# 2023 Annual Progress Report for the K Ply Site

K Ply Site

**Prepared for**
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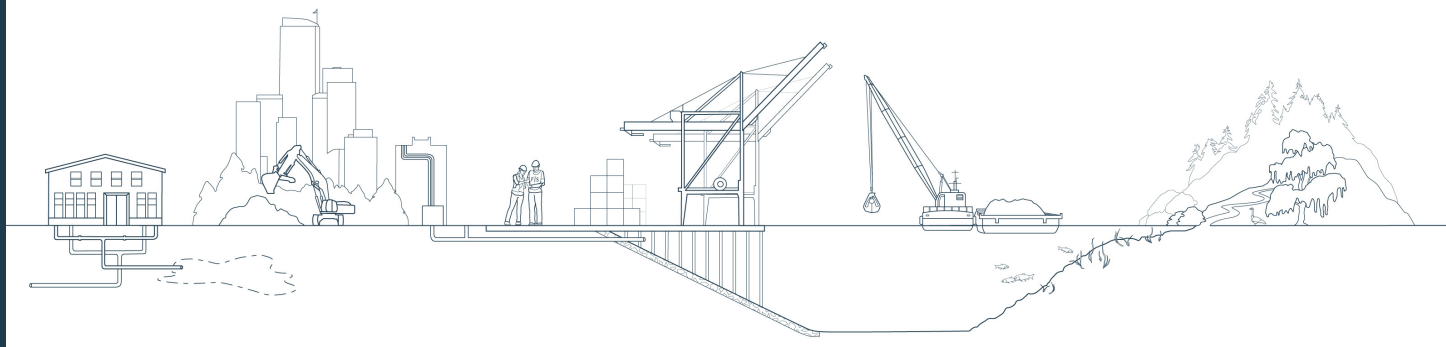

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# 2023 Annual Progress Report for the K Ply Site

This document was prepared for
the Port of Port Angeles
under the supervision of:


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Date: 1/9/2024

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## List of Abbreviations

| Abbreviation | Definition |
|---|---|
| AO | Agreed Order |
| bgs | Below ground surface |
| CAP | Cleanup Action Plan |
| COC | Contaminant of concern |
| CPOC | Conditional point of compliance |
| CUL | Cleanup level |
| DO | Dissolved oxygen |
| DRO | Diesel-range organics |
| Ecology | Washington State Department of Ecology |
| EDR | Engineering Design Report |
| EIM | Environmental Information Management |
| Fremont | Fremont Analytical, Inc. |
| FS | Feasibility Study |
| GRO | Gasoline-range organics |
| IG | Infiltration gallery |
| LNAPL | Light non-aqueous phase liquid |
| µg/L | Micrograms per liter |
| mg/kg | Milligrams per kilogram |

| Abbreviation | Definition |
|---|---|
| MNA | Monitored natural attenuation |
| ORC | Oxygen-releasing compound |
| ORO | Oil-range organics |
| ORP | Oxidation-reduction potential |
| PCP | Pentachlorophenol |
| Port | Port of Port Angeles |
| RI | Remedial Investigation |
| SAP/QAPP | Sampling and Analysis Plan/Quality Assurance Project Plan |
| SDG | Sample delivery group |
| Site | K Ply Site |
| TPH | Total petroleum hydrocarbons |

# 1.0 Introduction

This Annual Progress Report has been prepared by Floyd|Snider on behalf of the Port of Port Angeles (Port) to meet the reporting requirements of the 2015 Agreed Order (AO) No. DE 11302 with the Washington State Department of Ecology (Ecology) for the K Ply Site (Site). The Site is located at 439 Marine Drive in Port Angeles, Washington.

The objective of this report is to describe work performed for the monitoring period of January 2023 to December 2023, consistent with the requirements of Section VII, subsection C of the AO.

## 1.1 SITE BACKGROUND

The Site is located directly west of downtown Port Angeles and historically operated primarily as a plywood manufacturer. Environmental contamination under the former mill building was first documented in the late 1980s with partial cleanup actions undertaken by ITT Rayonier, one of the prior mill owners. The mill was demolished by the Port in 2013, which allowed for a comprehensive Remedial Investigation (RI)/Feasibility Study (FS; Floyd|Snider 2015a) and cleanup action to be completed. The RI/FS was completed in 2014 and documented a broad area of both gasoline- and hydraulic oil-contaminated soil and groundwater under the former mill. The Ecology-selected cleanup remedy was implemented for multiple cleanup areas, identified in the Construction Completion Report (Floyd|Snider 2016a) as either a "Primary" or "Minor" Cleanup Area, between August 2015 and May 2016. This remedial action included excavation followed by bioremediation of contaminated soil and groundwater. The cleanup removed the majority of soil contamination and greatly reduced the source mass of contamination that was causing elevated contaminant concentrations in groundwater in two primary cleanup areas.

### 1.1.1 Primary Cleanup Areas

The two primary cleanup areas included the following:

- **The Gasoline Area (Areas 5 and 6).** This area extended continuously from the northern to southern boundary of the Site (Figure 1.1). Gasoline was present in soil and groundwater at concentrations greater than Site cleanup levels (CULs) throughout this area. Remediation consisted of excavation of both vadose and smear zone soils to CULs in Area 6 and excavation of vadose zone soils to CULs and smear zone soils to remediation levels in Area 5, followed by application of bio-amendments during backfilling to promote natural attenuation. Residual smear zone soils in Area 5 and a small area of gasoline-range organics (GRO) along the bulkhead in Area 6 (where impacted soil could not be removed without potentially destabilizing the bulkhead) are additionally being addressed through monitored natural attenuation (MNA).
- **The Hydraulic Oil Area (Area 6).** This area is located in the vicinity of the former hydraulic presses. Hydraulic oil was present as a light non-aqueous phase liquid (LNAPL) pooled on the groundwater surface and also present in soil and groundwater

downgradient of the LNAPL zone. Remediation consisted of excavation of both vadose and smear zone soils exceeding CULs followed by application of bio-amendments during backfilling. A portion of the soil in the Hydraulic Oil Area was commingled with contamination from the Gasoline Area.

Per the remedial design, smear zone soils with gasoline and benzene concentrations in soil greater than the remediation levels of 3,000 milligrams per kilogram (mg/kg) and 10 mg/kg, respectively, were left in place in Area 5. These concentrations in soil within Area 5 were expected to attenuate over time after removal of a majority of source material, and the resulting reduction in upgradient groundwater contaminant concentrations was expected to allow for biodegradation as groundwater flows downgradient through clean backfill soil. The remedial action also included groundwater treatment to stimulate biodegradation of residual petroleum contamination in groundwater following excavation activities.

Groundwater within these primary cleanup areas at the Site was treated via application of bio-amendments in two forms:

- **Cedar Street Plume Bio-Injections**: The RI defined a plume of gasoline and benzene in groundwater emanating from the Gasoline Area and extending under Cedar Street toward the north. This area of dissolved-phase groundwater contamination was treated with an oxygen-releasing compound (ORC) that was injected during the construction phase of the project throughout an approximately 1-acre area between wells PP-15R2 and PP-37R (refer to Figure 3.3 in the Construction Completion Report; Floyd|Snider 2016a). The treated area roughly corresponded to benzene concentrations in the plume greater than 500 micrograms per liter (µg/L). In 2017, after 2 years of post-remediation groundwater monitoring that indicated the aquifer geochemical conditions were highly reducing, a limited area of the benzene plume around wells PP-14R and PP-37(R) was additionally treated with injections of activated carbon amended with magnesium sulfate to promote anaerobic degradation of benzene (Figure 1.1).
- **Groundwater Infiltration Galleries:** Infiltration galleries (IGs) were installed in Areas 5 and 6 prior to backfilling in 2016. These IGs were designed to allow for future application of an ORC or bacteriological nutrients if groundwater monitoring indicates that the groundwater CULs are not being attained at the conditional point of compliance (CPOC). Between 2017 and 2019, targeted treatment with sulfate-rich amendments were applied to the IGs and ground surface of Areas 5 and 6 (refer to Section 1.2.2). In 2018, the IGs were modified by extending IGs 3 and 5 to provide more treatment coverage to the west outside of the excavation footprint and bifurcating IGs 1 through 4 to target treatment applications along the west side of the excavation areas. Figure 1.1 shows the current IG alignment.

The effects of bio-amendment treatment are discussed in Section 2.1.2.4.

### 1.1.2 Minor Cleanup Areas

Outside of the primary cleanup areas, there were several other minor cleanup areas defined in the RI, including the Stack Area, the Hog Fuel Storage Area, the Pentachlorophenol (PCP) Area, and the Log Pond Fill Area.

- **The Stack Area** (Area 1). This area is near the former mill stack where dioxins/furans were detected in two surface soil samples following demolition of the stack. The dioxin/furan concentrations in this area prior to the cleanup were less than the industrial CUL; however, this soil posed a risk of being spread by wind or other mechanisms to neighboring properties. Remediation of this area consisted of scraping the upper foot of surface soils and then placing this soil as backfill in Area 6 (refer to the Soil Management Plan; Appendix L of the Construction Completion Report; Floyd|Snider 2016a). Site soil used as backfill went through additional field screening and stockpile testing to verify Site CULs were met.
- **The Hog Fuel Storage Area** (Areas 2 and 3). This area is where shallow diesel-range organics (DRO) and GRO soil contamination was observed near the former hog fuel pile. Remediation consisted of excavation and backfilling.
- **The PCP Area** (Area 4). The PCP Area is a small area of surface soil lying beneath the former mill floor where PCP was detected in surface soil due to past panel oiling operations. This area underwent a remedial action by Rayonier ITT in the 1990s, and CULs were met for PCP for this release to a small area of surface soil. However, this small area was incidentally removed because it overlaid the larger Area 5 cleanup area that was remediated with excavation in the smear and vadose zone for elevated levels of total petroleum hydrocarbons (TPH), and bio-amendments to treat TPH remaining in soils below the vadose zone, as discussed in Section 1.1.1.
- **The Log Pond Fill Area.** This area is in the eastern part of the Site where oil-range organics (ORO) concentrations exceed the CUL (refer to Figure 1.1). The soil contamination in former log pond sediments is localized in extent, found only in deeper soil at approximately 12 to 16 feet below grade, and was not found to be impacting groundwater quality. The log pond was filled in 1997, and soils are considered stable in this area (Clallam County 2017) and are being managed with an environmental covenant and soil management plan. Based on the findings that this remaining contaminated soil is a low risk to human health and the environment, Ecology determined in the Cleanup Action Plan (CAP) that institutional controls with a soil management plan was the cleanup action for the Log Pond Fill Area. In coordination with Ecology, monitoring wells PP-21 and PP-22, located along the shoreline in the downgradient portion of the Log Pond Fill Area, were added to the long-term compliance monitoring network starting in October 2023. These two monitoring wells will be monitored at a frequency of every 2.5 years to confirm the long-term stability of the log pond fill area.

## 1.2 SUMMARY OF ADDITIONAL ACTIVITIES COMPLETED UNDER THE AGREED ORDER

Additional activities to fulfill the AO after the completion of cleanup action construction include supplemental investigations and groundwater treatment as described in the following sections.

### 1.2.1 Log Pond Fill Area Soil Investigation and Management

As discussed in Section 1.1.2 and in the Soil Management Plan (Appendix L of the Construction Completion Report; Floyd|Snider 2016a), heavy oil-type contamination exceeding the CUL was detected in silty soil that appeared to represent the former log pond bottom at approximately 12 feet below ground surface (bgs). Due to the depth of the contamination, and a previous restrictive covenant that was placed at the time that the log pond was filled, the CAP did not require excavation in this area (Ecology 2015). In March 2016, additional soil borings were advanced in the former log pond to delineate the area of ORO contamination with results provided to Ecology in the March 2016 Quarterly Progress Report (FloydISnider 2016b). These borings confirmed that the ORO contamination was limited to the silty soil representing the former log pond bottom encountered below approximately 12 feet bgs and found that the horizontal extents of the contamination are limited to the area north of the former log debarker.

The results of additional soil characterization in the Log Pond Fill Area were incorporated in the Soil Management Plan for the Site (Appendix L of the Construction Completion Report; Floyd|Snider 2016a). The Soil Management Plan contains requirements and considerations for conducting ground-disturbing work, including prior notification to Ecology, identification and notice of potentially contaminated soils, health and safety protocols, and soil handling and disposal management requirements. The current and projected uses for the Log Pond Fill Area do not include ground-disturbing activities.

As discussed in Section 1.1.2, the groundwater monitoring wells within the Log Pond Fill Area that were added to the existing long-term monitoring plan will provide relevant data to monitor groundwater conditions downgradient. Further remedial actions for the Log Pond Fill Area will be implemented according to the Compliance Monitoring Plan and CAP, if monitoring indicates such actions are necessary. As discussed in further detail in this report, current contaminant concentrations at these wells are consistent with the groundwater concentrations measured during the 2013 and 2014 remedial investigations and confirm that conditions are stable in the Log Pond Fill Area.

### 1.2.2 In Situ Groundwater Treatment

After 1 year of post-remediation groundwater monitoring, groundwater was assessed to have low to high concentrations of contaminants and low dissolved oxygen (DO) that would not be conducive to aerobic degradation. Per Table 3.2 in the Engineering Design Report (EDR), additional bio-amendments with sulfate (as electron acceptors) to Site groundwater were injected to support anaerobic degradation of contaminants. In November 2017, two targeted areas around PP-14R and PP-37R were injected with activated carbon amended with magnesium sulfate to control plume migration. In conjunction with these carbon injections, bio-amendment

applications consisting of magnesium sulfate and seawater injections into upland IGs began in 2017 and reoccurred every 3 to 6 months until October 2019 to promote anaerobic degradation of benzene under sulfate-reducing conditions. A summary of the bio-amendment applications to date is included in Table 1.1.

**Table 1.1**
**Summary of Bio-Amendments**

| Date | Bio-Amendment | Location Applied (Figure 1.1) |
|---|---|---|
| November 2017 | $MgSO_4$ injection, 3,500 pounds (17% solution) with 2,000 gallons chase water per IG | Area 6: IGs 3, 4, and 5 |
| | $MgSO_4$ (400 pounds total) and activated carbon (1,200 pounds total) slurry direct injected via Geoprobe | Vicinity of PP-37R and PP-14R |
| | Land spread $CaSO_4$, 8,000 pounds | Area 5 |
| April 2018 | Land spread $CaSO_4$, 8,000 pounds | Excavation footprint |
| July 2018 | Injected 30,000 gallons of seawater followed by 2,000 gallons chase water per IG | IGs 4 and 5 |
| January 2019 | Injected 20,000 gallons of seawater followed by 1,000 gallons chase water per IG | IGs 2, 3, 4, and 5 |
| April 2019 | | |
| July 2019 | | |
| October 2019 | | |

Abbreviations:
$CaSO_4$ Calcium sulfate
$MgSO_4$ Magnesium sulfate

No bio-amendment applications were made to the Site between 2020 and 2023 to allow the aquifer to recover to a state of equilibrium and to gauge the effectiveness of the bio-amendment process on groundwater conditions. Current groundwater conditions are discussed in Section 2.1, but in general, the groundwater concentrations of contaminants of concern (COCs) have decreased substantially since active remediation was completed in 2016.

### 1.2.3 Long-Term Soil Monitoring

In Areas 5 and 6, where MNA is part of the selected cleanup action, long-term soil monitoring is conducted every 5 years to track progress of attenuation. The first post-remediation monitoring event was conducted in April 2021, and the soil results showed improvements with GRO concentrations less than CULs at the bulkhead in Area 6. The soil results in Area 5 were consistent with post-remediation confirmational monitoring results, which shows that the remedial excavation was effective at removing the bulk of the source soil; however, little attenuation has

been observed 5 years after active remediation. Refer to the 2021 Annual Progress Report for additional details (Floyd|Snider 2022).

Long-term soil monitoring was not required in areas where natural attenuation was not part of the selected cleanup action. Areas where long-term soil monitoring is not required include portions of Area 6, Areas 1 through 4, and the Log Pond Fill Area, where soil contamination was either fully removed or the risk posed from the remaining soil contamination was controlled by its depth and the institutional controls limiting exposure.

### 1.3 AGREED ORDER ACTIVITIES COMPLETED IN 2023

Activities completed during the 2023 monitoring period presented in this Annual Progress Report include the 18$^{th}$ and 19$^{th}$ rounds of post-remediation groundwater monitoring, which represent 7 years of post-remediation groundwater monitoring data. Groundwater samples were collected in April 2023 and October 2023 from 14 wells in the long-term monitoring network in accordance with the Ecology-approved Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP; Appendix G of the EDR; Floyd|Snider 2015b).

At the direction of Ecology, two additional groundwater samples were collected from monitoring wells downgradient of the Log Pond Fill Area (PP-21 and PP-22) during the October 2023 monitoring event.

In preparation for property redevelopment planned to begin in 2024, piezometers PZ-15S and PZ-15I were decommissioned on August 1, 2023, by Cascade Drilling. These piezometers were installed in 2017 to monitor the groundwater treatments conducted between 2017 and 2019 and were no longer being used after evaluation of the amendment distribution from the IGs.

# 2.0 Groundwater Compliance Monitoring

Groundwater monitoring is conducted per the schedule identified in the AO to ensure that residual soil contamination does not pose a risk to the surface water in Port Angeles Harbor via leaching of contaminants to groundwater and migration of contaminated groundwater to surface water. This section presents the groundwater monitoring results from the April 2023 and the October 2023 monitoring events. Except where deviations are noted, the field methods used were conducted in accordance with the SAP/QAPP (Appendix G of the EDR; Floyd|Snider 2015b). The groundwater data from these monitoring events were loaded to Ecology's Environmental Information Management (EIM) database in May 2023 and January 2024. Notification of acceptance of the data into the EIM database has not yet been received for either data set.

The following sections present the results of monitoring for Site groundwater COCs compared to CULs. The Site groundwater COCs are GRO, DRO, ORO, and benzene.

## 2.1 SEMIANNUAL GROUNDWATER COMPLIANCE MONITORING RESULTS

The list of long-term monitoring wells includes 4 CPOC wells (PP-17, PP-18R2, PP-19, and PP-34) and 10 performance monitoring wells (PP-13R, PP-14R, PP-15R2, PP-27, PP-29, PP-30, PP-32, PP-33, PP-36, and PP-37R) within the larger excavation areas (Areas 5 and 6) of the Site and 2 performance monitoring wells downgradient of the Log Pond Fill Area (PP-21 and PP-22). Monitoring well locations are shown in Figure 1.1. Groundwater samples were collected on April 19, 2023 (from the 14 wells within Areas 5 and 6) and October 26 and 27, 2023 (from all 16 wells listed above) using standard low-flow sampling methods. Purge water was collected and placed in a 55-gallon drum stored on-site for profiling and off-site disposal in accordance with applicable laws by Clean Harbors as industrial wastewater. All compliance monitoring samples were submitted to Fremont Analytical, Inc. (Fremont) of Seattle, Washington, under chain-of-custody procedures for analysis of GRO, DRO, ORO, benzene, toluene, ethylbenzene, and xylenes.

Water quality parameters, including specific conductivity, pH, DO, oxidation-reduction potential (ORP), temperature, and turbidity, were field monitored during sampling of all wells using a YSI Pro DSS water quality meter and LaMotte 2020we/t turbidimeter. Field parameters are presented in Table 2.1. Elevated pH measured at certain locations are likely a result of the crushed concrete backfill placed throughout the excavation area, which is expected to neutralize over time. In general, groundwater at the Site has anaerobic/reducing geochemical qualities, such as low DO and negative ORP; however, long-term trends along the fringe of the plume indicate increasing ORP. There are some seasonal variations in DO and ORP measurements that are likely influenced by tides and stormwater infiltration. Seawater mixing is most prevalent at monitoring wells PP-19, PP-21, and PP-18R2, which are all located along the shoreline.

### 2.1.1 Data Quality

As described in the SAP/QAPP (Appendix G of the EDR; Floyd|Snider 2015b), a Compliance Screening (Stage 2A) data quality review was performed on TPH and select volatile organic

compound data resulting from laboratory analysis. The analytical data were reviewed and validated using guidance and quality control criteria documented in the RI/FS SAP/QAPP (Appendix B of Floyd|Snider 2013), the *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2020a), and the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2020b).

A total of 15 groundwater samples, including 1 field duplicate sample, and 1 trip blank were submitted in one sample delivery group (SDG) in April 2023 monitoring (SDG 2304479). A total of 17 groundwater samples, including 1 field duplicate sample, and 1 trip blank were submitted in one SDG for October 2023 monitoring (SDG 2310501). All SDGs were submitted to Fremont for chemical analysis by NWTPH-Gx, NWTPH-Dx, and USEPA 8260D. For both SDGs, all analytical holding times were met, and there were no detections in the method blanks.

For SDG 2304479 and SDG 2310501, the laboratory noted that select NWTPH-Dx results may potentially be biased high due to chromatographic interference. These results were qualified J to indicate they are estimated.

Based on the data quality review, all data are determined to be of acceptable quality for use as reported for qualified.

### 2.1.2 Groundwater Analytical Results within Areas 5 and 6

Analytical results for the 2023 post-remediation groundwater compliance monitoring are presented in Table 2.2 and on Figures 2.1 through 2.6. The 2023 groundwater results are discussed separately by contaminant group: GRO, DRO, ORO, and benzene. For reference, the cumulative post-remediation groundwater monitoring results from 2016 to 2023 are presented in Tables A.1[1] and A.2 (Appendix A).

#### *2.1.2.1 Gasoline-Range Organics*

GRO concentrations in groundwater at the CPOC have generally decreased or remained stable since the previous sampling events, and the GRO plume continues to shrink. For both 2023 monitoring events, GRO concentrations in and around the CPOC were less than the CUL of 800 µg/L, with concentrations ranging from nondetect (at a reporting limit of 50 µg/L) to 298 µg/L, at all four CPOC wells (PP-17, PP-18R2, PP-19, and PP-34) and PP-37R immediately upgradient of the CPOC. GRO concentrations in groundwater performance wells PP-15R2, PP-27, and PP-36 are slowly declining but remain at concentrations greater than the CUL. These performance wells are located in Area 5, where residually contaminated soil with concentrations greater than CULs (but less than remediation levels of 3,000 mg/kg) was left in place in the smear

[1] In October 2021, the laboratory shifted the reporting of DRO and ORO concentrations based on carbon chains to quantification based on the chromatographic pattern and the conceptual site model of residual diesel fuel in soil. ORO concentrations reported in 2016 through April 2021 (Table A.1) are more consistent with a weathered diesel product rather than heavy oil (ORO).

zone; however, the GRO CUL is being achieved at the other performance wells and at the CPOC, indicating that attenuation is occurring as anticipated.

The most recent GRO concentrations in groundwater at Site wells from April and October 2023 are presented in Figures 2.1a and 2.1b, respectively. Figure 2.2 graphically presents all post-remediation GRO concentrations in CPOC wells since 2016.

#### *2.1.2.2 Diesel-Range Organics*

DRO concentrations in groundwater continue to be relatively stable with seasonal variability observed since remediation was completed in 2016. DRO concentrations measured in groundwater from CPOC well PP-19 have consistently been less than the Site CUL of 500 µg/L. Groundwater samples from the other three CPOC wells (PP-17, PP-18R2, and PP-34) consistently demonstrate exceedances of DRO with concentrations measured in 2023 ranging from 532 µg/L to 2,060 µg/L, or approximately 1.1 to 4.1 times the Site CUL. Additionally, DRO exceedances in upgradient performance monitoring wells range from 501 µg/L to 2,680 µg/L.

The use of silica gel cleanup on these samples site-wide result in a significant decrease in concentrations, with an average decrease of 73% for all 2023 results. Silica gel cleanup on the CPOC well samples resulted in DRO concentrations less than the CUL at all four CPOC wells during both monitoring events (refer to Table 2.2). The DRO concentrations with silica gel cleanup are a compelling line of evidence that despite stable DRO concentrations, diesel-range compounds are degrading, and continued exceedances of DRO represent a mix of weathered diesel, fuel metabolites, and naturally occurring organics in the aquifer.

The most recent DRO concentrations in groundwater at Site wells from April and October 2023 are presented in Figures 2.3a and 2.3b, respectively. Figure 2.4 graphically presents all post-remediation DRO concentrations in CPOC wells since 2016 (quantified by the laboratory as ORO between 2016 and April 2021 and quantified as DRO beginning in October 2021).

#### *2.1.2.3 Oil-Range Organics*

ORO concentrations resulting from hydraulic oil in groundwater comply with the Site CUL of 500 µg/L at the CPOC and all upgradient performance monitoring wells. In both April and October 2023, ORO was not detected in any monitoring well. This is consistent with previous results and the RI findings that ORO was not detected in most groundwater samples from the southern portion of the former mill building (Area 5) or in the northern portion of the former mill building and bulkhead (Area 6; Floyd|Snider 2015a). Because ORO was not detected in any monitoring wells in 2023, there is no figure depicting ORO results in groundwater.

#### *2.1.2.4 Benzene*

The 2023 benzene concentrations measured in all four CPOC wells (PP-17, PP-18R2, PP-19, and PP-34) are all less than the site-specific CUL of 51 µg/L and have been less than the CUL during the past 3 years of monitoring. Benzene concentrations in groundwater across the Site have

steadily decreased since 2016, and the overall plume footprint continues to shrink. The only 2023 benzene exceedances in groundwater were measured at upgradient performance monitoring wells PP-14R, PP-15R2, PP-27, and PP-37R. The upgradient wells PP-15R2 and PP-27 are expected to continue to exceed the CUL due to residual source mass in soil in Area 5 that is contributing to elevated groundwater concentrations.

Benzene concentrations at PP-13R, PP-14R, and PP-37R have slightly increased over the past year, which is an indication that there is some rebound occurring downgradient of the in situ treatment areas. Carbon and sulfate were injected upgradient of PP-14R and PP-37R in 2017 to adsorb and treat benzene, and concentrations of GRO and benzene have declined by over 90% in these wells. However, the localized increasing benzene concentrations indicate that either the carbon has become overwhelmed, or the sulfate (electron acceptor) has depleted, or both, and benzene degradation has slowed down in this part of the plume. The field parameters at PP-14R (refer to Table A.2) have also become more variable over the past 3 years, with ORP trending more positive (less reducing). The variability in field parameters at the fringe of the plume may indicate a gradual shift in the mechanism of benzene degradation as the plume continues to attenuate. Additional sampling of MNA parameters within the benzene plume is recommended to further evaluate the context of attenuation and mechanism of benzene degradation. Specific recommendations are provided in Section 3.0.

The benzene concentrations are less than the CUL at other performance wells and at the CPOC, demonstrating that despite these localized increases, the benzene exceedances in groundwater are successfully attenuating before reaching the CPOC.

The most recent benzene concentrations in groundwater at Site wells from April and October 2023 are presented on Figures 2.5a and 2.5b, respectively. Figure 2.6 graphically presents all post-remediation benzene concentrations in CPOC wells since 2016.

### 2.1.3 Groundwater Analytical Results in the Downgradient Portion of the Log Pond Fill Area

Analytical results for the October 2023 groundwater monitoring in the downgradient portion of the Log Pond Fill Area are presented in Table 2.2. GRO; benzene, toluene, ethylbenzene, and xylenes; and ORO were nondetect, and DRO concentrations are less than the CUL in both monitoring wells (PP-21 and PP-22), which is consistent with the groundwater concentrations measured during the 2013 and 2014 remedial investigations. The detected DRO chromatographic patterns in these samples indicated an unresolved complex mixture of weathered and organic material, consistent with historical presence of logs and minor releases of petroleum. The presence of both natural organic material and DRO metabolites is supported by the nondetect concentrations of DRO with silica gel cleanup. The monitoring well locations are shown on Figure 1.1; the results are not shown on a figure because there are no exceedances of CULs.

# 3.0 Groundwater Monitoring Conclusions and Recommendations

The groundwater monitoring results presented in this report confirm the overall effectiveness of remediation in reducing groundwater contamination to meet CULs at the CPOC. The COC concentrations in groundwater are generally stable or decreasing with a few localized increases upgradient of the CPOC described in this section. The results support the following summary conclusions:

- Post-remediation groundwater COC concentrations are gradually declining across the Site.
- Data indicate that the GRO and benzene groundwater plumes continue to shrink, with at least two consecutive years of data resulting in concentrations less than the Site CULs at the CPOC.
- Hydraulic oil as ORO is nondetect and remains in compliance with CULs at the CPOC.
- Weathered diesel as DRO concentrations (and historically quantified with overlap between DRO and ORO) in groundwater have remained stable generally with exceedances of approximately 1.1 to 4.1 times the CUL at the CPOC. Continued analysis with silica gel cleanup resulting in significantly reduced concentrations of DRO (often to nondetect concentrations) across the Site is a line of evidence for natural attenuation of DRO. DRO results after silica gel cleanup at the CPOC were less than the CUL for the past three monitoring events.
- Groundwater monitoring is proposed to continue on a semiannual basis for groundwater COCs within the Area 5 and 6 monitoring well network. Groundwater samples with detectable concentrations of DRO will continue to be analyzed with and without silica gel cleanup during the 2024 monitoring events.
- Localized increases of benzene upgradient of the CPOC at PP-13R, PP-14R, and PP-37R in the vicinity of the carbon/sulfate injections indicate that the in situ treatment materials may be overwhelmed and/or depleted. Re-baselining the MNA parameters is proposed to verify geochemical conditions within the footprint of the benzene plume by analyzing sulfate and nitrate at monitoring wells PP-13R, PP-14R, PP-15R2, and PP-37R during the 2024 monitoring events. Additional Gene-Trac analyses should be conducted at PP-15R2 and PP-14R to verify whether sulfate-reducing bacteria or another microbial population is present and sufficiently active to continue supporting anaerobic degradation of benzene. Coordination is ongoing for additional recommendations on MNA and microbial sampling and treatment options, and Ecology will be notified of the additional sampling recommendations before the semiannual monitoring events.
- Pending the results of further geochemical and biological evaluation of the aquifer, additional in situ treatment via the IGs may be proposed to replenish the electron acceptors to support anaerobic degradation of benzene, which will be coordinated with Ecology, if recommended, before the next annual report.

- Concentrations of COCs have continued to be nondetect or less than CULs in groundwater downgradient of the Log Pond Fill Area, which is consistent with stable soil conditions within the log pond. Groundwater will continue to be monitored along the shoreline at wells PP-21 and PP-22 every 2.5 years, per Ecology directive. It is proposed that these monitoring wells be monitored for samples only by analytical method NWTPH-Dx during future events. DRO was the only detected compound in 2023, and ORO is the only COC present in soil at concentrations greater than the CULs within the Log Pond Fill Area.

## 3.1 OTHER AGREED ORDER REPORTING REQUIREMENTS

Information on other AO reporting requirements include the following:

- Summary of deviations from the approved work plan: Addition of two performance monitoring wells, PP-21 and PP-22, to be monitored at a frequency of 2.5 years, as directed by Ecology
- Summary of contacts with representatives of the local community, public interest groups, press, and federal, state, or tribal governments related to the Site cleanup: None
- Changes in key personnel: None

## 3.2 UPCOMING WORK

AO work activities planned during the next work period, ending in December 2024, include the following:

- Groundwater monitoring, which will continue on a semiannual schedule in spring (April or May) and fall (October or November) 2024.
    - Groundwater monitoring downgradient of the Log Pond Fill Area will continue on a 2.5-year schedule with the next monitoring to occur in spring 2026.
- Preparation of an annual groundwater monitoring report to be submitted in December 2024.
- Coordination with Ecology to support the first 5-year review, which is currently in progress.

Additionally, the Port is preparing the Site for redevelopment to begin in 2024. Additional upcoming work to support redevelopment activities may include the following:

- Backfilling and grading Areas 5 and 6 with dredge spoils from Terminal 3, which meet the criteria for reuse as shallow grading material and are currently stockpiled in the Log Pond Fill Area, as further described in the EDR (Floyd|Snider 2015b) and required pursuant to Ecology's approval of the Dredged Material Management Plan for the Terminal 3 project (Floyd|Snider 2020)
- Altering the stick-up monitoring well monuments to be flush with the new surface grade

- Decommissioning additional monitoring wells that are within the footprint of the redevelopment plans and are no longer required for any remedial activities, including any long-term monitoring for compliance
- Installing utilities (underground water, sewer, electrical, and stormwater conveyance)
- Installing stormwater treatment
- Paving select areas

Design of the K Ply redevelopment plans are not yet final; however, a vapor intrusion assessment is required prior to construction of any buildings per Section VII of the AO. As redevelopment plans are finalized, a vapor intrusion assessment will be coordinated with Ecology for review and approval.

Ecology will be notified prior to any soil-disturbing activities, and any construction activities involving soil disturbance will follow the health, safety, and soil-handling protocols described in the Soil Management Plan where applicable (Appendix L of the Construction Completion Report; Floyd|Snider 2016a).

All monitoring well modifications will be completed by a licensed driller per Washington Administrative Code (WAC) 173-160-420 (8), and any additional requests to decommission wells will be coordinated with Ecology.

# 4.0 References

Clallam County Department of Health and Human Services (Clallam County). 2017. *Request to Discontinue Closure Activities for the Port K Ply Log Pond Solid Waste Handling Facility Permit #: SLW93-0001*. Letter from Lindsey Aspelund, Clallam County, to Chris Hartman, Port of Port Angeles. 14 March.

Floyd|Snider. 2013. *K Ply Site Remedial Investigation/Feasibility Study Work Plan*. Prepared for the Port of Port Angeles. September.

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_____. 2016a. *K Ply Site Construction Completion Report.* Prepared for the Port of Port Angeles. December.

_____. 2016b. *March 2016 Quarterly Progress Report for K Ply*. Letter from Tom Colligan and Tucker Stevens, Floyd|Snider, to Connie Groven, Washington State Department of Ecology. 13 March.

_____. 2020. *Terminal 3 Dredged Material Management.* Prepared for the Port of Port Angeles. 28 January.

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_____. 2020b. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* Prepared by the Office of Superfund Remediation and Technology Innovation. EPA-542-R-20-006/OLEM 9240.1-66. November.

Washington State Department of Ecology (Ecology). 2015. *K Ply Site Cleanup Action Plan.* 19 May.

# 2023 Annual Progress Report for the K Ply Site

K Ply Site

## Tables

# Table 2.1
# 2023 Groundwater Field Parameters

| Field Parameter [1] | | | Groundwater Elevation | Specific Conductivity | pH | Dissolved Oxygen | ORP | Temperature | Turbidity |
|---|---|---|---|---|---|---|---|---|---|
| Units | | | Feet NAVD 88 | µS/cm | -- | mg/L | mV | °C | NTU |
| Location | Measured Date | Screened Interval (feet bgs) | | | | | | | |
| PP-13R | 4/19/2023 | 5–15 | 5.45 | 487.3 | 9.48 | 0.18 | -60.2 | 10.7 | 2.10 |
| | 10/26/2023 | | 5.21 | 1,097 | 8.47 | 0.28 | 53.1 | 15.0 | 1.55 |
| PP-14R | 4/19/2023 | 5–15 | 5.57 | 662 | 8.25 | 0.16 | -43.2 | 9.7 | 1.15 |
| | 10/26/2023 | | 5.33 | 593 | 8.44 | 0.31 | 4.8 | 14.7 | 1.59 |
| PP-15R2 | 4/19/2023 | 5–15 | 6.22 | 976 | 7.70 | 0.19 | -45.8 | 10.5 | 1.51 |
| | 10/27/2023 | | 5.07 | 942 | 7.90 | 0.29 | 0.7 | 14.4 | 2.24 |
| PP-17 | 4/19/2023 | 5–15 | 5.26 | 646 | 10.84 | 0.00 | -116.5 | 10.8 | 1.36 |
| | 10/26/2023 | | 5.02 | 496.6 | 10.43 | 0.30 | -35.5 | 15.1 | 2.61 |
| PP-18R2 | 4/19/2023 | 10-20 | 5.20 | 1,843 | 7.67 | 1.64 | -19.0 | 10.4 | 1.26 |
| | 10/26/2023 | | 4.36 | 4,641 | 7.14 | 1.55 | -42.1 | 13.6 | 2.04 |
| PP-19 | 4/19/2023 | 5–15 | 4.66 | 12,826 | 7.30 | 3.58 | 63.4 | 10.6 | 1.18 |
| | 10/26/2023 | | 4.40 | 17,017 | 6.90 | 2.44 | 172.1 | 15.5 | 1.61 |
| PP-21 | 10/26/2023 | 8–18 | 4.66 | 14,637 | 6.64 | 0.18 | -42.0 | 13.7 | 5.87 |
| PP-22 | 10/26/2023 | 8–18 | 4.83 | 1,437 | 6.69 | 0.21 | -100.7 | 14.0 | 2.71 |
| PP-27 | 4/19/2023 | 5–15 | 6.30 | 732 | 11.53 | 0.23 | -134.4 | 9.8 | 4.65 |
| | 10/27/2023 | | 5.30 | 406.3 | 10.22 | 0.16 | -141.1 | 14.3 | 6.26 |
| PP-29 | 4/19/2023 | 5–15 | 5.74 | 676 | 7.36 | 2.58 | 58.0 | 10.3 | 1.43 |
| | 10/27/2023 | | 5.23 | 1,024 | 7.24 | 0.30 | 55.8 | 15.5 | 1.53 |
| PP-30 | 4/19/2023 | 5–15 | 5.52 | 605 | 11.2 | 0.17 | -101.8 | 10.1 | 1.99 |
| | 10/26/2023 | | 5.27 | 376.4 | 9.77 | 0.18 | -145.6 | 15.9 | 1.98 |
| PP-32 | 4/19/2023 | 8–18 | 5.34 | 1,158 | 7.57 | 0.04 | -137.5 | 12.7 | 1.30 |
| | 10/27/2023 | | 4.97 | 886 | 7.78 | 0.16 | -148.5 | 15.5 | 2.06 |
| PP-33 | 4/19/2023 | 5–15 | 5.86 | 955 | 7.37 | 0.22 | -76.8 | 10.7 | 1.39 |
| | 10/26/2023 | | 6.27 | 696 | 7.58 | 0.31 | -0.6 | 13.6 | 1.84 |
| PP-34 | 4/19/2023 | 10–20 | 5.39 | 1,582 | 12.35 | 0.00 | -113.4 | 10.7 | 1.39 |
| | 10/26/2023 | | 4.98 | 1,102 | 12.09 | 0.28 | -178.2 | 15.3 | 2.93 |
| PP-36 | 4/19/2023 | 10–20 | 6.31 | 357.9 | 9.06 | 0.03 | -126.6 | 10.5 | 0.75 |
| | 10/26/2023 | | 6.29 | 319.8 | 7.73 | 0.22 | -127.2 | 13.5 | 1.63 |
| PP-37R | 4/19/2023 | 10–20 | 5.24 | 1,284 | 7.72 | 0.01 | -130.4 | 11.2 | 1.03 |
| | 10/26/2023 | | 5.05 | 1,074 | 7.81 | 0.35 | -7.3 | 14.9 | 1.93 |

Note:

1 Field parameters collected with YSI Pro DSS water quality meter and LaMotte 2020t/we turbidity meter.

Abbreviations:

bgs Below ground surface
°C Degrees Celsius
µS/cm Microsiemens per centimeter
mg/L Milligrams per liter
mV Millivolts
NAVD 88 North American Vertical Datum of 1988
NTU Nephelometric turbidity units
ORP Oxidation–reduction potential

**Table 2.2**
**2023 Groundwater Analytical Results**

| Analyte | | Gasoline-Range Organics | Diesel-Range Organics | | Oil-Range Organics | | Total TPH (DRO + ORO) | Benzene | Ethylbenzene | Toluene | Xylene (total) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analysis Method | | NWTPH-Gx | NWTPH-Dx | NWTPH-Dx with SGC | NWTPH-Dx | NWTPH-Dx with SGC | NWTPH-Dx | USEPA 8260D | | | |
| Criteria | | 800 | 500 | 500 | 500 | 500 | 500 | 51 | -- | -- | -- |
| Units | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| Sample Location | Sample Date | | | | | | | | | | |
| **Conditional Point of Compliance Monitoring Wells** | | | | | | | | | | | |
| PP-17 | 4/19/2023 (1) | 298 | **1,470** (2) | 274 J (3) | 93.1 U | 93.1 U | **1,470** (2) | 36.1 | 1.84 | 1.00 U | 3.00 |
| | 10/26/2023 | 226 | **1,200 J** (4) | 229 J | 95.1 U | 95.1 U | **1,200 J** (4) | 29.2 | 1.41 | 1.00 U | 2.38 |
| PP-18R2 | 4/19/2023 | 50.0 U | 482 (2) | 93.1 U | 93.1 U | 93.1 U | 482 (2) | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| | 10/26/2023 | 89.9 | **532 J** (5) | 95.4 U | 95.4 U | 95.4 U | **532 J** (5) | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| PP-19 | 4/19/2023 | 50.0 U | 167 (2) | -- | 93.0 U | -- | 186 U | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| | 10/26/2023 | 50.0 U | 142 J (5) | 95.4 U | 95.4 U | 95.4 U | 191 U | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| PP-34 | 4/19/2023 | 86.5 | **1,740** (2) | 199 | 95.1 U | 95.1 U | **1,740** (2) | 0.522 | 2.04 | 1.00 U | 1.67 |
| | 10/26/2023 | 205 | **2,060 J** (4) | 177 | 94.3 U | 94.3 U | **2,060 J** (4) | 1.75 | 5.90 | 1.00 U | 4.18 |
| **Other Site Monitoring Wells** | | | | | | | | | | | |
| PP-13R | 4/19/2023 | 50.0 U | **501** (2) | 164 | 93.3 U | 93.3 U | **501** (2) | 3.27 | 0.400 U | 1.00 U | 1.00 U |
| | 10/26/2023 | 50.0 U | 405 J (5) | 161 J | 94.6 U | 94.6 U | 405 J (5) | 18.6 | 0.400 U | 1.00 U | 1.00 U |
| PP-14R | 4/19/2023 | 290 (6) | **873 J** (4) | 94.8 U | 94.8 U | 94.8 U | **873** (2) | **115** | 0.400 U | 1.00 U | 1.00 U |
| | 10/26/2023 | 635 | **1,030 J** (4) | 154 J | 94.4 U | 94.4 U | **1,030 J** (4) | **260** | 2.00 U | 5.00 U | 5.00 U |
| PP-15R2 | 4/19/2023 | **4,590 J** (7) | **2,680 J** (8) | **1,090** (9) | 92.1 U | 92.1 U | **2,680 J** (8) | **921** | 60.7 | 13.1 | 31.7 |
| | 10/27/2023 | **3,740** | **1,420 J** (4) | 469 J | 93.5 U | 93.5 U | **1,420 J** (4) | **1,170** | 8.00 U | 20.0 U | 20.0 U |
| PP-27 | 4/19/2023 | **1,040** | **1,750 J** (8) | **545** (9) | 93.6 U | 93.6 U | **1,750 J** (8) | **52.6** | 43.4 | 3.92 | 21.5 |
| | 10/27/2023 | **1,410** | **1,760 J** (4) | **580 J** | 94.5 U | 94.5 U | **1,760 J** (4) | 47.7 | 49.2 | 5.00 U | 18.6 |
| PP-29 | 4/19/2023 | 50.0 U | 427 (2) | 93.1 U | 93.1 U | 93.1 U | 427 (2) | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| | 10/27/2023 | 50.0 U | **1,210 J** (5) | 93.7 U | 93.7 U | 93.7 U | **1,210 J** (5) | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| PP-30 | 4/19/2023 | 439 | **1,510 J** (8) | 241 (9) | 92.9 U | 92.9 U | **1,510 J** (8) | 24.0 | 4.23 | 1.03 | 4.67 |
| | 10/26/2023 (1) | 651 | **1,630 J** (4) | 192 | 93.2 U | 93.2 U | **1,630 J** (4) | 18.0 | 2.63 | 1.00 U | 3.87 |
| PP-32 | 4/19/2023 | 50.0 U | 259 (2) | 93.5 U | 93.5 U | 93.5 U | 259 (2) | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| | 10/27/2023 | 50.0 U | 428 J (5) | 96.5 U | 96.5 U | 96.5 U | 428 J (5) | 1.64 | 0.400 U | 1.00 U | 1.00 U |
| PP-33 | 4/19/2023 | 50.0 U | **590** (2) | 93.0 U | 93.0 U | 93.0 U | **590** (2) | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| | 10/26/2023 | 50.0 U | **701 J** (5) | 93.6 U | 93.6 U | 93.6 U | **701 J** (5) | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| PP-36 | 4/19/2023 | **2,180** (10) | **1,210 J** (8) | **923** (9) | 93.3 U | 93.3 U | **1,210 J** (8) | 36.9 | 32.4 | 1.11 | 3.76 |
| | 10/26/2023 | **833** | 429 J (4) | 273 | 93.5 U | 93.5 U | 429 J (4) | 3.86 | 1.64 | 1.00 U | 1.00 U |
| PP-37R | 4/19/2023 | 167 (6) | 391 (2) | 94.6 U | 94.6 U | 94.6 U | 391 (2) | **110** | 0.400 U | 1.00 U | 1.00 U |
| | 10/26/2023 | 94.3 | 463 J (5) | 104 | 94.7 U | 94.7 U | 463 J (5) | 39.7 | 0.400 U | 1.00 U | 1.00 U |

## Table 2.2
## 2023 Groundwater Analytical Results

| Analyte | | Gasoline-Range Organics | Diesel-Range Organics | | Oil-Range Organics | | Total TPH (DRO + ORO) | Benzene | Ethylbenzene | Toluene | Xylene (total) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analysis Method | | NWTPH-Gx | NWTPH-Dx | NWTPH-Dx with SGC | NWTPH-Dx | NWTPH-Dx with SGC | NWTPH-Dx | USEPA 8260D | | | |
| Criteria | | 800 | 500 | 500 | 500 | 500 | 500 | 51 | -- | -- | -- |
| Units | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| **Sample Location** | **Sample Date** | | | | | | | | | | |
| **Monitoring Wells in Downgradient Portion of Log Pond Fill Area** | | | | | | | | | | | |
| PP-21 | 10/26/2023 | 50.0 U | 259 J [5] | 93.3 U | 93.3 U | 93.3 U | 259 J [5] | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| PP-22 | 10/26/2023 | 50.0 U | 336 J [5] | 94.1 U | 94.1 U | 94.1 U | 336 J [5] | 0.440 U | 0.400 U | 1.00 U | 1.00 U |

Notes:

-- Not available or not analyzed for.

**RED/BOLD** Detected concentration that exceeds criteria.

1 A field duplicate was collected. The greatest value is reported.

2 Laboratory noted that the chromatographic pattern indicates an unresolved complex mixture, which may be weathered and/or organic material.

3 Laboratory noted that the detection is biased high by overlap with gasoline-range material.

4 Chromatographic pattern indicates an unresolved complex mixture, which may be weathered and/or organic material. Detection is biased high by overlap with gasoline-range material.

5 Chromatographic pattern indicates an unresolved complex mixture, which may be weathered and/or organic material.

6 Laboratory noted that the detection is due to non-petroleum compounds.

7 Laboratory noted that the detection is biased high because of non-petroleum compounds.

8 Laboratory noted that the chromatographic pattern indicates an unresolved complex mixture, which may be weathered and/or organic material. Detection is biased high by overlap with gasoline-range material.

9 Laboratory noted that the detection is due to overlap with gasoline-range material.

10 Laboratory noted that the chromatographic pattern indicates a material consistent with weathered gasoline or stoddard solvent.

Abbreviations:

DRO Diesel-range organics

µg/L Micrograms per liter

ORO Oil-range organics

SGC Silica gel cleanup

TPH Total petroleum hydrocarbons

Qualifiers:

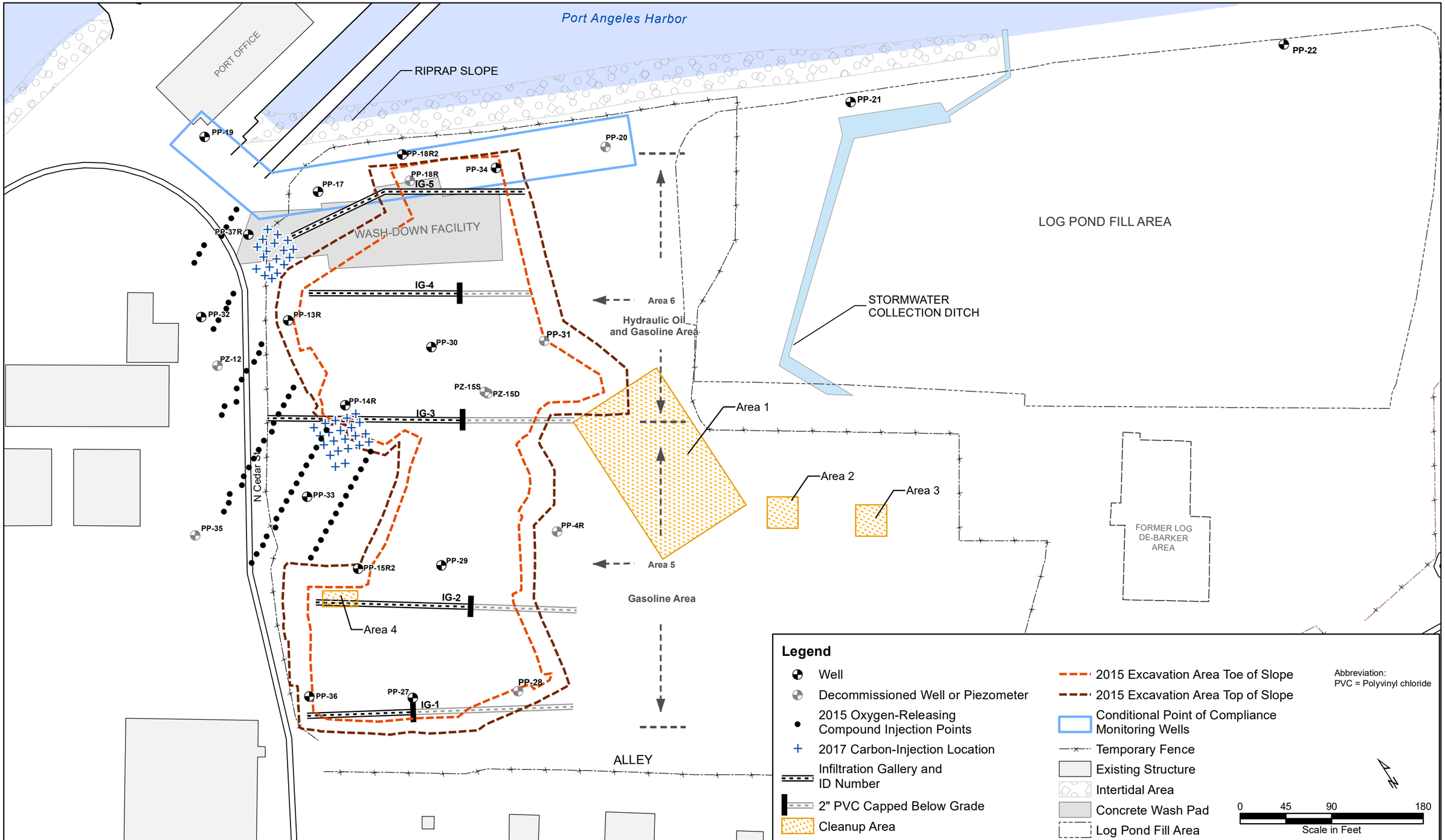
J Concentration is estimated but acceptable for most uses.

U Analyte is not detected at the associated reporting limit.

# 2023 Annual Progress Report for the K Ply Site

K Ply Site

## Figures

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**2023 Annual Progress Report for the K Ply Site**
**Port Angeles, Washington**

Figure 1.1
Site Features

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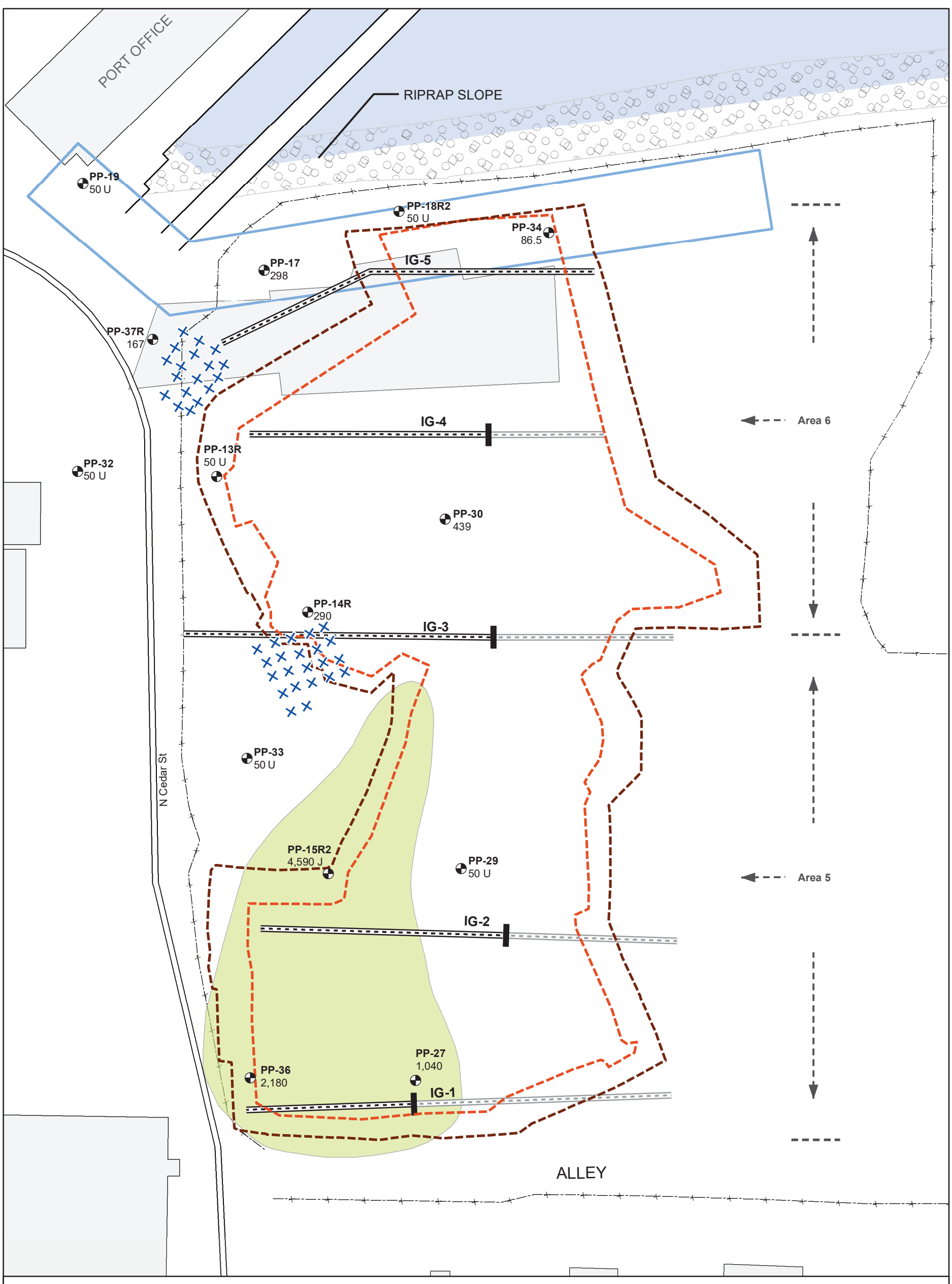
12/8/2023




## Legend

- Well
- Carbon-Injection Location
- Infiltration Gallery and ID Number
- 2" PVC Capped Below Grade

**Extent of GRO in Groundwater (µg/L)**

- >800
- 2015 Excavation Area Toe of Slope
- 2015 Excavation Area Top of Slope
- Conditional Point of Compliance Monitoring Wells
- Temporary Fence
- Existing Structure
- Intertidal Area

Notes:
- All results reported in µg/L.
- Cleanup level is 800 µg/L.
- If duplicate collected, greater concentration reported.
- Results rounded to three significant figures.

Abbreviations:
GRO = Gasoline-range organics
µg/L = Micrograms per liter
PVC = Polyvinyl chloride

Qualifier:
U = Analyte is not detected at the associated reporting limit.

0 30 60 120
Scale in Feet

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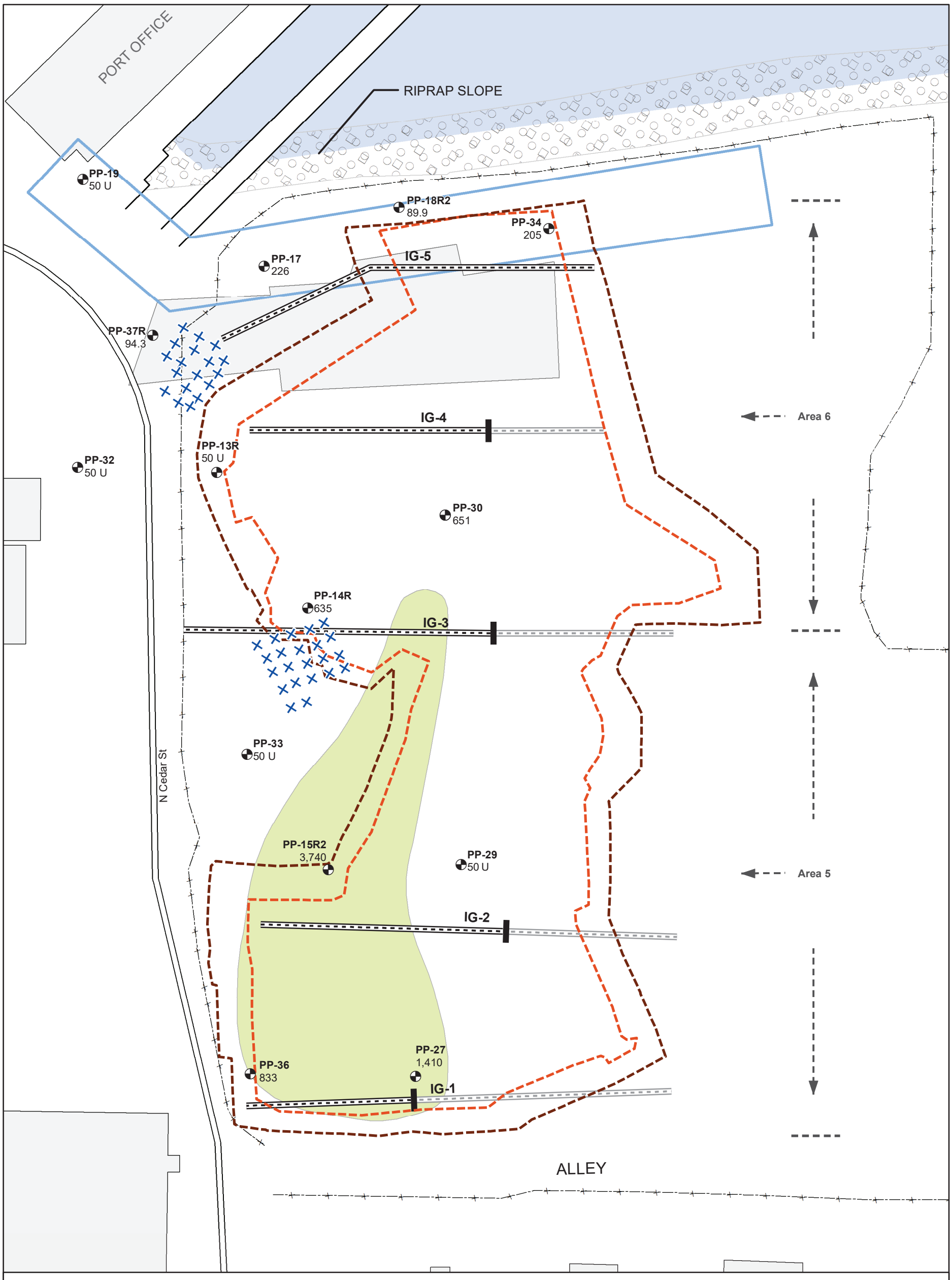
**2023 Annual Progress Report for the K Ply Site Port Angeles, Washington**

Figure 2.1a
April 2023 GRO Concentrations in Groundwater

I:\GIS\Projects\PPA_KPLY\MXD\Annual Report\2023\Figure 2.1a April 2023 GRO Concentrations in Groundwater.mxd
12/7/2023




## Legend

- Well
- Carbon-Injection Location
- Infiltration Gallery and ID Number
- 2" PVC Capped Below Grade

**Extent of GRO in Groundwater (µg/L)**

- >800
- 2015 Excavation Area Toe of Slope
- 2015 Excavation Area Top of Slope
- Conditional Point of Compliance Monitoring Wells
- Temporary Fence
- Existing Structure
- Intertidal Area

Notes:
- All results reported in µg/L.
- Cleanup level is 800 µg/L.
- If duplicate collected, greater concentration reported.
- Results rounded to three significant figures.

Abbreviations:
GRO = Gasoline-range organics
µg/L = Micrograms per liter
PVC = Polyvinyl chloride

Qualifier:
U = Analyte is not detected at the associated reporting limit.

0 30 60 120
Scale in Feet

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**2023 Annual Progress Report for the K Ply Site Port Angeles, Washington**

Figure 2.1b
October 2023 GRO Concentrations in Groundwater

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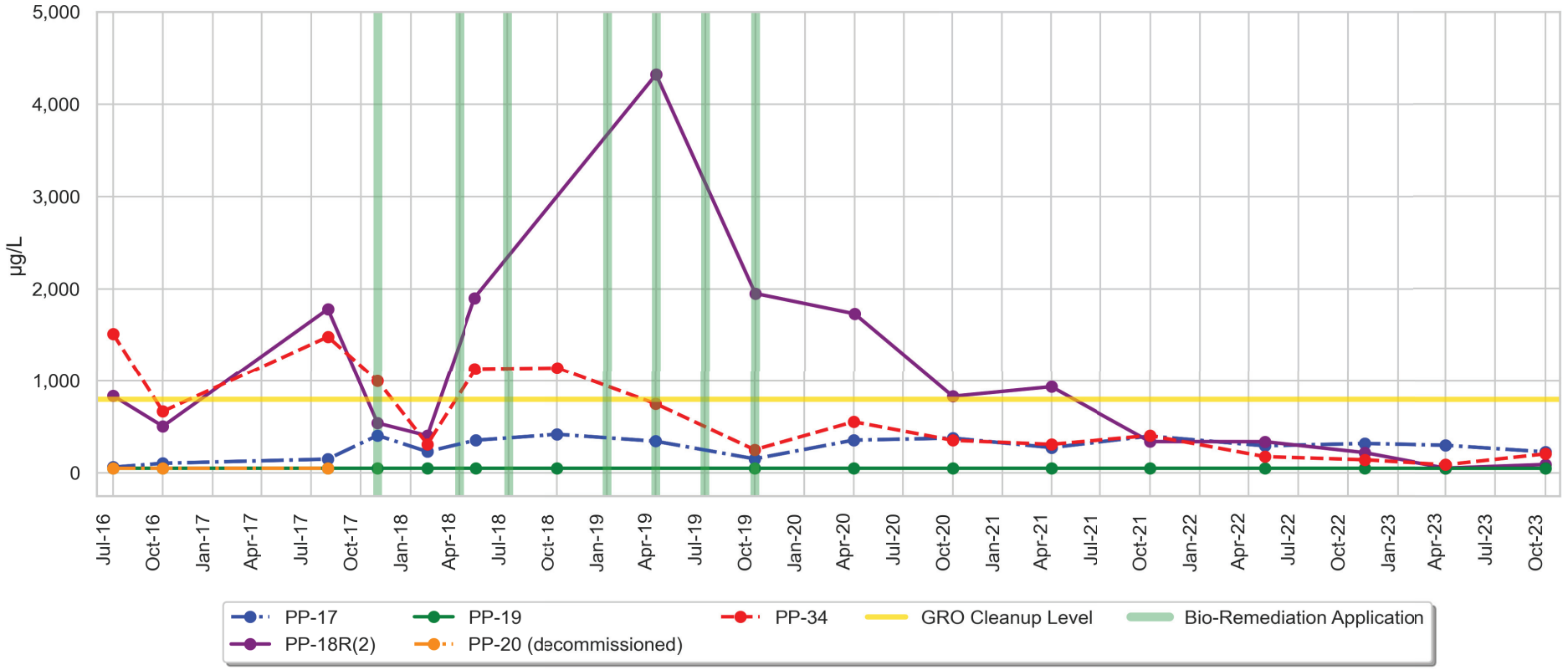
12/7/2023




Abbreviations: CPOC = Conditional point of compliance, GRO = Gasoline-range organics, µg/L = Micrograms per liter

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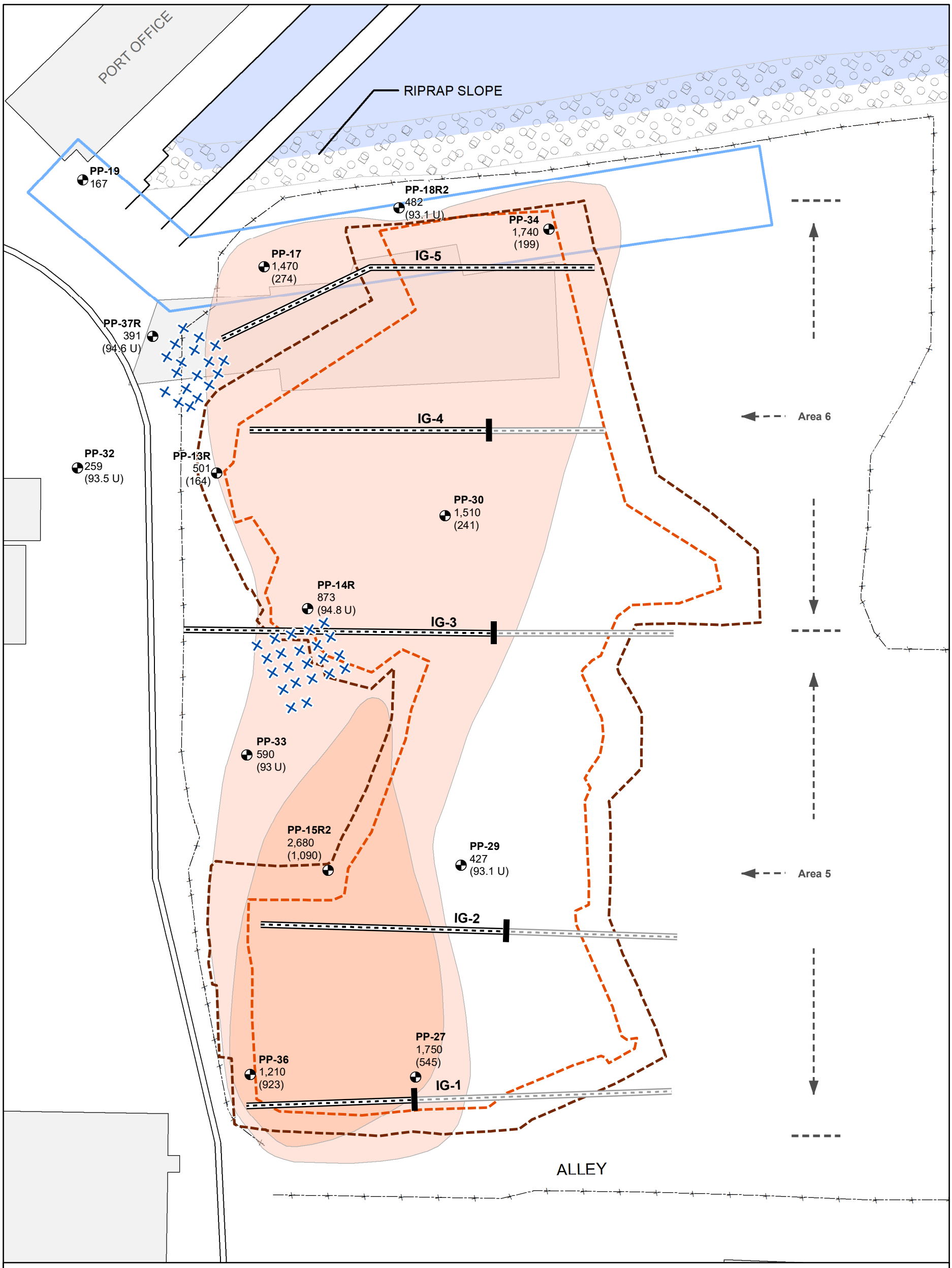
**2023 Annual Progress Report for the K Ply Site Port Angeles, Washington**

Figure 2.2
Post-Remediation CPOC GRO Concentrations in Groundwater




## Legend

- Well
- Carbon-Injection Location
- Infiltration Gallery and ID Number
- 2" PVC Capped Below Grade

**Extent of DRO in Groundwater (µg/L)**

- >500
- >500 with SGC

- 2015 Excavation Area Toe of Slope
- 2015 Excavation Area Top of Slope
- Conditional Point of Compliance Monitoring Wells
- Temporary Fence
- Existing Structure
- Intertidal Area

**Location Label**

PP-36 ← Location
822 ← DRO Result
(861) ← DRO Result with SGC

Notes:
- All results reported in µg/L.
- Cleanup level is 500 µg/L.
- If duplicate collected, greater concentration reported.
- Results rounded to three significant figures.

Abbreviations:
DRO = Diesel-range organics
µg/L = Micrograms per liter
PVC = Polyvinyl chloride
SGC = Silica gel cleanup

Qualifiers:
U = Analyte is not detected at the associated reporting limit.

0 30 60 120
Scale in Feet

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**2023 Annual Progress Report for the K Ply Site Port Angeles, Washington**

Figure 2.3a
April 2023 DRO Concentrations in Groundwater

I:\GIS\Projects\PPA_KPLY\MXD\Annual Report\2023\Figure 2.3a April 2023 DRO Concentrations in Groundwater.mxd
12/8/2023

PORT OFFICE

RIPRAP SLOPE

PP-19
142
(95.4 U)

PP-18R2
532
(95.4 U)

PP-34
2,060
(177)

PP-17
1,200
(229)

IG-5

PP-37R
463
(104)

IG-4

Area 6

PP-32
428
(96.5 U)

PP-13R
405
(161)

PP-30
1,630
(192)

PP-14R
1,030
(154)

IG-3

PP-33
701
(93.6 U)

PP-15R2
1,420
(469)

PP-29
1,210
(93.7 U)

IG-2

Area 5

PP-36
429
(273)

PP-27
1,760
(580)

IG-1

ALLEY

## Legend

- Well
- Carbon-Injection Location
- Infiltration Gallery and ID Number
- 2" PVC Capped Below Grade

**Extent of DRO in Groundwater (µg/L)**

- >500
- >500 with SGC

- 2015 Excavation Area Toe of Slope
- 2015 Excavation Area Top of Slope
- Conditional Point of Compliance Monitoring Wells
- Temporary Fence
- Existing Structure
- Intertidal Area

**Location Label**

PP-36 ← Location
822 ← DRO Result
(861) ← DRO Result with SGC

Notes:
- All results reported in µg/L.
- Cleanup level is 500 µg/L.
- If duplicate collected, greater concentration reported.
- Results rounded to three significant figures.

Abbreviations:
DRO = Diesel-range organics
µg/L = Micrograms per liter
PVC = Polyvinyl chloride
SGC = Silica gel cleanup

Qualifiers:
U = Analyte is not detected at the associated reporting limit.

0 30 60 120
Scale in Feet

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**2023 Annual Progress Report for the K Ply Site Port Angeles, Washington**

Figure 2.3b
October 2023 DRO Concentrations in Groundwater

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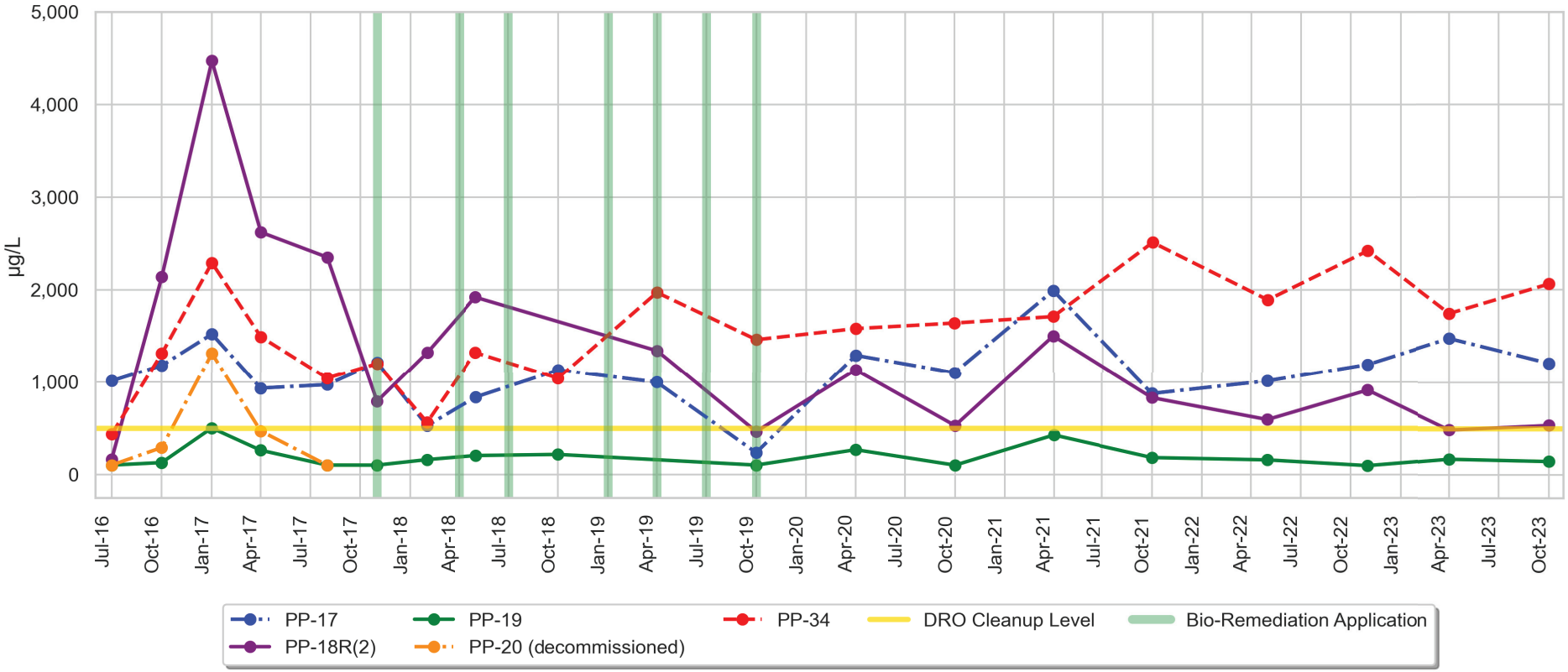
12/8/2023




Note: The results displayed depict groundwater concentrations of ORO quantified as weathered diesel between July 2016 and April 2021, and DRO quantified as weathered diesel from October 2021 onward.

Abbreviations: CPOC = Conditional point of compliance, DRO = Diesel-range organics, µg/L = Micrograms per liter, ORO = Oil-range organics

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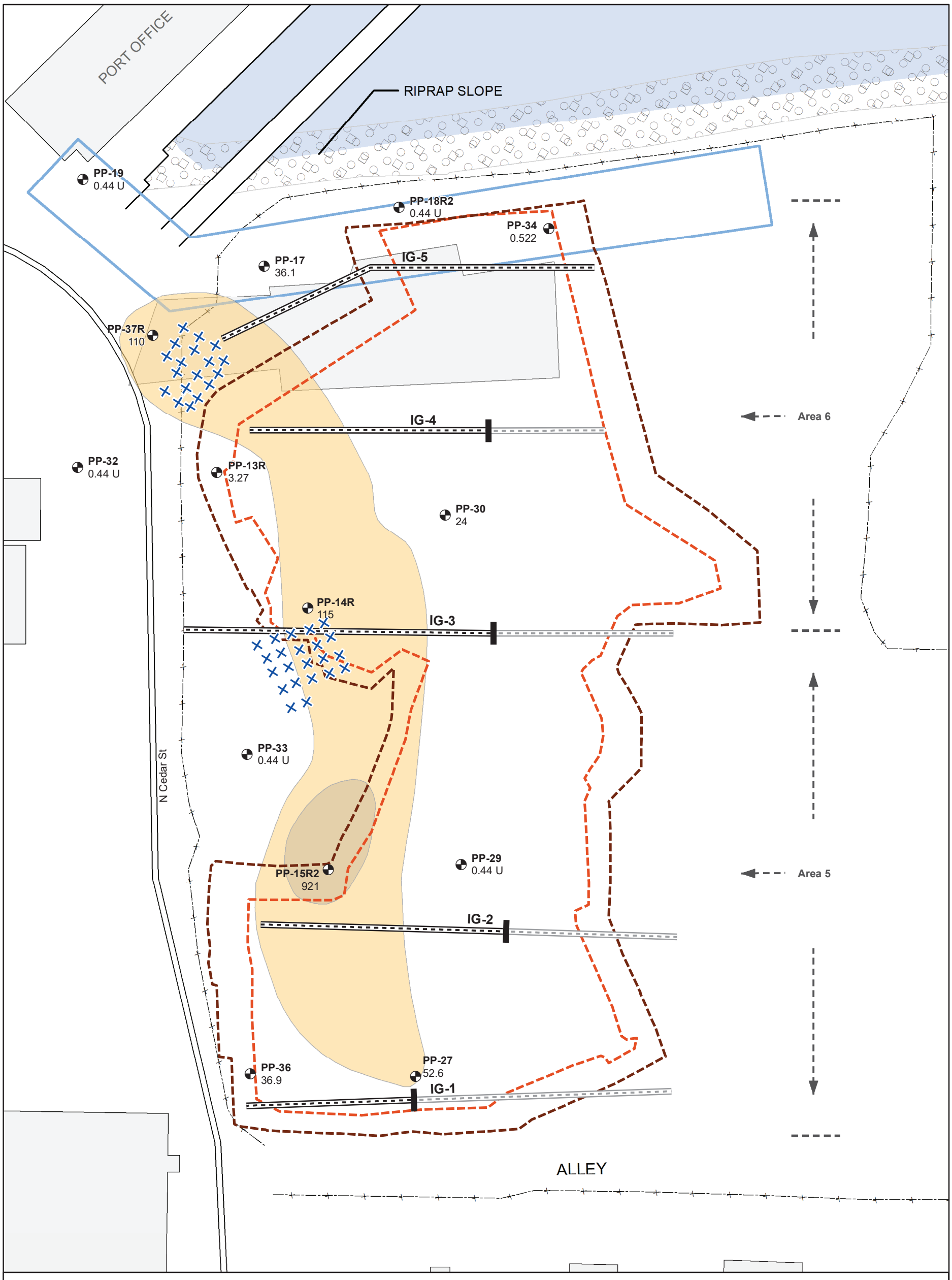
Figure 2.4
Post-Remediation CPOC DRO Concentrations in Groundwater




**Legend**

- Well
- Carbon-Injection Location
- Infiltration Gallery and ID Number
- 2" PVC Capped Below Grade

**Extent of Benzene in Groundwater (µg/L)**

- 51–500
- >500

- 2015 Excavation Area Toe of Slope
- 2015 Excavation Area Top of Slope
- Conditional Point of Compliance Monitoring Wells
- Temporary Fence
- Existing Structure
- Intertidal Area

Notes:
- All results reported in µg/L.
- Cleanup level is 51 µg/L.
- If duplicate collected, greater concentration reported.
- Results rounded to three significant figures.

Abbreviations:
µg/L = Micrograms per liter
PVC = Polyvinyl chloride

Qualifier:
U = Analyte is not detected at the associated reporting limit.

0 30 60 120
Scale in Feet

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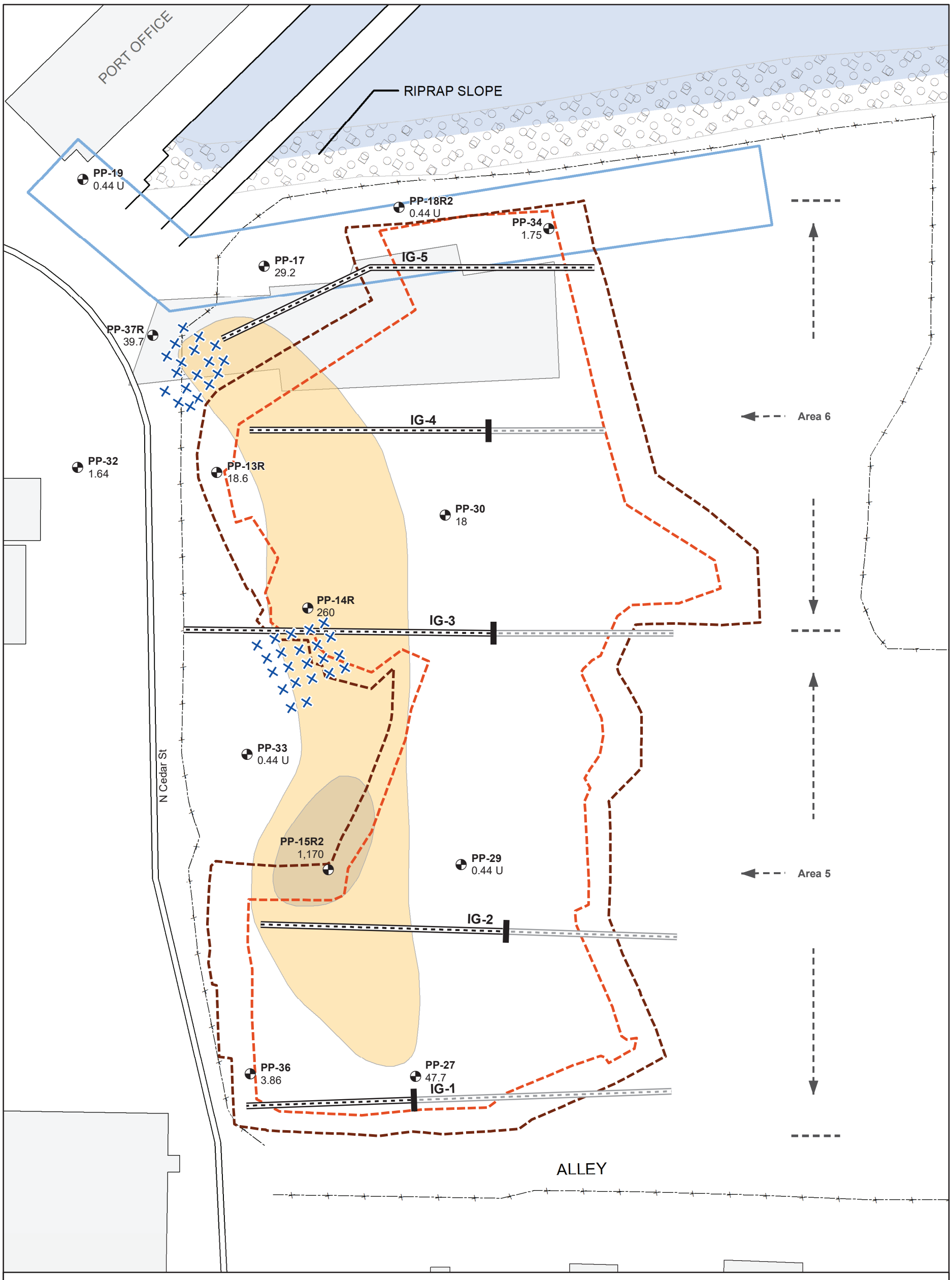
Figure 2.5a
April 2023 Benzene Concentrations in Groundwater

I:\GIS\Projects\PPA_KPLY\MXD\Annual Report\2023\Figure 2.5a April 2023 Benzene Concentrations in Groundwater.mxd
12/7/2023




## Legend

- Well
- Carbon-Injection Location
- Infiltration Gallery and ID Number
- 2" PVC Capped Below Grade

**Extent of Benzene in Groundwater (µg/L)**

- 51–500
- >500

- 2015 Excavation Area Toe of Slope
- 2015 Excavation Area Top of Slope
- Conditional Point of Compliance Monitoring Wells
- Temporary Fence
- Existing Structure
- Intertidal Area

Notes:
- All results reported in µg/L.
- Cleanup level is 51 µg/L.
- If duplicate collected, greater concentration reported.
- Results rounded to three significant figures.

Abbreviations:
µg/L = Micrograms per liter
PVC = Polyvinyl chloride

Qualifier:
U = Analyte is not detected at the associated reporting limit.

0 30 60 120
Scale in Feet

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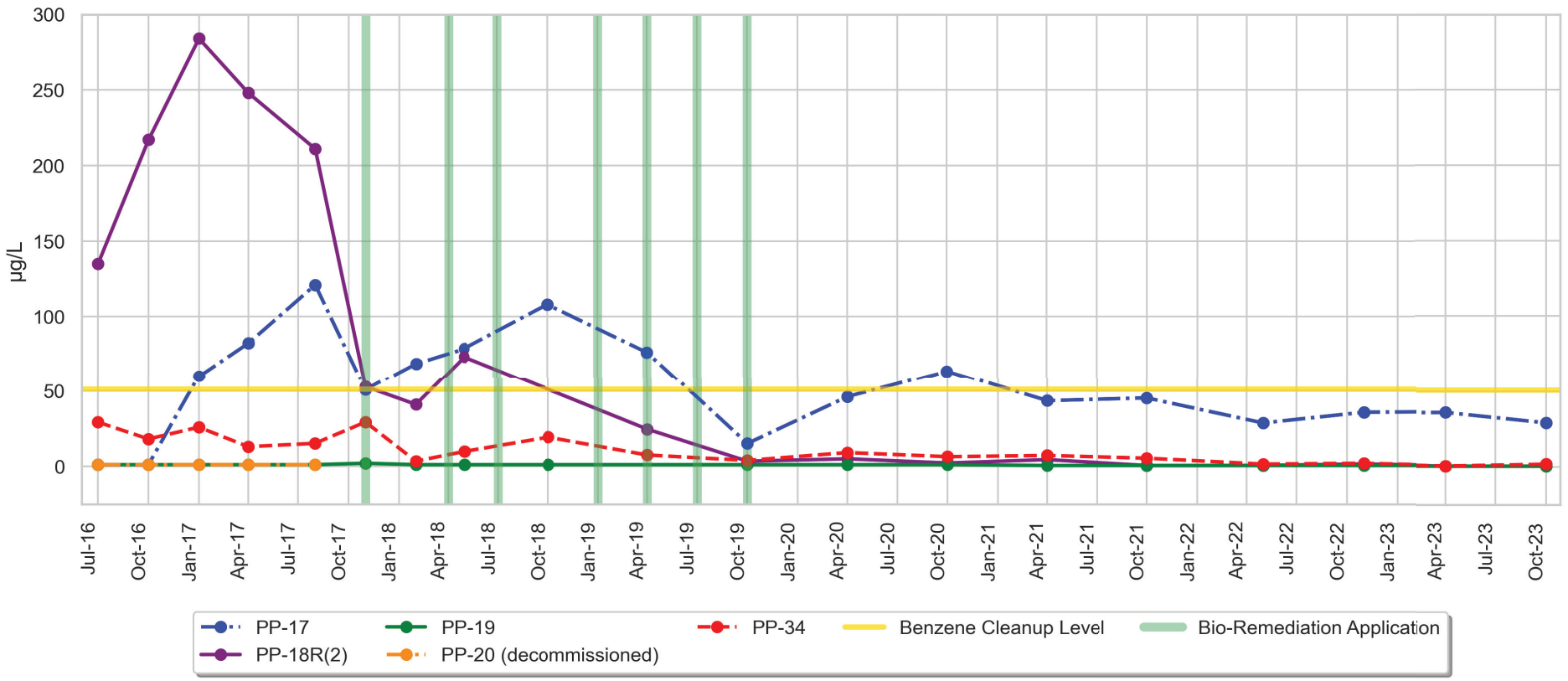
Figure 2.5b
October 2023 Benzene Concentrations in Groundwater

I:\GIS\Projects\PPA_KPLY\MXD\Annual Report\2023\Figure 2.5b October 2023 Benzene Concentrations in Groundwater.mxd
12/7/2023




Abbreviations: CPOC = Conditional point of compliance, µg/L = Micrograms per liter

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Figure 2.6
Post-Remediation CPOC Benzene Concentrations in Groundwater

# 2023 Annual Progress Report for the K Ply Site

K Ply Site

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# Appendix A
# Cumulative Post-Remediation Groundwater Results (2016 to 2023)

# Table A.1
## Groundwater Analytical Results: Contaminants of Concern

| Analyte | Total Petroleum Hydrocarbons (TPH) | | | | Benzene, Toluene, Ethylbenzene, and Xylenes | | | |
|---|---|---|---|---|---|---|---|---|
| | Gasoline-Range Organics | Diesel-Range Organics [1] | Oil-Range Organics [1,2] | Total TPH (DRO + ORO ) | Benzene | Ethylbenzene | Toluene | Xylene (total) |
| Units | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| Criteria | 800 | 500 | 500 | 500 | 51 | -- | -- | -- |
| **Sample Location and Date** | | | | | | | | |
| **Conditional Point of Compliance Monitoring Wells** | | | | | | | | |
| **PP-17 (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/27/2016 | 59.5 | 417 JM | **1,010** | **1,427** | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 10/27/2016 | 102 | 257 (153) | **1,180 (543)** | **1,437** | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 1/26/2017 | 195 | 160 (49.8 U) | **1,520 (633)** | **1,680** | **60.1** | 1.00 U | 1.00 U | 1.00 U |
| 4/26/2017 | 287 | 167 | **931** | **1,098** | **82.3** | 1.10 | 1.09 | 2.01 |
| 8/2/2017 | 147 | 135 [3] | **969** | **1,104** | **121** | 1.32 | 1.31 | 2.33 |
| 11/07/1027 | 404 | 471 [3] | **1,210** | **1,681** | 50.9 | 1.00 U | 1.00 U | 1.23 |
| 2/8/2018 | 228 | 91.1 [3] | **525** | **616** | **68.6** | 1.06 | 1.00 U | 1.39 |
| 05/2/2018 [4] | 352 | 218 [3] | **834** | **1,052** | **78.6** | 1.76 | 1.07 | 2.52 |
| 10/25/2018 | 417 | 354 | **1,130** | **1,484** | **108** | 2.70 | 1.04 | 2.76 |
| 4/8/2019 | 341 | 49.6 U | **996** | **996** | **76.2** | 1.00 U | 1.80 | 2.62 |
| 10/22/2019 | 150 | 49.8 UJ (49.8 UJ) | 234 J (178 J) | 234 J | 15.0 | 1.00 U | 1.00 U | 1.00 U |
| 04/27/2020 [4] | 353 | 158 [3] | **1,290** | **1,448** | 46.1 | 1.53 | 1.00 U | 2.70 |
| 10/21/2020 | 375 | 49.3 U | **1,100** | **1,100** | **63.6** | 1.90 | 1.00 U | 3.34 |
| 4/21/2021 | 272 | 99.5 U | **1,990** | **1,990** | 43.4 | 1.68 | 0.750 U | 2.75 |
| 10/13/2021 | 397 | **873** | 98.1 U | **873** | 45.2 | 1.77 | 0.750 U | 2.98 |
| 5/4/2022 [4] | 291 | **1,010** [3] **(651** [3]**)** | 91.8 U (91.8 U) | **1,010** | 28.6 | 1.41 | 0.750 U | 2.40 |
| 11/10/2022 | 317 | **1,190** [3] (194 J [3,5]) | 94.2 U (94.2 U) | **1,190** | 35.7 | 3.56 | 1.31 | 5.52 |
| 4/19/2023 [4] | 298 | **1470** [3] (274 J [3,5]) | 93.1 U (93.1 U) | **1,470** | 36.1 | 1.84 | 1.00 U | 3.00 |
| 10/26/2023 | 226 | **1200 J** [3,5] (229 J) | 95.1 U (95.1 U) | **1,200 J** | 29.2 | 1.41 | 1.00 U | 2.38 |
| **PP-18R2 [6] (Screened Interval 10–20 ft)** | | | | | | | | |
| 7/28/2016 | **835** | 151 JM | 163 | 314 | **135** | 2.10 | 2.82 | 6.69 |
| 10/27/2016 | 503 | **1,090** (406) | **2,140 (1,200)** | **3,230** | **217** | 1.31 | 1.00 U | 2.05 |
| 1/26/2017 | **921** | 494 (279) | **4,470 (1,760)** | **4,964** | **284** | 11.2 | 4.32 | 19.4 |
| 4/26/2017 | **1,130** | **643** | **2,620** | **3,263** | **248** | 12.9 | 4.46 | 22.6 |
| 8/2/2017 | **1,780** | **572 J** [3] | **2,350** | **2,922 J** | **211** | 15.5 | 3.93 | 19.8 |
| 11/7/2017 | 538 | 425 [3] | **789** | **1,214** | **52.8** | 7.06 | 1.20 | 9.74 |
| 2/8/2018 | 401 | **596** [3] | **1,320** | **1,916** | 40.9 | 14.4 | 1.65 | 15.7 |
| 5/2/2018 | **1,900** | **781** [3] | **1,920** | **2,701** | **73.3** | 17.8 | 1.94 | 20.2 |
| 10/25/2018 | -- | -- | -- | -- | -- | -- | -- | -- |
| 04/8/2019 [4] | **4,320** | 50.4 U | **1,340 (1,120)** | 1340 | 24.5 | 1.00 U | 19.8 | 6.09 |
| 10/22/2019 | **1,950** | 84.6 J [3] (129 J [3]) | 462 J (375 J) | 547 J | 3.28 | 13.4 | 1.00 U | 1.23 U |
| 4/27/2020 | **1,730** | 271 [3] | **1,130** | **1,401** | 4.87 | 9.84 | 1.00 U | 1.61 |
| 10/21/2020 | **829** | 242 [3] | **526** | **768** | 2.09 | 7.14 | 1.00 U | 1.00 U |
| 4/21/2021 | **933** | 394 [3] | **1,500** | **1,894** | 4.34 | 4.20 | 0.750 U | 1.31 |
| 10/13/2021 | 337 | **828** | 98.9 U | **927** | 0.440 U | 0.400 U | 0.750 U | 1.00 U |
| 5/4/2022 | 336 [3] | **591** [3,5] (307 [3,5]) | 93.9 U (93.9 U) | **591** | 0.485 | 1.27 | 0.750 U | 1.00 U |
| 11/10/2022 | 217 | **910** [3] (172J [5]) | 94.7 U (94.7 U) | **910** | 1.47 | 1.02 | 1.00 U | 1.00 U |
| 4/19/2023 | 50.0 U | 482 [3] (93.1 U) | 93.1 U (93.1 U) | 482 | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| 10/26/2023 | 89.9 | **532 J** [3] (95.4 U) | 95.4 U (95.4 U) | **532 J** | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| **PP-19 (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/27/2016 | 50.0 U | 49.9 U | 99.7 U | 99.7 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 10/27/2016 | 50.0 U | 50.0 U | 127 | 127 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 1/26/2017 | 50.0 U | 49.8 U (49.8 U) | 500 (248) | 500 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 4/26/2017 | 50.0 U | 49.8 U | 260 | 260 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 8/2/2017 | 50.0 U | 50.0 U | 100 U | 100 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 11/7/2017 | 50.0 U | 49.7 U | 99.4 U | 99.4 U | 1.96 | 1.00 U | 1.00 U | 1.00 U |
| 2/8/2018 | 50.0 U | 50.0 U | 159 | 159 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 5/2/2018 | 50.0 U | 50.2 U | 203 | 203 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 10/25/2018 | 50.0 U | 50.0 U | 215 | 215 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 10/22/2019 | 50.0 U | 49.9 UJ | 99.9 UJ | 99.9 UJ | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 4/27/2020 | 50.0 U | 49.9 U | 266 | 266 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 10/21/2020 | 50.0 U | 49.5 U | 99.0 U | 99.0 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 10/27/2016 | 50.0 U | 50 U (92.7) | 289 (177) | 289 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 1/26/2017 | 50.0 U | 49.9 U (49.9 U) | **1,310** (454) | **1,310** | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 4/26/2017 | 50.0 U | 49.8 U | 468 | 468 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 8/2/2017 | 50.0 U | 50.0 U | 100 U | 100 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 4/19/2023 | 50.0 U | 167 [5] | 93 U | 167 U | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| 10/26/2023 | 50.0 U | 142 J [3] (95.4 U) | 95.4 U (95.4 U) | 142 J | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| **PP-34 (Screened Interval 8–18 ft)** | | | | | | | | |
| 7/28/2016 | **1,510** | 328 JM | 433 | 761 | 29.1 | 76.3 | 7.19 | 132 |
| 10/27/2016 | 665 | **603** (493) | **1,310 (772)** | **1,913** | 18.0 | 35.1 | 3.77 | 62.6 |
| 1/26/2017 | **1,220** | **503** (348) | **2,290 (688)** | **2,793** | 25.8 | 61.8 | 4.10 | 88.7 |
| 4/26/2017 | **1,420** | 357 | **1,490** | **1,847** | 12.9 | 70.4 | 3.81 | 83.9 |
| 8/2/2017 | **1,480** | 238 [3] | **1,040** | **1,278** | 15.1 | 117 | 5.26 | 122 |
| 11/7/2017 [4] | **1,000** | **695** [3] | **1,200** | **1,895** | 29.2 | 82.6 | 3.92 | 86.1 |
| 2/8/2018 | 309 | 212 [3] | **560** | **772** | 3.31 | 15.2 | 1.00 U | 15.0 |
| 5/2/2018 | **1,130** | 458 [3] | **1,320** | **1,778** | 9.78 | 44.6 | 1.81 | 45.0 |
| 10/25/2018 | **1,140** | 417 [3] | **1,040** | **1,457** | 19.2 | 60.8 | 2.30 | 51.9 |
| 4/8/2019 | 749 | 50.0 U | **1,970** | **1,970** | 7.39 | 1.38 | 29.4 | 23.9 |
| 10/22/2019 | 249 | 90.7 J [3] (105 J [3]) | **1,460 J (1,030 J)** | **1,551** | 3.79 | 9.81 | 1.00 U | 6.53 |
| 4/27/2020 | 552 | 376 [3] | **1,580** | **1,956** | 9.01 | 17.4 | 1.00 U | 10.6 |
| 10/21/2020 | 351 | 114 [3] | **1,640** | **1,754** | 6.28 | 20.9 | 1.00 U | 11.6 |
| 4/21/2021 [4] | 307 | 99.3 U | **1,710** | **1,710** | 7.09 | 13.8 | 0.750 U | 8.54 |
| 10/13/2021 | 403 | **2,510** | 98.2 U | **2,510** | 5.28 | 16.9 | 0.750 U | 10.1 |
| 5/4/2022 | 174 | **1,890** [3] **(969** [3]**)** | 93.7 U (93.7 U) | **1,890** | 1.37 | 5.23 | 0.750 U | 3.30 |
| 11/10/2022 | 140 | **2,420** [3] (260 J [5]) | 94.3 U (94.3 U) | **2,420** | 1.94 | 7.56 | 1.00 U | 4.96 |
| 4/19/2023 | 86.5 | **1,740** [3] (199) | 95.1 U (95.1 U) | **1,740** | 0.522 | 2.04 | 1.00 U | 1.67 |
| 10/26/2023 | 205 | **2,060 J** [3,5] (177) | 94.3 U (94.3 U) | **2,060 J** | 1.75 | 5.90 | 1.00 U | 4.18 |

## Table A.1
## Groundwater Analytical Results: Contaminants of Concern

| Analyte | Total Petroleum Hydrocarbons (TPH) | | | | Benzene, Toluene, Ethylbenzene, and Xylenes | | | |
|---|---|---|---|---|---|---|---|---|
| | Gasoline-Range Organics | Diesel-Range Organics [1] | Oil-Range Organics [1,2] | Total TPH (DRO + ORO ) | Benzene | Ethylbenzene | Toluene | Xylene (total) |
| Units | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| Criteria | 800 | 500 | 500 | 500 | 51 | -- | -- | -- |
| **Sample Location and Date** | | | | | | | | |
| **Other Site Monitoring Wells** | | | | | | | | |
| **PP-13R (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/28/2016 | **4,560** | 124 JM | 377 | **501** | 1.00 U | 5.44 | 24.3 | 43.2 |
| 10/27/2016 | 340 | 157 | **611** | **768** | **106** | 1.00 U | 1.96 | 2.55 |
| 1/25/2017 | 66.5 | 49.8 | **1,030** | **1,080** | 7.43 | 1.00 U | 1.00 U | 1.00 U |
| 4/25/2017 | **1,460** | 80.7 J | **1,060** | **1,141** | **518** | 1.31 | 6.61 | 4.96 |
| 8/2/2017 | **6,700** | 156 [3] | **518** | **674** | **1,730** | 3.94 | 26.6 | 32.9 |
| 11/7/2017 | **7,630** | 289 [3] | **481** | **770** | **2,150** | 4.49 | 28.0 | 32.9 |
| 2/8/2018 | 159 | 106 [3] | **565** | **671** | 39.8 | 1.00 U | 1.00 U | 1.43 |
| 5/2/2018 | **1,110** | 302 [3] | **1,150** | **1,452** | **358** | 1.68 | 6.00 | 7.48 |
| 10/25/2018 [4] | 546 | 94.9 [3] | 398 | 493 | **123** | 1.00 U | 1.54 | 2.17 |
| 4/8/2019 | 433 | 50.0 U | **684** | **684** | **163** | 1.52 | 1.00 U | 2.07 |
| 10/21/2019 | **1,100** | 49.7 UJ | **646 J** | **646** | **606** | 1.00 U | 2.50 | 3.99 |
| 4/27/2020 | 446 | 122 [3] | **975** | **1,097** | **209** | 1.00 U | 1.00 U | 1.00 U |
| 10/21/2020 | 250 | 49.2 U | 201 | 201 | **80.1** | 1.00 U | 1.00 U | 1.00 U |
| 4/21/2021 | 71.4 | 99.3 U | **909** | **909** | 20.8 | 0.400 U | 0.750 U | 1.00 U |
| 10/13/2021 | 93.8 | **501** | 99.4 U | **501** | 26.7 | 0.400 U | 0.750 U | 1.00 U |
| 5/4/2022 | 50.0 U | **845** [3] (414 [3]) | 93.3 U (93.3 U) | **845** | 2.81 | 0.400 U | 0.750 U | 1.00 U |
| 11/11/2022 | 50.0 U | **873** [3] (123 [3]) | 98.1 U (98.1 U) | **873** | 2.81 | 0.400 U | 1.00 U | 1.00 U |
| 4/19/2023 | 50.0 U | **501** [3] (164) | 93.3 U (93.3 U) | **501** | 3.27 | 0.400 U | 1.00 U | 1.00 U |
| 10/26/2023 | 50.0 U | 405 J [3] (161 J) | 94.6 U (94.6 U) | 405 J | 18.6 | 0.400 U | 1.00 U | 1.00 U |
| **PP-14R (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/28/2016 | **4,350** | 105 JM | 99.4 U | 105 JM | **1,550** | 35.7 | 42.6 | 51.2 |
| 10/27/2016 | **5,640** | 90.0 | 193 | 283 | **2,120** | 20.9 | 35.1 | 51.7 |
| 1/25/2017 | **4,140** | 266 | **1,440** | **1,706** | **1,180** | 12.7 | 20.8 | 20.7 |
| 4/25/2017 | **7,290** | 60.3 | **552** | **612** | **1,870** | 15.6 | 27.7 | 27.5 |
| 8/2/2017 | **6,480** | 168 [3] | 480 | **648** | **1,960** | 6.51 | 19.1 | 19.1 |
| 11/7/2017 | **7,430** | 185 [3] | 299 | 484 | **2,100** | 7.67 | 18.7 | 20.6 |
| 2/8/2018 | **1,320** | 249 [3] | **710** | **959** | **415** | 2.78 | 3.60 | 3.20 |
| 5/2/2018 | **6,690** | 156 [3] | 475 | **631** | **1,290** | 3.42 | 4.93 | 4.21 |
| 10/25/2018 | **1,490** | 282 [3] | **674** | **956** | **362** | 1.76 | 3.07 | 3.30 |
| 4/8/2019 | **830** | 49.6 U | 141 | 141 | **356** | 2.67 | 1.58 | 2.00 |
| 10/21/2019 | 209 | 49.3 UJ | 296 J | 296 J | 38.4 | 1.00 U | 1.00 U | 1.00 U |
| 4/27/2020 | 375 | 80.6 [3] | 290 | 371 | **83.8** | 1.00 U | 1.00 U | 1.00 U |
| 10/21/2020 | 420 | 56.5 [3] | 472 | **529** | **105** | 1.00 U | 1.00 U | 1.00 U |
| 4/20/2021 | 78.0 | 99.2 U | 477 | 477 | 25.9 | 0.400 U | 0.750 U | 1.00 U |
| 10/13/2021 [4] | 156 | **1,570 J** | 98.5 U | **1,570** | 24.4 | 0.400 U | 0.750 U | 1.00 U |
| 5/4/2022 | 82.1 [3] | **752 J** [3] (200 [3]) | 95.4 UJ (95.4 U) | **752** | 9.91 | 0.400 U | 0.750 U | 1.00 U |
| 11/10/2022 | 127 | 353.0 [3] | 94.3 U | 353 | 3.18 | 0.400 U | 1.00 U | 1.00 U |
| 4/19/2023 | 290 [7] | **873** [3,5] (94.8 U) | 94.8 U (94.8 U) | **873** | **115** | 0.400 U | 1.00 U | 1.00 U |
| 10/26/2023 | 635 | **1,030 J** [3,5] (154 J) | 94.4 U (94.4 U) | **1,030 J** | **260** | 2.00 U | 5.00 U | 5.00 U |
| **PP-15R2 (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/27/2016 | **9,940** | **574 JM** | **526** | **1,100 JM** | 1.00 U | 215 | 29.7 | 41.8 |
| 10/26/2016 | **1,040** | 217 | 289 | **506** | **542 J** | 106 | 13.7 | 33.1 |
| 01/25/2017 [4] | **15,200** | **1,110** | **3,640** | **4,750** | **622** | 704 | 42.9 | 351 |
| 4/25/2017 | **18,500** | **501** | **2,810** | **3,311** | **490** | 912 | 31.9 | 520 |
| 8/2/2017 | **7,260** | 277 [3] | **1,520** | **1,797** | **1,190** | 171 | 11.2 | 68.6 |
| 11/8/2017 | **4,480** | **649** [3] | **1,470** | **2,119** | **1,200** | 48.5 | 11.6 | 71.3 |
| 2/8/2018 | **11,600** | **990** [3] | **2,010** | **3,000** | **265** | 887 | 52.6 | 234 |
| 5/2/2018 | **10,600** | **843** [3] | **2,190** | **3,033** | **1,440** | 324 | 18.4 | 78.9 |
| 10/25/2018 | **3,560** | 405 [3] | **959** | **1,364** | **828** | 21.2 | 10.0 U | 27.6 |
| 4/8/2019 | **7,540** | **574** (499) | **1,990 (1,380)** | **2,564** | **367** | 10.1 | 117 | 79.8 |
| 10/21/2019 | **6,950** | 411 [3] | **871 J** | **1,282 J** | **1,680** | 44.6 | 8.10 | 40.2 |
| 4/27/2020 | **7,480** | 447 [3] | **2,120** | **2,567** | **404** | 232 | 15.7 | 79.9 |
| 10/21/2020 | **5,070** | 189 [3] | **1,530** | **1,719** | **809** | 62.0 | 5.82 | 42.0 |
| 4/20/2021 | **6,800** | 335 [3] | **3,210** | **3,545** | **456** | 388 | 23.7 | 91.2 |
| 10/13/2021 | **7,660** | **2,240** | 99 U | **2,240** | **1,550** | 70.2 | 7.15 | 33.3 |
| 5/4/2022 | **8,870** | **7,330** [3,5] (**2,930** [3,5]) | 96.0 U (96.0 U) | **7,330** | **359** | 482 | 23.5 | 130 |
| 11/11/2022 | **8,140** | **3,110 J** [3,5] (**1,200 J** [5]) | 95.4 UJ (95.4 U) | **3,110 J** | **502** | 183 | 26.1 | 71.4 |
| 4/19/2023 | **4,590 J** [7] | **2,680 J** [3,5] (**1090** [3]) | 92.1 U (92.1 U) | **2,680 J** | **921** | 60.7 | 13.1 | 31.7 |
| 10/27/2023 | **3,740** | **1,420 J** [3,5] (469 J) | 93.5 U (93.5 U) | **1,420 J** | **1,170** | 8.00 U | 20.0 U | 20.0 U |
| **PP-27 (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/27/2016 | 507 | 90.4 JM | 257 | 347 JM | **64.0** | 28.0 | 5.51 | 27.5 |
| 10/26/2016 | 298 | 72.4 | 421 | 493 | 19.0 | 3.97 | 1.00 U | 4.24 |
| 1/25/2017 | **3,810** | **1,060** | **2,960** | **4,020** | **455** | 75.1 | 16.3 | 80.7 |
| 4/25/2017 | **4,460** | **744** | **1,360** | **2,104** | **464** | 130 | 15.1 | 86.5 |
| 8/2/2017 | **1,230** | 120 [3] | 323 | 443 | **101** | 31.6 | 2.80 | 17.4 |
| 11/8/2017 | 323 J | 249 [3] | 434 | **683** | **73.8** | 17.4 | 2.02 | 10.2 |
| 2/8/2018 | **2,060** | **1,390** [3] | **1,330** | **2,720** | **240** | 99.7 | 11.3 | 66.2 |
| 5/3/2018 | **1,700** | **585** [3] | **1,090** | **1,675** | **136** | 51.7 | 4.50 | 26.0 |
| 10/25/2018 | 428 | 198 [3] | 235 | 433 | 27.6 | 11.2 | 1.00 U | 6.47 |
| 4/8/2019 | **1,710** | **1,050** | 405 | **1,455** | **95.7** | 5.85 | 58.8 | 38.7 |
| 10/21/2019 | **960** | 150 J [3] | 158 J | 308 J | 43.2 | 31.4 | 1.83 | 12.1 |
| 4/27/2020 | **1,940** | **681** [3] | **992** | **1,673** | **85.1** | 67.3 | 6.15 | 34.9 |
| 10/21/2020 | **1,220** | 179 [3] | **525** | **704** | **69.4** | 46.3 | 3.42 | 19.5 |
| 4/20/2021 | **1,740** | **1,360** [3] | **906** | **2,266** | **73.6** | 61.5 | 5.68 | 38.1 |
| 10/13/2021 | **1,100** | **841** | 98.5 U | **841** | 31.3 | 31.8 | 1.60 | 11.2 |
| 5/4/2022 | **1,810** | **1,710** [3,5] (**1,170** [3,5]) | 93.1 U (93.1 U) | **1,710** | **58.1** | 56.1 | 4.15 | 28.0 |
| 11/11/2022 | **1,800** | **1,780 J** [3,5] (**547 J** [5]) | 94.6 U (94.6 U) | **1,780** | **54.0** | 54.9 | 4.91 | 27.3 |
| 4/19/2023 | **1,040** | **1,750 J** [3,5] (**545** [3]) | 93.6 U (93.6 U) | **1,750 J** | **52.6** | 43.4 | 3.92 | 21.5 |
| 10/27/2023 | **1,410** | **1,760 J** [3,5] (**580 J**) | 94.5 U (94.5 U) | **1,760 J** | 47.7 | 49.2 | 5.00 U | 18.6 |

## Table A.1
## Groundwater Analytical Results: Contaminants of Concern

| Analyte | Total Petroleum Hydrocarbons (TPH) | | | | Benzene, Toluene, Ethylbenzene, and Xylenes | | | |
|---|---|---|---|---|---|---|---|---|
| | Gasoline-Range Organics | Diesel-Range Organics [1] | Oil-Range Organics [1,2] | Total TPH (DRO + ORO ) | Benzene | Ethylbenzene | Toluene | Xylene (total) |
| Units | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| Criteria | 800 | 500 | 500 | 500 | 51 | -- | -- | -- |
| Sample Location and Date | | | | | | | | |
| **Other Site Monitoring Wells (cont.)** | | | | | | | | |
| **PP-29 (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/28/2016 | 4,170 | 531 JM | 985 | 1,516 | 1,480 | 40.8 | 14.6 | 83.9 |
| 10/26/2016 | 160 | 268 J | 402 | 670 J | 35.3 | 1.00 U | 1.00 U | 1.00 U |
| 1/25/2017 | 1,550 | 174 | 1,650 | 1,824 | 448 | 13.2 | 4.97 | 24.4 |
| 04/25/2017 [4] | 3,180 | 586 | 1,750 | 2,336 | 878 | 19.7 | 6.40 | 30.6 |
| 8/2/2017 | 752 | 183 [3] | 1,190 | 1,373 | 202 | 4.67 | 1.53 | 6.81 |
| 11/8/2017 | 997 | 646 [3] | 1,560 | 2,206 | 326 | 5.29 | 1.85 | 7.33 |
| 2/8/2018 | 288 | 387 [3] | 664 | 1,051 | 55.7 | 6.12 | 3.93 | 15.8 |
| 5/3/2018 | 324 | 179 [3] | 921 | 1,100 | 38.9 | 3.10 | 1.00 U | 5.78 |
| 10/25/2018 | 170 | 487 [3] | 952 | 1,439 | 10.9 | 1.00 U | 1.00 U | 1.00 U |
| 4/8/2019 | 145 | 49.9 U | 1,660 | 1,660 | 17.9 | 1.00 U | 1.28 | 1.41 |
| 10/21/2019 | 252 | 49.2 UJ | 836 J | 836 J | 26.4 | 1.00 U | 1.00 U | 1.00 U |
| 4/27/2020 | 322 | 112 [3] | 1,420 | 1,532 | 20.3 | 4.14 | 1.00 U | 1.00 U |
| 10/21/2020 [4] | 55.8 | 93.8 [3] | 863 | 957 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 4/20/2021 | 50.0 U | 99.7 U | 1,400 | 1,400 | 4.23 | 0.400 U | 0.750 U | 1.00 U |
| 10/13/2021 | 65.6 | 1,180 J | 98.8 U | 1,180 J | 0.440 U | 0.400 U | 0.750 U | 1.00 U |
| 5/4/2022 | 115 | 1,790 [3] (790 [3]) | 93.4 U (93.4 U) | 1,790 | 7.88 | 0.753 | 0.750 U | 1.00 U |
| 11/11/2022 [4] | 55.7 | 1,130 [3] (112 [3]) | 96.7 U (96.7 U) | 1,130 | 1.48 | 0.529 | 1.00 U | 1.00 U |
| 4/19/2023 | 50.0 U | 427 [3] (93.1 U) | 93.1 U (93.1 U) | 427 | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| 10/27/2023 | 50.0 U | 1,210 J [3] (93.7 U) | 93.7 U (93.7 U) | 1,210 J | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| **PP-30 (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/28/2016 | 2,310 | 1,210 | 1,430 | 2,640 | 450 | 61.2 | 8.89 | 86.9 |
| 10/27/2016 | 2,980 | 164 | 353 | 517 | 539 | 10.1 | 4.42 | 39.5 |
| 1/25/2017 | 1,570 | 1,510 | 4,330 | 5,840 | 139 | 25.9 | 4.55 | 43.6 |
| 4/25/2017 | 1,920 | 1,040 | 3,090 | 4,130 | 132 | 37.9 | 5.92 | 81.3 |
| 8/2/2017 | 1,460 | 453 [3] | 1,890 | 2,343 | 184 | 26.5 | 4.15 | 56.3 |
| 11/7/2017 | 1,280 | 987 [3] | 1,640 | 2,627 | 229 | 32.1 | 4.12 | 56.3 |
| 2/8/2018 | 862 | 910 [3] | 3,560 | 4,470 | 26.7 | 11.0 | 1.40 | 14.2 |
| 5/2/2018 | 2,800 | 865 [3] | 2,530 | 3,395 | 99.5 | 125 | 4.47 | 108 |
| 10/25/2018 | 1,640 | 547 [3] | 1,200 | 1,747 | 294 | 22.1 | 1.52 | 31.3 |
| 4/8/2019 | 1,180 | 49.9 U | 3,060 (1,760) | 3,060 | 26.7 | 2.74 | 44.4 | 42.9 |
| 10/22/2019 | 963 | 167 J [3] (138 J [3]) | 2,690 J (1,610 J) | 2,857 J | 119 | 12.6 | 1.54 | 15.0 |
| 4/27/2020 | 1,220 | 668 [3] | 2,530 | 3,198 | 60.7 | 19.2 | 1.44 | 18.6 |
| 10/21/2020 | 853 | 394 [3] | 2,680 | 3,074 | 118 | 13.6 | 1.74 | 16.5 |
| 4/21/2021 | 522 | 99.5 U | 2,420 | 2,420 | 37.2 | 9.68 | 0.961 | 8.07 U |
| 10/13/2021 | 863 | 1,580 | 99.3 U | 1,580 | 31.5 | 3.96 | 0.750 U | 1.00 U |
| 5/4/2022 | 365 | 704 [3,5] (755 [3,5]) | 94.7 U (94.7 U) | 704 | 17.9 | 3.83 | 0.750 U | 2.80 |
| 11/10/2022 | 353 | 2,030 J [3,5] (261 J [3,5]) | 98.6 U (98.6 U) | 2,030 J | 18.5 | 4.39 | 1.00 U | 7.00 |
| 4/19/2023 | 439 | 1,510 J [3,5] (241 [3]) | 92.9 U (92.9 U) | 1,510 J | 24.0 | 4.23 | 1.03 | 4.67 |
| 10/26/2023 [4] | 651 | 1,630 J [3,5] (192) | 93.2 U (93.2 U) | 1,630 J | 18.0 | 2.63 | 1.00 U | 3.87 |
| **PP-32 (Screened Interval 8–18 ft)** | | | | | | | | |
| 7/28/2016 | 296 | 50.0 U | 142 | 142 | 113 | 1.00 U | 1.00 U | 1.00 U |
| 10/27/2016 | 50.0 U | 50.3 U | 152 | 152 | 2.74 | 1.00 U | 1.00 U | 1.00 U |
| 1/26/2017 | 373 | 50.0 U | 542 | 542 | 160 | 1.00 U | 1.00 U | 1.00 U |
| 4/26/2017 | 289 | 49.8 U | 114 | 114 | 97.0 | 1.00 U | 1.00 U | 1.00 U |
| 8/2/2017 | 114 | 49.8 U | 99.6 U | 99.6 U | 80.4 | 1.00 U | 1.00 U | 1.00 U |
| 11/8/2017 | 50.0 U | 50.0 U | 159 | 159 | 40.3 | 1.00 U | 1.00 U | 1.00 U |
| 2/8/2018 | 50.0 U | 49.7 U | 99.4 U | 99.4 U | 26.1 | 1.00 U | 1.00 U | 1.00 U |
| 5/2/2018 | 221 | 49.9 U | 175 J | 175 J | 88.4 | 1.00 U | 1.00 U | 1.00 U |
| 10/25/2018 | 85.1 | 50.1 U | 100 U | 100 U | 30.1 | 1.00 U | 1.00 U | 1.00 U |
| 4/8/2019 | 50.0 U | 49.9 U | 271 | 271 | 2.37 | 1.00 U | 1.00 U | 1.00 U |
| 10/22/2019 | 95.0 | 49.4 UJ | 146 J | 146 J | 34.1 | 1.00 U | 1.00 U | 1.00 U |
| 4/27/2020 | 50.0 U | 49.6 U | 231 | 231 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 10/21/2020 | 50.0 U | 49.3 U | 332 | 332 | 16.2 | 1.00 U | 1.00 U | 1.00 U |
| 4/20/2021 | 50.0 U | 98.6 U | 414 | 414 | 0.440 U | 0.400 U | 0.750 U | 1.00 U |
| 10/13/2021 | 57.1 | 347 | 98.6 U | 347 | 8.86 | 0.400 U | 0.750 U | 1.00 U |
| 5/4/2022 | 50.0 U | 187 [3] (92.0 U) | 92.0 U (92.0 U) | 187 | 1.20 | 0.400 U | 0.750 U | 1.00 U |
| 11/10/2022 | 50.0 U | 355 [3] | 95.8 U | 355 | 8.16 | 0.400 U | 1.00 U | 1.00 U |
| 4/19/2023 | 50.0 U | 259 [3] (93.5 U) | 93.5 U (93.5 U) | 259 | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| 10/27/2023 | 50.0 U | 428 J [3] (96.5 U) | 96.5 U (96.5 U) | 428 J | 1.64 | 0.400 U | 1.00 U | 1.00 U |
| **PP-33 (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/28/2016 | 1,560 | 55.0 JM | 99.5 U | 55.0 JM | 670 | 3.90 | 6.30 | 4.38 |
| 10/26/2016 [4] | 50.0 U | 94.8 | 140 | 235 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 1/25/2017 | 316 | 109 | 520 | 629 | 49.6 | 1.00 U | 1.00 U | 1.00 U |
| 4/25/2017 | 442 | 170 | 685 | 855 | 80.6 | 1.00 U | 1.00 U | 1.11 |
| 8/2/2017 | 457 | 49.8 U | 99.6 U | 99.6 U | 207 | 1.00 U | 1.24 | 1.03 |
| 11/7/2017 | 50.0 U | 146 [3] | 264 | 410 | 20.1 | 1.00 U | 1.00 U | 1.12 |
| 02/8/2018 [4] | 1,160 | 218 [3] | 614 | 832 | 128 | 2.09 | 1.57 | 1.93 |
| 5/3/2018 | 647 | 205 [3] | 690 | 895 | 164 | 1.00 U | 1.10 | 1.00 U |
| 10/25/2018 | 81.4 | 142 | 302 | 444 | 1.00 U | 1.00 U | 1.10 | 1.00 U |
| 4/8/2019 | 128 | 49.9 U | 416 | 416 | 1.04 | 1.00 U | 1.00 U | 1.00 U |
| 10/21/2019 | 50.0 U | 49.4 UJ | 254 J | 254 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 4/27/2020 | 50.0 U | 68.6 [3,7] | 831 | 900 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 10/21/2020 | 50.0 U | 50.0 U | 366 | 366 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 4/20/2021 | 50.0 U | 98.7 U | 1,460 | 1,460 | 0.440 U | 0.400 U | 0.750 U | 1.00 U |
| 10/13/2021 | 50.0 U | 663 | 99.6 U | 663 | 0.440 U | 0.400 U | 0.750 U | 1.00 U |
| 5/4/2022 | 243 [3] | 1,380 [3] (800 [3]) | 96.9 U (96.9 U) | 1,380 | 31.5 | 1.82 | 1.37 | 1.00 U |
| 11/11/2022 | 50.0 U | 801 [3] (94.0 U) | 94.0 U (94.0 U) | 801 | 5.23 | 0.400 U | 1.00 U | 1.00 U |
| 4/19/2023 | 50.0 U | 590 [3] (93 U) | 93 U (93 U) | 590 | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| 10/26/2023 | 50.0 U | 701 J [3] (93.6 U) | 93.6 U (93.6 U) | 701 J | 0.440 U | 0.400 U | 1.00 U | 1.00 U |

# Table A.1
## Groundwater Analytical Results: Contaminants of Concern

| Analyte | Total Petroleum Hydrocarbons (TPH) | | | | Benzene, Toluene, Ethylbenzene, and Xylenes | | | |
|---|---|---|---|---|---|---|---|---|
| | Gasoline-Range Organics | Diesel-Range Organics [1] | Oil-Range Organics [1,2] | Total TPH (DRO + ORO ) | Benzene | Ethylbenzene | Toluene | Xylene (total) |
| Units | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| Criteria | 800 | 500 | 500 | 500 | 51 | -- | -- | -- |
| **Sample Location and Date** | | | | | | | | |
| **Other Site Monitoring Wells (cont.)** | | | | | | | | |
| **PP-36 (Screened Interval 5–15 ft)** | | | | | | | | |
| 7/27/2016 | 297 | 49.8 U | 99.7 U | 99.7 U | **90.6** | 4.72 | 1.00 U | 3.50 |
| 10/26/2016 | **2,900** | 49.8 U | **622** | **622** | **321** | 246 | 4.28 | 9.83 |
| 1/25/2017 | **6,000** | 255 | **1,240** | **1,495** | **323** | 355 | 4.01 | 15.2 |
| 4/25/2017 | **6,170** | 282 | **693** | **975** | **530** | 301 | 6.95 | 27.7 |
| 08/2/2017 [4] | **1,320** | 63.3 [3] | 374 | 437 | **153** | 39.6 | 1.64 | 6.77 |
| 11/8/2017 | 515 | 229 [3] | 435 | **664** | **153** | 22.2 | 1.04 | 4.38 |
| 2/8/2018 | **5,310** | 408 [3] | 497 | **905** | **272** | 348 | 5.09 | 17.5 |
| 5/3/2018 | **5,350** | 274 [3] | 337 J | **611 J** | **290** | 346 | 5.04 | 19.1 |
| 10/25/2018 | 513 | 58.9 [3] | 149 | 208 | 23.6 | 4.13 | 1.00 U | 1.00 U |
| 4/8/2019 | **4,200** | 49.5 U | 327 | 327 | **160** | 3.02 | 194 | 8.51 |
| 10/22/2019 | **1,610** | 110 J [3] | 624 J | **734 J** | 37.5 | 37.9 | 1.00 U | 34.1 |
| 4/27/2020 | **2,910** | 219 [3] | 424 | **643** | 39.5 | 72.2 | 1.13 | 3.86 |
| 10/21/2020 | **1,970** | 103 [3] | 379 | 482 | 47.7 | 42.1 | 1.42 | 1.85 |
| 4/21/2021 | **1,520** | 152 J [3] | 466 J | **618 J** | 37.6 | 26.5 | 0.762 | 2.78 |
| 10/13/2021 | **898** | 458 | 98.1 U | 458 | 5.09 | 0.928 | 0.750 U | 1.00 U |
| 5/4/2022 | **2,710 J** [3] | **822** [3,5] **(861** [3,5]**)** | 93.9 U (93.9 U) | **822** | 31.0 | 19.4 | 0.750 U | 2.80 |
| 11/10/2022 | **1,810** | **944 J** [3,5] (490 J [5]) | 93.8 U (93.8 U) | **944 J** | 29.6 | 20.9 | 1.00 U | 3.39 |
| 4/19/2023 | **2,180** [3] | **1,210 J** [3,5] **(923** [3]**)** | 93.3 U (93.3 U) | **1,210 J** | 36.9 | 32.4 | 1.11 | 3.76 |
| 10/26/2023 | **833** | 429 J [3,5] (273) | 93.5 U (93.5 U) | 429 J | 3.86 | 1.64 | 1.00 U | 1.00 U |
| **PP-37R [8] (Screened Interval 10–20 ft)** | | | | | | | | |
| 8/4/2017 | **3,640** | 56.9 [3] | 99.7 U | 56.9 | **1,420** | 1.00 U | 3.97 | 1.22 |
| 11/8/2017 | 50.0 U | 131 [3] | 339 | 470 | 20.1 | 1.00 U | 1.00 U | 1.00 U |
| 2/8/2018 | 50.0 U | 50.0 U | 123 | 123 | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| 5/2/2018 | 50.0 U | 49.8 U | 131 | 131 | 15.7 | 1.00 U | 1.00 U | 1.00 U |
| 4/8/2019 | 135 | 50.1 U | 324 | 324 | **72.1** | 1.00 U | 1.00 U | 1.00 U |
| 10/21/2019 [4] | 219 | 49.1 UJ | 49.1 UJ | 49.1 UJ | **135 J** | 80.6 | 1.00 U | 1.00 U |
| 4/27/2020 | 50.0 U | 49.7 U | 401 | 401 | 5.50 | 1.00 U | 1.00 U | 1.00 U |
| 10/21/2020 | 221 | 49.2 U | 251 | 251 | **100** | 1.00 U | 1.00 U | 1.00 U |
| 4/21/2021 | 177 | 98.2 U | **958** | **958** | **89.7** | 0.400 U | 0.750 U | 1.00 U |
| 10/13/2021 | 235 | **548** | 98.1 U | **548** | **100** | 0.400 U | 0.750 U | 1.00 U |
| 5/4/2022 | 50.0 U | 349 [3] (288 [3]) | 94.3 U (94.3 U) | 349 | 0.492 | 0.400 U | 0.750 U | 1.00 U |
| 11/10/2022 | 50.0 U | 473 J [3,5] | 98.8 U | 473 J | 1.16 | 0.400 U | 1.00 U | 1.00 U |
| 4/19/2023 | 167 [7] | 391 [3] (94.6 U) | 94.6 U (94.6 U) | 391 | **110** | 0.400 U | 1.00 U | 1.00 U |
| 10/26/2023 | 94.3 | 463 J [3] (104) | 94.7 U (94.7 U) | 463 J | 39.7 | 0.400 U | 1.00 U | 1.00 U |
| **Monitoring Wells Downgradient of Log Pond Area** | | | | | | | | |
| **PP-21 (Screened Interval 8–18 ft)** | | | | | | | | |
| 10/26/2023 | 50.0 U | 259 J [3] (93.3 U) | 93.3 U (93.3 U) | 259 J | 0.440 U | 0.400 U | 1.00 U | 1.00 U |
| **PP-22 (Screened Interval 8–18 ft)** | | | | | | | | |
| 10/26/2023 | 50.0 U | 336 J [3] (94.1 U) | 94.1 U (94.1 U) | 336 J | 0.440 U | 0.400 U | 1.00 U | 1.00 U |

Notes:

-- Not analyzed or not available.

**RED/BOLD** Detected concentration that exceeds criteria.

1 Results without and (with) silica gel cleanup.

2 Coordination with laboratory on quantification of DRO versus ORO was conducted between the April and October 2021 monitoring events. Laboratory concluded that overlap of DRO and ORO carbon ranges in a single peak is more indicative of a weathered diesel rather than heavy oil. ORO results collected prior to October 2021 interpreted as a weathered-diesel product based on labortory coordination and conceptual site model of residual diesel contamination in soil acting as source to groundwater.

3 Chromatogram indicates unresolved compounds, refer to annual reports for laboratory-specific comments.

4 A field duplicate was collected. The greatest value is reported.

5 Detection is biased due to overlap with gasoline range material; refer to annual reports for laboratory-specific comments.

6 PP-18R was replaced by PP-18R2 in March 2019, approximately 25 feet north.

7 Chromatographic pattern is not consistent with a petroleum standard.

8 PP-37 was screened 5–15 feet bgs, but was replaced by PP-37R in March 2019, which is screened 10–20 ft bgs.

Abbreviations:

bgs Below ground surface

DRO Diesel-range organics

ft Feet

µg/L Micrograms per liter

ORO Oil-range organics

Qualifiers:

J Concentration is estimated but acceptable for most uses.

JM Analyte is detected; concentration is considered to be an estimate due to poor match to chromatographic standard used for quantitation.

U Analyte is not detected at the associated reporting limit.

UJ Analyte is not detected at the associated reporting limit, which is considered to be an estimate.

# Table A.2
## Groundwater Analytical Results: Geochemical Parameters

| | Conventionals | | | | | Metals | | Field Parameters | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Biochemical Oxygen Demand | Chemical Oxygen Demand | Bromide | Methane | Sulfate | Iron, Dissolved | Iron, Total | Dissolved Oxygen | Oxidation-Reduction Potential |
| Units | mg/L | mg/L | mg/L | mg/L | mg/L | µg/L | µg/L | mg/L | mV |
| Sample Location and Date [1] | | | | | | | | | |
| **Conditional Point of Compliance Monitoring Wells** | | | | | | | | | |
| **PP-17 (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/27/2016 | 5.64 | 57.7 | -- | 0.005 U | -- | 617 | 835 | NM | NM |
| 10/27/2016 | 11.2 | -- | -- | 0.193 | -- | 592 | 1,020 | 0 | -75 |
| 1/26/2017 | 6.57 | -- | -- | 0.229 | 570 | 213 | 444 | 0.72 | -94 |
| 4/26/2017 | -- | -- | -- | -- | 110 | -- | -- | 0.78 | -165 |
| 11/7/2017 | -- | -- | -- | -- | 39.7 | -- | -- | 0 | 57 |
| 2/8/2018 | -- | -- | -- | 0.279 | 257 | -- | -- | 0 | -147 |
| 05/2/2018 [2] | -- | -- | 2.18 | -- | 191 | -- | -- | 0 | -143 |
| 10/25/2018 | -- | -- | 3.84 JQ | -- | 161 | -- | -- | 0 | -134 |
| 4/8/2019 | -- | -- | -- | -- | 243 | -- | -- | 3.36 | -108.7 |
| 10/22/2019 | -- | -- | 77 J | -- | 1,410 J | -- | -- | 0.23 | -207 |
| 04/27/2020 [2] | -- | -- | -- | -- | 144 | -- | -- | 0 | -180.9 |
| 10/21/2020 | -- | -- | -- | -- | 114 | -- | -- | 0.75 | -98.7 |
| 4/21/2021 | -- | -- | -- | -- | 89.5 | -- | -- | 0.50 | 0.0 |
| 10/13/2021 | -- | -- | -- | -- | 92.5 | -- | -- | 1.15 | 108 |
| 5/4/2022 [2] | -- | -- | -- | -- | -- | -- | -- | 0.66 | 96.0 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 6.23 | -164.9 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0 | -116.5 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.3 | -35.5 |
| **PP-18R2 [3] (Screened Interval 10–20 ft)** | | | | | | | | | |
| 7/28/2016 | 15.2 | 38.5 | -- | 5.48 J | -- | 100 U | 676 | NM | NM |
| 10/27/2016 | 20.3 | -- | -- | 0.117 | -- | 100 U | 100 U | 0 | -244 |
| 1/26/2017 | 11.6 | -- | -- | 0.259 | 41.0 | 100 U | 101 | 0.66 | -192 |
| 4/26/2017 | -- | -- | -- | -- | 44.2 | -- | -- | 0.96 | -180 |
| 11/7/2017 | -- | -- | -- | -- | 45.9 | -- | -- | 0 | 2 |
| 2/8/2018 | -- | -- | -- | 0.381 | 97.8 | -- | -- | 0 | -184 |
| 5/2/2018 | -- | -- | 0.361 | -- | 62.0 | -- | -- | 0 | -226 |
| 04/8/2019 [2] | -- | -- | -- | -- | 130 | -- | -- | 0.63 | -83 |
| 10/22/2019 | -- | -- | 16.4 J | -- | 266 J | -- | -- | 0.53 | -61 |
| 4/27/2020 | -- | -- | 2.98 | -- | 148 | -- | -- | 0.11 | -93 |
| 10/21/2020 | -- | -- | -- | -- | 300 | -- | -- | 0.76 | -66.6 |
| 4/21/2021 | -- | -- | -- | -- | 163 | -- | -- | 0.63 | 24.7 |
| 10/13/2021 | -- | -- | -- | -- | 286 | -- | -- | 1.07 | 74.7 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 2.27 | 127.5 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 5.79 | -143.2 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 1.64 | -19 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 1.55 | -42.1 |
| **PP-19 (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/27/2016 | 2 U | 80.9 | -- | 0.007 | -- | 100 U | 100 U | NM | NM |
| 10/27/2016 | 2 U | -- | -- | 0.005 U | -- | 500 U | 500 U | 3.01 | 49 |
| 1/26/2017 | 2 U | -- | -- | 0.0051 | 610 | 100 U | 291 | 4.50 | 105 |
| 4/26/2017 | -- | -- | -- | -- | 518 | -- | -- | 4.00 | 154 |
| 10/22/2019 | -- | -- | -- | -- | 740 J | -- | -- | 2.39 | 0.5 |
| 4/27/2020 | -- | -- | -- | -- | 274 | -- | -- | 1.38 | 58.5 |
| 10/21/2020 | -- | -- | -- | -- | 1,010 | -- | -- | 1.64 | 176.5 |
| 4/20/2021 | -- | -- | -- | -- | 210 | -- | -- | 1.26 | 102.1 |
| 10/13/2021 | -- | -- | -- | -- | 1,170 | -- | -- | 3.16 | 154.5 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 8.6* | 107.1 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 2.64 | 22.2 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 3.58 | 63.4 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 2.44 | 172.1 |
| **PP-34 (Screened Interval 8–18 ft)** | | | | | | | | | |
| 7/28/2016 | 10.8 | 53.1 | -- | 1.03 | -- | 100 U | 422 | NM | NM |
| 10/27/2016 | 8.26 | -- | -- | 0.0795 | -- | 100 U | 771 | 0 | -178 |
| 1/26/2017 | 7.16 | -- | -- | 0.838 | 38.6 | 100 U | 134 | 0.78 | -244 |
| 4/26/2017 | -- | -- | -- | -- | 47.8 | -- | -- | 0.76 | -143 |
| 11/07/2017 [2] | -- | -- | -- | -- | 41.8 | -- | -- | 0 | -3 |
| 2/8/2018 | -- | -- | -- | 0.197 | 106 | -- | -- | 0 | -186 |
| 5/2/2018 | -- | -- | 0.410 | -- | 63.0 | -- | -- | 1.24 | 103 |
| 10/25/2018 | -- | -- | 1.490 JQ | -- | 53.5 | -- | -- | 0 | -211 |
| 4/8/2019 | -- | -- | -- | -- | 101 | -- | -- | 0.44 | -94 |
| 10/22/2019 | -- | -- | 24.9 J | -- | 403 J | -- | -- | 0.21 | -232 |
| 4/27/2020 | -- | -- | 3.31 | -- | 60.6 | -- | -- | 0.03 | -104 |
| 10/21/2020 | -- | -- | -- | -- | 51.0 | -- | -- | 0.70 | -264 |
| 4/21/2021 [2] | -- | -- | -- | -- | 40.4 | -- | -- | 0.57 | -6.80 |
| 10/13/2021 | -- | -- | -- | -- | 35.4 | -- | -- | 0.74 | 17.3 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 0.75 | 141.2 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 5.66 | -656.9 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0 | -113.4 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.28 | -178.2 |

## Table A.2
## Groundwater Analytical Results: Geochemical Parameters

| Analyte | Conventionals | | | | | Metals | | Field Parameters | |
|---|---|---|---|---|---|---|---|---|---|
| | Biochemical Oxygen Demand | Chemical Oxygen Demand | Bromide | Methane | Sulfate | Iron, Dissolved | Iron, Total | Dissolved Oxygen | Oxidation-Reduction Potential |
| Units | mg/L | mg/L | mg/L | mg/L | mg/L | µg/L | µg/L | mg/L | mV |
| Sample Location and Date [1] | | | | | | | | | |
| **Other Site Monitoring Wells** | | | | | | | | | |
| **PP-13R (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/28/2016 | 32.9 | 51.7 | -- | 12.1 J | -- | 152 | 1,470 | NM | NM |
| 10/27/2016 | 30.7 | -- | -- | 1.74 | -- | 259 | 427 | 0 | -110 |
| 1/25/2017 | 2 U | -- | -- | 0.0915 | 164 | 100 U | 100 U | 0 | -208 |
| 4/25/2017 | -- | -- | -- | -- | 54.9 | -- | -- | 0.61 | -207 |
| 11/7/2017 | -- | -- | -- | -- | 5.07 | -- | -- | 0 | -68 |
| 2/8/2018 | -- | -- | -- | 0.308 | 148 | -- | -- | 0 | -226 |
| 5/2/2018 | -- | -- | -- | -- | 208 | -- | -- | 0 | -192 |
| 10/25/2018 [2] | -- | -- | 1.88 | -- | 14.7 | -- | -- | 0.17 | -159 |
| 4/8/2019 | -- | -- | -- | -- | 129 | -- | -- | 0.38 | -191 |
| 10/21/2019 | -- | -- | 6.36 J | -- | 74 J | -- | -- | 0.42 | -135 |
| 4/27/2020 | -- | -- | -- | -- | 91.4 | -- | -- | 0.29 | -176.6 |
| 10/21/2020 | -- | -- | -- | -- | 49.9 | -- | -- | 0.80 | 28.8 |
| 4/21/2021 | -- | -- | -- | -- | 108 | -- | -- | 0.52 | 48.9 |
| 10/13/2021 | -- | -- | -- | -- | 64.2 | -- | -- | 1.53 | -213.2 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 7.34* | -85.1 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 2.02 | -150.9 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.18 | -60.2 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.28 | 53.1 |
| **PP-14R (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/28/2016 | 25.5 | 35.9 | -- | 8.28 J | -- | 100 U | 287 | NM | NM |
| 10/27/2016 | 35.5 | -- | -- | 2.23 | -- | 100 U | 206 | 0 | -110 |
| 1/25/2017 | 12.0 | -- | -- | 6.80 J | 221 | 100 U | 100 U | 0.54 | -208 |
| 4/25/2017 | -- | -- | -- | -- | 231 | -- | -- | 0.60 | -151 |
| 11/7/2017 | -- | -- | -- | -- | 11.0 | -- | -- | 0 | -78 |
| 2/8/2018 | -- | -- | -- | 0.911 | 337 | -- | -- | 0 | -157 |
| 5/2/2018 | -- | -- | -- | -- | 155 | -- | -- | 0 | -87 |
| 10/25/2018 | -- | -- | 1.32 | -- | 30.4 | -- | -- | 0.22 | -155 |
| 4/8/2019 | -- | -- | -- | -- | 334 | -- | -- | 0.41 | -140 |
| 10/21/2019 | -- | -- | -- | -- | 1,060 J | -- | -- | 0.18 | -247 |
| 4/27/2020 | -- | -- | -- | -- | 264 | -- | -- | 0.33 | -151.4 |
| 10/21/2020 | -- | -- | -- | -- | 58.4 | -- | -- | 0.21 | -203.1 |
| 4/20/2021 | -- | -- | -- | -- | 201 | -- | -- | 0.61 | 56.4 |
| 10/13/2021 [2] | -- | -- | -- | -- | 178 | -- | -- | 0.77 | 20.6 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 7.02* | -125.6 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 1.93 | -80.6 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.16 | -43.2 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.31 | 4.8 |
| **PP-15R2 (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/27/2016 | 30.9 | 70.9 | -- | 7.4 J | -- | 212 | 1,670 | NM | NM |
| 10/26/2016 | 39.6 | -- | -- | 1.05 | -- | 1,950 | 2,210 | 0.81 | -130 |
| 01/25/2017 [2] | 21.6 | -- | -- | 5.34 | 225 | 535 | 1,100 | 0.60 | -166 |
| 4/25/2017 | -- | -- | -- | -- | 181 | -- | -- | 0.62 | -152 |
| 11/8/2017 | -- | -- | -- | -- | 7.70 | -- | -- | 0 | -56 |
| 2/8/2018 | -- | -- | -- | 1.54 | 68.8 | -- | -- | 0.16 | -199.6 |
| 5/2/2018 | -- | -- | -- | -- | 11.8 | -- | -- | 0 | -165 |
| 10/25/2018 | -- | -- | 1.13 | -- | 0.78 | -- | -- | 0.22 | -127 |
| 4/8/2019 | -- | -- | -- | -- | 14.9 | -- | -- | 0.45 | -146 |
| 10/21/2019 | -- | -- | -- | -- | 4.78 J | -- | -- | 0.18 | -240 |
| 4/27/2020 | -- | -- | 3.34 | -- | 45 | -- | -- | 0.22 | -282.5 |
| 10/21/2020 | -- | -- | -- | -- | 3 U | -- | -- | 0.29 | -110.8 |
| 4/20/2021 | -- | -- | -- | -- | 0.864 | -- | -- | 0.41 | -129.3 |
| 10/13/2021 | -- | -- | -- | -- | 6 U | -- | -- | 0.60 | -21.8 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 0.53 | -6.5 |
| 11/11/2022 | -- | -- | -- | -- | -- | -- | -- | 1.82 | -120.9 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.19 | -45.8 |
| 10/27/2023 | -- | -- | -- | -- | -- | -- | -- | 0.29 | 0.7 |
| **PP-27 (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/27/2016 | 10.4 | 54.4 | -- | 3.51 | -- | 199 | 20,100 | NM | NM |
| 10/26/2016 | 8.23 | -- | -- | 0.111 | -- | 100 U | 4,090 | 0 | -192 |
| 1/25/2017 | 17.7 | -- | -- | 1.11 | 18.8 | 100 U | 1,520 | 0.7 | -139 |
| 4/25/2017 | -- | -- | -- | -- | 31.0 | -- | -- | 0.77 | -210 |
| 11/8/2017 | -- | -- | -- | -- | 16.4 | -- | -- | 0.15 | -193 |
| 2/8/2018 | -- | -- | -- | 1.14 | 52.6 | -- | -- | 0.60 | -177 |
| 5/3/2018 | -- | -- | -- | -- | 124 | -- | -- | 1.25 | 74 |
| 10/25/2018 | -- | -- | 0.838 | -- | 0.714 | -- | -- | 0.23 | -158 |
| 4/8/2019 | -- | -- | -- | -- | 118 | -- | -- | 3.80 | 27.4 |
| 10/21/2019 | -- | -- | -- | -- | 42.5 J | -- | -- | 0.14 | -385 |
| 4/27/2020 | -- | -- | -- | -- | 16.4 | -- | -- | 0 | -143.2 |
| 10/21/2020 | -- | -- | -- | -- | 6.74 | -- | -- | 0.64 | -156 |
| 4/20/2021 | -- | -- | -- | -- | 6.69 | -- | -- | 0.5 | 110.8 |
| 10/13/2021 | -- | -- | -- | -- | 2.21 | -- | -- | 1.44 | -364.4 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 0.6 | 91.9 |
| 11/11/2022 | -- | -- | -- | -- | -- | -- | -- | 6.66 | -193.8 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.23 | -134.4 |
| 10/27/2023 | -- | -- | -- | -- | -- | -- | -- | 0.16 | -141.1 |

# Table A.2
## Groundwater Analytical Results: Geochemical Parameters

| | Conventionals | | | | | Metals | | Field Parameters | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | Biochemical Oxygen Demand | Chemical Oxygen Demand | Bromide | Methane | Sulfate | Iron, Dissolved | Iron, Total | Dissolved Oxygen | Oxidation-Reduction Potential |
| Units | mg/L | mg/L | mg/L | mg/L | mg/L | µg/L | µg/L | mg/L | mV |
| Sample Location and Date [1] | | | | | | | | | |
| **Other Site Monitoring Wells (cont.)** | | | | | | | | | |
| **PP-29 (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/28/2016 | 20.3 | 69.6 | -- | 3.34 | -- | 100 U | 1,750 | NM | NM |
| 10/26/2016 | 37.9 | -- | -- | 1.70 | -- | 100 U | 811 | 0 | -101 |
| 1/25/2017 | 15.6 | -- | -- | 2.45 | 152 | 100 U | 100 U | 1.11 | -104 |
| 04/25/2017 [2] | -- | -- | -- | -- | 123 | -- | -- | 0.60 | -173 |
| 11/8/2017 | -- | -- | -- | -- | 6.90 | -- | -- | 0 | -47 |
| 2/8/2018 | -- | -- | -- | 0.227 | 279 | -- | -- | 2.75 | -16.7 |
| 5/3/2018 | -- | -- | -- | -- | 163 | -- | -- | 0.07 | -49 |
| 10/25/2018 | -- | -- | 0.79 | -- | 2.21 | -- | -- | 0 | -77 |
| 4/8/2019 | -- | -- | -- | -- | 264 | -- | -- | 3.56 | 14.7 |
| 10/21/2019 | -- | -- | -- | -- | 27.4 J | -- | -- | 0.36 | -106 |
| 4/27/2020 | -- | -- | 4.12 | -- | 126 | -- | -- | 1.80 | -106 |
| 10/21/2020 [2] | -- | -- | -- | -- | 26.0 | -- | -- | 0.74 | -67.1 |
| 4/20/2021 | -- | -- | -- | -- | 35.8 | -- | -- | 2.93 | 60.1 |
| 10/13/2021 | -- | -- | -- | -- | 3.8 JQ | -- | -- | 1.39 | -104.5 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 0.84 | 46.1 |
| 11/11/2022 [2] | -- | -- | -- | -- | -- | -- | -- | 7.59* | -42.1 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 2.58 | 58 |
| 10/27/2023 | -- | -- | -- | -- | -- | -- | -- | 0.3 | 55.8 |
| **PP-30 (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/28/2016 | 13.0 | 91.5 | -- | 3.34 | -- | 100 U | 287 | NM | NM |
| 10/27/2016 | 11.3 | -- | -- | 2.14 | -- | 163 | 267 | 0 | -171 |
| 1/25/2017 | 21.0 | -- | -- | 2.1 | 43.2 | 100 U | 339 | 0.55 | -278 |
| 4/25/2017 | -- | -- | -- | -- | 59.8 | -- | -- | 0.60 | -272 |
| 11/7/2017 | -- | -- | -- | -- | 25.1 | -- | -- | 0 | -155 |
| 2/8/2018 | -- | -- | -- | 0.21 | 60.0 | -- | -- | 0 | -277 |
| 5/2/2018 | -- | -- | -- | -- | 108 | -- | -- | 0 | -221 |
| 10/25/2018 | -- | -- | 0.702 | -- | 15.3 | -- | -- | 0 | -221 |
| 4/8/2019 | -- | -- | -- | -- | 130 | -- | -- | 4.16 | -90.4 |
| 10/22/2019 | -- | -- | -- | -- | 199 J | -- | -- | 0.42 | -205 |
| 4/27/2020 | -- | -- | 2.56 | -- | 90.0 | -- | -- | 0.01 | -126.3 |
| 10/21/2020 | -- | -- | -- | -- | 54.8 | -- | -- | 0.29 | -21 |
| 4/21/2021 | -- | -- | -- | -- | 66.2 | -- | -- | 0.5 | -3.60 |
| 10/13/2021 | -- | -- | -- | -- | 15.6 | -- | -- | 0.71 | 20.5 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 7.00* | -209.60 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 1.9 | -153.90 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.17 | -101.8 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.18 | -145.6 |
| **PP-32 (Screened Interval 8–18 ft)** | | | | | | | | | |
| 7/28/2016 | 22.4 | 54.4 | -- | 7.63 J | -- | 503 | 2,290 | NM | NM |
| 10/27/2016 | 33.2 | -- | -- | 2.14 | -- | 466 | 672 | 0 | -107 |
| 1/26/2017 | 34.6 | -- | -- | 10 J | 16.6 | 1,390 | 1,820 | 0.55 | -173 |
| 4/26/2017 | -- | -- | -- | -- | 67.6 | -- | -- | 0.65 | -148 |
| 4/8/2019 | -- | -- | -- | -- | 81.3 | -- | -- | 0.40 | -156 |
| 10/22/2019 | -- | -- | -- | -- | 3.45 J | -- | -- | 0.15 | -248 |
| 4/27/2020 | -- | -- | -- | -- | 161 | -- | -- | 0.45 | -160.6 |
| 10/21/2020 | -- | -- | -- | -- | 4.21 | -- | -- | 0.27 | 25.2 |
| 4/20/2021 | -- | -- | -- | -- | 140 | -- | -- | 0.68 | 77.2 |
| 10/13/2021 | -- | -- | -- | -- | 1.25 | -- | -- | 1.46 | -199.6 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 7.53* | -37.2 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 6.39 | -142.7 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.04 | -137.5 |
| 10/27/2023 | -- | -- | -- | -- | -- | -- | -- | 0.16 | -148.5 |
| **PP-33 (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/28/2016 | 21.0 | 48.4 | -- | 5.67 J | -- | 609 | 2,530 | NM | NM |
| 10/26/2016 [2] | 26.0 | -- | -- | 1.07 | -- | 1,820 | 2,030 | 0.07 | -127 |
| 1/25/2017 | 11.8 | -- | -- | 2.71 | 135 | 588 | 1,710 | 0.55 | -135 |
| 4/25/2017 | -- | -- | -- | -- | 109 | -- | -- | 0.66 | -138 |
| 11/7/2017 | -- | -- | -- | -- | 5.64 | -- | -- | 0 | -86 |
| 02/08/2018 [2] | -- | -- | -- | 0.798 | 192 | -- | -- | 0.24 | -167 |
| 5/3/2018 | -- | -- | -- | -- | 49.1 | -- | -- | 1.05 | 52 |
| 10/25/2018 | -- | -- | 0.936 | -- | 11.6 | -- | -- | 0.19 | -143 |
| 4/8/2019 | -- | -- | -- | -- | 265 | -- | -- | 0.39 | -136 |
| 10/21/2019 | -- | -- | -- | -- | 26.4 J | -- | -- | 0.39 | -130 |
| 4/27/2020 | -- | -- | -- | -- | 138 | -- | -- | 0.69 | -146.7 |
| 10/21/2020 | -- | -- | -- | -- | 16.2 | -- | -- | 0.27 | -104.5 |
| 4/20/2021 | -- | -- | -- | -- | 108 | -- | -- | 0.53 | 77.8 |
| 10/13/2021 | -- | -- | -- | -- | 14.2 | -- | -- | 0.72 | -5.9 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 7.08* | -7.9 |
| 11/11/2022 | -- | -- | -- | -- | -- | -- | -- | 2.1 | -86.5 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.22 | -76.8 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.31 | -0.6 |

# Table A.2
## Groundwater Analytical Results: Geochemical Parameters

| Analyte | Conventionals | | | | | Metals | | Field Parameters | |
|---|---|---|---|---|---|---|---|---|---|
| | Biochemical Oxygen Demand | Chemical Oxygen Demand | Bromide | Methane | Sulfate | Iron, Dissolved | Iron, Total | Dissolved Oxygen | Oxidation-Reduction Potential |
| Units | mg/L | mg/L | mg/L | mg/L | mg/L | µg/L | µg/L | mg/L | mV |
| Sample Location and Date [1] | | | | | | | | | |
| **Other Site Monitoring Wells (cont.)** | | | | | | | | | |
| **PP-36 (Screened Interval 5–15 ft)** | | | | | | | | | |
| 7/27/2016 | 11.0 | 30.6 | -- | 2.80 | -- | 100 U | 10,600 | NM | NM |
| 10/26/2016 | 10.1 | -- | -- | 0.128 | -- | 100 U | 12,100 | 0 | -112 |
| 1/25/2017 | 14.2 | -- | -- | 1.41 | 113 | 507 | 1,560 | 0.60 | -173 |
| 4/25/2017 | -- | -- | -- | -- | 49 | -- | -- | 0.63 | -207 |
| 11/8/2017 | -- | -- | -- | -- | 33.8 | -- | -- | 0 | -94 |
| 2/8/2018 | -- | -- | -- | 0.211 | 148 | -- | -- | 0.16 | -236.5 |
| 5/3/2018 | -- | -- | -- | -- | 131 | -- | -- | 1.49 | 32 |
| 10/25/2018 | -- | -- | 0.403 | -- | 2.5 | -- | -- | 0.22 | -130 |
| 4/8/2019 | -- | -- | -- | -- | 68.5 | -- | -- | 3.82 | -72.6 |
| 10/22/2019 | -- | -- | -- | -- | 40.1 J | -- | -- | 0.2 | -199 |
| 4/27/2020 | -- | -- | 2 U | -- | 30.1 | -- | -- | 0.29 | -186.5 |
| 10/21/2020 | -- | -- | -- | -- | 10.1 | -- | -- | 0.27 | -108.1 |
| 4/21/2021 | -- | -- | -- | -- | 12 | -- | -- | 0.53 | 15.2 |
| 10/2/2021 | -- | -- | -- | -- | 0.6 U | -- | -- | 1.49 | -185.3 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 6.78* | -164.4 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 5.73 | -209.1 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.03 | -126.6 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.22 | -127.2 |
| **PP-37R [4] (Screened Interval 10–20 ft)** | | | | | | | | | |
| 11/8/2017 | -- | -- | -- | -- | 7.02 | -- | -- | 0.13 | -4 |
| 2/8/2018 | -- | -- | -- | 0.0218 | 148 | -- | -- | 1.8 | 9.2 |
| 5/2/2018 | -- | -- | -- | -- | 131 | -- | -- | 1.2 | 66 |
| 4/8/2019 | -- | -- | -- | -- | 12.8 | -- | -- | 3.4 | -12.7 |
| 10/21/2019 [2] | -- | -- | 1.92 J | -- | 42 J | -- | -- | 0.18 | -242 |
| 4/27/2020 | -- | -- | -- | -- | 80.2 | -- | -- | 0.06 | -67.3 |
| 10/21/2020 | -- | -- | -- | -- | 31.7 | -- | -- | 0.71 | -68.1 |
| 4/21/2021 | -- | -- | -- | -- | 50 | -- | -- | 0.62 | 15.2 |
| 10/13/2021 | -- | -- | -- | -- | 4.43 JQ | -- | -- | 1.87 | -196.8 |
| 5/4/2022 | -- | -- | -- | -- | -- | -- | -- | 0.74 | 136.9 |
| 11/10/2022 | -- | -- | -- | -- | -- | -- | -- | 1.8 | -121.9 |
| 4/19/2023 | -- | -- | -- | -- | -- | -- | -- | 0.01 | -130.4 |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.35 | -7.3 |
| **Monitoring Wells Downgradient of Log Pond Area** | | | | | | | | | |
| **PP-21 (Screened Interval 8–18 ft)** | | | | | | | | | |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.18 | -42 |
| **PP-22 (Screened Interval 8–18 ft)** | | | | | | | | | |
| 10/26/2023 | -- | -- | -- | -- | -- | -- | -- | 0.21 | -100.7 |

Notes:

-- Not analyzed or not available.

* Field reading biased because of equipment/sensor error.

1 No geochemical parameters were analyzed during the August 2017 sampling event.

2 A field duplicate was collected. The greatest value is reported.

3 PP-18R was replaced by PP-18R2 in March 2019, approximately 25 feet north.

4 PP-37 was screened 5–15 ft bgs, but was replaced by PP-37R in March 2019, which is screened 10–20 ft bgs.

Abbreviations:

bgs Below ground surface

ft Feet

µg/L Micrograms per liter

mg/L Milligrams per liter

mV Millivolts

NM Not measured

Qualifiers:

J Concentration is estimated but acceptable for most uses.

JQ Concentration is reported between the method detection limit and reporting limit and is considered an estimate.

U Analyte is not detected at the associated reporting limit.