10.63	10.73	9.94	11.11	9.84	11.80	13.16
5/9/2017	--	11.23	11.23	9.86	9.75	10.93	11.27	10.03	9.89	6.39	10.67	8.49	13.50	12.90
8/15/2017	8.68	10.60	10.52	9.55	9.88	10.43	10.11	9.47	9.59	8.33	10.18	8.90	10.40	11.65
11/30/2017	8.98	11.32	11.52	10.20	10.60	11.29	11.04	10.31	10.41	11.79	10.95	9.51	11.30	12.48
5/9/2018	8.04	10.92	10.90	9.56	9.61	9.64	10.66	9.67	9.73	9.03	10.40	8.64	10.89	12.36
11/25/2018	9.16	10.67	10.61	9.69	10.28	10.55	10.11	9.69	9.89	9.28	10.32	9.34	10.51	10.52
5/29/2019	7.72	10.68	10.67	9.38	9.41	10.48	10.24	9.54	9.53	7.93	10.22	8.46	10.54	11.83
5/27/2020	8.29	10.73	11.91	9.44	9.70	10.55	10.34	9.61	9.64	6.28	10.25	8.74	10.60	12.01
8/26/2021	8.22	9.56	10.40	9.45	9.56	10.37	9.89	9.45	9.42	7.56	10.04	8.77	10.29	--

Notes:

All water level elevations in feet MLLW.

Table 3. August 2021 Groundwater Results

Port of Seattle Terminal 91

Constituent	Units	Cleanup Level	CP-103A	CP-104A	CP-106A	CP-108A	CP-203B	CP-GP01B	CP-GP02	CP-GP08	CP-GP09R	CP-GP10	CP-GP11	CP-GP14	PNO-MW02	PNO-MW06A	PNO-MW06B	PNO-MW103
								CPOC		*CPOC*	*CPOC*	*CPOC*		*CPOC*			*CPOC*	
Field Parameters																		
Temperature	deg C	--	16.3	18.9	21.5	18.1	14.6	16.1	17.8	17.4	18.5	18.2	19.4	15.6	19.3	19.7	15.5	20.6
Specific Conductance	umhos/cm	--	498	498	860	523	574	6334	1105	831	10.32	15.86	5515	46.37	1369	2852	35.85	1521
pH	pH	--	7.13	7.21	6.83	7.23	7.32	8.32	6.8	7.12	6.98	7.36	7.34	7.21	6.73	6.93	7.33	6.79
Oxidation-Reduction Potential	mV	--	-117.5	-124.9	-98.1	-244.7	-100.7	-244.5	-142.3	-87.9	21.8	44.6	-281.3	-65.8	-61.5	-181.2	-100.9	-94.4
Oxygen, Dissolved	mg/L	--	0.49	0.4	0.59	0.27	0.31	0.41	0.33	0.39	0.99	5.59	2.64	1.95	0.5	2.19	1.17	0.58
Total Petroleum Hydrocarbons																		
NWTPH-Gasoline	ug/L	800	400U	400U	510	400U	400U	100U	400U	100U	100U	100U	400U	100U	400U	100U	400U	400U
NWTPH-Diesel *	mg/L	0.5	*1.5Z*	*1Z*	*4Z*	*2.7Z*	*1.4Z*	*1.5Z*	*6.2Z*	*0.48Z*	*0.45Z*	*0.2U*	*0.22Z*	*0.2U*	*3.7Z*	*4.5Z*	*2.6Z*	*6.2Z*
NWTPH-Oil *	mg/L	0.5	*0.43Z*	*0.43Z*	*2.3Z*	*1.8Z*	*0.55Z*	*1.1Z*	*3.1Z*	*0.66Z*	*0.48Z*	*0.35Z*	*0.27Z*	*0.26Z*	*1.1Z*	*2.3Z*	*1.3Z*	*1.7Z*

Notes:

* NWTPH-D and NWTPH-O analyses were conducted without silica gel cleanup, which is specified in the CMP. This will bias results high relative to prior results. The results are therefore not compared to cleanup levels.

Groundwater Cleanup Levels from (PES 2009)

Bold, outlined, shaded cells indicate exceedance of cleanup level

ug/L: micrograms per liter

mg/L: milligrams per liter

Z: The analyses were conducted without silica gel cleanup, are not consistent with the analytical methods in the CMP, and are biased high. The values are not compared to cleanup levels.

U: Constituent not detected at reporting limit shown; values are gray

CPOC flag in header indicates that the well is a conditional point of compliance well

NWTPH: Northwest Total Petroleum Hydrocarbon analysis, with distillate range indicated (diesel-, gasoline-, and oil-range)

O: Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

Table 4. Data Summary

Port of Seattle Terminal 91

			CPOC Wells																						
Constituent	**Units**	**Event Date**	**CP-GP08**	**CP-GP01B**	**CP-GP09R**	**CP-GP10**	**CP-GP14**	**CP-GP01B**	**PNO-MW06B**	**CP-103A**	**CP-104A**	**CP-106A**	**CP-108A**	**CP-108B**	**CP-114**	**CP-203B**	**CP-205B**	**CP-GP01A**	**CP-GP02**	**CP-GP03AR**	**CP-GP05**	**CP-GP11**	**PNO-MW02**	**PNO-MW06A**	**PNO-MW101**	**PNO-MW103**
Field Parameters																										
Oxidation-Reduction Potential	mV	11/14/2016	-170.5	-180.9	84.3	161.8	-8.8	-180.9	-133.2	-122.7	-154.9	-98.3	-51.1	-290	-60.9	70.5	-247.2	-197	16.6	-68.3	-95.2	-230	-93.2	-113.6	-94.4	-84.2
Oxidation-Reduction Potential	mV	2/13/2017	14.4	-68.2	-15.9	-28	-12.3	-68.2	-212.2	-22.6	-82.9	-6.7	-185.1	-278	-6.9	42.4	-107.8	-27.4	-11.3	-146.9	21	-40.7	18.6	-7.6	-127.2	-89.3
Oxidation-Reduction Potential	mV	5/10/2017	186.4	-186.4	-148.3	-166.8	183.9	-186.4	-198	-160.8	-205	108.2	54.8	-243	-196	-186.4	-245.8	-187.4	-181.3	-205.8	-202	-178.6	7.64	-192	-158.5	-186.8
Oxidation-Reduction Potential	mV	8/15/2017	-155.6	Error	--	115.4	11.2	Error	181.21	-157.3	-199.1	-223.2	-205.1	-299.4	--	-182.6	-328.9	-162.5	-232.9	-297.3	-230.5	141.1	228.9	225.8	635.1J	-46.5
Oxidation-Reduction Potential	mV	11/30/2017	-124.7	67	-97	-16.4	-30.4	67	-143.4	-66.7	-191.5	26.9	75.2	-253.7	-94.4J	-121.9	-216.3	37.9	-94.1	-180	-104.1	-188.6	-101.8	-129.3	-102.6	-123.7
Oxidation-Reduction Potential	mV	5/16/2018	40.9	112.9	71.8	78.1	-14.1	112.9	-247.7	-163.3	-22.5	-59.1	-24.5	-241.1	-50.9	--	-157.9	-1.9	2.9	-304.2	-89.8	-296.2	-142.8	-52.1	-66.7	-40.5
Oxidation-Reduction Potential	mV	11/25/2018	-53.7	23.8	-11.5	--	-219.8	23.8	-179.1	18.6	-5.5	-9.9	-25.2	-167.6	-149.7	26.2	-324.7	-40	-25	-323.3	-263.8	-306.9	-42.6	-114.5	-252.4	-253.3
Oxidation-Reduction Potential	mV	5/29/2019	-102	-89.8	220.4	-37.6	-40.2	-89.8	-190.4	-100.1	-138.7	-119.2	-178.3	-297.7	-147.1	-109.8	-247.6	-129.4	-126	-110.3	-93.8	-237.4	-78.2	-80.4	-117.8	-44.5
Oxidation-Reduction Potential	mV	5/27/2020	41.1	-92.8	212.1	247	-37.1	-92.8	-146.2	-57.4	26.8	-92.7	-219.6	-337.4	342	-43.7	-290.1	41.4	28.5	-306	-239.2	-303.3	76.3	-103.3	-208	-95.7
Oxidation-Reduction Potential	mV	8/25/2021	-87.9	-244.5	21.8	44.6	-65.8	-244.5	-100.9	-117.5	-124.9	-98.1	-244.7	--	--	-100.7	--	--	-142.3	--	--	-281.3	-61.5	-181.2	--	-94.4
Oxygen, Dissolved	mg/L	11/14/2016	1.56	0.37	0.97	5.01	5.36	0.37	0.08	0.13	1.23	0.18	0.11	0.32	1.59	2.8	0.14	0.38	0.53	0.41	1.51	0.34	0.33	0.08	0.33	0.58
Oxygen, Dissolved	mg/L	2/13/2017	2.54	0.51	1.66	7.27	4.57	0.51	0.01U	0.13	0.27	0.7	0.99	0.38	1.39	0.14	0.32	0.87	1.64	0.28	0.66	0.08	0.15	0.08	0.09	0.04
Oxygen, Dissolved	mg/L	5/10/2017	1.93	0.31	0.86	8.81	0.88	0.31	0.037	1.69	1.2	0.17	0.26	0.07	1.21	1.6	0.68	0.89	0.88	0.56	0.87	1.62	5.76	0.45	0.8	0.8
Oxygen, Dissolved	mg/L	8/15/2017	0.44	1.84	--	3.86	0.5	1.84	0.12	0.25	0.28	0.38	0.23	0.18		0.25	0.17	1.65	0.18	0.17	0.22	0.12	0.11	0.2	0.19	0.16
Oxygen, Dissolved	mg/L	11/30/2017	2.48	3.42	0.68	4.12	2.54	3.42	0.75	0.19	0.22	1	0.23	0.08	1.24	0.58	0.17J	0.48	0.37	0.32	0.93	0.61	0.63	0.39	0.64	0.68
Oxygen, Dissolved	mg/L	5/16/2018	1.22	0.16	2.07	7.97	4.4	0.16	1.27	0.12	0.29	0.14	0.4	0.28	0.99		0.19	0.17	0.3	1.04	2.54	0.54	1.1	0.82	2.66	0.67
Oxygen, Dissolved	mg/L	11/25/2018	0.3	2.69	0.23	--	0.22	2.69	0.63	0.23	0.18	0.28	0.79	0.56	0.4	0.28	1.12	0.38	0.32	0.27	0.23	0.8	0.25	0.31	1.77	0.41
Oxygen, Dissolved	mg/L	5/29/2019	0.24	0.7	0.68	7.46J	0.33	0.7	0.4	0.23	0.23	0.21	0.19	0.12	0.33	0.22	0.16	0.21	0.32	0.12	0.61	0.35	0.54	0.24	0.79	0.18
Oxygen, Dissolved	mg/L	5/27/2020	0.1	0.5	0.87	6.33	0.81	0.5	0.31	0.1	0.2	0.18	0.6	0.1	0.6	0.2	0.5	0.3	0.1	0.2	0.54	0.83	0.27	0.29	0.91	2.48
Oxygen, Dissolved	mg/L	8/25/2021	0.39	0.41	0.99	5.59	1.95	0.41	1.17	0.49	0.4	0.59	0.27	--	--	0.31	--	--	0.33	--	--	2.64	0.5	2.19	--	0.58
pH, Field	pH	11/14/2016	7.17	6.67	7.29	7.28	6.84	6.67	7.3	7.17	7.05	6.94	6.94	7.92	7.38	6.71	8.01	7.21	6.59	7.49	6.94	7.39	6.79	6.71	7.53	7.12
pH, Field	pH	2/13/2017	6.99	8.41	7.33	7.55	6.76	8.41	7.12	6.98	7.27	7.02	7.21	7.89	7.41	7.23	7.86	7.17	6.88	7.32	6.77	7.77	6.65	6.88	7.17	6.56
pH, Field	pH	5/10/2017	6.83	8.05	7.39	7.81	7.19	8.05	7.34	7.35	7.51	7.14	7.4	8.01	7.77	7.39	8.27	6.94	6.66	7.65	7.42	7.48	6.68	6.91	7.4	6.62
pH, Field	pH	8/15/2017	7.06	8.27	--	7.19	9.75	8.27	6.88	7.09	7.13	6.82	6.99	7.79		7.11	7.69	6.98	6.81	7.44	7.13	6.73	6.2J	6.94	5.01J	6.75
pH, Field	pH	11/30/2017	7.03	6.18	6.91	7.19	6.76	6.18	6.93	7.14	7.27	6.78	6.85	8.04	7.38	7.61	7.76	7.01	6.9	7.23	6.89	6.98	6.39	6.43	7.34	6.63
pH, Field	pH	5/16/2018	7.08	5.86	7.16	7.41	7.2	5.86	7.29	7.11	6.85	6.95	6.88	8.07	7.41		7.72	7.13	6.74	7.62	7.1	7.42	6.6	6.73	7.41	6.72
pH, Field	pH	11/25/2018	7.13	7.63	6.98	--	6.89	7.63	7.3	8.11	6.82	8.16	6.52	7.81	7.52	8.06	7.79	8.51	8.37	7.36	7.03	7.02	6.7	6.54	7.49	6.82
pH, Field	pH	5/29/2019	7.07	6.25	5.82	7.13	6.8	6.25	5.77	7.09	7.11	6.89	6.82	7.76	7.58	7.19	7.88	7.07	6.73	5.88	7.02	6.96	6.53	4.69	7.22	6.34
pH, Field	pH	5/27/2020	7.16	8.43	7.24	7.59	7.22	8.43	7.09	7.18	7.29	6.74	7.37	7.77	7.57	7.4	8.21	7.09	6.85	7.55	7.27	7.31	6.49	6.73	7.51	6.69
pH, Field	pH	8/25/2021	7.12	8.32	6.98	7.36	7.21	8.32	7.33	7.13	7.21	6.83	7.23	--	--	7.32	--	--	6.8	--	--	7.34	6.73	6.93	--	6.79
Specific Conductance, Field	umhos/cm	11/14/2016	582	105.5	15849	3001	8800	105.5	1510	454	550	740	640	4382	460	194	2640	593	1158	25021	18155	3743	838	1940	3722	2092
Specific Conductance, Field	umhos/cm	2/13/2017	864	4730	18600	22190	595	4730	1418	321	349	564	435	4171	437	395	2855	900	1286	38810	1782	1305	557	623	3282	1259
Specific Conductance, Field	umhos/cm	5/10/2017	731	3.39	7560	138200	4470	3.39	2140	384.7	388	617.3	416.9	5229	359.8	527.5	2504	1358	920	2.56	1757	1926	13.84	835	2009	1409
Specific Conductance, Field	umhos/cm	8/15/2017	802	4401		25560	404	4401	1881	465	441	745	504	5563		586	2943	1771	998	35010	22700	4301	1334	1667	1595	1357
Specific Conductance, Field	umhos/cm	11/30/2017	721	25	19.08	335600	8.54	25	1813	419	409	594	673	3904	410	589	2865	1507	1150	383700	286000	9.06	905	2190	3260	1658
Specific Conductance, Field	umhos/cm	5/16/2018	831	47	15750	18.3	2445	47	2062	444	423	670	398	2906	378	--	2162	1131	1107	31150	23.62	3953	1171	1224	2624	1561
Specific Conductance, Field	umhos/cm	11/25/2018	946	55	18.17	--	1800	55	1279	495	530	818	726	2965	476	567	3353	1709	1194	34.28	3254	12630	1435	4216	3285	1591
Specific Conductance, Field	umhos/cm	5/29/2019	710	71.5	7483	24125	5104	71.5	1759	486	510	720	368.1	5742	359.2	512	2537	1242	1043	28990	17144	4067	1141	1113	3839	1347
Specific Conductance, Field	umhos/cm	5/27/2020	868	4809	7550	20570	1967	4809	2675	473.8	494.4	735	379.8	6011	453.5	553.5	2865	1520	1244	33300	18650	3816	1012	1556	3711	1571
Specific Conductance, Field	umhos/cm	8/25/2021	831	6334	10.32	15.86	46.37	6334	35.85	498	498	860	523	--	--	574	--	--	1105	--	--	5515	1369	2852	--	1521
Temperature	deg C	11/14/2016	16.2	15.9	17.8	16.1	14.7	15.9	15.1	14.9	16.3	18.4	15.1	15.2	15.2	14.7	15	18.3	16.4	16.8	13.9	17	17.2	17.4	17.3	17.7
Temperature	deg C	2/13/2017	11.96	15.1	11.79	9.5	11.47	15.1	14.01	11.45	11.1	12.55	9.32	14	10.49	13.26	13.36	1340	11.82	10.75	10.31	12.68	11.5	11.53	12.79	12.94
Temperature	deg C	5/10/2017	12.8	14.56	13.05	11.34	11.77	14.56	14.44	12.8	13	14	11.6	14.4	12.7	14.2	14.2	13.94	12.75	11.11	11.05	13.92	13.84	13.88	13.35	13.13
Temperature	deg C	8/15/2017	17.12	16.25	--	17.67	17.76	16.25	15.39	15.74	18.44	20.76	17.87	15.65	--	15.01	16.09	18.99	18.56	17.2	15.52	19.73	18.89	18.9	17.42	18.41
Temperature	deg C	11/30/2017	15.2	15.66	15.34	13.78	12.63	15.66	13.33	13.52	15.5	15.99	14.09	14.4	13.89	12.67	14.99	16.96	13.89	14.84	11.42	13.7	14.53	14.65	14.83	15.26
Temperature	deg C	5/16/2018	15.74	15.56	14.08	13.05	12.46	15.56	15.35	13.7	13.37	15.89	12.94	14.93	14.64	--	14.08	15.64	13.99	12.52	11.37	14.52	14.99	14.6	13.38	14.49
Temperature	deg C	11/25/2018	13.5	14.6	15.81	--	12.46	14.6	13.69	12.2	14.66	15.98	13.19	12.93	13.32	12.21	12.95	15.57	13.96	14.62	12.39	14.52	16.02	15.38	14.77	15.64
Temperature	deg C	5/29/2019	13.8	15.6	15.1	12.9	12.8	15.6	14.7	13.8	14.1	15.9	14	14.7	14.4	14.1	15.1	16.2	14.4	12.7	11.9	15.3	15	14.8	13.8	15.3
Temperature	deg C	5/27/2020	14.5	16.2	15.9	13.8	13.6	16.2	15	14.3	14.5	16.6	14	15.1	14.6	14.7	15.2	15.7	15.1	13.2	12.6	16.2	15.6	15.8	15.1	16.1
Temperature	deg C	8/25/2021	17.4	16.11	18.53	18.24	15.57	16.11	15.46	16.3	18.89	21.46	18.14	--	--	14.63	--	--	17.79	--	--	19.43	19.33	19.71	--	20.55

Table 4. Data Summary

Port of Seattle Terminal 91

			CPOC Wells																							
Constituent	**Units**	**Event Date**	**CP-GP08**	**CP-GP01B**	**CP-GP09R**	**CP-GP10**	**CP-GP14**	**CP-GP01B**	**PNO-MW06B**	**CP-103A**	**CP-104A**	**CP-106A**	**CP-108A**	**CP-108B**	**CP-114**	**CP-203B**	**CP-205B**	**CP-GP01A**	**CP-GP02**	**CP-GP03AR**	**CP-GP05**	**CP-GP11**	**PNO-MW02**	**PNO-MW06A**	**PNO-MW101**	**PNO-MW103**
Petroleum Compounds																										
NWTPH-D-No Silica Gel	mg/L	8/10/2015	0.05U	0.641Z	0.05U	0.05U	0.05U	0.641Z	0.05U	2.14Z	0.408Z	4.62Z	0.05U	0.27Z	0.05U	1.45Z	0.05U	0.05U	3.88Z	0.05U	0.05U	0.05U	3.42Z	3.73Z	0.05U	11.2Z
NWTPH-D-No Silica Gel	mg/L	11/14/2016	0.26U	0.26U	0.26U	0.25U	0.26U	0.26U	2.8Z	2.2Z	0.56Z	0.78Z	6.2Z	--	0.26U	0.25U	0.26U	0.26U	0.55Z	0.65Z	0.26U	0.25U	3.6Z	9.5Z	0.26U	5.5Z
NWTPH-D-No Silica Gel	mg/L	8/25/2021	0.48Z	1.5Z	0.45Z	0.2U	0.2U	1.5Z	2.6Z	1.5Z	1.0Z	4.0Z	2.7Z	--	--	1.4Z	--	--	6.2Z	--	--	0.22Z	3.7Z	4.5Z	--	6.2Z
NWTPH-D-SG	mg/L	11/9/2015	0.05U	0.526	0.074	0.05U	0.113	0.526	2.98	1.9	0.63	2.83	6.98	1.12	0.05U	2.35	0.05U	0.05U	6.75	0.152	0.1	0.05U	4.92	5.62	0.185	5.01
NWTPH-D-SG	mg/L	2/8/2016	0.05U	1.04	0.05U	0.05U	0.05U	1.04	2.26	3.08	0.555	1.84	6.54	0.606	0.05U	1.68	0.05U	0.182	3.24	0.434	0.05U	0.05U	0.892	1.82	0.05U	5.1
NWTPH-D-SG	mg/L	5/3/2016	0.05U	0.448	0.05U	0.05U	0.05U	0.448	1.98	0.999	0.806	6.96	5.33	0.405	0.05U	1.52	0.05U	0.109	0.05U	0.05U	0.05U	0.05U	0.271	0.997	0.078	6.08
NWTPH-D-SG	mg/L	8/15/2016	0.05U	0.414	0.157	0.05U	0.05U	0.414	2.12	1.83	0.404	2.37	3.96	0.166	0.05U	1.94	0.05U	0.05U	7.72	0.137	0.091	0.05U	3.78	3.74	0.05U	1.5
NWTPH-D-SG	mg/L	2/13/2017	0.26UX	0.26UX	0.26UX	0.26UX	0.26UX	0.26UX	0.26UX	0.58X	0.38X	0.7X	0.26X	0.26U	0.26UX	0.26UX	0.31UX	0.26UX	0.26UX	0.25UX	0.26UX	0.26UX	0.26UX	0.26UX	0.26UX	0.6X
NWTPH-D-SG	mg/L	5/10/2017	0.26UX	0.26UX	0.25UX	0.26UX	0.26UX	0.26UX	0.26UX	0.53X	0.41X	0.66X	0.42X	0.26UX	0.26UX	0.26UX	0.26UX	0.26UX	0.26UX	0.25UX	0.26UX	0.26UX	0.26UX	0.26UX	0.25UX	0.73X
NWTPH-D-SG	mg/L	8/15/2017	0.26UX1	0.25UX1	0.26UX1	0.25UX1	0.26UX1	0.25UX1	0.25UX1	0.64X1	0.52X1	0.83X1	0.53X1	0.27UX1	0.25UX1	0.36X1	0.26UX1	0.26UX1	0.48X1	0.46X1	0.25UX1	0.26UX1	0.45X1	0.26UX1	0.26UX1	0.73X1
NWTPH-D-SG	mg/L	11/30/2017	0.26UX1	0.26UX1	0.25UX1	0.25UX1	0.25UX1	0.26UX1	0.26UX1	0.47X1,J	0.39X1,M	0.65X1,M	0.47X1	0.26UX1	0.26UX1	0.26X1,M	0.26UX1	0.26UX1	0.63X1,M	0.25UX1	0.25UX1	0.25UX1	0.26UX1	0.35X1	0.26UX1	0.98X1
NWTPH-D-SG	mg/L	5/16/2018	0.26UX1	0.26UX1	0.26UX1	0.25UX1	0.25UX1	0.26UX1	0.26UX1	0.76X1,M	0.64X1,M	0.79X1,M	0.4X1,M	0.31UX1	0.26UX1	0.3X1,M	0.3UX1	0.25UX1	0.26UX1	0.25UX1	0.26UX1	0.26UX1	0.26UX1	0.62X1	0.26UX1	0.9X1,M
NWTPH-D-SG	mg/L	11/15/2018	0.25UX1	0.26UX1	0.25UX1	--	0.26UX1	0.26UX1	0.25UX1	0.68X1	0.43X1	0.67X1	0.33X1	0.26UX1	0.25UX1	0.37X1	0.26UX1	0.26UX1	0.43X1	0.25UX1	0.25UX1	0.26UX1	0.47X1	0.41X1	0.25UX1	0.72X1
NWTPH-D-SG	mg/L	5/29/2019	0.25UX1	0.25UX1	0.26UX1	0.25UX1	0.25UX1	0.25UX1	0.25UX1	0.69X1	0.63X1	0.67X1,M	0.32X1	0.26UX1	0.25UX1	0.44X1	0.25UX1	0.25UX1	0.4X1	0.25UX1	0.25UX1	0.25UX1	0.35X1,M	0.5X1,M	0.25UX1	0.89X1
NWTPH-D-SG	mg/L	5/27/2020	0.21UX1	0.21UX1	0.2UX1	0.2UX1	0.21UX1	0.21UX1	0.24X1	0.78X1	0.5X1	0.86X1	0.59X1	0.22UX1	0.21UX1	0.3X1	0.22UX1	0.2UX1	0.97X1	0.2UX1	0.2UX1	0.2UX1	0.4X1	0.34X1	0.2UX1	0.86X1
NWTPH-G	ug/L	8/10/2015	50U	50U	50U	50U	50U	50U	50U	235	554	703	336	50U	50U	171	50U	50U	248	50U	50U	255	50U	50U	84.1	50U
NWTPH-G	ug/L	11/9/2015	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	51.8	50U
NWTPH-G	ug/L	2/8/2016	50U	50U	50U	50U	50U	50U	50U	334	50U	50U	79.2	50U	616	290	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U
NWTPH-G	ug/L	5/3/2016	50U	50U	50U	50U	50U	50U	164	290	712	1730	543	50U	50U	296	50U	50U	50U	50U	50U	1440	50U	50U	58.7	50U
NWTPH-G	ug/L	8/15/2016	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U	93.4	50U	50U	50U	50U	50U	50U	148	50U
NWTPH-G	ug/L	11/14/2016	100U	100U	100U	100U	100U	100U	400U	380	300	400U	400U	--	100U	100U	400U	100U	400U	400U	100U	400U	160	400U	100U	400U
NWTPH-G	ug/L	2/13/2017	100U	100U	100U	100U	100U	100U	200	430	390	860	270	100U	100U	320	100U	100U	100U	100U	100U	230	100U	100U	100U	450
NWTPH-G	ug/L	5/10/2017	100U	100U	100U	100U	100U	100U	130	500U	470O	1200O	500U	100U	100U	500U	100U	100U	140	100U	100U	360	100U	100U	100U	400U
NWTPH-G	ug/L	8/15/2017	100U	100U	100U	100U	100U	100U	500U	100U	500U	1200O	500U	100U	100U	500U	100U	100U	500U	100U	100U	500U	500U	100U	100U	500U
NWTPH-G	ug/L	11/30/2017	100U	100U	100U	100U	100U	100U	380O	540O	450O	990O	490O	400U	100U	380O	400U	100U	690O	100U	100U	350	380O	100UX	100U	600O
NWTPH-G	ug/L	5/16/2018	100U	100U	100U	400U	100U	100U	230	630	370	1100	430	400U	100U	380	400U	100U	250	400U	100U	730	150	220	100U	710
NWTPH-G	ug/L	11/15/2018	100U	100U	100U	--	400U	100U	400U	100U	100U	100U	100U	100U	100U	100U	400U	100U	100U	400U	400U	400U	400U	400U	400U	400U
NWTPH-G	ug/L	5/29/2019	100U	100U	100U	100U	100U	100U	170O	500U	500U	790O	500U	500U	100U	500U	500U	100U	500U	100U	100U	330	250O	160O	100U	500U
NWTPH-G	ug/L	5/27/2020	100U	100U	100U	100U	100U	100U	200O	520O	400O	900O	480O	100U	100U	370O	100U	100U	440O	100U	100U	280	190O	160O	100U	640O
NWTPH-G	ug/L	8/25/2021	100U	100U	100U	100U	100U	100U	400U	400U	400U	510O	400U	--	--	400U	--	--	400U	--	--	400U	400U	100U	--	400U
NWTPH-LO	mg/L	11/9/2015	0.1U	0.253	0.1U	0.1U	0.1U	0.253	0.1U	0.1U	0.76	3.83	0.1U	0.1U	0.1U	0.1U	0.1U	0.104	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
NWTPH-LO	mg/L	2/8/2016	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.16	2.28	0.104U	0.1U	0.146	0.1U	0.114	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
NWTPH-LO	mg/L	5/3/2016	0.1U	0.446	0.1U	0.1U	0.1U	0.446	0.1U	0.1U	0.1U	6.3	0.1U	0.524	0.338	0.103U	0.1U	0.1U	4.21	0.331	0.1U	0.1U	1.72	2.32	0.1U	0.1U
NWTPH-LO	mg/L	8/15/2016	0.1U	0.707	0.314	0.1U	0.1U	0.707	0.1U	0.1U	0.24	4.04	0.1U	0.593	0.118	0.1U	0.1U	0.15	0.1U	0.19	0.1U	0.1U	0.1U	0.1U	0.144	1.47
NWTPH-LO	mg/L	2/13/2017	0.41UX	0.42UX	0.41UX	0.41UX	0.41UX	0.42UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX	0.4U	0.41UX	0.41UX	0.49UX	0.41UX	0.41UX	0.4UX	0.41UX	0.41UX	0.41UX	0.42UX	0.41UX	0.41UX
NWTPH-LO	mg/L	5/10/2017	0.42UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX	0.42UX	0.41UX	0.41UX	0.42UX	0.41UX	0.41UX	0.4UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX	0.41UX
NWTPH-LO	mg/L	8/15/2017	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.42UX1	0.41UX1	0.41UX1	0.42UX1	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1
NWTPH-LO	mg/L	11/30/2017	0.41UX1	0.41UX1	0.4UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.42UX1	0.41UX1	0.41UX1	0.4UX1	0.4UX1	0.41UX1	0.41UX1	Error	0.41UX1	0.47X1,N
NWTPH-LO	mg/L	5/16/2018	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.49UX1	0.41UX1	0.41UX1	0.49UX1	0.41UX1	0.41UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1
NWTPH-LO	mg/L	11/15/2018	0.4UX1	0.41UX1	0.4UX1	--	0.41UX1	0.41UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.4UX1
NWTPH-LO	mg/L	5/29/2019	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1	0.4UX1	0.4UX1	0.4UX1	0.4UX1	0.41UX1	0.41UX1	0.41UX1
NWTPH-LO	mg/L	5/27/2020	0.21UX1	0.21UX1	0.2UX1	0.2UX1	0.21UX1	0.21UX1	0.2UX1	0.21UX1	0.21UX1	0.2UX1	0.21UX1	0.22UX1	0.21UX1	0.21UX1	0.22UX1	0.2UX1	0.21UX1	0.2UX1	0.2UX1	0.2UX1	0.2UX1	0.2UX1	0.2UX1	0.2UX1
NWTPH-LO-No Silica Gel	mg/L	8/10/2015	0.13Z	0.65Z	0.858Z	0.1U	0.1U	0.65Z	0.659Z	0.1U	0.1U	6.29Z	0.1U	0.1U	0.1U	0.1U	0.1U	0.151Z	5.58Z	0.57Z	0.1U	0.1U	2.44Z	2.17Z	0.196Z	0.1U
NWTPH-LO-No Silica Gel	mg/L	11/14/2016	0.41U	0.41U	0.41U	0.41U	0.41U	0.41U	0.93Z	0.52Z	0.46Z	2.3Z	2.8Z	--	0.45Z	0.41U	0.42U	0.41U	2.9Z	0.5Z	0.41U	0.4U	1.5Z	1.9Z	0.41U	1.3Z
NWTPH-LO-No Silica Gel	mg/L	8/25/2021	0.66Z	1.1Z	0.48NZ	0.35Z	0.26Z	1.1Z	1.3NZ	0.43NZ	0.43Z	2.3NZ	1.8NZ	--	--	0.55NZ	--	--	3.1NZ	--	--	0.27Z	1.1NZ	2.3NZ	--	1.7NZ

Notes:

U: non-detect at reporting limit shown.

J: Estimated value, result may be between reporting and method detection limits.

mg/L: milligrams per liter

ug/L: micrograms per liter

O: Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

CPOC: Conditional Point of Compliance

Z: sample did not include silical gel preparation and the detected result is biased high relative to the CMP-defined analytical method.

CP-205B 11.44
CP-205A 11.65
CP-113 11.55
CP-121 11.84
CP-114 10.82
CP-104B 11.33
CP-104A 11.65
CP-115A 11.62
CP-115B 11.31
CP-112 11.44
UT-MW39-1 11.4
CP-GP12 10.4
CP-106B 10.93
CP-106A 11.14
CP-122B 10.82
Cp-107 11.29
11
CP-GP11 9.56
CP-PR-13 10.37
CP-GP13 9.45
10
CP-110 10.28
B1-93
PNO-MW101 10.04
CP-111 10.32
PNO-MW104 10.29
CP-103A 10.36
CP-203B 9.33
CP-W210 9.89
CP-108B 7.53
CP-108A 10.4
CP-GP14 9.56
CP-GP06 9.76
CP-GP05 9.46
CP-GP07R 9.88
CP-GP02 9.72
PNO-MW02 9.45
9.42
7.56
PNO-MW06A
PNO-MW06B
CP-GP01B 6.8
CP-GP01A 9.17
CP-GP04R 9.42
9
9
CP-GP03AR 8.72
CP-GP03BR
PNO-MW103 8.77
CP-GP08 8.78
CP-GP10 8.22
CP-GP09R 8.77
0 Feet 150
1 inch = 150 feet
EagleView Technologies, Inc.

K:\Glen\Terminal 91\GIS\mxds\2021_08_ShallowAquiferWLE.mxd 1/25/2022

Monitoring Well Network
- Shallow Aquifer Well
- Deep Aquifer Well
- Shallow Groundwater Sampling Well
- Deep Groundwater Sampling Well
- Piezometer

Shallow Aquifer
- Groundwater Elevation Contours
- Flow Directions
- Bulkhead
- Tank Farm
- Tank Farm Affected Area (TFAA) Boundary
- Bentonite Cutoff Wall
- AOC 11 (Old Tank Farm)

Site Location

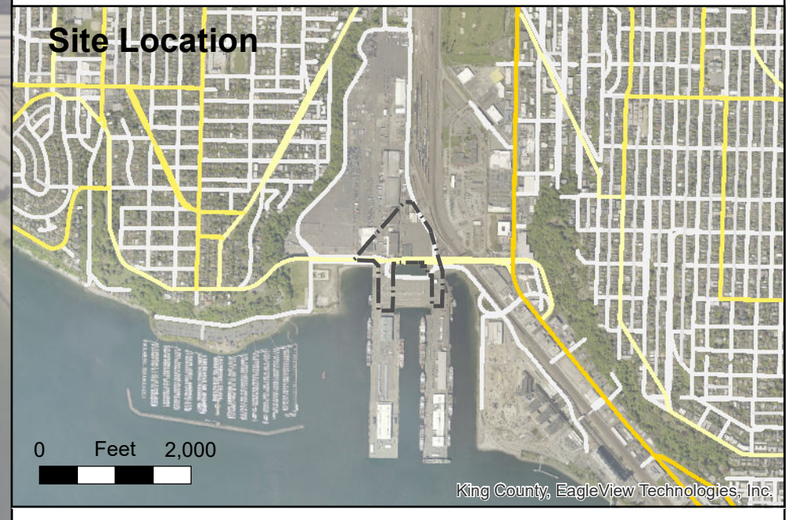
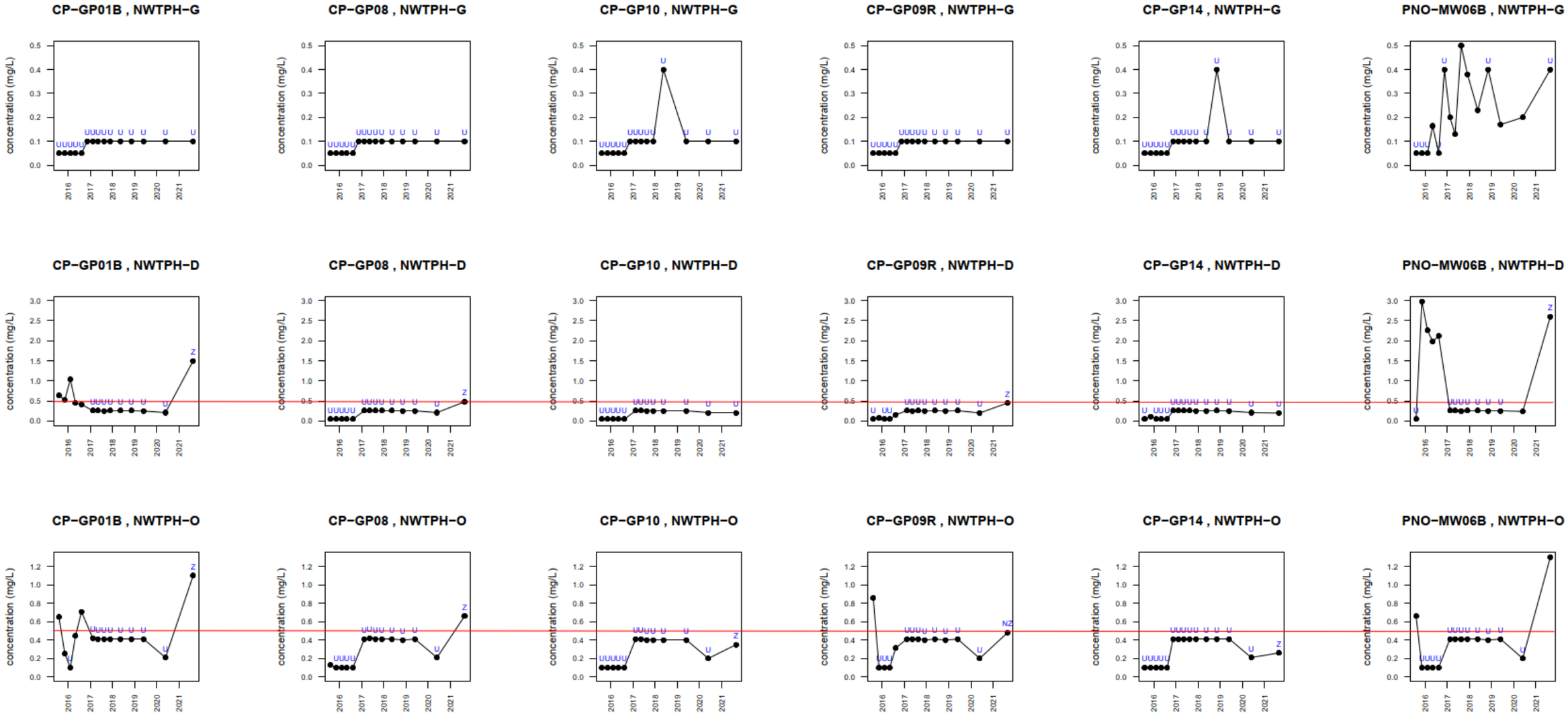


Figure 1
Shallow Groundwater Elevations
August 2021

Port of Seattle Terminal 91

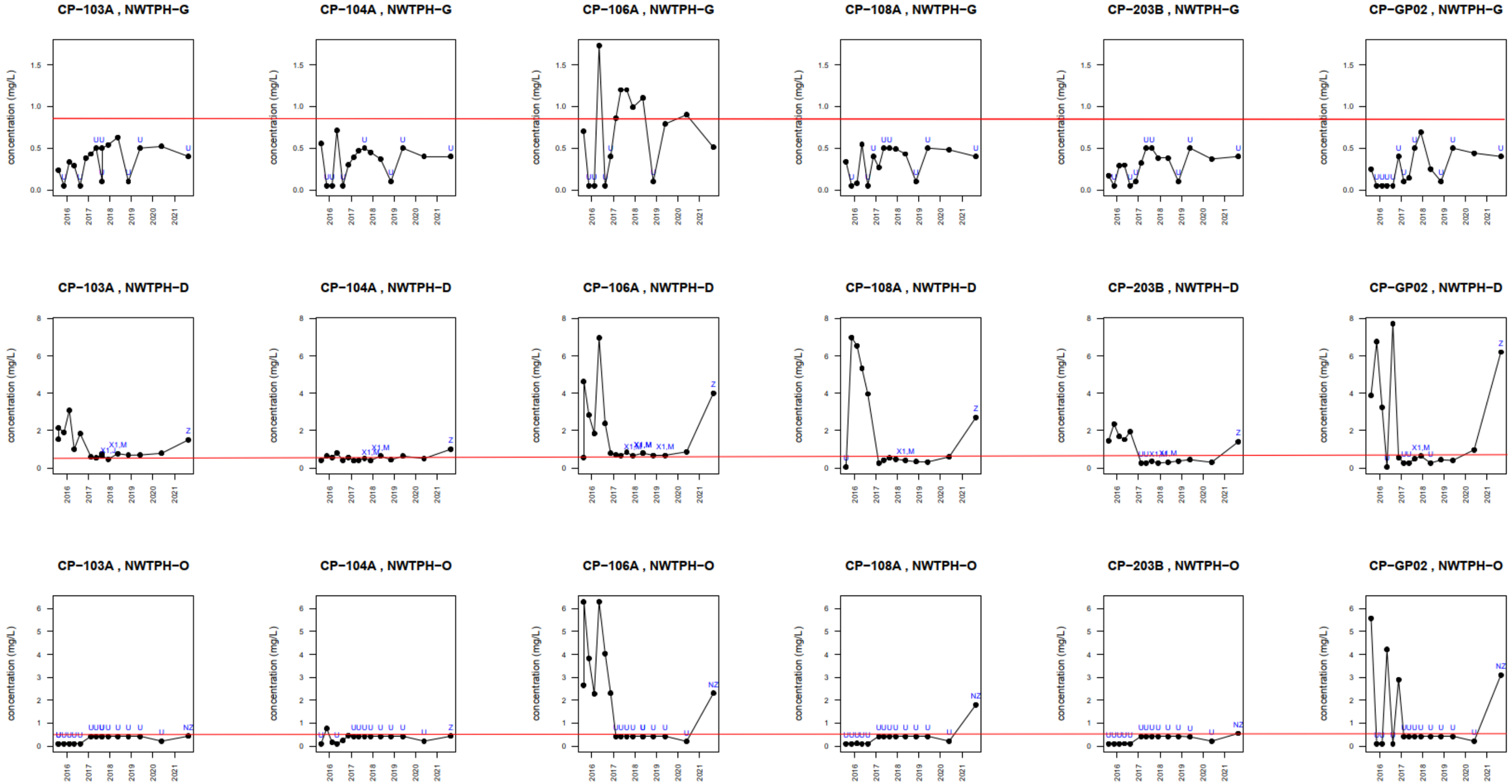
PgG
A Mott MacDonald Company



See Table 3 for data qualifiers shown in blue text.
Red lines are the cleanup levels for TPH-G (0.8mg/L) and TPH-D/O (0.5 mg/L); line not shown where cleanup levels are off-scale.
All Z-flagged data are biased high and should not be compared to cleanup levels.

Figure 2a. CPOC Well Time Series TPH Plots
Terminal 91

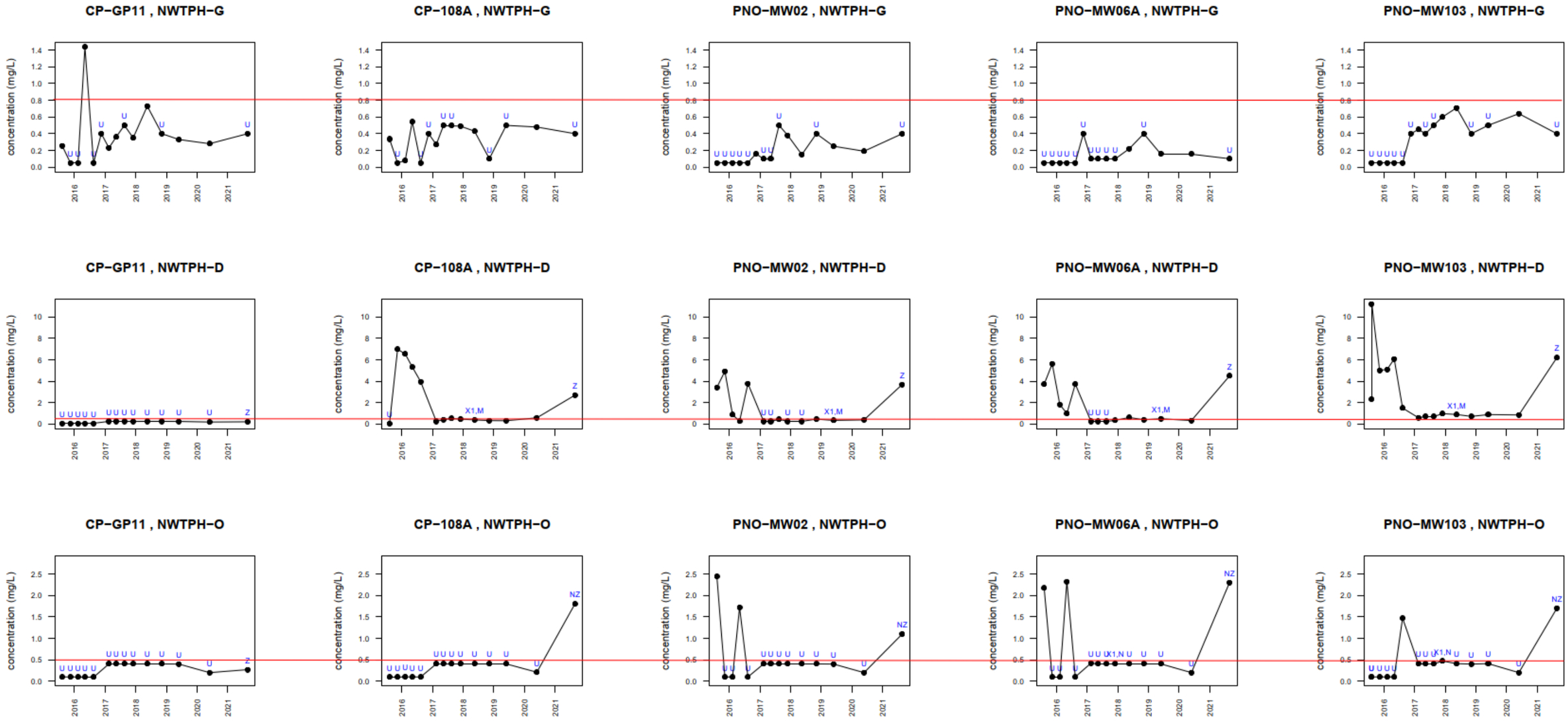
PgG



See Table 3 for data qualifiers shown in blue text.
Red lines are the cleanup levels for TPH-G (0.8mg/L) and TPH-D/O (0.5 mg/L); line not shown where cleanup levels are off-scale.
All Z-flagged data are biased high and should not be compared to cleanup levels.

Figure 2b. Northern Well Time Series TPH Plots
Terminal 91

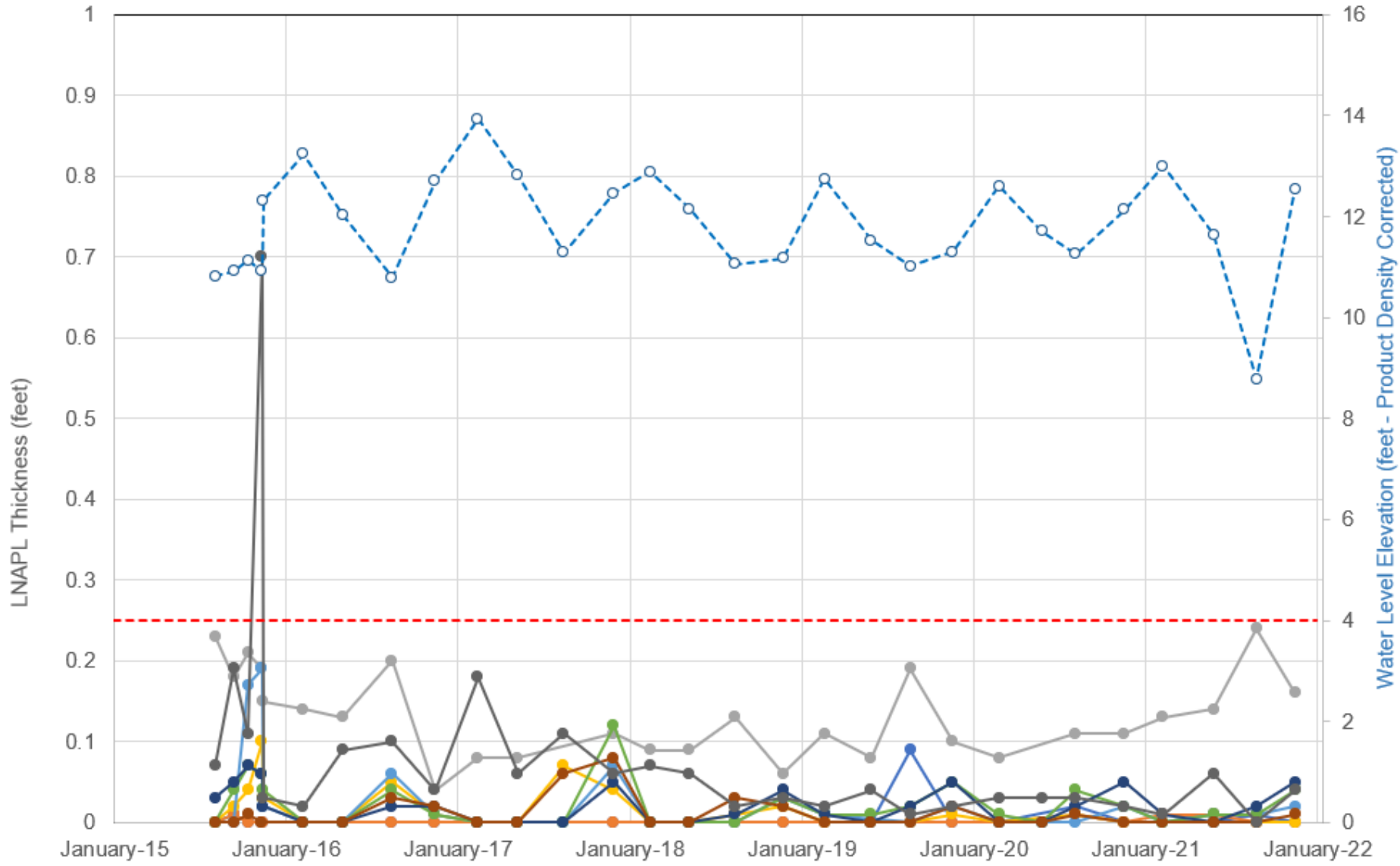
PgG



See Table 3 for data qualifiers shown in blue text.
Red lines are the cleanup levels for TPH-G (0.8mg/L) and TPH-D/O (0.5 mg/L); line not shown where cleanup levels are off-scale.
All Z-flagged data are biased high and should not be compared to cleanup levels.

Figure 2c. Southern Well Time Series TPH Plots
Terminal 91

PgG



The water level hydrograph for location Trench 5W is plotted to show seasonal high and low water levels relative to LNAPL thickness variations as discussed in text. LNAPL thickness is typically greatest during seasonal low water levels.

Figure 3
LNAPL Thickness Trends

Terminal 91

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A. Field Forms (Electronic Only)

LNAPL MEASUREMENT AND RECOVERY FIELD DATA SHEET

Sampling Event: 2021 Q2

Project Number: JG1601
Project Name: Terminal 91 (T91)
Project Address: 2001 W Garfield St.
Client Name: Port of Seattle

Date: 5/27
Location: T91
Measured By: NBW
Measuring Tool: Geotech Interface probe

Location	Time	MP	Depth Set 1 LNAPL	Depth Set 1 Water	Depth Set 1 Thickness	Depth Set 2 LNAPL	Depth Set 2 Water	Depth Set 2 Thickness
Trench 2E	922	TOC	ND	10.24	0.00	ND	10.24	0.00
Trench 2W	915	TOC	ND	7.16	0.00	7.16	7.17	0.01
Trench 3E	930	TOC	8.05	8.06	0.01	8.05	8.06	0.01
Trench 3W	935	TOC	6.86	6.86	<0.01	6.86	6.86	<0.01
Trench 5E	941	TOC	ND	4.93	0.00	ND	4.93	0.00
Trench 5W	946	TOC	4.91	4.97	0.06	4.91	4.97	0.06
PNO-104	1000	TOC	7.01	7.14	.153	7.01	7.15	.14
CP-107	1012	TOC	5.83	5.84	0.01	ND	5.83	0
CP-110	954	TOC	6.73	6.74	0.01	6.73	6.74	0.01

3

7.16 7.17 .01

7.01 7.15 .14

5.83 5.83 <0.01

LNAPL Recovery Notes

O&M Plan says recover if thickness > 0.25 ft. Use peristaltic to pump into safe container.

Location	Date	Start Time	End Time	Quantity	Notes:

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature: NBW

PgG

LNAPL MEASUREMENT AND RECOVERY FIELD DATA SHEET

Sampling Event: Feb 2020 T07

Project Number: JG1601
Project Name: Terminal 91 (T91)
Project Address: 2001 W Garfield St.
Client Name: Port of Seattle

Date: 2/9/2021
Location:
Measured By: TWH
Measuring Tool: geotech interface probe

Location	Time	MP	Depth Set 1 LNAPL	Depth Set 1 Water	Depth Set 1 Thickness	Depth Set 2 LNAPL	Depth Set 2 Water	Depth Set 2 Thickness
Trench 2E	13:32		–	9.41	0.00	–	9.41	0.00
Trench 2W	13:29		–	6.36	0.00	–	6.36	0.00
Trench 3E	13:24		–	7.24	0.00	–	7.24	0.00
Trench 3W	13:21		6.04	6.05	0.01	6.04	6.05	0.01
Trench 5E	13:14		–	3.58	0.00	–	3.58	0.00
Trench 5W	13:18		3.55	3.56	0.01	3.55	3.56	0.01
PNO-104	13:06		6.06	6.19		6.06	6.19	
CP-107	12:58		–	4.64	0.00	–	4.64	0.00
CP-110	13:03		5.64	5.65	0.01	5.64	5.65	0.01

LNAPL Recovery Notes

O&M Plan says recover if thickness > 0.25 ft. Use peristaltic to pump into safe container.

Location	Date	Start Time	End Time	Quantity	Notes:

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

APEX LABS

6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

CHAIN OF CUSTODY

Lab # ______ COC 1 of 1

Company: PGG	Project Mgr: Janet Knox	Project Name: Lakeside	Project #: JK1504
Address: 2377 Eastlake Ave E	Phone: 206 325 0141	Email: janet.knox@rattn...	PO #
Sampled by: Glen W. / Travis K.			

Site Location: OR (circled) WA CA AK ID ___

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs - Total	8270 Semi-Vols Full List	8082 PCBs	8081 Pesticides	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)	TPH-D (Centrifuge)	EPH (Aliphatic)	PAH-Settle	MS/MSD Vol	PAH-Centrifuge	PAH-Bottle		Hold Sample	Frozen Archive
Shore-02-0923	9/3/21	1105	W	7								X								X	X	X		X				
Shore-03-0923	↓	1100	W	14								X								X	X	X	X	X				
Shore-200-0923	↓	1150	W	7								X								X	X							
	9/3/21																											

Standard Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle) 1 Day 2 Day 3 Day 5 Day **Standard** (circled) Other: ______

SAMPLES ARE HELD FOR 30 DAYS

SPECIAL INSTRUCTIONS:
Special Settle, Centrifuge prep prior to Extraction. See Kent's notes.
EPH Subbed to Friedman Analytical (Settle First)

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date: 9/3/21	Signature: [signature] Date: 9/3/21	Signature: Date:	Signature: Date:
Printed Name: Glen Wallace Time: 1350	Printed Name: Kent D. Patton Time: 13:50	Printed Name: Time:	Printed Name: Time:
Company: PGG	Company: Apex Labs	Company:	Company:

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-103A

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/26/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split: NO

Depth to Water (feet): 6.85	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): 14.04	Purge Date/Time: 8/26 1223 - 1300
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used: Orange 166

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 7.25 x CVC _____ x Casing Volumes _____ = 3.75 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
7.06	1227	3/4	7.11	503	16.19	2.73↓	-120.7↓	Clear
7.09	1237	1 3/4	7.15	500	16.22	1.05	-120.4	Clear
7.09	1249	3	7.13	499	16.26	0.66	-120.1	clear
7.09	1254	3 1/2	7.13	498	16.26	0.56	-119.5	clear
7.09	1259	4	7.13	498	16.30	0.49	-117.5	clear

Well Integrity: no bolts, J-plug secure, monument flooded with rusty water.

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/26 1250

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
✓ 2	500 mL AG	HCl		NWTPH-Dx
✓ 3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature: a Wolk

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-203B

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/26/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 8.23	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): ~60.5	Purge Date/Time: 8/26 1036 - 1129
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used:

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=(πr^2 h) (7.48 gal/ft³)

Purge Volume = ft of water 52 x CVC _____ x Casing Volumes _____ = 26/9/5 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
8.31	1038	1/4	7.11	566	16.76	0.66	-62.9	clear
8.33	1046	2	7.15	575	14.69	0.40	-76.0	clear
8.36	1053	3 1/2	7.22	574	14.65	0.38	-85.2	clear
8.39	1105	6	7.29	575	14.67	0.33	-93.8	clear
8.40	1111	7 1/2	7.30	575	14.66	0.33	-96.3	Clear
8.40	1120	9	7.31	574	14.65	0.31	-99.1	clear
8.42	1125	10	7.32	574	14.64	0.31	-100.2	clear
8.42	1129	11	7.32	574	14.63	0.31	-100.7	clear

Well Integrity: no bolts, J-plug secure

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/26 1130

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
✓ 2	500 mL AG	HCl		NWTPH-Dx
✓ 3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature: [signature]

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-104A

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/26/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 5.84	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): 13.10	Purge Date/Time: 8/26 719-1001
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used: Orange 166

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 7.75 x CVC _____ x Casing Volumes _____ = ~4 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
5.86	921	1/4	7.35	509	18.65	5.86↓	-44.6	clear
5.85	927	1	7.21	498	18.85	1.12	-83.8	clear
5.86	936	2	7.21	498	18.90	0.68	-98.7	clear
5.87	946	3 1/4	7.20	498	18.90	0.52	-113.1	clear
5.87	950	4	7.20	498	18.88	0.46	-118.0	clear
	952	4 1/4	7.20	498	18.88	0.44	-119.2	clear
	956	4 3/4	7.20	498	18.90	0.44	-121.4	clear
	959	5	7.20	498	18.94	0.42	-123.8	clear
	1001	5 1/2	7.21	498	18.89	0.40	-124.9	clear

Well Integrity: Bolts present but stripped. J-plug secure

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/26 955

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
✓ 2	500 mL AG	HCl		NWTPH-Dx
✓ 3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-106A

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/26/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (**yes**/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 6.97	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): 13.92	Purge Date/Time: 8/26 824 -
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used: Orange P66

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 7 x CVC _____ x Casing Volumes _____ = 3.5 gallons

DTW

TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
7.03 828	3/4	6.86	816	21.48	6.78↓	-79.1	clear
7.04 836	1 3/4	6.83	835	21.60	1.31	-92.2	clear
7.05 844	3	6.83	857	21.54	0.80	-101.2	clear
7.05 847	3 1/4	6.83	858	21.55	0.75	-103.0	clear
7.06 850	3 3/4	6.83	861	21.56	0.67	-102.8	clear
7.06 853	4	6.83	860	21.55	0.62	-99.7	clear
7.06 855	4 1/2	6.83	860	21.46	0.59	-98.1	clear

Well Integrity: Bolts present but stripped, J-plug secure, water in inner monument.

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/26 845

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx
✓ 3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature: NBW

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-108A

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split: NO

Depth to Water (feet): 6.78	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): 13.65	Purge Date/Time: 8/25 1537
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used:

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 7 x CVC _____ x Casing Volumes _____ = 3.5 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
	1538	1/4	7.23	566	17.55	9.14↓	-130.4	clear
7.55	1542	3/4	6.82	521	17.69	1.54	-133.2	clear
7.25	1554*	1*	6.81	525	18.40	0.71	-142.2	clear
7.54	1559	1 1/2	6.79	503	18.39	0.60	-161.9↓	clear
7.72	1603	2	6.91	501	18.41	0.46	-183.5	clear
7.78	1607	2 1/2	7.00	506	18.30	0.41	-194.6	clear
7.74	1612	3	7.11	514	18.26	0.37	-212.2	clear
7.74	1618	3 1/2	7.16	514	18.20	0.33	-225.0	clear
7.80	1624	4 1/2	7.20	516	18.18	0.30	-235.3	clear

Well Integrity: No bolts, J-plug secure

*Note: tubing was getting stuck when fully lowered; needed to be lifted a couple feet to get steady flow.

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25 1610

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
✓ 2	500 mL AG	HCl		NWTPH-Dx
✓ 3	40mL VOA	HCl		NWTPH-G
MS/MSD Samplles				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-GP02

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 7.77	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): ~19.6	Purge Date/Time: 8/25 1407 – 1451
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used: orange P66 Engineer

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 12 x CVC _____ x Casing Volumes _____ = 6 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
—	1410	1/2	6.87	1322	18.80	3.40↓	-125.4	clear
8.16	1415	1	6.84	1314	18.36	1.55	-139.9	clear
8.17	1420	1 3/4	6.83	1228	17.97	1.05	-141.1	clear
8.17	1428	3	6.82	1172	17.95	0.69	-141.6	clear
8.17	1434	4	6.82	1148	17.85	0.52	-141.8	clear
8.17	1441	5	6.81	1126	17.85	0.44	-142.0	clear
8.17	1447	6	6.81	1111	17.79	0.36	-142.3	clear
	1450	6.1/2	6.80	1105	17.79	0.33	-142.3	clear

Well Integrity: Monument full of water, J-plug secure. No bolts.

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25 1445

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
✓ 2	500 mL AG	HCl		NWTPH-Dx
✓ 3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-6 P01B

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location: CP-6 P01B
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number: None
Shipment Method: [redacted]	Sample Split: No

Depth to Water (feet): 8.95 @ 1005

Depth of Well (feet): 52.1 measured, very soft bottom

Purge Volume Measurement Method: Graduated Bucket

Purge Date/Time: 8/25 1007 – [redacted] 1133

Reference Point: top of casing, N side if no notch

Purging Equipment: Peristaltic Pump

Sampling Equipment: Peristaltic Pump

Water Level Probe Used: orange P66 Engineers

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 46 x CVC .16 x Casing Volumes 3 = 23/7.4 gallons

* DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
—	1009	1/4	7.27	4504	18.43	14.01	42.4	clear, suspended particles
9.07	1014	3/4	7.51	4467	17.06	5.00	-106.3	clear w/ particles
9.13	1018	1 1/4	7.52	4457	16.69	4.21	-150.9	clearish lt brn
9.22	1025	2 1/4	7.64	4475	16.45	3.51	-183.8	clearish brn
9.33	1034	3 1/4	8.00	4560	16.39	3.00	-213.8	clearish brn
9.51	1048	5 1/2	8.28	5074	16.32	2.16	-235.0	clearish brn
9.63	1100	7	8.31	6094	16.20	1.99	-242.1	clearish brn
9.87	1116	9 1/4	8.31	6293	16.11	1.24	-220.7	clearish brn
9.92	1120	11 3/4	8.29	6310	16.13	1.09	-218.9	clearish brn

Well Integrity: No bolts on flush mount. J-plug [redacted] secure.

* This well is strongly tidally influenced.

High Tide at ~8am, low at 1:29 pm.

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25 1120

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
✓ 2	500 mL AG	HCl		NWTPH-Dx
✓ 3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature: [signature]

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-6108

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split: NO

Depth to Water (feet): 8.42	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): 16.74	Purge Date/Time: 8/25 1217 – 1320
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used: Orange P66 Engineer

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 8.3 x CVC .16 x Casing Volumes 3 = 4 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
—	1218	1/4	7.80	2278	19.34	22.33↓	-125↓	Rust
8.62	1227	3/4	7.16	941	17.42	1.23	-108.0	clear
8.64	1234	1 1/4	7.13	874	17.32	0.86	-92.5	Clear
8.64	1246	2	7.12	838	17.34	0.59	-93.2	Clear
8.65	1306	3	7.12	833	17.32	0.44	-86.5	Clear
8.67	1313	3 1/2	7.12	833	17.31	0.42	-86.0	clear
8.65	1322	4	7.12	831	17.40	0.39	-87.9	clear

Well Integrity: NO bolts, monument full of water, J-plug secure

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25 1320

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
✓ 2	500 mL AG	HCl		NWTPH-Dx
✓ 3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
✓ 3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: PND-MW06A

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 8.67

Depth of Well (feet): 17.04 + 0.29 = 17.33

Purge Volume Measurement Method: Graduated Bucket

Purge Date/Time: 8/25/2021 11:57 –

Reference Point: top of casing, N side if no notch

Purging Equipment: Peristaltic Pump

Sampling Equipment: Peristaltic Pump

Water Level Probe Used: PGG ET 150

Casing Volume Constants (CVC): (2-inch = **0.16** gpf); 4-inch = **0.656** gpf; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 8.66 x CVC 0.16 x Casing Volumes 3 = 4.2 gallons

1.38 = 1 Casing vol

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	~~EC~~ MD (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
		0.25	7.09	3669	18.50	3.43 ↓	-221.3	light
9.25 q1	12:03	0.50	7.02	3025	18.51	2.04	-219.3	light
9.42 q2	12:05	0.75	7.02	2897	18.89	1.86	-220.7	light
9.48 q2	12:10	1.00	7.01	2852	19.23	2.55	-223.5	light
9.48 q3	12:13	1.25	6.98	2845	19.39	2.25	-223.0	light
9.35	12:17	1.50	6.96	2841	19.59	2.12	-219.0	light
9.28	12:23	1.75	6.93	2841	19.68	2.22	-201.7	light
9.24	12:29	2.00	6.93	2852	19.71	2.19	-181.2	light

Well Integrity: Good, dpkg good holding out water. Small amount of sheen observed in purge water

light petroleum odor

q1 = 300 ml/min q3 = 200 ml/min

q2 = 250 ml/min

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25/2021 12:35

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx ✓
3	40mL VOA	HCl		NWTPH-G ✓
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-GP11

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 6.46	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): 17.23 + 0.29	Purge Date/Time: 8/25/2021 10:06
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used: ~~PG&E~~ ET 150'

Casing Volume Constants (CVC): (2-inch = **0.16** gpf); 4-inch = **0.656** gpf; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 11.06 x CVC 0.16 x Casing Volumes 3 = 5.3 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	~~EC~~ MS (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
—	—	0.25	7.19	6032	17.75	11.61↓	-24.6↓	Light
6.59	10:13	0.50	7.34	6099	18.28	5.76↓	-104.9↓	Light
6.59	10:18	1.00	7.42	6231	18.80	5.16↓	-180.7↓	Light
6.59	10:21	1.25	7.44	6179	18.97	4.34↓	-218.3↓	Light
6.59	10:23	1.50	7.46	6066	19.08	2.82↓	-245.9↓	Light
6.59	10:25	1.75	7.45	5822↓	19.19	2.69↓	-264.3↓	Light
6.60	10:30	2.25	7.35	5510	19.36	2.71	-272.4	Light
6.60	10:32	2.50	7.34	5517	19.42	2.76	-275.3	Light
6.60	10:35	2.75	7.34	5515	19.43	2.64	-281.3	Light

Well Integrity: no locks on monument. Plug is aging but seems like a good seal. strong degraded petroleum odor, gray-brown color purgewater

9 ~ 300 mL/min

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25/2021 10:40

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx ✓
3	40mL VOA	HCl		NWTPH-G ✓
MS/MSD Samples				
3	40mL VOA	~~HCl~~		~~NWTPH-G~~

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-GP14

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 7.90

Depth of Well (feet): 19.29

Purge Volume Measurement Method: Graduated Bucket

Purge Date/Time: 8/25/21 13:15

Reference Point: top of casing, N side if no notch

Purging Equipment: Peristaltic Pump

Sampling Equipment: Peristaltic Pump

Water Level Probe Used: PGG ET 150'

Casing Volume Constants (CVC): 2-inch = **0.16** gpf; 4-inch = **0.656** gpf; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 11.39 x CVC 0.16 x Casing Volumes 3 = 5.5 gallons

1.8 = 1C ✓

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	mS EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
7.90	13:20	0.50	7.29	69.18	14.88	4.23	-55.8	light
	13:23	0.75	7.26	63.78 ↓	15.19	3.04	-68.1	light
7.91	13:27	1.25	7.25	52.23 ↓	15.23	2.65	-72.6	light
7.91	1	1.75	7.23	48.05 ↓	15.27	2.38	-69.6	light
7.90	13:33	2.00	7.23	47.61	15.25	2.15	-69.3	light
7.91	13:36	2.25	7.22	46.91	15.31	1.70	-66.8	light
7.89	13:38	2.50	7.22	46.48	15.29	1.63	-65.8	light
7.89	13:40	2.75	7.22	46.25	15.52	1.77	-65.3	light
7.90	13:43	3.00	7.21	46.37	15.57	1.95	-65.8	light

Well Integrity: Good.

q = 300 ml/min

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25/2021 13:45

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx ✓
3	40mL VOA	HCl		NWTPH-G ✓
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PGG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: PNO-MW06B

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 12.09

Depth of Well (feet): ~~55.82~~ 56.19 + 0.29 = 56.48

Purge Volume Measurement Method: Graduated Bucket

Purge Date/Time: 8/25/21 14:34

Reference Point: top of casing, N side if no notch

Purging Equipment: Peristaltic Pump

Sampling Equipment: Peristaltic Pump

Water Level Probe Used: PGGT 150'

Casing Volume Constants (CVC): 2-inch = **0.16** gpf; 4-inch = **0.656** gpf; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 44.39 x CVC 0.16 x Casing Volumes 3 = 21.3 gallons

7.1 = 1CV

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
12.00	14:39	0.50	7.51	2421	15.70	1.00	-70.6	light
11.99	14:42	0.75	7.33	3361 ↑	15.56	0.93	-71.5	light
	14:46	1.25	7.33	35.70	15 58	0.93	-82.6	light
11.93	14:48	1.50	7.33	35.87	15 60	1.04	- 86.3	light
11.92	14:50	1.75	7.34	3591	15.48	1.03	-89.9	light
11.84	14:56	2.50	7.33	3589	15.49	1.04	-100.3	light
	15:02	3.25	7.32	3590	15:38	1.14	-100-8	light
	15:04	3.50	7.33	3585	15.46	1.17	-100.9	light

Well Integrity: good q = 475 ml/min

light yellow purge water.

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25/21 15:10

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx ✓
3	40mL VOA	HCl		NWTPH-G ✓
MS/MSD Samples				
~~3~~	~~40mL VOA~~	~~HCl~~		~~NWTPH-G~~

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-GP09R

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/26/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method:	Sample Split:

Depth to Water (feet): 8.90	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): 17.89	Purge Date/Time: 8/26/21 11:16
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used: PGG ET 150

Casing Volume Constants (CVC): 2-inch = **0.16** gpf; 4-inch = **0.656** gpf; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 8.99 x CVC 0.16 x Casing Volumes 3 = 4.3 gallons

1CV = 1.4 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	~~EC~~ mS (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
8.94	11:21	0.50	6.97	1060	18.07	10.76	44.1	light
8.95	11:23	0.75	6.98	1060	18.21	10.15	37.8	light
8.95	11:25	1.00	6.98	1057	18.31	9.10	33.6	light
8.95	11:28	1.50	6.98	1051	18.40	7.75	28.1	light
	11:30	1.75	6.98	1050	18.39	7.67	27.5	light
8.96	11:33	2.25	6.98	~~1054~~ 1044	18.40	7.08	24.5	light
8.96	11:35	2.50	6.98	1040	18.41	7.10	23.6	light
8.96	11:37	2.75	6.98	1031	18.51	1.01	21.7	light
8.96	11:41	3.25	6.98	1032	18.53	0.99	21.8	light

Well Integrity: Good initial sediment in purge (lt brown bacteria?)

2 = 475

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/26/2021 11:40

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx ✓
3	40mL VOA	HCl		NWTPH-G ✓
MS/MSD Samples				
~~3~~	~~40mL VOA~~	~~HCl~~		~~NWTPH-G~~

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PGG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: CP-GP10

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033
Project Name: Terminal 91 (T91)
Project Address: 2001 W Garfield St.
Client Name: Port of Seattle
Laboratory: OnSite Environmental, Redmond, WA
Chain-of-Custody (yes/no):
Shipment Method:

Date: 8/20/21
Location:
Sampled By: NBW/TWK
Purged By: NBW/TWK
Date Sent to Lab:
Field CC Sample Number:
Sample Split:

Depth to Water (feet): 9.46
Depth of Well (feet): 17.89

Purge Volume Measurement Method: Graduated Bucket
Purge Date/Time: 8/26/2021 12:15

Reference Point: top of casing, N side if no notch
Sampling Equipment: Peristaltic Pump

Purging Equipment: Peristaltic Pump
Water Level Probe Used:

Casing Volume Constants (CVC): 2-inch = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 8.43 x CVC 0.16 x Casing Volumes 3 = 4.041 gallons

1 CV = 1.3 gallons

DTW

TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	EC (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
9.45 12:20	0.50	7.34	1678	18.19	6.14	46.6	light
9.50 12:23	0.75	7.35	1643	18.18	6.12	44.8	light
9.53 12:25	1.00	7.35	1621	18.13	5.80	44.3	light
9.50 12:29	1.50	7.35	1607	18.12	5.91	44.3	light
9.51 12:33	2.00	7.36	1594	18.19	5.83	44.2	light
9.52 12:35	2.25	7.36	1591	18.29	5.64	44.3	light
9.52 12:37	2.50	7.36	1586	18.28	5.61	44.5	light
12:39	2.75	7.36	1586	18.24	5.59	44.6	light

Well Integrity: good

q = 475 mL/min

Bottle Inventory (check applicable rows)

Day/Time Sampled: 8/26/2021 12:50

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx
3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PGG

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: PND-MW02

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/26/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method: Courier	Sample Split:

Depth to Water (feet): 8.42

Depth of Well (feet): 17.01 to 29 17.30

Reference Point: top of casing, N side if no notch

Sampling Equipment: Peristaltic Pump

Purge Volume Measurement Method: Graduated Bucket

Purge Date/Time: 8/26/21 08:57

Purging Equipment: Peristaltic Pump

Water Level Probe Used: PG&E ET 150'

Casing Volume Constants (CVC): (2-inch) = **0.16** gpf ; 4-inch = **0.656** gpf ; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 8.88 x CVC 0.16 x Casing Volumes 3 = 4.3 gallons

1CV = 1.4 gallons

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	~~EC~~ MS (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
8.78	9:04 91	0.5	6.73	1560	18.11	6.35	-74.0	light
8.85	9:09 92	1.0	6.74	1494	18.69	2.81	-67.6	light
	9:12 (9:10) 92	1.25	6.74	1466	18.86	2.32	-66.2	light
8.77	9:18	1.75	6.74	1438	19.13	1.56	-63.3	light
8.79	9:24	2.25	6.74	1428	19.19	0.94	-63.9	light
8.79	9:30	2.75	6.74	1420	19.19	0.70	-64.0	light
8.78	9:33	3.00	6.74	1414	19.26	0.64	-63.6	light
8.78	9:36	3.25	6.74	1406	19.30	0.60	-63.1	light
8.78	9:39	3.50	6.73	1402	19.28	0.57	-62.9	light

Well Integrity: Upon questionable water in annulus at top of casing

light/brown color in purge water

- Petroleum odor

q_1 = 375 mL/min

q_2 = 300 mL/min

OVER

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/26/2021 9:30

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx
3	40mL VOA	HCl		NWTPH-G
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

8/26/21 PGG/Twk PNO-MW02

Time	DTW	pH	Ec	Temp	DO	ORP	Turb	Volume
9:48	8.78	6.73	1373	19.30	0.49	-61.9	light	4.0
9:51	8.80	6.73	1370	19.32	0.47	-61.7	light	4.25
9:54	8.80	6.73	1369	19.33	0.50	-61.5	light	4.50

GROUNDWATER SAMPLING FIELD DATA SHEET

Well #: PNO-MW103

Sampling Event: 2021 Q3

Sample #:

Project Number: 518300033	Date: 8/25/21
Project Name: Terminal 91 (T91)	Location:
Project Address: 2001 W Garfield St.	Sampled By: NBW/TWK
Client Name: Port of Seattle	Purged By: NBW/TWK
Laboratory: OnSite Environmental, Redmond, WA	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field CC Sample Number:
Shipment Method: Courier	Sample Split:

Depth to Water (feet): 8.94	Purge Volume Measurement Method: Graduated Bucket
Depth of Well (feet): 18.38 to 0.29	Purge Date/Time: 8/25/21 15:45 —
Reference Point: top of casing, N side if no notch	Purging Equipment: Peristaltic Pump
Sampling Equipment: Peristaltic Pump	Water Level Probe Used: PGG ET 150

Casing Volume Constants (CVC): ~~2-inch = 0.16 gpf~~; 4-inch = **0.656** gpf; 6-inch = **1.47** gpf PV=($\pi r^2 h$) (7.48 gal/ft³)

Purge Volume = ft of water 9.73 x CVC 0.16 x Casing Volumes 3 = 4.6 19.15 gallons

6.3 + 5 = 1 CV

DTW	TIME (2400 hr)	CUMULATIVE VOLUME (gal)	pH (units)	~~EC~~ mS (umhos/cm 25 c)	Temp. (C)	Diss O_2 (mg/L)	ORP (mV)	TURBIDITY (visual)
9.02	15:49	0.50	6.87	2080	18.70	1.87	-69.1	light
9.04	15:51	0.75	6.85	19.26	18.88	2.76	-75.7	light
9.05	15:55	1.25	6.83	17.48	19.27	2.74	-80.4	light
9.06	15:57	1.50	6.83	1667	19.50	2.43	-81.3	light
9.04	15:59	1.75	6.82	16.33	19.67	2.38	-82.1	light
9.05	16:05	2.50	6.81	1596	20.03	2.16	-85.0	light
9.05	16:07	2.75	6.81	1588	20.21	1.96	-86.6	light
9.05	16:09	3.00	6.81	1576	20.34	1.70	-88.0	light
9.05	16:13	3.50	6.81	1561	20.37	1.42	-89.7	light

(over)

Well Integrity: poor, the PVC is slotted and this is a flush mount.

Sheen in purge water, light yellow color

q = 250 ml/min

over for remaining parameters

Bottle Inventory (check applicable rows) Day/Time Sampled: 8/25/2021 16:20

Quantity:	Container:	Preservatives:	Filtered (type):	Remarks:
All Wells				
2	500 mL AG	HCl		NWTPH-Dx ✓
3	40mL VOA	HCl		NWTPH-G ✓
MS/MSD Samples				
3	40mL VOA	HCl		NWTPH-G

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature:

PgG

PGG/TWK 8/25/21 PNO-MW103

Time DTW	Vol	pH	Ec	Temp	DO	ORP	Turb	DTW
16:16	4.0	6.80	1545	20.45	1.20	-90.6	light	9.05
16:18	4.25	6.80	1540	20.45	1.13	-91.4	light	9.05
16:22	5.0	6.79	1530	20.54	0.92	-92.9	light	9.05
16:24	5.25	6.79	1525	20.59	0.78	-92.6	light	9.05
16:26	5.50	6.79	1522	20.56	0.66	-93.9	light	9.05
16:28	5.75	6.79	1521	20.55	0.58	-94.4	light	9.05

Terminal 91 Water Level Snapshot Sheet
Date: 8/26/21

Staff: NBW/TWK
Sounder:

Well	Time	DTW 1	DTW 2	DTW 3	Area	LNAPL	Aquifer	Elev.	Depth	Comments
UT-MW39-3					?	X	Shallow	17.31	14.00	Decommissioned
CP-GP01A	1601	8.62			P-90		Shallow	17.68	19.20	
CP-GP01B	1556	10.78			P-90		Deep	17.60	64.50	
CP-GP02	1554	7.80			P-90		Shallow	17.39	20.10	
CP-GP08	1615	8.49			P-90		Shallow	17.37	18.00	
CP-GP03AR	1604	9.28			P-91		Shallow	17.77	19.85	
CP-GP03BR	—	—	—	—	P-91	—	Deep	17.74	64.50	Damaged, cannot open
CP-GP04R	1641	8.72			P-91		Shallow	17.90	19.83	
CP-GP07R	1452	8.19			P-91		Shallow	18.08	19.85	
CP-GP09R					P-91		Shallow	17.45	18.00	
CP-GP10					P-91		Shallow	17.92	17.85	
PNO-MW02					P-91		Shallow	17.71	17.00	
PNO-MW06A	1636	8.79			P-91		Shallow	18.05	17.50	
PNO-MW06B	1633	10.61			P-91		Deep	17.98	55.40	
PNO-MW103	~~1614~~ 1613	8.76			P-91		Shallow	17.48	17.00	
B1-93					TF-90		Shallow	17.24	30.00	
CP-103A					TF-90		Shallow	17.11	15.00	
CP-104A					TF-90		Shallow	17.13	15.00	
CP-104B	6.06 ~~1446~~ 1447				TF-90		Deep	16.86	50.00	
CP-106A					TF-90		Shallow	18.00	15.00	
CP-106B	1551	7.13			TF-90		Deep	17.91	41.50	
CP-108A	1604	6.79			TF-90		Shallow	16.58	15.00	
CP-108B	1605	9.69			TF-90		Deep	16.77	60.00	
CP-113	1624	5.81			TF-90		Shallow	17.29	17.00	
CP-114	1511	6.35			TF-90		Shallow	17.94	14.00	
CP-115A	1515	6.12			TF-90		Shallow	17.74	21.00	
CP-115B	1513	6.56			TF-90		Shallow	17.64	42.50	J-plug missing
CP-121	1540	6.07			TF-90		Shallow	17.61	21.00	
CP-122B	1523	6.25			TF-90		Deep	16.90	42.50	
CP-203B					TF-90		Deep	16.99	59.95	
CP-205A	1507	6.04			TF-90		Shallow	17.74	14.00	
CP-205B	1504	6.28			TF-90		Deep	17.73	50.00	
CP-W210	1608	7.51			TF-90		Shallow	17.11	14.95	
CP-107					TF-91	X	Shallow	17.15	20.00	
CP-110					TF-91	X	Shallow	17.42	16.50	
CP-111	1446	7.42			TF-91		Shallow	17.64	15.00	
CP-112	1428	5.96			TF-91		Shallow	17.04	15.00	
CP-GP05	1536	8.29			TF-91		Shallow	17.44	10.00	
CP-GP06	1519	8.09			TF-91		Shallow	17.46	17.50	
CP-GP11	1636	6.44			TF-91		Shallow	16.94	20.00	
CP-GP12	1434	6.91			TF-91		Shallow	17.42	20.00	
CP-GP13	1459	7.			TF-91		Shallow	17.01	20.00	
CP-GP14	1510	8.04			TF-91		Shallow	17.63	20.00	
CP-PR-13	1638	6.97			TF-91		Shallow	17.31	12.90	
PNO-MW101	1441	7.68			TF-91		Shallow	17.74	16.30	
PNO-MW104					TF-91	X	Shallow	17.43	17.40	
UT-MW39-1	1420	5.49			TF-91		Shallow	16.65	17.50	

Notes: Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.
LNAPL = Light non-aqueous phase liquid, well with historic LNAPL presence
T-90 and TF-91 are arbitrary divisions that refer to portions of the TFAA on the Pier 90/91 side of the alley.
Record prodcut thickness at tagged LNAPL wells and TFAA trench ends.

LNAPL MEASUREMENT AND RECOVERY FIELD DATA SHEET

Sampling Event: 2021 (August)

Project Number: JG1601
Project Name: Terminal 91 (T91)
Project Address: 2001 W Garfield St.
Client Name: Port of Seattle

Date: 8/26/2021
Location:
Measured By: NBW & TWh
Measuring Tool: geotech interface

Check Trench Location

NW

NE

S

Location	Time	MP	Depth Set 1 LNAPL	Depth Set 1 Water	Depth Set 1 Thickness	Depth Set 2 LNAPL	Depth Set 2 Water	Depth Set 2 Thickness
Trench 2W	1332		5.52	5.54	.02	5.52	5.53	.01
Trench 2E	1337		ND	5.55	ND	ND	5.55	ND
Trench 3E	1341		8.66	8.67	.01	8.66	8.67	.01
Trench 3W	1339		7.46	7.48	0.02	7.46	7.48	0.02
Trench 5E	1345		ND	10.84	ND	ND	10.84	ND
Trench 5W	1348		ND	7.78	ND	ND	7.78	ND
PNO-104*	1359		7.35	7.60	0.25	7.36	7.60	0.24
CP-107	1350		6.41	6.42	0.01	6.41	6.42	0.01
CP-110	1356		7.18	7.18	Trace	7.18	7.18	Trace

5.52 5.54 .02

7.36 7.60 0.24

* PNO-104 has product that is less viscous & lighter in color than other LNAPL locations. Different smell

LNAPL Recovery Notes

O&M Plan says recover if thickness > 0.25 ft. Use peristaltic to pump into safe container.

Location	Date	Start Time	End Time	Quantity	Notes:

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature: N Wdk

PGG

LNAPL MEASUREMENT AND RECOVERY FIELD DATA SHEET

Sampling Event: Nov 2021

Project Number: JG1601
Project Name: Terminal 91 (T91)
Project Address: 2001 W Garfield St.
Client Name: Port of Seattle

Date: 11/17/2021
Location: T91
Measured By: GSV / SPierce
Measuring Tool: Interface Probe

Location	Time	MP	Depth Set 1 LNAPL	Depth Set 1 Water	Depth Set 1 Thickness	Depth Set 2 LNAPL	Depth Set 2 Water	Depth Set 2 Thickness
Trench 2W	1509	TOC	7.31	7.33	0.02	7.31	7.33	0.02
Trench 2WE	1503	TOC	10.35	10.35	NMT	10.35	10.35	NMT ← No sheen on probe
Trench 3E	1443	TOC	7.02	7.05	0.03	7.02	7.06	0.04
Trench 3W	1453	TOC	8.20	8.25	0.05	8.20	8.25	0.05
Trench 5E	1435	TOC	4.03	4.04	0.01	4.03	4.04	0.01
Trench 5W	1430	TOC	4.01	4.05	0.04	4.01	4.05	0.04
PNO-104	1530	TOC	6.12	6.26	0.14	6.10	6.26	0.16
CP-107	1542	TOC	4.92	4.92	NMT	4.92	4.92	NMT
CP-110	1515	TOC	5.80	5.80	NMT	5.80	5.80	NMT

LNAPL Recovery Notes

O&M Plan says recover if thickness > 0.25 ft. Use peristaltic to pump into safe container.

Location	Date	Start Time	End Time	Quantity	Notes:
		No Recovery this event			
		All thickness < 0.25			

Maritime Operations: (206) 787-3751 Call if wells are covered. Kelli Goodwin is our main point of contact at Ops.

Signature: [signature]

PGG

B. Laboratory Data Reports (Electronic Only)

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

September 7, 2021

Glen Wallace
Pacific Groundwater Group
2377 Eastlake Avenue E, Suite 200
Seattle, WA 98102

Re: Analytical Data for Project 518300033
Laboratory Reference No. 2108-303

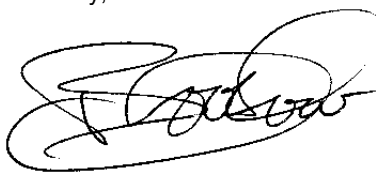
Dear Glen:

Enclosed are the analytical results and associated quality control data for samples submitted on August 27, 2021.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,



Blair Goodrow
Project Manager

Enclosures

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

Case Narrative

Samples were collected on August 25 and 26, 2021 and received by the laboratory on August 27, 2021. They were maintained at the laboratory at a temperature of 2°C to 6°C. Please see Sample/Cooler Receipt form at the end of the report.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
CP-GP01B	08-303-01	Water	8-25-21	8-27-21	
CP-GP08	08-303-02	Water	8-25-21	8-27-21	
CP-GP02	08-303-03	Water	8-25-21	8-27-21	
CP-GP-108A	08-303-04	Water	8-25-21	8-27-21	
Trip Blanks	08-303-05	Water	---	8-27-21	
PNO-MW06B	08-303-06	Water	8-25-21	8-27-21	
PNO-MW06A	08-303-07	Water	8-25-21	8-27-21	
CP-GP14	08-303-08	Water	8-25-21	8-27-21	
CP-GP11	08-303-09	Water	8-25-21	8-27-21	
PNO-MW103	08-303-10	Water	8-25-21	8-27-21	
CP-106A	08-303-11	Water	8-26-21	8-27-21	
CP-104A	08-303-12	Water	8-26-21	8-27-21	
CP-203B	08-303-13	Water	8-26-21	8-27-21	
CP-GP09R	08-303-14	Water	8-26-21	8-27-21	
PNO-MW02	08-303-15	Water	8-26-21	8-27-21	
CP-103A	08-303-16	Water	8-26-21	8-27-21	
CP-GP10	08-303-17	Water	8-26-21	8-27-21	

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**CP-GP01B**					
Laboratory ID:	08-303-01					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*93*	*66-117*				
Client ID:	**CP-GP08**					
Laboratory ID:	08-303-02					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*88*	*66-117*				
Client ID:	**CP-GP02**					
Laboratory ID:	08-303-03					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*97*	*66-117*				
Client ID:	**CP-108A**					
Laboratory ID:	08-303-04					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*98*	*66-117*				
Client ID:	**Trip Blanks**					
Laboratory ID:	08-303-05					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*103*	*66-117*				
Client ID:	**PNO-MW06B**					
Laboratory ID:	08-303-06					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*97*	*66-117*				
Client ID:	**PNO-MW06A**					
Laboratory ID:	08-303-07					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*94*	*66-117*				

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**CP-GP14**					
Laboratory ID:	08-303-08					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*88*	*66-117*				
Client ID:	**CP-GP11**					
Laboratory ID:	08-303-09					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*86*	*66-117*				
Client ID:	**PNO-MW103**					
Laboratory ID:	08-303-10					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*98*	*66-117*				
Client ID:	**CP-106A**					
Laboratory ID:	08-303-11					
Gasoline	**510**	400	NWTPH-Gx	9-1-21	9-1-21	O
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*89*	*66-117*				
Client ID:	**CP-104A**					
Laboratory ID:	08-303-12					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*66-117*				
Client ID:	**CP-203B**					
Laboratory ID:	08-303-13					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*99*	*66-117*				
Client ID:	**CP-GP09R**					
Laboratory ID:	08-303-14					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*66-117*				

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**PNO-MW02**					
Laboratory ID:	08-303-15					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*66-117*				
Client ID:	**CP-103A**					
Laboratory ID:	08-303-16					
Gasoline	**ND**	400	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*86*	*66-117*				
Client ID:	**CP-GP10**					
Laboratory ID:	08-303-17					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*95*	*66-117*				

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

GASOLINE RANGE ORGANICS
NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0901W1					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*66-117*				
Laboratory ID:	MB0901W2					
Gasoline	**ND**	100	NWTPH-Gx	9-1-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*93*	*66-117*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	08-303-02										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*88*	*83*	*66-117*			
Laboratory ID:	08-303-03										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*97*	*93*	*66-117*			

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**CP-GP01B**					
Laboratory ID:	08-303-01					
Diesel Range Organics	**1.5**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**1.1**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*102*	*50-150*				
Client ID:	**CP-GP08**					
Laboratory ID:	08-303-02					
Diesel Range Organics	**0.48**	0.21	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**0.66**	0.21	NWTPH-Dx	8-30-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*99*	*50-150*				
Client ID:	**CP-GP02**					
Laboratory ID:	08-303-03					
Diesel Fuel #2	**6.2**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**3.1**	0.20	NWTPH-Dx	8-30-21	9-1-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*102*	*50-150*				
Client ID:	**CP-108A**					
Laboratory ID:	08-303-04					
Diesel Fuel #2	**2.7**	0.22	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**1.8**	0.22	NWTPH-Dx	8-30-21	9-1-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*107*	*50-150*				
Client ID:	**PNO-MW06B**					
Laboratory ID:	08-303-06					
Diesel Fuel #2	**2.6**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**1.3**	0.20	NWTPH-Dx	8-30-21	9-1-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*98*	*50-150*				
Client ID:	**PNO-MW06A**					
Laboratory ID:	08-303-07					
Diesel Fuel #2	**4.5**	0.21	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**2.3**	0.21	NWTPH-Dx	8-30-21	9-1-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*100*	*50-150*				

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**CP-GP14**					
Laboratory ID:	08-303-08					
Diesel Range Organics	**ND**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil	**0.26**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*91*	*50-150*				
Client ID:	**CP-GP11**					
Laboratory ID:	08-303-09					
Diesel Range Organics	**0.22**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil	**0.27**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*104*	*50-150*				
Client ID:	**PNO-MW103**					
Laboratory ID:	08-303-10					
Diesel Fuel #2	**6.2**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**1.7**	0.20	NWTPH-Dx	8-30-21	9-1-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*98*	*50-150*				
Client ID:	**CP-106A**					
Laboratory ID:	08-303-11					
Diesel Range Organics	**4.0**	0.22	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**2.3**	0.22	NWTPH-Dx	8-30-21	9-1-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*118*	*50-150*				
Client ID:	**CP-104A**					
Laboratory ID:	08-303-12					
Diesel Range Organics	**1.0**	0.21	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**0.43**	0.21	NWTPH-Dx	8-30-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*106*	*50-150*				
Client ID:	**CP-203B**					
Laboratory ID:	08-303-13					
Diesel Fuel #2	**1.4**	0.21	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**0.55**	0.21	NWTPH-Dx	8-30-21	9-1-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*88*	*50-150*				

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**CP-GP09R**					
Laboratory ID:	08-303-14					
Diesel Range Organics	**0.45**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**0.48**	0.20	NWTPH-Dx	8-30-21	9-1-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*93*	*50-150*				
Client ID:	**PNO-MW02**					
Laboratory ID:	08-303-15					
Diesel Fuel #2	**3.7**	0.20	NWTPH-Dx	8-30-21	9-2-21	
Lube Oil Range Organics	**1.1**	0.20	NWTPH-Dx	8-30-21	9-2-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**CP-103A**					
Laboratory ID:	08-303-16					
Diesel Fuel #2	**1.5**	0.22	NWTPH-Dx	8-30-21	9-2-21	
Lube Oil Range Organics	**0.43**	0.22	NWTPH-Dx	8-30-21	9-2-21	N1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*86*	*50-150*				
Client ID:	**CP-GP10**					
Laboratory ID:	08-303-17					
Diesel Range Organics	**ND**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil	**0.35**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*98*	*50-150*				

Date of Report: September 7, 2021
Samples Submitted: August 27, 2021
Laboratory Reference: 2108-303
Project: 518300033

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0830W1					
Diesel Range Organics	**ND**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Lube Oil Range Organics	**ND**	0.20	NWTPH-Dx	8-30-21	9-1-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*93*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	08-303-02										
	ORIG	DUP									
Diesel Range Organics	**0.476**	**0.461**	NA	NA		NA		NA	3	NA	
Lube Oil Range Organics	**0.661**	**0.662**	NA	NA		NA		NA	0	NA	
Surrogate:											
o-Terphenyl						*99*	*101*	*50-150*			
Laboratory ID:	SB0830W1										
	ORIG	DUP									
Diesel Fuel #2	**0.488**	**0.363**	NA	NA		NA		NA	29	NA	
Surrogate:											
o-Terphenyl						*97*	*91*	*50-150*			
SPIKE BLANK											
Laboratory ID:	SB0830W1										
Diesel Fuel #2	**0.488**		0.500		NA	**98**		49-132	NA	NA	
Surrogate:											
o-Terphenyl						*97*		*50-150*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: Mott MacDonald PGG
Project Number: 518300033
Project Name: T91
Project Manager: Glen Wallace
Sampled by: NBW/TWK

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☒ Standard (7 Days)
- ☐ _____ (other)

Laboratory Number: 08-303

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260D	Halogenated Volatiles 8260D	EDB EPA 8011 (Waters Only)	Semivolatiles 8270E/SIM (with low-level PAHs)	PAHs 8270E/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270E/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A					% Moisture
1	CP-GP01B	8/25	1120	GW	5			X	X																		
2	CP-GP08	↓	1320	↓	8			↓	↓																		
3	CP-GP02	↓	1445	↓	5			↓	↓																		
4	CP-108A	↓	1610	↓	5			↓	↓																		
5	Trip Blanks	n/a	n/a	W	3			X																			
6	PNO-MW06B	8/25	1510	GW	5			X	X																		
7	PNO-MW06A	↓	1235	↓	5			↓	↓																		
8	CP-GP14	↓	1345	↓	5			↓	↓																		
9	CP-GP11	↓	1040	↓	5			↓	↓																		
10	PNO-MW103	↓	1620	↓	5			↓	↓																		

	Signature	Company	Date	Time
Relinquished		PGG	8/27/21	1255
Received		Speedy	8-27-21	1255
Relinquished		Speedy	8-27-21	1435
Received			8/27/21	1435
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

MS/MSD on TPH-G for CP-GP08

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: Mott MacDonald PGG
Project Number: 518300033
Project Name: T91
Project Manager: Glen Wallace
Sampled by: NBW/TWK

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days)
☐ _____ (other)

Laboratory Number: 08-303

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260D	Halogenated Volatiles 8260D	EDB EPA 8011 (Waters Only)	Semivolatiles 8270E/SIM (with low-level PAHs)	PAHs 8270E/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270E/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A					% Moisture
11	CP-106A	8/26	845	GW	5			X	X																		
12	CP-104A		955		5																						
13	CP-203B		1130		7																						
14	CP-GP09R		1140		5																						
15	PNO-MW02		930		5																						
16	CP-103A		1250		5																						
17	CP-GP10	↓	1250	↓	5			↓	↓																		

	Signature	Company	Date	Time
Relinquished		PGG	8/27/21	1255
Received		Speedy	8-27-21	1255
Relinquished		Speedy	8-27-21	1435
Received		ORE	8/27/21	1435
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
MS/MSD on CP-203B TPH-D

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

Sample/Cooler Receipt and Acceptance Checklist

Client: PGG

Client Project Name/Number: 518300033

Initiated by: MM

OnSite Project Number: 08-303

Date Initiated: 8/27/21

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	(No)	N/A	1 2 3 4	
1.2 Were the custody seals intact?	Yes	No	(N/A)	1 2 3 4	
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	(N/A)	1 2 3 4	
1.4 Were the samples delivered on ice or blue ice?	(Yes)	No	N/A	1 2 3 4	
1.5 Were samples received between 0-6 degrees Celsius?	(Yes)	No	N/A	Temperature:	5,6
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	(N/A)			
1.7 How were the samples delivered?	Client	(Courier)	UPS/FedEx	OSE Pickup	Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	(Yes)	No		1 2 3 4
2.2 Was the COC legible and written in permanent ink?	(Yes)	No		1 2 3 4
2.3 Have samples been relinquished and accepted by each custodian?	(Yes)	No		1 2 3 4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	(Yes)	No		1 2 3 4
2.5 Were all of the samples listed on the COC submitted?	(Yes)	No		1 2 3 4
2.6 Were any of the samples submitted omitted from the COC?	Yes	(No)		1 2 3 4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	(No)		1 2 3 4
3.2 Were any sample labels missing or illegible?	Yes	(No)		1 2 3 4
3.3 Have the correct containers been used for each analysis requested?	(Yes)	No		1 2 3 4
3.4 Have the samples been correctly preserved?	(Yes)	No	N/A	1 2 3 4
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	Yes	(No)	N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	(Yes)	No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	(No)		1 2 3 4
3.8 Was method 5035A used?	Yes	No	(N/A)	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#		(N/A)	1 2 3 4

Explain any discrepancies:

3.5) #1) 2 vials w/bubble
#16) 1 vial w/bubble

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed

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