K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Prepared for

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Table of Contents

List of Tables

List of Figures

List of Appendices

List of Abbreviations and Acronyms

Acronym/ Abbreviation	Definition
ºC	Degrees Celsius
AO	Agreed Order
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
COC	Contaminant of concern
cm	Centimeter
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
CSL	Cleanup Screening Level
CUL	Cleanup level
DRO	Diesel-range organics
Ecology	Washington State Department of Ecology
GRO	Gasoline-range organics
HRA	Historical Research Associates, Inc.
LNAPL	Light non-aqueous phase liquid
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
MTA	Marine Trades Area
MTCA	Model Toxics Control Act
NAPL	non-aqueous phase liquid
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCP	Pentachlorophenol
pg/g	Picograms per gram
PID	Photoionization detector
Port	Port of Port Angeles
psi	Pounds per square inch
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
Site	K Ply Site

Acronym/ Abbreviation	Definition
SMS	Sediment Management Standards
SPI	Sediment profile imaging
SQS	Sediment Quality Standard
SVOC	Semivolatile organic compound
TEQ	Toxicity Equivalency Quotient
TVS	Total volatile solids
USCS	United Soil Classification System
USEPA	U.S. Environmental Protection Agency
UV	Ultraviolet
VOC	Volatile organic compound
WPAHG	Western Port Angeles Harbor Group

1.0 Introduction

This document presents the data collected as part of the Remedial Investigation/Feasibility Study (RI/FS) at the K Ply Site (Site), located at 439 Marine Drive, Port Angeles, Washington 98362 (Figure 1.1). Specifically, this document summarizes data from the soil, groundwater, and sediment investigations conducted in accordance with Agreed Order (AO) No. DE 9546 between the Washington State Department of Ecology (Ecology) and the Port of Port Angeles (Port) for cleanup of the Site.

Per the AO, the purpose of this document is to describe the work conducted during the RI, including a summary of the sampling design, sampling methods, and sampling results. Following submittal of this Data Memorandum (referred to as the Data Memo) to Ecology, a RI/FS document will be prepared that will incorporate the data presented herein in a comprehensive fashion including identifying contaminants of concern (COCs) and cleanup levels (CULs), and developing site-wide remedial alternatives.

1.1 BACKGROUND AND OVERVIEW

Beginning in the 1940s, the K Ply mill (formerly PenPly) produced plywood in a mill facility located on the industrial waterfront of Port Angeles. Environmental contamination under the mill was first documented in the late 1980s with partial cleanup actions undertaken by ITT Rayonier, one of the prior mill owners. The mill was permanently closed in 2011 and has recently been demolished by the Port for redevelopment purposes (except for concrete pads). The recent environmental investigation and reporting of data in this Data Memo is the next step in the cleanup of the Site. A more thorough description of site background, prior operations, general history, previous investigations, and physical setting is provided in the RI/FS Work Plan (Floyd|Snider 2013).

Prior to 2012, the Site was part of the adjacent Marine Trades Area (MTA) Site, but the source and extent of the contamination at the Site was determined to be distinct from the contamination from bulk plants that once operated at the MTA Site. Hence the Site was split off from the MTA Site so its cleanup could proceed independently. One of the primary objectives of this environmental investigation was to address data gaps that were previously identified by the MTA RI/FS process. The Site is intended to include historical activities that occurred at this location and as defined by Model Toxics Control Act (MTCA) Chapter 173-340-200 as the location where contamination has come to lie. The Site boundary has not changed from the limits defined in the AO.

Port Angeles Harbor sediments in the area of the Site are also subject to a separate RI/FS process and cleanup led by multiple potentially liable parties that comprise the Western Port Angeles Harbor Group (WPAHG). The WPAHG will be evaluating sediment data for the entire harbor, including sediment data collected in front of the Site during this investigation.

1.2 SITE INVESTIGATION OBJECTIVES

The objectives of the investigation were defined in the RI/FS Work Plan. The main elements were to characterize upland soil and groundwater quality, define the extent of known areas of gasoline and hydraulic oil non-aqueous phase liquid (NAPL), evaluate sediment quality in the nearshore sediments, and to investigate several areas of potential concern identified in the

RI/FS Work Plan. A description of the areas of potential concern and how they were addressed is provided in Section 2.0.

1.3 REPORT ORGANIZATION

This Data Memo is organized as follows:

- **Section 2.0—Work Performed:** Provides a summary of the work performed as part of the environmental investigation and how the areas of potential concern that were identified in the RI/FS Work Plan were addressed.
- **Section 3.0—Soil Investigation Methods and Results:** Presents the uplands soil investigation procedures including a description of sampling design, field methods, and work plan deviations. Field activities described include soil sampling, groundwater monitoring well installation, test pits, and light non-aqueous phase liquid (LNAPL) assessment sampling procedures. Presents laboratory analytical methods and a summary of analytical results.
- **Section 4.0—Groundwater Investigation Methods and Results:** Presents the uplands groundwater investigation procedures including a description of sampling design, field methods, and work plan deviations. Field activities described include groundwater monitoring, well development and sampling, and water level elevation assessment procedures. Presents descriptions of laboratory analytical methods and a summary of groundwater analytical results.
- **Section 5.0—Sediment Investigation Methods and Results:** Presents the surface sediment sample procedures including a description of field methods and work plan deviations. Presents descriptions of laboratory analytical methods and requirements, and a summary of sediment sampling results including both chemistry and bioassay testing.
- **Section 6.0— Site Summary:** Presents a brief summary of results and findings.
- **Section 7.0— Additional Data Collection and Schedule:** Discusses the next steps and schedule for the remaining tasks to be completed as part of the RI/FS process.
- **Section 8.0— References:** Presents the reference information for materials cited in this document

2.0 Work Performed

The work performed was initially identified in the RI/FS Work Plan, which was developed by reviewing available historical information and existing environmental conditions based on previous investigations. This information was then used to identify areas in which further investigation was needed. RI/FS data collection activities were completed to fill these specific soil, groundwater, and sediment data gaps.

2.1 SOIL

Site-wide data needs and focused areas of concern soil data gaps were addressed with the RI/FS investigation. Work performed included the following:

- Advancement of 119 direct-push probes across the site and on Peninsula Fuel Company property, collection of soil samples for analytical testing, logging of soil cores, and field testing for contamination.
- Completion of 10 test pits in specific areas of concern.
- Collection of six surface samples for dioxin/furan testing.
- Visual examination of buried utilities including pressure testing of Pipeline 8.
- Ultraviolet (UV) photoimaging/petrophysical testing of soil cores.

Additional detail on the work performed to fulfill each soil data need is presented in Table 2.1.

2.2 GROUNDWATER

Groundwater data gaps were addressed through the installation and development of 6 new and four replacement monitoring wells, groundwater sampling from 19 wells including upgradient and downgradient wells, and collection of water level measurements during a low tide from 27 wells. The work performed to address the groundwater data gaps identified in the RI/FS Work Plan is described in Table 2.2.

2.3 SEDIMENT

Sediment data gaps were addressed through the collection of three nearshore sediment samples and completion of sediment profiling imaging. The work performed is described in Table 2.3.

2.4 CULTURAL RESOURCES

Historical Research Associates, Inc. (HRA) was retained to complete archaeological monitoring for the investigation as described in the RI/FS Work Plan (Floyd|Snider 2013).

In accordance with the existing settlement agreement between the City of Port Angeles, Port, and the Lower Elwha Klallam Tribe, an HRA archaeologist monitored all ground disturbing activities including direct-push soil borings, test pits, and monitoring well installation.

The results will be summarized in the *Archaeological Monitoring Report for K Ply Remediation Project*, which will be included as an attachment in the RI/FS.

3.0 Soil Investigation Methods and Results

This section summarizes soil investigation activities completed in September and October 2013.

3.1 DIRECT PUSH SOIL BORINGS

Soil borings were advanced using direct-push probe sampling technology by Holocene Drilling of Puyallup, Washington, between September 9, 2013 and October 16, 2013, in accordance with the procedures described in the RI/FS Work Plan. Borings were advanced from the ground surface to depths typically between 12 and 20 feet below ground surface (bgs) and were continuously logged according to the United Soil Classification System (USCS). Soil sample locations are shown on Figures 3.1A through 3.1D.[1] Concrete cores were cut into pre-designated locations on the concrete pad to allow the direct-push probe access to the underlying soil.

All soil samples were field screened for indications of petroleum using a photoionization detector (PID). Visual observations of contamination, such as staining and sheen, and olfactory indications of contamination were also recorded. The presence of sheen was screened by placing a small volume of soil in a stainless steel bowl with water. In the Hydraulic Oil Area, blot tests of all borings and UV light testing of a small subset of borings were used to document potential contamination. Blot tests were performed by placing a dry paper towel on the soil core and recording the color and type of staining that appeared. UV light testing was completed in a dark room by shining a UV light along the length of the soil core to look for contamination.

Following field screening of soil cores, select intervals were targeted for sample analysis. Soil samples were removed from the direct-push probe sampling liner from the sample interval of interest (e.g., 2 to 4 feet bgs) and placed into a decontaminated stainless steel bowl for homogenization. Samples were typically collected in the saturated zone (at the water table where there is tidal influence), the vadose zone (shallow soil), or both. Following homogenization, the soil was placed into laboratory-supplied sample containers, labeled, and immediately placed in a cooler maintained at a temperature of approximately 4 degrees Celsius (ºC) using crushed ice. Samples analyzed for gasoline-range organics (GRO)/benzene, toluene, ethylbenzene, and xylenes (BTEX) were collected directly from the soil core according to U.S. Environmental Protection Agency (USEPA) Method 5035. Samples were transported to Freidman & Bruya, Inc. in Seattle, Washington, under standard chain-of-custody procedures.

3.2 HOLLOW-STEM AUGER SOIL BORINGS

Hollow-stem auger borings were drilled by Holocene Drilling of Puyallup, Washington, between September 18 and September 20, 2013, in accordance with the procedures described in the RI/FS Work Plan. Borings were advanced from the ground surface to a typical depth of 19 feet bgs. Soil was collected for logging purposes using an 18-inch split spoon sampler. The split spoon was driven at 2.5-foot intervals using a 150-pound hammer. The split spoon samplers were decontaminated between sample collection intervals. Soil samples were field screened to identify intervals potentially contaminated with volatile constituents using a PID. PID readings

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[1] For purposes of displaying and explaining the data, the Site is divided into areas (refer to Figure 3.1A). These areas are shown on the figures in a series where the “A” figure refers to site-wide, the “B” figure refers to the Hydraulic Oil Area, and the “C” figure refers to the Gasoline Area., Outside the Site is shown in the “D” figure, which refers to Peninsula Fuel Company. These areas are also used in the text.

and visual observations of contamination, such as staining and sheen, were documented on the boring logs. The number of hammer blows necessary to drive the split spoon (i.e., the standard penetration test) was also recorded.

Per the RI/FS Work Plan, soil samples were not collected for laboratory analysis unless the field screening indicated that potential contamination was present. In only one instance did this occur and one sample was collected from the PP-23 boring where an elevated PID reading was observed. Soil volume from this interval was first collected directly from the split spoon for GRO/BTEX using USEPA Method 5035A. Soil from the desired depth interval was then scooped directly from the split spoon using a decontaminated stainless steel spoon and homogenized in a stainless steel bowl. Following homogenization, the sample material was placed into laboratory-supplied sample vials and jars, labeled, and immediately placed in a cooler maintained at a temperature of approximately 4 ºC using crushed ice. The sample was transported to Freidman & Bruya, Inc. in Seattle, Washington, under standard chain-of-custody procedures.

3.3 TEST PITS

Test pits were dug with an excavator using a 2-foot-wide bucket. A toothed bucket was used for the majority of the test pits; however, a flat bottom bucket was used for KT-2 and KT-20, which were excavated to reveal subsurface piping, to ensure that the piping was not ruptured during excavation.

Test pits were excavated in approximately 6-inch-deep increments and the soil was logged continuously by a field technician according to the USCS. Test pit soils were screened for volatile organic compounds (VOCs) by inserting a PID monitoring probe into the sidewall of the test pit. Signs of contamination such as odors, sheens, or staining were noted on field forms. Test pits were approximately 3 to 4 feet wide by 6 feet long and ranged in depth between 3 and 11 feet. KT-1, which exposed Pipeline 8, was a trench approximately 3 feet deep and 384 feet long.

Test pit soil samples were collected by scraping material from the desired depth of the sidewall of the excavation into a decontaminated stainless steel bowl, using a stainless steel spoon or trowel. Soil for VOC analysis was collected directly from the excavation sidewalls using USEPA Method 5035 procedures. The sample material was placed into laboratory-supplied sample vials and/or jars, labeled, and immediately placed in a cooler maintained at a temperature of approximately 4 ºC using crushed ice. Samples were transported to Freidman & Bruya, Inc. in Seattle, Washington, under standard chain-of-custody procedures.

3.4 SURFACE SOIL

The sampling locations for surface soil samples SS-1 through SS-3 were selected based on lack of pavement and lack of recent ground disturbance, and SS-4 through SS-6 were selected based on the footprint where the former mill stack was demolished. This was done in the field in coordination with Ecology. The sample locations were photographed, and samples were collected beneath any duff layer vegetation to a depth of approximately 3 inches using a decontaminated stainless steel spoon. Soils were homogenized in a decontaminated stainless steel bowl and placed into laboratory-provided jars. Sample jars were labeled and immediately placed in a cooler maintained at a temperature of approximately 4 ºC using crushed ice.

Samples were transported to Freidman & Bruya, Inc. in Seattle, Washington, under standard chain-of-custody procedures.

3.5 ANALYTICAL METHODS AND DATA VALIDATION

3.5.1 Analytical Methods

The soil samples collected as described above were analyzed for some or all of the following constituents using the analytical methods summarized below and in accordance with the RI/FS Work Plan (Floyd|Snider 2013):

- Metals (silver, arsenic, chromium, copper, lead, nickel, and zinc) by USEPA Method 6020
- Mercury by USEPA Method 7471
- Diesel-range organics (DRO) and oil-range organics by NWTPH-Dx with silica acid gel cleanup
- Gasoline-range organics (GRO) by NWTPH-Gx
- VOCs by USEPA Methods 8260 and 8021
- Semivolatile organic compounds (SVOCs) by USEPA Method 8270
- Polychlorinated biphenyls (PCBs) by USEPA Method 8082
- Dioxins/Furans (surface soil samples only) by USEPA Method 1613

3.5.2 Data Validation

A Compliance Screening, Tier I data quality review was performed on the soil analytical data. The analytical results are determined to be of acceptable quality for use with minor qualifications as detailed in the data validation reports attached in Appendix A.

3.6 PETROPHYSICAL AND UV ASSESSMENT

In addition to sampling for analytical chemistry, a subset of soil borings with observed or suspected NAPL were selected for petrophysical analysis and UV photography. These samples were collected by driving a parallel core adjacent to an existing direct-push boring to target a specific undisturbed interval for sampling using a 4-foot-long stainless steel liner. The liner was cut to isolate the desired depth interval for analysis, then capped and immediately frozen with dry ice to prevent loss of fluid. Samples were transported to PTS Laboratories in Santa Fe Springs, California, under standard chain-of-custody procedures. Petrophysical assessment results are presented in Section 3.8.4.

3.7 REMEDIAL INVESTIGATION/FEASIBILTY STUDY WORK PLAN DEVIATIONS

Soil borings were generally completed according to the RI/FS Work Plan, with minor adjustments to boring locations where obstructions, such as concrete rubble, were encountered. Boring K-93 in the eastern area of the Site was not installed because it was situated in the center of the log debarker and was not accessible by the drill rig.

All test pit locations were excavated according to the RI/FS Work Plan. Soil samples were not collected from the KT-13 and KT-14 test pits because the subsurface material in these locations was composed of wood fragments and no soil was present.

Surface soil samples were collected according to the RI/FS Work Plan, however the locations for SS-1, SS-2, and SS-3 were moved to areas that did not show evidence of recent surface disturbance. These locations were selected in the field in coordination with Ecology. The resin delineation on surface soils was also not completed because the resin area was covered with plastic sheeting to control surface water infiltration.

3.8 RESULTS

3.8.1 Field Screening Observations

Soil encountered in the soil borings and test pit excavations was generally composed of hydraulic fill deposits consisting of moist to wet well-graded sand with silt and gravel. Typically, groundwater was encountered between 9 and 12 feet bgs. A slight to moderate plastic silt deposit was observed underlying saturated sands in most borings. Field indications of petroleum were observed in many borings. Additional borings were advanced until the field-observed extent of each contaminant area was reasonably well-defined in both the saturated and vadose zone soil. Field observations of contamination, including gasoline odors, peak PID readings, sheen testing results, and blot testing results for individual borings, are included in Table 3.1. Field observations for indications of petroleum contamination in soil borings are shown on Figure 3.2. The following bullets describe the major findings from the field observations:

- In the former mill building area, most borings had indications of petroleum at or near the saturated zone. Elevated PID readings and gasoline odors were encountered at the Site and at Peninsula Fuel Company, beginning at the Peninsula Fuel Company southern property line to the K Ply bulkhead in the north.
- The most elevated PID readings were encountered under the former mill foundation adjacent to Pipeline 8 in both the vadose and saturated zone soil. Rainbow sheens were also were encountered in soil from this area, as well as on the Peninsula Fuel Company property.
- The hydraulic oil extent from blot testing appeared to be limited to the known area of contamination, as defined by existing wells and soil borings (i.e., no new downgradient hydraulic oil contamination was encountered). UV screening of step-out soil borings indicated that the hydraulic oil product layer dissipates into spotty lenses rather than thinning uniformly at the edges of the Hydraulic Oil Area. GRO and hydraulic oil appear to be comingled in the vadose zone in the northern portion of the Hydraulic Oil Area.
- No field indications of contamination were observed in the Debarker Area.

3.8.2 Pipeline 8 Trench and Pressure Test Results

As described above, the section of Pipeline 8 not covered by the alley or concrete pad was exposed for inspection and pressure testing (KT-1 and KT-2). Practically, this included two trenches and a test pit: 1) trench section between the concrete pad and the caustic tank area,

2) a second trench section between the caustic tank area the end near the bulkhead,[2] and 3) test pit KT-1 located at Peninsula Fuel Company to expose the ends of the two 4-inch pipelines (east and west pipelines). No signs of contamination (visual, olfactory, or PID) were observed along the length of the exposed pipeline and the exposed sections of Pipeline 8 appeared to be in good condition. The ends of each 4-inch pipeline that were historically cut were found to be plugged with a concrete/grout mix.

A pressure test was performed on the four sections of Pipeline 8. This was done by 1) locating the ends of the pipe, 2) drilling a small hole in the pipe and connecting a pressure meter and pump to the pipe, 3) pressurizing the pipe with compressed air to approximately 10 pounds per square inch (psi), and 4) monitoring to test for loss of pressure, which indicates a leak. When the test was started, the ends of the pipe and each exposed weld in the pipe were sprayed with a soapy water solution to check for leaks. The ends of the pipe that were filled with concrete/grout were initially found to leak and were sealed before finishing the pressure test.

After the desired pressure was reached in each line, it was noted that the pressure rapidly declined in three of the four pipe sections, including both segments under the concrete pad, indicating that there is a leak in the east and west pipelines of Pipeline 8 somewhere underneath the concrete pad or alley (labeled “pressure test failure area” on Figure 3.2). Further investigation to identify the exact location of area of pressure test failure could only be conducted following demolition of the concrete pad and trenching in the alley. The pressure test also indicated the west pipeline leaked at a single threaded joint coupling near the Hydraulic Oil Area (labeled “joint leak” on Figure 3.2). A soil sample was collected under this joint for chemical analysis, but contamination was not detected (refer to location Pipeline 8-West on Figure 3.1B). The east pipe of the northern section of Pipeline 8 held pressure during the pressure test and appeared to be intact.

During the drilling of the small hole to conduct the test, water was found in both pipelines. Water was removed as necessary to allow the pressure test to be conducted. A water sample was removed from each pipeline. The water appeared to be highly contaminated. A sample of the east pipeline water was submitted for analytical testing and the benzene concentration was 390 micrograms per liter (µg/L), and the GRO concentration was 22,000 µg/L.

3.8.3 Upland Soil Analytical Results

3.8.3.1 Petroleum Compounds

GRO, DRO, oil-range organics, and BTEX analytical results are presented in Table 3.2 and on Figures 3.3A through 3.6D. Analytical results were screened against MTCA Method A Unrestricted Land Use soil CULs.

GRO, DRO, and oil-range organics (i.e., hydraulic oil) were analyzed for in the majority of soil samples collected site-wide. GRO concentrations ranged from non-detect to 14,000 milligrams per kilogram (mg/kg). The elevated GRO concentrations were generally detected in the saturated zone soil (i.e., from approximately 9 to 12 feet bgs) under the concrete pad and downgradient from the concrete pad, extending as far north as the Hydraulic Oil Area.

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[2] The sections of Pipeline 8 in the caustic tank area and near the bulkhead had previously been removed; therefore, trenching was not required.

Elevated GRO concentrations were also detected in vadose zone soil under the concrete pad in the vicinity of Pipeline 8. The peak vadose zone GRO concentration of 7,300 mg/kg was detected from the K-47 boring located within several feet of Pipeline 8. On the Peninsula Fuel Company property, elevated GRO concentrations were detected in the saturated zone samples from the PF-7 and PF-8 borings, with concentrations of 1,600 and 2,000 mg/kg, respectively.

DRO was detected at elevated concentrations in the saturated zone under the concrete pad near Pipeline 8, with a maximum concentration of 24,000 mg/kg in the sample collected in K-48 from 7 to 8 ft bgs. DRO concentrations were generally not detected in soil samples to the north of the concrete pad, after accounting for chromatographic overlap from samples containing significant amounts of weathered gasoline and/or hydraulic oil, as denoted by the laboratory. A DRO concentration of 12,000 mg/kg was also detected on the Peninsula Fuel Company property in the PF-8 boring at a depth of 7 to 8 ft bgs.

Elevated BTEX concentrations were detected in saturated zone soil samples extending from under the concrete pad north to the bulkhead. Benzene detections appear to be generally associated with samples also containing GRO.

Oil-range organics concentrations ranged from non-detect to 32,000 mg/kg across the Site. The highest concentrations were detected in the saturated zone soil in the northern portion of the Site. In the Hydraulic Oil Area the highest oil-range organics concentrations were in Borings K-63, K-64, K-67, and K-73 at 32,000 mg/kg, 23,000 mg/g, 24,000 mg/kg, and 25,000 mg/kg, respectively.

3.8.3.2 Dioxins/Furans

Dioxin/furan analytical results from surface soil samples are presented in Table 3.3. Dioxin was detected in the samples representative of undisturbed surface soil (SS-1 through SS-3) at toxic equivalency quotients (TEQs) concentrations ranging from 0.707 picograms per gram (pg/g) to 8.15 pg/g. Dioxin was also detected in the surface soil samples collected in the footprint where the former mill stack fell (SS-4 through SS-6), at TEQ concentrations ranging from 19.4 pg/g to 222 pg/g.

3.8.3.3 Other Analytes

Sampling results for other analytes in soil are presented in Table 3.4.

The compounds specified in MTCA Table 830-1 for petroleum releases were analyzed in a subset of samples with field evidence of petroleum contamination. Samples were collected in each area with a suspected petroleum release. To meet the MTCA requirement, the following samples were collected:

- A soil sample was collected for SVOCs and PCBs in the area of the former panel oiler.
- K-98 and K-99 in the vicinity of the former dry well were sampled for MTCA metals, SVOCs, and VOCs.
- A subset of samples in the Gasoline Area and Hydraulic Oil Area were sampled for carcinogenic polycyclic aromatic hydrocarbon (cPAHs), lead, and/or VOCs.

Detected analytes are screened against the MTCA Method A Unrestricted Land Use CULs in Table 3.4.

Lead and other metals, including arsenic, barium, and chromium, were detected in most samples analyzed. The concentrations detected were typical of regional background soil concentrations.

Pentachlorophenol (PCP) was detected at a concentration of 230 mg/kg in one shallow soil sample collected from the Panel Oiler Area. PCBs were not detected in any soil samples. Select soil samples were collected for cPAHs in the Gasoline, Diesel, and Hydraulic Oil Areas and the TEQ concentration ranged from non-detect to 0.25 mg/kg with one exception. A soil sample collected from K-89 near the bulkhead had a cPAH TEQ concentration of 17 mg/kg. However, the laboratory noted that based on the total petroleum hydrocarbon diesel-range (TPH-Dx) chromatographs, the sample material was likely creosote and this boring was likely advanced immediately adjacent to a creosoted piling. Adjacent samples were not contaminated with cPAHs. K-89 also had a naphthalene concentration that exceeded the screening levels. As shown in Table 3.4, there were other miscellaneous VOC detections.

3.8.4 Petrophysical Testing and UV Photography

Petrophysical testing involved the determination of grain size, porosity, and soil pore space content (e.g., air, LNAPL, water; refer to Table 3.5). Grain size analysis generally showed that the field logging of soils as primarily sand and silt were generally accurate. The vadose zone samples selected from within the Gasoline Area (PZ-06A and K-27) were both primarily silts, with total moisture content of 45 and 35 percent, respectively. The remaining samples were fine to medium sands with moisture content ranging from approximately 14 to 20 percent.

Pore fluid saturation of hydraulic oil NAPL near EW-02A was greater than 50 percent of pore volume, suggesting significant free product is present in soil in this area. This was consistent with field blot testing, which showed approximately 1.5 feet of NAPL in the saturated zone at this location. Oil-range organics had been detected at concentrations up to 50,000 mg/kg in this area during previous investigations.

In contrast, NAPL saturation in both the vadose zone and saturated zone samples at PZ-06A were 9.8 and 8.7 percent, respectively. Previous investigations detected GRO at up to 4,000 mg/kg in the saturated zone in this area and up to 1.15 feet of LNAPL in PZ-6. The vadose zone sample collected at K-27 had a NAPL pore fluid saturation of 9.1 percent, roughly corresponding to a GRO concentration of 4,500 mg/kg. NAPL pore fluid saturation was a relatively low 5 percent in the saturated zone sample collected at K-15 on the presumed fringe of the Gasoline Area. Pore fluid saturation in the Peninsula Fuel Company PF-7 sample was 3 percent.

Generally, pore fluid saturation of gasoline-range NAPL was greatest in samples composed of fine-grained materials including silts and very fine sands. This is consistent with field observations of gasoline odors and elevated PID readings in tight sands and in or above silt lenses.

4.0 Groundwater Investigation Methods and Results

This section summarizes the results of the groundwater investigation completed in September and October 2013.

4.1 MONITORING WELL INSTALLATION AND DEVELOPMENT

Ten monitoring wells (PP-4R, PP-6R, PP-15R, PP-20, PP-21, PP-22, PP-23, PP-24, PP-25, and PP-26) were installed on the Site on October 18 to 20, 2013.

Three of these wells were replacement wells as PP-15, PP-4, and PP-6 were destroyed during mill demolition. Well PP-15 was located in the high-concentration area of the GRO and benzene plume and was replaced with PP-15R. Wells PP-6 and PP-4 were located east of the edge of the contamination beneath the mill and serve an important role in monitoring the eastern extent of contamination. PP-6 was replaced with PP-6R, and PP-4 replaced with PP-4R. A forth unplanned well, PP-26, was initially intended to be a replacement for PP-4 but was inadvertently installed at the location of PZ-8. PP-26 will now function as a water quality well in lieu of PZ-8.

Monitoring well locations are shown in Figures 3.1A. Monitoring well logs are included in Appendix B. The section below describes field methods used for installation of monitoring wells.

4.1.1 Field Methods

Monitoring well installation was completed by Holocene Drilling. The boreholes for the wells were drilled using standard hollow-stem auger technique. Auger boreholes were advanced using a 4-inch ID auger. Split-spoon soil samples were collected every 2 feet during completion of soil boring activities. Soil samples were only collected based on field observations and indications of the presence of petroleum contamination, as described in Section 3.2.

The monitoring wells were constructed with 10-foot-long screens set from 8 to 18 feet bgs. Well screen assemblies consist of a 10-foot length of 2–inch-diameter 0.020-inch (20-slot), Schedule 40 polyvinyl chloride (PVC) pipe set in a 10/20 Colorado silica sand filter pack. The sand filter pack was installed by pouring sand into the space between the well casing and auger as the auger was withdrawn. A weighted tape was used to monitor filter pack placement and depth during installation. The sand filter pack extends 2 feet above the top of the screened interval. A 3-foot-thick seal of hydrated bentonite chips was installed in the annular space immediately above the sand filter pack. The remainder of the annular space was sealed with bentonite grout to within 1 foot of the ground surface.

Monitoring Wells PP-23, PP-24, and PP-25 were secured with flush-to-ground locking steel protective monuments with expansion seals on the well casing to minimize the potential for surface water entering the monument. Monitoring Wells PP-4R, PP-6R, PP-15R, PP-20, PP-21, and PP-26 were installed with an aboveground protective steel monuments and bollards. PP-22 was installed with an aboveground protective steel monument and Ecology blocks. Well completion details are summarized in Table 4.1.

Well development was completed by continuous pumping at a steady rate using a battery-operated Whale pump. Well development equipment was decontaminated by pumping clean water through the pump and washing to the satisfaction of the field technical staff. Well development was terminated when turbidity readings stabilized or were below 50 Nephelometric

Turbidity Units (NTU). Installed wells were labeled with a permanent marker on the well casing and on the well covers. A professional survey including measuring point elevation and ground surface elevation was completed for all monitoring wells installed.

4.2 MONITORING WELL SAMPLING

On October 14 and 15, 2013, groundwater samples were collected from 19 existing and newly installed monitoring wells. The following section describes the field methods used for sampling.

4.2.1 Field Methods

All wells were purged and sampled using low-flow procedures to achieve the lowest turbidity practicable with a peristaltic pump and disposable polyethylene tubing. Prior to and during sampling, depth to water was measured to the nearest 0.01 foot using a water level indicator. The monitoring well was purged prior to sampling at a maximum rate of 0.5 liters per minute. During purging, field parameters (i.e., temperature, pH, conductivity, salinity, and turbidity) were recorded at 5-minute intervals using a multi-parameter water quality meter. Once the field measurements for water quality parameters were stable (within 10 percent) for three consecutive readings, the groundwater sample was collected. The last set of field parameters measured during purging will represent field parameters in the groundwater sample. All field measurements were recorded on a groundwater sample collection form, included in Appendix C.

After purging the well and labeling the sample bottles, the groundwater sample was collected by directly filling the laboratory-provided bottles from the pump discharge line at the same flow rate that was used for purging. The sample bottles were labeled and immediately placed in a cooler maintained at a temperature of approximately 4ºC using crushed ice. Samples were transported on ice to Freidman & Bruya, Inc. in Seattle, Washington, under standard chain-of-custody procedures.

4.3 DIRECT PUSH GROUNDWATER SCREENING SAMPLING

Groundwater screening samples were collected from Boring K-90 in a location with historical petroleum storage, from K-98 and K-99 in the vicinity of the former dry well, and from K-200 through K-203 along the 4-inch sewer line running to the southeast of the former mill. Screening samples were also collected from Borings PF-1 through PF-9 on the Peninsula Fuel Company property.

4.3.1 Field Methods

Groundwater grab samples were collected by inserting temporary 1-inch-diameter PVC casing with 5- or 10-foot slotted PVC screens into the direct-push boring rods once soil sampling was completed. The rods were then removed to allow groundwater to flow into the screen. Screen lengths and depths were determined in the field and set to span across the water table. A static depth to water measurement was also collected after installation and the screen depth was readjusted to span the water table when necessary.

Groundwater was purged from the temporary PVC casing using a peristaltic pump with disposable high-density polyethylene (HDPE) and silicone tubing. Groundwater screening samples were collected by filling laboratory-provided bottles directly from the pump discharge line once the purge water was visually clear. The sample bottles were labeled and immediately placed in a cooler maintained at a temperature of approximately 4ºC using crushed ice. Samples were transported on ice to Freidman & Bruya, Inc. in Seattle, Washington, under standard chain-of-custody procedures.

4.4 ANALYTICAL METHODS

4.4.1 Analytical Methods

The groundwater samples were analyzed for some or all of the following constituents by the methods indicated below and in accordance with Tables 7.2 and B.1 of the RI/FS Work Plan (Floyd|Snider 2013):

- DRO by NWTPH-Dx with silica acid gel cleanup
- GRO by NWTPH-Gx
- MTCA metals (arsenic, cadmium, chromium, lead, and mercury) by USEPA Methods 200.8, 245.1/245.5, and 7470A
- BTEX by USEPA Method 8021
- VOCs by USEPA Method 8260
- SVOCs by USEPA Method 8270
- Formaldehyde by USEPA Method 8315A

4.5 WATER LEVEL ELEVATIONS

Water level elevation measurements from representative wells and piezometers were completed on October 14, 2013 during low tide. All measurements were completed within an approximately 1-hour-long period. Water and/or LNAPL levels and elevations are summarized in Table 4.2.

4.6 RI/FS WORK PLAN DEVIATIONS

No deviations from the RI/FS Work Plan occurred during the investigation; however, a fourth unplanned well was installed. As described in Section 4.1, PP-26 was intended to be a replacement for PP-4, but was inadvertently installed adjacent to PZ-8. It is located adjacent to PZ-8 and will serve as a water quality well in lieu of PZ-8.

4.7 MONITORING WELL GROUNDWATER ANALYTICAL RESULTS

This section presents the analytical results of the groundwater sampling event completed on October 14 and 15, 2013. Analytical results are summarized in Tables 4.3 and 4.4 and on Figures 4.1A through 4.3B. Analytical results were screened against MTCA Method A groundwater CULs.

GRO was detected and exceeded the screening level at eight monitoring well locations (PP-13, PP-15R, PP-18, PP-23, PP-26, PZ-04, PZ-07, and PZ-12). The highest exceedance of 12,000 µg/L occurred at PP-15R.

Benzene was detected and exceeded the screening level at nine monitoring well locations (PP-13, PP-15R, PP-17, PP-18, PP-26, PZ-01, PZ-07, PZ-04, and PZ-12). The highest exceedance of 3,700 µg/L occurred at PP-15R.

Ethylbenzene was detected at seven monitoring well locations (PP-07, PP-13, PP-15R, PP-18, PP-23, PP-26, and PZ-07) but did not exceed the screening level (Table 4.3). Toluene was detected at nine monitoring well locations (PP-07, PP-13, PP-17, PP-18, PP-23, PP-26, PZ-01, PZ-07, and PZ-12) but did not exceed the screening level (Table 4.3). Toluene was not detected at levels greater than the reporting limit at any other monitoring well locations.

Total xylene was detected at six monitoring well locations (PP-07, PP-15R, PP-17, PP-18, PP-23, and PZ-01) but was less than the MTCA Method A Unrestricted Land Use screening level and was not detected at levels greater than the reporting limit at any other monitoring well locations (Table 4.3).

DRO was detected and exceeded the Site screening criterion at three monitoring wells (PP-18, PP-23, and PZ-04). The highest exceedance of 1,300 µg/L occurred at PP-18. Oil-range organics were not detected at any samples.

Lead was only detected in PP-18 but did not exceed the screening levels. Polycyclic aromatic hydrocarbons (PAHs) were detected in PP-17, PP-18, PP-19, PP-22, and PP-23, but all were less than the screening levels. cPAHs were not detected at levels greater than the reporting limit at PP-13, PP-20, PP-21, or PZ-12.

PCBs were not detected at levels greater than the reporting limit in PP-18.

SVOCs were detected in PP-17 and PP-23, but were all less than the MTCA Method A criteria. Naphthalene and 1-methylnaphthalene were detected in PP-18 at levels greater than the MTCA Method A screening level. 3- and 4-Methylphenol were detected in PP-22, but there is not a MTCA Method A screening level value. SVOCs were not detected at levels greater than the reporting limit in PP-13, PP-19, PP-20, PP-21, or PZ-12.

With one exception, the non-BTEX VOCs detected in PP-17, PP-18, PP-22, and PP-23 were all less than the MTCA Method A screening level. Ethylene dichloride (EDC) was detected in PP-15R at levels greater than the MTCA Method A screening level. VOCs were not detected in PP-19, PP-20, or PP-21.

Formaldehyde was not detected at concentrations greater than the reporting limit in PZ-12 and PP-13.

4.8 DIRECT-PUSH GROUNDWATER SCREENING ANALYTICAL RESULTS

All direct-push groundwater screening samples were analyzed for GRO, DRO, oil-range organics, and BTEX. Samples collected from the K-98 and K-99 borings near the former dry well were also analyzed for VOCs. Sample results for GRO, DRO, oil-range organics, and BTEX are presented in Tables 4.3 and 4.4.

Analytical results for groundwater screening samples on the Site were primarily non-detect. One VOC, the solvent methylene chloride, was detected in the sample collected from the K-98 boring at a concentration of 5.4 µg/L, slightly exceeding the MTCA Method A screening level.

GRO, DRO, and BTEX compounds were detected in samples from seven of nine borings on the Peninsula Fuel Company property. Oil-range organics were not detected in any samples. GRO and DRO concentrations exceeded the MTCA Method A screening level in samples collected from PF-3, PF-6, PF-7, and PF-8. A maximum GRO concentration of 9,500 µg/L was detected at PF-6, and a maximum DRO concentration of 2,400 µg/L was detected at PF-8. Benzene detections of 64 and 200 µg/L also exceeded the screening levels, at PF-7 and PF-8, respectively.

5.0 Sediment Investigation and Analytical Results

This section summarizes the results of the sediment investigation. The sediment investigation included sediment sampling in July 2013 for chemical analysis, sediment bioassay testing, and sediment profile imaging (SPI). Table 5.1 summarizes the sediment chemistry results from the sediment investigation. The sediment sample locations are shown in Figure 5.1. Refer to Appendix D for the full set of analytical results. Field notes that describe the details on the sampling conducted are included as Appendix E.

5.1 SURFACE SEDIMENT SAMPLING

Sediment investigation activities in front of the Site included the collection and analysis of surface sediment (0 to 10 centimeters [cm]) samples to evaluate if sediments in front of the Site were historically impacted from discharges from the Site, and sediment imaging to evaluate the presence of wood waste. The sediment sampling investigation was coordinated to be consistent with the WPAHG sampling event, and the procedures were performed in accordance with the WPAHG RI/FS Work Plan.

Three surface sediment samples were collected (KSS-1, KSS-2, and KSS-3) within the nearshore area of Port Angeles in front of the Site on July 9, 2013. The surface sediment sampling location KSS-1 was located in front of the historical sanitary sewer outfall. Surface sediment sampling location KSS-2 was located directly offshore of the existing outfall (and historical entrance to the log pond). The surface sediment sampling location KSS-3 was the furthest east of the sediment samples and was located offshore of the log storage yard. Positioning and navigation to the surface sediment sampling locations in Port Angeles Harbor was accomplished with a differential global positioning system with an accuracy of within 2 meters. Water depths were measured with the vessel depth finder, corrected for tide, and converted to mudline elevations.

The surface sediment sampling was performed from the BioMarine Enterprises' R/V Kittiwake by Integral Consulting field staff. The surface sediment samples were collected from a depth of 0 to 10 cm using a stainless steel Van Veen grab sampler. Multiple grabs were required at each sampling location to obtain the volume of sediment required for the chemical analyses and the biological testing.

Sample processing for the surface sediment samples collected occurred on the boat. Sediment sample characteristics and observations were made in a field notebook and include notes on texture, color, biological organisms or structures, presence of debris, relative size of wood debris, presence of sheen or contamination, and odor. Sediment descriptions were recorded in a field notebook (refer to Appendix E). Samples for total volatile solids (TVS) were collected directly from the grab sampler and placed in the sample containers. Once sufficient sample volume was collected, the samples were homogenized to a uniform appearance in stainless steel bowls (several bowls were required for each location). Following homogenization, the remaining sample containers for chemical analysis and bioassay testing were filled. All sampling containers were tightly capped, labeled, and immediately placed in a cooler maintained at a temperature of approximately 4 ºC using crushed ice. Samples for conventional and chemical analysis were shipped to ALS Environmental in Kelso, Washington and samples for PCB and dioxins/furans analysis were shipped to Axys Analytical Services in Sidney, British Columbia, Canada, under standard chain-of-custody procedures. Samples for bioassay testing were delivered to Newfields in Port Gamble, Washington, under standard chain-of-custody procedures.

5.2 SEDIMENT PROFILING IMAGING

SPI was completed at the three sediment sample locations to evaluate and delineate the extent of wood debris and to provide information on benthic habitat quality (Floyd|Snider et al. 2013). Images were collected using an Ocean Imaging Systems 3731 camera of the sediment column in profile. Plan view images were also taken to evaluate surface features. Multiple images were obtained at each location and a full analysis of the images was completed by Germano and Associates. Refer to the WPAHG Sampling and Analysis Plan (SAP) for additional details on the qualitative metrics that were determined from the images (Integral et al 2013).

5.3 ANALYTICAL METHODS AND DATA VALIDATION

5.3.1 Analytical Methods

The surface sediment samples collected were analyzed for the methods indicated below, in accordance with the RI/FS Work Plan (Floyd|Snider et al. 2013) and WPAHG RI/FS Work Plan (Integral et al. 2013):

- Grain size by Puget Sound Estuary Program (PSEP)
- Total solids by USEPA Method 160.3 Modified
- TVS by USEPA Method 160.3
- Total organic carbon by Plumb 1981
- Metals (arsenic, cadmium, chromium, copper, lead, silver, and zinc) by USEPA Method SW6020A
- Mercury by USEPA 7471B
- SVOCs by USEPA 8270D
- PAHs and PCP by USEPA 8270 SIM
- Butyltins by Krone 1988
- GRO and oil-range organics by NWTPH-Dx with silica gel and acid cleanup
- PCBs (congeners) by USEPA 1668A
- Dioxin/furans by USEPA 1613B

5.3.2 Bioassay Testing

As discussed in Section 5.6.2 below, biological toxicity tests were conducted following review of the analytical data with Ecology. The toxicity tests were conducted consistent with the procedures in the WPAHG RI/FS SAP (Integral 2013). Bioassay testing included the following:

- 10-day amphipod test with *Eohaustorius estuarius*
- 20-day polychaete test with *Neanthes arenaceodentata*
- 48-hour benthic larval test with the bivalve *Mytilus galloprovincialis* following the resuspension protocol

5.3.3 Data Validation

The sediment data were validated in accordance with the quality assurance procedures identified in the WPAHG RI/FS Work Plan. The dioxin/furan data and PCB data were validated by EcoChem. All other data were validated by Floyd|Snider. The data validation reports are included in Appendix A.

5.4 REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN DEVIATIONS

There was one deviation from the RI/FS Work Plan during the field event. A mooring dolphin was located at the coordinates for the proposed sample station KSS-2. Because of this obstruction, KSS-2 was moved approximately 20 meters from the proposed location to the southeast, directly offshore of the outfall.

5.5 FIELD OBSERVATIONS

The field observations from the sediment investigation were recorded in a field notebook (refer to Appendix E). Of note are the following observations related to odor, benthic health, and wood waste:

- The KSS-1 sediment sample had a sulfide smell and a large piece of kelp on the sample grab. There was no wood debris. A snail was observed on the kelp.
- The KSS-2 sediment sample was composed of approximately 30 percent fine wood waste with a few pieces of bark. It had a normal odor and shell fragments were observed.
- The KSS-3 sediment sample contained several small Dungeness crabs and shrimp. There was no wood debris or odor.

5.6 SEDIMENT RESULTS

5.6.1 Chemistry Data

Of the three sediment samples, there were only three instances where the Sediment Management Standards (SMS) cleanup screening level (CSL) or SMS Sediment Quality Standard (SQS) were exceeded. KSS-1 exceeded the SQS for chrysene and fluoranthene and KSS-2 exceeded the CSL for fluoranthene. In addition to the individual PAH detections, there were low level detections of metals, butyltins, and DRO and oil-range organics. PCBs were detected at levels greater than the reporting limit for all three samples, but the reported concentrations were one to two orders of magnitude lower than the CSL. The summed dioxin/furan TEQ concentration, using ½ the reporting limit for those analytes that were not detected in the calculation, was 11.9 pg/g for KSS-1, 12.3 pg/g for KSS-2, and 2.2 pg/g for KSS-3. Other SVOCs and PAHs were detected, but not at levels of concern.

5.6.2 Bioassay Data

Sediment samples were submitted to Newfields following sample collection, but the samples were held by the laboratory until the receipt and review of the chemistry data. Because of the fluoranthene and chrysene exceedances discussed above, Ecology requested that the bioassay testing be conducted for the three sediment samples.

The bioassay testing was compared to bioassay testing done on the reference sediment collected as part of the WPAHG investigation. The sediments for KSS-1, KSS-2, and KSS-3 met SQS performance standards for each of the bioassay tests. The bioassay data discussion is presented in a report prepared by Newfields and is included as Appendix E.

5.6.3 SPI Imaging

The sediment profile imaging results for KSS-1, KSS-2, and KSS-3 were included with the evaluation of the WPAHG sediment station imaging in the Sediment Profile Imaging Report prepared by Germano and Associates (Germano and Associates 2013). The report presents the evaluation of the sediment images taken in Port Angeles Harbor with regards to physical, chemical, and biological processes. The report includes a discussion of materials and methods and results for surface boundary roughness, wood debris, and apparent sediment health, among other items. The images indicate that there is between 5 and 20 percent wood debris in KSS-1, less than 5 percent wood debris in KSS-2, and no wood debris in KSS-3.

Generally, the image analysis for the Site sediment stations indicated consistency with the sediments observed in other parts of Port Angeles Harbor. A more thorough presentation and evaluation of the results will be available in the final Sediment Profile Imaging Report, anticipated to be included as an attachment to the WPAHG Data Report. Appendix F shows the plan view and profile images taken at KSS-1, KSS-2, and KSS-3.

5.7 INCLUSION OF THE SEDIMENT DATA IN THE WPAHG REMEDIAL INVESTIGATION/FEASIBILITY STUDY

The chemistry data, bioassay test results, and SPI images indicate that there are no significant sediment concerns that are specific to the Site. The sediment chemistry from KSS-1, KSS-2, and KSS-3 are similar or of better quality to samples previously collected in Port Angeles Harbor. For example, dioxin/furan and PCB concentrations indicate that concentrations are lower than at many locations within Port Angeles Harbor. Because no site-specific sediment concerns were identified, the data were provided to the WPAHG consulting team for inclusion in their RI/FS process. The data for KSS-1, KSS-2, and KSS-3 may be further evaluated by WPAHG or Ecology with any future decisions or remedial actions for this specific sediment area addressed by the WPAHG process.

6.0 Site Summary

This section provides a brief summary of results relative to the nature and extent of contamination.

The preliminary evaluation of the RI data completed for this report indicates that the primary COCs for the Site include, as expected based on existing data, GRO, oil-range organics (hydraulic oil), and benzene. No other new or previously undetected COCs were supported by the data. The data collected provide a much clearer understanding of the extent and magnitude of contamination. The figures developed for this Data Memo confirm that the majority of contamination is primarily focused in the areas that were previously known to have contamination, namely the Gasoline Area under the concrete pad and the Hydraulic Oil Area under the hydraulic presses. In contrast, the Debarker Area was free of contamination.

The field investigation did provide new information on Pipeline 8 as a probable source for the gasoline contamination and the quality of the surface soil with regards to dioxin/furan contamination. The field investigation also removed offshore sediment as a media of concern. Additionally, the data collected helps support discussions between the Port and Ecology on where the boundary of the Site, as defined under MTCA as “where contamination has come to lie,” should be drawn.

MTCA Method A CULs were used in the figures and tables for preliminary data evaluation purposes. A comprehensive list of COCs and the development of draft CULs will be presented in the RI/FS.

The data collected still supports the division of the contamination “source areas” that have been discussed in previous documents. The following bullets summarize conclusions that can be drawn for these areas:

- **Gasoline Area.** As shown in the soil and groundwater figures presented in Sections 3.0 and 4.0, GRO, DRO, and benzene contamination appears to have been released under the concrete pad in the vicinity of Pipeline 8 and have spread to the north and northeast. Contamination of GRO and benzene in groundwater appears to have originated in this area and has been transported toward the K Ply bulkhead, affecting soil quality near the water table for a substantial distance downgradient. Trenching along Pipeline 8 and the pressure test conducted on Pipeline 8 indicate that the integrity of the east and west pipelines was compromised in two general areas: (1) at a specific joint in the west pipeline that was exposed by the trenching (labeled “joint leak” on Figure 3.2) and (2) in the section of the west pipeline that was not visually examined (i.e., somewhere under the alley or concrete pad) and the section of the east pipeline that also runs under the alley/concrete pad and was not visually examined (labeled “pressure test failure area” on Figure 3.2). The northern section of the east pipe that was exposed by trenching held pressure. Soil contamination was not observed under the joint leak described above, whereas the east and west sections of Pipeline 8 that cross under the pad are where the most significant gasoline and diesel soil contamination was found in vadose zone soils. Historical information about Pipeline 8 operations is discussed in the RI/FS Work Plan. The weathered nature of the gasoline contamination encountered, as indicated by the laboratory, is consistent with the dates of pipeline operations discussed in the RI/FS Work Plan.

- **Peninsula Fuel Company.** Elevated levels of GRO and DRO were encountered in soil and groundwater at the Peninsula Fuel Company property. However, based on the lower peak concentrations observed, low LNAPL saturation, and much more limited areal extent of contamination, the releases originating within the Peninsula Fuel Company property appear to be generally confined to the Peninsula Fuel Company property, which is not a significant contributor to the gasoline and diesel contamination found downgradient under the former mill.
- **Hydraulic Oil Area.** Data collected in the hydraulic oil area have helped define the edges of the hydraulic oil contamination. The data will be further evaluated in the RI/FS, but the general understanding of the contaminated area is consistent with previous data.
- **Groundwater.** Groundwater upgradient of the Site, with the exception of Peninsula Fuel Company, appears not to be impacted. Groundwater near or immediately downgradient of source areas within the Site shows significantly elevated detections, as expected. However, further downgradient, near the bulkhead, contamination appears to be isolated to PP-18 and, to a much lesser extent, PP-17. Further groundwater monitoring will provide key data for the evaluation of groundwater presented in the RI/FS.
- **Debarker Area.** The data collected on the east side of the site in the general area of the debarker and log storage appear to be free of significant contamination. This area will likely not require further investigation or cleanup prior to redevelopment.
- **Sediment.** The data collected by the three nearshore sediment samples indicate that sediment is not a media of concern for the Site.

7.0 Additional Data Collection and Schedule

7.1 ADDITIONAL DATA COLLECTION

The recent field work conducted as part of the RI included a substantial number of borings to observe soil cores for evidence of petroleum contamination. In addition, the field work involved the collection of soil, groundwater, and sediment samples for laboratory analysis. Between this RI data and historical data collected during prior investigation, sufficient data for the Site exist to proceed with the RI/FS report; however, there are a few field activities that are not yet completed.

The round of groundwater monitoring, as described in the RI/FS Work Plan, will be completed in January 2013. The data collected from this groundwater monitoring event will be incorporated into the RI/FS.

There will also likely be some limited data collection as part of the FS or in the event of an interim action. This includes delineating the surface extent of resin material in the Hydraulic Oil Area (as described in the RI/FS Work Plan). Additional analytical samples could be collected to better determine the extent of contamination during a cleanup phase, but the scope of that sampling is not know at this time.

As specified in the AO, Ecology comments on this report will be incorporated into the RI/FS document. A revised Supplemental Data Collection Technical Memorandum will not be produced.

8.0 References

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

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K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Tables

Table 2.1
RI Soil Investigation Work Performed

Investigation Area	Location ID	Purpose[1]	Work Performed	Were the Objectives Fulfilled?
Site-wide Soil				
Air Deposition Related	Surface Sample Locations: SS-1, SS-2, and SS-3.	Characterize the potential air deposition contamination associated with stack emissions.	- Three surface soil samples were collected consistent with the procedures described in the RI/FS Work Plan.	- Yes.
Resin and Other Surface Solid Waste Extent	None	Delineate the horizontal and vertical extent of the dried resin for solid waste disposal purposes. Analytical testing of the material was conducted as part of the IAWP.	- These data were not collected because plastic sheeting currently covers the resin area.	- Data will be collected, if needed, as part of remedial design.
Focused Soil Areas of Concern				
Gasoline Plume Source	Direct-push Boring Locations: K-00 through K-49, K-77 through K-82, K-86, K-87, K-88, PP-4R, PP-15R, PP-23, PP-26, and PZ-06A. Test Pit Location: KT-21.	Determine the source of the gasoline plume as described in the rows below.	- Pipelines 8 and 5 were located with the aid of utility locating services and test pits. - The length of Pipeline 8 from concrete slab north to the bulkhead was uncovered for inspection. - Samples were collected from the direct-push borings in areas of the gasoline plume. Additional step out borings were used, as informed by signs of contamination, to delineate apparent source area(s).	- See below.
	Direct-push Boring Locations: K-00 through K-49, K-77 through K-82, K-86, K-87, K-88, PP-4R, PP-15R, PP-23, PP-26, and PZ-06A.	**Extent of Gasoline Area:** Delineate the approximate extent of LNAPL to estimate volume, assess fate and transport, and inform remedial evaluation.	- Direct-push borings were advanced. - PID and sheen tests were conducted. - Select samples were submitted for laboratory analysis. - Additional step out borings were advanced on October 14–16 to identify the full extent of the gasoline area. - Petrophysical testing was conducted in intervals with field evidence of LNAPL contamination.	- Yes.
	Trench Location: KT-2 (Pipeline 8). Test Pit Location: KT-1 (Pipeline 8 at terminus at Peninsula Fuel Company).	**Pipeline 8:** Assess the condition of Pipeline 8 and the potential contribution of contamination from Pipeline 8 found in deteriorated condition.	- Pipeline 8 was identified and exposed from the concrete slab along the length of Pipeline 8 to the terminus near Pier 1. - The soil around the exposed sections of pipe was inspected for signs of contamination. - Pressure testing was performed to determine the integrity of the pipe and evaluate the potential for historical leaks.	- Yes.
	Contingency only; to be determined at the time of sampling.	**8-inch Sanitary Sewer Line:** Determine if the 8-inch sanitary sewer line terminates in the buried manhole and if there are any environmental impacts.	- A manhole was not found and no further excavation work was conducted.	- No, it was not determined where the 8-inch sanitary sewer terminates or if there are any related environmental impacts in the alley. No further investigation is planned.
	Test Pit Location: KT-20. Contingency Direct-push Boring Locations: K-200, K-201, K-202, K-203.	**4-inch Sanitary Sewer Line:** Because of the gasoline odor detected during the utility survey, characterize the soil at the terminus of the 4-inch historical sanitary sewer line to evaluate if gasoline was historically dumped into the pipe. If the results indicate material was not dumped, evaluate the potential for contamination to have migrated into the pipe.	- Test Pit KT-20 was dug in the area where the 4-inch sanitary sewer terminus was suspected based on the utility survey. A 10-foot by 6-foot by 11-feet test pit was dug. - Concrete pipe debris, likely from the 4-inch pipe and a larger 8-inch pipe, was encountered. The terminus of the 4-inch pipe was not found. - No signs of contamination were observed and the pipe was not "chased." - Four direct-push borings were advanced along the 4-inch line between the manhole and the test pit.	- No, the terminus of the 4-inch sanitary sewer was not found. - Yes, impacts surrounding the 4-inch line were investigated. - No further investigation is planned.
Panel Oiler	Direct-push Boring Locations: K-29 through K-30. K-37 and K-39 were also analyzed for SVOCs. K-30 was relocated in the field.	Characterize the horizontal and vertical extent of PCP contamination along the concrete slab in the panel oiler area. Evaluate if the PCP contamination extends under the concrete wall. The data will supplement previous sidewall data collected that delineate the north, east, and west extent.	- Three direct-push borings co-located with gasoline area borings near the panel oiler were collected and analyzed for PCP. - Two samples were collected at the base of KT-1 near the panel oiler.	- Yes.
Peninsula Fuel Company	Direct-push Boring Locations: PF-1 through PF-9.	Characterize potential TPH contamination on the Peninsula Fuel Company property and assess source relationship with groundwater contamination on the K Ply Site.	- Nine direct-push borings were advanced on the Peninsula Fuel Company property. - Analytical samples were collected and field monitoring was conducted. - Co-located borings were collected for petrophysical testing at PF-5 and PF-7.	- Yes.

Table 2.1
RI Soil Investigation Work Performed

Investigation Area	Location ID	Purpose[1]	Work Performed	Were the Objectives Fulfilled?
Hydraulic Oil Area	Direct-push Boring Locations: K-50 through K-76, plus K-83, K-84, K-85, K-89, K-102, K-103, K-104, PP-6R, and PP-20.	Delineate the edges of the hydraulic oil contamination and gasoline contamination near the hydraulic presses. Delineate the extent of LNAPL to estimate volume, assess fate and transport, and inform remedial evaluation.	• Direct-push borings were advanced at the anticipated extent of the hydraulic oil and gasoline contamination. • LNAPL field testing methods (i.e., paper towel test, bowl test, UV light) were employed to determine if LNAPL was present. • Analytical samples were collected. • Step out borings were used as necessary. • Borings co-located with EW-02A and K-59 were collected for petrophysical testing. • Borings were advanced to determine the extent of commingled downgradient gasoline.	• Yes.
Other TPH Use Areas	Test Pit Locations: KT-10 and KT-11. Direct-push Boring Locations: K-90 through K-92.	Characterize the soil for potential contamination in the locations of the former UST/AST locations on-site and in the fuel pile location associated with historical dumping.	• Direct-push borings were advanced in the locations of the historical USTs and ASTs to assess soil conditions. • Two test pits were dug in the area of the fuel pile to determine if shallow soil was impacted by historical dumping on the fuel pile. • Analytical samples were collected.	• Yes.
Dry Well Area	Test Pit Location: KT-12. Direct-push Boring Locations: K-98 and K-99.	Characterize the soil for potential contamination in the location of the apparent dry well identified during demolition.	• A direct-push boring was advanced in the dry well location. • A test pit was dug in the dry well for inspection and collection of additional samples.	• Yes.
Surface Soil in the Stack Footprint	Surface Sample Locations: SS-4, SS-5, and SS-6.	Characterize the potential air deposition contamination associated with stack emissions and fly ash that could have been deposited during the stack demolition.	• Three surface soil samples were collected in the stack footprint and were analyzed for dioxins/furans.	• Yes.
Wood Debris Pile Characterization	Test Pit Locations: KT-13 and KT-14.	Visually characterize the material placed in the wood debris pile located southeast of the historical 10-foot lathe building.	• Two test pits were dug to examine the wood pile material.	• Yes.
Debarker Operations	Direct-push Boring Locations: K-94 through K-97.	Assess impacts to soil from historical operations.	• Four direct-push borings were advanced surrounding the log debarker and four analytical samples were collected.	• Yes, although a sample was not able to be collected in the location of the historical UST due to debarker operations. Adequate soil samples were collected surrounding the debarker to fulfill the objectives.
Log Pond Fill	Direct-push Boring Locations: K-100 and K-101.	Characterize the quality of log pond fill material that was incrementally placed in the log pond between 1940 and1985.	• Two direct-push borings were advanced in the area of the former log pond to characterize the fill material. Analytical samples were collected.	• Yes.

Note:

1 As defined in the RI/FS Work Plan.

Abbreviations:

AST	Aboveground storage tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
IAWP	Interim Action Work Plan
LNAPL	Light non-aqueous phase liquid
PCP	Pentachlorophenol
PID	Photoionization detector
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
UST	Underground storage tank
UV	Ultraviolet

Table 2.2
RI Groundwater Investigation Work Performed

Investigation Area	Location ID	Purpose[1]	Work Performed	Were the Objectives Fulfilled?
General Groundwater Data Objectives				
Water Level Data	Existing Monitoring Wells: PP-13, PP-18, PP-19, PZ-13, PZ-12, PP-17, PZ-7, PZ-8, PZ-4, MW-23, MW-8, PZ-1, and PP-9. New/Replacement Monitoring Wells: PP-20, PP-21, PP-22, PP-23, PP-24, PP-25, PP-15R, PP-6R, and PP-4R.	Collect and asses water level elevation for groundwater flow direction and gradient.	• A professional survey of monitoring well locations was conducted. • Water level elevation measurements were collected from site wells at a low tide.	• Yes, but the second round of groundwater monitoring has not yet been conducted.
LNAPL Thickness	Existing Monitoring Wells: PZ-6, PP-7, PP-11, PP-12, PP-10, PP-1, PP-14, PP-2, and other wells in which LNAPL is identified.	Monitor current LNAPL thickness.	• LNAPL thickness was measured during the first monitoring event.	• Yes, but the second round of groundwater monitoring has not yet been conducted.
Well Replacement	Replacement Monitoring Wells: PP-15R, PP-6R, and PP-4R.	Replace three wells destroyed during demolition.	• Four new wells were installed, including the three replacement wells and one well that was inadvertently installed.	• Yes.
Focused Groundwater Areas of Concern				
Mill Area Petroleum	Existing/Replacement Monitoring Wells: PP-15R, PP-13, PP-18, PP-19, PZ-13, PZ-12, PP-17, PZ-7, PZ-8, and PZ-4.	Monitor current conditions of GRO, benzene, and hydraulic oil plumes in mill area and Cedar Street.	• One round of groundwater monitoring was conducted.	• Yes, but the second round of groundwater monitoring has not yet been conducted.
Caustic Vault Area	Existing Monitoring Wells: PP-13 and PZ-12.	Assess the potential for leakage of caustic soda into groundwater and for impacts related to resin spill.	• pH was monitored in Monitoring Wells PP-13 and PZ-12.	• Yes.
Downgradient of Former Log Pond/Shoreline Groundwater Quality	Existing Monitoring Wells: PP-19, PP-17, and PP-18. New Monitoring Wells: PP-20, PP-21, and PP-22.	Assess the potential for contamination at the base of the former log pond to have impacted groundwater near the bulkhead. Confirm no VOCs, SVOCs, or PAHs in shoreline monitoring wells.	• One round of groundwater monitoring was conducted.	• Yes, but the second round of groundwater monitoring has not yet been conducted.
Other TPH Use Areas	Geoprobe Locations: K-90, K-91, K-92, and K-93.	Investigate data gap in groundwater quality in specific areas of historical TPH usage.	• Direct-push probe groundwater samples were collected from four locations.	• Yes.
Dry Well Area	Geoprobe Locations: K-98 and K-99.	Investigate groundwater for potential contamination beneath and downgradient of the location of the apparent dry well identified during demolition.	• Direct-push probe groundwater samples were collected from two locations.	• Yes.
Upgradient Groundwater				
Peninsula Fuel Company	Existing Monitoring Wells: PZ-1 and PP-07. New Monitoring Well: PP-23. Geoprobe Locations: PF-1, PF-2, PF-3, PF-4, PF-5, PF-6, PF-7, and PF-8.	Assess the effect of contamination at Peninsula Fuel Company to site groundwater.	• Direct-push probe groundwater samples were collected. • One round of groundwater monitoring was conducted for PZ-1, PP-07 and PP-23.	• Yes, but the second round of groundwater monitoring has not yet been conducted for PZ-1, PP-07, and PP-23.
Former Port Angeles Truck Stop Chevron	Existing Monitoring Well: PP-9.	Assess petroleum constituents in upgradient groundwater in the vicinity of the former service station.	• One round of groundwater monitoring was conducted.	• Yes, but the second round of groundwater monitoring has not yet been conducted.
Former PenPly Retail Office	New Monitoring Well: PP-24.	Assess petroleum constituents in upgradient groundwater in the vicinity of the former service station.	• One round of groundwater monitoring was conducted.	• Yes, but the second round of groundwater monitoring has not yet been conducted.
Marine Drive Exxon	New Monitoring Well: PP-25.	Assess petroleum constituents in upgradient groundwater in the vicinity of the former service station.	• One round of groundwater monitoring was conducted.	• Yes, but the second round of groundwater monitoring has not yet been conducted.

Note:

1 As defined in the RI/FS Work Plan.

Abbreviations:

GRO	Gasoline-range organics
LNAPL	Light non-aqueous phase liquid
PAH	Polycyclic aromatic hydrocarbon
RI/FS	Remedial Investigation/Feasibility Study
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
VOC	Volatile organic compound

Table 2.3
RI Sediment Investigation Work Performed

Investigation Area	**Location ID**	**Purpose[1]**	**Work Performed**	**Were the Objectives Fulfilled?**
Nearshore Surface Sediment Chemistry	KSS-1, KSS-2, and KSS-3.	Assess surface sediment chemistry in the nearshore area based on prior investigation results. Locations based on the locations of current or historical outfalls.	• Three surface sediment grab samples were collected and were submitted for chemical analysis and, following review of analytical results, bioassay testing.	• Yes.
Nearshore Wood Debris Evaluation	KSS-1, KSS-2, and KSS-3.	Confirm local presence and amount of wood debris identified in the K Ply vicinity in previous investigations.	• Sediment profile images were taken to evaluate the presence of wood debris.	• Yes.

Note:

1 As defined in the RI/FS Work Plan.

Abbreviations:

K Ply	K Ply Inc.
RI/FS	Remedial Investigation/Feasibility Study

Table 3.1
Soil Boring Field Observations

Gasoline Area

Boring Location	Field Observation	K-00*	K-01*	K-02*	K-03*	K-04*	K-06*	K-07*	K-08*	K-09*
0–4 ft bgs	Peak PID ppm	7.7 @ 2 ft	60 @ 1.5 ft	29 @ 4 ft	3.9 @ 4 ft	0.1 (all)	16 @ 4 ft	26.5 @ 4 ft	0.1 (all)	0.3 @ 2.5 ft
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	NA	NA
4–8 ft bgs	Peak PID ppm	287 @ 8 ft	340 @ 5.5 ft	52 @ 6 ft	12.2 @ 8 ft	0.1 (all)	6.4 @ 5 ft	690 @ 7 ft	0.1 (all)	0.1 (all)
	Odor	strong gasoline	strong gasoline	negative	negative	negative	negative	strong gasoline	negative	negative
	Sheen	negative	slight rainbow	negative	negative	negative	negative	heavy rainbow	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	NA	NA
8–12 ft bgs	Peak PID ppm	673 @ 9.5 ft	333 @ 9.5 ft	694 @ 9.5 ft	117 @ 11 ft	0.1 (all)	794 @ 11 ft	297 @ 9.5 ft	1.7 @ 9 ft	0.1 (all)
	Odor	strong gasoline	strong gasoline	strong gasoline	negative	negative	strong gasoline	strong gasoline	negative	negative
	Sheen	stringy rainbow	heavy rainbow	stringy white	negative	negative	heavy rainbow	heavy rainbow	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	3.0 @ 12 ft	NA	NA	3.6 @ 12 ft	NA	NA	NA	NA	NA
	Odor	negative	NA	NA	negative	NA	NA	NA	NA	NA
	Sheen	negative	NA	NA	negative	NA	NA	NA	NA	NA
	Blot Test	negative	NA	NA	negative	NA	NA	NA	NA	NA
Depth to Groundwater		11 ft	NA	NA	11 ft	NA	NA	10.5 ft	NA	NA

Boring Location	Field Observation	K-10	K-11	K-12	K-13	K-14	K-15	K-16*	K-17*	K-18*
0–4 ft bgs	Peak PID ppm	4.8 @ 2 ft	106 @ 2.5 ft	148 @ 1 ft	1.7 @ 1.5 ft	0.9 @ 3.5 ft	0.6 @ 2.5 ft	18.3 @ 2.5 ft	8.8 @ 2 ft	17 @ 1.5 ft
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	NA	NA	NA	NA
4–8 ft bgs	Peak PID ppm	1050 @ 6.5 ft	705 @ 6.5 ft	594 @ 7 ft	3.8 @ 8 ft	3.6 @ 8 ft	2.7 @ 7.5 ft	46 @ 5 ft	11.2 @ 4.5 ft	210 @ 7 ft
	Odor	strong gasoline	strong gasoline	strong gasoline	negative	negative	negative	negative	negative	NA
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	42 @ 9 ft	77 @ 12 ft	61 @ 9.5 ft	369 @ 10.5 ft	332 @ 10 ft	76 @ 10 ft	415 @ 11 ft	764 @ 12 ft	256 @ 10.5 ft
	Odor	slight gasoline	negative	slight gasoline	moderate gasoline	strong gasoline	moderate gasoline	strong gasoline	strong gasoline	strong gasoline
	Sheen	negative	negative	negative	negative	negative	negative	stringy rainbow	stringy rainbow	NA
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	NA	NA	NA	NA	NA	NA	2.3 @ 12.5 ft	11.2 @ 13 ft	NA
	Odor	NA	NA	NA	NA	NA	NA	negative	negative	NA
	Sheen	NA	NA	NA	NA	NA	NA	negative	negative	NA
	Blot Test	NA	NA	NA	NA	NA	NA	negative	negative	NA
Depth to Groundwater		9.2 ft	9.2 ft	9 ft	9.3 ft	9.5 ft	9.2 ft	11.5 ft	11.9 ft	NA

Table 3.1
Soil Boring Field Observations

Boring Location	Field Observation	K-19	K-20	K-21	K-23*	K-24*	K-25*	K-26*	K-27*	K-28*
0–4 ft bgs	Peak PID ppm	2.7 @ 2.5 ft	4.3 @ 4 ft	159 @ 4 ft	18.8 @ 1.5 ft	5.8 @ 2.5 ft	8.3 @ 2 ft	10.4 @ 4 ft	109 @ 2.5 ft	223 @ 4 ft
	Odor	negative	negative	strong gasoline	negative	negative	negative	negative	moderate gasoline	strong gasoline
	Sheen	negative	negative	negative	negative	negative	slight	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	292 @ 6 ft	410 @ 6.5 ft	942 @ 6.5 ft	758 @ 5 ft	256 @ 6.5 ft	108 @ 7 ft	350 @ 5 ft	1,148 @ 5 ft	758 @ 4.5 ft
	Odor	strong gasoline	strong gasoline	strong gasoline	strong gasoline	strong gasoline	strong gasoline	moderate gasoline	strong gasoline	strong gasoline
	Sheen	negative	negative	negative	heavy rainbow	heavy rainbow	heavy rainbow	heavy rainbow	rainbow?	rainbow?
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	555 @ 8.5 ft	13 @ 8.5 ft	156 @ 9 ft	179 @ 9.5 ft	332 @ 9.5 ft	395 @ 9.5 ft	53 @ 10 ft	265 @ 9.5 ft	395 @ 9 ft
	Odor	strong gasoline	moderate gasoline	strong gasoline	strong gasoline	strong gasoline	strong gasoline	moderate gasoline	moderate gasoline	strong gasoline
	Sheen	negative	negative	negative	NA	heavy rainbow	heavy rainbow	heavy rainbow	heavy rainbow	heavy rainbow
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	NA	NA	NA	NA	NA	1.6 @ 12.5 ft	NA	NA	NA
	Odor	NA	NA	NA	NA	NA	negative	NA	NA	NA
	Sheen	NA	NA	NA	NA	NA	negative	NA	NA	NA
	Blot Test	NA	NA	NA	NA	NA	negative	NA	NA	NA
Depth to Groundwater		9.2 ft	8.9 ft	9.3 ft	NA	NA	11 ft	NA	NA	NA

Boring Location	Field Observation	K-29	K-30	K-31	K-32	K-33	K-34	K-35	K-36	K-37
0–4 ft bgs	Peak PID ppm	0.2 (all)	228 @ 4 ft	368 @ 4 ft	179 @ 4 ft	8.5 @ 2 ft	15 @ 2 ft	6.9 @ 2 ft	1.6 @ 3 ft	0.1 (all)
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	5.7 @ 8 ft	135 @ 7 ft	346 @ 7 ft	347 @ 7 ft	342 @ 6 ft	344 @ 7 ft	203 @ 6.5 ft	16.6 @ 8 ft	0.2 (all)
	Odor	negative	strong gasoline	strong gasoline	strong gasoline	strong gasoline	moderate gasoline	negative	negative	negative
	Sheen	negative	negative	slight rainbow	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	3.5 @12 ft	11.2 @ 11 ft	27 @ 11 ft	43 @ 12 ft	13 @ 10 ft	310 @ 9 ft	376 @ 9 ft	16.4 @ 10.5 ft	0.6 @ 9 ft
	Odor	slight HC (non-gasoline)	negative	strong gasoline	moderate gasoline	moderate gasoline	moderate gasoline	strong gasoline	slight gasoline	very slight
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Odor	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sheen	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Blot Test	NA	NA	NA	NA	NA	NA	NA	NA	NA
Depth to Groundwater		9 ft	10.5 ft	10.5 ft	10.5 ft	9.3 ft	10.3 ft	9 ft	9 ft	9.1 ft

Table 3.1
Soil Boring Field Observations

Boring Location	Field Observation	K-38	K-39	K-40*	K-41*	K-42*	K-43*	K-44*	K-45*	K-46*
0–4 ft bgs	Peak PID ppm	0.4 @ 3.5 ft	0.3 (all)	1.1 @ 1.5 ft	NA	6.9 @ 2.5 ft	3.6 @ 2.5 ft	1.5 @ 1 ft	0.9 @ 3 ft	312 @ 3.5 ft
	Odor	negative	penta	negative	gasoline	negative	negative	negative	PCP?	strong gasoline
	Sheen	negative	negative	negative	negative	negative	slight strings	negative	negative	heavy rainbow
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	0.3 (all)	205 @ 7 ft	6.2 @ 6.5 ft	>100 (all)	525 @ 7 ft	289 @ 5 ft	0.1 (all)	0 (all)	298 @ 5 ft
	Odor	negative	negative	negative	strong gasoline	strong gasoline	strong gasoline	negative	negative	strong gasoline
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	684 @ 10 ft	24 @ 10 ft	506 @ 10 ft	>100 (all)	400 @ 9.5 ft	25.5 @ 9.5 ft	3.2 @ 9.5 ft	12.5 @ 9.5 ft	426 @ 9.5 ft
	Odor	strong gasoline	penta?	gasoline?	gasoline	strong gasoline	gasoline?	negative	negative	gasoline?
	Sheen	negative	negative	negative	rainbow	heavy rainbow	heavy rainbow	negative	negative	slight
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	NA	NA	155 @ 14 ft	NA	NA	NA	NA	NA	NA
	Odor	NA	NA	gasoline?	NA	NA	NA	NA	NA	NA
	Sheen	NA	NA	negative	NA	NA	NA	NA	NA	NA
	Blot Test	NA	NA	negative	NA	NA	NA	NA	NA	NA
Depth to Groundwater		9.5 ft	8.5 ft	11 ft	NA	NA	NA	11 ft	NA	NA

Boring Location	Field Observation	K-47*	K-48*	K-49*	K-77	K-78	K-79	K-80	K-81	K-82
0–4 ft bgs	Peak PID ppm	628 @ 3 ft	17.2 @ 2 ft	10.2 @ 2.5 ft	0.0 (all)	0.0 (all)	0.0 (all)	0.7 @ 4 ft	0.2 @ 3.5 ft	0.4 @ 3.5 ft
	Odor	strong gasoline	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	heavy rainbow	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	543 @ 5 ft	729 @ 5 ft	327 @ 5 ft	1.8 @ 8 ft	0.2 @ 8 ft	870 @ 6.5 ft	612 @ 7 ft	57 @ 7 ft	0.8 @ 7 ft
	Odor	strong gasoline	strong gasoline	strong gasoline	negative	negative	strong gasoline	strong gasoline	negative	negative
	Sheen	heavy rainbow	rainbow	heavy rainbow	negative	negative	n o	slight stringy	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	611 @ 10 ft	839 @ 9.5 ft	569 @ 10 ft	8.9 @ 10 ft	14.5 @ 10 ft	22.3 @ 11 ft	610 @ 9 ft	510 @ 9 ft	6.4 @ 10.5 ft
	Odor	strong gasoline	strong gasoline	strong gasoline	very slight HC	very slight HC	negative	strong gasoline	strong gasoline	negative
	Sheen	heavy rainbow	heavy rainbow	heavy rainbow	negative	negative	negative	slight stringy	stringy rainbow	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	NA	NA	NA	NA	NA	NA	4.6 @ 12 ft	NA	NA
	Odor	NA	NA	NA	NA	NA	NA	negative	NA	NA
	Sheen	NA	NA	NA	NA	NA	NA	negative	NA	NA
	Blot Test	NA	NA	NA	NA	NA	NA	negative	NA	NA
Depth to Groundwater		NA	NA	NA	NA	NA	NA	14 ft	NA	NA

Table 3.1
Soil Boring Field Observations

Boring Location	Field Observation	K-86	K-87	K-88	PP-4R	PP-15R	PP-23	PP-26	PZ-06A
0–4 ft bgs	Peak PID ppm	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)	11.6 @ 3 ft	0.2 @ 4 ft	0.0 (all)	782 @ 4 ft
	Odor	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	0.0 (all)	0.0 (all)	2.4 @ 7 ft	0.0 (all)	223 @ 5 ft	negative	0.4 @ 5.5 ft	733 @ 8 ft
	Odor	negative	negative	negative	negative	strong petroleum	negative	slight petroleum	strong gasoline
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	0.0 (all)	017.3 @ 10 ft	0.8 @ 10 ft	0.9 @ 10.5 ft	37 @ 8.5 ft	16 @ 10 ft	176 @ 8.5 ft	395 @ 11 ft
	Odor	negative	negative	negative	negative	slight petroleum	petroleum	strong petroleum	moderate
	Sheen	negative	negative	negative	negative	negative	negative	negative	slight
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	NA	NA	NA	1.8 @ 13 ft	1.1 @ 13.5 ft	0.2 @ 15 ft	0.4 @ 13 ft	NA
	Odor	NA	NA	NA	negative	negative	negative	negative	NA
	Sheen	NA	NA	NA	negative	negative	negative	negative	NA
	Blot Test	NA	NA	NA	negative	negative	negative	negative	NA
Depth to Groundwater		NA	11 ft	9.9 ft	11 ft	10.5 ft	11 ft	10.5 ft	9.3 ft

Hydraulic Oil Area and Downgradient

Boring Location	Field Observation	EW-02A	K-50	K-51	K-52	K-53	K-54	K-55	K-56	K-57
0–4 ft bgs	Peak PID ppm	NA	173 @ 4 ft	NA	NA	5 @ 3 ft	NA	NA	NA	NA
	Odor	negative	strong HC	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	NA
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	NA	260 @ 5.5 ft	NA	NA	NA	<10 (all)	NA	230 @ 7 ft	NA
	Odor	negative	Strong gasoline	negative	negative	negative	negative	negative	gasoline?	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	NA	9.5 @ 11 ft	1.8 @ 12 ft	11 @ 10 ft	770 @ 11 ft	602 @ 10.5 ft	582 @ 11 ft	800 @ 10 ft	1.3 @ 11.5 ft
	Odor	HC?	negative	negative	negative	gasoline?	gasoline?	strong petroleum	gasoline?	very slight petroleum
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	saturated 11–12 ft	negative	negative	negative	negative	very slight amber	saturated 10–12 ft	negative	very slight smudge
12–16 ft bgs	Peak PID ppm	NA	0.3 @ 14 ft	NA	NA	<20 (all)	40 @ 12 ft	22.5 @ 12.5 ft	NA	NA
	Odor	negative	negative	negative	negative	negative	NA	strong petroleum	NA	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	saturated 12–13.25 ft	negative	negative
Depth to Groundwater		11.5 ft	12.5 ft	12.3 ft	12 ft	11.75 ft	10.5 ft	13.25 ft	11.5 ft	NA

Table 3.1
Soil Boring Field Observations

Boring Location	Field Observation	K-59	K-60	K-61	K-62	K-63	K-64	K-65	K-66	K-67
0–4 ft bgs	Peak PID ppm	NA	NA	NA	NA	NA	0.8 @ 1.5 ft	0.2 @ 3 ft	177 @ 4 ft	0.0 (all)
	Odor	negative	negative	negative	negative	negative	negative	negative	gasoline	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	NA	NA	NA	NA	NA	0.7 @ 8 ft	24.6 @ 8 ft	193 @ 7 ft	0.6 @ 7.5 ft
	Odor	negative	negative	negative	negative	negative	negative	negative	gasoline to 5.5 ft	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	2.9 @ 11.5 ft	2.1 @ 12 ft	NA	NA	NA	176 @ 11 ft	766 @ 11 ft	116 @ 12 ft	20.2 @ 11.5 ft
	Odor	negative	petroleum	negative	negative	petroleum	moderate HC	strong gasoline	negative	HC odor
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	very slight	~30% saturated	~50%	~50%	100% @ 11.5 ft	negative	negative	negative	saturated
12–16 ft bgs	Peak PID ppm	NA	NA	NA	NA	NA	2.7 @ 14 ft	87 @ 15 ft	453 @ 15 ft	NA
	Odor	negative	negative	negative	negative	negative	negative	moderate gasoline	strong gasoline	NA
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	NA
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	NA
Depth to Groundwater		9 ft	12.8 ft	12 ft	12.2 ft	12 ft	12 ft	12 ft	12 ft	11.5 ft

Boring Location	Field Observation	K-68	K-69	K-70	K-71	K-72	K-73	K-74	K-75	K-76
0–4 ft bgs	Peak PID ppm	0.0 (all)	0.1 @ 4 ft	1.7 @ 1.5 ft	0.2 (all)	0.1 @ 4 ft	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	8.7 @ 7 ft	3.8 @ 7.5 ft	4.4 @ 7.5 ft	0.2 (all)	0.2 @ 8 ft	0.1 (all)	0.0 (all)	0.1 (all)	0.0 (all)
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	17.2 @ 10.5 ft	215 @ 11.5 ft	486 @ 12 ft	0.2 (all)	1.4 @ 9.5 ft	6.8 @ 11 ft	5.0 @ 12 ft	0.5 @ 12 ft	6.5 @ 10 ft
	Odor	negative	gasoline	gasoline	negative	HC (non-gasoline)	HC (non-gasoline)	HC (non-gasoline)	very slight HC	very slight HC
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	0.7 @ 16 ft	NA	5.5 @ 12.5ft	NA	NA	NA	NA	NA	NA
	Odor	negative	NA	negative	NA	NA	NA	NA	NA	NA
	Sheen	negative	NA	negative	NA	NA	NA	NA	NA	NA
	Blot Test	negative	NA	negative	NA	NA	NA	NA	NA	NA
Depth to Groundwater		>11 ft	11.8 ft	12 ft	NA	NA	NA	12 ft	NA	NA

Table 3.1
Soil Boring Field Observations

Boring Location	Field Observation	K-83	K-84	K-85	K-89	K-102	K-103	K-104	PP-6R	PP-20
0–4 ft bgs	Peak PID ppm	0.0 (all)	0.1 (all)	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	608 @ 7 ft	10.2 @ 7.5 ft	0.4 @ 6.5 ft	0.0 (all)	0.0 (all)	0.0 (all)	2.5 @ 6.5 ft	0.0 (all)	0.0 (all)
	Odor	gasoline	negative	negative	negative	negative	negative	strong HC	negative	negative
	Sheen	stringy rainbow	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	462 @ 9 ft	398 @ 11.5 ft	3.0 @ 10 ft	1.9 @ 10.5 ft	0.0 (all)	0.0 (all)	6.8 @ 10.5 ft	0.1 (all)	0.0 (all)
	Odor	gasoline	gasoline	negative	creosote	negative	negative	negative	negative	negative
	Sheen	stringy rainbow	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	oily brown	negative	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	3.8 @ 14 ft	NA	NA	18 @ 14 ft	0.0 (all)	715 @ 13.5 ft	NA	0.0 (all)	0.0 (all)
	Odor	negative	NA	NA	creosote	negative	strong gasoline	NA	negative	negative
	Sheen	negative	NA	NA	negative	negative	rainbow	NA	negative	negative
	Blot Test	negative	NA	NA	oily brown	negative	negative	NA	negative	negative
Depth to Groundwater		13 ft	NA	NA	13 ft	NA	13 ft	NA	11.5 ft	15.5 ft

Upgradient Areas East

Boring Location	Field Observation	K-91	K-92	K-98	K-99	K-200	K-201	K-202	K-203	KT-10
0–4 ft bgs	Peak PID ppm	0.0 (all)	0.3 @ 2 ft	0.1 (all)	NA	2.2 @ 1 ft	0.3 (all)	0.1 (all)	0.1 (all)	3.5 @ 3 ft
	Odor	negative	negative	negative	NA	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	NA	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	NA	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	0.0 (all)	156 @ 8 ft	0.1 (all)	2.1 @ 7 ft	0.4 (all)	0.3 (all)	0.1 (all)	0.1 (all)	7.2 @ 5 ft
	Odor	negative	slight gasoline	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	0.0 (all)	9 @ 8.5 ft	0.1 (all)	0.1 (all)	0.3 (all)	0.3 (all)	0.1 (all)	0.1 (all)	NA
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	NA
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	NA
	Blot Test	NA	NA	NA	NA	NA	NA	NA	NA	NA
12–16 ft bgs	Peak PID ppm	0.0 (all)	0.1 @ 13 ft	0.1 (all)	0.0 (all)	NA	0.3 (all)	0.1 (all)	0.0 (all)	NA
	Odor	negative	negative	negative	negative	NA	negative	negative	negative	NA
	Sheen	negative	negative	negative	negative	NA	negative	negative	negative	NA
	Blot Test	negative	negative	negative	negative	NA	negative	negative	negative	NA
Depth to Groundwater		10 ft	10.4 ft	10.7 ft	11.5 ft	10 ft	12 ft	11 ft	12 ft	NA

Table 3.1
Soil Boring Field Observations

Boring Location	Field Observation	KT-11	KT-12	KT-20
0–4 ft bgs	Peak PID ppm	0.0 (all)	0.0 (all)	0.0 (all)
	Odor	negative	negative	negative
	Sheen	negative	negative	negative
	Blot Test	negative	negative	negative
4–8 ft bgs	Peak PID ppm	0.0 (all)	5.0 (all)	0.0 (all)
	Odor	negative	negative	negative
	Sheen	negative	negative	negative
	Blot Test	negative	negative	negative
8–12 ft bgs	Peak PID ppm	NA	0.0 (all)	0.0 (all)
	Odor	NA	negative	negative
	Sheen	NA	negative	negative
	Blot Test	NA	negative	negative
12–16 ft bgs	Peak PID ppm	NA	NA	NA
	Odor	NA	NA	NA
	Sheen	NA	NA	NA
	Blot Test	NA	NA	NA
Depth to Groundwater		NA	NA	NA

Debarker and Log Pond

Boring Location	Field Observation	K-90	K-94	K-95	K-96	K-97	K-100	K-101	KT-13	KT-14
0–4 ft bgs	Peak PID ppm	0.1 (all)	0.3 (all)	0.1 (all)	0.1 (all)	0.1 (all)	0.4 (all)	0.1 (all)	0.0 (all)	0.0 (all)
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	0.1 (all)	0.2 (all)	0.1 (all)	0.1 (all)	0.1 (all)	0.4 (all)	0.1 (all)	0.0 (all)	0.0 (all)
	Odor	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative	negative	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	0.1 (all)	0.2 (all)	0.1 (all)	0.1 (all)	0.1 (all)	0.4 (all)	0.1 (all)	NA	NA
	Odor	negative	negative	negative	negative	negative	negative	negative	NA	NA
	Sheen	negative	negative	negative	negative	negative	negative	negative	NA	NA
	Blot Test	negative	negative	negative	negative	negative	negative	negative	NA	NA
12–16 ft bgs	Peak PID ppm	0.1 (all)	0.2 (all)	0.1 (all)	0.1 (all)	0.1 (all)	0.4 (all)	0.1 (all)	NA	NA
	Odor	negative	negative	negative	negative	negative	negative	negative	NA	NA
	Sheen	negative	negative	negative	negative	negative	negative	negative	NA	NA
	Blot Test	negative	negative	negative	negative	negative	negative	negative	NA	NA
Depth to Groundwater		12 ft	NA	10 ft	NA	NA	14.5 ft	15 ft	NA	NA

Table 3.1
Soil Boring Field Observations

Boring Location	Field Observation	PP-21	PP-22	PP-24	PP-25
0–4 ft bgs	Peak PID ppm	0.0 (all)	0.0 (all)	0.0 (all)	0.1 (all)
	Odor	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)
	Odor	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)
	Odor	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative
12–16 ft bgs	Peak PID ppm	0.0 (all)	0.0 (all)	0.0 (all)	0.0 (all)
	Odor	negative	negative	negative	negative
	Sheen	negative	negative	negative	negative
	Blot Test	negative	negative	negative	negative
Depth to Groundwater		13.5 ft	11.5 ft	9 ft	15 ft

Peninsula Fuel Company

Boring Location	Field Observation	PF-1	PF-2	PF-3	PF-4	PF-5	PF-6	PF-7	PF-8	PF-9
0–4 ft bgs	Peak PID ppm	0.3 @ 4 ft	1.9 @ 2.5 ft	0.0 (all)	2.7 @ 3.5 ft	0.2 (all)	3.6 @ 3 ft	147 @ 4 ft	1.0 @ 4 ft	0.1 @ 2 ft
	Odor	negative	negative	negative	negative	negative	negative	stringy rainbow	stringy opaque	negative
	Sheen	negative	negative	negative	negative	negative	negative	gasoline	negative	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
4–8 ft bgs	Peak PID ppm	8 @ 7 ft	60 @ 7 ft	35 @ 7 ft	8.2 @ 7.5 ft	0.3 (all)	185 @ 7.5 ft	146 @ 7.5 ft	291 @ 7.5 ft	0 (all)
	Odor	slight HC	HC	gasoline	negative	negative	gasoline	gasoline	gasoline	negative
	Sheen	negative	negative	negative	negative	stringy opaque	heavy rainbow	stringy rainbow	heavy rainbow	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
8–12 ft bgs	Peak PID ppm	1.2 @ 9.5 ft	1.2 (all)	0.8 @ 10.5 ft	0.3 @ 9.5 ft	0.4 (all)	NA	4.8 @ 9.5 ft	92 @ 10.5 ft	0 (all)
	Odor	slight HC	negative	negative	negative	negative	negative	negative	gasoline	negative
	Sheen	stringy rainbow	negative	negative	negative	negative	negative	negative	heavy rainbow	negative
	Blot Test	negative	negative	negative	negative	negative	negative	negative	negative	negative
Depth to Groundwater		5.3 ft	4 ft	5.3 ft	7 ft	4.2 ft	4 ft	5.5 ft	7.2 ft	6.1 ft

Note:

* Borings advanced on the raised concrete foundation were field screened beginning at a depth corresponding to the adjacent ground surface, approximately 5 feet below the foundation grade.

Abbreviations:

bgs	Below ground surface
ft	Feet
HC	Hydrocarbon
NA	Not applicable or not measured
PCP	Pentachlorophenol
PID	Photoionization detector
ppm	Parts per million

Table 3.2
Gasoline-range, Diesel-range, and Oil-range Organics, and BTEX Results for Soil

		Analyte	Gasoline-range Organics	Diesel-range Organics	Oil-range Organics	Benzene	Toluene	Ethylbenzene	Xylenes^1
		Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
		MTCA Method A Unrestricted Land Use CUL	30^2	2,000	2000	0.030	7.0	6.0	9.0
Location	**Sample Date**	**Sample Depth (ft bgs)**							
Gasoline/Diesel Source Area									
K-00*	10/16/2013	14–15	**9,300**	**23,000** JM	690 JM	**120**	**52**	**170**	**690**
K-01*	10/16/2013	10–11	**2,200**	**13,000** JM	250 U	**5**	**10**	**15**	**92**
K-02*	10/16/2013	14–15	**2,400**	**14,000**	250 U	**11**	**11**	**49**	5.9
K-03*	10/16/2013	15.5–16	29	50 U	250 U	**0.8**	0.14	1	0.06 U
K-04*	10/16/2013	15.5–16	2 U			0.02 U	0.02 U	0.02 U	0.06 U
K-06*	10/16/2013	15.5–16	**4,200**	**2,600**	250 U	2 U	**22**	**78**	6 U
K-07*	10/16/2013	11–12	**3,400**	**7,000**	**4,600**	**51**	**180**	**45**	**300**
K-08*	9/23/2013	11–12	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-09*	9/23/2013	15–16	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-11	9/10/2013	1.5–2.5	2 U			0.02 U	0.02 U	0.02 U	0.06 U
K-12	9/11/2013	1–2	2 U			0.02 U	0.02 U	0.02 U	0.098
K-13	9/11/2013	3–4	2 U			0.02 U	0.02 U	0.02 U	0.06 U
K-13	9/11/2013	10–11	**1,200**			**0.76**	5.9	**8.4**	**11**
K-14	9/11/2013	9.5–10.5	**1,600**			**0.34**	**8.6**	**14**	8
K-15	9/11/2013	9.5–10.5	**1,900**			**0.58**	**12**	**15**	**10**
K-16*	9/23/2013	15.5–16.5	**560**	710 JM	120 U	**0.58**	3.7	2.4	5.8
K-17*	9/23/2013	16.8–17.8	**510**	180 JM	120 U	**1.6**	4.5	**7.2**	4.4
K-18*	9/20/2013	14–15.5	**2,000**	690 JM	120 U	**6.6**	**12**	**35**	**34**
K-19	9/11/2013	8.5–10	**2,400**			**13**	**21**	**35**	**160**
K-20	9/11/2013	3–4	**44**			**0.034**	0.16	0.46	0.72
K-21	9/11/2013	3.8–5.2	**8,600**			**2.5**	**29**	**48**	**290**
K-23*	9/20/2013	10–10.5	**3,500**	1,700 JM	120 U	**4.1**	**17**	**36**	**190**
K-24*	9/20/2013	14–15	**3,100**	**6,200**	120 U	**4.6**	**15**	**55**	**19**
K-25*	9/23/2013	7–8	4.6	38 JM	120 U	**0.21**	0.02 U	0.048	0.11
K-26*	9/18/2013	9.8–10.3	**2,500**	**6,300**	120 U	**1.3**	**7**	**34**	**24**
K-27*	9/18/2013	9.5–11.5	**4,500**	**3,400** JM	120 U	**10**	**100**	**50**	**290**
K-28*	9/18/2013	9.5–11.5	**6,600**	1,100 JM	120 U	**7.3**	**28**	**90**	**230**
K-29	9/12/2013	8.5–9.5	3	25 U	120 U	**0.097**	0.051	0.058	0.06 U
K-33	9/11/2013	3–4	2 U			0.02 U	0.02 U	0.02 U	0.06 U
K-34	9/11/2013	3–4	2 U			0.02 U	0.02 U	0.02 U	0.06 U
K-35	9/11/2013	3–4	2 U			0.02 U	0.02 U	0.02 U	0.06 U
K-35	9/11/2013	9–10	**500**			**0.56**	3.5	5	**26**
K-36	9/11/2013	3–4	2 U			0.02 U	0.02 U	0.02 U	0.06 U
K-36	9/11/2013	9–10	2.6			0.02 U	0.024	0.077	0.06 U
K-36	9/11/2013	10–11	**880**			0.2 U	4.9	**7.1**	4.8
K-39	9/12/2013	9–10	10	48 JM	120 U	**0.59**	0.069	0.038	0.12
K-40*	9/12/2013	7–8	6.3			0.02 U	0.02 U	0.033	0.29
K-40*	9/12/2013	10.5–12	**14,000**			**46**	**350**	**140**	**800**
K-42*	9/20/2013	11.5–12	**2,800**	**13,000** JM	1,100 JM	**33**	**130**	**42**	**260**
K-43*	9/23/2013	10–11	**3,200**	**9,500**	**8,700**	**5**	**23**	**41**	**150**
K-44*	9/23/2013	15–16	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-45*	9/18/2013	9–11	2 U	25 U	120 U	0.02 U	0.041	0.02 U	0.06 U
K-46*	9/19/2013	7–8	**1,300**	**11,000** J	120 UJ	**3.4**	4.4	**14**	**36**
K-46*	9/19/2013	10–11	**7,000**	**17,000** J	120 UJ	**15**	**23**	**51**	**200**
K-47*	9/23/2013	7–8	**7,300**	**2,100** JM	120 U	**5.1**	**58**	**79**	**490**
K-48*	9/23/2013	10–11	**6,000**	**24,000**	230 JM	**41**	**36**	**65**	**320**
K-49*	9/23/2013	10–11	**3,300**	**6,300**	120 U	**21**	**14**	**40**	**62**
K-77	10/14/2013	10.5–11.5	2 U	20 U	100 U	**0.15**	0.02 U	0.02 U	0.06 U
K-78	10/14/2013	11–12	2 U	20 U	100 U	**0.091**	0.02 U	0.11	0.06 U
K-79	10/14/2013	6–7	**3,300**	670 JM	100 U	**5.6**	**19**	**19**	**85**
K-80	10/14/2013	6.5–7.5	**3,300**	1,500 JM	100 U	**2.5**	**41**	**31**	**210**
K-81	10/15/2013	7.5–9.5	**3,000**	580 JM	100 U	0.4 U	**14**	**16**	**75**
K-82	10/15/2013	7–8	2 U	20 U	100 U	0.02 U	0.02 U	0.02 U	0.06 U
K-86	10/15/2013	7–8	2 U	20 U	100 U	0.02 U	0.02 U	0.02 U	0.06 U
K-87	10/15/2013	9.5–10.5	2 U	20 U	100 U	0.02 U	0.02 U	0.02 U	0.06 U
K-88	10/15/2013	9–9.5	3.2	20 U	100 U	0.02 U	0.038	0.02 U	0.06 U
KT-21	9/12/2013	0.5–1.5	2 U			0.02 U	0.02 U	0.02 U	0.06 U
Pipeline 8-West	9/12/2013	4–4.2	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
PP-23	9/18/2013	10–11.5	**190**	**4,500**	180 JM	0.02 U	0.02 U	0.15	0.57
PZ-06A	9/10/2013	3–4	**1,300**	140 JM	120 U	0.2 U	0.2 U	1.9	**14**
Hydraulic Oil Area and Downgradient									
K-50	9/10/2013	3.5–6	**860**	**5,200** JM	**5,400**	0.4 U	**12**	1.9	5.5
K-52	9/9/2013	10.5–11	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-55	9/9/2013	10.5–11	89	1500 JM	120 U	0.02 U	0.14	0.42	1.3
K-56	9/9/2013	10–10.5	**4,600**	990 JM	120 U	**4.4**	**23**	**55**	**240**
K-57	9/9/2013	11–11.5		25 U	120 U				
K-59	9/9/2013	11–11.5		25 U	120 U				
K-61	9/9/2013	11–12		25 U	120 U				
K-63	9/10/2013	11–12	9.9	**3,300** JM	**32,000**	**0.16**	0.095	0.027	0.17
K-64	9/10/2013	10.5–11.5	**740**	**3,500** JM	**23,000**	**0.47**	5	1.4	4.9
K-65	9/10/2013	9.5–11.5	**3,500**	**3,300** JM	**16,000**	1 U	**26**	**46**	**20**
K-66	9/10/2013	11.5–15.5	7.1	220 JM	310	0.02 U	0.032	0.02 U	0.067
K-66	9/10/2013	3.5–5.5	**160**	**4,200** JM	**6,800**	0.02 U	2.1	0.35	0.98
K-67	10/14/2012	11–12	2 U	**2,000** JM	**24,000**	0.02 U	0.02 U	0.02 U	0.06 U
K-68	10/14/2013	10.5–11.5	2 U	20 U	100 U	0.02 U	0.02 U	0.02 U	0.06 U
K-69	10/14/2013	11–12	49	30 JM	180	0.1 U	0.28	0.14	0.38
K-70	10/14/2013	11–12	**1,000**	940 JM	**3,100**	**0.23**	4.1	3.8	**12**
K-71	10/14/2013	11–12	2 U	20 U	100 U	0.02 U	0.02 U	0.02 U	0.06 U
K-72	10/14/2013	11–12	2 U	200 JM	1300	0.02 U	0.02 U	0.02 U	0.06 U
K-73	10/14/2013	11–12	3.4	**2,500** JM	**25,000**	**0.17**	0.061	0.02 U	0.082
K-74	10/14/2013	11–12	2 U	20 U	100 U	0.02 U	0.02 U	0.02 U	0.06 U
K-75	10/14/2013	11–12	2 U	20 U	100 U	**0.094**	0.025	0.02 U	0.06 U
K-76	10/14/2013	11–12	2 U	20 U	100 U	0.029	0.02 U	0.02 U	0.06 U
K-83	10/15/2013	6.5–9	**150**	170 JM	100 U	**0.075**	0.39	1.2	5.9
K-84	10/15/2013	11.5–12	**1,500**	130 JM	100 U	0.4 U	**7.7**	0.4 U	6.4
K-85	10/15/2013	7–8	2 U	20 U	100 U	0.02 U	0.02 U	0.02 U	0.06 U
K-89	10/16/2013	14–15	**880**	**8,100** JM	1,200 JM	**0.24**	0.95	2.3	3.8
K-103	10/16/2013	13–14	**5,600**	**2,300** JM	**2,400**	2 U	**31**	**87**	**15**

Table 3.2
Gasoline-range, Diesel-range, and Oil-range Organics, and BTEX Results for Soil

		Analyte	**Gasoline-range Organics**	**Diesel-range Organics**	**Oil-range Organics**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylenes**[1]
		Units	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
		MTCA Method A Unrestricted Land Use CUL	30[2]	2,000	2000	0.030	7.0	6.0	9.0
Location	**Sample Date**	**Sample Depth (ft bgs)**							
Upgradient Areas East									
K-91	9/20/2013	10–12	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-92	9/20/2013	7.5–8	**1,500**	79 JM	120 U	0.02 U	**9.1**	**10**	**23**
K-98	9/10/2013	10.5–11.5	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-99	9/10/2013	10.5–11.5	2 U	35 JM	240	0.02 U	0.02 U	0.02 U	0.06 U
K-200	9/19/2013	8–10	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-201	9/19/2013	10–11	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-202	9/19/2013	10–11	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-203	9/19/2013	11–12	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
KT-10	9/10/2013	2–3	4	25 U	120 U	0.02 U	0.02 U	0.41	0.17
KT-11	9/11/2013	1–1.5	2 U	200 JM	**2,600**	0.02 U	0.02 U	0.02 U	0.06 U
KT-12	9/10/2013	3–3.5		25 U	120 U				
KT-12	9/10/2013	8.5–9		34 JM	120 U				
KT-20	9/10/2013	10.5–11	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
Debarker and Log Pond									
K-90	9/12/2013	14–15	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-94	9/12/2013	10–11	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-95	9/12/2013	5.5–7	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-96	9/12/2013	10.5–11.5	2 U	55 JM	320	0.02 U	0.02 U	0.02 U	0.06 U
K-97	9/12/2013	5.5–7	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-100	9/12/2013	11–15.5	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U
K-101	9/12/2013	13.5–15	2 U	250 JM	**2,800**	0.02 U	0.02 U	0.02 U	0.06 U
Peninsula Fuel Company									
PF-1	9/13/2012	7–8	7.9	160	120 U	0.02 U	0.051	0.024	0.067
PF-2	9/13/2013	7–8	**140**	1,000	120 U	0.02 U	0.4	0.5	1
PF-3	9/18/2013	7–8	27	300	120 U	0.02 U	0.02 U	0.091	0.21
PF-4	9/18/2013	6–8	2 U	38	120 U	0.02 U	0.02 U	0.02 U	0.06 U
PF-5	9/13/2013	7–8	8.7	350	120 U	0.02 U	0.02 U	0.02 U	0.06 U
PF-6	9/13/2013	6.7–8	**630**	910	120 U	0.2 U	3.7	3.6	4
PF-7	9/13/2013	7–8	**260**	1,200	180 JM	**0.05**	0.69	2.1	3.1
PF-7	9/13/2013	3.5–6.5	**1,600**	**3,400**	430 JM	0.2 U	5.6	**7**	**13**
PF-8	9/13/2013	3–4	2 U	39	120 U	0.02 U	0.02 U	0.02 U	0.06 U
PF-8	9/13/2013	7–8	**2,200**	**12,000**	180 JM	**2.4**	**11**	4.2	**13**
PF-9	9/18/2013	7–8	2 U	25 U	120 U	0.02 U	0.02 U	0.02 U	0.06 U

Notes:

BOLD	Indicates a concentration that exceeds the MTCA CUL.
*	Indicates a boring that was advanced through the concrete slab, which sits approximately 5 feet above grade.
1	The reported xylenes concentration is the sum of o-xylene, p-xylene, and m-xylene.
2	The MTCA Method A Unrestricted CUL for gasoline-range organics in soil is 30 mg/kg if benzene is detected.
	Blank cells indicate the sample was not analyzed for that analyte.

Abbreviations:

bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CUL	Cleanup level
ft	Feet
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act

Qualifiers:

JM	Concentration is estimated due to poor match to standard, acceptable for use with qualification.
U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimat

Table 3.3
Dioxins/Furans Results for Soil

Location			SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Sample ID			SS-1	SS-2	SS-3	SS-4-0-0.25	SS-5-0-0.25	SS-6-0-0.25
Sample Date			9/11/2013	9/11/2013	9/11/2013	9/20/2013	9/20/2013	9/20/2013
Analyte	**Units**	**TEF**						
2,3,7,8-TCDD	pg/g	1	0.334 U	0.941 J	0.284 U	1.43	3.78	23.7
1,2,3,7,8-PeCDD	pg/g	1	0.461 J	2.49 J	0.422 U	3.75 J	14.6	87.7
1,2,3,4,7,8-HxCDD	pg/g	0.1	0.449 U	1.96 J	0.327 U	3.65 J	15.6	64.3
1,2,3,6,7,8-HxCDD	pg/g	0.1	1.44 J	4.04 J	0.611 J	15.9	30.3	131
1,2,3,7,8,9-HxCDD	pg/g	0.1	0.978 J	3.32 J	0.627 J	7.74	21.4	87.5
1,2,3,4,6,7,8-HpCDD	pg/g	0.01	49	63.1	6.28	280	210	549
OCDD	pg/g	0.0003	384	464	30.1	2330	665	660
2,3,7,8-TCDF	pg/g	0.1	0.62 U	3.98	0.379 J	7.84	26.9	114
1,2,3,7,8-PeCDF	pg/g	0.03	0.25 U	2.8 J	0.327 U	5.36	35.1	97.1
2,3,4,7,8-PeCDF	pg/g	0.3	0.791 J	5.52	0.292 U	7.74	33.7	107
1,2,3,4,7,8-HxCDF	pg/g	0.1	0.328 U	1.81 J	0.199 U	14.7	43	84.9
1,2,3,6,7,8-HxCDF	pg/g	0.1	0.465 J	2.43 J	0.201 U	8.14	41.6	87.5
2,3,4,6,7,8-HxCDF	pg/g	0.1	0.527 J	3.14 J	0.206 U	8.15	33.5	89
1,2,3,7,8,9-HxCDF	pg/g	0.1	0.285 U	0.504 U	0.285 U	3.54 J	10.5	18.9
1,2,3,4,6,7,8-HpCDF	pg/g	0.01	5.22	9.71	0.802 J	110	93.2	152
1,2,3,4,7,8,9-HpCDF	pg/g	0.01	0.352 U	1.07 J	0.409 U	8.05	10.5	20.6
OCDF	pg/g	0.0003	20.9	22.8	1.77 J	337	85.3	52.1
Summed Dioxin/ Furan TEQ[1,2]	pg/g		1.7	8.12	0.242	19.4	55.2	222
Summed Dioxin/Furan TEQ with One-half of the Detection Limit[1,3]	pg/g		1.96	8.15	0.707	19.4	55.2	222

Notes:

1 World Health Organization 2005 Toxic Equivalency Factors used for calculation of dioxin/furan TEQ (Van den Berg et al. 2006).

2 Calculated using detected dioxin/furan concentrations.

3 Calculated using detected dioxin/furan concentrations plus one-half the detection limit for dioxins/furans that were not detected.

Abbreviations:

HpCDD	Heptachlorodibenzo-p-dioxin
HpCDF	Heptachlorodibenzofuran
HxCDD	Hexachlorodibenzo-p-dioxin
HxCDF	Hexachlorodibenzofuran
MTCA	Model Toxics Control Act
OCDD	Octachlorodibenzo-p-dioxin
OCDF	Octachlorodibenzofuran
PeCDD	Pentachlorodibenzo-p-dioxin
PeCDF	Pentachlorodibenzofuran
pg/g	Picograms per gram
TCDD	Tetrachlorodibenzo-p-dioxin
TCDF	Tetrachlorodibenzofuran
TEQ	Total equivalancy quotient

Qualifiers:

J	Analyte was detected, concentration should be considered an estimate.
U	Analyte was not detected, concentration given is the reporting limit.

Table 3.4
Metals, SVOC, and VOC Detections in Soil[1]

Location			AOPC3-10	AOPC3-11	K-11	K-29	K-33	K-34	K-37	K-39	K-39	K-40	K-46
Sample ID			AOPC3-10	AOPC3-11	K-11-1.5-2.5	K-29-8.5-9.5	K-33-3-4	K-34-3-4	K-37-8.5-9.5	K-39-0-4	K-39-9-10	K-40-10.5-12	K-46-10-11
Sample Date			09/11/2013	09/11/2013	09/10/2013	09/12/2013	09/11/2013	09/11/2013	09/12/2013	09/12/2013	09/12/2013	09/12/2013	09/19/2013
Sample Depth (ft bgs)			2.5	2.5	1.5–2.5	8.5–9.5	3–4	3–4	8.5–9.5	0–4	9–10	10.5–12	10–11
Analytes	**Units**	**MTCA Method A Unrestricted Land Use CUL**											
Metals													
Arsenic	mg/kg	20											
Barium	mg/kg												
Chromium	mg/kg	2,000											
Lead	mg/kg	250			11.6							19	12.8
Semivolatile Organic Compounds (SVOCs)													
bis(2-ethylhexyl)phthalate	mg/kg		60	0.096 U		0.096 U			0.096 U	0.096 U	0.096 U		
Carbazole	mg/kg		0.3 U	0.006 U		0.006 U			0.006 U	0.006 U	0.006 U		
Diethylphthalate	mg/kg		0.3 U	0.0091		0.0081			0.0072	0.006 U	0.0061		
Pentachlorophenol	mg/kg		230	0.06 U		0.06 U			0.06 U	0.06 U	0.06 U		
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)													
Benzo(a)anthracene	mg/kg		0.3 U	0.036		0.006 U			0.006 U	0.006 U	0.006 U		0.1 U
Benzo(a)pyrene	mg/kg		0.3 U	0.033		0.006 U			0.006 U	0.006 U	0.006 U		0.1 U
Benzo(b)fluoranthene	mg/kg		0.41	0.044		0.006 U			0.006 U	0.006 U	0.006 U		0.1 U
Benzo(k)fluoranthene	mg/kg		0.3 U	0.017		0.006 U			0.006 U	0.006 U	0.006 U		0.1 U
Chrysene	mg/kg		0.3 U	0.044		0.006 U			0.006 U	0.006 U	0.006 U		0.11
Dibenzo(a,h)anthracene	mg/kg		0.3 U	0.0063		0.006 U			0.006 U	0.006 U	0.006 U		0.1 U
Indeno(1,2,3-cd)pyrene	mg/kg		0.3 U	0.023		0.006 U			0.006 U	0.006 U	0.006 U		0.1 U
Summed cPAH TEQ with One-half of the Reporting Limit[2,3]	mg/kg	2	0.25	0.046		0.0045 U			0.0045 U	0.0045 U	0.0045 U		0.076
Polycyclic Aromatic Hydrocarbons (PAHs)													
Naphthalene	mg/kg	5	0.3 U	0.006 U	0.05 U	0.006 U	0.05 U	0.05 U	0.015	0.006 U	0.18		**38**
Acenaphthylene	mg/kg		0.3 U	0.006 U		0.006 U			0.006 U	0.006 U	0.006 U		
Acenaphthene	mg/kg		0.3 U	0.006 U		0.006 U			0.006 U	0.006 U	0.006 U		
Fluorene	mg/kg		0.3 U	0.006 U		0.006 U			0.006 U	0.006 U	0.006 U		
Phenanthrene	mg/kg		0.3 U	0.033		0.0073			0.006 U	0.006 U	0.0061		
Anthracene	mg/kg		0.3 U	0.0079		0.006 U			0.006 U	0.006 U	0.006 U		
2-Methylnaphthalene	mg/kg		0.3 U	0.006 U		0.006 U			0.006 U	0.006 U	0.096		
Fluoranthene	mg/kg		0.3 U	0.06		0.0093			0.006 U	0.006 U	0.006 U		
Pyrene	mg/kg		1.2	0.059		0.0089			0.0067	0.006 U	0.006 U		
Benzo(g,h,i)perylene	mg/kg		0.3 U	0.022		0.006 U			0.006 U	0.006 U	0.006 U		
Volatile Organic Compounds (VOCs)[4]													
1,2,4-Trimethylbenzene	mg/kg				0.05 U		0.056	0.05 U					
2,6-bis(1,1-dimethylethyl)-4-Methylphenol	mg/kg						1.1						
2-Methylpentane	mg/kg												
iso-Pentane	mg/kg												
n-Hexane	mg/kg											70	12
n-Pentane	mg/kg												

Notes:

Bold Indicates a concentration that exceeds the MTCA Method A Unrestricted Land Use CUL.

Blank cells indicate the sample was not analyzed for that analyte.

1 Sample results are included in this table if there was at least a single detection of a metal, SVOC, or VOC. Only those analytes detected are included.

2 Calculation of cPAH TEQ concentrations was performed using the California Environmental Protection Agency 2005 Toxic Equivalency Factors as presented in Table 708-2 of WAC 173-340-900 (WSDOE 2007).

3 Calculated using detected cPAH concentrations plus one-half the reporting limit for cPAHs that were not detected.

4 BTEX results are included in Table 3.2.

Abbreviations:

BETX	Benzene, toluene, ethylbenzene, and xylenes
CUL	Cleanup level
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
TEQ	Total equivalancy quotient

Qualifiers:

U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimate.

Table 3.4

Metals, SVOC, and VOC Detections in Soil[1]

		Location	K-50	K-59	K-63	K-64	K-66	K-89	K-91		K-92	K-98	K-99
		Sample ID	K-50-3.5-6	K-59-11-11.5	K-63-11-12	K-64-10.5-11.5	K-66-3.5-5.5	K-89-14-15	K-91-10-12	K-91-10-12-D	K-92-7.5-8	K-98-10.5-11.5	K-99-10.5-11.5
		Sample Date	09/10/2013	09/09/2013	09/10/2013	09/10/2013	09/10/2013	10/16/2013	09/20/2013	09/20/2013	09/20/2013	09/10/2013	09/10/2013
		Sample Depth (ft bgs)	3.5–6	11–11.5	11–12	10.5–11.5	3.5–5.5	14–15	10–12	10–12	7.5–8	10.5–11.5	10.5–11.5
Analytes	**Units**	**MTCA Method A Unrestricted Land Use CUL**											
Metals													
Arsenic	mg/kg	20										3.04	2.75
Barium	mg/kg											11.2	13.1
Chromium	mg/kg	2,000										15.2	12.4
Lead	mg/kg	250	58.4			3.68	11.1		1 U	1 U	3.05	3.78	2.84
Semivolatile Organic Compounds (SVOCs)													
bis(2-ethylhexyl)phthalate	mg/kg							48 UJ				0.48 U	4.8 U
Carbazole	mg/kg							30 UJ				0.03 U	0.3 U
Diethylphthalate	mg/kg							3 U				0.03 U	0.3 U
Pentachlorophenol	mg/kg							30 UJ				0.3 U	3 U
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)													
Benzo(a)anthracene	mg/kg			0.01 U	0.1 U	0.56		33				0.01 U	0.1 U
Benzo(a)pyrene	mg/kg			0.01 U	0.1 U	0.1 U		11				0.01 U	0.1 U
Benzo(b)fluoranthene	mg/kg			0.01 U	0.1 U	0.1 U		18				0.01 U	0.1 U
Benzo(k)fluoranthene	mg/kg			0.01 U	0.1 U	0.1 U		5.5				0.01 U	0.1 U
Chrysene	mg/kg			0.01 U	0.18	0.29		29				0.01 U	0.1 U
Dibenzo(a,h)anthracene	mg/kg			0.01 U	0.1 U	0.1 U		1 U				0.01 U	0.1 U
Indeno(1,2,3-cd)pyrene	mg/kg			0.01 U	0.1 U	0.1 U		4.1				0.01 U	0.1 U
Summed cPAH TEQ with One-half of the Reporting Limit[2,3]	mg/kg	2		0.0076 U	0.077	0.13		**17**				0.0076 U	0.076 U
Polycyclic Aromatic Hydrocarbons (PAHs)													
Naphthalene	mg/kg	5		0.01 U	0.05 U	0.1 U		**690**				0.03 U	0.05 U
Acenaphthylene	mg/kg			0.01 U	0.1 U	0.1 U		4.4				0.03 U	0.3 U
Acenaphthene	mg/kg			0.01 U	0.28	0.1 U		240				0.03 U	0.3 U
Fluorene	mg/kg			0.01 U	0.1 U	0.1 U		210				0.03 U	0.3 U
Phenanthrene	mg/kg			0.01 U	0.1 U	0.23		530				0.03 U	0.3 U
Anthracene	mg/kg			0.01 U	0.1 U	0.1 U		65				0.03 U	0.3 U
2-Methylnaphthalene	mg/kg							280				0.03 U	0.3 U
Fluoranthene	mg/kg			0.01 U	0.1 U	0.1 U		180				0.03 U	0.3 U
Pyrene	mg/kg			0.01 U	0.1 U	0.16		130				0.03 U	0.3 U
Benzo(g,h,i)perylene	mg/kg			0.01 U	0.1 U	0.1 U		2.8				0.03 U	0.3 U
Volatile Organic Compounds (VOCs)[4]													
1,2,4-Trimethylbenzene	mg/kg				0.05 U							0.05 U	0.05 U
2,6-bis(1,1-dimethylethyl)-4-Methylphenol	mg/kg												
2-Methylpentane	mg/kg				0.55								
iso-Pentane	mg/kg				1.4								
n-Hexane	mg/kg		0.31										
n-Pentane	mg/kg				0.32								

Notes:

Bold	Indicates a concentration that exceeds the MTCA Method A Unrestricted Land Use CUL.
	Blank cells indicate the sample was not analyzed for that analyte.
1	Sample results are included in this table if there was at least a single detection of a metal, SVOC, or VOC. Only those analytes detected are included.
2	Calculation of cPAH TEQ concentrations was performed using the California Environmental Protection Agency 2005 Toxic Equivalency Factors as presented in Table 708-2 of WAC 173-340-900 (WSDOE 2007).
3	Calculated using detected cPAH concentrations plus one-half the reporting limit for cPAHs that were not detected.
4	BTEX results are included in Table 3.2.

Abbreviations:

BETX	Benzene, toluene, ethylbenzene, and xylenes
CUL	Cleanup level
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
TEQ	Total equivalancy quotient

Qualifiers:

U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimate.

Table 3.4

Metals, SVOC, and VOC Detections in Soil[1]

		Location	K-100	K-101	KT-10	KT-11	KT-12		PF-1	PF-6	PP-23	PZ-06A
		Sample ID	K-100-11-15.5	K-101-13.5-15	KT-10-2-3	KT-11-1-1.5	KT-12-3-3.5	KT-12-8.5-9	PF-1-7-8	PF-6-6.7-8	PP-23-10-11.5	PZ-06A-3-4
		Sample Date	09/12/2013	09/12/2013	09/10/2013	09/11/2013	09/10/2013	09/10/2013	09/13/2012	09/13/2013	09/18/2013	09/10/2013
		Sample Depth (ft bgs)	11–15.5	13.5–15	2–3	1–1.5	3–3.5	8.5–9	7–8	6.7–8	10–11.5	3–4
Analytes	**Units**	**MTCA Method A Unrestricted Land Use CUL**										
Metals												
Arsenic	mg/kg	20	2.12	1.75			2.57	1.95				
Barium	mg/kg		60.9	28.4			15.8	7.33				
Chromium	mg/kg	2,000	18.6	17.3			13.9	9.59				
Lead	mg/kg	250	4.82	5.65	6.84	10.8	3.73	1 U	2.22	11.3	6.83	6.95
Semivolatile Organic Compounds (SVOCs)												
bis(2-ethylhexyl)phthalate	mg/kg						120 U	0.48 U	0.096 U	4.8 U		
Carbazole	mg/kg						7.5 U	0.03 U	0.0081	0.3 U		
Diethylphthalate	mg/kg						7.5 U	0.03 U	0.006 U	0.3 U		
Pentachlorophenol	mg/kg						75 U	0.3 U	0.06 U	3 U		
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)												
Benzo(a)anthracene	mg/kg		0.01 U	0.1 U			2.5 U	0.01 U	0.006 U	0.3 U	0.011	
Benzo(a)pyrene	mg/kg		0.01 U	0.1 U			2.5 U	0.01 U	0.006 U	0.3 U	0.01 U	
Benzo(b)fluoranthene	mg/kg		0.01 U	0.1 U			2.5 U	0.01 U	0.006 U	0.3 U	0.01 U	
Benzo(k)fluoranthene	mg/kg		0.01 U	0.1 U			2.5 U	0.01 U	0.006 U	0.3 U	0.01 U	
Chrysene	mg/kg		0.01 U	0.19			2.5 U	0.01 U	0.006 U	0.3 U	0.027	
Dibenzo(a,h)anthracene	mg/kg		0.01 U	0.1 U			2.5 U	0.01 U	0.006 U	0.3 U	0.01 U	
Indeno(1,2,3-cd)pyrene	mg/kg		0.01 U	0.1 U			2.5 U	0.01 U	0.006 U	0.3 U	0.01 U	
Summed cPAH TEQ with One-half of the Reporting Limit[2,3]	mg/kg	2	0.0076 U	0.077			1.9 U	0.0076 U	0.0045 U	0.23 U	0.0084	
Polycyclic Aromatic Hydrocarbons (PAHs)												
Naphthalene	mg/kg	5					7.5 U	0.03 U	0.0073	0.61	0.066	
Acenaphthylene	mg/kg						7.5 U	0.03 U	0.0099	0.3 U		
Acenaphthene	mg/kg						7.5 U	0.03 U	0.022	0.3 U		
Fluorene	mg/kg						7.5 U	0.03 U	0.053	0.3 U		
Phenanthrene	mg/kg						7.5 U	0.043	0.095	0.3 U		
Anthracene	mg/kg						7.5 U	0.03 U	0.006 U	0.3 U		
2-Methylnaphthalene	mg/kg						7.5 U	0.03 U	0.33	4.8		
Fluoranthene	mg/kg						7.5 U	0.03 U	0.006 U	0.3 U		
Pyrene	mg/kg						7.5 U	0.03 U	0.006 U	0.3 U		
Benzo(g,h,i)perylene	mg/kg						7.5 U	0.03 U	0.006 U	0.3 U		
Volatile Organic Compounds (VOCs)[4]												
1,2,4-Trimethylbenzene	mg/kg											
2,6-bis(1,1-dimethylethyl)-4-Methylphenol	mg/kg											4.6
2-Methylpentane	mg/kg											
iso-Pentane	mg/kg											
n-Hexane	mg/kg								0.25 U	0.25 U	0.25 U	0.25 U
n-Pentane	mg/kg											

Notes:

Bold Indicates a concentration that exceeds the MTCA Method A Unrestricted Land Use CUL.

Blank cells indicate the sample was not analyzed for that analyte.

1 Sample results are included in this table if there was at least a single detection of a metal, SVOC, or VOC. Only those analytes detected are included.

2 Calculation of cPAH TEQ concentrations was performed using the California Environmental Protection Agency 2005 Toxic Equivalency Factors as presented in Table 708-2 of WAC 173-340-900 (WSDOE 2007).

3 Calculated using detected cPAH concentrations plus one-half the reporting limit for cPAHs that were not detected.

4 BTEX results are included in Table 3.2.

Abbreviations:

BETX	Benzene, toluene, ethylbenzene, and xylenes
CUL	Cleanup level
mg/kg	Milligrams per kilogram
MTCA	Model Toxics Control Act
TEQ	Total equivalancy quotient

Qualifiers:

U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimate.

Table 3.5
Petrophysical Test Physical Properties Data

		METHOD	API RP 40 / ASTM D2216	API RP 40		API RP 40		API RP 40	
			Moisture Content (% weight)	Density		Porosity, %Vb[2]		Pore Fluid Saturations, % Pv[3]	
Location	Depth (ft.)	Sample Orientation[1]		Dry Bulk g/cc	Grain g/cc	Total	Air Filled	Water	NAPL
PF-7-6.5-10	6.6	V	19.0	1.67	2.73	39.0	7.5	77.5	3.3
K-15-9.5-11	10.7	V	20.3	1.60	2.72	41.3	8.8	73.7	5.0
EW-2-A-10.5-12	11.6	V	14.4	1.71	2.73	37.4	10.0	22.4	50.7
PZ-06-A-3.5-5.5	4.6	V	45.3	1.19	2.68	55.5	1.0	88.4	9.8
PZ-06-A-8-9.5	9.4	V	13.7	1.94	2.72	28.7	1.7	85.3	8.7
K-27-9.5-11.5*	9.9	V	35.2	1.17	2.69	56.4	14.4	65.4	9.1

Notes:

***** Indicates a boring that was advanced through the concrete slab, which sits approximately 5 feet above grade.

1 Sample Orientation: H = horizontal; V = vertical; R = remold.

2 Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.

3 Fluid density used to calculate pore fluid saturations: Water = 0.9996 g/cc, NAPL = 0.8600 g/cc.

Abbreviations:

ft	Feet
g/cc	Grams per cubic centimeter
NAPL	Non-aqueous phase liquid
Pv	Pore volume
Vb	Bulk volume

Table 4.1
Monitoring Well Installation Details

Monitoring Well	Date Installed	Total Depth Drilled (ft bgs)	Total Well Length (ft bgs)	Screened Interval (ft bgs)	Casing Size (inches)	Approximate Ground Surface Elevation (ft NAVD 88)	Top of Casing Elevation (ft NAVD 88)	Northing (ft NAD 83/98)	Easting (ft NAD 83/98)	Completion Type
PP-4R	9/19/2013	19	18	8–18	2	17.85	15.74	420,417	1,003,289	Stick up/above ground
PP-6R	9/19/2013	19	18	8–18	2	18.01	15.91	420,512	1,003,411	Stick up/above ground
PP-15R	9/19/2013	19	18	8–18	2	17.72	14.81	420,492	1,003,105	Stick up/above ground
PP-20	9/20/2013	19	18	8–18	2	20.00	17.62	420,710	1,003,533	Stick up/above ground
PP-21	9/20/2013	19	18	8–18	2	17.62	15.41	420,618	1,003,760	Stick up/above ground
PP-22	9/19/2013	19	18	8–18	2	17.53	15.34	420,437	1,004,150	Stick up/above ground
PP-23	9/18/2013	19	18	8–18	2	16.58	NA	420,275	1,003,009	Flush mount
PP-24	9/19/2013	19	18	8–18	2	17.84	NA	419,957	1,003,543	Flush mount
PP-25	9/19/2013	19	18	8–18	2	19.86	19.18	419,921	1,003,890	Flush mount
PP-26	9/18/2013	19	18	8–18	2	17.96	15.46	420,450	1,003,236	Stick up/above ground

Abbreviations:

bgs	Below ground surface
ft	Feet
NA	Not available
NAD 83/98	North American Datum of 1983/1998
NAVD 88	North American Vertical Datum of 1988

Table 4.2
Water Level Elevation and Tidal Information

Monitoring Point	Elevation of TOC (ft NAVD 88)	Date	Time of Sampling (24-hour)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Water Table Elevation (ft NAVD 88)	Approximate Tidal Elevation at Time of Sampling[1] (ft MLLW)	Approximate Height of Water Table above/below Tidal Level at Time of Sampling (ft)
PZ-1	16.52	10/14/2013	18:22	10.65	--	--	5.87	3.03	2.8
PZ-2	17.45	--	--	--	--	--	--	--	--
PZ-3	17.23	--	--	--	--	--	--	--	--
PZ-4	20.88	10/14/2013	18:33	14.88	--	--	6.00	3.02	3.0
PZ-5	20.84	--	--	--	--	--	--	--	--
PZ-6[2]	20.91	11/5/2012	--	14.9	14.55	0.35	6.07	--	--
	20.91	11/6/2012	15:30	15.00	14.55	0.45	5.91	4.88	1.0
	15.45	2/5/2013	13:00	9.91	8.76	1.15	5.54	3.63	1.9
	15.45	10/14/2013	18:18	9.94	9.42	0.52	5.51	3.03	2.5
PZ-7	20.6	10/14/2013	18:29	10.15	--	--	10.45	3.02	7.4
PZ-8	20.75	--	--	--	--	--	--	--	--
PZ-9	14.98	--	--	--	--	--	--	--	--
PZ-10	17.01	--	--	--	--	--	--	--	--
PZ-11	16	--	--	--	--	--	--	--	--
PZ-12	15.69	11/5/2012	--	10.93	0.00	--	4.76	--	--
	15.69	11/6/2012	11:50	10.12	0.00	--	5.57	5.66	-0.1
	15.69	2/5/2013	11:25	10.10	0.00	--	5.59	5.84	-0.3
	15.69	10/14/2013	18:13	10.37	--	--	5.32	3.04	2.3
PZ-13	14.77	11/5/2012	--	10.6	0.00	--	4.17	--	--
	14.77	11/6/2012	9:50	9.85	0.00	--	4.92	6.08	-1.2
	14.77	2/5/2013	11:20	10.30	0.00	--	4.47	5.96	-1.5
	14.77	10/15/2013	11:52	10.49	--	--	4.28	6.03	-1.8
PP-1	14.75	--	--	--	--	--	--	--	--
PP-2	15.78	10/14/2013	18:22	12.49	10.2	2.29	3.29	3.02	0.3
PP-3	16.22	10/14/2013	18:26	11.08	10.75	0.33	5.14	3.02	2.1
PP-4	15.55	--	--	--	--	--	--	--	--
PP-4R	17.85	10/14/2013	18:38	12.02	--	--	5.83	3.02	2.8
PP-6	16.4	--	--	--	--	--	--	--	--
PP-6R	18.01	10/14/2013	18:41	12.32	--	--	5.69	3.02	2.7
PP-7	16.36	10/14/2013	18:13	10.62	--	--	5.74	3.04	2.7
PP-9	17.09	--	--	--	--	--	--	--	--
	17.09	10/14/2013	18:32	10.65	--	--	6.44	3.02	3.4
PP-10	15.34	--	--	--	--	--	--	--	--
PP-11	15.21	10/14/2013	18:33	11.26	10.22	1.04	3.95	3.02	0.9
PP-12	15.21	10/14/2013	18:31	11.09	10.02	1.07	4.12	3.02	1.1
PP-13	16.64	11/5/2012	--	11.06	0.00	--	5.58	--	--
	16.64	11/6/2012	11:00	7.40	0.00	--	9.24	5.88	3.4
	16.64	2/5/2013	14:35	11.50	0.00	--	5.14	1.2	3.9
	16.64	10/14/2013	18:17	11.50			5.14	3.03	2.1
PP-14	14.47	--	--	--	--	--	--	--	--
PP-15	14.93	11/5/2012	--	8.62	0.00	--	6.31	--	--
	14.93	11/6/2012	13:45	8.25	0.00	--	6.68	5.06	1.6
	14.93	2/5/2013	14:10	8.20	0.00	--	6.73	1.81	4.9
PP-15R	17.72	10/14/2013	18:20	12.01	--	--	5.71	3.03	2.7

Table 4.2
Water Level Elevation and Tidal Information

Monitoring Point	Elevation of TOC (ft NAVD 88)	Date	Time of Sampling (24-hour)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Water Table Elevation (ft NAVD 88)	Approximate Tidal Elevation at Time of Sampling[1] (ft MLLW)	Approximate Height of Water Table above/below Tidal Level at Time of Sampling (ft)
PP-16	20.89	--	--	--	--	--	--	--	--
PP-17	16.32	11/5/2012	--	12.5	0.00	--	3.82	--	--
	16.32	11/6/2012	9:33	11.25	0.00	--	5.07	6.23	-1.2
	16.32	2/5/2013	10:20	11.15	0.00	--	5.17	6.9	-1.7
	16.32	10/14/2013	18:35	11.69	--	--	4.63	3.02	1.6
PP-18	16.83	11/5/2012	--	13	0.00	--	3.83	--	--
	16.83	11/6/2012	9:25	11.34	0.00	--	5.49	6.22	-0.7
	16.83	2/5/2013	10:35	14.50	0.00	--	2.33	6.67	-4.3
	16.83	10/14/2013	18:30	11.91	--	--	4.92	3.02	1.9
PP-19	15.64	11/5/2012	--	12.5	0.00	--	3.14	--	--
	15.64	11/6/2012	10:30	10.61	0.00	--	5.03	6.16	-1.1
	15.64	2/5/2013	9:40	10.25	0.00	--	5.39	7.22	-1.8
	15.64	10/14/2013	18:40	11.53	--	--	4.11	3.02	1.1
PP-20	20.11	10/14/2013	18:22	15.81	--	--	4.3	3.02	1.3
PP-21	17.62	10/14/2013	18:18	13.42	--	--	4.2	3.03	1.2
PP-22	17.53	10/14/2013	18:13	12.71	--	--	4.82	3.04	1.8
PP-23	16.58	10/14/2013	18:30	10.31	--	--	6.27	3.02	3.3
PP-24	17.84	10/14/2013	18:17	11.65	--	--	6.19	3.03	3.2
PP-25	19.86	10/14/2013	18:13	13.51	--	--	6.35	3.04	3.3
PP-26	17.96	10/14/2013	18:23	12.02	--	--	5.94	3.02	2.9
MW-3	16.11	--	--	--	--	--	--	--	--
MW-4	15.63	--	--	--	--	--	--	--	--
MW-6	16.33	--	--	--	--	--	--	--	--
MW-8	17.89	10/14/2013	18:53	12.08	--	--	5.81	3.04	2.8
MW-9	15.56	--	--	--	--	--	--	--	--
MW-10	15.1	--	--	--	--	--	--	--	--
MW-12	14.29	--	--	--	--	--	--	--	--
MW-13	13.53	--	--	--	--	--	--	--	--
MW-14	16.16	--	--	--	--	--	--	--	--
MW-23	16.62	10/14/2013	18:46	10.85	--	--	5.77	3.04	2.7
MW-24	15.39	--	--	--	--	--	--	--	--
MW-25	15.58	--	--	--	--	--	--	--	--
EW-1	14.24	--	--	--	--	--	--	--	--
EW-2	16.69	--	--	--	--	--	--	--	--

Notes:

Earlier Interim Action Quarterly Monitoring results are included.

-- Not measured during Quarter 1 Baseline Monitoring Event; however, water levels may be measured at subsequent monitoring events.

1 Information is sourced from the National Oceanic and Atmospheric Administration (NOAA 2012). The NAVD 88 datum is 0.42 ft above MLLW at Station 9444090 NOAA/NOS/CO-OPS.

2 The water table elevation has been corrected due to the presence of product assuming a specific gravity of 0.85 for the product.

Abbreviations:

ft Feet
MLLW Mean Lower Low Water
NAVD 88 North American Vertical Datum of 1988
TOC Top of casing

Table 4.3
Gasoline-range, Diesel-range, and Oil-range Organics, and BTEX Results for Groundwater – Direct-push Probe Screening and Groundwater Monitoring Well Sampling

	Analyte	**Gasoline-range Organics**	**Diesel-range Organics**	**Motor Oil-range Organics**	**Benzene**	**Ethylbenzene**	**Toluene**	**Total Xylenes[1]**
	Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
MTCA Method A Unrestricted Land Use CUL		800	500	500	5	700	1,000	1,000
Sample ID	**Sample Date**							
Direct-push Probe Groundwater								
K-200-7-12	9/20/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
K-201-10-15	9/20/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
K-202-10-15	9/20/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
K-203-10-15	9/20/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
K-90-11-16	9/12/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
K-98-5-15	9/10/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
K-99-6.5-16.5	9/10/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
PF-1-4-9	9/13/2013	510	130	250 U	1 U	2.3	2.2	3.8
PF-2-4-9	9/13/2013	610	60	250 U	1 U	1.8	2.5	4.3
PF-3-4-9	9/18/2013	**2,200**	**2,300**	250 U	3.2	5.2	6.6	7.3
PF-5-4-9	9/13/2013	290	50 U	250 U	1 U	1 U	1.7	3 U
PF-6-3.5-8.5	9/13/2013	**9,500**	**1,200**	250 U	4.5	53	79	49
PF-7-4-9	9/13/2013	**6,900**	**2,100**	250 U	**64**	66	38	140
PF-8-5-10	9/13/2013	**2,300**	**2,400**	250 U	**200**	9.4	8.1	3 U
PF-9-4-9	9/18/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
Monitoring Wells								
PP-07	10/14/2013	600	350 JM	250 U	1.6	1	5.5	5
PP-13	10/14/2013	**1,200**	50 U	250 U	**420**	1.7	14	20
PP-15R	10/14/2013	**12,000**	110 JM	250 U	**3,700**	130	100 U	300 U
PP-17	10/15/2013	720	50 U	250 U	**170**	1 U	7.8	8.1
PP-18	10/15/2013	**7,500**	**1,200** JM	250 U	**240**	430	8.1	9.1
PP-18-D	10/15/2013	**7,300**	**1,300** JM	250 U	**250**	390	8.1	9.2
PP-19	10/15/2013	100 U	50 U	250 U	0.35 U	1 U	1 U	3 U
PP-20	10/15/2013	100 U	50 U	250 U	0.35 U	1 U	1 U	3 U
PP-21	10/15/2013	100 U	50 U	250 U	0.35 U	1 U	1 U	3 U
PP-22	10/15/2013	140	80 JM	250 U	0.35 U	1 U	1 U	3 U
PP-23	10/14/2013	**2,200**	**810** JM	250 U	3.3	6.3	11	8.8
PP-24	10/14/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
PP-25	10/15/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
PP-26	10/14/2013	**7,000**	250 JM	280 U	**1,600**	480	71	120 U
PP-9	10/14/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U
PZ-01	10/14/2013	500	50 U	250 U	**8.3**	1 U	6.6	4.3
PZ-01-D	10/14/2013	520	50 U	250 U	**8.5**	1 U	6.7	4.4
PZ-04	10/14/2013	**9,300**	**770** JM	250 U	**2,300**	40 U	40 U	120 U
PZ-07	10/14/2013	**2,100**	340 JM	250 U	**25**	110	17	30 U
PZ-12	10/14/2013	**910**	50 U	250 U	**370**	1 U	4.5	3 U
PZ-13	10/15/2013	100 U	50 U	250 U	1 U	1 U	1 U	3 U

Notes:

BOLD Exceeds MTCA Method A Unrestricted Land Use CUL.

1 The reported xylenes concentration is the sum of o-xylene, p-xylene, and m-xylene.

Abbreviations:

BTEX	Benzene, toluene, ethylbenzene, and xylenes
CUL	Cleanup level
-D	Duplicate sample
µg/L	Micrograms per liter
MTCA	Model Toxics Control Act

Qualifiers:

JM	Concentration is estimated due to poor match to standard, acceptable for use with qualification.
U	Analyte was not detected, value given is reporting limit.

Table 4.4
Metals, SVOC, VOC, Formaldehyde, and PCB Results in Groundwater
Direct-push Probe Screening and Groundwater Monitoring Well Sampling

		Sample ID	K-98-5-15	K-99-6.5-16.5	PP-13	PP-15R	PP-17	PP-18	PP-18-D	PP-19	PP-20	PP-21	PP-22	PP-23	PZ-12
		Sample Date	09/10/2013	09/10/2013	10/14/2013	10/14/2013	10/15/2013	10/15/2013	10/15/2013	10/15/2013	10/15/2013	10/15/2013	10/15/2013	10/14/2013	10/14/2013
Analyte	**Units**	**MTCA Method A Unrestricted Land Use CUL**													
Metals															
Lead	µg/L	15				1 U		2.44						1 U	
Semivolatile Organic Compounds (SVOCs)															
Naphthalene	µg/L	160	1 U	1 U	0.05 U	13	0.05 U	**260**	**230**	0.05 U	0.05 U	0.05 U	20	0.05 U	0.05 U
2-Methylnaphthalene	µg/L				1 U		0.2 U	160	160	0.2 U	0.2 U	0.2 U	2.4	4.5	1 U
2,4-Dimethylphenol	µg/L				10 U		2 U	2 U	2 U	2 U	2 U	2 U	8.1	10 U	10 U
3- & 4-Methylphenol	µg/L				20 U		4 U	4 U	4 U	4 U	4 U	4 U	100	20 U	20 U
2,4-Dinitrotoluene	µg/L				1 U		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	1	1 U
Benzoic acid	µg/L				50 U		10 U	10 U	10 U	10 U	10 U	10 U	230	50 U	50 U
Carbazole	µg/L				1 U		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.52	1 U	1 U
Diethylphthalate	µg/L				1 U		0.61	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	1 U	1 U
Phenol	µg/L				10 U		2 U	2 U	2 U	2 U	2 U	2 U	72	10 U	10 U
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)															
Benzo(a)anthracene	µg/L				0.05 U		0.05 U	0.05 U	0.5 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzo(a)pyrene	µg/L	0.1			0.01 U		0.01 U	0.01 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Benzo(b)fluoranthene	µg/L				0.01 U		0.01 U	0.01 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Benzo(k)fluoranthene	µg/L				0.01 U		0.01 U	0.01 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chrysene	µg/L				0.01 U		0.01 U	0.01 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Dibenzo(a,h)anthracene	µg/L				0.01 U		0.01 U	0.01 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Indeno(1,2,3-cd)pyrene	µg/L				0.01 U		0.01 U	0.01 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Summed cPAH TEQ with One-half of the Reporting Limit[1,2]	µg/L	0.1			0.0096 U		0.0096 U	0.0096 U	0.096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U
Polycyclic Aromatic Hydrocarbons (PAHs)															
Acenaphthene	µg/L				1 U		0.05 U	0.39	0.4 J	0.068	0.05 U	0.05 U	4.2	2.2	1 U
Anthracene	µg/L				1 U		0.073	0.05 U	0.5 U	0.05 U	0.05 U	0.05 U	0.18	1 U	1 U
Fluorene	µg/L				1 U		0.05 U	0.57	0.58	0.05 U	0.05 U	0.05 U	1.2	4.2	1 U
Phenanthrene	µg/L				1 U		0.05 U	0.53	0.51	0.05 U	0.05 U	0.05 U	0.05 U	3.2	1 U
Pyrene	µg/L				1 U		0.05 U	0.05 U	0.5 U	0.052	0.05 U	0.05 U	0.05 U	1 U	1 U
Volatile Organic Compounds (VOCs)															
1,2-Dichloroethane (EDC)	µg/L	5	1 U	1 U		**87**	4	1 U	1 U	1 U	1 U	1 U	1 U		
1,2-Dibromoethane (EDB)	µg/L		1 U	1 U			1 U	1 U	1 U	1 U	1 U	1 U	1 U		
Methyl tertiary-butyl ether (MTBE)	µg/L		1 U	1 U			1 U	1 U	1 U	1 U	1 U	1 U	1 U		
1,3,5-Trimethylbenzene	µg/L		1 U	1 U			1 U	2	2	1 U	1 U	1 U	1 U		
Acetone	µg/L		10 U	10 U			10 U	10 U	10 U	10 U	10 U	10 U	45		
n-Hexane	µg/L					1 U								1.5	
iso-Propylbenzene	µg/L		1 U	1 U			3.4	67	69	1 U	1 U	1 U	1 U		
Methylene chloride	µg/L	5	**5.4 J**	5 U			5 U	5 U	5 U	5 U	5 U	5 U	5 U		
n-Propylbenzene	µg/L		1 U	1 U			8.1	250	230	1 U	1 U	1 U	1 U		
Cymene	µg/L		1 U	1 U			1 U	1 U	1 U	1 U	1 U	1 U	14		
sec-Butylbenzene	µg/L		1 U	1 U			1 U	10	11	1 U	1 U	1 U	1 U		
Aldehydes															
Formaldehyde	µg/L				100 U										100 U
Polychlorinated Biphenyls (PCBs)															
PCBs (Total, Aroclors)	µg/L	0.1						0.1 U							

Notes:

1 Calculation of cPAH TEQ concentrations was performed using the California Environmental Protection Agency 2005 Toxic Equivancy Factors as presented in Table 708-2 of WAC 173-340-900 (WSDOE 2007).

2 Calculated using detected cPAH concentrations plus one-half the reporting limit for cPAHs that were not detected.

BOLD Exceeds MTCA Method A Unrestricted Land Use CUL.

Blank cells indicate the sample was not analyzed for that analyte.

J Analyte was detected, result concentration is an estimate.

U Analyte was not detected, value given is reporting limit.

Abbreviations:

CUL	Cleanup level
µg/kg	Micrograms per kilogram
MTCA	Model Toxics Control Act
TEQ	Total equivalancy quotient

Table 5.1
Analytical Results for Sediment

		Sediment Samples Results			Sediment Management Standards (SMS)			
	Location	**KSS-1**	**KSS-2**	**KSS-3**				
	Sample ID	**SD0001K**	**SD0002K**	**SD0003K**				
	Sample Date	**07/09/2013**	**07/09/2013**	**07/09/2013**				
	Sample Depth	**0–10 cm**	**0–10 cm**	**0–10 cm**	**SMS**	**SMS**	**SMS**	**SMS**
Analyte	**Units**				**SQS**	**CSL**	**LAET**	**2LAET**
Grain Size								
Gravel	%	0.59	3.45	0.15	NA	NA	NA	NA
GS <0.98 µm	%	7.36	5.86	3.95	NA	NA	NA	NA
GS 0.98–1.95 µm	%	3.75	2.66	1.83	NA	NA	NA	NA
GS 1.95–3.9 µm	%	3.79	2.75	1.86	NA	NA	NA	NA
GS 1000–2000 µm	%	1.61	3.86	0.78	NA	NA	NA	NA
GS 125–250 µm	%	6.67	10.97	23.32	NA	NA	NA	NA
GS 15.6–31.3 µm	%	18.4	8.69	4.9	NA	NA	NA	NA
GS 250–500 µm	%	2.2	5.51	3.7	NA	NA	NA	NA
GS 3.9–7.8 µm	%	5.5	3.65	2.36	NA	NA	NA	NA
GS 31.3–62.5 µm	%	17.47	9.47	11.68	NA	NA	NA	NA
GS 500–1000 µm	%	1.42	4.24	1.19	NA	NA	NA	NA
GS 62.5–125 µm	%	19.51	22.71	35.97	NA	NA	NA	NA
GS 7.8–15.6 µm	%	9.11	4.75	3.04	NA	NA	NA	NA
Conventionals								
Ammonia (total as nitrogen)	mg/kg	20.2	8.9	12.1	NA	NA	NA	NA
Moisture	%	51.9	53.1	38.4	NA	NA	NA	NA
Sulfide	mg/kg	650	940	1290	NA	NA	NA	NA
Total Organic Carbon	%	4.39	7.64	1.98	NA	NA	NA	NA
Total Solids	%	45.8	46.8	59.1	NA	NA	NA	NA
Total Volatile Solids	%	11.3	16.6	6.73	NA	NA	NA	NA
Metals								
Arsenic	mg/kg	9.1	8.47	4.8	57	93	57	93
Cadmium	mg/kg	1.41	0.801	0.332	5.1	6.7	5.1	6.7
Chromium	mg/kg	32.5	27.4	28.2	260	270	260	270
Copper	mg/kg	39.7	35.5	31.7	390	390	390	390
Lead	mg/kg	12.9	9.43	7.54	450	530	450	530
Mercury	mg/kg	0.102	0.071	0.041	0.41	0.59	0.41	0.59
Silver	mg/kg	0.169	0.095	0.07	6.1	6.1	6.1	6.1
Zinc	mg/kg	88 J	65.7 J	57.9 J	410	960	410	960
Butyltins								
Di-n-butyltin Cation	µg/kg	6.5	5 J	0.59 JQ	NA	NA	NA	NA
n-Butyltin Cation	µg/kg	2.9	2.5 J	0.52 JQ	NA	NA	NA	NA
Tetra-n-butyltin	µg/kg	2.2 U	2.1 UJ	1.7 U	NA	NA	NA	NA
Tri-n-butyltin Cation	µg/kg	24	13 J	1.3 JQ	NA	NA	NA	NA
Petroleum Hydrocarbons								
Diesel-range Organics	mg/kg	47 JQ	94 JM	16 JQ	NA	NA	NA	NA
Residual-range Organics	mg/kg	210 JQ	330 JM	120 JQ	NA	NA	NA	NA
Dioxin/Furans								
1,2,3,4,6,7,8-HpCDD	pg/g	417	253	40.2	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	pg/g	28.3	23.9	7.08	NA	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	pg/g	1.77 J	1.78 J	0.343 J	NA	NA	NA	NA
1,2,3,4,7,8-HxCDD	pg/g	2.27 J	2.2 J	0.475 J	NA	NA	NA	NA
1,2,3,4,7,8-HxCDF	pg/g	2.58 J	2.88 J	0.587 J	NA	NA	NA	NA
1,2,3,6,7,8-HxCDD	pg/g	11.1	8.21	1.85 J	NA	NA	NA	NA
1,2,3,6,7,8-HxCDF	pg/g	1.89 J	2.18 J	0.402 J	NA	NA	NA	NA
1,2,3,7,8,9-HxCDD	pg/g	9.53	7.58	1.3 J	NA	NA	NA	NA
1,2,3,7,8,9-HxCDF	pg/g	0.223 J	0.234 J	0.094 U	NA	NA	NA	NA
1,2,3,7,8-PeCDD	pg/g	1.86 J	2.85 J	0.54 J	NA	NA	NA	NA
1,2,3,7,8-PeCDF	pg/g	1.58 J	3.13 J	0.393 U	NA	NA	NA	NA
2,3,4,6,7,8-HxCDF	pg/g	1.75 J	2.16 J	0.343 J	NA	NA	NA	NA
2,3,4,7,8-PeCDF	pg/g	2.42 J	5.12	0.591 J	NA	NA	NA	NA
2,3,7,8-TCDD	pg/g	0.67 J	1.15	0.341 J	NA	NA	NA	NA
2,3,7,8-TCDF	pg/g	2.36	6.16	0.598 J	NA	NA	NA	NA
Total HpCDD	pg/g	2650	1440	146	NA	NA	NA	NA
Total HpCDF	pg/g	108	105	27.7	NA	NA	NA	NA
Total HxCDD	pg/g	225	164	23.8	NA	NA	NA	NA
Total HxCDF	pg/g	53	46.4	12.2	NA	NA	NA	NA
Total OCDD	pg/g	3020	2110	340	NA	NA	NA	NA
Total OCDF	pg/g	67.2	153	32.4	NA	NA	NA	NA
Total PCDD	pg/g	48.3	68.4	11	NA	NA	NA	NA
Total PCDF	pg/g	43.9	74.6	10.6	NA	NA	NA	NA
Total TCDD	pg/g	50.4	72.3	15.2	NA	NA	NA	NA
Total TCDF	pg/g	59.5	153	18.7	NA	NA	NA	NA
Summed Dioxin/Furan TEQ[1,2]	pg/g	11.9 J	12.3 J	2.21 J	NA	NA	NA	NA
Summed Dioxin/Furan TEQ with One-half of the Detection Limit[1,3]	pg/g	11.9 J	12.3 J	2.2 J	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs)								
Dichlorobiphenyls	pg/g	333	467	85.4	NA	NA	NA	NA
Heptachlorobiphenyls	pg/g	2360	2950	669	NA	NA	NA	NA
Hexachlorobiphenyls	pg/g	4610	4980	1240	NA	NA	NA	NA
Monochlorobiphenyls	pg/g	102	357	26.5	NA	NA	NA	NA
Nonachlorobiphenyls	pg/g	123	135	35.7	NA	NA	NA	NA
Octachlorobiphenyls	pg/g	722	947	216	NA	NA	NA	NA
Pentachlorobiphenyls	pg/g	4500	4070	1080	NA	NA	NA	NA
Tetrachlorobiphenyls	pg/g	2690	3280	540	NA	NA	NA	NA
Trichlorobiphenyls	pg/g	1240	2520	273	NA	NA	NA	NA
PCB-001	pg/g	26.2	59.9	4.91 J	NA	NA	NA	NA

Table 5.1
Analytical Results for Sediment

		Sediment Samples Results			Sediment Management Standards (SMS)			
Location		KSS-1	KSS-2	KSS-3				
Sample ID		SD0001K	SD0002K	SD0003K				
Sample Date		07/09/2013	07/09/2013	07/09/2013				
Sample Depth		0–10 cm	0–10 cm	0–10 cm				
Analyte	**Units**				**SMS SQS**	**SMS CSL**	**SMS LAET**	**SMS 2LAET**
Polychlorinated Biphenyls (PCBs) (cont.)								
PCB-002	pg/g	36.2	164	14.2 J	NA	NA	NA	NA
PCB-003	pg/g	39.7	133	7.35	NA	NA	NA	NA
PCB-004	pg/g	28	60.5	6.75 J	NA	NA	NA	NA
PCB-005	pg/g	3.33 J	7.29 J	0.944 U	NA	NA	NA	NA
PCB-006	pg/g	28.9	35.3	4.26 J	NA	NA	NA	NA
PCB-007	pg/g	8.26 J	9.83 J	0.884 J	NA	NA	NA	NA
PCB-008	pg/g	99.8	134	20.1	NA	NA	NA	NA
PCB-009	pg/g	9.85 J	12.1	1.11 J	NA	NA	NA	NA
PCB-010	pg/g	1.84 J	2.91 J	0.8 U	NA	NA	NA	NA
PCB-011	pg/g	52.5	63	31.7	NA	NA	NA	NA
PCB-012/013	pg/g	30.1	61.2	4.63 J	NA	NA	NA	NA
PCB-014	pg/g	2.21 U	6.06 J	0.854 U	NA	NA	NA	NA
PCB-015	pg/g	70.3	74.7	16	NA	NA	NA	NA
PCB-016	pg/g	51.7	143	10.5	NA	NA	NA	NA
PCB-017	pg/g	68.7	174	13	NA	NA	NA	NA
PCB-018/030	pg/g	134	325	29.7	NA	NA	NA	NA
PCB-019	pg/g	10.9 J	41.7	2.82	NA	NA	NA	NA
PCB-020/028	pg/g	288	546	67.2	NA	NA	NA	NA
PCB-021/033	pg/g	131	283	28.5	NA	NA	NA	NA
PCB-022	pg/g	87.6	180	21	NA	NA	NA	NA
PCB-023	pg/g	0.501 U	4.72 U	0.101 U	NA	NA	NA	NA
PCB-024	pg/g	2.08 J	7.35 J	0.309 J	NA	NA	NA	NA
PCB-025	pg/g	25	36.3	4.63	NA	NA	NA	NA
PCB-026/029	pg/g	56.1	92.3	10.1	NA	NA	NA	NA
PCB-027	pg/g	11.5 J	30.9	2.15	NA	NA	NA	NA
PCB-031	pg/g	231	407	48.9	NA	NA	NA	NA
PCB-032	pg/g	46.8	115	9.09	NA	NA	NA	NA
PCB-034	pg/g	1.68 J	4.66 U	0.262 J	NA	NA	NA	NA
PCB-035	pg/g	13.2 J	18.4	2.96	NA	NA	NA	NA
PCB-036	pg/g	2.46 U	4.71 U	0.794 J	NA	NA	NA	NA
PCB-037	pg/g	78.7	121	19.4	NA	NA	NA	NA
PCB-038	pg/g	1 U	4.81 U	0.554 J	NA	NA	NA	NA
PCB-039	pg/g	2.92 J	4.72 U	0.683 J	NA	NA	NA	NA
PCB-040/041/071	pg/g	126	199	25.2	NA	NA	NA	NA
PCB-042	pg/g	69.7	95.3	12.4	NA	NA	NA	NA
PCB-043	pg/g	14.2 J	26.5	1.98	NA	NA	NA	NA
PCB-044/047/065	pg/g	301	354	56.5	NA	NA	NA	NA
PCB-045/051	pg/g	38.9	72.1	6.92	NA	NA	NA	NA
PCB-046	pg/g	14.1 J	25.9	2.46	NA	NA	NA	NA
PCB-048	pg/g	55	87.9	9.7	NA	NA	NA	NA
PCB-049/069	pg/g	222	245	37	NA	NA	NA	NA
PCB-050/053	pg/g	34.9	55	6.05	NA	NA	NA	NA
PCB-052	pg/g	444	509	83.5	NA	NA	NA	NA
PCB-054	pg/g	0.681 J	0.991 J	0.128 J	NA	NA	NA	NA
PCB-055	pg/g	11.6 J	29.8	1.54 J	NA	NA	NA	NA
PCB-056	pg/g	133	157	29.3	NA	NA	NA	NA
PCB-057	pg/g	1.45 J	2.52 J	0.374 J	NA	NA	NA	NA
PCB-058	pg/g	1.26 U	1.72 U	0.194 U	NA	NA	NA	NA
PCB-059/062/075	pg/g	26.6	39.3	4.65	NA	NA	NA	NA
PCB-060	pg/g	77.3	110	17.9	NA	NA	NA	NA
PCB-061/070/074/076	pg/g	623	701	140	NA	NA	NA	NA
PCB-063	pg/g	12.5 J	14.1	2.58	NA	NA	NA	NA
PCB-064	pg/g	121	160	21.3	NA	NA	NA	NA
PCB-066	pg/g	303	328	66.5	NA	NA	NA	NA
PCB-067	pg/g	9.56 J	13	2.03	NA	NA	NA	NA
PCB-068	pg/g	2.25 J	2.01 J	0.637 J	NA	NA	NA	NA
PCB-072	pg/g	4.32 J	3.1 J	0.716 J	NA	NA	NA	NA
PCB-073	pg/g	0.186 U	0.338 U	0.0463 U	NA	NA	NA	NA
PCB-077	pg/g	34.8	38.6	8.67	NA	NA	NA	NA
PCB-078	pg/g	1.37 U	1.77 U	0.205 U	NA	NA	NA	NA
PCB-079	pg/g	8.19 J	8.04 J	1.87	NA	NA	NA	NA
PCB-080	pg/g	1.19 U	1.55 U	0.179 U	NA	NA	NA	NA
PCB-081	pg/g	1.64 U	2.2 U	0.392 U	NA	NA	NA	NA
PCB-082	pg/g	76.7	81.9	20.3	NA	NA	NA	NA
PCB-083/099	pg/g	414	347	92.8	NA	NA	NA	NA
PCB-084	pg/g	152	144	36	NA	NA	NA	NA
PCB-085/116/117	pg/g	112	102	28.4	NA	NA	NA	NA
PCB-086/087/097/108/119/125	pg/g	439	408	105	NA	NA	NA	NA
PCB-088/091	pg/g	77.1	72.7	18	NA	NA	NA	NA
PCB-089	pg/g	5.51 J	6.97 J	1.31 J	NA	NA	NA	NA
PCB-090/101/113	pg/g	746	662	175	NA	NA	NA	NA
PCB-092	pg/g	130	115	29.3	NA	NA	NA	NA
PCB-093/095/098/100/102	pg/g	542	501	123	NA	NA	NA	NA
PCB-094	pg/g	2.79 J	2.27 J	0.479 J	NA	NA	NA	NA
PCB-096	pg/g	3.6 J	3.52 J	0.627 J	NA	NA	NA	NA
PCB-103	pg/g	7.52 J	4.91 J	1.26 J	NA	NA	NA	NA
PCB-104	pg/g	0.139 U	0.295 U	0.0463 U	NA	NA	NA	NA
PCB-105	pg/g	258	241	66.3	NA	NA	NA	NA

Table 5.1
Analytical Results for Sediment

		Sediment Samples Results			Sediment Management Standards (SMS)			
	Location	KSS-1	KSS-2	KSS-3				
	Sample ID	SD0001K	SD0002K	SD0003K				
	Sample Date	07/09/2013	07/09/2013	07/09/2013				
	Sample Depth	0–10 cm	0–10 cm	0–10 cm	SMS	SMS	SMS	SMS
Analyte	**Units**				**SQS**	**CSL**	**LAET**	**2LAET**
Polychlorinated Biphenyls (PCBs) (cont.)								
PCB-106	pg/g	0.832 U	1.05 U	0.951 U	NA	NA	NA	NA
PCB-107/124	pg/g	25.8	24.7	6.67	NA	NA	NA	NA
PCB-109	pg/g	46.4	40	13	NA	NA	NA	NA
PCB-110/115	pg/g	756	676	191	NA	NA	NA	NA
PCB-111	pg/g	1.06 U	0.551 U	0.147 U	NA	NA	NA	NA
PCB-112	pg/g	1.03 U	0.405 U	0.143 U	NA	NA	NA	NA
PCB-114	pg/g	10.5 J	12	3.1	NA	NA	NA	NA
PCB-118	pg/g	668	607	167	NA	NA	NA	NA
PCB-120	pg/g	1.72 J	0.772 J	0.533 J	NA	NA	NA	NA
PCB-121	pg/g	1.04 U	0.447 J	0.142 U	NA	NA	NA	NA
PCB-122	pg/g	7.48 J	7.01 J	2.15	NA	NA	NA	NA
PCB-123	pg/g	11.3 J	10.5	2.89	NA	NA	NA	NA
PCB-126	pg/g	2.09 J	1.89 J	1.08 U	NA	NA	NA	NA
PCB-127	pg/g	0.967 U	1.21 U	1.04 U	NA	NA	NA	NA
PCB-128/166	pg/g	158	211	41.7	NA	NA	NA	NA
PCB-129/138/160/163	pg/g	1020	1100	298	NA	NA	NA	NA
PCB-130	pg/g	61.5	66.8	16.1	NA	NA	NA	NA
PCB-131	pg/g	12 J	14.6	2.97	NA	NA	NA	NA
PCB-132	pg/g	316	344	84.1	NA	NA	NA	NA
PCB-133	pg/g	14.9 J	14.9	3.5	NA	NA	NA	NA
PCB-134/143	pg/g	53.1	56.1	11.7	NA	NA	NA	NA
PCB-135/151/154	pg/g	344	337	82	NA	NA	NA	NA
PCB-136	pg/g	110	111	25.6	NA	NA	NA	NA
PCB-137	pg/g	40.5	51.5	10.7	NA	NA	NA	NA
PCB-139/140	pg/g	15.4 J	17	3.65	NA	NA	NA	NA
PCB-141	pg/g	185	245	51.5	NA	NA	NA	NA
PCB-142	pg/g	1.35 U	2.13 U	1.66 U	NA	NA	NA	NA
PCB-144	pg/g	50	52.9	12.4	NA	NA	NA	NA
PCB-145	pg/g	0.576 J	0.091 U	0.097 U	NA	NA	NA	NA
PCB-146	pg/g	150	168	39.4	NA	NA	NA	NA
PCB-147/149	pg/g	818	794	207	NA	NA	NA	NA
PCB-148	pg/g	1.27 J	1.08 J	0.238 J	NA	NA	NA	NA
PCB-150	pg/g	1.33 J	1.37 J	0.318 J	NA	NA	NA	NA
PCB-152	pg/g	0.678 J	0.89 U	0.151 U	NA	NA	NA	NA
PCB-153/168	pg/g	923	1010	252	NA	NA	NA	NA
PCB-155	pg/g	0.194 J	0.246 J	0.07 J	NA	NA	NA	NA
PCB-156/157	pg/g	104	134	31.4	NA	NA	NA	NA
PCB-158	pg/g	105	117	28.7	NA	NA	NA	NA
PCB-159	pg/g	14.6 J	15.5	3.96	NA	NA	NA	NA
PCB-161	pg/g	0.986 U	1.54 U	1.22 U	NA	NA	NA	NA
PCB-162	pg/g	3.68 J	2.95 J	1.31 U	NA	NA	NA	NA
PCB-164	pg/g	67.2	74.8	19.9	NA	NA	NA	NA
PCB-165	pg/g	1.11 U	1.77 U	1.36 U	NA	NA	NA	NA
PCB-167	pg/g	37.3	44.1	11.1	NA	NA	NA	NA
PCB-169	pg/g	1.34 U	1.97 U	1.48 U	NA	NA	NA	NA
PCB-170	pg/g	282	309	83.5	NA	NA	NA	NA
PCB-171/173	pg/g	91.5	107	24.9	NA	NA	NA	NA
PCB-172	pg/g	49.7	63.1	14.7	NA	NA	NA	NA
PCB-174	pg/g	267	332	76.9	NA	NA	NA	NA
PCB-175	pg/g	12.9 J	17.6	4.03	NA	NA	NA	NA
PCB-176	pg/g	38.4	48.2	10.1	NA	NA	NA	NA
PCB-177	pg/g	171	188	47.7	NA	NA	NA	NA
PCB-178	pg/g	60.3	70.8	17.2	NA	NA	NA	NA
PCB-179	pg/g	121	148	31.6	NA	NA	NA	NA
PCB-180/193	pg/g	603	763	182	NA	NA	NA	NA
PCB-181	pg/g	1.87 J	3.4 J	0.705 J	NA	NA	NA	NA
PCB-182	pg/g	2.55 J	0.163 U	0.575 J	NA	NA	NA	NA
PCB-183/185	pg/g	212	269	58	NA	NA	NA	NA
PCB-184	pg/g	0.423 U	0.545 U	0.088 J	NA	NA	NA	NA
PCB-186	pg/g	0.223 U	0.132 U	0.0463 U	NA	NA	NA	NA
PCB-187	pg/g	370	530	94.5	NA	NA	NA	NA
PCB-188	pg/g	0.723 U	0.42 J	0.188 J	NA	NA	NA	NA
PCB-189	pg/g	10.2 J	12.4	3.1	NA	NA	NA	NA
PCB-190	pg/g	55.9	68.1	15.8	NA	NA	NA	NA
PCB-191	pg/g	14.1 J	19	3.71	NA	NA	NA	NA
PCB-192	pg/g	0.273 J	0.164 U	0.0479 U	NA	NA	NA	NA
PCB-194	pg/g	166	199	49	NA	NA	NA	NA
PCB-195	pg/g	62.3	83.3	20.4	NA	NA	NA	NA
PCB-196	pg/g	89.4	120	25	NA	NA	NA	NA
PCB-197/200	pg/g	27.2	41.8	10.9 J	NA	NA	NA	NA
PCB-198/199	pg/g	189	252	53.8	NA	NA	NA	NA
PCB-201	pg/g	24.1	34.4	8.23 J	NA	NA	NA	NA
PCB-202	pg/g	36.5	49.9	11.7	NA	NA	NA	NA
PCB-203	pg/g	120	155	34.5	NA	NA	NA	NA
PCB-204	pg/g	0.154 U	0.227 U	0.0463 U	NA	NA	NA	NA
PCB-205	pg/g	7.21 J	12	2.19	NA	NA	NA	NA
PCB-206	pg/g	86.2 J	93.4 J	23.4	NA	NA	NA	NA
PCB-207	pg/g	9.89 J	14.7 J	3.39	NA	NA	NA	NA

Table 5.1
Analytical Results for Sediment

		Sediment Samples Results			Sediment Management Standards (SMS)			
	Location	KSS-1	KSS-2	KSS-3				
	Sample ID	SD0001K	SD0002K	SD0003K				
	Sample Date	07/09/2013	07/09/2013	07/09/2013				
	Sample Depth	0–10 cm	0–10 cm	0–10 cm	SMS SQS	SMS CSL	SMS LAET	SMS 2LAET
Analyte	**Units**							
Polychlorinated Biphenyls (PCBs) (cont.)								
PCB-208	pg/g	26.7	26.6	8.95	NA	NA	NA	NA
PCB-209	pg/g	57.7	28	17.6	NA	NA	NA	NA
PCBs (Total, All Forms)	pg/g	16,700	19,700	4,180	NA	NA	130,000	1,000,000
PCBs (Total, All Forms)	mg/kg-OC	--[4]	--[4]	0.211	12	65	NA	NA
Semivolatile Organic Compounds (SVOCs)								
1,2,4-Trichlorobenzene	µg/kg	11 U	11 U	8.5 U	NA	NA	31	5
1,2,4-Trichlorobenzene	mg/kg-OC	--[4]	--[4]	0.43	0.81	1.8	NA	NA
1,2-Dichlorobenzene	µg/kg	11 U	11 U	8.5 U	NA	NA	35	50
1,2-Dichlorobenzene	mg/kg-OC	--[4]	--[4]	0.43	2.3	2.3	NA	NA
1,3-Dichlorobenzene	µg/kg	11 U	11 U	8.5 U	NA	NA	170	NA
1,4-Dichlorobenzene	µg/kg	11 U	11 U	8.5 U	NA	NA	110	110
1,4-Dichlorobenzene	mg/kg-OC	--[4]	--[4]	0.43	3.1	9.0	NA	NA
2,4,5-Trichlorophenol	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
2,4,6-Trichlorophenol	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
2,4-Dichlorophenol	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
2,4-Dimethylphenol	µg/kg	55 U	15 JQ	43 U	29	29	29	29
2,4-Dinitrophenol	µg/kg	220 U	220 U	200 U	NA	NA	NA	NA
2,4-Dinitrotoluene	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
2,6-Dinitrotoluene	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
2-Chloronaphthalene	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
2-Chlorophenol	µg/kg	11 U	5 JQ	8.5 U	NA	NA	NA	NA
2-Methylphenol	µg/kg	11 U	61	8.5 U	63	63	63	63
2-Nitroaniline	µg/kg	22 U	22 U	17 U	NA	NA	NA	NA
2-Nitrophenol	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
3,3'-Dichlorobenzidine	µg/kg	110 U	110 U	85 U	NA	NA	NA	NA
3-Nitroaniline	µg/kg	22 U	22 U	17 U	NA	NA	NA	NA
4,6-Dinitro-o-cresol	µg/kg	110 U	110 U	85 U	NA	NA	NA	NA
4-Bromophenyl phenyl ether	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
4-Chloro-3-methylphenol	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
4-Chloroaniline	µg/kg	11 U	11 U	10 U	NA	NA	NA	NA
4-Chlorophenyl phenyl ether	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
4-Methylphenol	µg/kg	30	120	5.1 JQ	670	670	670	670
4-Nitroaniline	µg/kg	22 U	22 U	17 U	NA	NA	NA	NA
4-Nitrophenol	µg/kg	110 U	110 U	85 U	NA	NA	NA	NA
Benzoic acid	µg/kg	220 U	150 JQ	200 U	650	650	650	650
Benzyl alcohol	µg/kg	22 U	22 U	17 U	57	73	57	73
bis(2-chloroethoxy)methane	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
bis(2-chloroethyl)ether	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
bis(2-chloroisopropyl)ether	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	µg/kg	37 JQ	44 JQ	17 JQ	NA	NA	1,300	3,100
bis(2-ethylhexyl)phthalate	mg/kg-OC	--[4]	--[4]	0.86 JQ	47	78	NA	NA
Butyl benzyl phthalate	µg/kg	11 U	11 U	8.5 U	NA	NA	63	900
Butyl benzyl phthalate	mg/kg-OC	--[4]	--[4]	0.43 U	4.9	64	NA	NA
Diethylphthalate	µg/kg	11 U	11 U	8.5 U	NA	NA	200	1,200
Diethylphthalate	mg/kg-OC	--[4]	--[4]	0.43 U	61	110	NA	NA
Dimethyl phthalate	µg/kg	11 U	19	19	NA	NA	71	160
Dimethyl phthalate	mg/kg-OC	--[4]	--[4]	0.96	53	53	NA	NA
Di-n-butyl phthalate	µg/kg	22 U	7.2 JQ	17 U	NA	NA	1,400	5,100
Di-n-butyl phthalate	mg/kg-OC	--[4]	--[4]	0.86 U	220	17,000	NA	NA
Di-n-octyl phthalate	µg/kg	11 U	11 U	8.5 U	NA	NA	6,200	6,200
Di-n-octyl phthalate	mg/kg-OC	--[4]	--[4]	0.43 U	58	4,500	NA	NA
Hexachlorobenzene	µg/kg	11 U	11 U	8.5 U	NA	NA	22	70
Hexachlorobenzene	mg/kg-OC	--[4]	--[4]	0.43 U	0.38	2.3	NA	NA
Hexachlorobutadiene	µg/kg	11 U	11 U	8.5 U	NA	NA	11	120
Hexachlorobutadiene	mg/kg-OC	--[4]	--[4]	0.43 U	3.9	6.2	NA	NA
Hexachlorocyclopentadiene	µg/kg	55 U	54 U	50 U	NA	NA	NA	NA
Hexachloroethane	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
Isophorone	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
Nitrobenzene	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
N-Nitroso-di-n-propylamine	µg/kg	11 U	11 U	8.5 U	NA	NA	NA	NA
N-Nitrosodiphenylamine	µg/kg	11 U	11 U	8.5 U	NA	NA	28	40
N-Nitrosodiphenylamine	mg/kg-OC	--[4]	--[4]	0.43	11	11	NA	NA
Pentachlorophenol	µg/kg	110 U	110 U	85 U	360	690	360	690
Phenol	µg/kg	28 JQ	340	12 JQ	420	1,200	420	1,200
Polycyclic Aromatic Hydrocarbons (PAHs)								
2-Methylnaphthalene	µg/kg	26	68	4.8	NA	NA	670	670
2-Methylnaphthalene	mg/kg-OC	--[4]	--[4]	0.24	38	64	NA	NA
Acenaphthene	µg/kg	38	75	8.3	NA	NA	500	500
Acenaphthene	mg/kg-OC	--[4]	--[4]	0.42	15	57	NA	NA
Acenaphthylene	µg/kg	59	430	6.8	NA	NA	1,300	1,300
Acenaphthylene	mg/kg-OC	--[4]	--[4]	0.34	66	66	NA	NA
Anthracene	µg/kg	190	300	51	NA	NA	960	960
Anthracene	mg/kg-OC	--[4]	--[4]	2.6	220	1,200	NA	NA
Benzo(a)anthracene	µg/kg	500	440	110	NA	NA	1,300	1,600
Benzo(a)anthracene	mg/kg-OC	--[4]	--[4]	5.6	110	270	NA	NA
Benzo(a)pyrene	µg/kg	390	400	97	NA	NA	1,600	1,600

Table 5.1
Analytical Results for Sediment

		Sediment Samples Results			Sediment Management Standards (SMS)			
	Location	KSS-1	KSS-2	KSS-3				
	Sample ID	SD0001K	SD0002K	SD0003K				
	Sample Date	07/09/2013	07/09/2013	07/09/2013				
	Sample Depth	0–10 cm	0–10 cm	0–10 cm				
Analyte	Units				SMS SQS	SMS CSL	SMS LAET	SMS 2LAET
Polycyclic Aromatic Hydrocarbons (PAHs) (cont.)								
Benzo(a)pyrene	mg/kg-OC	--[4]	--[4]	4.9	99	210	NA	NA
Benzo(b)fluoranthene	µg/kg	820	740	140	NA	NA	NA	NA
Benzo(b)fluoranthene	mg/kg-OC	--[4]	--[4]	7.1	NA	NA	NA	NA
Benzo(k)fluoranthene	µg/kg	310	270	53	NA	NA	NA	NA
Benzo(k)fluoranthene	mg/kg-OC	--[4]	--[4]	2.7	NA	NA	NA	NA
Total Benzofluoranthenes	µg/kg	1,130	1,010	190	NA	NA	3,200	3,600
Total Benzofluoranthenes	mg/kg-OC	--[4]	--[4]	9.6	230	450	NA	NA
Benzo(g,h,i)perylene	µg/kg	210	210	56	NA	NA	670	720
Benzo(g,h,i)perylene	mg/kg-OC	--[4]	--[4]	2.83	31	78	NA	NA
Chrysene	µg/kg	**1,400**	930	160	NA	NA	1,400	2,800
Chrysene	mg/kg-OC	--[4]	--[4]	8.1	110	460	NA	NA
Dibenzo(a,h)anthracene	µg/kg	49	47	11	NA	NA	230	230
Dibenzo(a,h)anthracene	mg/kg-OC	--[4]	--[4]	0.56	12	33	NA	NA
Dibenzofuran	µg/kg	50	180	5.1	NA	NA	540	540
Dibenzofuran	mg/kg-OC	--[4]	--[4]	0.26	15	58	NA	NA
Fluoranthene	µg/kg	**1,900**	**2,600**	310	NA	NA	1,700	2,500
Fluoranthene	mg/kg-OC	--[4]	--[4]	16	160	1,200	NA	NA
Fluorene	µg/kg	72	140	14	NA	NA	540	540
Fluorene	mg/kg-OC	--[4]	--[4]	0.71	23	79	NA	NA
Indeno(1,2,3-cd)pyrene	µg/kg	260	240	59	NA	NA	600	690
Indeno(1,2,3-cd)pyrene	mg/kg-OC	--[4]	--[4]	3.0	34	88	NA	NA
Naphthalene	µg/kg	100	1,100	10	NA	NA	2,100	2,100
Naphthalene	mg/kg-OC	--[4]	--[4]	0.51	99	170	NA	NA
Phenanthrene	µg/kg	540	1,200	150	NA	NA	1,500	1,500
Phenanthrene	mg/kg-OC	--[4]	--[4]	7.6	100	480	NA	NA
Pyrene	µg/kg	1,600	2,100	300	NA	NA	2,600	3,300
Pyrene	mg/kg-OC	--[4]	--[4]	15	1,000	1,400	NA	NA
Total LPAH	µg/kg	1,000	3,200	240	NA	NA	5,200	5,200
Total LPAH	mg/kg-OC	--[4]	--[4]	12	370	780	NA	NA
Total HPAH	µg/kg	7,400	8,000	1,300	NA	NA	12,000	17,000
Total HPAH	mg/kg-OC	--[4]	--[4]	66	960	53,000	NA	NA

Notes:

BOLD	The detected concentration exceeds the SMS SQS or LAET.
bold highlight	The detected concentration exceeds the SMS SQS and CSL or LAET and 2LAET.
1	World Health Organization 2005 Toxic Equivalency Factors used for calculation of dioxin/furan TEQ (Van den Berg et al. 2006).
2	Calculated using detected dioxin/furan concentrations.
3	Calculated using detected dioxin/furan concentrations plus one-half the detection limit for dioxins/furans that were not detected.
4	Total organic carbon was outside of the recommended range for OC-normalization (0.5–4%) in this sample.

Abbreviations:

2LAET	Second lowest apparent effects threshold
cm	Centimeter
CSL	Cleanup Screening Level
GS	Grain size
HpCDD	Heptachlorodibenzo-p-dioxin
HpCDF	Heptachlorodibenzofuran
HxCDD	Hexachlorodibenzo-p-dioxin
HxCDF	Hexachlorodibenzofuran
LAET	Lowest apparent effects threshold
MDL	Method detection limit
µg/kg	Micrograms per kilogram
µm	Micrometer
mg/kg	Milligrams per kilogram
mg/kg-OC	Milligrams per kilogram organic carbon
NA	Not available
OCDD	Octachlorodibenzo-p-dioxin
OCDF	Octachlorodibenzofuran
PeCDD	Pentachlorodibenzo-p-dioxin
PeCDF	Pentachlorodibenzofuran
pg/g	Picograms per gram
RL	Reporting limit
SQS	Sediment Quality Standard
TCDD	Tetrachlorodibenzo-p-dioxin
TCDF	Tetrachlorodibenzofuran
TEQ	Total equivalancy quotient

Qualifiers:

J	Concentration is estimated.
JM	Concentration is estimated due to poor match to standard.
JQ	Concentration is an estimated value reported below the associated quantitation limit but greater than the MDL.
U	Analyte is not detected at the associated reporting limit.
UJ	Analyte is not detected at the associated reporting limit, which is an estimate.

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Figures

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Figure 1.1
Vicinity Map

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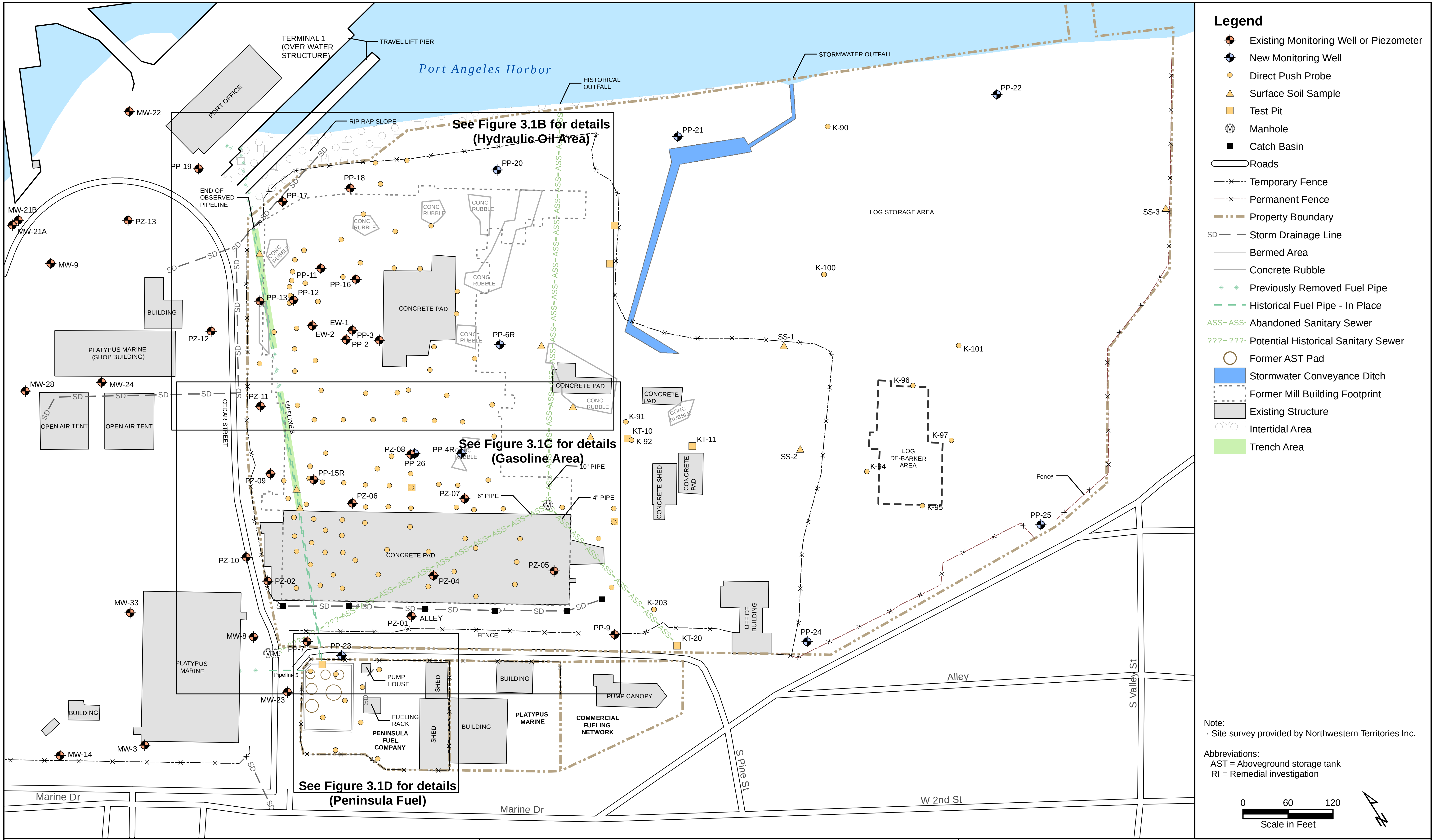

Note:
· Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
RI = Remedial investigation

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Figure 3.1A
RI Sample Locations

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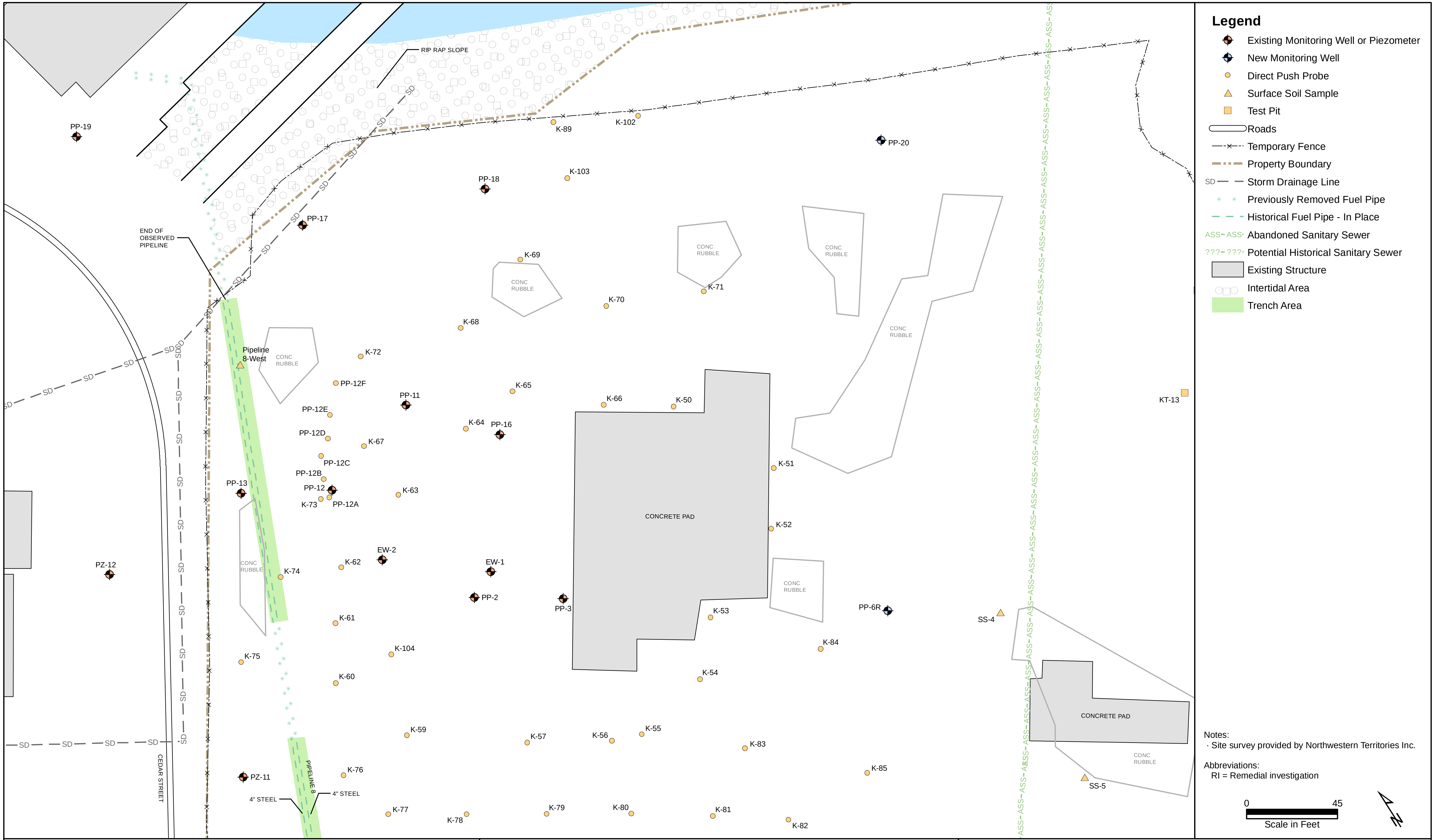

Legend

- Existing Monitoring Well or Piezometer
- New Monitoring Well
- Direct Push Probe
- Surface Soil Sample
- Test Pit
- Roads
- Temporary Fence
- Property Boundary
- SD — Storm Drainage Line
- Previously Removed Fuel Pipe
- Historical Fuel Pipe - In Place
- ASS-ASS- Abandoned Sanitary Sewer
- ???-???- Potential Historical Sanitary Sewer
- Existing Structure
- Intertidal Area
- Trench Area

Notes:
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Figure 3.1B
RI Sample Locations, Hydraulic Oil Area

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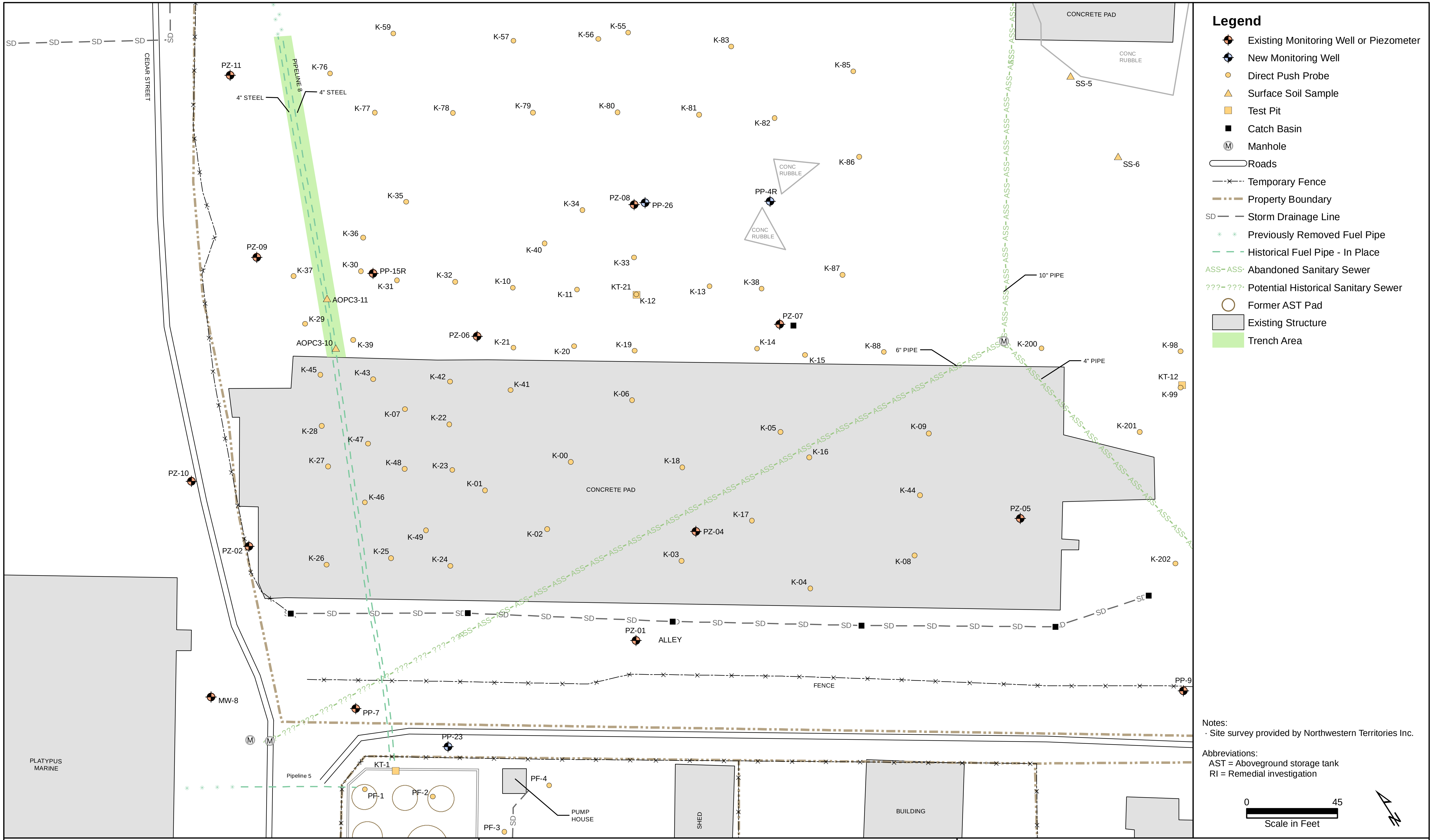

Notes:
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Figure 3.1C
RI Sample Locations, Gasoline Area

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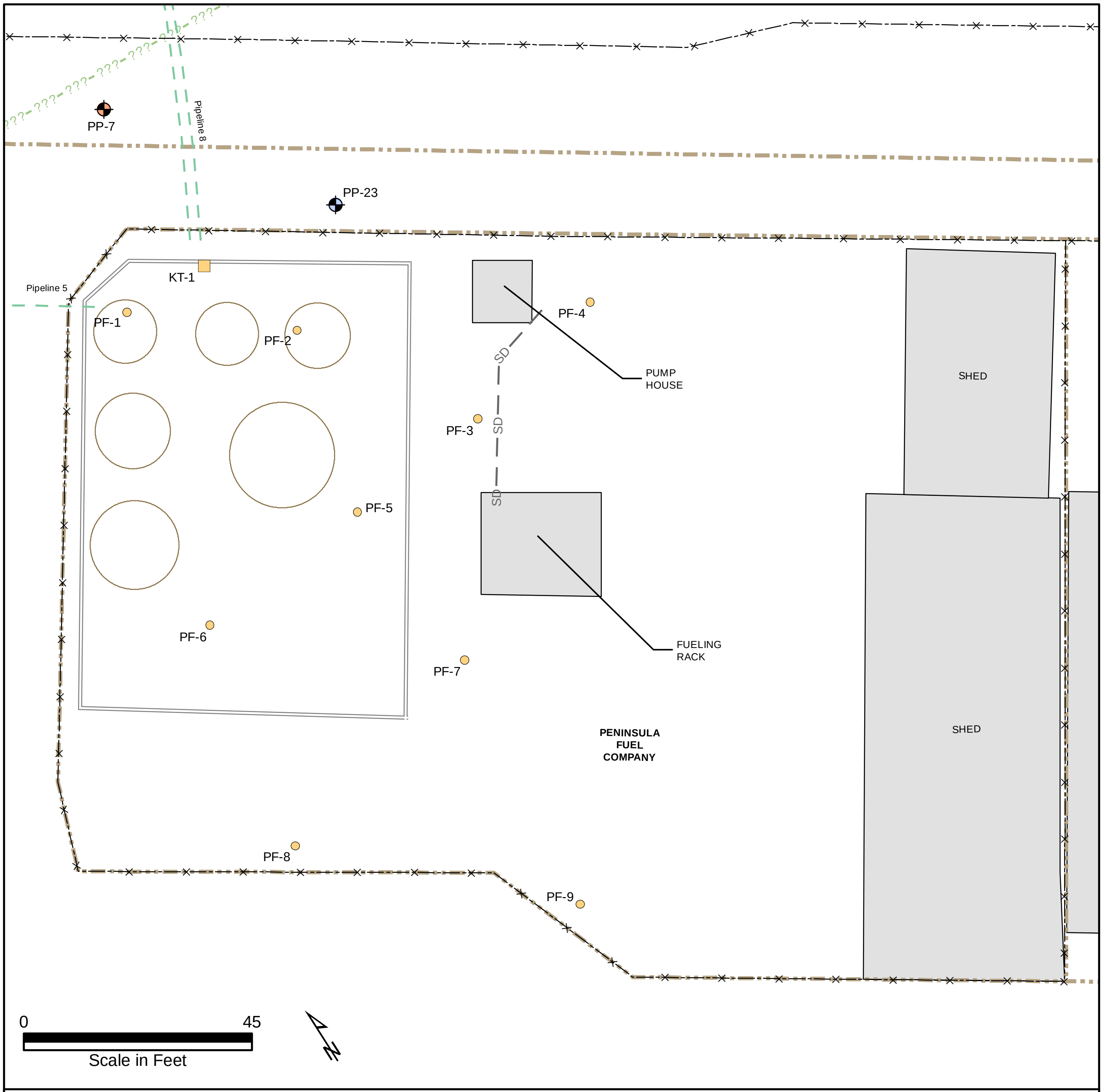

Legend

⊕	Existing Monitoring Well or Piezometer	▢	Existing Structure
⊕	New Monitoring Well	—×—	Temporary Fence
●	Direct Push Probe	—··—	Property Boundary
△	Surface Soil Sample	═	Bermed Area
■	Test Pit	– –	Historical Fuel Pipe - In Place
○	Former AST Pad	???–???	Potential Historical Sanitary Sewer

Notes:
· Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
RI = Remedial investigation

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Figure 3.1D
Peninsula Fuel Company
RI Boring Locations

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1/7/2014

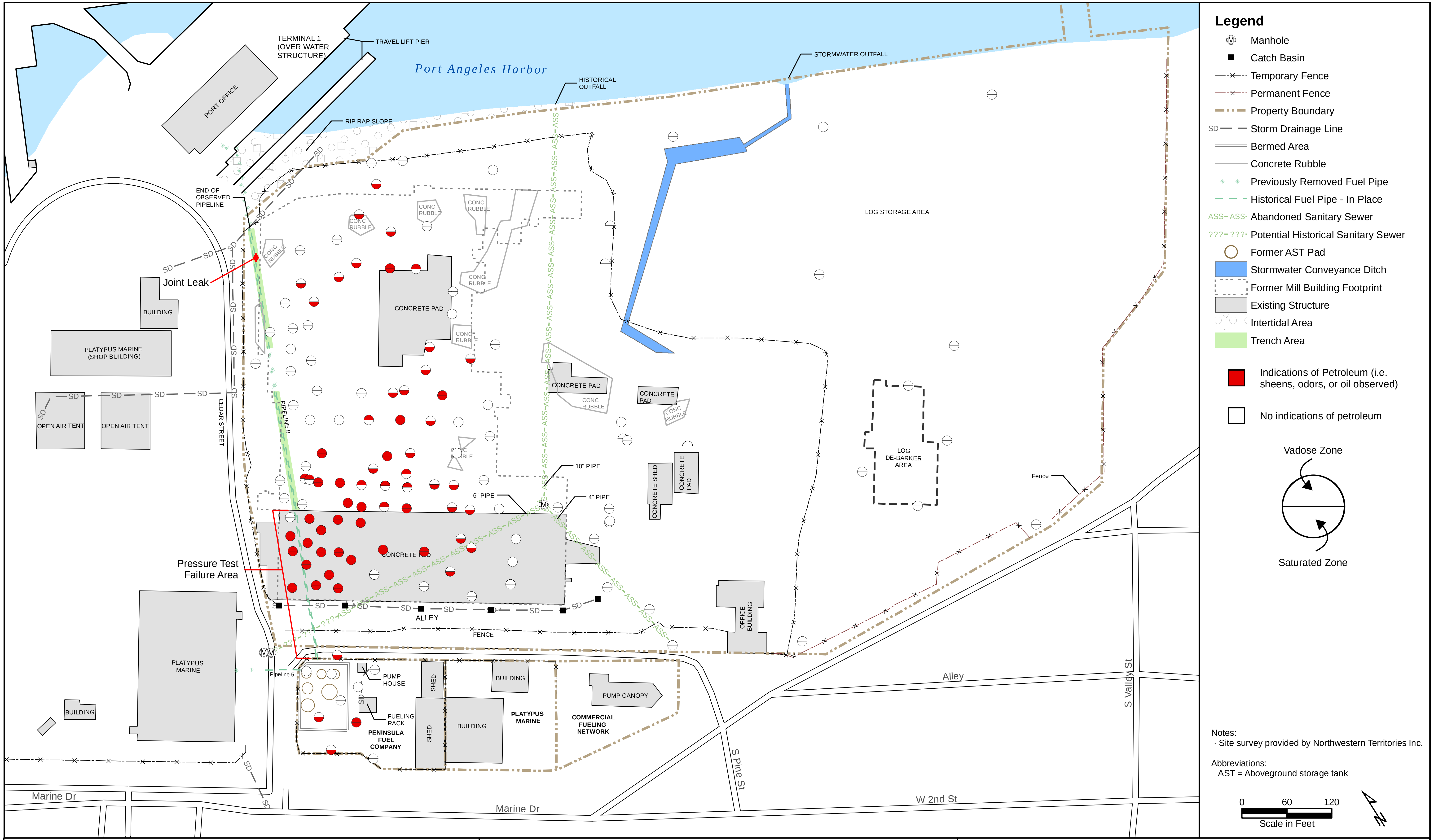

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Figure 3.2
Site-wide Field Observations
for Indications of Petroleum in Soil Borings

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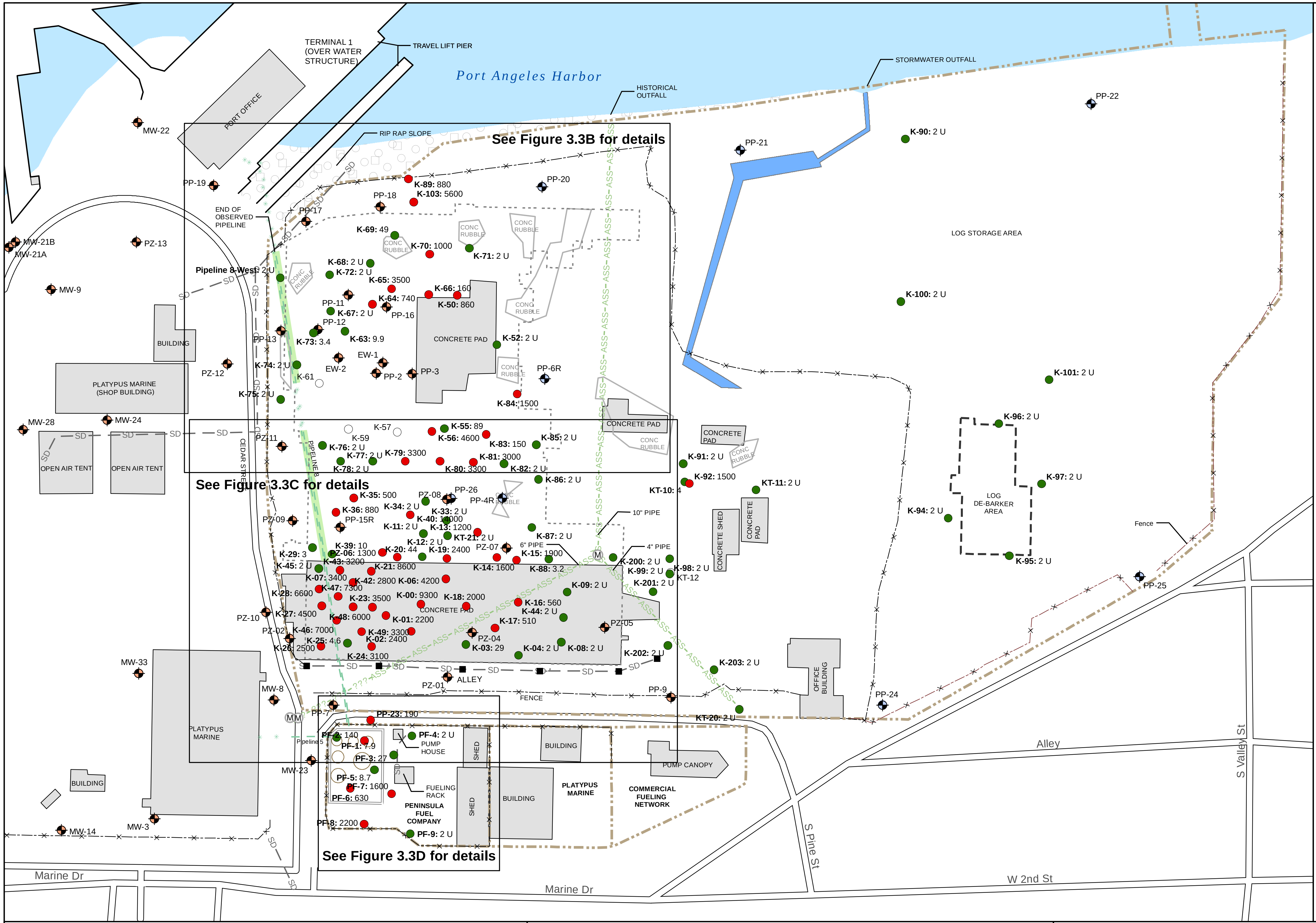

Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Not Sampled
- ⊕ Existing Monitoring Well or Piezometer
- ⊕ New Monitoring Well
- Ⓜ Manhole
- ■ Catch Basin
- Roads
- Temporary Fence
- Permanent Fence
- Property Boundary
- SD Storm Drainage Line
- Bermed Area
- Concrete Rubble
- Previously Removed Fuel Pipe
- Historical Fuel Pipe - In Place
- ASS- ASS- Abandoned Sanitary Sewer
- ???- ???- Potential Historical Sanitary Sewer
- ○ Former AST Pad
- Stormwater Conveyance Ditch
- Former Mill Building Footprint
- Existing Structure
- Intertidal Area
- Trench Area

Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
GRO = Gasoline Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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Figure 3.3A
Site-wide Soil GRO Results
Maximum Concentration at Any Depth

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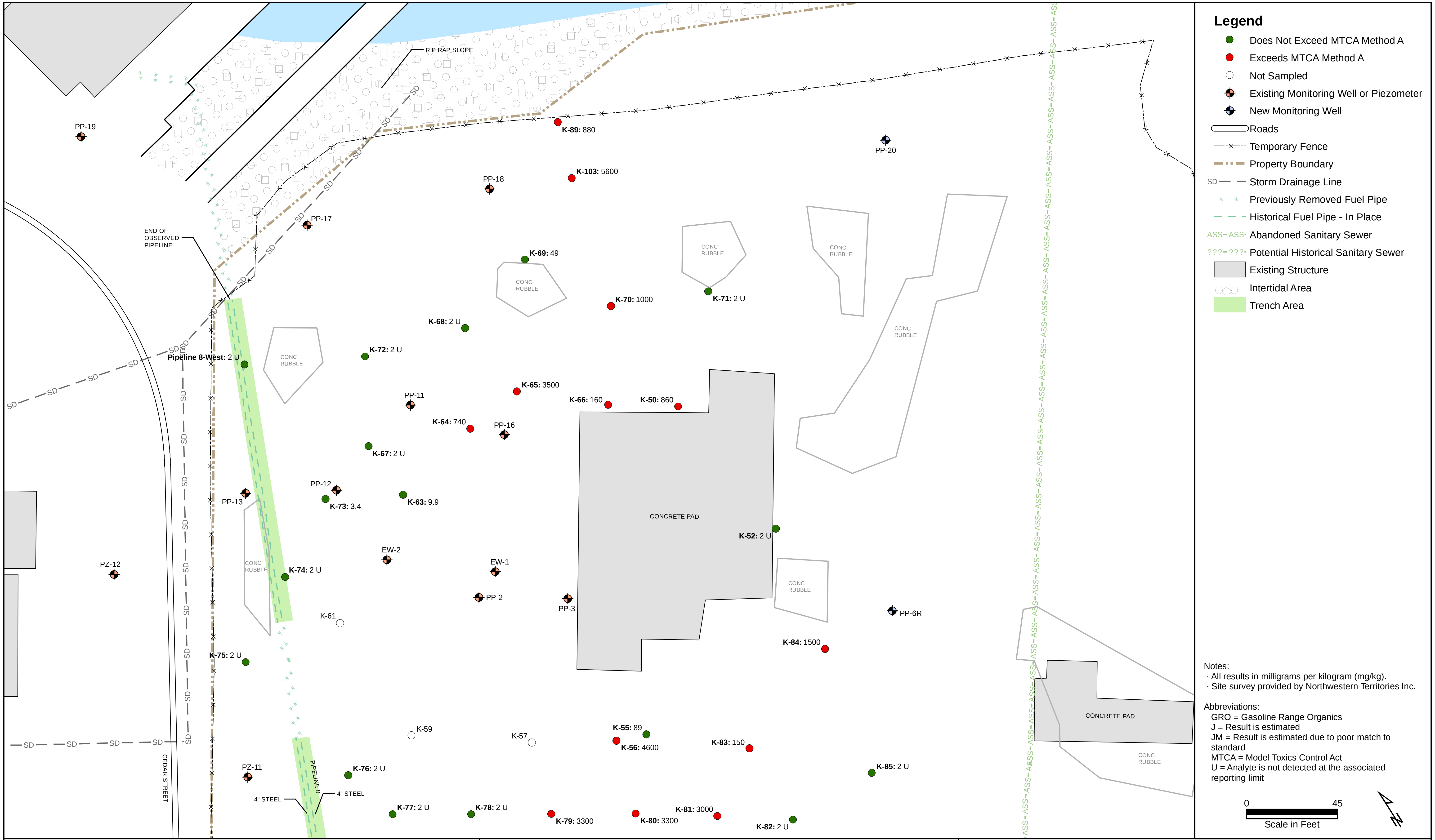

Notes:
· All results in milligrams per kilogram (mg/kg).
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Abbreviations:
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Figure 3.3B
Soil GRO Results in Hydraulic Oil Area
Maximum Concentration at Any Depth

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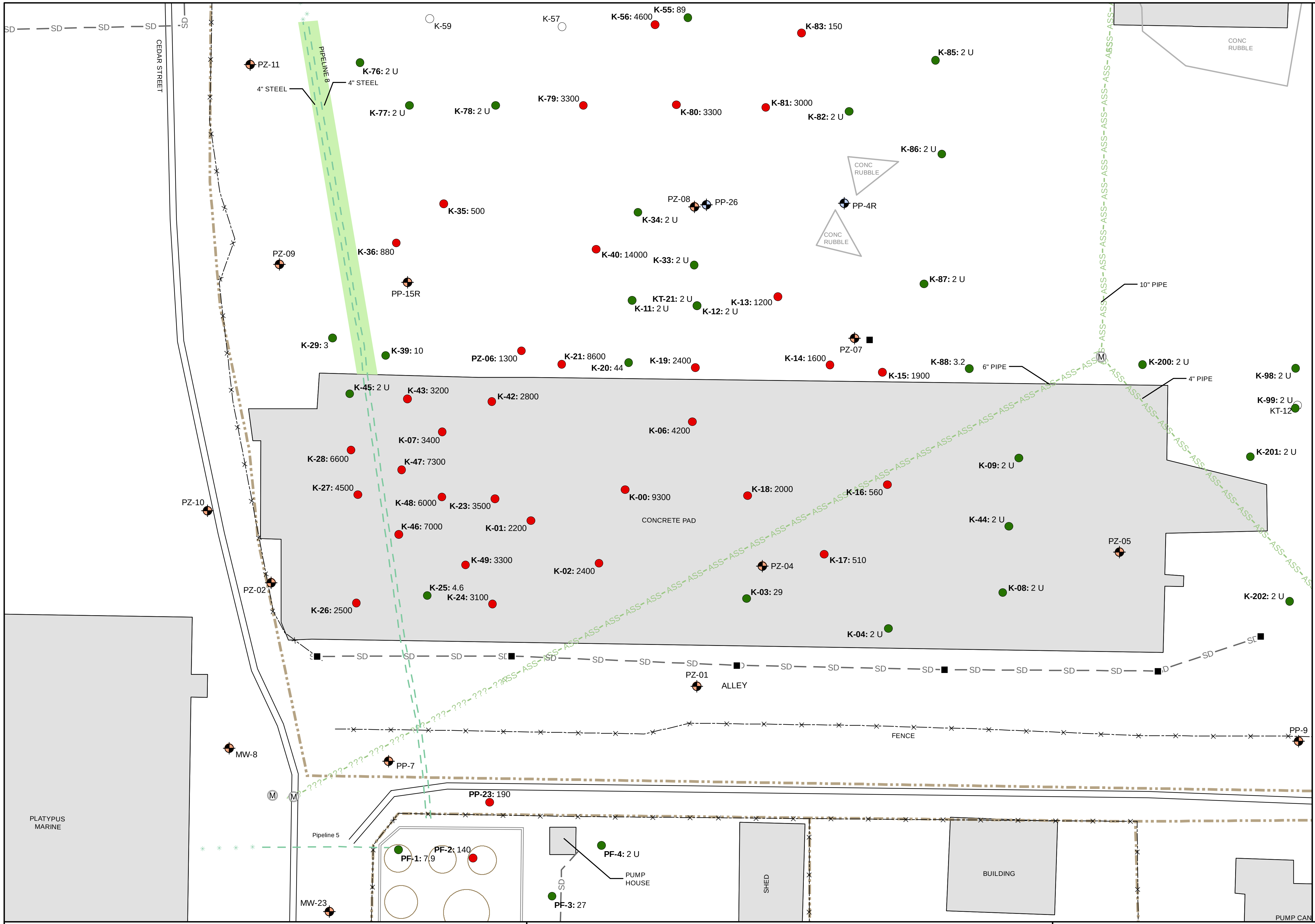

Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Not Sampled
- ⊕ Existing Monitoring Well or Piezometer
- ⊕ New Monitoring Well
- Ⓜ Manhole
- ■ Catch Basin
- Roads
- —x— Temporary Fence
- Property Boundary
- SD — Storm Drainage Line
- * * Previously Removed Fuel Pipe
- — — Historical Fuel Pipe - In Place
- ASS–ASS Abandoned Sanitary Sewer
- ???–??? Potential Historical Sanitary Sewer
- ○ Former AST Pad
- ▨ Existing Structure
- 🟩 Trench Area

Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
GRO = Gasoline Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

0 45
Scale in Feet

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Figure 3.3C
Soil GRO Results in Gasoline Area
Maximum Concentration at Any Depth

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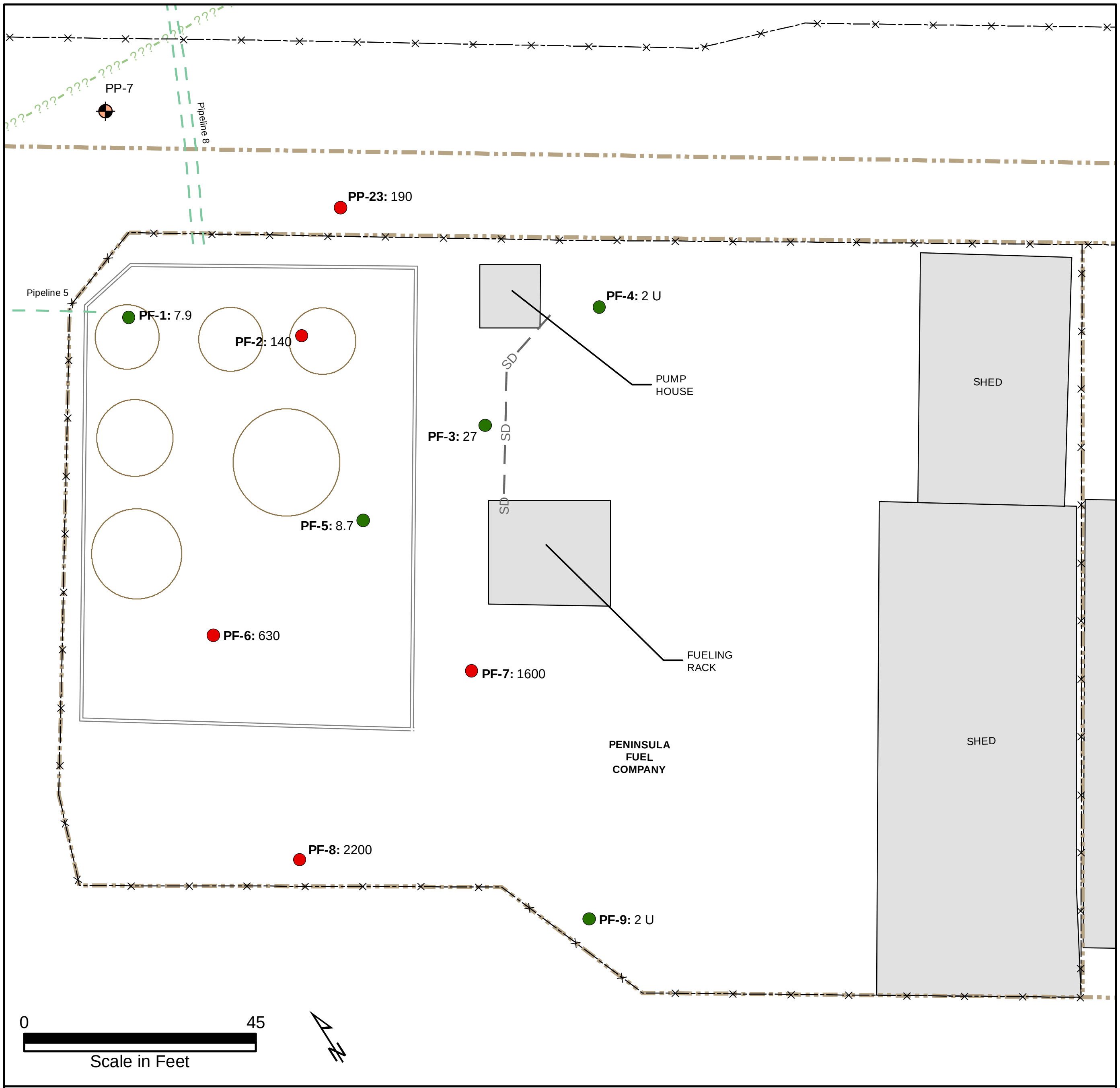

Legend

🟢	Does Not Exceed MTCA Method A	▭	Existing Structure
🔴	Exceeds MTCA Method A	—×—	Temporary Fence
○	Not Sampled	—··—	Property Boundary
⊕	Existing Monitoring Well or Piezometer	═	Bermed Area
⊕	New Monitoring Well	— —	Historical Fuel Pipe - In Place
○	Former AST Pad	???–???·	Potential Historical Sanitary Sewer

Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
GRO = Gasoline Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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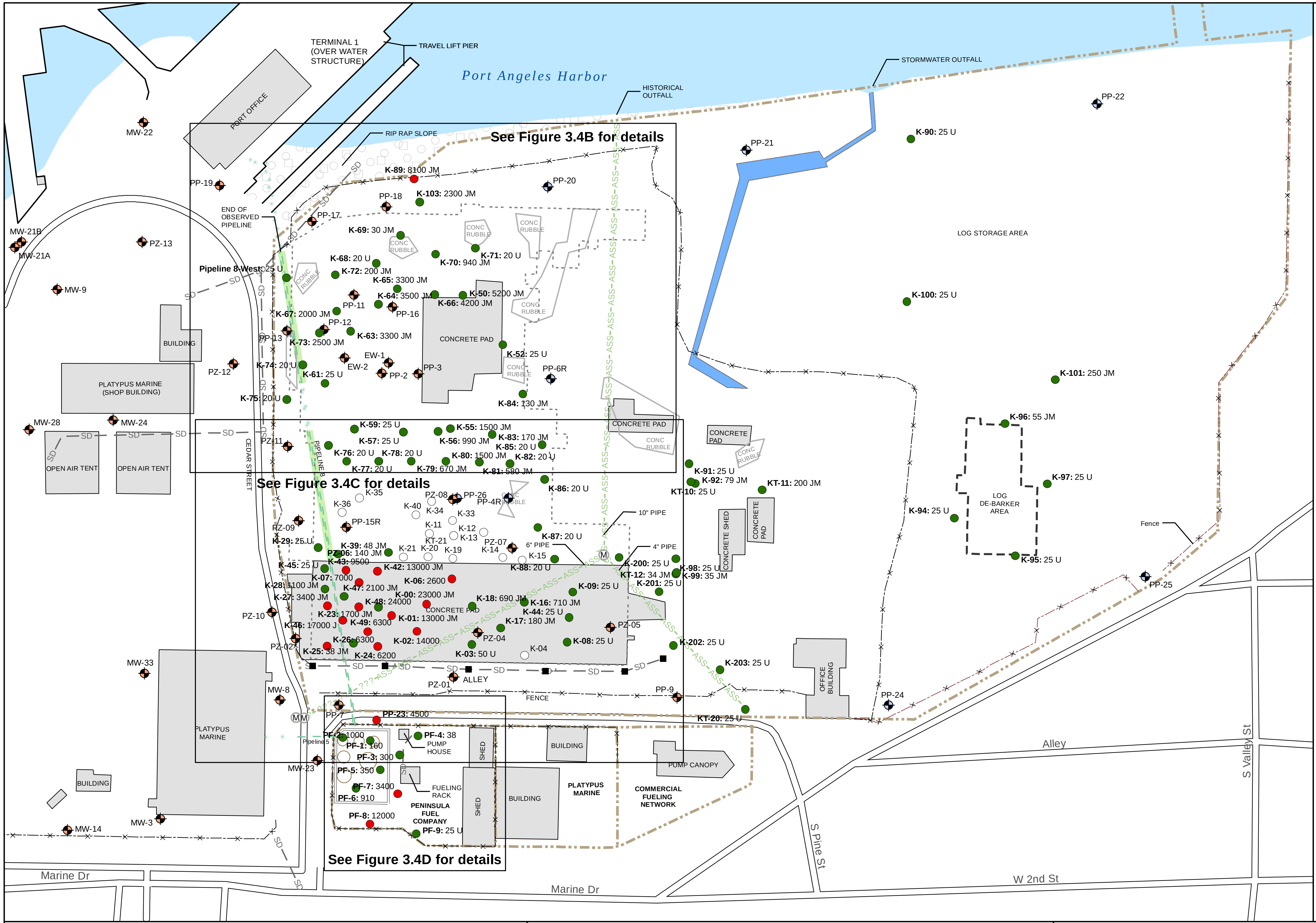
Figure 3.3D
Soil GRO Results at
Peninsula Fuel Company
Maximum Concentration at Any Depth



Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Not Sampled
- ⊕ Existing Monitoring Well or Piezometer
- ⊕ New Monitoring Well
- Ⓜ Manhole
- ■ Catch Basin
- Roads
- Temporary Fence
- Permanent Fence
- Property Boundary
- SD Storm Drainage Line
- Bermed Area
- Concrete Rubble
- Previously Removed Fuel Pipe
- Historical Fuel Pipe - In Place
- ASS Abandoned Sanitary Sewer
- ??? Potential Historical Sanitary Sewer
- ○ Former AST Pad
- Stormwater Conveyance Ditch
- Former Mill Building Footprint
- Existing Structure
- Intertidal Area
- Trench Area

Notes:

- All results in milligrams per kilogram (mg/kg).
- DRO results with the JM qualifier are due to chromatographic overlap from weathered gasoline and/or hydraulic oil, and hence are displayed as not exceeding MTCA Method A.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:

AST = Aboveground storage tank
DRO = Diesel Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

0 60 120
Scale in Feet

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K Ply Site
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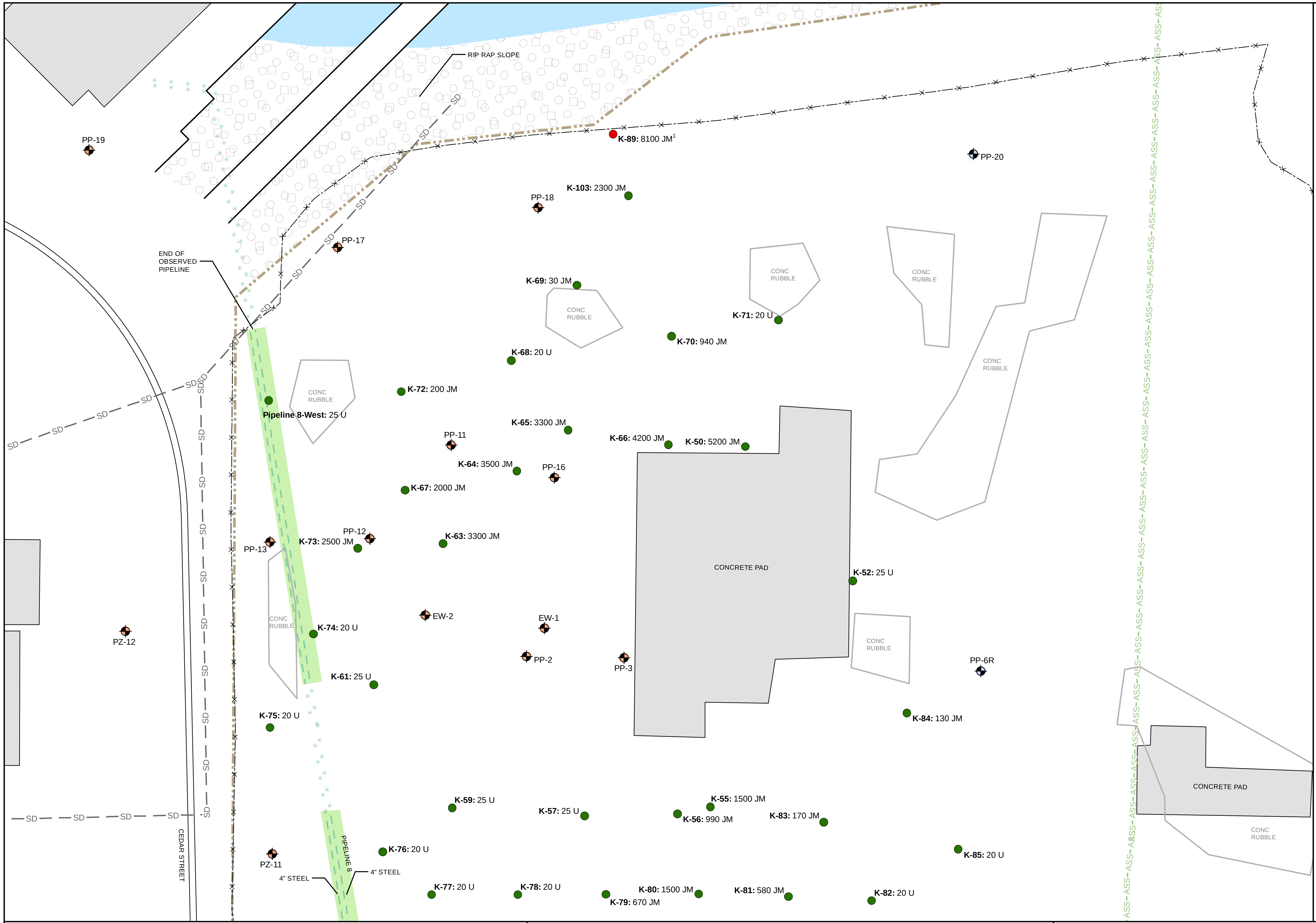
Figure 3.4A
Site-wide DRO Results
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.4A (Site-wide DRO Results).mxd 1/7/2014



Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Not Sampled
- ⊕ Existing Monitoring Well or Piezometer
- ⊕ New Monitoring Well
- ▭ Roads
- –×– Temporary Fence
- –··– Property Boundary
- SD — — Storm Drainage Line
- * * Previously Removed Fuel Pipe
- — — Historical Fuel Pipe - In Place
- ASS- ASS- Abandoned Sanitary Sewer
- ▭ Existing Structure
- Intertidal Area
- 🟩 Trench Area

Notes:

1 Chroatograms indicate the DRO concentration is due to the presence of creosote.

- All results in milligrams per kilogram (mg/kg).
- DRO results with the JM qualifier are due to chromatographic overlap from weathered gasoline and/or hydraulic oil, and hence are displayed as not exceeding MTCA Method A.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:

DRO = Diesel Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

0 45
Scale in Feet

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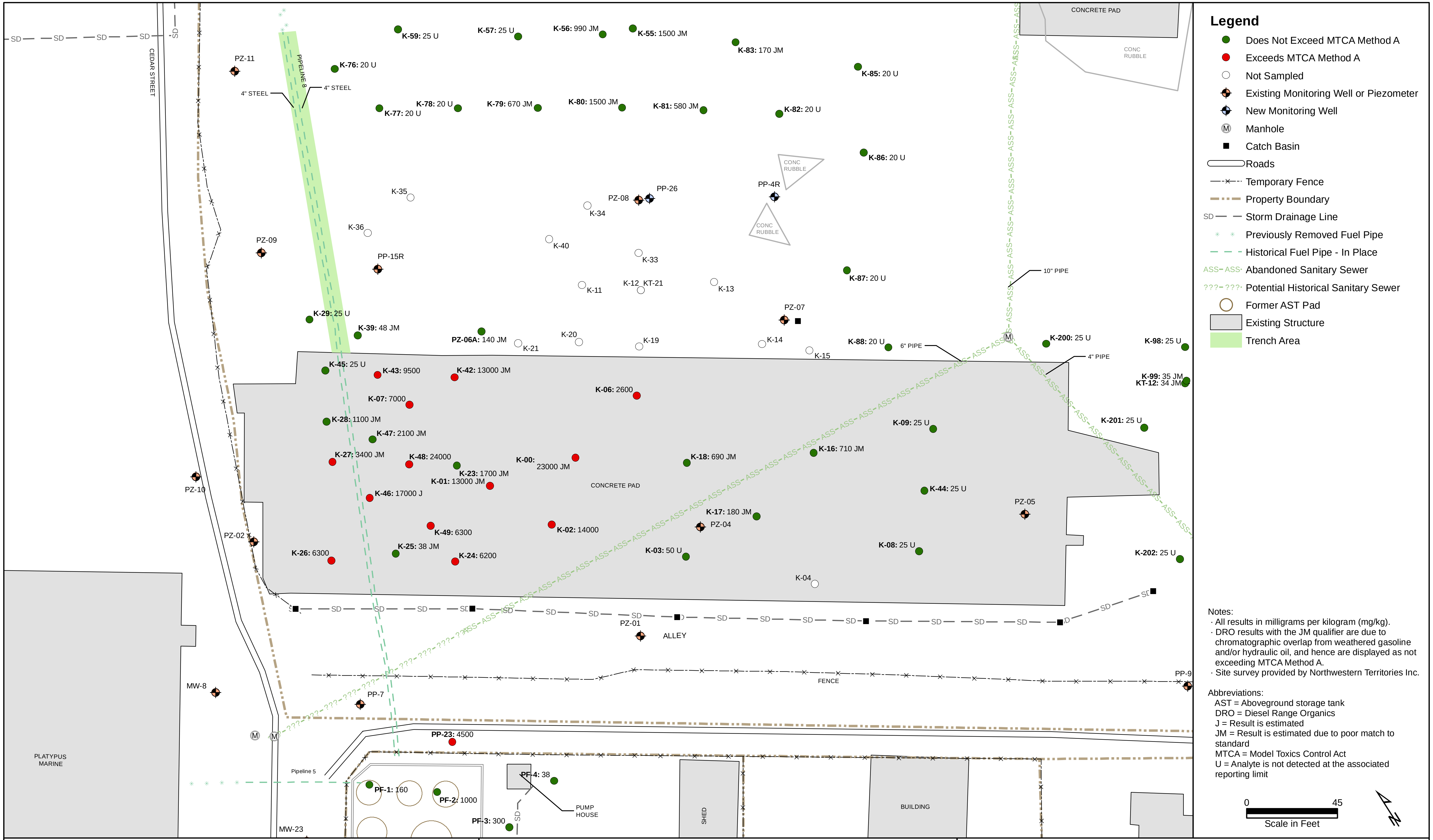
Figure 3.4B
Soil DRO Results in Hydraulic Oil Area
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.4B (Soil DRO Results in Hydraulic Oil Area).mxd 1/7/2014



Notes:
- All results in milligrams per kilogram (mg/kg).
- DRO results with the JM qualifier are due to chromatographic overlap from weathered gasoline and/or hydraulic oil, and hence are displayed as not exceeding MTCA Method A.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
DRO = Diesel Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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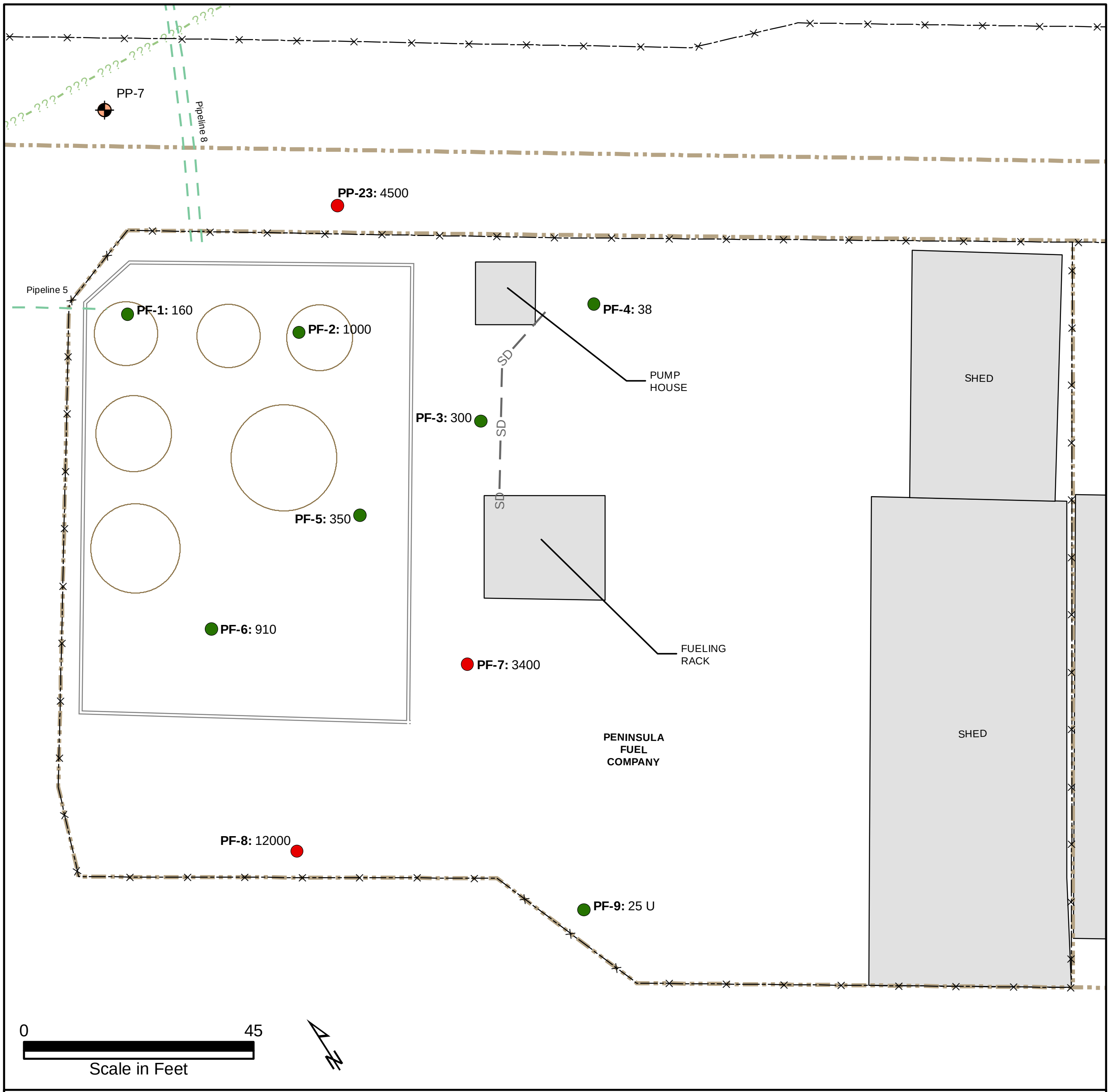
Figure 3.4C
Soil DRO Results in Gasoline Area
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.4C (Soil DRO Results in Gasoline Area).mxd 1/7/2014



Legend

🟢	Does Not Exceed MTCA Method A	⬜	Existing Structure
🔴	Exceeds MTCA Method A	—x—	Temporary Fence
○	Not Sampled	— - - —	Property Boundary
⊕	Existing Monitoring Well or Piezometer	═	Bermed Area
⊕	New Monitoring Well	– – –	Historical Fuel Pipe - In Place
◯	Former AST Pad	???–???	Potential Historical Sanitary Sewer

Notes:
- · All results in milligrams per kilogram (mg/kg).
- · DRO results with the JM qualifier are due to chromatographic overlap from weathered gasoline and/or hydraulic oil, and hence are displayed as not exceeding MTCA Method A.
- · Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
DRO = Diesel Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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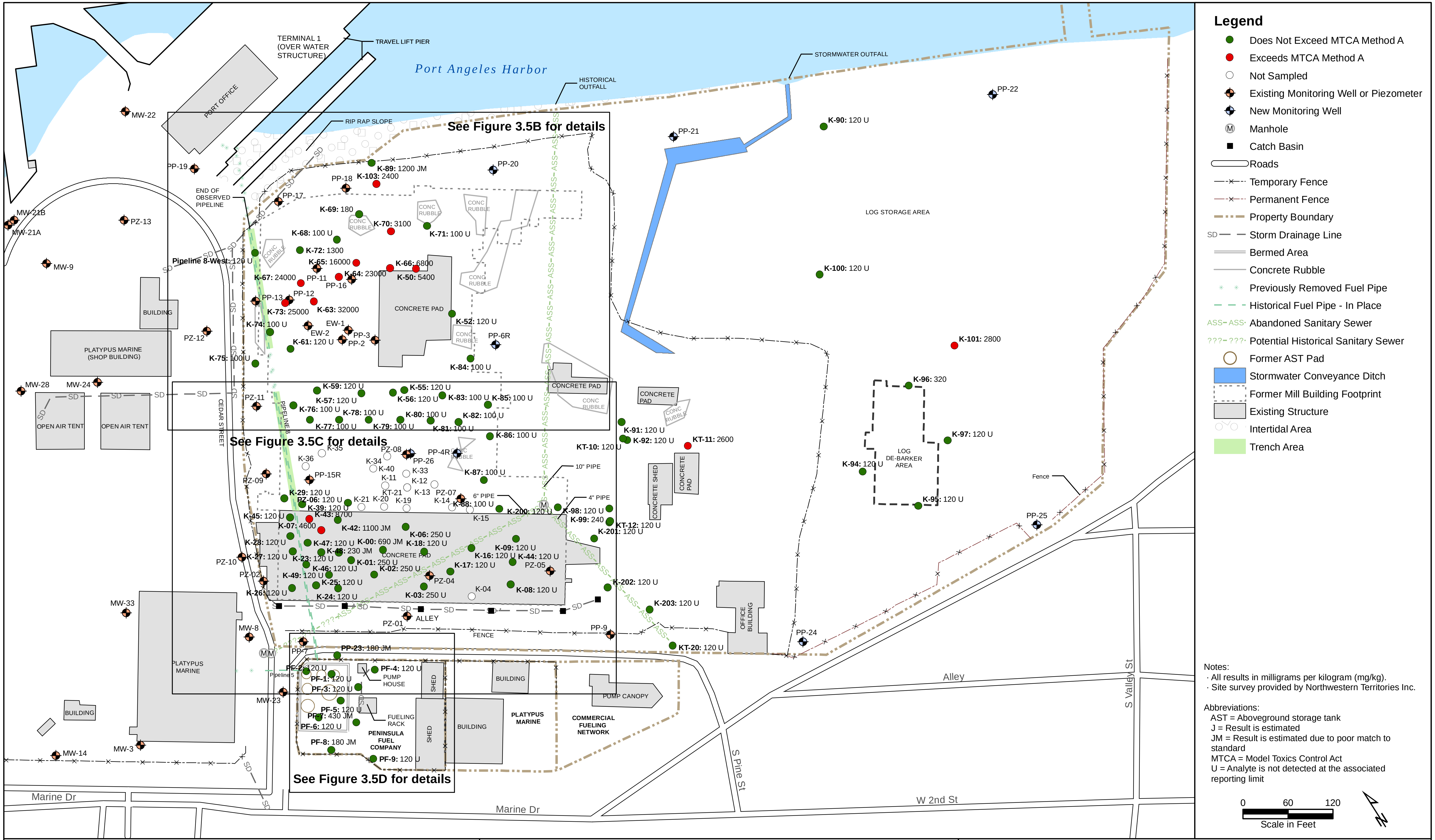
Figure 3.4D
Soil DRO Results at
Peninsula Fuel Company
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.4D (Soil DRO Results at Pennisula Fueling).mxd
1/7/2014



Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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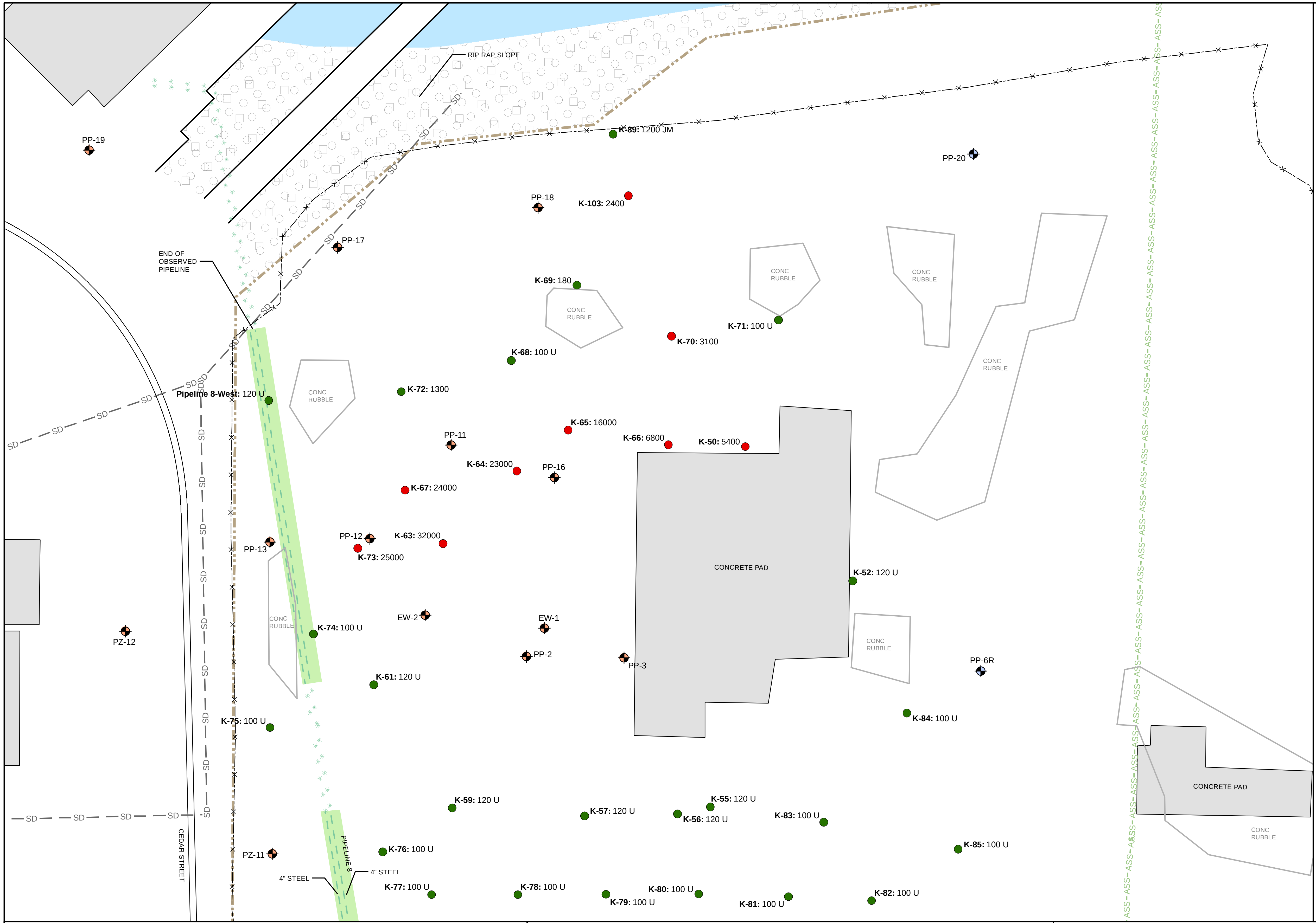
Figure 3.5A
Site-wide Oil Range Organics Results
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.5A (Site-wide Oil Range Organics Results).mxd 1/7/2014



Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Not Sampled
- ⊕ Existing Monitoring Well or Piezometer
- ⊕ New Monitoring Well
- ▭ Roads
- —×— Temporary Fence
- —·— Property Boundary
- SD — Storm Drainage Line
- * * Previously Removed Fuel Pipe
- — — Historical Fuel Pipe - In Place
- ASS–ASS· Abandoned Sanitary Sewer
- ???–???· Potential Historical Sanitary Sewer
- ▨ Existing Structure
- ○○ Intertidal Area
- 🟩 Trench Area

Notes:
· All results in milligrams per kilogram (mg/kg).
· Site survey provided by Northwestern Territories Inc.

Abbreviations:
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

0 45
Scale in Feet

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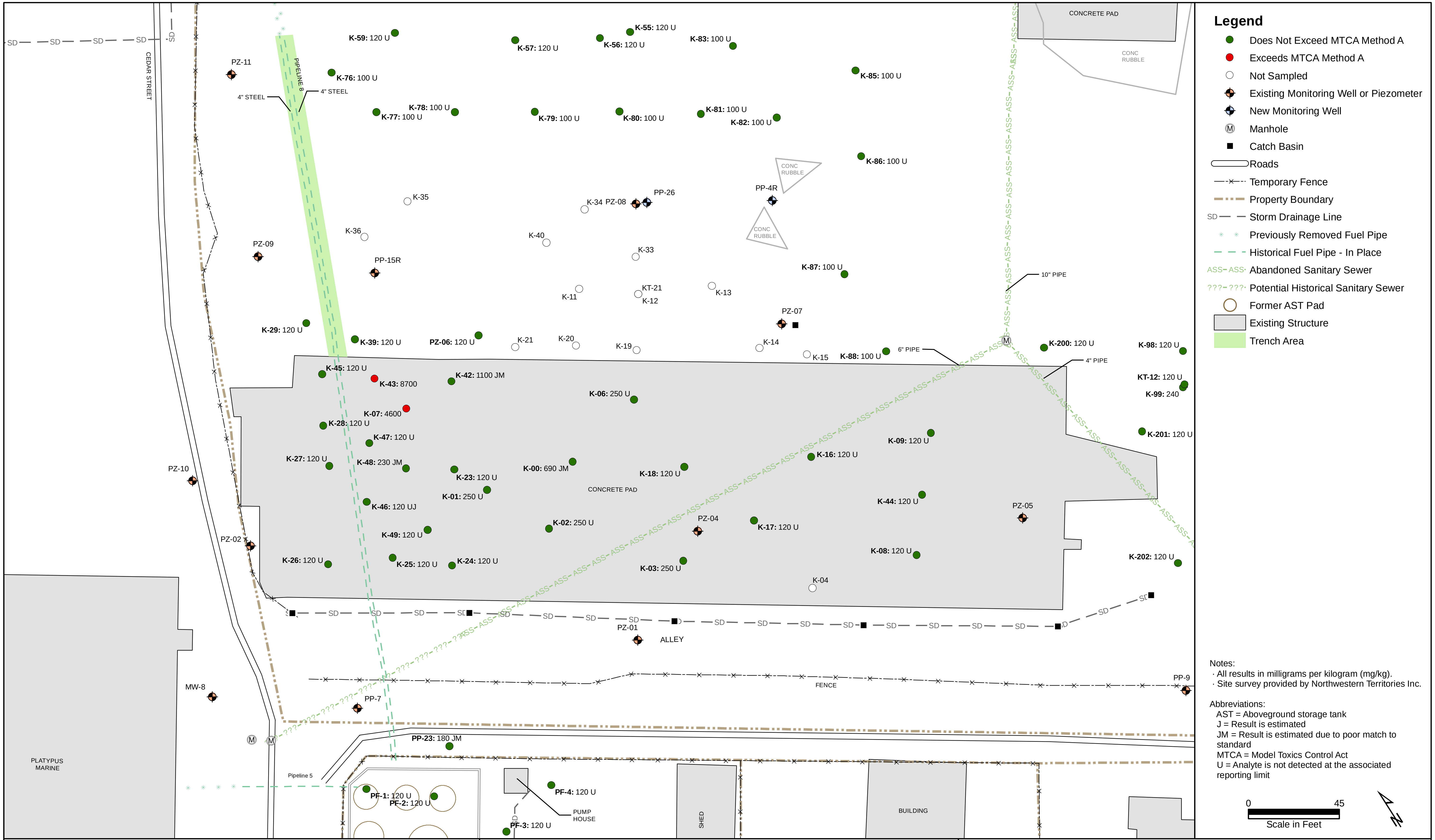
Figure 3.5B
Soil Oil Range Organics Results in Hydraulic Oil Area
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.5B (Soil Oil Range Organics Results in Hydraulic Oil Area).mxd 1/7/2014



Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.

Abbreviations:

AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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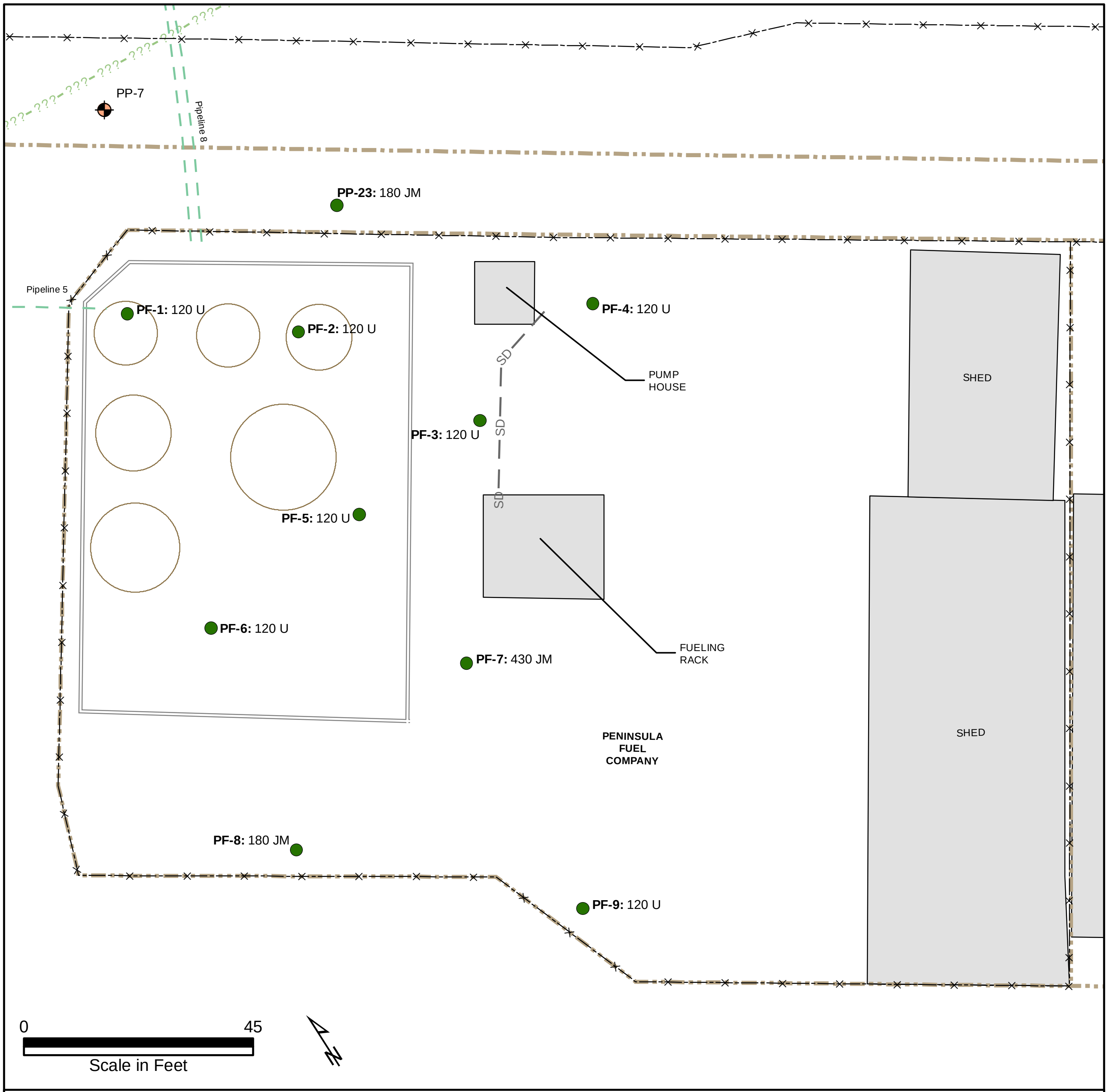
Figure 3.5C
Soil Oil Range Organics Results in Gasoline Area
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.5C (Soil Oil Range Organics Results in Gasoline Area).mxd 1/7/2014



Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Not Sampled
- ⊕ Existing Monitoring Well or Piezometer
- ⊕ New Monitoring Well
- ○ Former AST Pad
- ▭ Existing Structure
- —×— Temporary Fence
- — · · — Property Boundary
- ═ Bermed Area
- – – Historical Fuel Pipe - In Place
- ???–??? Potential Historical Sanitary Sewer

Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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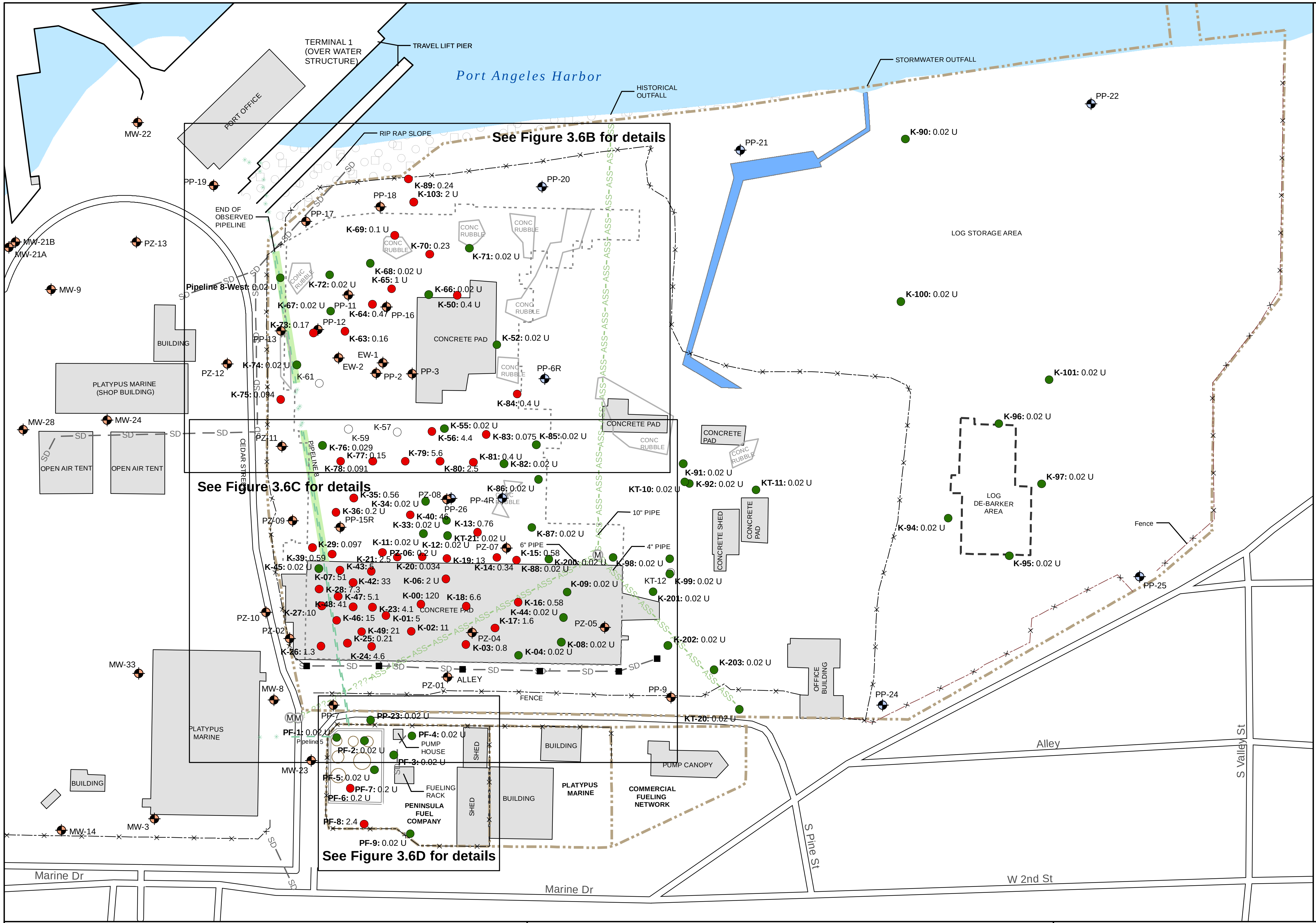
Figure 3.5D
Soil Oil Range Organics Results at
Peninsula Fuel Company
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.5D (Soil Oil Range Organics Results at Peninsula Fueling).mxd
1/7/2014



Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Not Sampled
- ⊕ Existing Monitoring Well or Piezometer
- ⊕ New Monitoring Well
- Ⓜ Manhole
- ■ Catch Basin
- Roads
- Temporary Fence
- Permanent Fence
- Property Boundary
- SD Storm Drainage Line
- Bermed Area
- Concrete Rubble
- Previously Removed Fuel Pipe
- Historical Fuel Pipe - In Place
- ASS Abandoned Sanitary Sewer
- ??? Potential Historical Sanitary Sewer
- ○ Former AST Pad
- Stormwater Conveyance Ditch
- Former Mill Building Footprint
- Existing Structure
- Intertidal Area
- Trench Area

Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.
- Sample results where the reporting limit is greater than the MTCA Method A CUL are shown as exceedances.

Abbreviations:
AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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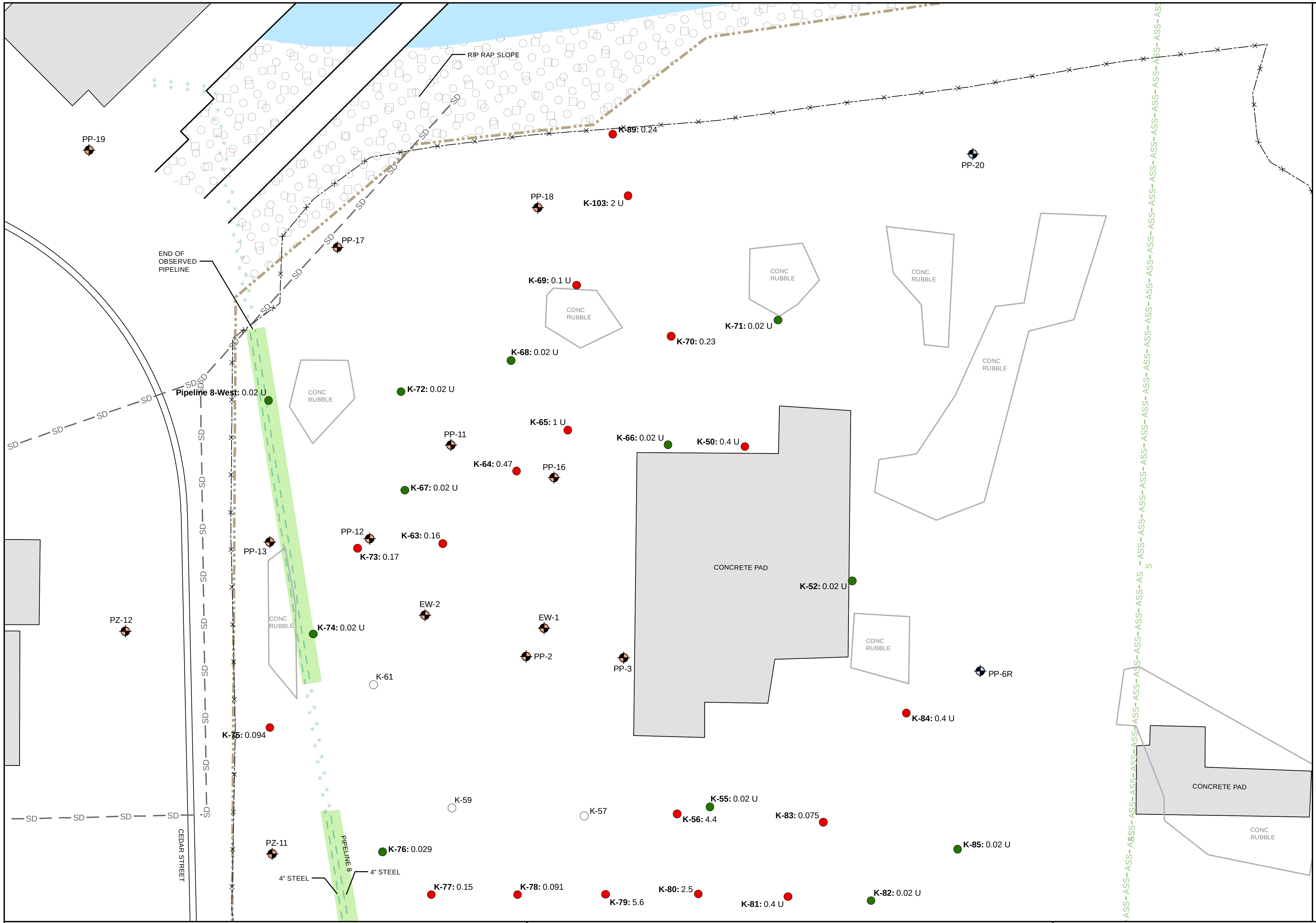
Figure 3.6A
Site-wide Soil Benzene Results
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.6A (Site-wide Soil Benzene Results).mxd 1/7/2014



Legend

● Does Not Exceed MTCA Method A
● Exceeds MTCA Method A
○ Not Sampled
⊕ Existing Monitoring Well or Piezometer
⊕ New Monitoring Well
Roads
Temporary Fence
Property Boundary
SD Storm Drainage Line
Previously Removed Fuel Pipe
Historical Fuel Pipe - In Place
ASS Abandoned Sanitary Sewer
??? Potential Historical Sanitary Sewer
Existing Structure
Intertidal Area
Trench Area

Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.
- Sample results where the reporting limit is greater than the MTCA Method A CUL are shown as exceedances.

Abbreviations:
AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

0 45
Scale in Feet

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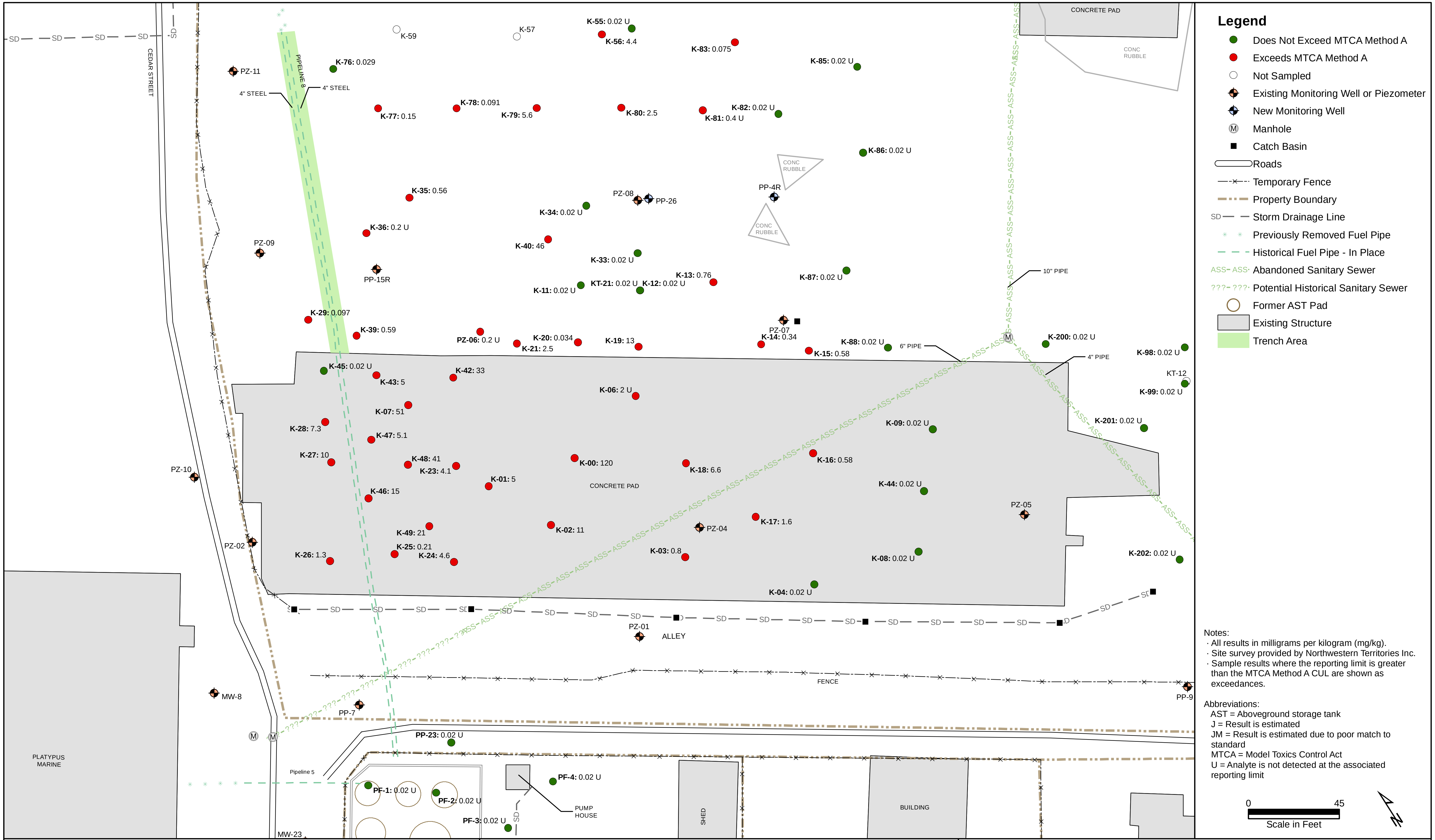
Figure 3.6B
Soil Benzene Results in Hydraulic Oil Area
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.6B (Soil Benzene Results in Hydraulic Oil Area).mxd 1/7/2014



Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.
- Sample results where the reporting limit is greater than the MTCA Method A CUL are shown as exceedances.

Abbreviations:
AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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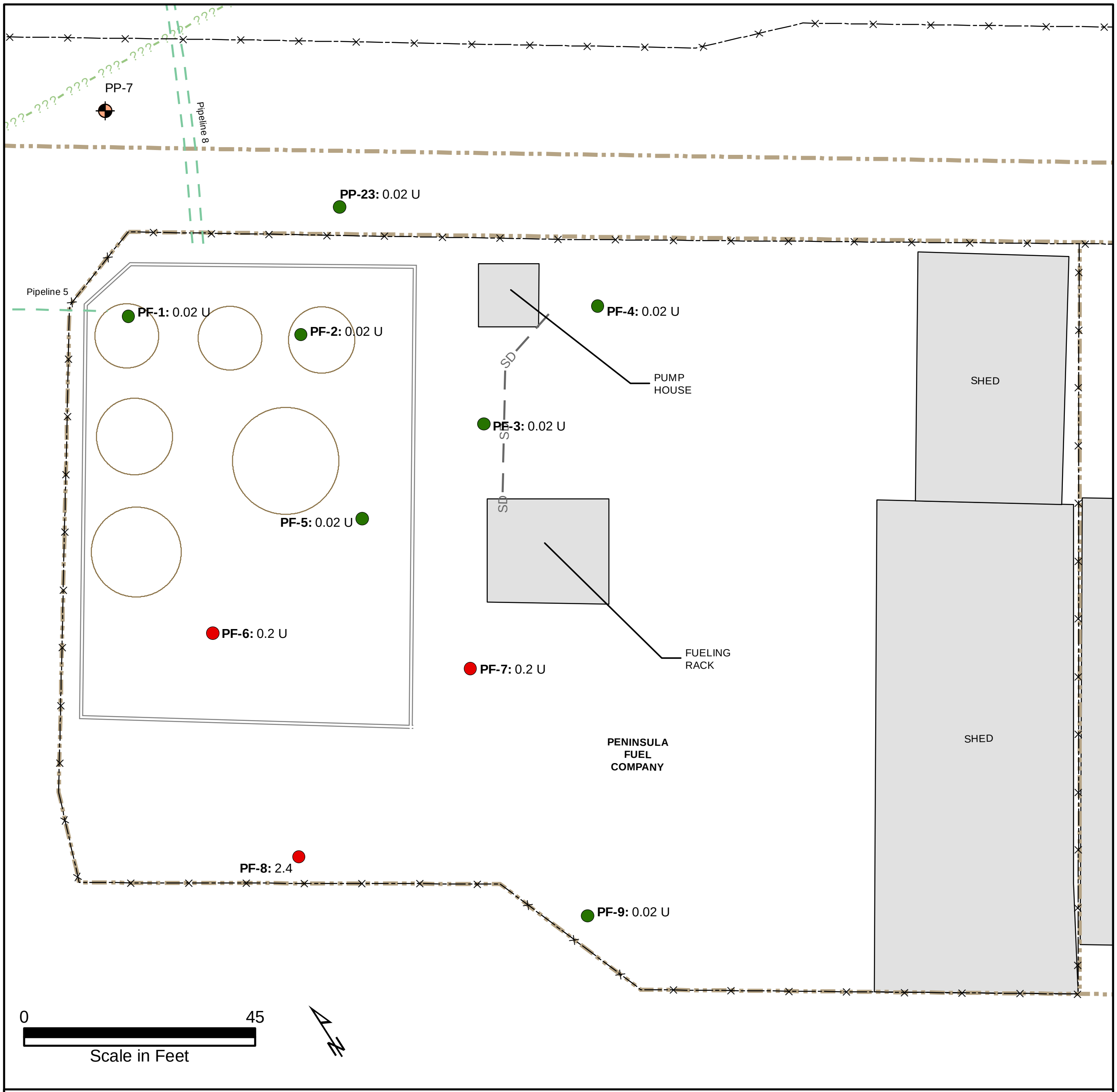
Figure 3.6C
Soil Benzene Results in Gasoline Area
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.6C (Soil Benzene Results in Gasoline Area).mxd 1/7/2014



Legend

● Does Not Exceed MTCA Method A

● Exceeds MTCA Method A

○ Not Sampled

⊕ Existing Monitoring Well or Piezometer

⊕ New Monitoring Well

○ Former AST Pad

▭ Existing Structure

-x- Temporary Fence

-··- Property Boundary

═ Bermed Area

– – Historical Fuel Pipe - In Place

???-???· Potential Historical Sanitary Sewer

Notes:
- All results in milligrams per kilogram (mg/kg).
- Site survey provided by Northwestern Territories Inc.
- Sample results where the reporting limit is greater than the MTCA Method A CUL are shown as exceedances.

Abbreviations:
AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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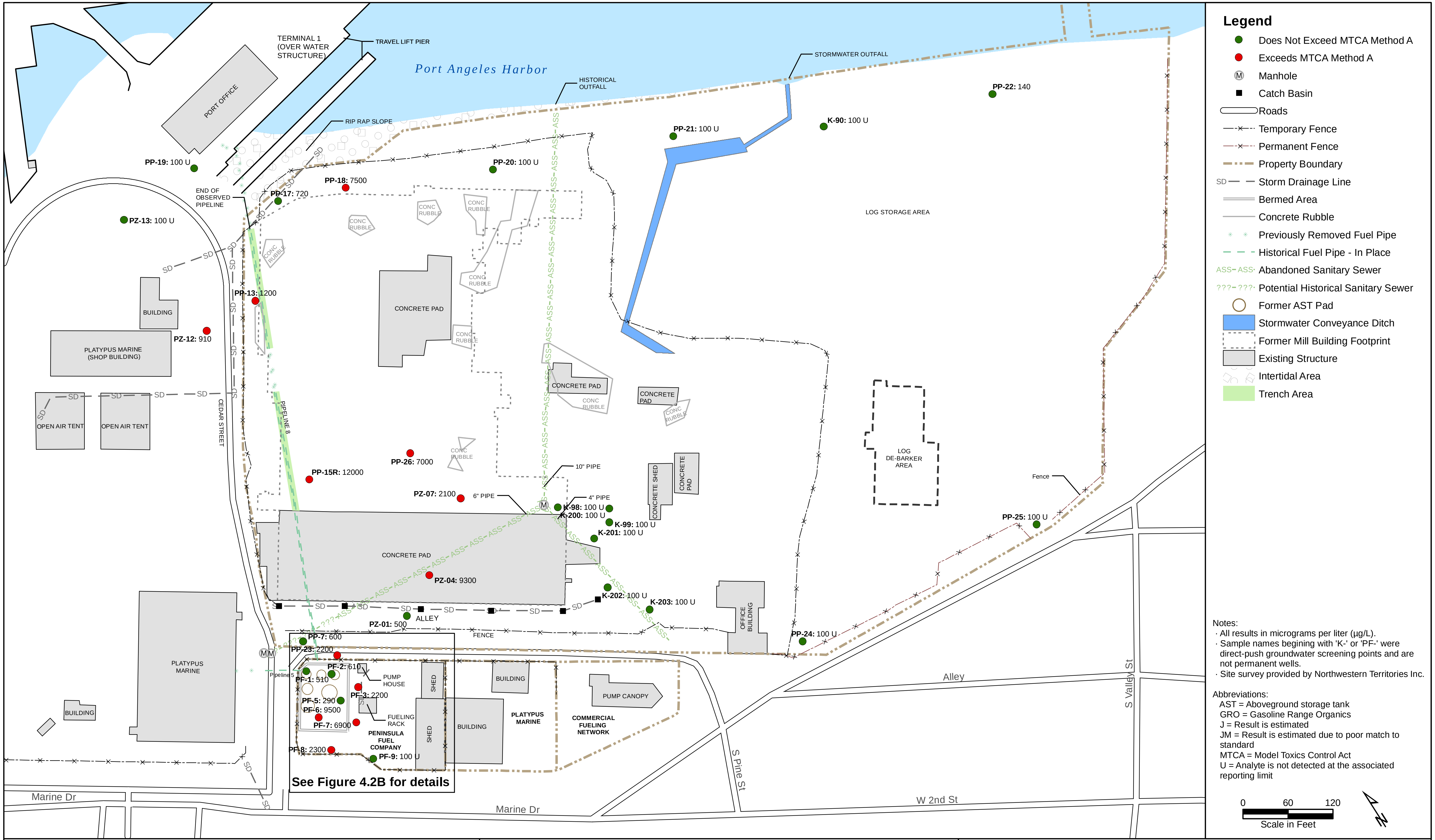
Figure 3.6D
Soil Benzene Results
at Peninsula Fuel Company
Maximum Concentration at Any Depth

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 3.6D (Soil Benzene Results at Peninsula Fueling).mxd
1/7/2014



Notes:
- All results in micrograms per liter (µg/L).
- Sample names begining with 'K-' or 'PF-' were direct-push groundwater screening points and are not permanent wells.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
GRO = Gasoline Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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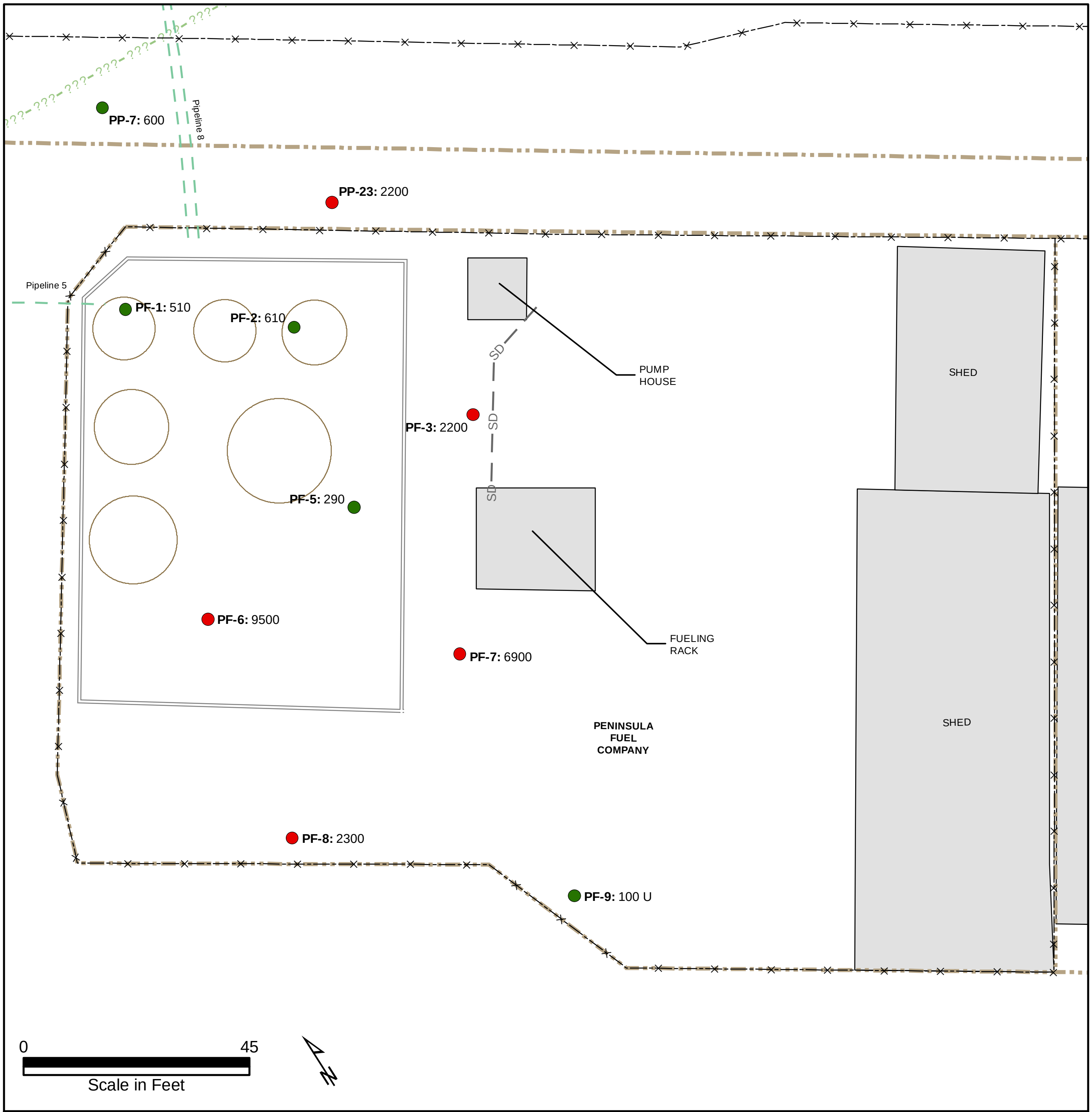
Figure 4.1A
October 2013 Groundwater Monitoring GRO Results

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 4.1A (October 2013 Groundwater Monitoring GRO Results).mxd 1/7/2014



Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Former AST Pad
- ▨ Existing Structure
- —x— Temporary Fence
- —··— Property Boundary
- SD — — Storm Drainage Line
- ═ Bermed Area
- — — Historical Fuel Pipe
- ???–???· Potential Historical Sanitary Sewer

Notes:
- All results in micrograms per liter (µg/L).
- Sample names begining with 'K-' or 'PF-' were direct-push groundwater screening points and are not permanent wells.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
GRO = Gasoline Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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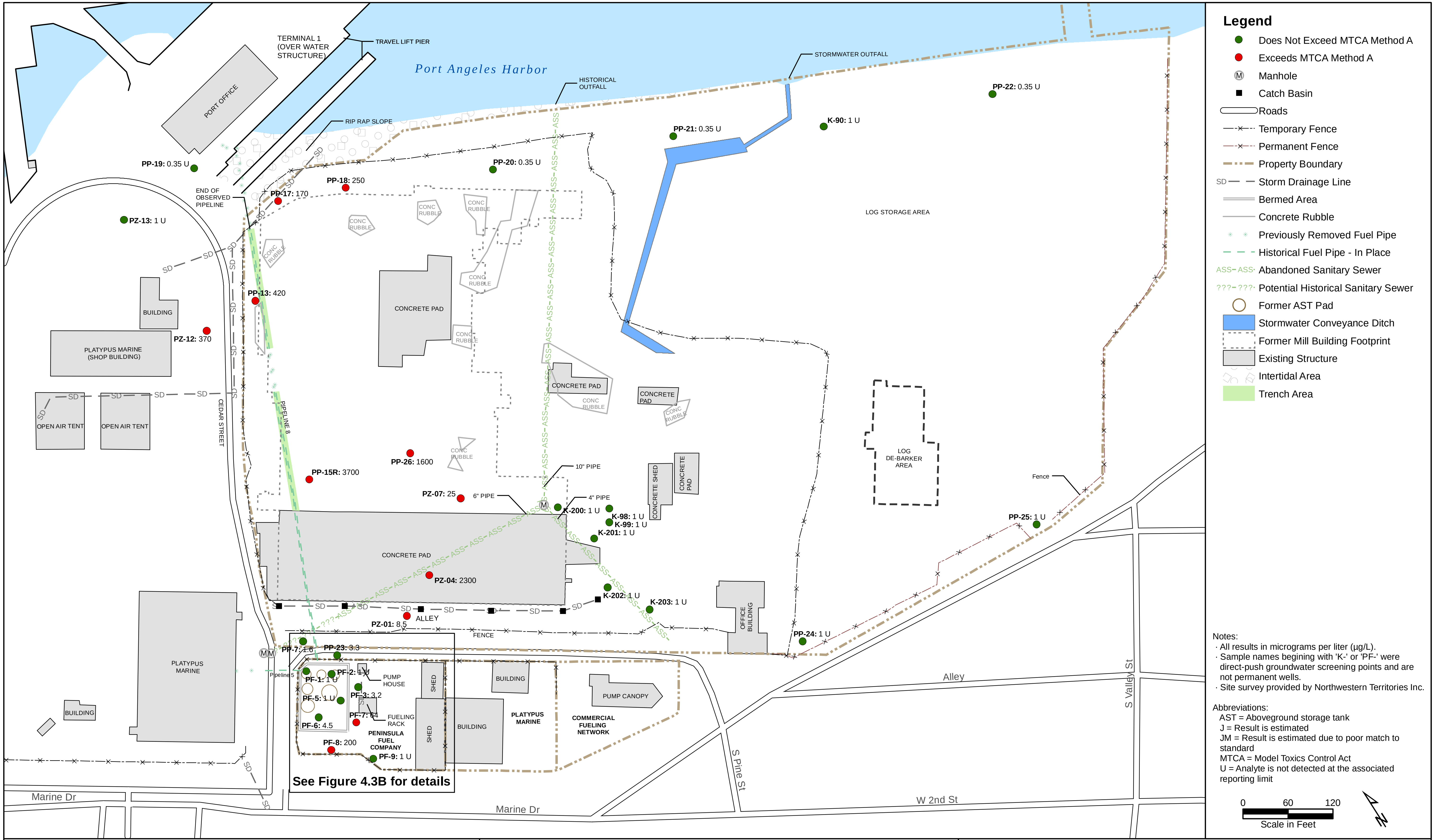
Figure 4.1B
Peninsula Fuel Company
October 2013 Groundwater Monitoring
GRO Results

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 4.1B (October 2013 Groundwater Monitoring GRO Results - Peninsula Fuel Company).mxd
1/20/2014



Notes:
- All results in micrograms per liter (µg/L).
- Sample names begining with 'K-' or 'PF-' were direct-push groundwater screening points and are not permanent wells.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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Figure 4.2A
October 2013 Groundwater Monitoring Benzene Results

Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Former AST Pad
- ▭ Existing Structure
- Temporary Fence
- Property Boundary
- SD Storm Drainage Line
- Bermed Area
- Historical Fuel Pipe - In Place
- ???–??? Potential Historical Sanitary Sewer

Notes:
- All results in micrograms per liter (µg/L).
- Sample names begining with 'K-' or 'PF-' were direct-push groundwater screening points and are not permanent wells.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
AST = Aboveground storage tank
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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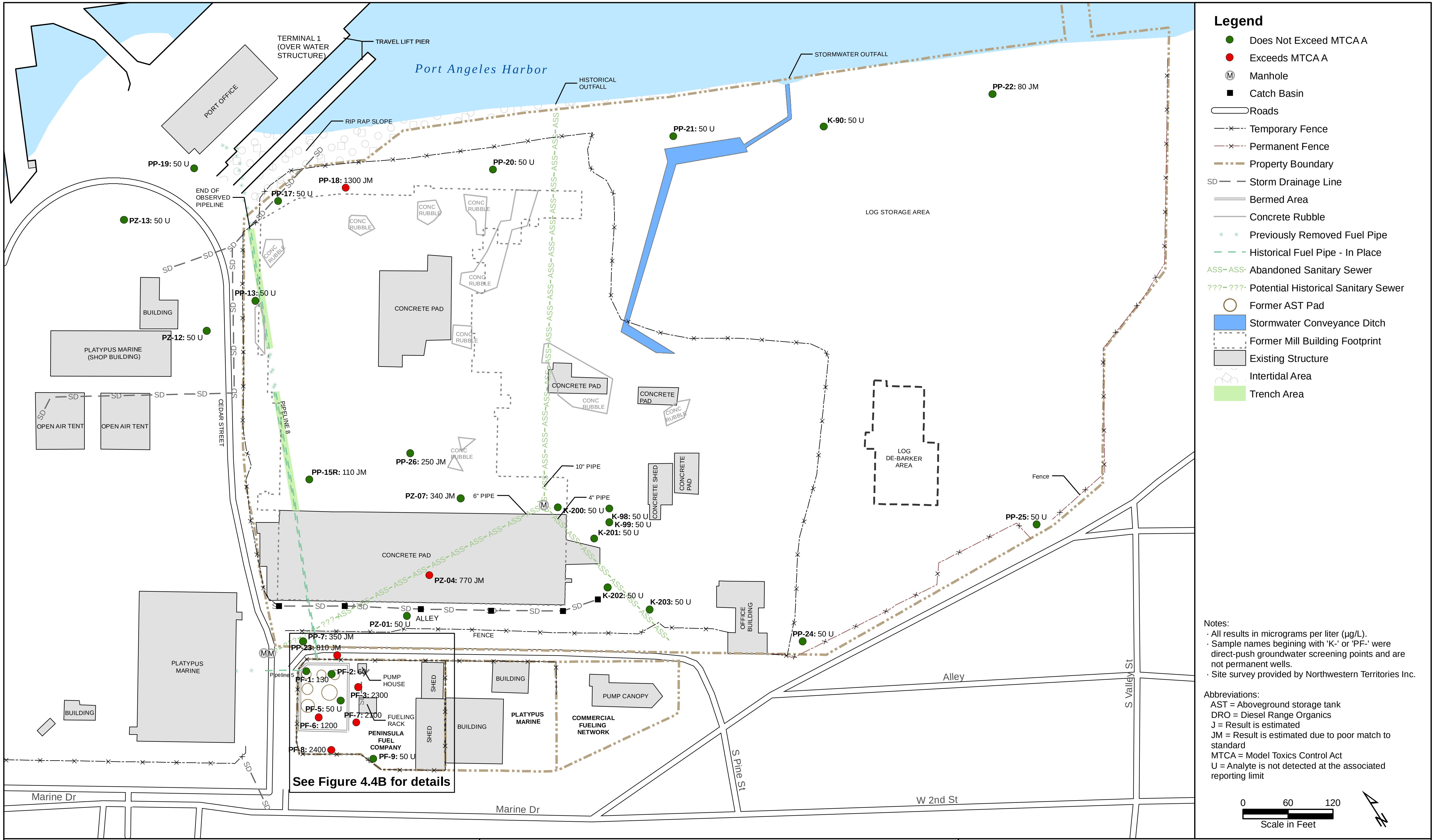
Figure 4.2B
Peninsula Fuel Company
October 2013 Groundwater Monitoring
Benzene Results

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 4.2B (October 2013 Groundwater Monitoring Benzene Results - Peninsula Fuel Company).mxd
1/7/2014



Notes:

- All results in micrograms per liter (µg/L).
- Sample names begining with 'K-' or 'PF-' were direct-push groundwater screening points and are not permanent wells.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:

AST = Aboveground storage tank
DRO = Diesel Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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Figure 4.3A
October 2013 Groundwater Monitoring DRO Results

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 4.3A (October 2013 Groundwater Monitoring DRO Results).mxd 1/7/2014

Legend

- ● Does Not Exceed MTCA Method A
- ● Exceeds MTCA Method A
- ○ Former AST Pad
- ▨ Existing Structure
- Temporary Fence
- Property Boundary
- SD Storm Drainage Line
- Bermed Area
- Historical Fuel Pipe - In Place
- ???-???- Potential Historical Sanitary Sewer

Notes:
- All results in micrograms per liter (µg/L).
- Sample names begining with 'K-' or 'PF-' were direct-push groundwater screening points and are not permanent wells.
- Site survey provided by Northwestern Territories Inc.

Abbreviations:
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DRO = Diesel Range Organics
J = Result is estimated
JM = Result is estimated due to poor match to standard
MTCA = Model Toxics Control Act
U = Analyte is not detected at the associated reporting limit

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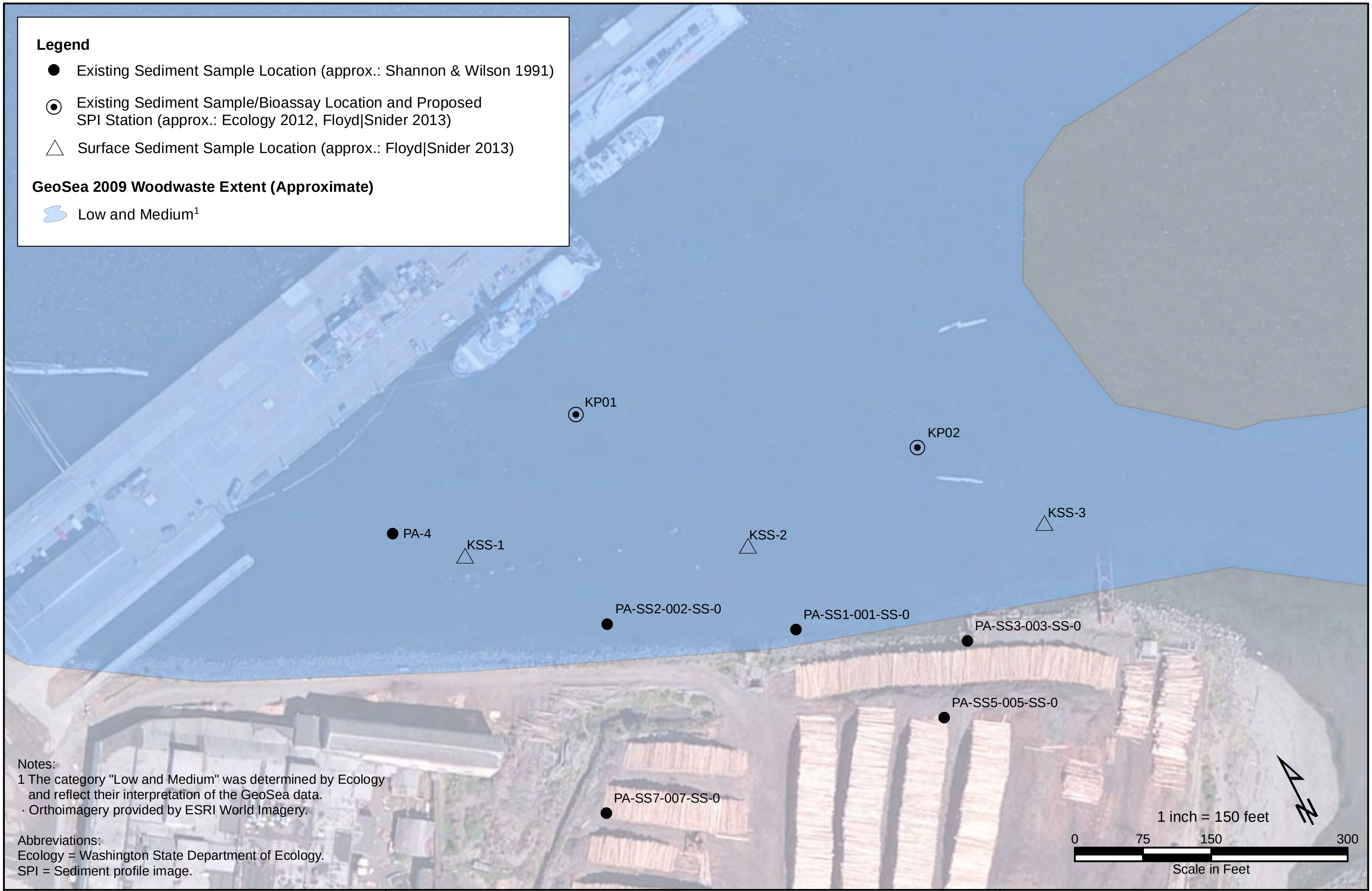
Figure 4.3B
Peninsula Fuel Company
October 2013 Groundwater Monitoring
DRO Results

I:\GIS\Projects\PPA_KPLY\MXD\DataReport\Figure 4.3B (October 2013 Groundwater Monitoring DRO Results - Peninsula Fuel Company).mxd
1/7/2014



Legend

- ● Existing Sediment Sample Location (approx.: Shannon & Wilson 1991)
- ⦿ Existing Sediment Sample/Bioassay Location and Proposed SPI Station (approx.: Ecology 2012, Floyd|Snider 2013)
- △ Surface Sediment Sample Location (approx.: Floyd|Snider 2013)

GeoSea 2009 Woodwaste Extent (Approximate)

- Low and Medium[1]

Notes:
1 The category "Low and Medium" was determined by Ecology and reflect their interpretation of the GeoSea data.
· Orthoimagery provided by ESRI World Imagery.

Abbreviations:
Ecology = Washington State Department of Ecology.
SPI = Sediment profile image.

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Figure 5.1
Sediment Characterization Locations

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Appendix A
Data Validation Reports

Appendix A

The following data validation reports are included in Appendix A:

1. Data Validation Report Prepared by Floyd|Snider July 2013 Sediment Sampling
2. Data Validation Report Prepared by EcoChem July 2013 Sediment Sampling
3. Data Validation Report Prepared by Floyd|Snider 2013 Remedial Investigation Soil and Groundwater Sampling Event
4. Data Validation Report Prepared by EcoChem 2013 Remedial Investigation Soil and Groundwater Sampling Event

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Appendix A
Data Validation Reports

Data Validation Report
Prepared by Floyd|Snider
July 2013 Sediment Sampling

K Ply Site

Data Validation Report
July 2013 Sediment Sampling

Prepared for

Port of Port Angeles
338 West First Street
Port Angeles, Washington 98362

Prepared by

Floyd|Snider
601 Union Street, Suite 600
Seattle, Washington 98101

November 2013

Table of Contents

List of Appendices

List of Abbreviations and Acronyms

Abbreviation/ Acronym	**Definition**
ALS	ALS Environmental
CCV	Continuing calibration verification
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
MDL	Method detection limit
MRL	Method reporting limit
MS	Matrix spike
MSD	Matrix spike duplicate
RPD	Relative percent difference
QA	Quality assurance
QC	Quality control
TPH	Total petroleum hydrocarbons
USEPA	U. S. Environmental Protection Agency

1.0 Project Narrative

1.1 OVERVIEW OF DATA VALIDATION

This report summarizes the results of the Compliance Screening (Level I) performed on the sediment sample data for the K Ply July 2013 Sediment Sampling Event. A complete list of samples is provided below.

Project Sample Index

Sample Delivery Group	Sample ID	Laboratory ID	USEPA 6020A/7471A	Krone	NWTPH-Dx	USEPA 8270D	USEPA 8270D-SIM
K1306878	SD0001K	K1306878-001	X	X	X	X	X
K1306878	SD0002K	K1306878-002	X	X	X	X	X
K1306878	SD0003K	K1306878-003	X	X	X	X	X

The chemical analyses were performed by ALS Environmental (ALS) in Kelso, Washington. Three sediment samples were collected on July 9, 2013, and submitted to ALS for chemical analyses. The analytical methods include the following:

- Select Metals—USEPA Methods 6020A and 7471A
- Butyltins—Krone Method
- Total Petroleum Hydrocarbons (TPH)—NWTPH-Dx Method
- Semivolatile Organic Compounds—USEPA Method 8270D
- Polynuclear Aromatic Hydrocarbons—USEPA Method 8270D-SIM

The data were reviewed using guidance and quality control (QC) criteria documented in the analytical methods, the Sampling and Analysis Plan for the Western Port Angeles Harbor RI/FS (Integral et al. 2013), *National Functional Guidelines for Inorganic Data Review* (USEPA 1994, 2004), and *National Functional Guidelines for Organic Data Review* (USEPA 1999, 2008).

Conventional parameters of total solids, total volatile solids, ammonia as nitrogen, sulfide, total organic carbon, and grain size were also analyzed; however they do not have data quality compliance requirements; therefore, the results are not included in this data validation report. Data quality review of dioxan/furan and polychlorinated biphenyl (PCB) analytical results is not included in this report because these analyses were validated and reported separately by EcoChem.

Floyd|Snider's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes, but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. When compounds are analyzed at multiple dilutions, select results will be assigned a Do Not Report (DNR) qualification as a more appropriate result is reported from another dilution. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reasons, and validation criteria are included as Appendix A. The Qualified Data Summary Table is included in Appendix B. Data validation worksheets (Excel worksheets) will be kept on file at Floyd|Snider.

2.0 Data Validation Report
Select Metals by USEPA Methods 6020A and 7471A

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory QC samples. Samples were analyzed by ALS. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

2.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes, and all anomalies were discussed in the case narrative.

2.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

	Cooler temperature and preservation	1	Matrix spike
	Extraction and analysis holding times		Laboratory sample duplicates
	Blank contamination		Reporting limits and reported results
	Laboratory control sample		Target analyte list

Note:

1 Quality control outliers that impact the reported data were noted. Data qualifiers were issued, as discussed below.

Appendix A presents data validation criteria tables for inorganic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

2.2.1 Matrix Spike

The matrix spike (MS) recoveries for arsenic (50.4 percent), copper (42.6 percent), and zinc (56 percent) were outside laboratory control limits of 75 to 125 percent. The original concentrations of arsenic and copper in the batch QC sample were 724 and 303 milligrams per kilogram (mg/kg), respectively. These were greater than four times the spike amounts of 89.23 mg/kg for arsenic and 44.62 mg/kg for copper. Per U.S. Environmental Protection Agency (USEPA) guidelines, spike recovery limits do not apply when sample concentrations exceed the spike concentration by a factor of four or greater, and in such an event, the data will be reported unflagged. Therefore, no qualifiers will be added to the arsenic and copper results based on this MS recovery information alone. The original concentration of zinc in the sample was 243 mg/kg and is less than four times the spike amount of 89.23 mg/kg. Therefore, the MS recovery suggests a potential low bias, and the detected results for zinc have been qualified "J" to indicate they should be considered an estimate.

2.3 OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the MS for all analytes except zinc, as noted above, and laboratory control sample (LCS) percent recovery values. Precision was acceptable, as demonstrated by the laboratory sample/laboratory sample duplicate relative percent differences (RPDs).

All data are acceptable for use as qualified; see Appendix B for details.

3.0 Data Validation Report
Butyltins by Krone Method

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory QC samples. Samples were analyzed by ALS. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

3.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes, and any anomalies were discussed in the case narrative.

3.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	MS and MS duplicate
[1] Extraction and analysis holding times	LCS
Blank contamination	[1] Reporting limits and reported results
Surrogate recoveries	

Note:
1 Quality control outliers that impact the reported data were noted. Data qualifiers were issued, as discussed below.

QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

3.2.1 Extraction and Analysis Holding Times

The laboratory noted that a significant portion of the original extract for sample SD002K had been lost during the extraction process and could indicate a potential low bias to the sample. The reanalysis was performed as soon as possible after this problem was identified; however the reextraction occurred 2 days past the recommended hold time for the method. Surrogates met control limits for both sets of analyses, and per the laboratory, the final result numbers suggest that approximately two-thirds of the original extract was lost. Therefore, on the basis of professional judgment, the original analysis was flagged as DNR in favor of the results from the reanalysis. Because the reanalysis occurred outside of the recommended method hold time, all results from the Krone method for sample SD0002K have been flagged “J” to indicate they are estimated.

3.2.2 Reporting Limits and Reported Results

Sample SD003K had reported results for tri-n-butyltin cation, di-n-butyltin cation, and n-butyltin cation that were flagged "J" by the laboratory to indicate they were estimates between the method detection limit (MDL) and the method reporting limit (MRL). The results have been flagged “JQ,” which is the interpretive qualifier to be used for database entry and project reporting to indicate estimated concentrations due to the reporting of a value between the MDL and MRL.

3.3 OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the MS, matrix spike duplicate (MSD), and LCS percent recovery values. Precision was acceptable, as demonstrated by the MS/MSD RPDs.

All data are acceptable for use as qualified; see Appendix B for details.

4.0 Data Validation Report
Total Petroleum Hydrocarbons by NWTPH-Dx Method

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory QC samples. Samples were analyzed by ALS. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

4.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes, and any anomalies were discussed in the case narrative.

4.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	[1] Laboratory sample duplicate RPDs
Extraction and analysis holding times	LCS
Blank contamination	[2] Reporting limits and reported results
Surrogate recoveries	[2] Chromatographic match to TPH standards

Notes:
1 Quality control results are discussed below, but no data were qualified.
2 Quality control outliers that impact the reported data were noted. Data qualifiers were issued, as discussed below.

Appendix A presents data validation criteria tables for diesel-range hydrocarbon analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

4.2.1 Laboratory Sample Duplicate RPDs

The laboratory noted that the RPDs for the sample/sample duplicate were not applicable for diesel-range organics or residual-range organics because the analyte concentrations were not significantly greater than the MRL. The RPDs were still within the laboratory limit of 40 percent. Therefore, no results have been qualified based on the notation by the laboratory.

4.2.2 Reporting Limits and Reported Results

The results for diesel-range organics and residual-range organics for samples SD0001K and SD0003K were flagged "J" by the laboratory to indicate they were estimates between the MDL and MRL. The results have been flagged “JQ,” which is the interpretive qualifier to be used for database entry and project reporting to indicate estimated concentrations due to the reporting of a value between the MDL and MRL.

4.2.3 Chromatographic Match to TPH Standards

As part of the validation of TPH data, the detectable hydrocarbons and/or organics within the diesel, gasoline, or residual hydrocarbon chromatogram ranges have been reviewed relative to the appropriate laboratory standard. If the hydrocarbons are not identifiable based on a poor chromatographic match with the standards, the data will be qualified “MP” to reflect a poor match, and the interpretive qualifier to be used for database entry and project reporting is “JM” to indicate estimated concentrations due the poor chromatographic match. Similarly, if the hydrocarbons provide a good chromatographic match with the standards, the data will be qualified “MG” to reflect a good match, and no interpretive qualifier will be used for database entry or project reporting.

Sample SD002K was the only sample with detected results above the MRL; therefore only chromatograms for this sample were compared with laboratory standards. The laboratory qualified both the diesel-range organics and residual-range organics results with “Z” qualifiers to indicate the chromatograms did not match standards. The chromatogram review conducted as part of TPH data validation, as described above, concurred with the laboratory assessment, and the results have been qualified “MP” with an interpretive qualifier of “JM.”

4.3 OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate and LCS recovery values. Precision was acceptable, as demonstrated by the laboratory sample duplicate RPDs.

All data are acceptable for use as qualified; see Appendix B for details.

5.0 Data Validation Report
Semivolatile Organic Compounds by USEPA Method 8270D

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory QC samples. Samples were analyzed by ALS. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

5.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes, and all anomalies were discussed in the case narrative.

5.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

	Cooler temperature and preservation	1	MS and MSD
	Extraction and analysis holding times	1	LCS and LCSD
	Blank contamination	2	Reporting limits and reported results
1	Surrogate recoveries	1	Continuing calibration verification

Notes:
1 Quality control results are discussed below, but no data were qualified.
2 Quality control outliers that impact the reported data were noted. Data qualifiers were issued, as discussed below

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

5.2.1 Surrogate Recoveries

The 2,4,6-tribromophenol acid surrogate for the batch MSD sample was outside the upper control limit. Per USEPA guidelines, no action is taken on surrogate recoveries unless two or more surrogates from the same fraction (acid or base/neutral) are outside the specification. Because only one surrogate was outside the specification, no results were qualified based on this recovery information.

5.2.2 Matrix Spike and Matrix Spike Duplicates

The MS recovery for phenol in the batch QC analysis was outside the laboratory control limits. The laboratory advised it was due to the heterogeneous character of the sample, which was why the RPD between the MS and MSD was outside the laboratory control limits as well. Per USEPA guidelines, data are not qualified based on MS/MSD information alone. Because all other quality assurance (QA)/QC objectives were met for phenol in this analysis and the batch

QC analysis was performed on a sample for another client, professional judgment was used in deciding that no phenol results should be qualified based on this MS/MSD recovery information.

5.2.3 Laboratory Control Sample and Laboratory Control Sample Duplicate

Benzoic acid was outside the control limits for the LCS and LCSD. Per the laboratory, the limits are default values temporarily in use until sufficient data points are generated to calculate statistical control limits. Based on the method and historical data, the recoveries observed were in the range expected for this analysis. Professional judgment was used in deciding that no benzoic acid results should be qualified based on this LCS/LCSD recovery information.

5.2.4 Reporting Limits and Reported Results

All three samples had reported results for multiple analytes that were flagged "J" by the laboratory to indicate they were estimates between the MDL and MRL. The results have been flagged “JQ,” which is the interpretive qualifier to be used for database entry and project reporting to indicate estimated concentrations due to the reporting of a value between the MDL and MRL. Details of which analyte was qualified in each sample are provided in Appendix B.

The laboratory noted that detection limits for samples SD0001K and SD0002K were elevated because the extracted sample mass was less than optimal for analysis. The samples contained a low percentage of solids, which prevented extraction of the sample mass necessary to achieve target detection limits.

5.2.5 Continuing Calibration Verification

The laboratory advised that three analytes, benzoic acid, 2,4-dinitrophenol, and 2,-methyl-4,6-dinitriophenol, were outside the lower control criterion for continuing calibration verification (CCV), and two analytes, hexachlorobutadiene and 2,4,6-tribromphenol, were outside the upper control criterion. Per the laboratory, in accordance with the USEPA Method 8270D, 80 percent or more of the CCV analytes must be within 20 percent of the true value, and the remaining analytes are allowed a 40 percent difference per the ALS standard operating procedure. The laboratory advised that the CCV met these criteria, and that the data quality was not affected; therefore, no further corrective action was required. Professional judgment was used in deciding that the results should not be qualified based on this continuing calibration information.

5.3 OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, MS, MSD, LCS, and LCSD recoveries as discussed above. Precision was acceptable, as demonstrated by the MS/MSD RPDs and LCS/LCSD RPDs, as discussed above.

All data are acceptable for use as qualified; see Appendix B for details.

6.0 Data Validation Report
Polynuclear Aromatic Hydrocarbons by USEPA Method 8270D-SIM

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory QC samples. Samples were analyzed by ALS. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

6.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes, and all anomalies were discussed in the case narrative.

6.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	[1] MS and MSD
Extraction and analysis holding times	LCS and LCSD
Blank contamination	[1] Reporting limits and reported results
Surrogate recoveries	Target analyte list

Note:
1 Quality control results are discussed below, but no data were qualified.

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

6.2.1 Matrix Spike and Matrix Spike Duplicate

The MS recoveries for numerous analytes were outside the laboratory control limits. The laboratory advised that it was due to the heterogeneous character of the sample which was why the RPDs between the MS and MSD were also outside the laboratory control limits. Per USEPA guidelines, data are not qualified based on MS/MSD information alone. Because all other QA/QC objectives were met in this analysis, professional judgment was used in deciding that no results should be qualified based on this MS/MSD recovery information.

6.2.2 Reporting Limits and Reported Results

The laboratory noted that detection limits for samples SD0001K and SD0002K were elevated because the extracted sample mass was less than optimal for analysis. The samples contained a low percentage of solids, which prevented extraction of the sample mass necessary to achieve target detection limits.

6.3 OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the MS and LCS percent recovery values. Precision was acceptable, as demonstrated by the MS/MSD RPDs and LCS/LCSD RPDs.

All data, as reported by the laboratory, are acceptable for use.

7.0 References

Integral Consulting Inc. (Integral); Anchor QEA, LLC; Exponent; and Floyd|Snider. 2013. *Sampling and Analysis Plan, Western Port Angeles Harbor RI/FS*. Prepared for Western Port Angeles Harbor Group (City of Port Angeles; Georgia-Pacific LLC; Merrill & Ring; Nippon Paper Industries USA Co., Ltd.; and Port of Port Angeles). 13 June.

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K Ply Site

Data Validation Report
July 2013 Sediment Sampling

Appendix A
Data Qualifier Definitions and Criteria Tables

DATA VALIDATION QUALIFIER CODES
National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.
NJ	The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is a Floyd|Snider qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

Floyd|Snider Validation Guidelines for Metals Analysis by ICP-MS (Based on Inorganic NFG 1994 & 2004)

Validation QC Element	Acceptance Criteria	Action
Cooler Temperature and Preservation	Cooler temperature: 4°C ±2° Waters: Nitric Acid to pH < 2 For Dissolved Metals: 0.45um filter & preserve after filtration	Floyd|Snider Professional Judgment—no qualification based on cooler temperature outliers J/UJ if pH preservation requirements are not met
Holding Time	180 days from date sampled Frozen tissues—HT extended to 2 years	J/UJ if holding time exceeded
Tune	Prior to ICAL monitoring compounds analyzed 5 times wih Std Dev. < 5% mass calibration <0.1 amu from True Value Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height	Use Professional Judgment to evaluate tune J/UJ if tune criteria not met
Initial Calibration	Blank + minimum 1 standard If more than 1 standard, r>0.995	J/UJ if r<0.995 (for multi point cal)
Initial Calibration Verification (ICV)	Independent source analyzed immediately after calibration %R within ±10% of true value	J/UJ if %R 75–89% J if %R = 111-125% R if %R > 125% R if %R < 75%
Continuing Calibration Verification (CCV)	Every ten samples, immediately following ICV/ICB and at end of run ±10% of true value	J/UJ if %R = 75–89% J if %R 111-125% R if %R > 125% R if %R < 75%

Initial and Continuing Calibration Blanks (ICB/CCB)	After each ICV and CCV
	every ten samples and end of run
	| blank | < IDL (MDL)
		Action level is 5x absolute value of blank conc.
		For (+)blanks, U results < action level
		For (-) blanks, J/UJ results < action level

Validation QC Element	**Acceptance Criteria**	**Action**
Reporting Limit Standard (CRI)	2x RL analyzed beginning of run Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Co,Mn, Zn)	R, < 2x RL if %R < 50% (< 30% Co,Mn, Zn) J < 2x RL, UJ if %R 50-69% (30%-49% Co,Mn, Zn) J < 2x RL if %R 130%-180% (150%-200% Co,Mn, Zn) R < 2x RL if %R > 180% (200% Co, Mn, Zn)
Interference Check Samples (ICSA/ICSAB)	Required by SW 6020, but not 200.8 ICSAB %R 80% - 120% for all spiked elements | ICSA | < IDL (MDL) for all unspiked elements	For samples with Al, Ca, Fe, or Mg > ICS levels R if %R < 50% J if %R >120% J/UJ if %R = 50% to 79% Use Professional Judgment for ICSA to determine if bias is present
Method Blank	One per matrix per batch (batch not to exceed 20 samples) blank < MDL	Action level is 5x blank concentration U results < action level
Laboratory Control Sample (LCS)	One per matrix per batch Blank Spike: %R within 80%-120%	R if %R < 50% J/UJ if %R = 50-79% J if %R >120%
	CRM: Result within manufacturer's certified acceptance range or project guidelines	J/UJ if < LCL, J if > UCL
Matrix Spike/ Matrix Spike Duplicate (MS/MSD)	One per matrix per batch 75-125% for samples where results do not exceed 4x spike level	J if %R>125% J/UJ if %R <75% J/R if %R<30% or J/UJ if Post Spike %R 75%-125% Qualify all samples in batch
Post-digestion Spike	If Matrix Spike is outside 75-125%, Spike parent sample at 2x the sample conc.	No qualifiers assigned based on this element
Laboratory Duplicate (or MS/MSD)	One per matrix per batch RPD < 20% for samples > 5x RL Diff < RL for samples > RL and < 5 x RL (Diff < 2x RL for solids)	J/UJ if RPD > 20% or diff > RL All samples in batch
Serial Dilution	5x dilution one per matrix %D < 10% for original sample values > 50x MDL	J/UJ if %D >10% All samples in batch

Validation QC Element	Acceptance Criteria	Action
Internal Standards	Every sample SW6020: 60%-125% of cal blank IS 200.8: 30%-120% of cal blank IS	J /UJ all analytes associated with IS outlier
Field Blank	Blank < MDL	Action level is 5x blank conc. U sample values < AL in associated field samples only
Field Duplicate	For results > 5x RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff < RL Solid: Diff < 2x RL	J/UJ in parent samples only
Linear Range	Sample concentrations must fall within range	J values over range

Floyd|Snider Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

Validation QC Element	Acceptance Criteria	Action
Cooler Temperature	4°C ± 2°	J/UJ if greater than 6 deg. C (Floyd|Snider PJ)
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	Water: J/UJ if ext. > 7 and < 21 days J/R if ext > 21 days (Floyd|Snider PJ) Solids/Wastes: J/UJ if ext. > 14 and < 42 days J/R if ext. > 42 days (Floyd|Snider PJ) J/UJ if analysis >40 days
Tuning	DFTPP Beginning of each 12 hour period Method acceptance criteria	R all analytes in all samples associated with the tune
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(Floyd|Snider PJ) If MDL= reporting limit: J/R if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05
	%RSD < 30%	(Floyd|Snider PJ) J if %RSD > 30%
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(Floyd|Snider PJ) If MDL= reporting limit: J/R if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF < 0.05
	%D <25%	(Floyd|Snider PJ) If > +/-90%: J/RIf -90% to -26%: J (high bias) If 26% to 90%: J/UJ (low bias)
Method Blank	One per matrix per batch No results > CRQL	U if sample result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)
		U if sample result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)

Validation QC Element	**Acceptance Criteria**	**Action**
Method Blank (continued)	No TICs present	RTICs using 10X rule
Field Blanks (Not Required)	No results > CRQL	Apply 5X/10X rule; U < action level
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J if both %R > UCL J/UJ if both %R < LCL J/R if both %R < 10% Floyd|Snider PJ if only one %R outlier
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J in parent sample if RPD > CL
LCS CLP **low conc. H2O only**	One per lab batch Within method control limits	J assoc. cmpd if > UCL J/R assoc. cmpd if < LCL J/R all cmpds if half are < LCL
LCS **regular SVOA (H2O & solid)**	One per lab batch Lab or method control limits	J if %R > UCL J/UJ if %R <LCL J /R if %R < 10% (Floyd|Snider PJ)
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J/UJ associated compounds in all samples
Surrogates	Minimum of 3 acid and 3 base/neutral compounds Use method acceptance criteria	Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10% J if %R > UCL J/UJ if %R < LCL J/R if %R < 10%
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J if > 200% J/UJ if < 50% J/R if < 25% RT>30 seconds, narrate and Notify PM
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (Floyd|Snider PJ)

Validation QC Element	Acceptance Criteria	Action
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R common laboratory contaminants See Technical Director for ID issues
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers

Abbreviation:

PJ	Professional judgment

Floyd|Snider Validation Guidelines for Total Petroleum Hydrocarbons-Diesel & Residual Range and Gasoline Range
(Based on USEPA National Functional Guidelines as applied to criteria in NWTPH-Dx and NWTPH-Gx, June 1997, Ecology & Oregon DEQ)

Validation QC Element	Acceptance Criteria	Action
Cooler Temperature & Preservation	4°C± 2°C Water: HCl to pH < 2	J/UJ if greater than 6 deg. C
Holding Time	Ext. Waters: 14 days preserved 7 days unpreserved Ext. Solids: 14 Days Analysis: 40 days from extraction	J/UJ if hold times exceeded J/R if exceeded > 3X (Floyd|Snider PJ)
Initial Calibration	5 calibration points (All within 15% of true value) Linear Regression: R2 >0.990 If used, RSD of response factors <20%	Narrate if fewer than 5 calibration levels or if %R >15% J/UJ if R2 <0.990 J/UJ if %RSD > 20%
Mid-range Calibration Check Std.	Analyzed before and after each analysis shift & every 20 samples. Recovery range 85% to 115%	Narrate if frequency not met. J/UJ if %R < 85% J if %R >115%
Method Blank	At least one per batch (<10 samples) Method Blank No results >RL	U (at the RL) if sample result is < RL & < 5X blank result.
		U (at reported sample value) if sample result is > RL and < 5X blank result
Field Blanks (if required by project)	No results > RL	Action is same as method blank for positive results remaining in the field blank after method blank qualifiers are assigned.
MS samples (accuracy) (if required by project)	%R within lab control limits	Qualify parent only, unless other QC indicates systematic problems. J if both %R > upper control limit (UCL) J/UJ(-) if both %R < lower control limit (LCL) No action if parent conc. >5X the amount spiked. Use PJ if only one %R outlier
Precision: MS/MSD or LCS/LCSD or sample/dup	At least one set per batch (<10 samples) RPD < lab control limit	J if RPD > lab control limits

Validation QC Element	**Acceptance Criteria**	**Action**
LCS (not required by method)	%R within lab control limits	J/UJ if %R < LCL J if %R > UCL J/R if any %R <10% (Floyd|Snider PJ)
Surrogates	2-fluorobiphenyl, p-terphenyl, o-terphenyl, and/or pentacosane added to all samples (inc. QC samples). %R = 50-150%	J/UJ if %R < LCL J if %R > UCL J/R if any %R <10% No action if 2 or more surrogates are used, and only one is outside control limits. (Floyd|Snider PJ)
Pattern Identification	Compare sample chromatogram to standard chromatogram to ensure range and pattern are reasonable match. Laboratory may flag results which have poor match.	J
Field Duplicates	Use project control limits, if stated in QAPP Floyd|Snider default: water: RPD < 35% solids: RPD < 50%	Narrate (Floyd|Snider PJ to qualify)
Two analyses for one sample (dilution)	Report only one result per analyte	"DNR" (or client requested qualifier) all results that should not be reported

Abbreviation:

PJ	Professional judgment

K Ply Site

Data Validation Report
July 2013 Sediment Sampling

Appendix B
Qualified Data Summary Table

Qualified Data Summary Table

SDG	Sample ID	Lab ID	Method	Analyte	Result	Units	Lab Qualifier	DV Qualifier	Final Qualifier
K1306878	SD0001K	K1306878-001	6020A	Zinc	88	mg/kg	N	J	J
K1306878	SD0002K	K1306878-002	6020A	Zinc	65.7	mg/kg	N	J	J
K1306878	SD0003K	K1306878-003	6020A	Zinc	57.9	mg/kg	N	J	J
K1306878	SD0002K	K1306878-002	Krone	Tetra-n-butyltin	2.2	µg/kg	ND	DNR	DNR
K1306878	SD0002K	K1306878-002	Krone	Tri-n-butyltin Cation	5.7	µg/kg		DNR	DNR
K1306878	SD0002K	K1306878-002	Krone	Di-n-butyltin Cation	2	µg/kg	J	DNR	DNR
K1306878	SD0002K	K1306878-002	Krone	n-Butyltin Cation	0.93	µg/kg	J	DNR	DNR
K1306878	SD0002K	K1306878-002 RE	Krone	Tetra-n-butyltin	2.1	µg/kg	ND	JH	UJ
K1306878	SD0002K	K1306878-002 RE	Krone	Tri-n-butyltin Cation	13	µg/kg		JH	J
K1306878	SD0002K	K1306878-002 RE	Krone	Di-n-butyltin Cation	5	µg/kg		JH	J
K1306878	SD0002K	K1306878-002 RE	Krone	n-Butyltin Cation	2.5	µg/kg		JH	J
K1306878	SD0003K	K1306878-003	Krone	Tri-n-butyltin Cation	1.3	µg/kg	J		JQ
K1306878	SD0003K	K1306878-003	Krone	Di-n-butyltin Cation	0.59	µg/kg	J		JQ
K1306878	SD0003K	K1306878-003	Krone	n-Butyltin Cation	0.52	µg/kg	J		JQ
K1306878	SD0001K	K1306878-001	NWTPH-Dx	Diesel Range Organics	47	mg/kg	J		JQ
K1306878	SD0001K	K1306878-001	NWTPH-Dx	Residual Range Organics	210	mg/kg	J		JQ
K1306878	SD0002K	K1306878-002	NWTPH-Dx	Diesel Range Organics	94	mg/kg	Z	MP	JM
K1306878	SD0002K	K1306878-002	NWTPH-Dx	Residual Range Organics	330	mg/kg	Z	MP	JM
K1306878	SD0003K	K1306878-003	NWTPH-Dx	Diesel Range Organics	16	mg/kg	J		JQ
K1306878	SD0003K	K1306878-003	NWTPH-Dx	Residual Range Organics	120	mg/kg	J		JQ
K1306878	SD0001K	K1306878-001	8270D	Phenol	28	µg/kg	J		JQ
K1306878	SD0001K	K1306878-001	8270D	Bis(2-ethylhexyl)-phthalate	37	µg/kg	J		JQ
K1306878	SD0002K	K1306878-002	8270D	2-Chlorophenol	5	µg/kg	J		JQ
K1306878	SD0002K	K1306878-002	8270D	2,4-Dimethylphenol	15	µg/kg	J		JQ
K1306878	SD0002K	K1306878-002	8270D	Di-n-butyl Phthalate	7.2	µg/kg	J		JQ
K1306878	SD0002K	K1306878-002	8270D	Bis(2-ethylhexyl)-phthalate	44	µg/kg	J		JQ

SDG	Sample ID	Lab ID	Method	Analyte	Result	Units	Lab Qualifier	DV Qualifier	Final Qualifier
K1306878	SD0003K	K1306878-003	8270D	Phenol	12	µg/kg	J		JQ
K1306878	SD0003K	K1306878-003	8270D	4-Methylphenol	5.1	µg/kg	J		JQ
K1306878	SD0003K	K1306878-003	8270D	Bis(2-ethylhexyl)-phthalate	17	µg/kg	J		JQ

Abbreviations:

DV	Data validation
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
RE	Reextraction
SDG	Sample Delivery Group

Qualifiers:

DNR	Do not report.
J	The result is an estimated value.
JH	The result should be considered an estimated value; the analysis occurred outside of holding time.
JM	The result should be considered an estimated value; there was a poor match to the chromatographic standard.
JQ	The result should be considered an estimated value; it has been reported between the method reporting limit and the method detection limit.
N	The matrix spike sample recovery is not within control limits.
ND	Not detected.
MP	The chromatograph was a poor match to standard.
UJ	Not detected at the associated reporting limit, which is an estimate.
Z	The chromatographic fingerprint does not resemble a petroleum product.

K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Appendix A
Data Validation Reports

Data Validation Report
Prepared by EcoChem
July 2013 Sediment Sampling

DATA VALIDATION REPORT
CITY OF PORT ANGELES – K-Ply

Prepared for:

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Prepared by:

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EcoChem Project: C15218-1

November 1, 2013

Approved for Release

Melissa Swanson
Project Manager
EcoChem, Inc.

Basis for Data Validation

This report summarizes the results of validation (EPA Stage 2B) performed on sediment, and quality control (QC) sample data for the City of Port Angeles – K-Ply site. Field sample ID, laboratory sample ID, and requested analyses are provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section.

Samples were analyzed by Axys Analytical, Sidney, British Columbia, Canada. The analytical methods and EcoChem project chemists are listed below.

Analysis	Method of Analysis	Primary Review	Secondary Review
Dioxin Furans	EPA1613B	M. Swanson	E. Strout
Polychlorinated Biphenyls	EPA1668A		

The data were reviewed using guidance and quality control criteria documented in the analytical methods and the following project and guidance documents:

- Sampling and Analysis Plan - *Western Port Angeles Harbor RI/FS* (Integral/Anchor QEA/Exponent/Floyd | Snider, June 2013)
- *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (EPA, 2002, 2005)

EcoChem's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
City of Port Angeles - K Ply

SDG	Sample ID	Lab ID	Dioxin	PCB
WG44197	SD0001K	L19903-1	✓	✓
WG44197	SD0002K	L19903-2	✓	✓
WG44197	SD0003K	L19903-3	✓	✓

DATA VALIDATION REPORT
City of Port Angeles K-Ply
Dioxin & Furan Compounds by Axys Method MLA-017 (EPA 1613B)

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Axys Analytical Services, Ltd. of Sidney, British Columbia, Canada. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples	Validation Level
WG44197	3 Sediment	EPA Stage 2B

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. EDD TO LABORATORY REPORT PACKAGE VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the laboratory data package. No errors were noted.

III. TECHNICAL DATA VALIDATION

The QC requirements reviewed are summarized in the following table:

✓	Sample Receipt, Preservation, and Holding Time	✓	Ongoing Precision and Recovery (OPR)
✓	System Performance and Resolution Checks	1	Field Replicates
✓	Initial Calibration (ICAL)	1	Laboratory Duplicates
✓	Calibration Verification (CVER)	✓	Target Analyte List
1	Method Blanks	2	Reported Results
✓	Labeled Compounds	2	Compound Identification

✓ ***Stated method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.***
[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Method Blanks

In order to assess the impact of blank contamination on the reported sample results, action levels are established at five times the blank concentrations. If the concentrations in the associated field samples are less than the action levels, the results are qualified as not detected (U-7).

The laboratory assigned K-flags to dioxin and furan values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations". When these occurred in the method blank the results were considered as false positives. No action levels were established for these analytes.

The analytes 2,3,7,8-TCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD were reported in the method blank as K-flagged results. No data were qualified.

Field Replicates

No field replicates were submitted.

Laboratory Duplicates

No laboratory duplicates were analyzed.

Reported Results

All results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. The 2,3,7,8-TCDF results from both columns were reported. The 2,3,7,8-TCDF results from the DB-5 column were qualified do-not-report (DNR-11).

Compound Identification

The laboratory assigned a" K" flag to one or more analytes in all samples to indicate the ion ratio criterion were not met. Since the ion abundance ratio is the primary identification criterion for high resolution mass spectroscopy, an outlier indicates that the reported result may be a false positive. All “K” flagged results were qualified as not detected (U-25) at the reported concentration.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the labeled compound and OPR recoveries. Precision could not be assessed.

Detection limits were elevated based on ion ratio outliers.

Results for 2,3,7,8-TCDF on the DB-5 column were qualified do-not-report (DNR). Since a usable result remains for this compound in all samples; completeness was unaffected. Data that have been flagged DNR are not useable for any purpose.

All other data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
City of Port Angeles K-Ply
PCB Congeners by Axys Method MLA-010 (EPA 1668)

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Axys Analytical Services, Ltd. of Sydney, British Columbia, Canada. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples	Validation Level
WG44197	3 Sediment	EPA Stage 2B

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. EDD TO LABORATORY REPORT PACKAGE VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the laboratory data package. No errors were noted.

III. TECHNICAL DATA VALIDATION

The QC requirements reviewed are summarized in the following table:

✓	Sample Receipt, Preservation, and Holding Times	✓	Ongoing Precision and Recovery (OPR)
✓	System Performance and Resolution Checks	1	Field Replicates
✓	Initial Calibration (ICAL)	1	Laboratory Duplicates
✓	Calibration Verification (CVER)	2	Compound Identification
1	Method Blanks	2	Reported Results
✓	Labeled Compounds	1	Reporting Limits

✓ Stated method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

[1] Quality control results are discussed below, but no data were qualified.

[2] Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.

Method Blanks

In order to assess the impact of blank contamination on the reported sample results, action levels are established at five times the blank concentrations. If the concentrations in the associated field samples are less than the action levels, the results are qualified as not detected (U-7).

The laboratory assigned K-flags to PCB congener values when a peak was detected but did not meet identification criteria. These values cannot be considered as positive identifications, but are "estimated maximum possible concentrations". When these occurred in the method blank the results were considered as false positives. No action levels were established for these analytes.

Many PCB congeners were detected in the method blank, but all sample results were either not detected or detected at concentrations greater than the action levels; no data were qualified.

Field Replicates

No field replicates were submitted.

Laboratory Duplicates

No laboratory duplicates were analyzed.

Compound Identification

The laboratory assigned a "K" flag to one or more analytes in all samples to indicate the ion ratio criterion were not met. Since the ion abundance ratio is the primary identification criterion for high resolution mass spectroscopy, an outlier indicates that the reported result may be a false positive. These “K” flagged results were qualified as not-detected (U-25) at elevated detection limits.

Reported Results

Although the percent recovery (%R) values for all labeled compounds were within control limits, the laboratory noted that labeled congener 13C-PCB 206 was impacted by interferences in Samples SD0001K and SD0002K. The target analytes PCB 206 and PCB 207 are normally quantitated against 13C-PCB 206 (or an average of 13C-PCB 206 & 13C-PCB 208), but due to the interference they were quantitated using 13C-PCB 208 only. The results for PCB 206 and PCB 207 were estimated (J-14) in these samples.

Reporting Limits

Samples SD0001K, SD0002K, and SD0003K were analyzed or reanalyzed at dilution (5x or 10x) to reduce interferences. Reporting limits were elevated accordingly.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the labeled compound and OPR recoveries. Precision could not be assessed.

Data were estimated due to interference resulting in the use of a different labeled congener to calculate compound concentrations. Detection limits were elevated due to ion ratio outliers.

All data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

APPENDIX A

DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

DATA VALIDATION QUALIFIER CODES
Based on National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

DATA QUALIFIER REASON CODES

Group	Code	Reason for Qualification
Sample Handling	1	Improper Sample Handling or Sample Preservation (i.e., headspace, cooler temperature, pH, summa canister pressure); Exceeded Holding Times
Instrument Performance	24	Instrument Performance (i.e., tune, resolution, retention time window, endrin breakdown, lock-mass)
	5A	Initial Calibration (RF, %RSD, r^2)
	5B	Calibration Verification (ICV, CCV, CCAL; RF, %D, %R) Use bias flags (H,L)[1] where appropriate
Blank Contamination	6	Field Blank Contamination (Equipment Rinsate, Trip Blank, etc.)
	7	Lab Blank Contamination (i.e., method blank, instrument blank, etc.) Use low bias flag (L)[1] for negative instrument blanks
Precision and Accuracy	8	Matrix Spike (MS &/or MSD) Recoveries Use bias flags (H,L)[1] where appropriate
	9	Precision (all replicates: LCS/LCSD, MS/MSD, Lab Replicate, Field Replicate)
	10	Laboratory Control Sample Recoveries (a.k.a. Blank Spikes) Use bias flags (H,L)[1] where appropriate
	12	Reference Material Use bias flags (H,L)[1] where appropriate
	13	Surrogate Spike Recoveries (a.k.a. labeled compounds, recovery standards) Use bias flags (H,L)[1] where appropriate
Interferences	16	ICP/ICP-MS Serial Dilution Percent Difference
	17	ICP/ICP-MS Interference Check Standard Recovery Use bias flags (H,L)[1] where appropriate
	19	Internal Standard Performance (i.e., area, retention time, recovery)
	22	Elevated Detection Limit due to Interference (i.e., chemical and/or matrix)
	23	Bias from Matrix Interference (i.e. diphenyl ether, PCB/pesticides)
Identification and Quantitation	2	Chromatographic pattern in sample does not match pattern of calibration standard
	3	2nd column confirmation (RPD or %D)
	4	Tentatively Identified Compound (TIC) (associated with NJ only)
	20	Calibration Range or Linear Range Exceeded
	25	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
Miscellaneous	11	A more appropriate result is reported (multiple reported analyses i.e., dilutions, re-extractions, etc. Associated with “R” and “DNR” only)
	14	Other (See DV report for details)
	26	Method QC information not provided

[1] H = high bias indicated
L = low bias indicated

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature	Waters/Solids < 4°C Tissues <-10°C	EcoChem PJ, see TM-05	1
Holding Time	Extraction - Water: 30 days from collection *Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days* Extraction - Soil: 30 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext > 30 days J(+)/UJ(-) if analysis > 40 Days EcoChem PJ, see TM-05	1
Mass Resolution	>=10,000 resolving power at m/z 304.9824 Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) . Analyzed prior to ICAL and at the start and end of each 12 hr. shift	R(+/-) if not met	14
Window Defining Mix and Column Performance Mix	Window defining mixture/Isomer specificity std run before ICAL and CCAL Valley < 25% (valley = (x/y)*100%) x = ht. of TCDD y = baseline to bottom of valley For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290)	J(+) if valley > 25%	5A (ICAL) 5B (CCAL
Initial Calibration	Minimum of five standards %RSD < 20% for native compounds %RSD <30% for labeled compounds (%RSD <35% for labeled compounds under 1613b)	J(+) natives if %RSD > 20%	5A
	Abs. RT of $^{13}C_{12}$-1234-TCDD >25 min on DB5 >15 min on DB-225	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10 for all native and labeled compounds in CS1 std.	If <10, elevate Det. Limit or R(-)	

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Continuing Calibration	Analyzed at the start and end of each 12 hour shift. %D+/-20% for native compounds %D +/-30% for labeled compounds (Must meet limits in Table 6, Method 1613B) (If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4)	Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers. For native compound %D outliers: 8290: J(+)/UJ(-) if %D = 20% - 75% J(+)/R(-) if %D > 75% 1613: J(+)/UJ(-) if %D is outside Table 6 limits J(+)/R(-) if %D is +/- 75% of Table 6 limit	5B
	Abs. RT of $^{13}C_{12}$-1234-TCDD and ^{13}C12-123789-HxCDD +/- 15 sec of ICAL.	EcoChem PJ, see ICAL section of TM-05	
	RRT of all other compounds must meet Table 2 of 1613B.	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10	If <10, elevate Det. Limit or R(-)	
Method Blank	One per matrix per batch No positive results	If sample result <5X action level, qualify U at reported value.	7
Field Blanks (Not Required)	No positive results	If sample result <5X action level, qualify U at reported value.	6
LCS / OPR	Concentrations must meet limits in Table 6, Method 1613B or lab limits.	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
MS/MSD (recovery)	May not analyze MS/MSD %R should meet lab limits.	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	May not analyze MS/MSD RPD < 20%	J(+) in parent sample if RPD > CL	9

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Lab Duplicate	RPD <25% if present.	J(+)/UJ(-) if outside limts	9
Labeled Compounds / Internal Standards	*Method 8290:* %R = 40% - 135% in all samples -- *Method 1613B:* %R must meet limits specified in Table 7, Method 1613	J(+)/UJ(-) if %R = 10% to LCL J(+) if %R > UCL J(+)/R(-) if %R < 10%	13
Quantitation/ Identification	Ions for analyte, IS, and rec. std. must max w/in 2 sec. S/N >2.5 IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290 RRTs w/in limits in Table 2 of 1613B	If RT criteria not met, use PJ (see TM-05) If S/N criteria not met, J(+). if unlabelled ion abundance not met, change to EMPC If labelled ion abundance not met, J(+).	21
EMPC (estimated maximum possible concentration)	If quantitation idenfication criteria are not met, laboratory should report an EMPC value.	If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit.	14
Interferences	PCDF interferences from PCDPE	If both detected, change PCDF result to EMPC	14
Second Column Confirmation	All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis.	Report lower of the two values. If not performed use PJ (see TM-05).	3
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used	11

EcoChem Validation Guidelines for PCB Congener Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 1, 12/1995 & EPA SW-846, Method 1668)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature	Waters/Solids <4°C Tissues <-10°C	EcoChem PJ, see TM-05	1
Holding Time	Samples: Up to one year if stored in the dark & temp as above. Extracts: Up to 1 year if stored at <-10°C and in the dark	J(+)/UJ(-) if HT > 1 year EcoChem PJ, see TM-05	1
Mass Resolution	>=10,000 resolving power at m/z 330.9792 <5 ppm deviation from each m/z listed in Table 7 of method. Analyzed prior to ICAL and at the beginning and end of each 12 hr. shift	R(+/-) if not met	14
Column Resolution 209 Congener Solution	Mix of all 209 PCBs run prior to each ICAL and each 12 hour shift RT of PCB209 must be > 55 min PCB 156 & 157 must coelute w/in 2 sec PCB34 & 23 and PCB187 & 182 must be resolved where ((x/y)*100%) < 40% x = ht. of valley and y = ht of shortest peak	J(+) if valley >40%	5A (ICAL) 5B (CCAL)
Initial Calibration	Minimum of five standards %RSD < 20% for native compounds %RSD < 35% for labeled compounds	J(+) natives if %RSD > 20%	5A
	Ion Abundance ratios within QC limits (Method 1668, Table 8) in CS1 std.	EcoChem PJ, see TM-05	
	S/N ratio > 10 for all native and labeled compounds in CS1 std.	If <10, elevate Det. Limit or R(-)	
Continuing Calibration	Every 12 hours: Concentrations must meet criteria specified in Method 1668, Table 6	J(+)/(UJ(-) natives if %D = 30% - 50% J(+)/R(-) natives if %D > 75%	5B
	Absolute RT of all Labelled Compounds and Window Defining Congeners must be +/- 15 sec of RT in ICAL RRT of all compounds must meet Table 2 of method.	EcoChem PJ, see ICAL section of TM-05	
	S/N ratio > 10	If <10, elevate Det. Limit or R(-)	
	Ion Abundance ratios must meet criteria specified in Method 1668, Table 8	EcoChem PJ, see TM-05	
Method Blank	One per matrix per batch No positive results	If sample result <5X action level, qualify U at reported value.	7

EcoChem Validation Guidelines for PCB Congener Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 1, 12/1995 & EPA SW-846, Method 1668)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Rinse/Field Blank (if required)	One per matrix per batch No positive results	If sample result <5X action level, qualify U at reported value.	6
LCS / OPR	One per matrix per batch %R Values w/in limits specified in Method 1668, Table 6	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
MS/MSD (if required)	Accuracy: %R values within laboratory limits	Qualify parent sample only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
	Precision: RPD < 20%	J(+) in parent sample if RPD > 20%	9
Duplicate (if required)	RPD <25%	J(+)/UJ(-) if outside limts	9
Labeled Compounds / Internal Standards	%R must meet limits specified in Method 1668, Table 6.	J(+)/UJ(-) if %R = 10% to LCL J(+) if %R > UCL J(+)/R(-) if %R < 10%	13
Quantitation/ Identification	Ions for analyte, IS, and rec. std. must max w/in 2 sec. S/N >2.5 Ion abundance (IA ratios) must meet limits stated in Table 8 of Method 1668 Relative retention times (RRT) must be w/in limits stated in Table 2 of Method 1668	If RT criteria not met, use PJ (see TM-05) J(+) if S/N criteria not met if unlabelled ion abundance not met, change to EMPC J(+) if labelled ion abundance not met.	21
Interferences	Lock masses must not deviate +/- 20%	Change result to EMPC	14
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used to avoid reporting two results for one sample	11

EcoChem, INC.
Environmental Data Quality

APPENDIX B
QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
City of Port Angeles - K Ply

SDG	Sample ID	Lab ID	Method	Analyte	Result	Units	Lab Flags	Validation Qualifier	Validation Reason
WG44197	SD0001K	L19903-1	EPA 1613B	2,3,7,8-TCDF	9.51	pg/g		DNR	11
WG44197	SD0002K	L19903-2	EPA 1613B	2,3,7,8-TCDF	30.5	pg/g		DNR	11
WG44197	SD0003K	L19903-3	EPA 1613B	1,2,3,7,8,9-HXCDF	0.094	pg/g	K J	U	25
WG44197	SD0003K	L19903-3	EPA 1613B	1,2,3,7,8-PECDF	0.393	pg/g	K J	U	25
WG44197	SD0003K	L19903-3	EPA 1613B	2,3,7,8-TCDF	2.41	pg/g		DNR	11
WG44197	SD0001K	L19903-1 W	EPA 1668A	2,2',3,3',4,4',5,5',6-NoCB	86.2	pg/g	D T	J	14
WG44197	SD0001K	L19903-1 W	EPA 1668A	2,2',3,3',4,4',5,6,6'-NoCB	9.89	pg/g	D J T	J	14
WG44197	SD0001K	L19903-1 W	EPA 1668A	2,2',3,4,4',5,6,6'-OcCB	0.154	pg/g	K D J	U	25
WG44197	SD0001K	L19903-1 W	EPA 1668A	2,2',3,4,4',6,6'-HpCB	0.423	pg/g	K D J	U	25
WG44197	SD0001K	L19903-1 W	EPA 1668A	2,2',3,4,5,6,6'-HpCB	0.223	pg/g	K D J	U	25
WG44197	SD0001K	L19903-1 W	EPA 1668A	2,2',3,4',5,6,6'-HpCB	0.723	pg/g	K D J	U	25
WG44197	SD0001K	L19903-1 W	EPA 1668A	3,3',5-TriCB	2.46	pg/g	K D J	U	25
WG44197	SD0001K	L19903-1 W	EPA 1668A	3,4,4',5-TeCB	1.64	pg/g	K D J	U	25
WG44197	SD0001K	L19903-1 W	EPA 1668A	3,4,5-TriCB	1	pg/g	K D J	U	25
WG44197	SD0001K	L19903-1 W	EPA 1668A	3,5-DiCB	2.21	pg/g	K D J	U	25
WG44197	SD0002K	L19903-2 LW	EPA 1668A	2,2',3,3',4,4',5,5',6-NoCB	93.4	pg/g	D T	J	14
WG44197	SD0002K	L19903-2 LW	EPA 1668A	2,2',3,3',4,4',5,6,6'-NoCB	14.7	pg/g	D T	J	14
WG44197	SD0002K	L19903-2 LW	EPA 1668A	2,2',3,4,4',5,6,6'-OcCB	0.227	pg/g	K D J	U	25
WG44197	SD0002K	L19903-2 LW	EPA 1668A	2,2',3,4,4',6,6'-HpCB	0.545	pg/g	K D J	U	25
WG44197	SD0002K	L19903-2 LW	EPA 1668A	2,2',3,5,6,6'-HxCB	0.89	pg/g	K D J	U	25
WG44197	SD0002K	L19903-2 LW	EPA 1668A	2,3,3',5,5'-PeCB	0.551	pg/g	K D J	U	25
WG44197	SD0002K	L19903-2 LW	EPA 1668A	3,4,4',5-TeCB	2.2	pg/g	K D J	U	25
WG44197	SD0003K	L19903-3 i	EPA 1668A	2,2',3,4,6,6'-HxCB	0.097	pg/g	K J	U	25
WG44197	SD0003K	L19903-3 i	EPA 1668A	2,2',3,5,6,6'-HxCB	0.151	pg/g	K J	U	25
WG44197	SD0003K	L19903-3 i	EPA 1668A	3,4,4',5-TeCB	0.392	pg/g	K J	U	25

K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Appendix A
Data Validation Reports

Data Validation Report
Prepared by Floyd|Snider
2013 Remedial Investigation Soil and Groundwater Sampling Event

K Ply Site
September 2013 Soil and Groundwater Sampling Event
Port Angeles, Washington

Data Validation Report

Prepared for

Port of Port Angeles
338 West First Street
Port Angeles, Washington 98362

Prepared by

Floyd|Snider
601 Union Street
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Seattle, Washington 98101

January 2014

Table of Contents

List of Tables

List of Appendices

List of Abbreviations and Acronyms

Abbreviation/ Acronym	**Definition**
BTEX	Benzene, toluene, ethylbenzene, and xylenes
DNR	Do not report
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
mg/kg	Milligrams per kilogram
MS	Matrix spike
MSD	Matrix spike duplicate
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
RPD	Relative percent difference
QA	Quality assurance
QC	Quality control
SDG	Sample delivery group
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
USEPA	U. S. Environmental Protection Agency
VOC	Volatile organic compound

1.0 Project Narrative

1.1 OVERVIEW OF DATA VALIDATION

This report summarizes the results of the Compliance Screening (Level I) performed on the soil, groundwater, and quality control (QC) water sample data for the K Ply September 2013 Soil and Groundwater Sampling Event. A complete list of samples is provided in Table 1.

The chemical analyses were performed by Friedman & Bruya, Inc. in Seattle, Washington. Soil, groundwater, and QC water samples were collected between September 10, 2013 and October 16, 2013 and submitted to Friedman & Bruya for chemical analyses. The analytical methods include the following:

- Total petroleum hydrocarbons (TPHs)—NWTPH-Dx and NWTPH-Gx
- Benzene, toluene, ethylbenzene, and xylenes (BTEX)—USEPA Method 8021B
- Metals—USEPA Methods 200.8 and 6020
- Volatile organic compounds (VOCs) —USEPA Methods 8260C and 8260C-Direct Sparge
- Polycyclic aromatic hydrocarbons (PAHs)—USEPA Method 8270D-SIM
- Semivolatile organic compounds (SVOCs) —USEPA Method 8270D
- Polychlorinated biphenyls (PCBs)—USEPA Method 8082A

The data were reviewed using guidance and quality control criteria documented in the analytical methods*: K Ply Site Remedial Investigation/Feasibility Study Work Plan Appendix B Sampling and Analysis Plan/Quality Assurance and Project Plan* (Floyd|Snider 2013), *National Functional Guidelines for Inorganic Data Review* (USEPA 1994 and 2004), and *National Functional Guidelines for Organic Data Review* (USEPA 1999 and 2008).

Data quality review of dioxin/furan analytical results is not included in this report because these analyses were validated and reported separately by EcoChem, Inc.

Floyd|Snider's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes, but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. When compounds are analyzed at multiple dilutions or by multiple analytical methods, select results will be assigned a Do Not Report (DNR) qualification as a more appropriate result is reported from another dilution or analytical method. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reasons, and validation criteria are included as Appendix A. The Qualified Data Summary Table is included in Appendix B. Data validation worksheets (excel worksheets) will be kept on file at Floyd|Snider.

2.0 Data Validation Report
TPH by NWTPH-Dx

This report documents the review of analytical data from the analyses of soil and groundwater samples and the associated laboratory QC samples. Samples were analyzed by Friedman & Bruya. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

2.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and any anomalies were discussed in the case narrative.

2.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

	Cooler temperature and preservation		Laboratory control samples (LCS)
	Extraction and analysis holding times	1	Surrogate recoveries
	Blank contamination		Reporting limits and reported results
	Laboratory Sample Duplicate Relative Percent Difference (RPD)	1	Chromatographic match to TPH standards

Note:

1 Quality control outliers that impact the reported data were noted. Data qualifiers were issued, as discussed below.

Appendix A presents data validation criteria tables for diesel-range hydrocarbon analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

2.2.1 Surrogate Recoveries

For sample delivery group (SDG) 309355, the surrogate recoveries for Samples K-46-7-8, K-46-7-8-D, and K-46-10-11 were flagged as outside of normal control limits by the laboratory with no numeric percent of recovery provided. The laboratory noted that it was due to compounds in the sample matrix interfering with the quantitation of the surrogate analyte. It is with professional judgment that the diesel- and oil-range organics results be qualified “J-S” to reflect the surrogate recovery, and the interpretive qualifier to be used for database entry and project reporting is a “J” to indicate estimated concentrations.

For SDG 309413, the surrogate recovery for Sample K-48-10-11 was flagged as outside of normal control limits by the laboratory with no numeric percent of recovery provided. The laboratory noted that it was due to compounds in the sample matrix interfering with the quantitation of the surrogate analyte. It is with professional judgment that the diesel- and oil-range organics results be qualified “J-S” to reflect the surrogate recovery, and the interpretive qualifier to be used for database entry and project reporting is a “J” to indicate estimated concentrations.

2.2.2 Chromatographic Match to Total Petroleum Hydrocarbon Standards

As part of the validation of TPH data, the detectable hydrocarbons and/or organics within the diesel and residual hydrocarbon chromatogram ranges were reviewed relative to the appropriate laboratory standard. If the hydrocarbons are not identifiable based on a poor chromatographic match with the standards, the data were qualified “MP” to reflect a poor match, and the interpretive qualifier to be used for database entry and project reporting is a “JM” to indicate estimated concentrations. Similarly, if the hydrocarbons provide a good chromatographic match with the standards, the data were qualified “MG” to reflect a good match, and no interpretive qualifier will be used for database entry or project reporting.

2.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate and LCS percent recovery values. Precision was acceptable, as demonstrated by the Laboratory Sample Duplicate RPDs.

All data are acceptable for use as qualified. Refer to Appendix B for details.

3.0 Data Validation Report
TPH by NWTPH-Gx

This report documents the review of analytical data from the analyses of soil and groundwater samples and the associated laboratory QC samples. Samples were analyzed by Friedman & Bruya. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

3.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and any anomalies were discussed in the case narrative.

3.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	LCS
Extraction and analysis holding times	Surrogate recoveries
Blank contamination	Reporting limits and reported results
Laboratory Sample Duplicate RPD	

Appendix A presents data validation criteria tables for gasoline-range hydrocarbon analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

3.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate and LCS percent recovery values. Precision was acceptable, as demonstrated by the Laboratory Sample Duplicate RPDs.

All data, as reported by the laboratory, are acceptable for use.

4.0 Data Validation Report
BTEX by USEPA Method 8021B

This report documents the review of analytical data from the analyses of soil and groundwater samples and the associated laboratory QC samples. Samples were analyzed by Friedman & Bruya. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

4.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

4.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	LCS
Extraction and analysis holding times	Surrogate recoveries
Blank contamination	Reporting limits and reported results
Laboratory Sample Duplicate RPD	Target analyte list

All QC requirements were met without exception, and did not require further evaluation.

4.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate and LCS percent recovery values. Precision was acceptable, as demonstrated by the Laboratory Sample Duplicate RPDs.

All data, as reported by the laboratory, are acceptable for use.

5.0 Data Validation Report
Metals by USEPA Methods 200.8 and 6020A

This report documents the review of analytical data from the analyses of soil and groundwater samples and the associated laboratory QC samples. Samples were analyzed by Friedman & Bruya. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

5.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

5.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

	Cooler temperature and preservation	LCS
	Extraction and analysis holding times	Internal standards
	Blank contamination	Reporting limits and reported results
1	Matrix spike (MS) and Matrix spike duplicate (MSD)	Target analyte list

Note:
1 Quality control results are discussed below, but no data were qualified.

Appendix A presents data validation criteria tables for inorganic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

5.2.1 Matrix Spike and Matrix Spike Duplicate

For SDG 309237, the laboratory noted that the MS/MSD recoveries and RPDs for lead in soil may not be meaningful, as they were spiked at a level that was less than five times that present in the sample. The MS/MSD was performed on Sample 309114-01 at a ten times dilution with no recovery of the MS or MSD. The spike amount was 50 milligrams per kilogram (mg/kg) with an original concentration of 165 mg/kg. Per U.S. Environmental Protection Agency (USEPA) guidelines, the sample concentration should be greater than four times the spike amount to report the data unflagged when the recovery does not meet criteria. The guidelines also state that professional judgment should be used to determine if the samples are sufficiently similar to apply the flags to all samples. As the MS/MSD was performed on a sample for another client from an unknown location, it is with professional judgment that no lead results be flagged based on this MS/MSD recovery information, as sample similarity cannot be evaluated, and all other quality assurance (QA)/QC objectives for this lead analysis have been met.

5.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the MS, MSD, and LCS percent recovery values. Precision was acceptable, as demonstrated by the MS/MSD RPDs.

All data, as reported by the laboratory, are acceptable for use.

6.0 Data Validation Report
VOCs by USEPA 8260C and 8260C-Direct Sparge

This report documents the review of analytical data from the analyses of soil and groundwater samples and the associated laboratory QC samples. Samples were analyzed by Friedman & Bruya. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

6.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

6.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

2	Cooler temperature and preservation	1	MS and MSD
	Extraction and analysis holding times	2	Lab contamination
	Blank contamination	2	Internal standards
1	Surrogate recoveries		Reporting limits and reported results
1	LCS and laboratory control sample duplicate (LCSD)		Target analyte list

Notes:
1 Quality control results are discussed below, but no data were qualified.
2 Quality control outliers that impact the reported data were noted. Data qualifiers were issued, as discussed below.

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

6.2.1 Cooler Temperature and Preservation

The vinyl chloride results associated with water samples from SDG 309169were noted by the laboratory to be considered estimates due to the use of hydrochloric acid as the sample preservative. All vinyl chloride results were non-detect. It is with professional judgment that the laboratory flag be retained and the vinyl chloride results be qualified as “UJ” to indicate the reporting limit should be considered an estimate.

6.2.2 Surrogate Recoveries

For SDG 309169, the laboratory noted that the surrogate recoveries for 1,2-dichloroethane-d4 and 4-bromofluorobenzene in the USEPA Method 8260C-Direct Sparge analysis of soil were outside of laboratory control limits high for Sample K-50-3.5-6. The only reported compound for this sample by this analysis was 1,2-dibromoethane and it was a non-detect. Per USEPA guidelines, only detected results are qualified when surrogate recoveries are greater than control limits; therefore, no qualifiers have been added to the 1,2-dibromoethane result for Sample K-50-3.5-6.

For SDG 309267, the laboratory noted that the surrogate recoveries for toulene-d8 and 4-bromofluroaobenze in the USEPA Method 8260C-Direct Sparge analysis of soil were outside of laboratory control limits high for Sample PF-6-6.7-8 due to compounds in the sample matrix interfering with the quantitation of the surrogate analytes. The only reported compound for this sample by this analysis was 1,2-dibromoethane and it was a non-detect. Per USEPA guidelines, only detected results are qualified when surrogate recoveries are greater than control limits; therefore, no qualifiers have been added to the 1,2-dibromoethane result for Sample PF-6-6.7-8.

For SDG 309267, the laboratory noted that the surrogate recovery for toluene-d8 in the USEPA Method 8260C analysis of soil was outside the laboratory control limits high for Sample K-40-10.5-12. Hexane was the only detected compound, and it was flagged estimated due to a response greater than the valid instrument calibration range requiring a dilution to obtain accurate quantification. Per USEPA guidelines, only detected results are qualified when surrogate recoveries are greater than control limits. Therefore the non-detect results for this sample will not be qualified based on the surrogate recovery information. The hexane result will be flagged “DNR” in favor of the result from the re-analysis of the sample at 100 times dilution, which had no surrogate recovery issues.

6.2.3 Laboratory Control Samples and Laboratory Control Sample Duplicates

For SDG 309169, the laboratory noted that the LCS recoveries for bromoethane, acetone, trans-1,3-dichloropropene, and 1,1,2-trichlorethane were outside control limits high for water. The recoveries for these analytes in the LCSD were within control limits. All results for these compounds were non-detect. Per USEPA guidelines, only detected results are qualified when LCS recoveries are greater than control limits; therefore, no qualifiers have been added to the reported results for these analytes.

6.2.4 Matrix Spike and Matrix Spike Duplicate

For SDG 309237, the laboratory noted that the MS/MSD recoveries and RPD for benzene may not be meaningful as they were spiked at a level less than five times that found in the original sample. The MS/MSD recoveries were within laboratory standards and the RPD was outside the laboratory control limit by 1 percent. All sample results were non-detect. Per USEPA guidelines, data are not qualified based on MS/MSD information alone. As all other QA/QC objectives for this analysis were met, it is with professional judgment that no results be qualified based on this RPD information.

For SDG 309331, the laboratory noted that the MS/MSD recoveries for naphthalene were outside of normal control limits due to sample matrix interference. The MS/MSD recoveries for hexane were flagged as potentially not meaningful as the spike level was less than five times that present in the original sample. The LCS recoveries for both analytes were within control limits. Per USEPA guidelines, data are not qualified based on MS/MSD information alone, as all other QA/QC objectives for these analytes were met. It is with professional judgment that no naphthalene or hexane results be qualified.

For SDG 309355, the laboratory noted that the MS/MSD recoveries and RPD for hexane may not be meaningful as the analyte was spiked at a level that was less than five times that found in the original sample. The MS/MSD recoveries and RPD were within laboratory control limits; therefore, no results were qualified based on this laboratory notation.

For SDG 301255, the MS recovery of 1,2-dichloroethane was outside laboratory control limits high for the analysis of water. The MS was for the batch QC and run on Sample 310277-02 from another client. The analyte was a non-detect in the field sample. Per USEPA guidelines, data are not qualified based on MS/MSD information alone; therefore, it is with professional judgment that no qualifiers be added to the 1,2-dichlorethane results based on this MS recovery information.

6.2.5 Laboratory Contamination

For SDG 309169, the laboratory noted that the detected methylene chloride result of 5.4 micrograms per liter (µg/L) for Sample K-98-5-15 was likely due to laboratory contamination from the use of methylene chloride in the extraction steps of UESPA Method 8270D and NWTPH-Dx in other areas of the laboratory. Methylene chloride was not reported in the method blank and had acceptable recoveries in the MS, LCS, and LCSD. It is with professional judgment that this result be flagged “J” to indicate it should be considered an estimated result due to the potential laboratory contamination.

6.2.6 Internal Standards

For SDG 309331, the laboratory noted that the internal standard failed in the USEPA Method 8260C-Direct Sparge analysis of Sample PP-23-10-11.5 due to matrix interference. They flagged the surrogate recoveries and the sample result as estimated based on this failure. 1,2-Dibromoethane was the only analyte reported and it was a non-detect. The “J” flag from the laboratory will be preserved and the result will be reported with a final qualifier of “UJ” to indicate an estimated reporting limit.

6.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, MS, MSD, LCS, and LCSD percent recovery values, and as discussed above. Precision was acceptable, as demonstrated by the MS/MSD RPDs and LCS/LSCD RPDs, and as discussed above.

All data are acceptable for use as qualified. Refer to Appendix B for details.

7.0 Data Validation Report
PAHs by USEPA Method 8270D-SIM

This report documents the review of analytical data from the analyses of soil and groundwater samples and the associated laboratory QC samples. Samples were analyzed by Friedman & Bruya. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

7.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

7.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	[1] MS and MSD
Extraction and analysis holding times	Continuing Calibrations
Blank contamination	Reporting limits and reported results
[1] Surrogate recoveries	Target analyte list
LCS and LCSD	

Note:
1 Quality control results are discussed below, but no data were qualified.

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

7.2.1 Surrogate Recoveries

For SDG 309237, the laboratory noted that Samples K-64-10.5-11.5 and K-63-11-12 were diluted due to matrix interference and the surrogate recoveries may not be meaningful. All surrogate recoveries were still within laboratory control limits; therefore, no results have been qualified based on this notation by the laboratory.

7.2.2 Matrix Spike and Matrix Spike Duplicate

For SDG 309331, the laboratory noted that the MS/MSD recoveries and RPDs in soil for benzo(b)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene may not be meaningful as they were spiked at a level less than five times that present in the sample. All recoveries were within laboratory control limits; however, the RPDs for benzo(b)fluoranthene at 26 percent and benzo(a)pyrene at 28 percent were outside control limits. All LCS/LCSD recoveries and RPDs were within control limits. Per USEPA guidelines, data are not qualified based on MS/MSD information alone. As all other QA/QC objectives for this analysis were met, it is with professional judgment that no results be qualified.

7.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, MS, MSD, LCS, and LCSD percent recovery values. Precision was acceptable, as demonstrated by the MS/MSD RPDs and LCS/LSCD RPDs.

All data, as reported by the laboratory, are acceptable for use.

8.0 Data Validation Report SVOCs by USEPA Method 8270D

This report documents the review of analytical data from the analyses of soil and groundwater samples and the associated laboratory QC samples. Samples were analyzed by Friedman & Bruya. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

8.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

8.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

	Cooler temperature and preservation	1	MS and MSD
	Extraction and analysis holding times	2	Calibration standards
	Blank contamination		Reporting limits and reported results
1	Surrogate recoveries		Target analyte list
1	LCS and LCSD		

Notes:

1 Quality control results are discussed below, but no data were qualified.

2 Quality control outliers that impact the reported data were noted. Data qualifiers were issued, as discussed below.

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

8.2.1 Surrogate Recoveries

For SDG 309237, the laboratory noted that Sample AOPC3-10 was diluted due to matrix interference and that the surrogate recoveries may not be meaningful. The sample was first diluted 50 times with four of the six surrogates still within laboratory control limits; the remaining two surrogates were nitrobenzene-d5 from the base/neutral fraction and tribromophenol from the acid fraction. The pentachlorophenol result for the 50 times dilution had a response greater than the valid instrument calibration range, requiring a 500 times dilution to also be analyzed. For the 500 times dilution, only two of the six surrogates were within laboratory control limits. The only analyte that will be reported from this 500 times dilution is pentachlorophenol. Per USEPA guidelines, data are only qualified if two or more surrogates in the same fraction are outside laboratory control limits; therefore, no results from the 50 times dilution shall be qualified. It is with professional judgment that the pentachlorophenol results from the 500 times dilution not be qualified due to the large dilution factor potentially interfering with recovery results.

For SDG 309243, the surrogate recovery in Sample K-39-0-4 for base/neutral fraction surrogate terphyenyl-d14 was outside laboratory control limits high. Per USEPA guidelines, data are only qualified if two or more surrogates in the same fraction are outside laboratory control limits; therefore, it is with professional judgment that no results for Sample K-39-0-4 be qualified based on this surrogate recovery information.

For SDG 309267, the laboratory noted that Sample PF-6-6.7-8 was diluted due to matrix interference and that the surrogate recoveries may not be meaningful. Four of the six surrogate recoveries were still within laboratory control limits. The remaining two surrogates were nitrobenzene-d5 from the base/neutral fraction and 2,4,6-tribromophenol from the acid fraction. Per USEPA guidelines, data are not qualified based on surrogate recovery unless two or more surrogates in the same fraction are outside laboratory control limits; therefore, no results have been qualified based on this recovery information.

For SDG 320155, the surrogate recoveries in Sample PZ-12 for the acid fraction surrogate 2,4,6-tribromophenol and the base/neutral fraction surrogate terphenyl-d14 were outside laboratory control limits high. All analytes in this sample were non-detect. Per USEPA guidelines, data are only qualified if two or more surrogates in the same fraction are outside laboratory control limits. Therefore it is with professional judgment that no results for Sample PZ-12 be qualified based on this surrogate recovery information.

8.2.2 Laboratory Control Sample and Laboratory Control Sample Duplicate

For SDG 310255, the LCS recovery and RPD for pyrene was outside laboratory control limits high, the LCSD recovery for 3-+ 4-methylphenol was outside laboratory control limits high. These recoveries indicate a potential high bias in the results; however, all field sample results for these analytes were non-detect. As all other LCS/LSCD and RPDs for the remaining analytes were within control limits, it is with professional judgment that no pyrene or 3- + 4-methylphenol results be qualified for the USEPA Method 8270D analysis of water samples.

For SDG 309243, the LCSD recovery for 4,6-dinitro-2-methylphenol was outside laboratory control limits high. All sample results for this analyte were non-detect. Per USEPA guidelines, only detected results are qualified when recoveries are outside of control limits high; therefore, no results for this analyte have been qualified.

8.2.3 Matrix Spike and Matrix Spike Duplicate

For SDG 309243, the laboratory noted that the MS/MSD recoveries for benzoic acid and the MSD recovery for hexachlorocyclopentadiene were outside laboratory control limits low. All sample results for these analytes were non-detect, and the LCS/LCSD recoveries were within laboratory control limits. The benzoic acid results have already been qualified “UJ” based on calibration verification standard failures (refer to Section 8.2.4). Per USEPA guidelines, data are not qualified based on MS/MSD recovery information alone; therefore, it is with professional judgment that no hexachlorocylcopentadiene results be qualified based on the MSD recovery information, as the MS, LCS, and LCSD recoveries were within laboratory control limits, and all other QA/QC objectives for the analyte have been met.

8.2.4 Calibration Standards

For SDGs 309169, 309237, 309243, and 309267, the laboratory noted that the calibration standard failed the acceptance criteria for benzoic acid, 2,4-dinitrophenol, and 4,6-dintrio-2-methylphneol and flagged all sample results for these analytes. All results for these analytes were non-detect. Per USEPA guidelines, all non-detect results have been flagged “UJ” due to the calibration standard failing the acceptance criteria.

8.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the MS and LCS percent recovery values. Precision was acceptable, as demonstrated by the MS/MSD RPDs and LCS/LSCD RPDs.

All data are acceptable for use as qualified. Refer to Appendix B for details.

9.0 Data Validation Report
PCBs by USEPA Method 8082A

This report documents the review of analytical data from the analyses of soil and groundwater samples and the associated laboratory QC samples. Samples were analyzed by Friedman & Bruya. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

9.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

9.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	LCS
Extraction and analysis holding times	[1] MS and MSD
Blank contamination	Reporting limits and reported results
Surrogate recoveries	Target analyte list

Note:
1 Quality control results are discussed below, but no data were qualified.

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

9.2.1 Matrix Spike and Matrix Spike Duplicate

For SDG 309382, the laboratory noted that the MS/MSD recoveries and RPDs for Aroclor 1260 in soil may not be meaningful as the analyte was spiked at a level that was less than five times that present in the sample. The recoveries and RPD were still within laboratory control limits; therefore, no results were qualified based on this laboratory notation.

9.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, MS, MSD, and LCS percent recovery values. Precision was acceptable, as demonstrated by the MS/MSD RPDs.

All data, as reported by the laboratory, are acceptable for use.

10.0 References

Floyd|Snider. 2013. *K Ply Site Remedial Investigation/Feasibility Study Work Plan Appendix B Sampling and Analysis Plan/Quality Assurance and Project Plan.* Prepared for the Port of Port Angeles. September.

U.S. Environmental Protection Agency (USEPA), 1999. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P.* EPA540/R-99/008. October.

———. 2004. *USEPA National Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, OSWER 9240.1-45, EPA 540-R-04-004.* Office of Superfund Remediation and Technology Innovation (OSRTI), Washington, D.C. October.

———. 2008. *USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review*. EPA-540/R-99/008. October.

K Ply Site
September 2013 Soil and Groundwater Sampling Event
Port Angeles, Washington

Data Validation Report

Table

Table 1
Project Sample Index

SDG	Sample ID	Lab ID	Matrix	TPHs		BTEX	Metals	VOCs		PAHs	SVOCs	PCBs
				NWTPH-Dx	NWTPH-Gx	USEPA 8021B	USEPA 6010A	USEPA 8260C	USEPA 8260C-Direct Sparge	USEPA 8270D-SIM	USEPA 8270D	USEPA 8082A
FB309169	K-61-11-12	309169-01	Soil	X								
FB309169	K-59-11-11.5	309169-02	Soil	X						X		
FB309169	K-57-11-11.5	309169-03	Soil	X								
FB309169	K-55-10.5-11	309169-04	Soil	X	X	X						
FB309169	K-56-10-10.5	309169-05	Soil	X	X	X						
FB309169	K-52-10.5-11	309169-06	Soil	X	X	X						
FB309169	K-99-10.5-11.5	309169-07	Soil	X	X	X	X	X			X	
FB309169	K-99-6.5-16.5	309169-08	Water	X	X	X		X				
FB309169	K-98-10.5-11.5	309169-09	Soil	X	X	X	X	X			X	
FB309169	K-98-5-15	309169-10	Water	X	X	X		X				
FB309169	K-50-3.5-6	309169-11	Soil	X	X	X		X	X			
FB309169	K-66-3.5-5.5	309169-12	Soil	X	X	X						
FB309169	K-66-11.5-15.5	309169-13	Soil	X	X	X						
FB309169	K-65-9.5-11.5	309169-14	Soil	X	X	X						
FB309169	KT-12-3-3.5	309169-15	Soil	X			X				X	
FB309169	KT-12-8.5-9	309169-16	Soil	X			X				X	
FB309237	KT-11-1-1.5	309237-01	Soil	X	X	X	X					
FB309237	K-64-10.5-11.5	309237-02	Soil	X	X	X	X			X		
FB309237	K-63-11-12	309237-03	Soil	X	X	X		X		X		X
FB309237	P7-06A-3-4	309237-04	Soil	X	X	X	X	X				
FB309237	KT-20-10.5-11	309237-05	Soil	X	X	X		X				
FB309237	KT-10-2-3	309237-06	Soil	X	X	X	X					
FB309237	K-11-1.5-2.5	309237-07	Soil		X	X	X	X				
FB309237	K-12-1-2	309237-08	Soil		X	X						
FB309237	K-13-3-4	309237-09	Soil		X	X						
FB309237	K-13-10-11	309237-10	Soil		X	X						
FB309237	K-14-9.5-10.5	309237-11	Soil		X	X						
FB309237	K-15-9.5-10.5	309237-12	Soil		X	X						
FB309237	K-19-8.5-10	309237-13	Soil		X	X						
FB309237	K-20-3-4	309237-14	Soil		X	X						
FB309237	K-21-3.8-5.2	309237-15	Soil		X	X						
FB309237	K-33-3-4	309237-16	Soil		X	X		X				

Table 1
Project Sample Index

SDG	Sample ID	Lab ID	Matrix	TPHs		BTEX	Metals	VOCs		PAHs	SVOCs	PCBs
				NWTPH-Dx	NWTPH-Gx	USEPA 8021B	USEPA 6010A	USEPA 8260C	USEPA 8260C-Direct Sparge	USEPA 8270D-SIM	USEPA 8270D	USEPA 8082A
FB309237	SS-1	309237-17	Soil	Dioxan/Furan - Outside DV								
FB309237	SS-2	309237-18	Soil	Dioxan/Furan - Outside DV								
FB309237	SS-3	309237-19	Soil	Dioxan/Furan - Outside DV								
FB309237	AOPC3-10	309237-20	Soil								X	
FB309237	AOPC3-11	309237-21	Soil		X	X					X	
FB309237	K-35-3-4	309237-22	Soil		X	X						
FB309237	K-34-3-4	309237-23	Soil		X	X			X			
FB309237	K-35-9-10	309237-24	Soil		X	X						
FB309237	K-36-3-4	309237-25	Soil		X	X						
FB309237	K-36-9-10	309237-26	Soil		X	X						
FB309237	K-36-10-11	309237-27	Soil		X	X						
FB398243	K-39-9-10	309243-01	Soil	X	X	X					X	
FB398243	K-39-0-4	309243-02	Soil								X	
FB398243	K-29-8.5-9.5	309243-03	Soil	X	X	X					X	
FB398243	K-37-8.5-9.5	309243-04	Soil								X	
FB398243	KT-1-W-4-4.2	309243-05	Soil	X	X	X						
FB398243	K-94-10-11	309243-06	Soil	X	X	X						
FB398243	Pipeline 8-East	309243-07	Water	X		X						
FB398243	K-90-14-15	309243-08	Soil	X	X	X						
FB309267	KT-21-0.5-1.5	309267-01	Soil		X	X						
FB309267	K-40-7-8	309267-02	Soil		X	X						
FB309267	K-40-10.5-12	309267-03	Soil		X	X	X		X			
FB309267	K-100-11-15.5	309267-04	Soil	X	X	X	X			X		
FB309267	K96-10.5-11.5	309267-05	Soil	X	X	X						
FB309267	K-101-13.5-15	309267-06	Soil	X	X	X	X			X		
FB309267	K-90-11-16	309267-07	Water	X	X	X						
FB309267	K-95-5.5-7	309267-08	Soil	X	X	X						
FB309267	K-97-5.5-7	309267-09	Soil	X	X	X						
FB309267	PF-1-7-8	309267-10	Soil	X	X	X	X		X		X	
FB309267	PF-2-7-8	309267-11	Soil	X	X	X						
FB309267	PF-5-7-8	309267-12	Soil	X	X	X						
FB309267	PF-6-6.7-8	309267-13	Soil	X	X	X	X		X		X	

Table 1
Project Sample Index

				TPHs		BTEX	Metals	VOCs		PAHs	SVOCs	PCBs
SDG	Sample ID	Lab ID	Matrix	NWTPH-Dx	NWTPH-Gx	USEPA 8021B	USEPA 6010A	USEPA 8260C	USEPA 8260C-Direct Sparge	USEPA 8270D-SIM	USEPA 8270D	USEPA 8082A
FB309267	PF-6-3.5-8.5	309267-14	Water	X	X	X						
FB309267	PF-5-4-9	309267-15	Water	X	X	X						
FB309267	PF-2-4-9	309267-16	Water	X	X	X						
FB309267	PF-1-4-9	309267-17	Water	X	X	X						
FB309267	PF-8-7-8	309267-18	Soil	X	X	X						
FB309267	PF-8-7-8-D	309267-19	Soil	X	X	X						
FB309267	PF-8-3-4	309267-20	Soil	X	X	X						
FB309267	PF-8-5-10	309267-21	Water	X	X	X						
FB309267	PF-7-3.5-6.5	309267-22	Soil	X	X	X						
FB309267	PF-7-7-8	309267-23	Soil	X	X	X						
FB309267	PF-7-4-9	309267-24	Water	X	X	X						
FB309331	PF-3-7-8	309331-01	Soil	X	X	X						
FB309331	PF-3-4-9	309331-02	Water	X	X	X						
FB309331	PF-4-6-8	309331-03	Soil	X	X	X						
FB309331	PF-4-6-8-D	309331-04	Soil	X	X	X						
FB309331	PF-4-5-10	309331-05	GW	X	X	X						
FB309331	PF-9-7-8	309331-06	Water	X	X	X						
FB309331	PF-9-4-9	309331-07	GW	X	X	X						
FB309331	PP-23-10-11.5	309331-08	Soil	X	X	X	X	X	X	X		
FB309331	K-45-9-11	309331-09	Soil	X	X	X				Archived		
FB309331	K-45-9-11-D	309331-10	Soil	X	X	X				Archived		
FB309331	K-28-9.5-11.5	309331-11	Soil	X	X	X						
FB309331	TB-091813	309331-12	QC Water			X						
FB309355	K-27-9.5-11.5	309355-01	Soil	X	X							
FB309355	K-26-9.8-10.3	309355-02	Soil	X	X							
FB309355	TB-091913	309355-03	QC Water			X						
FB309355	K-46-7-8	309355-04	Soil	X	X							
FB309355	K-46-7-8-D	309355-05	Soil	X	X							
FB309355	K-46-10-11	309355-06	Soil	X	X		X	X		X		
FB309382	TB-091913-B	309382-01	QC Water			X						
FB309382	K-200-8-10	309382-02	Soil	X	X	X						
FB309382	K-201-10-11	309382-03	Soil	X	X	X						

Table 1
Project Sample Index

				TPHs		BTEX	Metals	VOCs		PAHs	SVOCs	PCBs
SDG	**Sample ID**	**Lab ID**	**Matrix**	**NWTPH-Dx**	**NWTPH-Gx**	**USEPA 8021B**	**USEPA 6010A**	**USEPA 8260C**	**USEPA 8260C-Direct Sparge**	**USEPA 8270D-SIM**	**USEPA 8270D**	**USEPA 8082A**
FB309382	K-202-10-11	309382-04	Soil	X	X	X						
FB309382	K-202-10-11-D	309382-05	Soil	X	X	X						
FB309382	K-203-11-12	309382-06	Soil	X	X	X						
FB309382	K-200-7-12	309382-07	Water	X	X	X						
FB309382	K-201-10-15	309382-08	Water	X	X	X						
FB309382	K-202-10-15	309382-09	Water	X	X	X						
FB309382	K-203-10-15	309382-10	Water	X	X	X						
FB309382	SS-4-0-0.25	309382-11	Soil	Dioxan/Furan - Outside DV								
FB309382	SS-5-0-0.25	309382-12	Soil	Dioxan/Furan - Outside DV								
FB309382	SS-6-0-0.25	309382-13	Soil	Dioxan/Furan - Outside DV								
FB309382	K-91-10-12	309382-14	Soil	X	X	X	X					
FB309382	K-91-10-12-D	309382-15	Soil	X	X	X	X					
FB309382	K-91-8.5-13.5	309382-16	Water	X	X	X						
FB309382	K-62-7.5-8	309382-17	Soil	X	X	X	X					
FB309382	K-92-8.5-13.5	309382-18	Water	X	X	X						
FB309382	K-2-0-0.5	309382-19	Soil									X
FB309382	K-91-10-12	309382-14	Soil	X	X	X	X					
FB309382	K-2-1.5-2	309382-20	Soil	Archived								
FB309382	K-23-10-10.5	309382-21	Soil	X	X	X						
FB309382	K-42-11.5-12	309382-22	Soil	X	X	X						
FB309382	K-24-14-15	309382-23	Soil	X	X	X						
FB309382	K-24-14-15-D	309382-24	Soil	X	X	X						
FB309382	K18-14-15.5	309382-25	Soil	X	X	X						
FB309382	TB-092013	309382-26	QC Water			X						
FB309413	K-16-15.5-16.5	309413-01	Soil	X	X	X						
FB309413	K-17-16.8-17.8	309413-02	Soil	X	X	X						
FB309413	K-17-16.8-17.8-D	309413-03	Soil	X	X	X						
FB309413	K-25-7-8	309413-04	Soil	X	X	X						
FB309413	K-47-7-8	309413-05	Soil	X	X	X						
FB309413	K-47-7-8-D	309413-06	Soil	X	X	X						
FB309413	K-48-10-11	309413-07	Soil	X	X	X						
FB309413	K-49-10-11	309413-08	Soil	X	X	X						

Table 1
Project Sample Index

				TPHs		BTEX	Metals	VOCs		PAHs	SVOCs	PCBs
SDG	Sample ID	Lab ID	Matrix	NWTPH-Dx	NWTPH-Gx	USEPA 8021B	USEPA 6010A	USEPA 8260C	USEPA 8260C-Direct Sparge	USEPA 8270D-SIM	USEPA 8270D	USEPA 8082A
FB309413	K-43-10-11	309413-09	Soil	X	X	X						
FB309413	K-44-15-16	309413-10	Soil	X	X	X						
FB309413	K-09-15-16	309413-11	Soil	X	X	X						
FB309413	K-08-11-12	309413-12	Soil	X	X	X						
FB309413	K-08-11-12-D	309413-13	Soil	X	X	X						
FB309413	RB-092313	309413-14	QC Water	X	X	X						
FB309413	TB-092313	309413-15	QC Water			X						

Abbreviations:

BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
DV	Data validation
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
QC	Quality control
SDG	Sample delivery group
SVOC	Semi volatile organic compound
TPH	Total petroleum hydrocarbon
VOC	Volatile organic compound

K Ply Site
September 2013 Soil and Groundwater Sampling Event
Port Angeles, Washington

Data Validation Report

Appendix A
Data Qualifier Definitions and Criteria Tables

DATA VALIDATION QUALIFIER CODES
National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.
NJ	The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is a Floyd|Snider qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

Floyd|Snider Validation Guidelines for Metals Analysis by ICP-MS (Based on Inorganic NFG 1994 & 2004)

Validation QC Element	Acceptance Criteria	Action
Cooler Temperature and Preservation	Cooler temperature: 4°C ±2° Waters: Nitric Acid to pH < 2 For Dissolved Metals: 0.45um filter & preserve after filtration	Floyd|Snider Professional Judgment—no qualification based on cooler temperature outliers J/UJ if pH preservation requirements are not met
Holding Time	180 days from date sampled Frozen tissues—HT extended to 2 years	J/UJ if holding time exceeded
Tune	Prior to ICAL monitoring compounds analyzed 5 times wih Std Dev. < 5% mass calibration <0.1 amu from True Value Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height	Use Professional Judgment to evaluate tune J/UJ if tune criteria not met
Initial Calibration	Blank + minimum 1 standard If more than 1 standard, r>0.995	J/UJ if r<0.995 (for multi point cal)
Initial Calibration Verification (ICV)	Independent source analyzed immediately after calibration %R within ±10% of true value	J/UJ if %R 75–89% J if %R = 111-125% R if %R > 125% R if %R < 75%
Continuing Calibration Verification (CCV)	Every ten samples, immediately following ICV/ICB and at end of run ±10% of true value	J/UJ if %R = 75–89% J if %R 111-125% R if %R > 125% R if %R < 75%

Initial and Continuing Calibration Blanks (ICB/CCB)	After each ICV and CCV
	every ten samples and end of run
	| blank | < IDL (MDL)
		Action level is 5x absolute value of blank conc.
		For (+)blanks, U results < action level
		For (-) blanks, J/UJ results < action level

Validation QC Element	**Acceptance Criteria**	**Action**
Reporting Limit Standard (CRI)	2x RL analyzed beginning of run Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Co,Mn, Zn)	R, < 2x RL if %R < 50% (< 30% Co,Mn, Zn) J < 2x RL, UJ if %R 50-69% (30%-49% Co,Mn, Zn) J < 2x RL if %R 130%-180% (150%-200% Co,Mn, Zn) R < 2x RL if %R > 180% (200% Co, Mn, Zn)
Interference Check Samples (ICSA/ICSAB)	Required by SW 6020, but not 200.8 ICSAB %R 80% - 120% for all spiked elements | ICSA | < IDL (MDL) for all unspiked elements	For samples with Al, Ca, Fe, or Mg > ICS levels R if %R < 50% J if %R >120% J/UJ if %R = 50% to 79% Use Professional Judgment for ICSA to determine if bias is present
Method Blank	One per matrix per batch (batch not to exceed 20 samples) blank < MDL	Action level is 5x blank concentration U results < action level
Laboratory Control Sample (LCS)	One per matrix per batch Blank Spike: %R within 80%-120%	R if %R < 50% J/UJ if %R = 50-79% J if %R >120%
	CRM: Result within manufacturer's certified acceptance range or project guidelines	J/UJ if < LCL, J if > UCL
Matrix Spike/ Matrix Spike Duplicate (MS/MSD)	One per matrix per batch 75-125% for samples where results do not exceed 4x spike level	J if %R>125% J/UJ if %R <75% J/R if %R<30% or J/UJ if Post Spike %R 75%-125% Qualify all samples in batch
Post-digestion Spike	If Matrix Spike is outside 75-125%, Spike parent sample at 2x the sample conc.	No qualifiers assigned based on this element
Laboratory Duplicate (or MS/MSD)	One per matrix per batch RPD < 20% for samples > 5x RL Diff < RL for samples > RL and < 5 x RL (Diff < 2x RL for solids)	J/UJ if RPD > 20% or diff > RL All samples in batch
Serial Dilution	5x dilution one per matrix %D < 10% for original sample values > 50x MDL	J/UJ if %D >10% All samples in batch

Validation QC Element	**Acceptance Criteria**	**Action**
Internal Standards	Every sample SW6020: 60%-125% of cal blank IS 200.8: 30%-120% of cal blank IS	J /UJ all analytes associated with IS outlier
Field Blank	Blank < MDL	Action level is 5x blank conc. U sample values < AL in associated field samples only
Field Duplicate	For results > 5x RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff < RL Solid: Diff < 2x RL	J/UJ in parent samples only
Linear Range	Sample concentrations must fall within range	J values over range

Floyd|Snider Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

Validation QC Element	**Acceptance Criteria**	**Action**
Cooler Temperature	4°C ± 2°	J/UJ if greater than 6 deg. C (Floyd|Snider PJ)
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	Water: J/UJ if ext. > 7 and < 21 days J/R if ext > 21 days (Floyd|Snider PJ) Solids/Wastes: J/UJ if ext. > 14 and < 42 days J/R if ext. > 42 days (Floyd|Snider PJ) J/UJ if analysis >40 days
Tuning	DFTPP Beginning of each 12 hour period Method acceptance criteria	R all analytes in all samples associated with the tune
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(Floyd|Snider PJ) If MDL= reporting limit: J/R if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05
	%RSD < 30%	(Floyd|Snider PJ) J if %RSD > 30%
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(Floyd|Snider PJ) If MDL= reporting limit: J/R if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF < 0.05
	%D <25%	(Floyd|Snider PJ) If > +/-90%: J/RIf -90% to -26%: J (high bias) If 26% to 90%: J/UJ (low bias)
Method Blank	One per matrix per batch No results > CRQL	U if sample result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)
		U if sample result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)

Validation QC Element	**Acceptance Criteria**	**Action**
Method Blank (continued)	No TICs present	RTICs using 10X rule
Field Blanks (Not Required)	No results > CRQL	Apply 5X/10X rule; U < action level
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J if both %R > UCL J/UJ if both %R < LCL J/R if both %R < 10% Floyd|Snider PJ if only one %R outlier
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J in parent sample if RPD > CL
LCS CLP **low conc. H2O only**	One per lab batch Within method control limits	J assoc. cmpd if > UCL J/R assoc. cmpd if < LCL J/R all cmpds if half are < LCL
LCS **regular SVOA (H2O & solid)**	One per lab batch Lab or method control limits	J if %R > UCL J/UJ if %R <LCL J /R if %R < 10% (Floyd|Snider PJ)
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J/UJ associated compounds in all samples
Surrogates	Minimum of 3 acid and 3 base/neutral compounds Use method acceptance criteria	Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10% J if %R > UCL J/UJ if %R < LCL J/R if %R < 10%
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J if > 200% J/UJ if < 50% J/R if < 25% RT>30 seconds, narrate and Notify PM
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (Floyd|Snider PJ)

Validation QC Element	**Acceptance Criteria**	**Action**
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R common laboratory contaminants See Technical Director for ID issues
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers

Abbreviation:

PJ	Professional judgment

Floyd|Snider Validation Guidelines for Total Petroleum Hydrocarbons-Diesel & Residual Range and Gasoline Range
(Based on USEPA National Functional Guidelines as applied to criteria in NWTPH-Dx and NWTPH-Gx, June 1997, Ecology & Oregon DEQ)

Validation QC Element	Acceptance Criteria	Action
Cooler Temperature & Preservation	4°C± 2°C Water: HCl to pH < 2	J/UJ if greater than 6 deg. C
Holding Time	Ext. Waters: 14 days preserved 7 days unpreserved Ext. Solids: 14 Days Analysis: 40 days from extraction	J/UJ if hold times exceeded J/R if exceeded > 3X (Floyd|Snider PJ)
Initial Calibration	5 calibration points (All within 15% of true value) Linear Regression: R2 >0.990 If used, RSD of response factors <20%	Narrate if fewer than 5 calibration levels or if %R >15% J/UJ if R2 <0.990 J/UJ if %RSD > 20%
Mid-range Calibration Check Std.	Analyzed before and after each analysis shift & every 20 samples. Recovery range 85% to 115%	Narrate if frequency not met. J/UJ if %R < 85% J if %R >115%
Method Blank	At least one per batch (<10 samples) Method Blank No results >RL	U (at the RL) if sample result is < RL & < 5X blank result.
		U (at reported sample value) if sample result is > RL and < 5X blank result
Field Blanks (if required by project)	No results > RL	Action is same as method blank for positive results remaining in the field blank after method blank qualifiers are assigned.
MS samples (accuracy) (if required by project)	%R within lab control limits	Qualify parent only, unless other QC indicates systematic problems. J if both %R > upper control limit (UCL) J/UJ(-) if both %R < lower control limit (LCL) No action if parent conc. >5X the amount spiked. Use PJ if only one %R outlier
Precision: MS/MSD or LCS/LCSD or sample/dup	At least one set per batch (<10 samples) RPD < lab control limit	J if RPD > lab control limits

Validation QC Element	**Acceptance Criteria**	**Action**
LCS (not required by method)	%R within lab control limits	J/UJ if %R < LCL J if %R > UCL J/R if any %R <10% (Floyd|Snider PJ)
Surrogates	2-fluorobiphenyl, p-terphenyl, o-terphenyl, and/or pentacosane added to all samples (inc. QC samples). %R = 50-150%	J/UJ if %R < LCL J if %R > UCL J/R if any %R <10% No action if 2 or more surrogates are used, and only one is outside control limits. (Floyd|Snider PJ)
Pattern Identification	Compare sample chromatogram to standard chromatogram to ensure range and pattern are reasonable match. Laboratory may flag results which have poor match.	J
Field Duplicates	Use project control limits, if stated in QAPP Floyd|Snider default: water: RPD < 35% solids: RPD < 50%	Narrate (Floyd|Snider PJ to qualify)
Two analyses for one sample (dilution)	Report only one result per analyte	"DNR" (or client requested qualifier) all results that should not be reported

Abbreviation:

PJ	Professional judgment

K Ply Site
September 2013 Soil and Groundwater Sampling Event
Port Angeles, Washington

Data Validation Report

Appendix B
Qualified Data Summary Table

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB309169	K-99-10.5-11.5	309169-07	EPA 8260C	Benzene	1	0.03	mg/kg	U	DNR	DNR
FB309169	K-99-10.5-11.5	309169-07	EPA 8260C	Ethylbenzene	1	0.05	mg/kg	U	DNR	DNR
FB309169	K-99-10.5-11.5	309169-07	EPA 8260C	Toluene	1	0.05	mg/kg	U	DNR	DNR
FB309169	K-99-6.5-16.5	309169-08	EPA 8260C	Benzene	1	0.35	µg/L	U	DNR	DNR
FB309169	K-99-6.5-16.5	309169-08	EPA 8260C	Ethylbenzene	1	1	µg/L	U	DNR	DNR
FB309169	K-99-6.5-16.5	309169-08	EPA 8260C	Toluene	1	1	µg/L	U	DNR	DNR
FB309169	K-99-6.5-16.5	309169-08	EPA 8260C	Vinyl chloride	1	0.2	µg/L	U pr	J	UJ
FB309169	K-98-10.5-11.5	309169-09	EPA 8260C	Benzene	1	0.03	mg/kg	U	DNR	DNR
FB309169	K-98-10.5-11.5	309169-09	EPA 8260C	Ethylbenzene	1	0.05	mg/kg	U	DNR	DNR
FB309169	K-98-10.5-11.5	309169-09	EPA 8260C	Naphthalene	1	0.05	mg/kg	U	DNR	DNR
FB309169	K-98-10.5-11.5	309169-09	EPA 8260C	Toluene	1	0.05	mg/kg	U	DNR	DNR
FB309169	K-98-5-15	309169-10	EPA 8260C	Benzene	1	0.35	µg/L	U	DNR	DNR
FB309169	K-98-5-15	309169-10	EPA 8260C	Ethylbenzene	1	1	µg/L	U	DNR	DNR
FB309169	K-98-5-15	309169-10	EPA 8260C	Methylene chloride	1	5.4	µg/L	lc	J	J
FB309169	K-98-5-15	309169-10	EPA 8260C	Toluene	1	1	µg/L	U	DNR	DNR
FB309169	K-98-5-15	309169-10	EPA 8260C	Vinyl chloride	1	0.2	µg/L	U pr	J	UJ
FB309169	K-99-10.5-11.5	309169-07	EPA 8270D	Naphthalene	10	0.3	mg/kg	U	DNR	DNR
FB309169	K-99-10.5-11.5	309169-07	EPA 8270D	2,4-Dinitrophenol	10	9	mg/kg	U ca	J	UJ
FB309169	K-99-10.5-11.5	309169-07	EPA 8270D	4,6-Dinitro-o-cresol	10	9	mg/kg	U ca	J	UJ
FB309169	K-99-10.5-11.5	309169-07	EPA 8270D	Benzoic acid	10	15	mg/kg	U ca	J	UJ
FB309169	K-98-10.5-11.5	309169-09	EPA 8270D	2,4-Dinitrophenol	1	0.9	mg/kg	U	J	UJ
FB309169	K-98-10.5-11.5	309169-09	EPA 8270D	4,6-Dinitro-o-cresol	1	0.9	mg/kg	U	J	UJ
FB309169	K-98-10.5-11.5	309169-09	EPA 8270D	Benzoic acid	1	1.5	mg/kg	U	J	UJ
FB309169	KT-12-3-3.5	309169-15	EPA 8270D	2,4-Dinitrophenol	250	220	mg/kg	U	J	UJ
FB309169	KT-12-3-3.5	309169-15	EPA 8270D	4,6-Dinitro-o-cresol	250	220	mg/kg	U	J	UJ
FB309169	KT-12-3-3.5	309169-15	EPA 8270D	Benzoic acid	250	370	mg/kg	U	J	UJ
FB309169	KT-12-8.5-9	309169-16	EPA 8270D	2,4-Dinitrophenol	1	0.9	mg/kg	U	J	UJ
FB309169	KT-12-8.5-9	309169-16	EPA 8270D	4,6-Dinitro-o-cresol	1	0.9	mg/kg	U	J	UJ
FB309169	KT-12-8.5-9	309169-16	EPA 8270D	Benzoic acid	1	1.5	mg/kg	U	J	UJ
FB309169	K-55-10.5-11	309169-04	NWTPH-Dx SG	Diesel-range organics	0.5	1500	mg/kg	x1	MP	JM
FB309169	K-56-10-10.5	309169-05	NWTPH-Dx SG	Diesel-range organics	0.5	990	mg/kg	x1	MP	JM
FB309169	K-99-10.5-11.5	309169-07	NWTPH-Dx SG	Oil-range organics	0.5	240	mg/kg		MG	
FB309169	K-99-10.5-11.5	309169-07	NWTPH-Dx SG	Diesel-range organics	0.5	35	mg/kg	x2	MP	JM
FB309169	K-50-3.5-6	309169-11	NWTPH-Dx SG	Oil-range organics	0.5	5400	mg/kg		MG	

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB309169	K-50-3.5-6	309169-11	NWTPH-Dx SG	Diesel-range organics	0.5	5200	mg/kg	x3	MP	JM
FB309169	K-66-3.5-5.5	309169-12	NWTPH-Dx SG	Oil-range organics	0.5	6800	mg/kg		MG	
FB309169	K-66-3.5-5.5	309169-12	NWTPH-Dx SG	Diesel-range organics	0.5	4200	mg/kg	x3	MP	JM
FB309169	K-66-11.5-15.5	309169-13	NWTPH-Dx SG	Oil-range organics	0.5	310	mg/kg		MG	
FB309169	K-66-11.5-15.5	309169-13	NWTPH-Dx SG	Diesel-range organics	0.5	220	mg/kg	x3	MP	JM
FB309169	K-65-9.5-11.5	309169-14	NWTPH-Dx SG	Oil-range organics	5	16000	mg/kg		MG	
FB309169	K-65-9.5-11.5	309169-14	NWTPH-Dx SG	Diesel-range organics	5	3300	mg/kg	x3	MP	JM
FB309169	KT-12-8.5-9	309169-16	NWTPH-Dx SG	Diesel-range organics	0.5	34	mg/kg	x2	MP	JM
FB309237	K-63-11-12	309237-03	EPA 8260C	Benzene	1	0.6	mg/kg		DNR	DNR
FB309237	K-63-11-12	309237-03	EPA 8260C	Ethylbenzene	1	0.05	mg/kg	U	DNR	DNR
FB309237	K-63-11-12	309237-03	EPA 8260C	Toluene	1	0.05	mg/kg	U	DNR	DNR
FB309237	K-11-1.5-2.5	309237-07	EPA 8260C	1,2-Dibromoethane	1	0.05	mg/kg	U	DNR	DNR
FB309237	K-11-1.5-2.5	309237-07	EPA 8260C	Benzene	1	0.03	mg/kg	U	DNR	DNR
FB309237	K-11-1.5-2.5	309237-07	EPA 8260C	Ethylbenzene	1	0.05	mg/kg	U	DNR	DNR
FB309237	K-11-1.5-2.5	309237-07	EPA 8260C	Toluene	1	0.05	mg/kg	U	DNR	DNR
FB309237	K-33-3-4	309237-16	EPA 8260C	Benzene	1	0.03	mg/kg	U	DNR	DNR
FB309237	K-33-3-4	309237-16	EPA 8260C	Ethylbenzene	1	0.05	mg/kg	U	DNR	DNR
FB309237	K-33-3-4	309237-16	EPA 8260C	Toluene	1	0.05	mg/kg	U	DNR	DNR
FB309237	K-34-3-4	309237-23	EPA 8260C	Benzene	1	0.03	mg/kg	U	DNR	DNR
FB309237	K-34-3-4	309237-23	EPA 8260C	Ethylbenzene	1	0.05	mg/kg	U	DNR	DNR
FB309237	K-34-3-4	309237-23	EPA 8260C	Toluene	1	0.05	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	bis(2-Ethylhexyl)phthalate	50	50	mg/kg		DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Pentachlorophenol	50	180	mg/kg	ve	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2,4-Dinitrophenol	50	9	mg/kg	U ca	J	UJ
FB309237	AOPC3-10	309237-20	EPA 8270D	4,6-Dinitro-o-cresol	50	9	mg/kg	U ca	J	UJ
FB309237	AOPC3-10	309237-20	EPA 8270D	Benzoic acid	50	15	mg/kg	U ca	J	UJ
FB309237	AOPC3-10	309237-20	EPA 8270D	1,2,4-Trichlorobenzene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	1,2-Dichlorobenzene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	1,3-Dichlorobenzene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	1,4-Dichlorobenzene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2,4,5-Trichlorophenol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2,4,6-Trichlorophenol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2,4-Dichlorophenol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2,4-Dimethylphenol	500	30	mg/kg	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB309237	AOPC3-10	309237-20	EPA 8270D	2,4-Dinitrophenol	500	90	mg/kg	U ca	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2,4-Dinitrotoluene	500	15	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2,6-Dinitrotoluene	500	15	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2-Chloronaphthalene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2-Chlorophenol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2-Methylnaphthalene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2-Methylphenol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2-Nitroaniline	500	15	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	2-Nitrophenol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	3- & 4-Methylphenol	500	60	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	3-Nitroaniline	500	300	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	4,6-Dinitro-o-cresol	500	90	mg/kg	U ca	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	4-Bromophenyl phenyl ether	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	4-Chloro-3-methylphenol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	4-Chloroaniline	500	300	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	4-Chlorophenyl phenyl ether	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	4-Nitroaniline	500	300	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	4-Nitrophenol	500	90	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Acenaphthene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Acenaphthylene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Anthracene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Benzo(a)anthracene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Benzo(a)pyrene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Benzo(b)fluoranthene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Benzo(g,h,i)perylene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Benzo(k)fluoranthene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Benzoic acid	500	150	mg/kg	U ca	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Benzyl alcohol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	bis(2-Chloroethoxy)methane	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	bis(2-Chloroethyl)ether	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	bis(2-Chloroisopropyl)ether	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Butyl benzyl phthalate	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Carbazole	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Chrysene	500	3	mg/kg	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB309237	AOPC3-10	309237-20	EPA 8270D	Di-n-butyl phthalate	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Di-n-octyl phthalate	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Dibenzo(a,h)anthracene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Dibenzofuran	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Diethylphthalate	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Dimethyl phthalate	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Fluoranthene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Fluorene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Hexachlorobenzene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Hexachlorobutadiene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Hexachlorocyclopentadiene	500	9	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Hexachloroethane	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Indeno(1,2,3-cd)pyrene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Isophorone	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	N-Nitroso-di-n-propylamine	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	N-Nitrosodiphenylamine	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Naphthalene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Nitrobenzene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Phenanthrene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Phenol	500	30	mg/kg	U	DNR	DNR
FB309237	AOPC3-10	309237-20	EPA 8270D	Pyrene	500	3	mg/kg	U	DNR	DNR
FB309237	AOPC3-11	309237-21	EPA 8270D	2,4-Dinitrophenol	1	0.18	mg/kg	U ca	J	UJ
FB309237	AOPC3-11	309237-21	EPA 8270D	4,6-Dinitro-o-cresol	1	0.18	mg/kg	U ca	J	UJ
FB309237	AOPC3-11	309237-21	EPA 8270D	Benzoic acid	1	0.3	mg/kg	U ca	J	UJ
FB309237	K-63-11-12	309237-03	EPA 8270D-SIM	Naphthalene	50	0.1	mg/kg	U	DNR	DNR
FB309237	KT-11-1-1.5	309237-01	NWTPH-Dx SG	Oil-range organics	0.5	2600	mg/kg		MG	
FB309237	KT-11-1-1.5	309237-01	NWTPH-Dx SG	Diesel-range organics	0.5	200	mg/kg	x2	MP	JM
FB309237	K-64-10.5-11.5	309237-02	NWTPH-Dx SG	Oil-range organics	5	23000	mg/kg		MG	
FB309237	K-64-10.5-11.5	309237-02	NWTPH-Dx SG	Diesel-range organics	5	3500	mg/kg	x3	MP	JM
FB309237	K-63-11-12	309237-03	NWTPH-Dx SG	Oil-range organics	5	32000	mg/kg		MG	
FB309237	K-63-11-12	309237-03	NWTPH-Dx SG	Diesel-range organics	5	3300	mg/kg	x2	MP	JM
FB309237	PZ-06A-3-4	309237-04	NWTPH-Dx SG	Diesel-range organics	0.5	140	mg/kg	x1	MP	JM
FB309243	K-39-9-10	309243-01	EPA 8270D	2,4-Dinitrophenol	1	0.18	mg/kg	U ca	J	UJ
FB309243	K-39-9-10	309243-01	EPA 8270D	4,6-Dinitro-o-cresol	1	0.18	mg/kg	U ca	J	UJ

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB309243	K-39-9-10	309243-01	EPA 8270D	Benzoic acid	1	0.3	mg/kg	U ca	J	UJ
FB309243	K-39-0-4	309243-02	EPA 8270D	2,4-Dinitrophenol	1	0.18	mg/kg	U ca	J	UJ
FB309243	K-39-0-4	309243-02	EPA 8270D	4,6-Dinitro-o-cresol	1	0.18	mg/kg	U ca	J	UJ
FB309243	K-39-0-4	309243-02	EPA 8270D	Benzoic acid	1	0.3	mg/kg	U ca	J	UJ
FB309243	K-29-8.5-9.5	309243-03	EPA 8270D	2,4-Dinitrophenol	1	0.18	mg/kg	U ca	J	UJ
FB309243	K-29-8.5-9.5	309243-03	EPA 8270D	4,6-Dinitro-o-cresol	1	0.18	mg/kg	U ca	J	UJ
FB309243	K-29-8.5-9.5	309243-03	EPA 8270D	Benzoic acid	1	0.3	mg/kg	U ca	J	UJ
FB309243	K-37-8.5-9.5	309243-04	EPA 8270D	2,4-Dinitrophenol	1	0.18	mg/kg	U ca	J	UJ
FB309243	K-37-8.5-9.5	309243-04	EPA 8270D	4,6-Dinitro-o-cresol	1	0.18	mg/kg	U ca	J	UJ
FB309243	K-37-8.5-9.5	309243-04	EPA 8270D	Benzoic acid	1	0.3	mg/kg	U ca	J	UJ
FB309243	K-39-9-10	309243-01	NWTPH-Dx SG	Diesel-range organics	0.5	48	mg/kg	x2	MP	JM
FB309267	K-40-10.5-12	309267-03	EPA 8260C	n-Hexane	1	110	mg/kg	ve	DNR	DNR
FB309267	K-40-10.5-12	309267-03	EPA 8260C	1,2-Dibromoethane	100	5	mg/kg	U	DNR	DNR
FB309267	K-40-10.5-12	309267-03	EPA 8260C	1,2-Dichloroethane	100	5	mg/kg	U	DNR	DNR
FB309267	K-40-10.5-12	309267-03	EPA 8260C	Methyl-tert-butyl ether	100	5	mg/kg	U	DNR	DNR
FB309267	PF-1-7-8	309267-10	EPA 8270D	2,4-Dinitrophenol	1	0.18	mg/kg	U ca	J	UJ
FB309267	PF-1-7-8	309267-10	EPA 8270D	4,6-Dinitro-o-cresol	1	0.18	mg/kg	U ca	J	UJ
FB309267	PF-1-7-8	309267-10	EPA 8270D	Benzoic acid	1	0.3	mg/kg	U ca	J	UJ
FB309267	PF-6-6.7-8	309267-13	EPA 8270D	2,4-Dinitrophenol	50	9	mg/kg	U ca	J	UJ
FB309267	PF-6-6.7-8	309267-13	EPA 8270D	4,6-Dinitro-o-cresol	50	9	mg/kg	U ca	J	UJ
FB309267	PF-6-6.7-8	309267-13	EPA 8270D	Benzoic acid	50	15	mg/kg	U ca	J	UJ
FB309267	K-96-10.5-11.5	309267-05	NWTPH-Dx SG	Oil-range organics	0.5	320	mg/kg		MG	
FB309267	K-96-10.5-11.5	309267-05	NWTPH-Dx SG	Diesel-range organics	0.5	55	mg/kg	x2	MP	JM
FB309267	K-101-13.5-15	309267-06	NWTPH-Dx SG	Oil-range organics	0.5	2800	mg/kg		MG	
FB309267	K-101-13.5-15	309267-06	NWTPH-Dx SG	Diesel-range	0.5	250	mg/kg	x2	MP	JM
FB309267	PF-1-7-8	309267-10	NWTPH-Dx SG	Diesel-range	0.5	160	mg/kg		MG	
FB309267	PF-2-7-8	309267-11	NWTPH-Dx SG	Diesel-range	0.5	1000	mg/kg		MG	
FB309267	PF-5-7-8	309267-12	NWTPH-Dx SG	Diesel-range	0.5	350	mg/kg		MG	
FB309267	PF-6-6.7-8	309267-13	NWTPH-Dx SG	Diesel-range	0.5	910	mg/kg		MG	
FB309267	PF-6-3.5-8.5	309267-14	NWTPH-Dx SG	Diesel-range	1	1200	µg/L		MP	
FB309267	PF-2-4-9	309267-16	NWTPH-Dx SG	Diesel-range	1	60	µg/L		MP	
FB309267	PF-1-4-9	309267-17	NWTPH-Dx SG	Diesel-range	1	130	µg/L		MP	
FB309267	PF-8-7-8	309267-18	NWTPH-Dx SG	Diesel-range	0.5	8600	mg/kg		MG	
FB309267	PF-8-7-8	309267-18	NWTPH-Dx SG	Oil-range organics	0.5	140	mg/kg	x4	MP	JM

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB309267	PF-8-7-8-D	309267-19	NWTPH-Dx SG	Diesel-range organics	0.5	12000	mg/kg		MG	
FB309267	PF-8-7-8-D	309267-19	NWTPH-Dx SG	Oil-range organics	0.5	180	mg/kg	x4	MP	JM
FB309267	PF-8-3-4	309267-20	NWTPH-Dx SG	Diesel-range	0.5	39	mg/kg		MP	
FB309267	PF-8-5-10	309267-21	NWTPH-Dx SG	Diesel-range	1	2400	µg/L		MP	
FB309267	PF-7-3.5-6.5	309267-22	NWTPH-Dx SG	Diesel-range	0.5	3400	mg/kg		MG	
FB309267	PF-7-3.5-6.5	309267-22	NWTPH-Dx SG	Oil-range organics	0.5	430	mg/kg		MP	JM
FB309267	PF-7-7-8	309267-23	NWTPH-Dx SG	Diesel-range organics	0.5	1200	mg/kg		MG	
FB309267	PF-7-7-8	309267-23	NWTPH-Dx SG	Oil-range organics	0.5	180	mg/kg		MP	JM
FB309267	PF-7-4-9	309267-24	NWTPH-Dx SG	Diesel-range	1	2100	µg/L		MP	
FB309331	PF-3-7-8	309331-01	NWTPH-Dx SG	Diesel-range	0.5	300	mg/kg		MG	
FB309331	PF-3-4-9	309331-02	NWTPH-Dx SG	Diesel-range	1	2300	µg/L		MP	
FB309331	PF-4-6-8	309331-03	NWTPH-Dx SG	Diesel-range	0.5	34	mg/kg		MP	
FB309331	PF-4-6-8-D	309331-04	NWTPH-Dx SG	Diesel-range	0.5	38	mg/kg		MP	
FB309331	PF-4-5-10	309331-05	NWTPH-Dx SG	Diesel-range	1	73	µg/L		MP	
FB309331	PP-23-10-11.5	309331-08	EPA 8260C-DS	1,2-Dibromoethane	1	0.005	mg/kg	U J	J	UJ
FB309331	PP-23-10-11.5	309331-08	NWTPH-Dx SG	Diesel-range organics	0.5	4500	mg/kg		MG	
FB309331	PP-23-10-11.5	309331-08	NWTPH-Dx SG	Oil-range organics	0.5	180	mg/kg	x4	MP	JM
FB309331	K-28-9.5-11.5	309331-11	NWTPH-Dx SG	Diesel-range organics	0.5	1100	mg/kg	x1	MP	JM
FB309355	K-46-10-11	309355-06	EPA 8260C	Naphthalene	1	44	mg/kg	ve	DNR	DNR
FB309355	K-46-10-11	309355-06	EPA 8260C	1,2-Dibromoethane	10	0.5	mg/kg	U	DNR	DNR
FB309355	K-46-10-11	309355-06	EPA 8260C	1,2-Dichloroethane	10	0.5	mg/kg	U	DNR	DNR
FB309355	K-46-10-11	309355-06	EPA 8260C	Methyl-Tert-Butyl Ether	10	0.5	mg/kg	U	DNR	DNR
FB309355	K-46-10-11	309355-06	EPA 8260C	n-Hexane	10	6.7	mg/kg		DNR	DNR
FB309355	K-27-9.5-11.5	309355-01	NWTPH-Dx SG	Diesel-range organics	0.5	3400	mg/kg		MP	JM
FB309355	K-26-9.8-10.3	309355-02	NWTPH-Dx SG	Diesel-range	0.5	6300	mg/kg		MG	
FB309355	K-46-7-8	309355-04	NWTPH-Dx SG	Diesel-range	0.5	8800	mg/kg		MG, J-S	J
FB309355	K-46-7-8	309355-04	NWTPH-Dx SG	Oil-range organics	0.5	120	mg/kg	U	J-S	UJ
FB309355	K-46-7-8-D	309355-05	NWTPH-Dx SG	Diesel-range organics	0.5	11000	mg/kg		MG, J-S	J
FB309355	K-46-7-8-D	309355-05	NWTPH-Dx SG	Oil-range organics	0.5	120	mg/kg	U	J-S	UJ
FB309355	K-46-10-11	309355-06	NWTPH-Dx SG	Diesel-range organics	0.5	17000	mg/kg		MG, J-S	J
FB309355	K-46-10-11	309355-06	NWTPH-Dx SG	Oil-range organics	0.5	120	mg/kg	U	J-S	UJ
FB309382	K-92-7.5-8	309382-17	NWTPH-Dx SG	Diesel-range	0.5	79	mg/kg	x1	MP	JM
FB309382	K-23-10-10.5	309382-21	NWTPH-Dx SG	Diesel-range	0.5	1700	mg/kg		MP	JM
FB309382	K-42-11.5-12	309382-22	NWTPH-Dx SG	Diesel-range	0.5	13000	mg/kg		MP	JM

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB309382	K-42-11.5-12	309382-22	NWTPH-Dx SG	Oil-range organics	0.5	1100	mg/kg	x4	MP	JM
FB309382	K-24-14-15	309382-23	NWTPH-Dx SG	Diesel-range	0.5	5800	mg/kg		MG	
FB309382	K-24-14-15-D	309382-24	NWTPH-Dx SG	Diesel-range	0.5	6200	mg/kg		MG	
FB309382	K-18-14-15.5	309382-25	NWTPH-Dx SG	Diesel-range	0.5	690	mg/kg		MP	JM
FB309413	K-16-15.5-16.5	309413-01	NWTPH-Dx SG	Diesel-range	0.5	710	mg/kg	x1	MP	JM
FB309413	K-17-16.8-17.8	309413-02	NWTPH-Dx SG	Diesel-range	0.5	180	mg/kg	x1	MP	JM
FB309413	K-17-16.8-17.8-D	309413-03	NWTPH-Dx SG	Diesel-range	0.5	200	mg/kg	x1	MP	JM
FB309413	K-25-7-8	309413-04	NWTPH-Dx SG	Diesel-range	0.5	38	mg/kg	x1	MP	JM
FB309413	K-47-7-8	309413-05	NWTPH-Dx SG	Diesel-range	0.5	2100	mg/kg	x1	MP	JM
FB309413	K-47-7-8-D	309413-06	NWTPH-Dx SG	Diesel-range	0.5	2400	mg/kg	x1	MP	JM
FB309413	K-48-10-11	309413-07	NWTPH-Dx SG	Diesel-range	0.5	24000	mg/kg		MG, J-S	J
FB309413	K-48-10-11	309413-07	NWTPH-Dx SG	Oil-range organics	0.5	230	mg/kg	x4	MP, J-S	JM
FB309413	K-49-10-11	309413-08	NWTPH-Dx SG	Diesel-range	0.5	6300	mg/kg		MG	
FB309413	K-43-10-11	309413-09	NWTPH-Dx SG	Diesel-range	0.5	9500	mg/kg		MG	
FB309413	K-43-10-11	309413-09	NWTPH-Dx SG	Oil-range organics	0.5	8700	mg/kg		MG	
FB310255	PP-23	310255-01	EPA 8260C	1,2-Dibromoethane	1	1	µg/L	U	DNR	DNR
FB310255	PP-23	310255-01	NWTPH-Dx SG	Diesel-range	1	810	µg/L	x1	MP	JM
FB310255	PP-07	310255-02	NWTPH-Dx SG	Diesel-range	1	350	µg/L	x1	MP	JM
FB310255	PZ-04	310255-03	NWTPH-Dx SG	Diesel-range	1	770	µg/L	x1	MP	JM
FB310255	PP-26	310255-06	NWTPH-Dx SG	Diesel-range	1.1	250	µg/L	x1	MP	JM
FB310255	PZ-07	310255-07	NWTPH-Dx SG	Diesel-range	1	340	µg/L	x1	MP	JM
FB310255	K-67-11-12	310255-11	NWTPH-Dx SG	Oil-range organics	4	24000	mg/kg		MG	
FB310255	K-67-11-12	310255-11	NWTPH-Dx SG	Diesel-range organics	4	2000	mg/kg	x2	MP	JM
FB310255	K-69-11-12	310255-13	NWTPH-Dx SG	Oil-range organics	0.4	180	mg/kg		MG	
FB310255	K-69-11-12	310255-13	NWTPH-Dx SG	Diesel-range organics	0.4	30	mg/kg	x3	MP	JM
FB310255	K-70-11-12	310255-14	NWTPH-Dx SG	Oil-range organics	0.4	3100	mg/kg		MG	
FB310255	K-70-11-12	310255-14	NWTPH-Dx SG	Diesel-range organics	0.4	940	mg/kg	x3	MP	JM
FB310255	K-72-11-12	310255-17	NWTPH-Dx SG	Oil-range organics	0.4	1300	mg/kg		MG	
FB310255	K-72-11-12	310255-17	NWTPH-Dx SG	Diesel-range organics	0.4	200	mg/kg	x2	MP	JM
FB310255	K-73-11-12	310255-18	NWTPH-Dx SG	Oil-range organics	4	25000	mg/kg		MG	
FB310255	K-73-11-12	310255-18	NWTPH-Dx SG	Diesel-range	4	2500	mg/kg	x2	MP	JM
FB310255	K-79-6-7	310255-23	NWTPH-Dx SG	Diesel-range	0.4	670	mg/kg	x1	MP	JM
FB310277	PP-17	310277-04	EPA 8260C	Benzene	1	160	µg/L	ve	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Naphthalene	1	1	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-17	310277-04	EPA 8260C	1,1,1,2-Tetrachloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,1,1-Trichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,1,2,2-Tetrachloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,1,2-Trichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,1-Dichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,1-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,1-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2,3-Trichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2,3-Trichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2,4-Trichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2,4-Trimethylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2-Dibromo-3-chloropropane	10	100	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2-Dibromoethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2-Dichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,2-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,3,5-Trimethylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,3-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,3-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	1,4-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	2,2-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	2-Chlorotoluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	2-Hexanone	10	100	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	4-Chlorotoluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Acetone	10	100	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Bromobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Bromodichloromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Bromoform	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Bromomethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Carbon tetrachloride	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Chlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Chloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Chloroform	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Chloromethane	10	100	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-17	310277-04	EPA 8260C	cis-1,2-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	cis-1,3-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Cymene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Dibromochloromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Dibromomethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Dichlorodifluoromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Ethylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Hexachlorobutadiene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	iso-Propylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Methyl ethyl ketone	10	100	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Methyl iso butyl ketone	10	100	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Methyl-tert-butyl ether	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Methylene chloride	10	50	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	n-Propylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Naphthalene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	sec-Butylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Styrene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	tert-Butylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Tetrachloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Toluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	trans-1,2-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	trans-1,3-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Trichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Trichlorofluoromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Vinyl chloride	10	2	µg/L	U pr	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Xylene (meta & para)	10	20	µg/L	U	DNR	DNR
FB310277	PP-17	310277-04	EPA 8260C	Xylene (ortho)	10	10	µg/L	U	DNR	DNR
FB310277	PP-19	310277-05	EPA 8260C	Naphthalene	1	1	µg/L	U	DNR	DNR
FB310277	PP-20	310277-06	EPA 8260C	Naphthalene	1	1	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2-Dibromoethane	1	1	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Benzene	1	250	µg/L	ve	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Ethylbenzene	1	400	µg/L	ve	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	n-Propylbenzene	1	250	µg/L	ve	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Naphthalene	1	240	µg/L	ve	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-18	310277-07	EPA 8260C	1,1,1,2-Tetrachloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,1,1-Trichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,1,2,2-Tetrachloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,1,2-Trichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,1-Dichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,1-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,1-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2,3-Trichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2,3-Trichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2,4-Trichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2,4-Trimethylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2-Dibromo-3-chloropropane	10	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2-Dibromoethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2-Dichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,2-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,3,5-Trimethylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,3-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,3-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	1,4-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	2,2-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	2-Chlorotoluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	2-Hexanone	10	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	4-Chlorotoluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Acetone	10	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Bromobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Bromodichloromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Bromoform	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Bromomethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Carbon tetrachloride	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Chlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Chloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Chloroform	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Chloromethane	10	100	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-18	310277-07	EPA 8260C	cis-1,2-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	cis-1,3-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Cymene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Dibromochloromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Dibromomethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Dichlorodifluoromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Hexachlorobutadiene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	iso-Propylbenzene	10	67	µg/L		DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Methyl ethyl ketone	10	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Methyl iso butyl ketone	10	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Methyl-tert-butyl ether	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Methylene chloride	10	50	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	sec-Butylbenzene	10	10	µg/L		DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Styrene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	tert-Butylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Tetrachloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Toluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	trans-1,2-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	trans-1,3-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Trichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Trichlorofluoromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Vinyl chloride	10	2	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Xylene (meta & para)	10	20	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8260C	Xylene (ortho)	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2-Dibromoethane	1	1	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Benzene	1	250	µg/L	ve	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Ethylbenzene	1	430	µg/L	ve	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	n-Propylbenzene	1	250	µg/L	ve	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Naphthalene	1	260	µg/L	ve	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,1,1,2-Tetrachloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,1,1-Trichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,1,2,2-Tetrachloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,1,2-Trichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,1-Dichloroethane	10	10	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-18-D	310277-08	EPA 8260C	1,1-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,1-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2,3-Trichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2,3-Trichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2,4-Trichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2,4-Trimethylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2-Dibromo-3-chloropropane	10	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2-Dibromoethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2-Dichloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,2-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,3,5-Trimethylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,3-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,3-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	1,4-Dichlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	2,2-Dichloropropane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	2-Chlorotoluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	2-Hexanone	10	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	4-Chlorotoluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Acetone	10	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Bromobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Bromodichloromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Bromoform	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Bromomethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Carbon tetrachloride	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Chlorobenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Chloroethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Chloroform	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Chloromethane	10	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	cis-1,2-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	cis-1,3-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Cymene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Dibromochloromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Dibromomethane	10	10	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-18-D	310277-08	EPA 8260C	Dichlorodifluoromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Hexachlorobutadiene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	iso-Propylbenzene	10	63	µg/L		DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Methyl ethyl ketone	10	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Methyl iso butyl ketone	10	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Methyl-tert-butyl ether	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Methylene chloride	10	50	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	sec-Butylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Styrene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	tert-Butylbenzene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Tetrachloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Toluene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	trans-1,2-Dichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	trans-1,3-Dichloropropene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Trichloroethene	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Trichlorofluoromethane	10	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Vinyl chloride	10	2	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Xylene (meta & para)	10	20	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8260C	Xylene (ortho)	10	10	µg/L	U	DNR	DNR
FB310277	PP-21	310277-09	EPA 8260C	Naphthalene	1	1	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2-Methylnaphthalene	1	150	µg/L	ve	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	1,2,4-Trichlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	1,2-Dichlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	1,3-Dichlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	1,4-Dichlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2,4,5-Trichlorophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2,4,6-Trichlorophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2,4-Dichlorophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2,4-Dimethylphenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2,4-Dinitrophenol	50	300	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2,4-Dinitrotoluene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2,6-Dinitrotoluene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2-Chloronaphthalene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2-Chlorophenol	50	100	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-18	310277-07	EPA 8270D	2-Methylphenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2-Nitroaniline	50	30	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	2-Nitrophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	3- & 4-Methylphenol	50	200	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	3-Nitroaniline	50	30	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	4,6-Dinitro-o-cresol	50	300	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	4-Bromophenyl phenyl ether	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	4-Chloro-3-methylphenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	4-Chloroaniline	50	30	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	4-Chlorophenyl phenyl ether	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	4-Nitroaniline	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	4-Nitrophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Benzoic acid	50	500	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Benzyl alcohol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	bis(2-Chloroethoxy)methane	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	bis(2-Chloroethyl)ether	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	bis(2-Chloroisopropyl)ether	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	bis(2-Ethylhexyl)phthalate	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Butyl benzyl phthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Carbazole	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Di-n-butyl phthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Di-n-octyl phthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Dibenzofuran	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Diethylphthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Dimethyl phthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Hexachlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Hexachlorobutadiene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Hexachlorocyclopentadiene	50	30	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Hexachloroethane	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Isophorone	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	n-Nitroso-di-n-propylamine	50	100	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	n-Nitrosodiphenylamine	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Nitrobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D	Pentachlorophenol	50	100	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-18	310277-07	EPA 8270D	Phenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2-Methylnaphthalene	1	150	µg/L	ve	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	1,2,4-Trichlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	1,2-Dichlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	1,3-Dichlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	1,4-Dichlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2,4,5-Trichlorophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2,4,6-Trichlorophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2,4-Dichlorophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2,4-Dimethylphenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2,4-Dinitrophenol	50	300	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2,4-Dinitrotoluene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2,6-Dinitrotoluene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2-Chloronaphthalene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2-Chlorophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2-Methylphenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2-Nitroaniline	50	30	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	2-Nitrophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	3- & 4-Methylphenol	50	200	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	3-Nitroaniline	50	30	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	4,6-Dinitro-o-cresol	50	300	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	4-Bromophenyl phenyl ether	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	4-Chloro-3-methylphenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	4-Chloroaniline	50	30	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	4-Chlorophenyl phenyl ether	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	4-Nitroaniline	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	4-Nitrophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Benzoic acid	50	500	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Benzyl alcohol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	bis(2-Chloroethoxy)methane	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	bis(2-Chloroethyl)ether	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	bis(2-Chloroisopropyl)ether	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	bis(2-Ethylhexyl)phthalate	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Butyl benzyl phthalate	50	10	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-18-D	310277-08	EPA 8270D	Carbazole	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Di-n-butyl phthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Di-n-octyl phthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Dibenzofuran	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Diethylphthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Dimethyl phthalate	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Hexachlorobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Hexachlorobutadiene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Hexachlorocyclopentadiene	50	30	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Hexachloroethane	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Isophorone	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	n-Nitroso-di-n-propylamine	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	n-Nitrosodiphenylamine	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Nitrobenzene	50	10	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Pentachlorophenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D	Phenol	50	100	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Methylnaphthalene	1	2.2	µg/L		DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	3- & 4-Methylphenol	1	100	µg/L	ve	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Benzoic acid	1	140	µg/L	ve	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Phenol	1	74	µg/L	ve	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	1,2,4-Trichlorobenzene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	1,2-Dichlorobenzene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	1,3-Dichlorobenzene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	1,4-Dichlorobenzene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4,5-Trichlorophenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4,6-Trichlorophenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4-Dichlorophenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4-Dimethylphenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4-Dinitrophenol	10	60	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4-Dinitrotoluene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,6-Dinitrotoluene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Chloronaphthalene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Chlorophenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Methylphenol	10	20	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-22	310277-10	EPA 8270D	2-Nitroaniline	10	6	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Nitrophenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	3-Nitroaniline	10	6	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4,6-Dinitro-o-cresol	10	60	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Bromophenyl phenyl ether	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Chloro-3-methylphenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Chloroaniline	10	6	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Chlorophenyl phenyl ether	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Nitroaniline	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Nitrophenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Benzoic acid	10	300	µg/L	ve	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Benzyl alcohol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	bis(2-Chloroethoxy)methane	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	bis(2-Chloroethyl)ether	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	bis(2-Chloroisopropyl)ether	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	bis(2-Ethylhexyl)phthalate	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Butyl benzyl phthalate	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Carbazole	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Di-n-butyl phthalate	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Di-n-octyl phthalate	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Dibenzofuran	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Diethylphthalate	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Dimethyl phthalate	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Hexachlorobenzene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Hexachlorobutadiene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Hexachlorocyclopentadiene	10	6	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Hexachloroethane	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Isophorone	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	n-Nitroso-di-n-propylamine	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	n-Nitrosodiphenylamine	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Nitrobenzene	10	2	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Pentachlorophenol	10	20	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	1,2,4-Trichlorobenzene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	1,2-Dichlorobenzene	20	4	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-22	310277-10	EPA 8270D	1,3-Dichlorobenzene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	1,4-Dichlorobenzene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4,5-Trichlorophenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4,6-Trichlorophenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4-Dichlorophenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4-Dimethylphenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4-Dinitrophenol	20	120	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,4-Dinitrotoluene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2,6-Dinitrotoluene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Chloronaphthalene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Chlorophenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Methylnaphthalene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Methylphenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Nitroaniline	20	12	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	2-Nitrophenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	3- & 4-Methylphenol	20	80	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	3-Nitroaniline	20	12	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4,6-Dinitro-o-cresol	20	120	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Bromophenyl phenyl ether	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Chloro-3-methylphenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Chloroaniline	20	12	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Chlorophenyl phenyl ether	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Nitroaniline	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	4-Nitrophenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Benzyl alcohol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	bis(2-Chloroethoxy)methane	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	bis(2-Chloroethyl)ether	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	bis(2-Chloroisopropyl)ether	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	bis(2-Ethylhexyl)phthalate	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Butyl benzyl phthalate	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Carbazole	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Di-n-butyl phthalate	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Di-n-octyl phthalate	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Dibenzofuran	20	4	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-22	310277-10	EPA 8270D	Diethylphthalate	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Dimethyl phthalate	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Hexachlorobenzene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Hexachlorobutadiene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Hexachlorocyclopentadiene	20	12	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Hexachloroethane	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Isophorone	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	n-Nitroso-di-n-propylamine	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	n-Nitrosodiphenylamine	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Nitrobenzene	20	4	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Pentachlorophenol	20	40	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D	Phenol	20	55	µg/L		DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Naphthalene	1	130	µg/L	ve	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Acenaphthene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Acenaphthylene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Anthracene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Benzo(a)anthracene	100	5	µg/L	U J	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Benzo(a)pyrene	100	1	µg/L	U J	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Benzo(b)fluoranthene	100	1	µg/L	U J	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Benzo(g,h,i)perylene	100	5	µg/L	U J	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Benzo(k)fluoranthene	100	1	µg/L	U J	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Chrysene	100	1	µg/L	U J	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Dibenzo(a,h)anthracene	100	1	µg/L	U J	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Fluoranthene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Fluorene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Indeno(1,2,3-cd)pyrene	100	1	µg/L	U J	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Naphthalene	100	170	µg/L		DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Phenanthrene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18	310277-07	EPA 8270D-SIM	Pyrene	100	5	µg/L	U J	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Acenaphthylene	1	0.05	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Anthracene	1	0.05	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(a)anthracene	1	0.05	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(a)pyrene	1	0.01	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(b)fluoranthene	1	0.01	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(g,h,i)perylene	1	0.05	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(k)fluoranthene	1	0.01	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Chrysene	1	0.01	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Dibenzo(a,h)anthracene	1	0.01	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Fluoranthene	1	0.05	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Fluorene	1	0.58	µg/L	J	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Indeno(1,2,3-cd)pyrene	1	0.01	µg/L	U J	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Naphthalene	1	150	µg/L	ve J	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Phenanthrene	1	0.55	µg/L	J	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Pyrene	1	0.05	µg/L	U J	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Acenaphthene	10	0.5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Naphthalene	10	190	µg/L	ve	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Acenaphthene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Acenaphthylene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Anthracene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(a)anthracene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(a)pyrene	100	1	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(b)fluoranthene	100	1	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(g,h,i)perylene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Benzo(k)fluoranthene	100	1	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Chrysene	100	1	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Dibenzo(a,h)anthracene	100	1	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Fluoranthene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Fluorene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Indeno(1,2,3-cd)pyrene	100	1	µg/L	U J	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Naphthalene	100	200	µg/L		DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Phenanthrene	100	5	µg/L	U	DNR	DNR
FB310277	PP-18-D	310277-08	EPA 8270D-SIM	Pyrene	100	5	µg/L	U J	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Naphthalene	1	11	µg/L	ve	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Acenaphthene	10	4.2	µg/L		DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Acenaphthylene	10	0.5	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Anthracene	10	0.5	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Benzo(a)anthracene	10	0.5	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Benzo(a)pyrene	10	0.1	µg/L	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310277	PP-22	310277-10	EPA 8270D-SIM	Benzo(b)fluoranthene	10	0.1	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Benzo(g,h,i)perylene	10	0.5	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Benzo(k)fluoranthene	10	0.1	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Chrysene	10	0.1	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Dibenzo(a,h)anthracene	10	0.1	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Fluoranthene	10	0.5	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Fluorene	10	1.1	µg/L		DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Indeno(1,2,3-cd)pyrene	10	0.1	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Naphthalene	10	17	µg/L		DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Phenanthrene	10	0.5	µg/L	U	DNR	DNR
FB310277	PP-22	310277-10	EPA 8270D-SIM	Pyrene	10	0.5	µg/L	U	DNR	DNR
FB310277	PP-15R	310277-02	NWTPH-Dx SG	Diesel-range organics	1	110	µg/L	x	MP	JM
FB310277	PP-18	310277-07	NWTPH-Dx SG	Diesel-range	1	1200	µg/L	x	MP	JM
FB310277	PP-18-D	310277-08	NWTPH-Dx SG	Diesel-range	1	1300	µg/L	x	MP	JM
FB310277	PP-22	310277-10	NWTPH-Dx SG	Diesel-range	1	80	µg/L	x	MP	JM
FB310278	K-80-6.5-7.5	310278-02	NWTPH-Dx SG	Diesel-range	0.4	1500	mg/kg	x1	MP	JM
FB310278	K-81-7.5-9.5	310278-03	NWTPH-Dx SG	Diesel-range	0.4	580	mg/kg	x1	MP	JM
FB310278	K-83-6.5-9	310278-06	NWTPH-Dx SG	Diesel-range	0.4	170	mg/kg	x1	MP	JM
FB310278	K-84-11.5-12	310278-07	NWTPH-Dx SG	Diesel-range	0.4	130	mg/kg	x1	MP	JM
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Acenaphthene	500	230	mg/kg	ve	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Fluoranthene	500	190	mg/kg	ve	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Fluorene	500	210	mg/kg	ve	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Naphthalene	500	650	mg/kg	ve	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Phenanthrene	500	480	mg/kg	ve	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Acenaphthylene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Anthracene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Benzo(a)anthracene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Benzo(a)pyrene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Benzo(b)fluoranthene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Benzo(g,h,i)perylene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Benzo(k)fluoranthene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Chrysene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Dibenzo(a,h)anthracene	50000	100	mg/kg	U	DNR	DNR
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Indeno(1,2,3-cd)pyrene	50000	100	mg/kg	U	DNR	DNR

Qualified Data Summary Table

Sample Delivery Group	Sample ID	Lab ID	Analytical Method	Analyte	Dilution Factor	Result	Unit	Lab Qualifier	DV Qualifier	Final Qualifier
FB310328	K-89-14-15	310328-02	EPA 8270D-SIM	Pyrene	50000	120	mg/kg		DNR	DNR
FB310328	K-103-13-14	310328-01	NWTPH-Dx SG	Oil-range organics	1	2400	mg/kg		MG	
FB310328	K-103-13-14	310328-01	NWTPH-Dx SG	Diesel-range	1	2300	mg/kg	x3	MP	JM
FB310328	K-89-14-15	310328-02	NWTPH-Dx SG	Diesel-range	1	8100	mg/kg	x5	MP	JM
FB310328	K-89-14-15	310328-02	NWTPH-Dx SG	Oil-range organics	1	1200	mg/kg	x5	MP	JM
FB310328	K-01-10-11	310328-03	NWTPH-Dx SG	Diesel-range	1	13000	mg/kg		MP	JM
FB310328	K-07-11-12	310328-04	NWTPH-Dx SG	Diesel-range	1	7000	mg/kg		MG	
FB310328	K-07-11-12	310328-04	NWTPH-Dx SG	Oil-range organics	1	4600	mg/kg		MG	
FB310328	K-00-14-15	310328-05	NWTPH-Dx SG	Diesel-range organics	1	23000	mg/kg		MP	JM
FB310328	K-00-14-15	310328-05	NWTPH-Dx SG	Oil-range organics	1	690	mg/kg		MP	JM
FB310328	K-02-14-15	310328-06	NWTPH-Dx SG	Diesel-range	1	14000	mg/kg		MG	
FB310328	K-06-15.5-16	310328-09	NWTPH-Dx SG	Diesel-range	1	2100	mg/kg		MP	
FB310328	K-06-15.5-16-D	310328-10	NWTPH-Dx SG	Diesel-range	1	2600	mg/kg		MP	

Abbreviations:

DV	Data validation
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram

Laboratory Qualifiers:

J	The internal standard associated with the analyte is outside control limits. The reported concentration is an estimate.
U	The analyte was not detected.
U ca	The analyte was not detected. The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.
U J	The analyte was not detected. The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
U pr	The analyte was not detected. The sample was received with incorrect preservation. The value reported should be considered an estimate.
ve	Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
ve J	Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte. The internal standard associated with the analyte is out of control limits.
x	The diesel range concentration reported is due to overlap from a gasoline range product and is not due to the presence of a middle distillate, such as diesel fuel.
x1	The diesel range concentration reported is due to overlap from a weathered gasoline product and is not due to the presence of a middle distillate, such as diesel fuel.
x2	The diesel range concentration reported is due to overlap from a residual range product and is not due to the presence of a middle distillate, such as diesel fuel.
x3	The diesel range concentration reported is due to overlap from a weathered gasoline product, as well as a residual range product and is not due to the presence of a middle distillate, such as diesel fuel.
x4	the residual range concentration reported is due to overlap from a diesel range product and is not due to the presence of a heavy oil product.
x5	The diesel and motor oil range concentrations reported are due to a material that does not resemble diesel fuel or motor oil range compounds. The material resembles creosote.

DV Qualifiers:

DNR	Do not report in favor of a more appropriate result from another dilution or analysis method.
J	The associated value is an estimate due to quality assurance concerns, see data validation report for details.
J-S	The associated value is an estimate due to surrogate recovery outside of control limits.
MG	Chromatogram has a good spectral match to standard.
MG, J-S	Chromatogram has a good spectral match to standard; the associated value should be considered an estimate due to surrogate recovery outside of control limits.
MP	Chromatogram has a poor spectral match to standard.
MP, J-S	Chromatogram has a poor spectral match to standard; the associated value should be considered an estimate due to surrogate recovery outside of control limits.

Final Qualifiers:

DNR	Do not report in favor of a more appropriate result from another dilution or analysis method.
J	The concentration is estimated but acceptable for most uses.
JM	The concentration is estimated due to poor match to standard, acceptable for use with qualification.
UJ	Analyte is not detected at the associated reporting limit, which should be considered an estimate.

K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Appendix A
Data Validation Reports

Data Validation Report
Prepared by EcoChem
2013 Remedial Investigation Soil and Groundwater Sampling Event

EcoChem, INC.
Environmental Data Quality

DATA VALIDATION REPORT
CITY OF PORT ANGELES – K-Ply 2

Prepared for:

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Prepared by:

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EcoChem Project: C15218-2

December 17, 2013

Approved for Release

Melissa Swanson
Project Manager
EcoChem, Inc.

Basis for Data Validation

This report summarizes the results of validation (EPA Stage 2A) performed on sediment, and quality control (QC) sample data for the City of Port Angeles – K-Ply site, round 2. Field sample ID, laboratory sample ID, and requested analyses are provided in the **Sample Index**. Laboratory batch ID numbers and associated level of validation are provided at the beginning of each technical section.

Samples were analyzed by Ceres Analytical Laboratory, El Dorado Hills, California. The analytical method and EcoChem project chemists are listed below.

Analysis	Method of Analysis	Primary Review	Secondary Review
Dioxin Furans	EPA1613B	M. Swanson	C. Frans

The data were reviewed using guidance and quality control criteria documented in the analytical methods and the following project and guidance documents:

- Sampling and Analysis Plan - *Western Port Angeles Harbor RI/FS* (Integral/Anchor QEA/Exponent/Floyd | Snider, June 2013)
- *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (EPA, 2011)

EcoChem's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix A**. The qualified data summary table is included as **Appendix B.** Data Validation Worksheets will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) was also submitted with this report.

Sample Index
City of Port Angeles - K Ply

SDG	Sample ID	Lab ID	Dioxin
10168	SS-1	10168-001	✓
10168	SS-2	10168-002	✓
10168	SS-3	10168-003	✓
10193	SS-4-0-0.25	10193-001	✓
10193	SS-5-0-0.25	10193-002	✓
10193	SS-6-0-0.25	10193-003	✓

DATA VALIDATION REPORT
City of Port Angeles K-Ply
Dioxin & Furan Compounds by EPA Method 1613

This report documents the review of analytical data from the analysis of sediment samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Ceres Analytical Laboratory, Inc. of El Dorado Hills, California. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples	Validation Level
10168	3 Sediment	EPA Stage 2A
10196	3 Sediment	

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. EDD TO LABORATORY REPORT PACKAGE VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) was performed by comparison to the laboratory data package. No errors were noted.

III. TECHNICAL DATA VALIDATION

The QC requirements reviewed are summarized in the following table:

✓	Sample Receipt, Preservation, and Holding Time	✓	Ongoing Precision and Recovery (OPR)
✓	System Performance and Resolution Checks	1	Field Replicates
✓	Initial Calibration (ICAL)	1	Laboratory Duplicates
✓	Calibration Verification (CVER)	✓	Target Analyte List
1	Method Blanks	1	Reported Results
✓	Labeled Compounds	2	Compound Identification

✓ ***Stated method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.***

[1] ***Quality control results are discussed below, but no data were qualified.***

[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Method Blanks

In order to assess the impact of blank contamination on the reported sample results, action levels are established at five times the blank concentrations. If the concentrations in the associated field samples are less than the action levels, the results are qualified as not detected (U-7).

The analyte OCDD was reported in both method blanks. All OCDD results were greater than the action levels; no data were qualified.

Field Replicates

No field replicate results were submitted with this SDG.

Laboratory Duplicates

No laboratory duplicate sample results were submitted with this SDG.

Reported Results

All results for 2,3,7,8-TCDF were confirmed on a DB-225 column as required by the method. Only the 2,3,7,8-TCDF results from the confirmation column were reported.

Compound Identification

The laboratory reported EMPC or "estimated maximum possible concentrations" values for one or more of the target analytes in most samples. An EMPC value was reported when a peak was detected but did not meet identification criteria as required by the method; therefore the result cannot be considered as positive identification for the analyte. The EMPC values were qualified as not detected (U-25) to indicate that the result is not-detected at an elevated reporting limit. The EMPC values for total homolog groups were qualified as estimated (J-25) at the reported values.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the labeled compound and OPR recoveries. Precision could not be assessed.

Detection limits were elevated based on ion ratio outliers. Total homolog results were estimated based on ion ratio outliers.

All data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

APPENDIX A

DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

DATA VALIDATION QUALIFIER CODES
Based on National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

DATA QUALIFIER REASON CODES

Group	Code	Reason for Qualification
Sample Handling	1	Improper Sample Handling or Sample Preservation (i.e., headspace, cooler temperature, pH, summa canister pressure); Exceeded Holding Times
Instrument Performance	24	Instrument Performance (i.e., tune, resolution, retention time window, endrin breakdown, lock-mass)
	5A	Initial Calibration (RF, %RSD, r^2)
	5B	Calibration Verification (ICV, CCV, CCAL; RF, %D, %R) Use bias flags (H,L)[1] where appropriate
Blank Contamination	6	Field Blank Contamination (Equipment Rinsate, Trip Blank, etc.)
	7	Lab Blank Contamination (i.e., method blank, instrument blank, etc.) Use low bias flag (L)[1] for negative instrument blanks
Precision and Accuracy	8	Matrix Spike (MS &/or MSD) Recoveries Use bias flags (H,L)[1] where appropriate
	9	Precision (all replicates: LCS/LCSD, MS/MSD, Lab Replicate, Field Replicate)
	10	Laboratory Control Sample Recoveries (a.k.a. Blank Spikes) Use bias flags (H,L)[1] where appropriate
	12	Reference Material Use bias flags (H,L)[1] where appropriate
	13	Surrogate Spike Recoveries (a.k.a. labeled compounds, recovery standards) Use bias flags (H,L)[1] where appropriate
Interferences	16	ICP/ICP-MS Serial Dilution Percent Difference
	17	ICP/ICP-MS Interference Check Standard Recovery Use bias flags (H,L)[1] where appropriate
	19	Internal Standard Performance (i.e., area, retention time, recovery)
	22	Elevated Detection Limit due to Interference (i.e., chemical and/or matrix)
	23	Bias from Matrix Interference (i.e. diphenyl ether, PCB/pesticides)
Identification and Quantitation	2	Chromatographic pattern in sample does not match pattern of calibration standard
	3	2nd column confirmation (RPD or %D)
	4	Tentatively Identified Compound (TIC) (associated with NJ only)
	20	Calibration Range or Linear Range Exceeded
	25	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
Miscellaneous	11	A more appropriate result is reported (multiple reported analyses i.e., dilutions, re-extractions, etc. Associated with “R” and “DNR” only)
	14	Other (See DV report for details)
	26	Method QC information not provided

[1] H = high bias indicated
L = low bias indicated

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature	Waters/Solids < 4°C Tissues <-10°C	EcoChem PJ, see TM-05	1
Holding Time	Extraction - Water: 30 days from collection *Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days* Extraction - Soil: 30 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext > 30 days J(+)/UJ(-) if analysis > 40 Days EcoChem PJ, see TM-05	1
Mass Resolution	>=10,000 resolving power at m/z 304.9824 Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) . Analyzed prior to ICAL and at the start and end of each 12 hr. shift	R(+/-) if not met	14
Window Defining Mix and Column Performance Mix	Window defining mixture/Isomer specificity std run before ICAL and CCAL Valley < 25% (valley = (x/y)*100%) x = ht. of TCDD y = baseline to bottom of valley For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290)	J(+) if valley > 25%	5A (ICAL) 5B (CCAL
Initial Calibration	Minimum of five standards %RSD < 20% for native compounds %RSD <30% for labeled compounds (%RSD <35% for labeled compounds under 1613b)	J(+) natives if %RSD > 20%	5A
	Abs. RT of $^{13}C_{12}$-1234-TCDD >25 min on DB5 >15 min on DB-225	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10 for all native and labeled compounds in CS1 std.	If <10, elevate Det. Limit or R(-)	

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Continuing Calibration	Analyzed at the start and end of each 12 hour shift. %D+/-20% for native compounds %D +/-30% for labeled compounds (Must meet limits in Table 6, Method 1613B) (If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4)	Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers. For native compound %D outliers: 8290: J(+)/UJ(-) if %D = 20% - 75% J(+)/R(-) if %D > 75% 1613: J(+)/UJ(-) if %D is outside Table 6 limits J(+)/R(-) if %D is +/- 75% of Table 6 limit	5B
	Abs. RT of $^{13}C_{12}$-1234-TCDD and ^{13}C12-123789-HxCDD +/- 15 sec of ICAL.	EcoChem PJ, see ICAL section of TM-05	
	RRT of all other compounds must meet Table 2 of 1613B.	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10	If <10, elevate Det. Limit or R(-)	
Method Blank	One per matrix per batch No positive results	If sample result <5X action level, qualify U at reported value.	7
Field Blanks (Not Required)	No positive results	If sample result <5X action level, qualify U at reported value.	6
LCS / OPR	Concentrations must meet limits in Table 6, Method 1613B or lab limits.	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
MS/MSD (recovery)	May not analyze MS/MSD %R should meet lab limits.	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	May not analyze MS/MSD RPD < 20%	J(+) in parent sample if RPD > CL	9

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Lab Duplicate	RPD <25% if present.	J(+)/UJ(-) if outside limts	9
Labeled Compounds / Internal Standards	*Method 8290:* %R = 40% - 135% in all samples *Method 1613B:* %R must meet limits specified in Table 7, Method 1613	J(+)/UJ(-) if %R = 10% to LCL J(+) if %R > UCL J(+)/R(-) if %R < 10%	13
Quantitation/ Identification	Ions for analyte, IS, and rec. std. must max w/in 2 sec. S/N >2.5 IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290 RRTs w/in limits in Table 2 of 1613B	If RT criteria not met, use PJ (see TM-05) If S/N criteria not met, J(+). if unlabelled ion abundance not met, change to EMPC If labelled ion abundance not met, J(+).	21
EMPC (estimated maximum possible concentration)	If quantitation idenfication criteria are not met, laboratory should report an EMPC value.	If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit.	14
Interferences	PCDF interferences from PCDPE	If both detected, change PCDF result to EMPC	14
Second Column Confirmation	All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis.	Report lower of the two values. If not performed use PJ (see TM-05).	3
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used	11

EcoChem, INC.
Environmental Data Quality

APPENDIX B
QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
City of Port Angeles - K Ply

SDG	Sample ID	Lab ID	Method	Analyte	Result	Units	Lab Flags	Validation Qualifier	Validation Reason
10168	SS-1	10168-001	EPA 1613B	2,3,7,8-TCDF	0.620	pg/g	EMPC	U	25
10168	SS-1	10168-001	EPA 1613B	1,2,3,4,7,8-HxCDF	0.328	pg/g	EMPC	U	25
10168	SS-1	10168-001	EPA 1613B	Total TCDD	18.3	pg/g	EMPC	J	25
10168	SS-1	10168-001	EPA 1613B	Total PeCDD	13.8	pg/g	EMPC	J	25
10168	SS-1	10168-001	EPA 1613B	Total TCDF	12.3	pg/g	EMPC	J	25
10168	SS-1	10168-001	EPA 1613B	Total PeCDF	7.02	pg/g	EMPC	J	25
10168	SS-1	10168-001	EPA 1613B	Total HxCDF	7.51	pg/g	EMPC	J	25
10168	SS-3	10168-003	EPA 1613B	Total TCDF	3.23	pg/g	EMPC	J	25
10168	SS-3	10168-003	EPA 1613B	Total HxCDF	1.31	pg/g	EMPC	J	25
10168	SS-3	10168-003	EPA 1613B	Total Hp CDF	1.94	pg/g	EMPC	J	25
10193	SS-4-0-0.25	10193-001	EPA 1613B	Total PeCDD	107	pg/g	EMPC	J	25
10193	SS-4-0-0.25	10193-001	EPA 1613B	Total PeCDF	98.7	pg/g	EMPC	J	25

K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Appendix B
Monitoring Well Logs

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Monitoring Well ID: PP-4R

Installation Date: September 19, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 4.5" ID Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 11

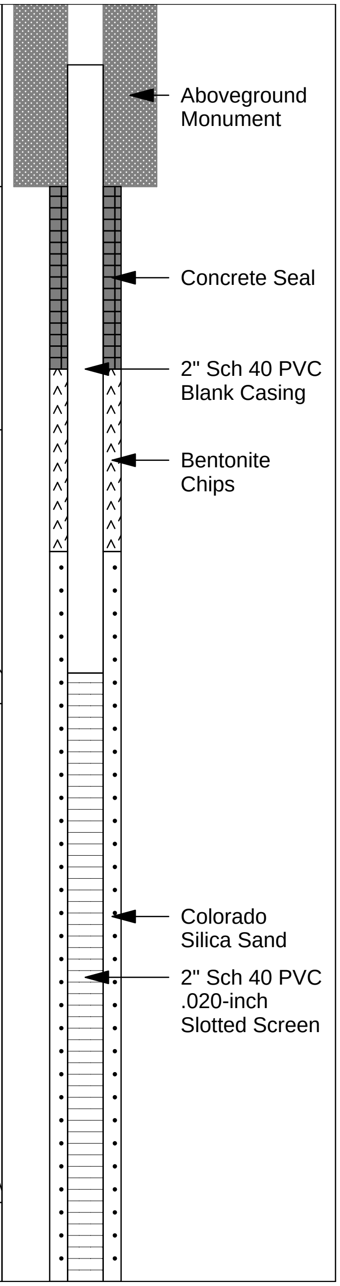
Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.
Port Angeles, WA

Ground Surface Elevation: 15.74
Vertical Datum: NAVD83
Casing Elevation: 17.85
Latitude/Northing: 420417.411
Longitude/Easting: 1003289.79
Coordinate System: WA State Plane North

Remarks: Replacement well for PP-4. Installed directly northwest of original well location.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
				SM	Light brown, very fine silty SAND, trace gravel, dry, no odor or staining. Grades to reddish brown at 3 feet bgs.
0.0		1,1,1			
				SM	Gray silty SAND with wood fragment, moist, no odor.
0.0		2,1,2			
0.0		2,0,1		ML	Gray SILT, no odor.
				SM	Gray, fine-medium silty SAND, moist, no odor.
0.9		2,3,2			Shell fragments, wood pieces at 11 feet bgs and 13.5 feet bgs.
1.8		2,1,2			
0.2		0,1,2			
				ML	Gray SILT, no odor.
				SM	Gray, very fine silty SAND, some small rounded gravel and shell fragments at 19 feet bgs, wet, no odor.

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
--- Dashed contact line in soil description indicates a gradational contact
USCS = Unified Soil Classification System
▼ = denotes groundwater occurrence based on soil saturation observation

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Monitoring Well ID: PP-6R

Ground Surface Elevation: 15.91
Vertical Datum: NAVD83
Casing Elevation: 18.01
Latitude/Northing: 420512.277
Longitude/Easting: 1003411.101
Coordinate System: WA State Plane North

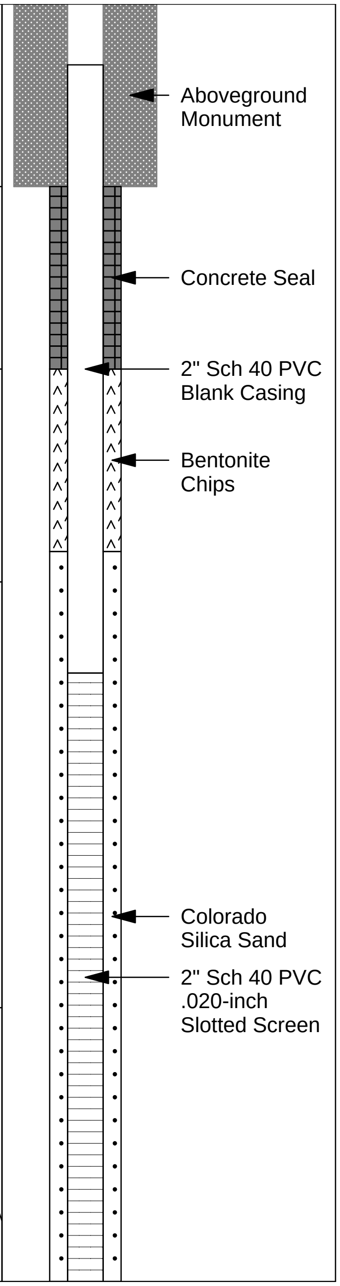
Installation Date: September 19, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 4.5" ID Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 11.5

Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.
Port Angeles, WA

Remarks: Replacement well for PP-6.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
				GW	Brown, silty sandy GRAVEL, some wood debris and concrete rubble, dry, no odor or staining.
0.0		3,5,8		SM	Light brown, medium-coarse silty SAND, small rounded gravel, shell fragments, loose, dry, no odor.
0.0		5,7,5			
				SP/SM	Gray, medium SAND to silty SAND, shell fragments, moist, no odor.
0.1		5,7,8			SILT lense at 8' bgs.
0.1		5,4,1			Same as above.
0.0		4,3,5			
				SP/SM	Gray, medium-coarse SAND, small rounded gravels, shell fragments, grading to a fine silty SAND at 14.5, wet, no odor, no sheen.
0.0		2,3,2			
				SM	Gray, fine-medium silty SAND, small rounded gravel at 19.5' bgs, shell fragments throughout, saturated, no odor, no sheen.

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
--- Dashed contact line in soil description indicates a gradational contact
USCS = Unified Soil Classification System
▼ = denotes groundwater occurrence based on soil saturation observation

Monitoring Well ID: PP-15R

Installation Date: September 19, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 4.5" ID Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 10.5

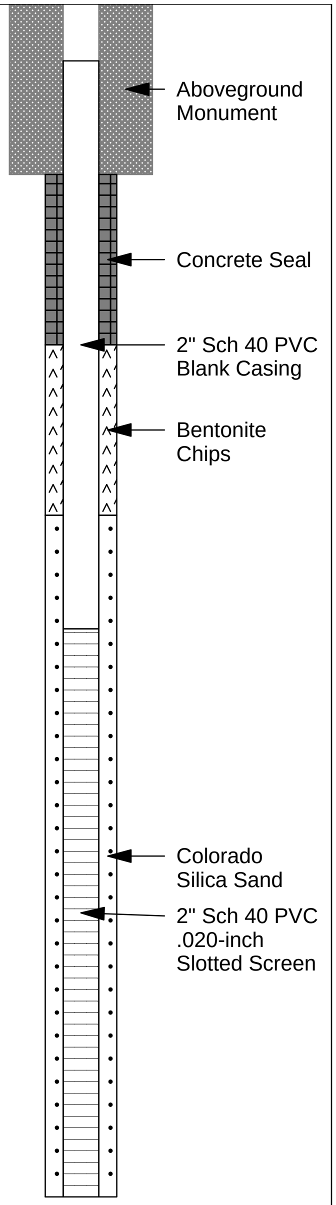
Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.
Port Angeles, WA

Ground Surface Elevation: 14.81
Vertical Datum: NAVD83
Casing Elevation: 17.72
Latitude/Northing: 420492.915
Longitude/Easting: 1003105.213
Coordinate System: WA State Plane North

Remarks: Replacement well for PP-15.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
			0	SM	Light brown, fine silty gravelly SAND, dry, no odor or staining.
11.6		2,1,3	3	SP	Brown, fine silty SAND, no gravel, grading to dark gray silty SAND, moist.
223		0,1,1	5		Strong petroleum odor at 4' and 6' bgs.
37		1,1,3	8.5	SP/SM	Dark gray silty SAND, shell framents, grading to medium SAND at 9.5', moist, slight petroleum odor.
			10.5		Wet at 10.5' bgs.
9		1,1,2	11.5		Same as above, wet, thin rootlets, no odor, no sheen.
1.1		3,2,2	13.5	SM	Dark gray, fine silty SAND, saturated, no odor, no sheen.
0.8		2,1,1	15.5		
0.1		1,3,4	17.5		
			19		Same as above, some small to medium rounded gravel and shell fragments, no odor, no sheen.

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
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USCS = Unified Soil Classification System
▼ = denotes groundwater occurrence based on soil saturation observation

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Monitoring Well ID: PP-20

Ground Surface Elevation: 17.62
Vertical Datum: NAVD83
Casing Elevation: 20.09
Latitude/Northing: 420710.608
Longitude/Easting: 1003533.372
Coordinate System: WA State Plane North

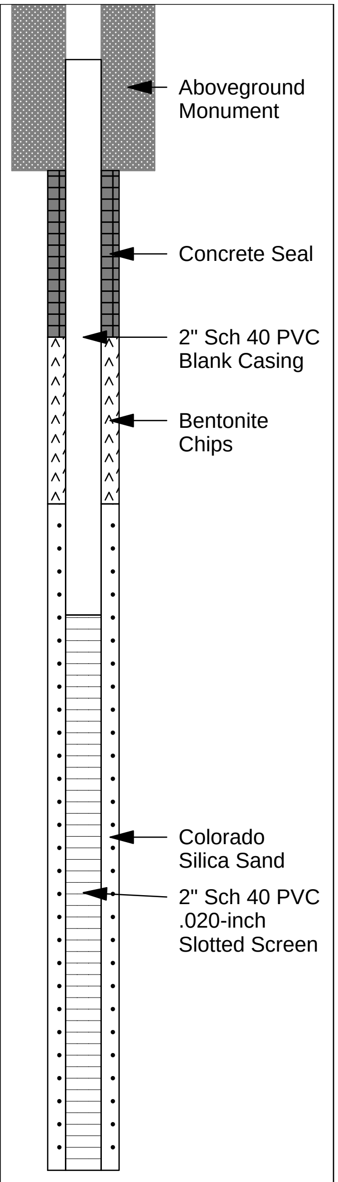
Installation Date: September 20, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 4.5" ID Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 15.5

Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.
Port Angeles, WA

Remarks: Located along the shoreline.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
			0	GW	Gravelly fill, demo debris, misc. debris, some vegetation.
0.0		2,1,1	3	SM	Grayish brown silty SAND with some angular gravel, dry, no odor.
0.0		1,15,18	6	GW	Reddish brown, sandy GRAVEL with wood, concrete, and metal debris, dry.
0.0		4,4,8	8	SP	Brown, medium SAND with shell fragments, grading to very fine silty SAND at 9' bgs, moist, no odor.
			9	SM	Grayish brown, fine silty SAND, few small rounded gravel, moist, no odor.
0.0		4,12,20	11		
		9,9,7	13		No recovery due to large rock, cuttings are brown fine sitly SAND and some pebbles, moist, no odor.
0.0		4,5,6	16		Grades to gray silty SAND, shell fragments, wet, no odor.
0.0		4,5,8	19		Dark gray, fine-medium silty SAND, shell fragments, rock at 19' bgs, wet, no odor.

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
--- Dashed contact line in soil description indicates a gradational contact
USCS = Unified Soil Classification System
▼ = denotes groundwater occurrence based on soil saturation observation

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Monitoring Well ID: PP-21

Installation Date: September 20, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 4.5" ID Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 13.5

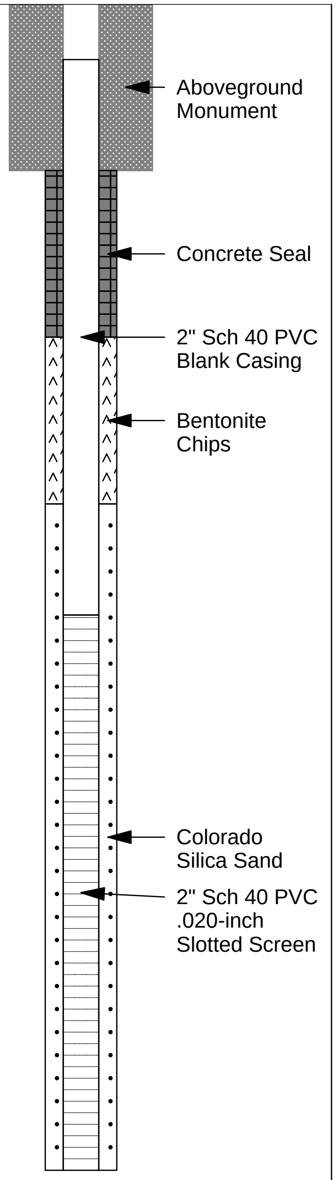
Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.
Port Angeles, WA

Ground Surface Elevation: 15.41
Vertical Datum: NAVD83
Casing Elevation: 17.26
Latitude/Northing: 420618.442
Longitude/Easting: 1003760.228
Coordinate System: WA State Plane North

Remarks: Located along the shoreline on the log debarker property.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
				SP	Dark brown silty SAND, bark and woody debris, some small rounded gravel, dry.
0.0		4,22,22			
				SM	Light brown, silty SAND with some gravel, moist, no odor.
0.0		2,5,5			Reddish brown, silty SAND with some small rounded gravel, loose, moist, no odor.
0.0		3,3,4			
0.0		3,2,3			
		1,1,1			Gray, fine silty SAND, shell fragments, few gravel, wet, no odor.
0.0		2,3,2			Dark gray, medium silty SAND, shell fragments, wet, no odor.
0.0		2,1,1			Dark gray, medium-coarse silty SAND, wet, no odor.

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million

--- Dashed contact line in soil description indicates a gradational contact
USCS = Unified Soil Classification System
▼ = denotes groundwater occurrence based on soil saturation observation

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Monitoring Well ID: PP-22

Installation Date: September 20, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 4.5" ID Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 11.5

Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.
Port Angeles, WA

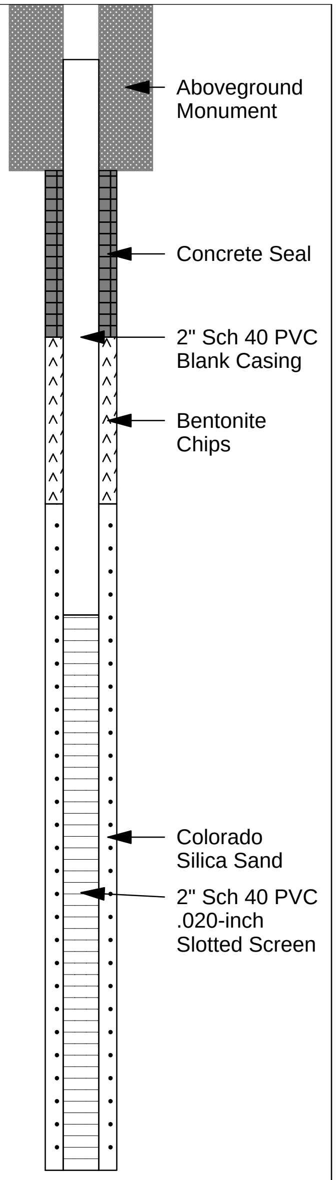
Ground Surface Elevation: 15.34
Vertical Datum: NAVD83
Casing Elevation: 17.53
Latitude/Northing: 420437.557
Longitude/Easting: 1004150.138
Coordinate System: WA State Plane North

Remarks: Located along the shoreline on the log debarker property.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS
0.0		20,25,23	3
0.0		5,5,5	5
0.0		3,4,4	7.5
0.0		3,3,3	10
0.0		5,7,15	12.5
0.0		4,3,3	15
0.0		2,1,3	17.5

USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
SM	Brown, gravelly silty SAND with bark, and cobbles, dry, no odor.
	Light gray silty SAND, small rounded gravels, loose, moist, no odor.
	Light gray w/reddish brown mottles, silty SAND, some small-medium gravels, shell fragments, moist, no odor.
	Gray, fine silty SAND, some rounded gravels, shell fragments, moist, no odor.
	Piece of wood at 12' bgs.
SP	Gray, medium-coarse SAND, some rounded gravels, shell fragments, wet, no odor or sheen.
	Piece of wood at 15' bgs.
	3-4" diameter cobbles coming up with cuttings.
SM	Gray, fine silty SAND, small rounded gravel, shell fragments, wet, no odor.

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
--- Dashed contact line in soil description indicates a gradational contact
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Monitoring Well ID: PP-23

Ground Surface Elevation: 16.581
Vertical Datum: NAVD83
Casing Elevation: No Data Available
Latitude/Northing: 420275.443
Longitude/Easting: 1003009.985
Coordinate System: WA State Plane North

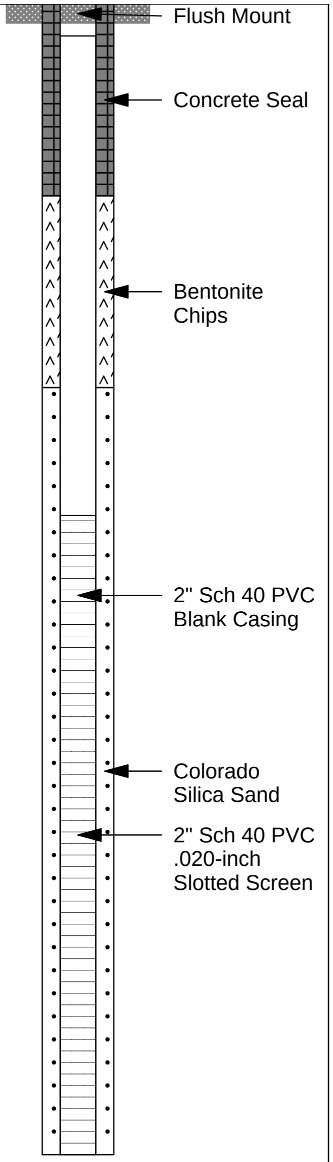
Installation Date: September 18, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 8"-dia Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 11

Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.

Remarks: Located in the alleyway south of the concrete pad and north of Pensiula Fuel Company property.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
			0	AS	Asphalt surface.
			1	GW	Reddish-brown, sandy GRAVEL, dry, no odor.
0.2		7,10,8	3		
0.0		4,6,6	5		
			6	SM	Gray with reddish-brown mottles, silty SAND, dry.
0.0		4,11,10	8		
16 (PP-23-10-11.5')		4,4,5	11 ▼	SP	Dark brown, medium-coarse SAND with some gravel, wet, strong petroleum odor, slight sheen, some dark staining.
0.1		3,3,4	13		Wet, no odor no sheen at 12.5' bgs. 1" seam of light brown sandy SILT at 13' bgs.
0.2		3,2,2	16		Same as above.
		2,5,3	18		No recovery.

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
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Monitoring Well ID: PP-24

Installation Date: September 19, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 8"-dia Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 9

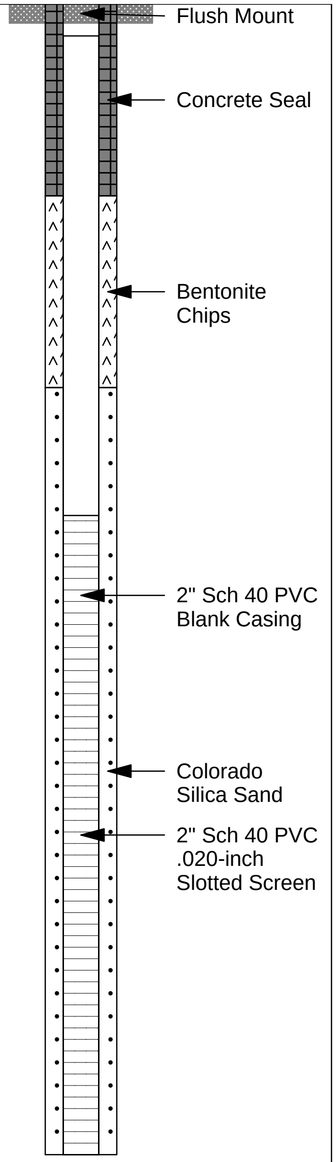
Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.

Ground Surface Elevation: 17.845
Vertical Datum: NAVD83
Casing Elevation: No Data Available
Latitude/Northing: 419957.504
Longitude/Easting: 1003543.849
Coordinate System: WA State Plane North

Remarks: Located near the west side of the south entrance of the log debarker property.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
			0	AS	Asphalt surface.
			1	SM	Brown, gravelly SAND, loose, large gravel, dry, no odor.
			2		
		2,2,2	3		
			4	ML	Brown, sandy SILT, medium dense, no gravel, moist, no odor.
0.0		2,2,2	5		
			6		Brown with reddish-brown mottles, few small rounded gravel, moist, no odor.
0.0		3,0,4	7		
			8		
			9 ▼	SM	Dark gray, silty SAND, some small round gravel, wet, no odor.
			10		
0.0		2,1,3	11		
			12		
0.0		1,4,3	13	ML	Dark gray, sandy SILT lense, wet, no odor.
			14	SM	Dark gray, gravelly silty SAND, wet, no odor, no sheen.
			15		
0.0		5,6,7	16		
			17		
0.0		4,5,5	18	SP	Gray, medium-coarse, SAND, wet, no odor, no sheen.
			19		
			20		

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
--- Dashed contact line in soil description indicates a gradational contact
USCS = Unified Soil Classification System
▼ = denotes groundwater occurrence based on soil saturation observation

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Monitoring Well ID: PP-25

Installation Date: September 19, 2013
Logged By: Lisa Meoli
Drilled By: Holocene
Drill Type: 8"-dia Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18
Groundwater ATD (ft bgs): 15

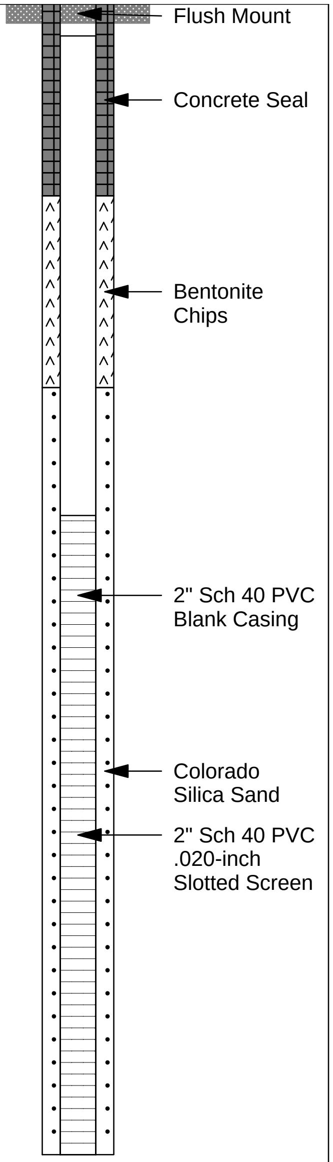
Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.

Ground Surface Elevation: 19.185
Vertical Datum: NAVD83
Casing Elevation: 19.861
Latitude/Northing: 419921.215
Longitude/Easting: 1003890.504
Coordinate System: WA State Plane North

Remarks: Located on the east side of the south entrance of the log debarker property.

PID (ppm)	BLOW COUNT	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
		AS	Asphalt surface.
		SM	Reddish-brown, silty SAND and small rounded gravel, loose, dry, no odor.
0.1	5,5,6		
0.0	5,3,3		
	6,7,7		
			No recovery.
0.0	3,4,3	ML	Light brown with reddish-gray mottles, sandy SILT, some rounded gravel, moist, no odor.
0.0	2,5,3		Same as above.
	20,35, 30		No recovery.
		SP	Dark gray, medium-coarse SAND, small rounded gravel, wet, no odor, no sheen.
0.0	5,5,6		

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
--- Dashed contact line in soil description indicates a gradational contact
USCS = Unified Soil Classification System
▼ = denotes groundwater occurrence based on soil saturation observation

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Monitoring Well ID: PP-26

Installation Date: September 18, 2013
Logged By: Jenny Graves
Drilled By: Holocene
Drill Type: 8"-dia Hollow Stem Auger
Sample Method: 2"x18" SS Sampler
Boring Diameter: 8-inch
Boring Depth (ft bgs): 18 feet bgs
Groundwater ATD (ft bgs): 10.5

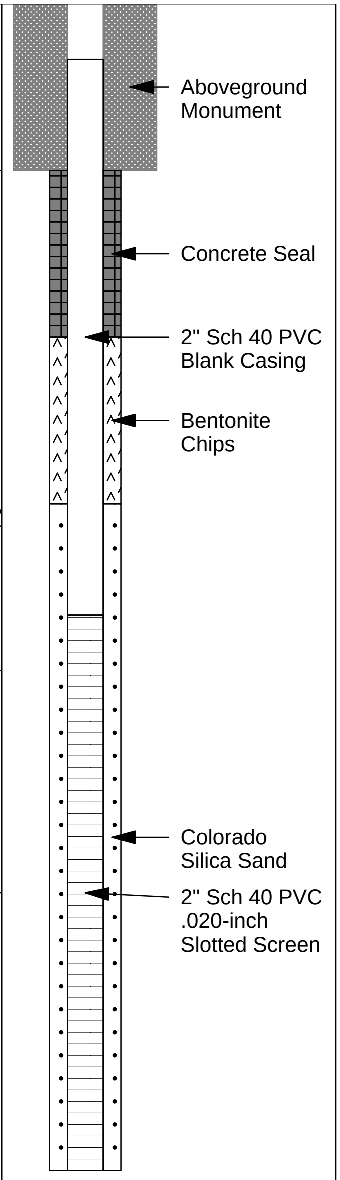
Client: Port of Port Angeles
Project: K Ply
Task Number: AO2C
Site Location: Marine Dr./Cedar St.

Ground Surface Elevation: 15.46
Vertical Datum: NAVD83
Casing Elevation: 17.96
Latitude/Northing: 420450.165
Longitude/Easting: 1003236.968
Coordinate System: WA State Plane North

Remarks: North of concrete pad and approximately 60 feet west of PP-4R.

PID (ppm)	DRIVE / RECOVERY	BLOW COUNT	DEPTH FT BGS	USCS SYMBOL	SOIL DESCRIPTION AND OBSERVATIONS: (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)
				SM	Light brown, silty SAND, some gravel, loose, dry, no odor.
0.0		1,2,1			
0.4		0,1,1			
				ML	Gray SILT lense, slight odor.
				SM	Brown, fine-medium silty SAND.
176		0,0,4			
				SP	Gray, coarse SAND with shell fragments, wet, strong petroleum odor.
3.4		3,3,4			1-inch silt lense at 10' bgs, no odor.
0.4		3,2,1		SP/ML/SP	Gray, medium-coarse SAND, with some interbedded SILT, wet, woody debris, no odor.
0.1		0,1,3			2-inch silt lense at 16' bgs, some woody debris, no odor.
0.0		2,5,6			1-inch silt lense at 19' bgs, no odor.

MONITORING WELL DETAIL



Notes:
FT BGS = feet below ground surface
ppm = parts per million
--- Dashed contact line in soil description indicates a gradational contact
USCS = Unified Soil Classification System
▼ = denotes groundwater occurrence based on soil saturation observation

K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Appendix C
Groundwater Sampling Forms

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: KPLY

Date of Collection: 10/14/13

Project Number: KPLY RI GW SAMPLING

Field Personnel: T. STEVENS

Purge Data

Well ID: PP-24

Secure: ☒ Yes ☐ No

Well Condition/Damage Description: 2" PVC, NEW WELL

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No

One Casing Volume (gal):

Depth of water (from top of well casing): 11.70' DTB=17.51'

Well Casing Type/Diameter/Screened Interval:

After 5 minutes of purging (from top of casing): 11.80'

Begin purge (time): 1712

End purge (time): 1747

Gallons purged: 3.5 ~~4~~ GALLONS

Purge water disposal method: DRUM - IDW

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L DO	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	Comments
1717	11.80'	2L	7.49	2.50	0.837	19.7	15.11	86	
1722	11.80'	3L	6.87	1.75	0.891	14.6	14.08	-42	
1727	11.80'	5L	6.65	1.36	0.904	12.3	13.85	-55	
1732	11.80'	8L	6.59	1.14	0.901	11.9	13.77	-54	
1737	11.80'	9L	6.51	0.93	0.899	~~10~~ 7.7	13.74	-53	
1742	11.79'	10L	6.49	0.92	0.897	10.8	13.81	-50	
1747	11.79'	13L	6.47	0.85	0.897	11.1	13.82	-49	

Sampling Data

Sample No: PP-24

Location and Depth: PP-24 @ 15.5'

Date Collected (mo/dy/yr): 10/14/13

Time Collected: 1748 ☐ AM ☒

Weather: CLEAR / SUNNY

Type: ☒ Ground Water ☐ Surface Water Other:

Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other:

Type: PERISTALTIC

Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:

Sample Description (Color, Turbidity, Odor, Other): ~~CLEAR~~ (TS), NO ODOR, ~~NO SHEEN~~ (TS). SLIGHT SHEEN & YELLOW TINGE

Sample Analyses

[✓ TPH-D]	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☒	[✓ BTEX]	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 mL AMBER	1		
40 mL VOA w/HCL	2		
40 mL VOA	2		

Signature: Tucker Stevens

Date: 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: K PLY
Date of Collection: 10/14/13
Project Number: K PLY RI GW SAMPLING
Field Personnel: T. STEVENS

Purge Data

Well ID: PP-15R
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: 2" PVC, NEW - GOOD CONDITION

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 11.62' DTB=20.65'
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 11.99'
Begin purge (time): 15:40
End purge (time): 16:21
Gallons purged: 3.5 GALLONS
Purge water disposal method: DRUM-IDW

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Comments
1545	11.99'	2L	6.79	5.83	0.566	42.3	17.28	92	
1550	12.00'	5L	7.23	3.60	1.26	33.7	17.08	107	
1555	11.99'	7L	7.42	2.76	1.25	20.2	16.78	85	
1600	11.98'	9L	7.43	2.33	1.26	17.6	15.38	77	
1605	11.98'	11L	7.43	2.13	1.27	16.7	15.26	69	
1610	11.97'	13L	7.41	2.17	1.28	13.4	15.30	64	
1615	11.96'	14L	7.40	1.96	1.28	17.2	15.31	60	
1620	11.98'	15L	7.39	1.83	1.29	9.8	15.41	56	

Sampling Data

Sample No: PP-15R
Location and Depth: PP-15R @ 18.5'
Date Collected (mo/dy/yr): 10/14/13
Time Collected: 1622
☐ AM ☒ PM
Weather: CLEAR/SUNNY
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☒ Filtered -METALS ☒ Unfiltered -OTHER Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: PERISTALTIC
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): GASOLINE ODOR, NO SHEEN

Sample Analyses

[✓ TPH-D] (HCl) ☒ | LEAD ☒ | Chlor / Fluor (unpres) ☐ | EDB, EDC, HEXANE, MTBE, naphthalene ☒ | COD / TOC (H2SO4) ☐ | Orthophos (FILTER) ☐ | Diss. Metals (HNO3) ☐

[✓ TPH-G] (HCl) ☒ | [✓ BTEX] (HCl) ☒ | Total Metals (HNO3) ☐ | TKN/Phos (N2SO4) ☐ | VOCs (HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 ml AMBER	1		
40 ml VOA's w/ HCL	4		
40 ml VOA	4		
500 ml HDPE w/ HNO3	1		

Signature: T. Stevens
Date: 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: KPLY
Date of Collection: 10/14/13
Project Number: KPLY RI SAMPLING
Field Personnel: T. STEVENS

Purge Data

Well ID: PZ-12
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: GOOD CONDITION

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 10.34' DTB=14.67'
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 10.70'
Begin purge (time): 14:25
End purge (time): 1455
Gallons purged: 4 GALLONS
Purge water disposal method: DRUM - IDW

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L DO	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	Comments
1430	10.70'	1.5L	6.36	11.39	—	215	15.13	82	
1435	10.69'	4L	7.06	2.24	0.746	28.7	14.99	-19	
1440	10.69'	6L	7.04	1.56	-	13.6	15.40	-17	
1445	10.68'	8L	7.02	1.57	0.760	6.6	15.58	-16	
1450	10.68'	9.5L	7.03	1.02	0.762	1.2	15.64	-17	
1455	10.66	11L	7.03	1.60	0.765	5.1	15.65	-17	

Sampling Data

Sample No: PZ-12
Location and Depth: PZ-12 @ 12.5'
Date Collected (mo/dy/yr): 10/14/13
Time Collected: 1456 ☐ AM ☒
Weather: CLEAR/SUNNY
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: PERISTALTIC
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable] and/or dedicated [✓ silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): CLEAR, NO ODOR, NO SHEEN. WHITE FLOATIES PRESENT

Sample Analyses

SVOCs ☒ FORMALDEHYDE ☒

[✓ TPH-D]	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☒	[✓ BTEX]	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 mL AMBER	1		
1 L AMBER	2		
40mL VOA w/ HCL	2		
40mL VOA	2		

Signature: **Date:** 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: K Ply
Date of Collection: 10/14/13
Project Number: KPLY GW SAMPLING
Field Personnel: T. STEVENS

Purge Data

Well ID: PZ-07
Secure: ☐ Yes ☒ No
Well Condition/Damage Description: 1" PEIZOMETER, w/ NO MONUMENT MARKER BY CONE, TUBING WAS DIRTY WHEN PULLED FROM WELL

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 9.24' DTB= 13.78'
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 9.50'
Begin purge (time): 12:44
End purge (time): 1315
Gallons purged: 2 GALLONS
Purge water disposal method: DRUM - IDW

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO	mS/cm Conductivity	NTU Turbidity	Temp °C	mV ORP	Comments
12:49	9.50'	2L	5.98	9.83	0.128	102	15.66	65	FEW DIRT/FILM
12:54	9.55'	3L	6.08	10.12	-	215	15.60	64	PIECES PURGED
12:59	9.53'	4L	6.21	2.97	0.457	7.0	15.46	60	
13:04	9.59'	6L	7.04	4.30	0.498	1.3	14.41	41	
13:09	9.60'	7L	7.04	2.35	0.505	1.8	14.20	30	
13:14	9.59'	8L	7.03	1.91	0.506	2.0	14.25	22	

Sampling Data

Sample No: PZ-07
Location and Depth: PZ-07 @ 12.5'
Date Collected (mo/dy/yr): 10/14/13
Time Collected: 1315 ☐ AM ☒ PM
Weather: CLEAR/SUNNY
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: PERISTALTIC
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable] and/or dedicated [✓ silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): SLIGHT PETROLEUM ODOR & SHEEN

Sample Analyses

[✓ TPH-D] (HCl) ☒ Chlor / Fluor (unpres) ☐ COD / TOC (H2SO4) ☐ Orthophos (FILTER) ☐ Diss. Metals (HNO3) ☐
[✓ TPH-G] (HCl) ☒ [✓ BTEX] (HCl) ☒ Total Metals (HNO3) ☐ TKN/Phos (N2SO4) ☐ VOCs (HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 ml AMBER	1		
40 mL VOA w/ HCL	2		
40 mL VOA	2		

Signature: Tucker Stevens
Date: 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: KPLY
Date of Collection: 10/14/13
Project Number: KPLY RI SAMPLING
Field Personnel: T. STEVENS

Purge Data

Well ID: PZ-01
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: 1" PEIZOMETER IN ALLEY DIRTY CASING, BUT OK COND.

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 10.61' DTB = 14.60'
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 10.69'
Begin purge (time): 11:27
End purge (time): 12:03
Gallons purged: 3.5 GALLONS
Purge water disposal method: DRUM - IDW

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Conductivity mS/cm	Turbidity	Temp °C	ORP mV	Comments
11:32	10.69	2L	5.57	10.50	-	213	14.92	59	
11:37	10.69	4L	5.68	3.60	0.456	27.3	15.0	56	
11:42	10.68	6L	6.58	1.64	0.857	13.7	14.51	14	
11:47	10.68	8L	6.54	1.36	0.854	10.8	14.64	4	
11:52	10.66	10L	6.54	1.35	0.853	11.3	14.74	1	
11:57	10.65	12L	6.54	1.50	0.851	8.3	14.85	-3	
12:02	10.65	14L	6.54	1.28	0.848	5.1	1488	-5	

Sampling Data

Sample No: PZ-01
Location and Depth: PZ-01 @ 12.6'
Date Collected (mo/dy/yr): 10/14/13
Time Collected: 12:04 ☐ AM ☒ PM
Weather: CLEAR/SUNNY
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: PERISTALTIC
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable] and/or dedicated [✓ silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): SLIGHT PETROLEUM ODOR, CLEAR

Sample Analyses

[✓ TPH-D]	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☒	[✓ BTEX]	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 mL AMBER	1	PZ-01-D @ 9:05	
40 mL VOA w/HCL	1		
40 mL VOA	1		

Signature:
Date: 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: K PLY
Date of Collection: 10/14/13
Project Number: K PLY RI SAMPLING
Field Personnel: T. Stevens

Purge Data

Well ID: PP-07
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: 2" STEEL CASING, OLD BUT GOOD CONDITION

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 10.59' DTB= 13.7'
Well Casing Type/Diameter/Screened Interval: 2" STEEL
After 5 minutes of purging (from top of casing): 12.38'
Begin purge (time): 10:20
End purge (time): 10:50
Gallons purged: 3.5 GALLONS
Purge water disposal method: DRUM

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water ft	Vol. Purged	pH	DO	Conductivity mS/cm	Turbidity	Temp °C	ORP mV	Comments
10:25	12.38	4 L	5.64	4.15	0.001	9.7	15.30	64	
10:30	11.87	6L	6.27	1.33	0.341	1.9	14.75	3	
10:35	11.84	8L	6.27	1.27	0.340	3.8	14.85	-7	
10:40	11.84	10L	6.30	1.03	0.339	4.3	14.89	-12	
10:45	11.82	12L	6.26	1.21	0.341	0.0	14.94	-13	
10:50	11.82	14L	6.24	2.24	0.340	0.0	14.97	-13	

Sampling Data

Sample No: PP-07
Location and Depth: PP-07 @ 12.7'
Date Collected (mo/dy/yr): 10/14/13
Time Collected: 10:52 ☒ AM ☐
Weather: CLEAR / SUNNY
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: PERISTALTIC
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): PETROLEUM ODOR, SLIGHT SHEEN

Sample Analyses

[✓ TPH-D]	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☒	[✓ BTEX]	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1 - 500 mL AMBER	1		
40ml VOA w/ HCL	2		
40 ml VOA	2		

Signature: Tucker Stevens
Date: 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: KPLY
Date of Collection: 10/15/13
Project Number: KPLY RI GW SAMPLING
Field Personnel: T. STEVENS

Purge Data

Well ID: PZ-13
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: STANDING WATER/MUD ON TOP OF WELL, WATER IN ~~BAD~~ MONUMENT. OTHERWISE IN GOOD COND.

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 10.49
Well Casing Type/Diameter/Screened Interval: 1" PVC
After 5 minutes of purging (from top of casing): 11.39'
Begin purge (time): 11:52
End purge (time): (TS) 12:28
Gallons purged: ~~DRY~~ 3.5 GALLONS
Purge water disposal method: DRUM - IDW

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L ~~DO~~	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	Comments
11:57	11.39'	3L	6.38	7.30	0.519	20.7	18.46	101	
12:02	11.29'	4L	7.44	5.03	0.784	4.7	16.75	91	
12:07	11.25'	6L	7.18	4.10	0.796	1.4	15.86	96	
12:12	11.25'	8L	7.13	3.63	0.809	0.9	15.30	100	
12:17	11.24'	10L	7.07	3.35	0.810	0.0	15.24	105	
12:22	11.24'	12L	7.00	2.98	0.816	0.0	14.95	111	
12:27	11.21'	14L	6.97	2.84	0.816	0.0	14.96	113	

Sampling Data

Sample No: PZ-13
Location and Depth: PZ-13 @ 1' FROM BOTTOM OF WELL
Date Collected (mo/dy/yr): 10/15/13
Time Collected: 1230 ☐ AM ☒ PM
Weather: CLEAR/SUNNY
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: PERISTALTIC
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable] and/or dedicated [✓ silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): CLEAR, NO ODOR, NO SHEEN

Sample Analyses

[✓ TPH-D] (HCl) ☒ Chlor / Fluor (unpres) ☐ COD / TOC (H2SO4) ☐ Orthophos (FILTER) ☐ Diss. Metals (HNO3) ☐
[✓ TPH-G] (HCl) ☒ [✓ BTEX] (HCl) ☒ Total Metals (HNO3) ☐ TKN/Phos (N2SO4) ☐ VOCs (HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 mL AMBER	1		
40 mL VOA w/ HCL	(TS) ~~4~~ 2		
40 mL VOA *	~~4~~ 2		

Signature:
Date: 10/15/13

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GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: KPLY
Date of Collection: 10/15/13
Project Number: KPLY RI GW SAMPLING
Field Personnel: T.STEVENS

Purge Data

Well ID: PP-21
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: ~~N/A~~ NEW

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 13.75
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 14.01
Begin purge (time): 9:17
End purge (time): 9:48
Gallons purged: 3.5 GALLONS
Purge water disposal method: DRUM-IDW

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO mg/L	Conductivity mS/cm	NTU Turbidity	°C Temp	mV ORP	Comments
9:22	14.01'	2L	7.43	17.03	—	121	9.99	101	
9:27	14.05'	4L	6.19	3.09	8.20	0.0	12.51	139	
9:32	14.05'	6L	6.27	1.66	8.65	0.0	12.95	67	
9:37	14.05'	8L	6.29	1.54	8.73	0.0	12.98	55	
9:42	14.04'	10L	6.30	1.25	8.96	0.0	13.[illegible]	34	
9:47	14.03'	12L	6.31	1.10	9.14	0.0	13.25	26	

Sampling Data

Sample No: PP-21
Location and Depth: PP-21 @ 2' FROM BOTTOM OF WELL
Date Collected (mo/dy/yr): 10/15/13
Time Collected: 9:50 ☒ AM ☐
Weather: CLEAR/SUNNY
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: PERISTALTIC
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): SLIGHT SHEEN, NO ODOR, YELLOW TINGE

Sample Analyses

[✓ SVOCs] ☒

[✓ TPH-D]	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☒	[✓ BTEX]	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	[✓ VOCs]	(HCl) ☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1 L AMBER	1		
500 mL AMBER w/HCL	1		
40 mL VOA w/HCL	4		
40 mL VOA	4		

Signature:
Date: 10/15/13

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GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: PP-18
Date of Collection: 10/15/13
Project Number: K PLY RI GW SAMPLING
Field Personnel: T. STEVENS

Purge Data

Well ID: PP-18
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: GOOD CONDITION

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 12.22'
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 12.40'
Begin purge (time): 734
End purge (time): 809
Gallons purged: 4 GALLONS
Purge water disposal method: DRUM / DW

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L DO	mS/cm Conductivity	Turbidity	°C Temp	mV ORP	Comments
739	12.40'	2L	7.87	12.67	–	216	8.77	128	
744	12.41'	4L	7.10	3.01	0.937	0.8	11.39	112	
749	12.41'	6L	6.82	2.31	0.945	0.0	12.54	88	
754	12.39'	10L	6.74	2.07	0.965	0.0	12.56	66	
759	12.38'	12L	6.71	1.91	0.971	0.0	12.61	57	
804	12.37'	14L	6.69	2.56	0.974	0.0	12.64	46	
809	12.37	16L	6.69	1.77	0.975	0.0	12.64	38	

Sampling Data

Sample No: PP-18
Location and Depth: PP-18 @ 2' FROM BOTTOM OF WELL
Date Collected (mo/dy/yr): 10/15/13
Time Collected: 810 ☒ AM ☐
Weather: CLEAR, COLD
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☒ Filtered LEAD ☒ Unfiltered OTHERS Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: PERISTALTIC
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): GASOLINE ODOR, SLIGHT YELLOW TINGE, NO SHEEN

Sample Analyses

	[✓ SVOCs]	☒	[✓ LEAD]	☒	[✓ PCBs]	☒			
[✓ TPH-D]	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
[✓ TPH-G]	(HCl) ☒	[✓ BTEX]	(HCl) ☐	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	[✓ VOCs]	(HCl) ☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1 L AMBER	1	PP-18-D	DUPLICATE NOT COLLECTED FOR LEAD
500 mL AMBER w/HCL	1	DUPLICATE BOTTLES	OR PCBS
40 ml VOA w/ HCL	4	DOUBLE THE	
40mL VOA	4	QUANTITY LISTED	
		HERE,	
		LABLED AS	
		COLLECTER AT 1300	

Signature:
Date: 10/15/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: KPLY

Date of Collection: 10/15/13

Project Number: KPLY GW RI SAMPLING

Field Personnel: T. STEVENS

Purge Data

Well ID: PP-19

Secure: ☒ Yes ☐ No

Well Condition/Damage Description: GOOD CONDITION - 1 BOLT IS MISSING FOR ~~CASH~~ MONUMENT LID

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No

One Casing Volume (gal):

Depth of water (from top of well casing): 11.71'

Well Casing Type/Diameter/Screened Interval:

After 5 minutes of purging (from top of casing): 11.80'

Begin purge (time): 6:28

End purge (time): 6:59

Gallons purged: 2.5 GALLONS

Purge water disposal method: DRUM - IDW

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L ~~DO~~	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	Comments
6:33	11.80'	1L	6.35	12.5	–	224	11.81	146	
6:38	11.77'	3L	6.56	5.81	1.39	0.0	11.48	147	TURBIDITY READING
6:43	11.76	5L	6.93	3.91	2.11	0.0	12.91	176	LIKELY AN ERROR?
6:48	11.77'	6L	7.17	3.28	2.16	0.0	13.21	168	
6:53	11.74	8L	7.25	3.70	2.09	0.0	13.16	161	
6:58	11.77'	10L	7.28	3.40	2.08	0.0	13.12	156	

Sampling Data

Sample No: PP-19

Location and Depth: PP-19 @ 2' FROM BOTTOM OF WELL

Date Collected (mo/dy/yr): 10/15/13

Time Collected: 7:00 ☒ AM ☐

Weather: CLEAR, COLD, DARK

Type: ☒ Ground Water ☐ Surface Water Other:

Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other:

Type: PERISTALTIC

Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other:

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or [✓ dedicated silicon and poly tubing] Other:

Sample Description (Color, Turbidity, Odor, Other): CLEAR, NO ODOR

Sample Analyses

[✓ SVOCs] ☒

[✓ TPH-D] (HCl) ☒ Chlor / Fluor (unpres) ☐ COD / TOC (H2SO4) ☐ Orthophos (FILTER) ☐ Diss. Metals (HNO3) ☐

[✓ TPH-G] (HCl) ☒ [✓ BTEX] (HCl) ☒ Total Metals (HNO3) ☐ TKN/Phos (N2SO4) ☐ [✓ VOCs] SFET ~~(HCl)~~ ☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
1 L AMBER	1		
500 mL AMBER w/ HCL	1		
40 mL VOA w/ HCL	4		
40 mL VOA ~~w/ HCL~~	4		

Signature: Teddy Stevens

Date: 10/15/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name:

Date of Collection: 10/15/13

Project Number: ~~[illegible]~~ KPLY

Field Personnel: LiMeoli

Purge Data

Well ID: PP-25

Secure: ☒ Yes ☐ No

Well Condition/Damage Description: New

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No

One Casing Volume (gal):

Depth of water (from top of well casing): 13.60

Well Casing Type/Diameter/Screened Interval:

After 5 minutes of purging (from top of casing): 13.61

Begin purge (time): 12:00

End purge (time):

Gallons purged:

Purge water disposal method: 55 gal drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L DO	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	% Sal	g/L TDS Comments
12:05	13.61	0.20	6.83	3.77	1.2	13	13.3	216	0.1	0.8
12:10	↓	0.40	6.69	2.90	1.2	16	13.4	170	"	"
12:15		0.75	6.62	2.42	1.2	18	13.4	99	"	0.7
12:20		1.00	6.58	2.12	1.2	14	13.3	32	"	"
12:25	13.64	1.25	6.56	2.10	1.2	17	13.3	-11	"	"
12:30	"	1.~~TW~~50	6.54	2.11	1.1	15	13.4	-57	"	"

Sampling Data

Sample No: PP-25

Location and Depth:

Date Collected (mo/dy/yr): 10/15/13

Time Collected: 1235 ☐ AM ☒

Weather: Sunny 65°

Type: ☒ Ground Water ☐ Surface Water Other:

Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other:

Type:

Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☐ Horiba U-50 Other: U-22

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other: New tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor or sheen. left in well.

Sample Analyses

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 ml Amber	1		
VOAs	4		

Signature:

Date: 10/15/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: ______ Date of Collection: 10/15/13

Project Number: K Ply Field Personnel: L. Meoli

Purge Data

Well ID: PP-22 Secure: ☒ Yes ☐ No Well Condition/Damage Description: New

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): ______

Depth of water (from top of well casing): 13.00 Well Casing Type/Diameter/Screened Interval: ______

After 5 minutes of purging (from top of casing): ______

Begin purge (time): 9:25 pump rate 4.18

End purge (time): 9:55

Gallons purged: 1.25

Purge water disposal method: 55 gal drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L DO	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	% Sal	g/L Comments TDS
9:30	13.00	0.20	6.42	2.94	2.0	84	13.1	206	0.1	1.3
9:35	"	0.40	6.44	2.98	2.2	64	13.0	98	0.1	1.4
9:40	"	0.50	6.44	2.94	2.2	63	13.1	81	0.1	1.4
9:45	"	0.75	6.44	2.85	2.2	65	13.1	67	"	"
9:50	"	1.00	6.44	2.84	2.2	63	13.1	59	"	"
9:55	"	1.25	6.40	2.83	2.2	50	13.0	~~59~~ -22	"	1.7

Sampling Data

Sample No: PP-22 Location and Depth: ______

Date Collected (mo/dy/yr): 10/15/13 Time Collected: 10:00 ☒ AM ☐ Weather: 50° sunny

Type: ☒ Ground Water ☐ Surface Water Other: ______ Sample: ☐ Filtered ☒ Unfiltered Other: ______

Sample Collected with: ☐ Bailer ☒ Pump Other: ______ Type: Alexis

Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☐ Horiba U-50 Other: Horiba U-22

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other: New - left in well.

Sample Description (Color, Turbidity, Odor, Other): Slightly brownish, Hydrogen sulfide odor. *Rap LM

Sample Analyses

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs SVOCs	(HCl) ☒ ☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500ml Amber	1		
1L Amber	1		
VOAs	8	* Water reacted w/ preservative could not get bubbles out of preserved bottles.	

Signature: Lm Date: 10/15/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name:
Date of Collection: 10/15/13
Project Number: KPLY
Field Personnel: Medi

Purge Data

Well ID: PP-20
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: New

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 15.15
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): " "
Begin purge (time): 7:40 temp rate 4.18 - 3.49
End purge (time):
Gallons purged: ~1.5
Purge water disposal method: Containerized 55gal drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO	Conductivity mS/cm	Turbidity NTU	Temp °C	ORP mV	Sal %	Comments TDS g/L
7:45	15.15	0.20	6.44	3.71	0.00	31	12.9	160	0.0	0.00
7:50	" "	0.40	6.52	2.84	"	45	13.0	151	0.0	0.00
7:55	↓	0.50	6.54	2.55	*	50	12.9	152	"	"
8:00		0.75	6.56	2.12	2.1*	57	12.8	155	0.1	1.3
8:05		1.00	6.56	2.09	2.1	44	12.8	159	"	"
8:10		1.25	6.57	2.00	2.1	31	12.8	164	"	"
8:15		1.50	6.57	1.99	2.1	30 **	12.7	166	"	"

Sampling Data

* calibrated - turned off + on & reading after this.

Sample No: PP-20
Location and Depth:
Date Collected (mo/dy/yr): 10/15/13
Time Collected: 820 ☒ AM ☐
Weather: 42° Sunny

Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Aegis

Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☐ Horiba U-50 Other: U-22

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other: New tubing - left in well.

Sample Description (Color, Turbidity, Odor, Other): No odor, No sheen, clear

Sample Analyses

** Appearance crystal clear? but reading around 30.

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☑	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs SVOCs	(HCl) ☒ ☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 mL Amber	1		
1L Amber	1		
VOAs	8		

Signature:
Date: 10/15/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name:
Date of Collection: 10/15/13
Project Number: KPLY
Field Personnel: Meri

Purge Data

Well ID: PP-17
Secure: ☒ Yes ☐ No
Well Condition/Damage Description:

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 11.75
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 11.77
Begin purge (time): 6:35
End purge (time): 7:10 pumprate 5.68
Gallons purged: containerized 55 gal drum
Purge water disposal method: ~2 gals

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO	Conductivity	Turbidity	Temp	ORP	Sal	TDS Comments
640	11.77	0.20	6.63	3.65	0.9	5	13.8	205	0.0	0.6
645	"		6.54	2.55	0.9	0	13.8	125	"	"
650	"	0.50	6.52	2.27	0.9	0	13.8	86	"	"
655	"	0.75	6.50	1.96	0.9	0	13.8	42	"	"
700	"	1.00	6.51	1.82	0.9	0	13.8	-10	"	"
705			6.50	1.81	0.9	2	13.8	-40	"	"
710		2.00	6.50	1.79	0.9	2	13.8	-43	"	"

Sampling Data

Sample No: PP-17
Location and Depth:
Date Collected (mo/dy/yr): 10/15/13
Time Collected: 715 ☒ AM ☐
Weather: 42° Clear
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Mass
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☐ Horiba U-50 Other: U-22
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/[✓ or dedicated silicon and poly tubing] Other:
Sample Description (Color, Turbidity, Odor, Other): slight odor, clear

Sample Analyses

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs + SVOCs 8	(HCl) ☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 mL Amber	1		
1 L Amber	1		
VOAS	8		

Signature:

Date: 10/15/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: KPLY
Date of Collection: 10/14/13
Project Number:
Field Personnel: G Miceli

Purge Data

Well ID: PP-9
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: OK

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 11.22
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 11.22
Begin purge (time): 16:10
End purge (time): 16:35
Gallons purged: ~1.25
Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	gal Vol. Purged	pH	mg/L DO	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	Sal	Comments TDS
16:15	11.22	0.15	6.10	2.02	0.79	20	15.6	29	0.0	0.50
16:20	"	0.25	6.09	1.87	0.79	12	15.6	10	"	"
16:25	"	0.50	6.07	1.77	0.79	3	15.6	-19	"	0.51
16:30	"	0.75	6.05	1.76	0.79	2	16.5	-30	"	"
16:35	"	1.00	6.05	1.76	0.79	1	15.5	-35	"	"

Sampling Data

Sample No: PP-9
Location and Depth:
Date Collected (mo/dy/yr): 10/14/13
Time Collected: 16:40 ☐ AM ☒
Weather: Sunny 65°
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☐ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other: Alexis Peristaltic Type:
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☐ Horiba U-50 Other: Horiba U-22
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other: New - left inside casing in a ziploc bag.
Sample Description (Color, Turbidity, Odor, Other): Clear, slight petroleum odor + sheen.

Sample Analyses

TPH-D	(HCl) ☒	Chlor / Fluor	(unpres) ☐	COD / TOC	(H2SO4) ☐	Orthophos	(FILTER) ☐	Diss. Metals	(HNO3) ☐
TPH-G	(HCl) ☒	BTEX	(HCl) ☒	Total Metals	(HNO3) ☐	TKN/Phos	(N2SO4) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 ml Amber	1		
VOAs	4		

Signature:
Date: 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name:

Date of Collection: 10/14/13

Project Number: KPLY AOC2

Field Personnel: L. Meoli

Purge Data

Well ID: PP-13

Secure: ☒ Yes ☐ No

Well Condition/Damage Description: Good

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No

One Casing Volume (gal):

Depth of water (from top of well casing): 11.49

Well Casing Type/Diameter/Screened Interval:

After 5 minutes of purging (from top of casing): 11.49

Begin purge (time): 1430 pump rate 6.28

End purge (time):

Gallons purged:

Purge water disposal method: Containerized - 65gal drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	DO	Conductivity	Turbidity	Temp	ORP	sal	~~Comments~~ TDS g/L
1435	11.49	0.20	7.44	3.86	0.58	5	14.1	73	0.0	0.39
1440	"	0.30	7.21	3.01	0.57	0	14.1	-57	"	0.36
1445	↓	0.50	7.05	2.43	0.56	1	14.1	-81	"	"
1450		0.75	7.00	2.22	0.57	0	14.1	-94	"	"
1455		1.00	6.99	2.20	0.57	0	14.1	-99	"	"
1500		1.25	6.98	2.21	0.57	0	14.1	-105	"	0.37
1505		1.50	6.99	2.20	0.57	0	14.1	-107	"	0.36

Sampling Data

Sample No: PP-13

Location and Depth:

Date Collected (mo/dy/yr): 10/14/13

Time Collected: 1510 ☐ AM ☒ PM

Weather: Sunny 65°

Type: ☒ Ground Water ☐ Surface Water Other:

Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Alexis Peristaltic Type:

Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☐ Horiba U-50 Other: U-22-Horiba

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; [✓ disposable and/or dedicated silicon and poly tubing] Other:

Sample Description (Color, Turbidity, Odor, Other): Clear, slight petroleum odor, stringy "white" material floating in H_2O.

Sample Analyses

TPH-D (HCl) ☐

TPH-G (HCl) ☐

Chlor / Fluor (unpres) ☐

BTEX (HCl) ☐

COD / TOC (H2SO4) ☐

Total Metals (HNO3) ☐

Orthophos (FILTER) ☐

TKN/Phos (N2SO4) ☐

Diss. Metals (HNO3) ☐

VOCs (HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
Amber 2L	2		
500ml AMBER	1		
VOAS	4		

Signature:

Date: 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name:
Date of Collection: 10/14/13
Project Number: K PLY AOC2
Field Personnel: L. Meoli

Purge Data

Well ID: PP-23
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: New

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 10.40
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 10.40
Begin purge (time): 10:00 pump rate 3.95-3.40
End purge (time): 10:35
Gallons purged: ~2 gallons
Purge water disposal method: Containerized

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	gal Vol. Purged	pH	mg/L DO	mS/cm Conductivity	NTU Turbidity	°C Temp	ORP	% Sal	g/L Comments TDS
10:05	10.40	0.25	5.78	3.75	0.28	120	15.1	29	0.0	0.18
10:10	10.40	0.50	5.81	3.08	0.26	96	15.2	24	0.0	0.17
10:15	"	0.75	5.82	3.07	0.26	54	15.2	19	0.0	0.17
10:20	"	1.00	5.83	2.18	0.27	16	15.1	-5	0.0	0.18
10:25	"	1.15	5.84	2.17	0.27	8	15.0	-18	0.0	0.17
10:30	"	1.50	5.84	2.16	0.27	3	15.1	-23	0.0	0.17
10:35	"	1.75	5.84	2.17	0.27	1	15.0	-26	0.0	0.17

Sampling Data

Sample No: PP-23
Location and Depth:
Date Collected (mo/dy/yr): 10/14/2013
Time Collected: 10:40 ☒ AM ☐
Weather: Sunny 55°
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☒ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peristaltic Alexis
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☐ Horiba U-50 Other: U-22 Horiba
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other: New tubing-left in well.
Sample Description (Color, Turbidity, Odor, Other): Slighty yellow, slight petroleum odor. Slight sheen

Sample Analyses

TPH-D	(HCl)	☒	Chlor / Fluor	(unpres)	☐	COD / TOC	(H2SO4)	☐	Orthophos	(FILTER)	☐	Diss. Metals	Pb (HNO3)	☒
TPH-G	(HCl)	☐	BTEX	(HCl)	☒	Total Metals	(HNO3)	☐	TKN/Phos	(N2SO4)	☐	VOCs	4 (HCl)	☒
												SVOCs		☒

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
Amber 1L			
Poly 500 mL HDPE			
Amber 500 mL			
VOAs 4			

Signature:
Date: 10/14/13

F:\projects\Port of PA KPLY Mill\Field\Field Forms\Groundwater Sample Collection Form.doc

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name:
Date of Collection: 10/14/13
Project Number: K PLY AOC2
Field Personnel: L. Meoli

Purge Data

Well ID: PZ-26
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: New

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 11.87
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 12.00
Begin purge (time): 12:35 pump rate 4.87-5.38
End purge (time): 13:05
Gallons purged: ~1.40 gals
Purge water disposal method: Containerized-55gal drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L DO	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	% Sal	TDS g/L Comments
12:40	12.00	0.10	7.14	3.69	1.3	20	14.2	53	0.1	0.8
12:45	12.00	0.25	7.17	2.69	1.3	7	14.4	-10	"	"
12:50	12.00	0.40	7.19	2.20	1.3	15	14.4	-61	"	"
12:55	"	0.50	7.20	2.03	1.3	3	14.4	-76	"	"
13:00	"	1.00	7.20	2.02	1.3	0	14.4	-89	"	"
13:05	"	1.25	7.20	2.00	1.3	0	14.4	-96	"	"

Sampling Data

Sample No: PZ-26
Location and Depth:
Date Collected (mo/dy/yr): 10/14/13
Time Collected: 13:10 ☐ AM ☒ PM
Weather: Sunny 65°
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Alexis Peristaltic
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☐ Horiba U-50 Other: Horiba U-22
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other: New - left in well.
Sample Description (Color, Turbidity, Odor, Other): clear, slight petroleum odor

Sample Analyses

TPH-D	(HCl)	☒	Chlor / Fluor	(unpres)	☐	COD / TOC	(H2SO4)	☐	Orthophos	(FILTER)	☐
TPH-G	(HCl)	☒	BTEX	(HCl)	☒	Total Metals	(HNO3)	☐	TKN/Phos	(N2SO4)	☐

Diss. Metals (HNO3) ☐
VOCs (HCl) ☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 mL Amber	1		
VOAs	4		

Signature: Lori Meoli
Date: 10/14/13

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name:
Date of Collection: 10/14/13
Project Number: K PRY ADC2
Field Personnel: L. Meoli

Purge Data

Well ID: PZ-4
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: OK - casing full of H_2O bailed out before opening.

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):
Depth of water (from top of well casing): 15.02
Well Casing Type/Diameter/Screened Interval:
After 5 minutes of purging (from top of casing): 15.55
Begin purge (time): 11:25 pump rate @ 3.41
End purge (time): 12:10
Gallons purged: ~1.5 gals
Purge water disposal method: containerized - 55 gal drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water	Vol. Purged	pH	mg/L DO	mS/cm Conductivity	NTU Turbidity	°C Temp	mV ORP	% Sal	TDS g/L Comments
11:30	15.55	0.10	6.16	3.75	1.7	94	14.6	112	0.1	1.1
11:35	15.43	0.25	6.24	2.98	1.7	48	14.6	-14	"	"
11:40	15.43	0.40	6.26	2.58	1.7	67	14.6	-59	0.1	1.1
11:45	"	0.50	6.30	2.12	1.7	15	14.8	-88	"	"
11:50 ~~12:00~~	"	0.80	6.30	2.10	1.7	10	14.7	-99	"	"
12:00 ~~12:05~~ LM	"	1.00	6.31	2.11	1.7	7	14.8	-102	"	"
12:05 ~~12:10~~	"	1.20	6.32	2.08	1.7	3	14.8	-108	"	"

Sampling Data

Sample No: PZ-4
Location and Depth:
Date Collected (mo/dy/yr): 10/14/13
Time Collected: 12:15 ☒ AM ☐
Weather: Sunny 60°
Type: ☐ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other: Alexis peristaltic Type:
Water Quality Instrument Data Collected with: Type: ☐ Hanna 9828 ☒ Horiba U-50 Other: U-22
Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing Other: New tubing - left in well.
Sample Description (Color, Turbidity, Odor, Other): Clear, ~~no odor~~ slight petroleum odor + sheen.

Sample Analyses

TPH-D	(HCl)	☒	Chlor / Fluor	(unpres)	☐	COD / TOC	(H2SO4)	☐	Orthophos	(FILTER)	☐
TPH-G	(HCl)	☒	BTEX	(HCl)	☒	Total Metals	(HNO3)	☐	TKN/Phos	(N2SO4)	☐

Diss. Metals	(HNO3)	☐
VOCs	(HCl)	☐

Additional Information

Types of Sample Containers:	Quantity:	Duplicate Sample Numbers:	Comments:
500 ML Amber	1		
VOAS	4		

Signature: Lori Meoli
Date: 10/14/13

K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Appendix D
Laboratory Analytical Data Reports
(provided on CD-ROM)

K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Appendix E
Sediment Investigation Field Notes, SPI Images, and Bioassay Report

Appendix E

The following documents are included in Appendix E:

1. Sediment Bioassay Testing Report (*Sediment Testing for Floyd|Snider, Inc., October 11, 2013*)
2. Sediment Bioassay Testing Report Appendices
3. KSS1 Sediment Images
4. KSS2 Sediment Images
5. KSS3 Sediment Images
6. Sediment Sampling Field Notes
7. Sediment Profile Imaging Field Log

SEDIMENT TESTING FOR
FLOYD|SNIDER, INC

K-PLY MILL
PORT OF PORT ANGELES, WASHINGTON

OCTOBER 11, 2013

PREPARED FOR:

FLOYD|SNIDER, Inc.
601 Union Street, Suite 600
Seattle, WA 98101-2341

PREPARED BY:

NewFields

PO BOX 216
4729 NE VIEW DRIVE
PORT GAMBLE, WA 98364

Introduction

NewFields conducted biological toxicity tests with sediment samples collected from the K-Ply plywood mill site in support an ongoing evaluation of sediments in Port Angeles Harbor. Reference sediment samples were tested concurrent to the test sediments and were collected in Carr Inlet by NewFields. Biological testing was conducted on selected stations within the harbor using the 10-day amphipod test with *Eohaustorius estuarius*, the 20-day polychaete test with *Neanthes arenaceodentata* and the 48-h benthic larval test with the bivalve *Mytilus galloprovincialis* following the resuspension protocol. This report presents the results of the toxicity testing conducted on test and reference sediments.

Methods

Methods for sediment collection, storage and handling, and toxicity testing followed those outlined in the "*Western Port Angeles Harbor RI/FS Sampling and Analysis Plan*" (Integral 2013). Biological test methods followed guidance provided by the Puget Sound Estuary Program (PSEP 1995) with appropriate modifications as developed in support of the Sediment Management Standards Program (SMS), the WDOE Sediment Sampling and Analysis Plan Appendix (SSAPA; Ecology 2008), and the various updates presented during the Annual Sediment Management Review meetings (SMARM). The SMS Program is administered by the Department of Ecology, providing sediment management standards for marine and estuarine environments in the state of Washington with the goal of reducing or eliminating adverse effects on biological resources.

Sample and Animal Receipt

Three test sediments were collected on July 9, 2013; samples were delivered by courier to NewFields. Two reference sediment samples were collected from Carr Inlet by NewFields personnel on June 25, 2013. Sediment samples were stored in the dark with zero headspace in a walk-in cold room at 4 ± 2°C. All of the test sediments were tested using the full suite of PSEP bioassays (amphipod, juvenile polychaete, and benthic larval tests). The test sediment was not sieved prior to testing and all tests were conducted within the eight week holding time.

Amphipods (*Eohaustorius estuarius*) were supplied by Northwestern Aquatic Sciences in Newport, Oregon. *Eohaustorius* were held in native sediment at 15°C prior to test initiation. Juvenile polychaete worms (*Neanthes arenaceodentata*) were obtained from Aquatic Toxicology Support in Bremerton, Washington. Juvenile polychaetes were held in seawater at 20°C (*Neanthes* were cultured in water-only and were not held in sediment prior to testing). *Mytilus galloprovincialis* (mussel) broodstock were provided by Taylor Shellfish in Shelton, Washington. Broodstock were held in unfiltered seawater at 16°C prior to spawning. Native *E. estuarius* sediment from Yaquina Bay, Oregon was provided by Northwestern Aquatic Sciences for use as control sediment treatments for both the amphipod and polychaete tests.

Sample Grain Size and Reference Comparison

Sediment grain size is one of the characteristics used in selecting the appropriate reference sediment(s) to compare with the biological results of the test treatments. The percent fines value is defined as the mass of sediment that passes through a 62.5-µm sieve, expressed as a percentage of the mass of the total sample analyzed. Percent fines for each of the test treatments and the reference treatments based on analytical laboratory grain size analysis as well as the selected reference for comparison are presented Table 1.

Table 1. Sample and Reference Grain Size Comparison

Treatment	Grain Size[1]	Reference Comparison
CARR-20	26	
CR-02	59	
SD0001K	65	CR-02
SD0002K	38	CARR-20
SD0003K	30	CARR-20

[1] Percent fines (∑ silt and clay)

10-day Amphipod Bioassay

The 10-day acute toxicity test with *E. estuarius* was initiated on August 27, 2013. To prepare the test exposures, approximately 175 mL of sediment was placed in clean, acid and solvent-rinsed 1-L glass jars, which were then filled with 775 mL of 0.45-µm filtered seawater at 28 ppt. Seven replicate chambers were prepared for each test treatment, the reference sediments, and the native control sediment. The control and reference sediments were tested concurrently with the test treatments. Five replicates were used to evaluate sediment toxicity while the remaining two replicates were designated as sacrificial water quality surrogates. One surrogate chamber was sacrificed to measure overlying and interstitial ammonia and sulfides at test initiation and the remaining surrogate chamber was used for measuring daily water quality throughout the test, as well as porewater and overlying ammonia and sulfides at test termination. Total ammonia as nitrogen was monitored using an Orion meter fitted with an ammonia ion-specific probe. Total sulfides as S^{2-} were monitored using a HACH DR/2800 Spectrophotometer.

Test chambers were placed in randomly assigned positions in a 15°C water bath and allowed to equilibrate overnight. Trickle-flow aeration was provided to prevent dissolved oxygen concentrations from dropping below acceptable levels.

Immediately prior to test initiation, water quality parameters were measured in the surrogate chamber for each treatment. Dissolved oxygen (DO), temperature, pH, and salinity were then monitored in the surrogate chambers daily until test termination.

Target test parameters were:

Dissolved Oxygen:	≥5.1 mg/L
pH:	7 - 9 units
Temperature:	15 ± 1°C
Salinity:	28 ± 1‰

The tests were initiated by randomly allocating 20 *E. estuarius* into each test chamber, ensuring that each of the amphipods successfully buried into the sediment. Amphipods that did not bury within approximately one hour were replaced with healthy amphipods. The 10-day amphipod bioassay was conducted as a static test with no feeding during the exposure period. At test termination, sediment from each test chamber was sieved through a 0.5-mm screen and all recovered amphipods transferred into a Petri dish. The number of surviving and dead amphipods was then determined under a dissecting microscope.

A water-only, 4-day reference-toxicant test was conducted concurrently with the sediment tests using ammonium chloride. The ammonium chloride reference-toxicant test was used to ensure animals used in the test were of a similar sensitivity to prior tests. This test also provided information on the sensitivity of the test population to ammonia concentrations in the test sediments.

20-day Juvenile Polychaete Bioassay

The 20-day chronic toxicity test with *N. arenaceodentata* was initiated on August 29, 2013. Test exposures were prepared with approximately 175 mL of sediment placed in clean, acid and solvent-rinsed 1-L glass jars, which were then filled with 775 mL of 0.45-µm filtered seawater at 28 ppt. Seven replicate chambers were prepared for each test treatment, the two reference sediments, and control sediment. The control and reference sediments were tested concurrently with the test treatments. Five replicates were used to evaluate sediment toxicity while the remaining two replicates were designated as sacrificial water quality surrogate chambers. One surrogate chambers was sacrificed to measure porewater and overlying ammonia and sulfides at test initiation. The remaining surrogate chamber was used for measuring daily water quality throughout the test, as well as overlying and interstitial ammonia and sulfides at test termination. Total ammonia as nitrogen was monitored using an Orion meter fitted with an ammonia ion-specific probe. Total sulfides as S^{2-} were monitored using a HACH DR/2800 Spectrophotometer.

Test chambers were placed in randomly assigned positions in a water bath at 20°C and allowed to equilibrate overnight. Trickle-flow aeration was provided to prevent dissolved oxygen concentrations from dropping below acceptable levels.

Immediately prior to test initiation, water quality parameters were measured. Dissolved oxygen, temperature, pH, and salinity were then monitored in the surrogates daily until test termination. Target test parameters were as follows:

Dissolved Oxygen:	≥4.6 mg/L
pH:	7 - 9 units
Temperature:	20 ± 1°C
Salinity:	28 ± 2‰

The juvenile polychaete test was initiated by randomly allocating five *N. arenaceodentata* into each test chamber and observing whether each of the worms successfully buried into the sediment. Worms that did not bury within approximately one hour were replaced with healthy worms. The 20-day test was conducted as a static-renewal test, with exchanges of 300 mL of water occurring every third day. *N. arenaceodentata* were fed every other day with 40 mg of TetraMarin® (approximately 8 mg dry weight per worm). At test termination, sediment from each test chamber was sieved through a 0.5-mm screen and all recovered worms transferred into a Petri dish. The number of surviving and dead worms was determined. All surviving worms were then transferred to pre-weighed, aluminum foil weigh-boats, and then dried in a drying oven at 60°C for approximately 24 hours. Each weigh-boat was removed, cooled in a dessicator, and then weighed on a microbalance to 0.01 mg. Each of the weigh boats was then heated to 550°C for 2 hours in order to determine the ashed weight. Ash-free dry weights (AFDW) were calculated to remove the influence of the mass of sediment in the guts of the test organisms. The ashed boats were weighed to 0.01 mg and the ashed weight was subtracted from the dry weight to calculate the AFDW. Both dry weight and AFDW were used to determine individual worm weight and growth rates.

A water-only, 4-day reference-toxicant test was conducted concurrently with the sediment tests using ammonium chloride. The ammonium chloride reference-toxicant test was used to ensure animals used in the test were of similar sensitivity to prior tests. This test also provided information on the sensitivity of the test population to ammonia concentrations in the test sediments.

Larval Developmental Bioassay

Test sediment was evaluated using the larval benthic toxicity test with the mussel, *M. galloprovincialis*. The mussel larval test was initiated on August 28, 2013. The seawater control and each of the reference sediments were tested concurrently with the test treatments. To prepare the test exposures, 18 g (±0.5 g) of test sediment was placed in clean, acid and solvent-rinsed 1-L glass jars, which were then filled with 900 mL with 0.45-µm filtered seawater. Six replicate chambers were prepared for each test treatment, reference sediment, and control treatment. Five of the replicates were used to evaluate the test; the sixth replicate was used as a water quality surrogate. Each chamber was shaken for 10 seconds and then placed in predetermined randomly-assigned positions in a water bath at 16°C.

To collect gametes for each test, mussels were placed in clean seawater and acclimated at 16°C for approximately 20 minutes. The water bath temperature was then increased over a period of 15 minutes to 20°C. Mussels were held at 20°C and monitored for spawning individuals. Spawning females and males were removed from the water bath and placed in individual containers with seawater. These individuals were allowed to spawn until sufficient gametes were available to initiate the test. After the spawning period, eggs were transferred to fresh seawater and filtered through a 0.5 mm Nitex® mesh screen to remove large debris, feces, and excess gonadal matter. A composite was made of the sperm and diluted with fresh seawater. The fertilization process was initiated by adding sperm to the isolated egg containers. Egg-sperm solutions were periodically homogenized with a perforated plunger during the fertilization process and sub-samples observed under the microscope for egg and sperm viability. Approximately one to one and a half hours after fertilization, embryo solutions were checked for fertilization rate. Only those embryo stocks with >90% fertilization were used to initiate the tests. Embryo solutions were rinsed free of excess sperm and then combined to create one embryo stock solution. Density of the embryo stock solution was determined by counting the number of embryos in a subsample of homogenized stock solution. This was used to determine the volume of embryo stock solution to deliver approximately 27,000 embryos to each test chamber.

Dissolved oxygen, temperature, pH, and salinity were monitored in water quality surrogate chambers to prevent loss or transfer of larvae by adhesion to water-quality probes. Ammonia and sulfides in the overlying water were measured at initiation and termination. Total ammonia as nitrogen was monitored using an Orion meter fitted with an ammonia ion-specific probe. Total sulfides as S^{-2} were monitored using a HACH DR/2800V Spectrophotometer.

Target test parameters were as follows:

Dissolved Oxygen:	≥5.0 mg/L
pH:	7 - 9 units
Temperature:	16 ± 1°C
Salinity:	28 ± 1‰

The development test was conducted as a static test. Aeration was provided for treatments with DO concentrations approaching 5.0 mg/L during the test.

The larval test was conducted following the resuspension technique developed by USACE and Ecology to address the potential entrainment of larvae in very fine sediments or sediments with a high wood-debris component (Kendall et al. 2012). At approximately 40 hours, the controls were checked for development to verify that greater than 90% of the larvae present had developed into the normal D-cell stage. The test sediment was then resuspended in the test chamber by gentle mixing with a perforated plunger for approximately 10 seconds. The contents of the test jar were then allowed to settle. At 48 hours, the tests were terminated by decanting the overlying seawater into a clean 1-L jar. The supernatant was homogenized with a perforated plunger. From this container, a 10 mL subsample was transferred to a scintillation vial and preserved in 5% buffered formalin. Larvae were subsequently stained with a dilute solution of Rose Bengal in 70% alcohol to help visualization of larvae. The number of normal and abnormal larvae was enumerated on an inverted microscope. Normal larvae included all D-shaped prodissoconch I stage larvae. Abnormal larvae included abnormally shaped prodissoconch I larvae and all early stage larvae.

A water-only reference-toxicant test was conducted concurrently with the sediment tests using ammonium chloride. The ammonium chloride reference-toxicant test was used to ensure animals used in the test were healthy and of similar sensitivity to prior tests. This test also provided information on the sensitivity of the test population to ammonia concentrations in the test sediments.

Data Analysis and QA/QC

All water quality and endpoint data were entered into Excel spreadsheets. Water quality parameters were summarized by calculating the mean, minimum, and maximum values for each test treatment. Endpoint data were calculated for each replicate and the mean values and standard deviations were determined for each test treatment. All hand-entered data was reviewed for data entry errors, which were corrected prior to summary calculations. A minimum of 10% of all calculations and data sorting were reviewed for errors.

For the larval test, normal survivorship was used to evaluate the test sediments. Control performance was based on the number of normal larvae in the control divided by the stocking density, expressed as a percentage. Normal survivorship in the test and reference treatments was defined as the number of normal larvae in the test or reference divided by the number of normal larvae in the control, expressed as a percentage, as defined in Ecology (2005).

For SMS suitability determinations, comparisons were made according to SSAPA and Fox et al. (1998). Data reported as percent mortality or survival was transformed using an arcsine square root transformation prior to statistical analysis. All data were tested for normality using the Wilk-Shapiro test and equality of variance using Levene's test. Determinations of statistical significance were based on one-tailed Student's t-tests with an alpha of 0.05. A comparison of the larval endpoint relative to the reference was made using an alpha level of 0.10. For samples failing to meet assumptions of normality, a Mann-Whitney test was conducted to determine significance. For those samples failing to meet the assumptions of normality and equality of variance, a t-test on rankits was used.

Results

The results of sediment testing, including a summary of test results and water quality observations are presented in this section. Laboratory bench sheets are provided in Appendix A, statistical analyses are provided in Appendix B, and chain of custody forms are in Appendix C.

10-day Amphipod Bioassay

The bioassay test with *Eohaustorius estuarius* was validated with 1% mortality in the native sediment control, which met the SMS performance criterion of ≤10% mortality. This indicates that the test conditions were suitable for adequate amphipod survival. Mean mortality in the reference treatments were each 5% (CARR-20 and CR-02), which met the SMS performance criteria of <25% mortality (SMS). These results indicated that the reference sediments were acceptable for use in suitability determination. Mean percentage survival in each of the test treatments was ≥95% and is summarized in Table 2.

Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in Tables 3, 4, and 5. Water-quality parameters were within the acceptable limits throughout the duration of the test. A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The LC_{50} value was within control chart limits (±2 standard deviations from the laboratory historical mean). This indicates that the test organisms used in this study were of similar sensitivity to those previously tested at NewFields.

Ammonia concentrations observed in the *E. estuarius* test were below the no observed effect concentration (NOEC) value derived from the concurrent ammonia reference-toxicant test (Table 4; compare to NOEC of 86.4 mg/L total ammonia). Ammonia values in the test treatments were also at or below the published threshold concentration of 15 mg/L total ammonia (Barton 2002). Total sulfide concentrations in the overlying water ranged from 0.000 to 0.031 mg/L for the test treatments; interstitial total sulfide concentrations ranged from 0.013 to 0.262 mg/L.

Table 2. Test Results for *Eohaustorius estuarius*

Treatment	Number Surviving					Mean Percentage		Standard Deviation
	Replicate					Survival	Mortality	
	1	2	3	4	5			
Control	20	19	20	20	20	99	1	2.2
CARR-20 Reference	19	18	20	18	20	95	5	5.0
CR-02 Reference	17	20	19	20	19	95	5	6.1
SD0001K	20	19	19	19	19	96	4	2.2
SD0002K	19	20	19	19	20	97	3	2.7
SD0003K	20	18	20	20	19	97	3	4.5

Table 3. Water Quality Summary for *Eohaustorius estuarius*

Treatment	Dissolved Oxygen (mg/L)			Temperature (°C)			Salinity (ppt)			pH (units)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	8.2	7.9	8.4	14.8	13.9	15.7	29	28	29	8.1	7.8	8.4
CARR-20 Reference	7.9	7.5	8.2	15.1	14.3	16.0	28	28	29	8.2	7.9	8.5
CR-02 Reference	8.0	7.6	8.3	15.0	14.0	16.0	28	28	29	8.3	8.0	8.5
SD0001K	7.8	7.3	8.2	15.1	14.1	16.3	29	28	29	8.2	7.8	8.7
SD0002K	8.0	7.6	8.1	14.9	14.0	15.8	29	28	29	8.3	8.0	8.6
SD0003K	7.9	7.6	8.1	15.0	14.1	15.9	29	28	29	8.4	7.9	8.8

Table 4. Ammonia and Sulfide Summary for *Eohaustorius estuarius*

Treatment	Overlying Ammonia (mg/L Total)		Interstitial Ammonia (mg/L Total)		Overlying Total Sulfide		Interstitial Total Sulfide	
	Day		Day		Day		Day	
	0	10	0	10	0	10	0	10
Control	0.092	0.024	0.124	0.069	0.000	0.019	0.013	0.195
CARR-20 Reference	0.743	0.000	15.000	0.153	0.002	0.020	0.035	0.062
CR-02 Reference	1.610	5.970	14.200	4.250	0.000	0.019	0.162	0.195
SD0001K	0.413	0.899	3.110	0.467	0.000	0.031	0.046	0.262
SD0002K	0.417	1.250	3.880	1.060	0.026	0.016	0.184	0.182
SD0003K	0.415	2.060	3.810	1.870	0.006	0.015	0.104	0.065

Ammonia NOEC (concurrent reference-toxicant test derived) = 86.4 mg/L total

Table 5. Test Condition Summary for *Eohaustorius estuarius*

Test Conditions: *E. estuarius* (SMS)		
Sample Identification	Control; References CARR20, CR-02; SD0001K, SD0002K, SD0003K	
Date sampled	Reference Sediment: June 25, 2013 Test Sediment: July 9, 2013	
Date received at NewFields	July 10, 2013	
Test dates	August 27 – September 6, 2013	
Sample storage conditions	4°C, dark	
Holding time Recommended: ≤8 weeks (56 days)	52 days; Reference sediments 67 days	
Source of control sediment	Yaquina Bay, OR	
Test Species	***E. estuarius***	
Supplier	Northwestern Aquatic Sciences, OR	
Date acquired	August 23, 2013	
Acclimation/holding time	4 days	
Age class	Subadult, 3-5 mm	
Test Procedures	PSEP 1995 with SMARM revisions	
Regulatory Program	SMS	
Test location	NewFields Laboratory	
Test type/duration	10-Day static	
Control water	North Hood Canal sea water, 0.45µm filtered	
Test dissolved oxygen	Recommended: > 4.6 mg/L	Achieved: 7.3 – 8.4 mg/L
Test temperature	Recommended: 15 ± 1 °C	Achieved: 13.9- 16.3 °C
Test Salinity	Recommended: 28 ± 1 ppt	Achieved: 28 - 29 ppt
Test pH	Recommended: 7 - 9	Achieved: 7.8 – 8.8
SMS control performance standard	Recommended: Control ≤ 10% mortality	Achieved: 1%; Pass
SMS reference performance standard	Recommended: Reference mortality < 25%	Achieved: CARR-20: 5%; CR-02: 5%
Reference Toxicant LC$_{50}$ (total ammonia)	LC$_{50}$ = 140 mg/L total ammonia	
Mean; Acceptable Range (total ammonia)	144; 24.5-263.5 mg/L total ammonia	
NOEC (total ammonia)	86.4 mg/L total ammonia	
NOEC (unionized ammonia)	1.24 mg NH_3 /L	
Test Lighting	Continuous	
Test chamber	1-Liter Glass Chamber	
Replicates/treatment	5 + 2 surrogates (used for WQ measurements)	
Organisms/replicate	20	
Exposure volume	175 mL sediment/ 775 mL water	
Feeding	None	
Water renewal	None	
Deviations from Test Protocol	None	

20-day Juvenile Polychaete Bioassay

No mortality was observed in the *N. arenaceodentata* control sediment and mean individual growth (MIG) in the control sediment was 0.844 mg/ind/day (dry weight) and 0.584 mg/ind/day (AFDW). These values are within the test acceptability criteria for mean mortality (≤10%) and mean individual growth (≥0.38 mg/ind/day dry weight; Kendall 1996), indicating that the test conditions were suitable for adequate polychaete survival and growth. A summary of the test results for all samples is shown in Table 6. Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in Tables 7, 8, and 9.

Mean mortality in the reference treatments was 0%, meeting the reference performance standard of ≥80% of the control survival (Ecology 2008). Mean individual growth rates in the reference treatments CARR20, and CR-12 were 0.748 to 0.836 mg/ind/day (dry weight) respectively, and 0.539 to 0.555 mg/ind/day (AFDW) respectively. Relative to the control, MIG in reference treatments CARR20, and CR-02 was 89% and, 99% respectively, meeting the reference acceptability criteria of ≥80%.

A reference-toxicant test (positive control) was performed to determine the relative sensitivity of the batch of test organisms utilized in this study. The LC_{50} value of 229 mg/L total ammonia was within control chart limits (±2 standard deviations from the laboratory historical mean, 51.0 - 252 mg total ammonia/L). This indicates that the test organisms used in this study were of similar sensitivity to those previously tested at NewFields.

On day 9 of the test, temperatures in all chambers rose above recommended limits (21.0°C) to between 22.5 and 22.9°C. The water bath used to keep the jars in the appropriate temperature range was drained of water and then refilled after the temperature controller was adjusted to 20.5°C. Temperatures remained in range for the remainder of the test. The airline in the water quality surrogate for reference sample CARR20 was inadvertently removed on Day 2. Dissolved oxygen levels in that chamber dropped to 1.1 mg/L. The airline was replaced on Day 3 and following the scheduled water renewal that day DO had risen to 6.3 mg/L. All test chambers were checked for proper aeration and were observed to be functioning correctly. The low DO level was likely isolated to the single surrogate chamber and did not affect the test chambers. DO in the surrogate chamber remained within recommended limits for the remainder of the test. All other water quality parameters were within the target range of the species throughout the duration of the test. Ammonia concentrations observed in the *N. arenaceodentata* test were below the NOEC value derived from the concurrent ammonia reference-toxicant test (Table 8; compare to NOEC of 105 mg/L total ammonia). This indicates that ammonia concentrations within the sediment samples were not above effects thresholds for mortality. Sulfide concentrations in interstitial water were below the NOEC (3.47 mg/L; Kendall and Barton 2004) for all samples.

Table 6. Test Results for *Neanthes arenaceodentata*

Treatment	Replicate	Survivors	Mean Mortality (%)	Individual Growth (mg/ind/day)					
				Dry Weight	Mean	SD	AFDW	Mean	SD
Control	1	5	0	0.932	0.844	0.149	0.648	0.584	0.080
	2	5		1.046			0.663		
	3	5		0.723			0.508		
	4	5		0.834			0.609		
	5	5		0.686			0.492		
CARR20	1	5	0	0.681	0.748	0.137	0.515	0.539	0.105
	2	5		0.616			0.442		
	3	5		0.848			0.591		
	4	5		0.660			0.453		
	5	5		0.935			0.695		
CR-02	1	5	0	1.015	0.836	0.159	0.607	0.555	0.080
	2	5		0.957			0.641		
	3	5		0.845			0.580		
	4	5		0.744			0.503		
	5	5		0.621			0.446		
SD-0001K	1	5	0	0.634	0.758	0.110	0.531	0.592	0.078
	2	5		0.852			0.658		
	3	5		0.650			0.490		
	4	5		0.868			0.664		
	5	5		0.785			0.617		
SD-0002K	1	5	0	0.798	0.783	0.056	0.603	0.602	0.061
	2	5		0.732			0.532		
	3	5		0.745			0.585		
	4	5		0.873			0.699		
	5	5		0.768			0.593		
SD-0003K	1	5	0	0.969	0.858	0.106	0.723	0.663	0.069
	2	5		0.749			0.602		
	3	5		0.973			0.752		
	4	5		0.790			0.614		
	5	5		0.808			0.623		

Table 7. Water Quality Summary for *Neanthes arenaceodentata*

Treatment	Dissolved Oxygen (mg/L)			Temperature (°C)			Salinity (ppt)			pH (units)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	7.4	7.0	8.7	20.2	19.5	22.9	28.0	28.0	28.0	8.0	7.8	8.2
CARR20	6.7	1.1	7.6	20.2	19.6	22.8	28.0	28.0	28.0	8.0	7.6	8.3
CR-02	7.2	6.7	8.3	20.2	19.6	22.8	28.0	28.0	28.0	8.0	7.8	8.3
SD0001K	7.1	6.4	8.4	20.2	19.5	22.8	28.0	28.0	29.0	8.1	7.7	8.5
SD0002K	7.1	6.5	8.0	20.1	19.4	22.5	28.1	28.0	29.0	8.0	7.7	8.4
SD0003K	7.1	6.3	7.9	20.2	19.5	22.8	28.0	28.0	28.0	8.0	7.6	8.7

Table 8. Ammonia and Sulfide Summary for *Neanthes arenaceodentata*

Treatment	Overlying Ammonia		Interstitial Ammonia		Overlying Sulfides		Interstitial Sulfides	
	Day		Day		Day		Day	
	0	10	0	10	0	10	0	10
Control	0.108	3.88	0.252	*	0.005	0.017	0.170	0.120
CARR20	3.98	4.85	21.20	*	0.004	0.012	0.770	0.170
CR-02	2.77	0.177	19.50	2.77	0.015	0.014	0.083	0.104
SD0001K	1.60	0.171	7.29	2.32	0.026	0.012	0.170	0.164
SD0002K	0.983	0.066	3.56	0.607	0.012	0.007	0.381	0.200
SD0003K	1.09	0.232	6.53	1.65	0.010	0.012	0.153	0.315

NOEC for ammonia = 105 mg/L total ammonia
*Insufficient interstitial water for analysis

Table 9. Test Condition Summary for *Neanthes arenaceodentata*

Test Conditions: PSEP *N. arenaceodentata* (SMS)		
Sample Identification	Control; References CARR20, CR-02; SD0001K, SD0002K, SD0003K	
Date sampled	Reference Sediment: June 25, 2013 Test Sediment: July 9, 2013	
Date received at NewFields	July 10, 2013	
Test dates	August 29 to September 18, 2013	
Sample storage conditions	4°C, dark	
Holding (Recommended: ≤8 wks	54 days, Reference sediments 69 days	
Source of control sediment	Yaquina Bay, Oregon	
Test Species	***N. arenaceodentata***	
Supplier	Aquatic Toxicology Support	
Date acquired	August 29, 2013	
Acclimation/holding time	0 days	
Age class	Juvenile; 15 days old	
Test Procedures	PSEP 1995 with SMARM revisions	
Regulatory Program	SMS	
Test location	NewFields Northwest Laboratory	
Test type/duration	20-Day static renewal	
Control water	North Hood Canal sea water, 0.45µm filtered	
Test dissolved oxygen	Recommended: > 4.6 mg/L	Achieved: 1.1 – 8.7 mg/L
Test temperature	Recommended: 20 ± 1 °C	Achieved: 19.4 – 22.9 °C
Test Salinity	Recommended: 28 ± 2 ppt	Achieved: 28- 29 ppt
Test pH	Recommended: 7 - 9	Achieved: 7.6 – 8.7
Initial biomass	Recommended: 0.5 - 1.0 mg DW Minimum: 0.25 mg DW	1.09 mg DW
SMS control performance standard	Recommended: Mortality: < 10% MIG: ≥ 0.72 mg/ind/day Minimum: ≥ 0.38 mg/ind/day (as dry weight)	Achieved: Mortality: 0%; Pass MIG: 0.844 mg/ind/day; Pass
SMS and DMMP control performance standard	Recommended: Mortality ≤20% $MIG_{Reference}/MIG_{Control} \geq 80\%$	Achieved: Mortality: 0%; Pass MIG: 89% to 99%; Pass
Reference Toxicant LC_{50}	LC_{50} = 229 mg $NH_3 + NH_4^+$/L	
Mean; Acceptable Range	152; 50.9 - 252 mg $NH_3 + NH_4^+$/L	
NOEC (total ammonia)	105 mg $NH_3 + NH_4^+$/L	
NOEC (unionized ammonia)	1.30 mg NH_3 /L	
Test Lighting	Continuous	
Test chamber	1-Liter Glass Chamber	
Replicates/treatment	5 + 2 surrogates (one used for WQ measurements)	
Organisms/replicate	5	
Exposure volume	175 mL sediment/ 775 mL water	
Feeding	40 mg/jar every other day (8 mg/ind every other day)	
Water renewal	Water renewed every third day (1/3 test volume)	
Deviations from Test Protocol	Dissolved oxygen and Temperature	

Larval Development Bioassay

The larval development test with *M. galloprovincialis* was validated by 95.3% combined normal survivorship, defined as the mean number of normal larvae within the control divided by the stocking density. This value was within the SMS acceptability criteria of ≥70%. A summary of the test results for all samples is shown in Table 10. Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in Tables 11, 12, and 13.

Mean control-normalized normal survival in the reference treatments (CARR20 and CR-02) was 62.6% and 84.6% respectively. CR-02 met the reference performance standard of >65% mean control-normalized normal survival; however, CARR20 failed to meet the criteria. Mean control-normalized survival in test treatments ranged from 77.3% to 88.5%. The test mean chamber stocking density (measured at test initiation) was 33.5 embryos/mL.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The LC50 value was within control chart limits (±2 standard deviations from the laboratory historical mean). This indicates that the test organisms used in this study were of similar sensitivity to those previously tested at NewFields.

All water quality parameters were within the acceptable limits throughout the duration of the test. Ammonia concentrations observed in the *M. galloprovincialis* test were below the NOEC value derived from the concurrent ammonia reference-toxicant test (Table 12; compare to NOEC of 2.39 mg/L for mean observed at NewFields). This indicates that ammonia concentrations within the sediment samples should not have been a contributor to any adverse biological effects observed in the test treatments.

All water quality parameters were within the acceptable limits throughout the duration of the test. Total sulfide concentrations in the test and reference treatments ranged from 0.112 – 0.170 mg/L at test initiation and ranged from 0.010 – 0.042 mg/L at test termination. Ammonia concentrations observed in the *M. galloprovincialis* test were below the NOEC value derived from the concurrent ammonia reference-toxicant test (Table 12; compare to NOEC of 3.20 mg/L for mean observed at NewFields). This indicates that ammonia concentrations within the sediment samples were below effects levels and should not have been a contributor to adverse biological effects observed in the test treatments.

Table 10. Test Results for *Mytilus galloprovincialis* Test

Treatment	Replicate	Number Normal	Number Abnormal	Mean Number Normal	Normal Survivorship (%)[1, 2]	Mean Normal Survivorship (%)	SD
Control	1	331	15	319.6	98.7	95.3	3.4
	2	330	20		98.4		
	3	317	12		94.5		
	4	317	16		94.5		
	5	303	21		90.3		
CARR20	1	77	216	200.2	24.1	62.6	28.1
	2	206	93		64.5		
	3	305	14		95.4		
	4	152	146		47.6		
	5	261	77		81.7		
CR-02	1	234	4	270.4	73.2	84.6	7.2
	2	277	7		86.7		
	3	287	8		89.8		
	4	291	6		91.1		
	5	263	3		82.3		
SD-0001K	1	253	10	273.2	79.2	85.5	5.7
	2	262	7		82.0		
	3	272	10		85.1		
	4	278	18		87.0		
	5	301	9		94.2		
SD-0002K	1	225	49	247.0	70.4	77.3	10.5
	2	277	10		86.7		
	3	257	20		80.4		
	4	276	15		86.4		
	5	200	57		62.6		
SD-0003K	1	270	5	261.8	84.5	81.9	6.9
	2	284	9		88.9		
	3	261	22		81.7		
	4	225	11		70.4		
	5	269	12		84.2		

[1] Control normality normalized to stocking density (335.4).

[2] Reference and treatment normal survivorship are normalized to the mean number of normal larvae in the Control (319.6).

Table 11. Water Quality Summary for *Mytilus galloprovincialis* Test

Treatment	Dissolved Oxygen (mg/L)			Temperature (°C)			Salinity (ppt)			pH (units)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	7.9	7.6	8.1	15.7	15.3	16.2	29.0	29	29	7.9	7.8	8.0
CARR20	7.2	6.4	8.0	16.3	15.7	16.8	29.0	29	29	7.9	7.9	7.9
CR-02	7.3	6.8	7.7	16.8	16.4	17.1	29.0	29	29	7.9	7.8	7.9
SD0001K	7.3	6.0	8.0	16.2	15.8	16.6	29.0	29	29	7.9	7.8	8.0
SD0002K	7.0	6.1	7.6	16.8	16.5	17.0	29.0	29	29	7.8	7.7	7.8
SD0003K	7.3	5.7	8.1	16.0	15.4	16.7	29.0	29	29	7.8	7.8	7.9

Table 12. Ammonia and Sulfide Summary for *Mytilus galloprovincialis* Test

Treatment	Overlying Ammonia (mg/L Total)		Overlying Sulfides (mg/L)	
	Initial	Final	Initial	Final
Control	0.062	0.065	0.000	0.023
CARR20	0.248	0.084	0.112	0.025
CR-02	0.210	0.017	0.117	0.030
SD0001K	0.104	0.055	0.170	0.042
SD0002K	0.062	0.021	0.125	0.019
SD0003K	0.075	0.000	0.127	0.010

NOEC for ammonia = 3.20 mg/L total ammonia, laboratory mean

Table 13. Test Condition Summary for *Mytilus galloprovincialis* Test

Test Conditions: PSEP *M. galloprovincialis* (SMS)		
Sample Identification	Control; References CARR20, CR-02; SD0001K, SD0002K, SD0003K	
Date sampled	Reference Sediment: June 25, 2013 Test Sediment: July 9, 2013	
Date received at NewFields Northwest	July 10, 2013	
Test dates	August 28-30, 2013	
Sample storage conditions	4°C, dark	
Holding time Recommended: < 8 weeks (56 days)	53 days, Reference sediments 68 days	
Test Species	***M. galloprovincialis***	
Supplier	Taylor Shellfish, Shelton, WA	
Date acquired	August 27, 2013	
Acclimation/holding time (broodstock)	1 day	
Age class	<2-h old embryos	
Test Procedures	PSEP 1995 with SMARM revisions	
Regulatory Program	SMS	
Test location	NewFields Northwest Laboratory	
Test type/duration	48-60 Hour static test	
Control water	North Hood Canal sea water, 0.45µm filtered	
Test dissolved oxygen	Recommended: >5.0 mg/L	Achieved: 5.7 – 8.1 mg/L
Test temperature	Recommended: 16 ± 1 °C	Achieved: 15.3 – 17.1 °C
Test Salinity	Recommended: 28 ± 1 ppt	Achieved: 29 ppt
Test pH	Recommended: 7 - 9	Achieved: 7.7 – 8.0
Stocking Density	Recommended: 20 – 40 embryos/mL	Achieved: 33.5 embryos/mL
Control performance standard	Recommended: Control normal survival ≥70%	Achieved: 95.3%; Pass
Reference performance standard	Recommended: Reference normal survival ≥65%	Achieved: CARR20:62.6%; Fail CR-02: 84.6% Pass
Reference Toxicant LC$_{50}$ (total ammonia)	LC$_{50}$ = 5.06 mg $NH_3 + NH_4^+$/L	
Mean; Acceptable Range (total ammonia)	5.33; 1.12 – 9.54 mg $NH_3 + NH_4^+$/L	
NOEC (total ammonia)	2.39 mg $NH_3 + NH_4^+$/L	
NOEC (unionized ammonia)	0.036 mg NH_3 /L	
Test Lighting	14hr Light / 10hr Dark	
Test chamber	1-Liter Glass Chamber	
Replicates/treatment	5 + 1 surrogate (used for WQ measurements)	
Exposure volume	18 g sediment/ 900 mL water	
Feeding	None	
Water renewal	None	
Deviations from Test Protocol	None	

Discussion

Sediments were evaluated based on criteria specified in the Sediment Management Standards (SMS). The biological criteria are based on both statistical significance (a statistical comparison) and the degree of biological response (a numerical comparison). The SMS criteria are derived from the Washington Department of Ecology Sediment Sampling and Analysis Plan Appendix (WDOE 2008). The criteria include a lower and a higher threshold, sediment quality standards (SQS) and Cleanup Standards Limit (CSL).

Endpoint comparisons were made for each treatment against the appropriate reference sample. Reference selection was based on a comparison of the percentage of fines for the test treatment and the each of the references. That reference with the most similar percentage of fines was selected for SMS endpoint evaluation. If the difference for two references were similar, the finer grained size reference was selected. The percentage of fines for all selected references were within the SMS recommended range of ≤25% (Fox 1997), relative to the test treatments.

Amphipod Test

Under the SMS program, a treatment will fail SQS if mean mortality in the test sediment is >25% more (on an absolute basis) than the mean mortality in the appropriate reference sediment and the difference is statistically significant ($p \leq 0.05$). Treatments fail the CSL if mean mortality in the test treatment >30% over that of the reference sediment and the difference is statistically significant. A summary of the SMS evaluation for the K-Ply Mill Site test samples is presented in Table 14. All test treatments met both the SQS and CSL criteria for the benthic amphipod test.

Juvenile Polychaete Test

Suitability determinations for the juvenile polychaete test were based on mean individual growth (MIG) using ash-free dry weight (AFDW). A test treatment fails SQS criteria if MIG is statistically lower in the test treatment, relative to the reference, and MIG in the test treatment is <70% that of the reference (on a relative basis). The treatments will fail CSL criteria if MIG is significantly lower than the reference treatment and is <50% that of the treatment. A summary of the SMS evaluation for the K-Ply test samples is presented in Table 15. All test treatments met both the SQS and CSL criteria for the juvenile polychaete test.

Larval Bivalve Test

Larval test treatments fail SQS criteria if the percentage of normal larvae in the test treatment is significantly lower than that of the reference and if normal survivorship in the test treatment is less than 85%, relative to normal survivorship in the reference (on a relative basis). Test treatments fail CSL criteria if normal survivorship in the test treatment is significantly lower than that of the reference and if the normal survivorship in the test treatment is less than 70%, relative to the reference.

A summary of the SMS comparisons for the benthic larval test is presented in Table 16. Reference sample CARR20 failed to meet criteria for use in test comparisons. As per Michelsen and Shaw (1996), all test treatments were compared to CR-02 which met criteria for use as a reference comparison and CARR20 was removed from statistical analysis. Mean normal survivorship in test samples ranged from 91.3% to 101%, relative to the passing reference (CR-02), meeting both the SQS and CSL criteria.

Overall Summary

A summary of the SMS comparisons for each of the K-Ply test samples is presented in Table 17.

Table 14. SMS Comparison for the Benthic Amphipod Test with *Eohaustorius estuarius*

Treatment	Mean Mortality (%)	Reference	Statistically More than Reference?	Mortality Comparison to Reference $M_T - M_R$ (%)	Fails SQS?[1] >25 %	Fails CSL?[2] >30 %
Control	1					
CARR20	5					
CR-02	5					
SD0001K	4	CR-02	No	-1	No	No
SD0002K	3	CARR20	No	-2	No	No
SD0003K	3	CARR20	No	-2	No	No

M = Mortality, T = Treatment, R = Reference

[1] SQS: Statistical Significance and M_T-M_R >25%

[2] CSL: Statistical Significance and M_T-M_R >30%

No = Meets criteria; Yes = Does not meet criteria

Table 15. SMS Comparison for the Juvenile Polychaete Test with *Neanthes arenaceodentata*

Treatment	MIG (mg/ind/day) AFDW	Reference	AFDW Statistically less than Reference?	Comparison to Reference MIG_T / MIG_R	Fails SQS?[1] >70 %	Fails CSL?[2] >50 %
Control	0.584					
CARR20	0.539					
CR-02	0.555					
SD0001K	0.592	CR-02	No	107%	No	No
SD0002K	0.602	CARR20	No	112%	No	No
SD0003K	0.663	CARR20	No	123%	No	No

T = Treatment, R = Reference

[1] SQS: Statistical Significance and N_{CT}<0.70*N_{CR}

[2] CSL: Statistical Significance and N_{CT}<0.50*N_{CR}

No = Meets criteria; Yes = Does not meet criteria

Table 16. SMS Comparison for the Benthic Larval Test with *Mytilus galloprovincialis* Test

Treatment	Mean Number Normal	Reference	Statistically Less than Reference?	Normal Survival Comparison to Reference $(N_T/N_C)/(N_R/N_C)$	Fails SQS?[1] < 85%	Fails CSL?[2] < 70%
Control	319.6					
CARR20	200.2					
CR-02	270.4					
SD0001K	273.2	CR-02	No	101	No	No
SD0002K	247.0	CR-02	No	91	No	No
SD0003K	261.8	CR-02	No	97	No	No

[1] SQS: Statistical Significance and $N_{CT}<0.85*N_{CR}$

[2] CSL: Statistical Significance and $N_{CT}<0.70*N_{CR}$

No = Meets criteria; Yes = Does not meet criteria

Table 17. Summary of SMS Comparisons for K-Ply Samples

Treatment	Grain Size[1]	Reference Comparison	Amphipod	Juvenile Polychaete	Benthic Larval
SD0001K	65	CR-02[2]	Pass	Pass	Pass
SD0002K	38	CARR20	Pass	Pass	Pass
SD0003K	30	CARR20	Pass	Pass	Pass

[1] Percent fines (∑ silt and clay)

[2] Excluding benthic larval test when compared to CARR20

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APPENDICES

A. LABORATORY DOCUMENTS

B. STATISTICAL COMPARISONS

C. CHAIN-OF-CUSTODY FORMS

APPENDIX A

LABORATORY DOCUMENTS

APPENDIX A.1.1

Eohaustorius estuarius

Amphipod Bioassay

Laboratory Data Sheets

NewFields

10-DAY SOLID PHASE TEST OBSERVATION DATA

CLIENT FloydSnider	PROJECT K Ply	SPECIES *Eohaustorius estuarius*	NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester	TEST START DATE 27-Aug-13	TEST END DATE 6-Sep-13	

N = Normal
#E = Emergence
#M = Mortality or Molts
G = Growth
(fungal, bacterial, or algal)
D = No Air Flow (DO?)
F = Floating on Surface
TC = Too Cloudy

Initial # of Organisms: 20

			ENDPOINT DATA AND OBSERVATIONS											
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10		
			Date 8/28/13	Date 8/29	Date 8/30	Date 8/31	Date 9/01	Date 9/02	Date 9/3	Date 9/4	Date 9/05	Date 9/06		
Client/NewFields ID	Rep	Jar #	Tech. MMB	Tech. HK	Tech. JL	Tech. JL	Tech. JL	Tech. JL	Tech. MMB	Tech. MMB	Tech. JL	Tech. JL	Number Alive	Number Dead Recovered (if any) / Comments
Control	1		N	N	N	N	N	N	N	N	N	N	20	
	2												19	1NB
	3												20	
	4												20	
	5												20	
CARR20	1		N									N	19	1NB
	2				G		1F						18	2NB
	3				N		N						20	
	4												18	2NB
	5								①~~1F~~				20	
CR 02	1		N						N	N		N	17	3NB
	2		2F						N	N	1F		20	
	3		1F		1m				1M, 1F	1M	N	1S	19	1NB
	4		N		N				N	N		N	20	
	5		1F						1F	N		1S	19	
SD0001K	1		N						N	N		1F	20	
	2		N									N	19	1NB
	3		1E			1F					1F		19	1NB
	4		N	3F		N					N		19	1
	5		N	N		2m		1F					19	1NB

① WC, MMB 9/3/13

NewFields

10-DAY SOLID PHASE TEST OBSERVATION DATA

CLIENT FloydSnider	**PROJECT** K Ply	**SPECIES** *Eohaustorius estuarius*	**NEWFIELDS LABORATORY** Port Gamble	**PROTOCOL** PSEP 1995
NEWFIELDS JOB NUMBER 0	**PROJECT MANAGER** B. Hester	**TEST START DATE** 27-Aug-13	**TEST END DATE** 6-Sep-13	

N = Normal
#E = Emergence
#M = Mortality or Molts
G = Growth
(fungal, bacterial, or algal)
D = No Air Flow (DO?)
F = Floating on Surface
TC = Too Cloudy

Initial # of Organisms			ENDPOINT DATA AND OBSERVATIONS										Number Alive	Number Dead Recovered (if any) / Comments
20			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10		
			Date 8/28/13	Date 8/29	Date 8/30	Date 8/31	Date 9/01	Date 9/02	Date 9/3	Date 9/4	Date 9/05	Date 9/06		
Client/NewFields ID	Rep	Jar #	Tech. MMB	Tech.	Tech. JL	Tech. JL	Tech. JL	Tech. JL	Tech. MMB	Tech. MMB	Tech. JL	Tech. JL		
SD0002K	1		N	N	N	N	N	N	N	N	N	N	19	1
	2		N							1F			20	
	3		2F		1m		1E	1F		N		1E	19	1 WB
	4		N		1m		N	N				2E	19	1 NB
	5		N		N							1E	20	
SD0003K	1		1E						N	N		N	20	
	2		N					G	G	G	G	G	18	1, 1NB
	3		N					1F	1F	N	N	N	20	
	4		2E		1E			2F	N	N			20	
	5		N		N			G	N	G	G	G, 1E	19	1NB

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT	PROJECT
FloydSnider	K Ply
NEWFIELDS JOB NUMBER	PROJECT MANAGER
0	B. Hester

SPECIES		NEWFIELDS LABORATORY	PROTOCOL
Eohaustorius estuarius		Port Gamble	PSEP 1995
TEST START DATE	TIME	TEST END DATE	TIME
27-Aug-13	1100	6-Sep-13	1030

				WATER QUALITY DATA									
Test Conditions				DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	0	WQ	5	6	7.3	6	16.0	2	28	5	8.0	CR	8/27
CARR20	0	WQ	6	↓	7.5	↓	16.0	↓	28	↓	8.3	↓	↓
CR 02	0	WQ	7		7.6		16.0		28		8.3		
SD0002K	0	WQ	13		7.6		15.6		28		8.3		
SD0003K	0	WQ	17		7.6		15.5		28		8.3		
Control	0	WQ	19		7.9		15.2		28		8.3		

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

				WATER QUALITY DATA									
			Test Conditions	DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	1	WQ	5	6	7.9	6	15.1	2	29	5	7.9	MWB	8/28/13
CARR20	1	WQ	6	↓	8.1	↓	15.3	↓	28	↓	8.0	↓	↓
CR 02	1	WQ	7		8.0		15.1		29		8.0		
SD0002K	1	WQ	13		7.9		15.4		28		8.0		
SD0003K	1	WQ	17		8.0		15.5		29		8.0		
Control	1	WQ	19		8.1		15.6		29		8.0		

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

WATER QUALITY DATA

			Test Conditions	DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	2	WQ	5	6	7.5	6	16.3	2	29	5	7.8	HE	8/29
CARR20	2	WQ	6	6	7.9	6	15.8	2	28	5	7.9	HE	8/29
CR 02	2	WQ	7	6	7.9	6	15.6	2	29	5	8.0	HE	8/29
SD0002K	2	WQ	13	6	7.9	6	15.5	2	29	5	8.0	HE	8/29
SD0003K	2	WQ	17	6	8.0	6	15.4	2	29	5	7.9	HE	8/29
Control	2	WQ	19	6	8.2	6	15.0	2	29	5	7.9	HE	8/29

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

			Test Conditions	WATER QUALITY DATA									
				DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	3	WQ	5	V	7.7	6	15.8	2	29	5	8.1	JL	8/30/13
CARR20	3	WQ	6		8.1		15.6		28		8.0		
CR 02	3	WQ	7		7.9		15.5		28		8.1		
SD0002K	3	WQ	13		8.0		15.4		29		8.1		
SD0003K	3	WQ	17		7.9		15.5		29		8.1		
Control	3	WQ	19	↓	8.2	↓	15.4	↓	29	↓	8.0	↓	↓

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

			Test Conditions	WATER QUALITY DATA DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	4	WQ	5	6	7.5	6	16.3	2	29	5	8.2		8/31
CARR20	4	WQ	6	6	7.9	6	15.9	2	28	5	8.0		
CR 02	4	WQ	7	6	7.9	6	15.9	2	29	5	8.1		
SD0002K	4	WQ	13	6	7.9	6	15.8	2	29	5	8.2		
SD0003K	4	WQ	17	6	7.9	6	15.9	2	29	5	8.2		
Control	4	WQ	19	6	8.1	6	15.7	2	29	5	8.1		

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble		PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13		TIME 1030

			Test Conditions	WATER QUALITY DATA									
				DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	5	WQ	5	6	7.6	6	15.3	2	29	5	8.5	JL	9/01/13
CARR20	5	WQ	6	↓	8.0	↓	15.1	↓	28	↓	8.2	↓	↓
CR 02	5	WQ	7	↓	7.9	↓	15.1	↓	28	↓	8.2	↓	↓
SD0002K	5	WQ	13	↓	7.9	↓	14.9	↓	29	↓	8.3	↓	↓
SD0003K	5	WQ	17	↓	7.8	↓	15.1	↓	29	↓	8.4	↓	↓
Control	5	WQ	19	↓	8.1	↓	14.9	↓	29	↓	8.1	↓	↓

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

				WATER QUALITY DATA									
			Test Conditions	DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	6	WQ	5	6	8.1	6	14.7	2	28	5	8.1	JL	9/02
CARR20	6	WQ	6		7.8		15.1		29		8.5		
CR 02	6	WQ	7		8.1		14.7		28		8.3		
SD0002K	6	WQ	13		8.1		14.6		29		8.4		
SD0003K	6	WQ	17		7.9		14.7		29		8.5		
Control	6	WQ	19		8.4		14.3		29		8.1		

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

			Test Conditions	WATER QUALITY DATA									
				DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	7	WQ	5	6	7.9	6	14.4	2	29	5	8.7	MMB	9/3
CARR20	7	WQ	6	↓	8.1	↓	14.5	↓	28	↓	8.2	↓	↓
CR 02	7	WQ	7	↓	8.1	↓	14.5	↓	28	↓	8.5	↓	↓
SD0002K	7	WQ	13	↓	8.1	↓	14.4	↓	29	↓	8.5	↓	↓
SD0003K	7	WQ	17	↓	8.0	↓	14.6	↓	29	↓	8.6	↓	↓
Control	7	WQ	19	↓	8.3	↓	14.3	↓	29	↓	8.2	↓	↓

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

Test Conditions				WATER QUALITY DATA									
				DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	8	WQ	5	6	8.0	6	14.3	2	29	5	8.6	MMB	9/4
CARR20	8	WQ	6		8.2		14.3		28		8.3		
CR 02	8	WQ	7		8.3		14.2		28		8.5		
SD0002K	8	WQ	13		8.1		14.2		29		8.6		
SD0003K	8	WQ	17		8.1		14.3		29		8.8		
Control	8	WQ	19		8.4		14.1		29		8.3		

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

			Test Conditions	WATER QUALITY DATA DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	9	WQ	5	6	8.2	6	14.1	2	28	5	8.1	JL	9/05/13
CARR20	9	WQ	6		7.8		14.3		29		8.3		
CR 02	9	WQ	7		8.2		14.2		28		8.3		
SD0002K	9	WQ	13		8.1		14.4		29		8.3		
SD0003K	9	WQ	17		8.0		14.7		29		8.4		
Control	9	WQ	19		8.2		14.3		28		7.8		

NewFields

10 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATA SHEET

CLIENT FloydSnider	PROJECT K Ply
NEWFIELDS JOB NUMBER 0	PROJECT MANAGER B. Hester

SPECIES *Eohaustorius estuarius*		NEWFIELDS LABORATORY Port Gamble	PROTOCOL PSEP 1995
TEST START DATE 27-Aug-13	TIME 1100	TEST END DATE 6-Sep-13	TIME 1030

			Test Conditions	WATER QUALITY DATA									
				DO (mg/L) >4.6 mg/L		Temperature (°C) 15±1		Salinity (ppt) 28±1		pH 7 - 9		Tech	Date
Client/NewFields ID	Day	Rep	Jar#	meter	mg/L	meter	deg C	meter	ppt	meter	unit		
SD0001K	10	WQ	5	6	8.2	6	14.1	2	28	5	8.3	JL	9/06/13
CARR20	10	WQ	6		8.0		14.3		29		8.5		
CR 02	10	WQ	7		8.2		14.0		28		8.5		
SD0002K	10	WQ	13		8.1		14.0		29		8.5		
SD0003K	10	WQ	17		8.1		14.1		29		8.7		
Control	10	WQ	19		8.4		13.9		28		8.4		

NewFields

Ammonia and Sulfide Analysis Record

Page ____of____

Client/Project: K. Ply	**Organism:** Eohs	**Test Duration (days):** 10

~~PRETEST~~ / [✓ INITIAL] / ~~FINAL~~ / OTHER (circle one)

[✓ OVERLYING (OV)] / & [✓ POREWATER (PW)] (circle one) / Comments: ____________

DAY of TEST: 0

Calibration Standards Temperature		
Date:	**Temperature:**	Sample temperature should be within ±1°C of standards temperature at time and date of analysis.
8/27/13	21.0	

Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Temp °C	Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (mg/L)	Multi-plier	Calc-ulated Sulf. (mg/L)
OV Control	Swr.	8/27/13 MMB	0.0915	21.5	8/27/13 MMB	N			10	0.00		
CR.02			1.61							0.00		
CARR20			0.743							0.002		
SD0001K			0.413							0.00		
SD0002K			0.417							0.026		
SD0003K			0.415							0.006		
PW Control			0.124				7.8	30	10	0.013	—	—
CR.02			14.2				7.8	29	5	0.081	2	0.162
CARR20			15.0				7.6	29	10	0.035	—	—
SD0001K			3.11				7.6	30	10	0.046	—	—
SD0002K			3.88				7.7	30	5	0.092	2	0.184
SD0003K			3.81				7.9	30	5	0.052	2	0.104

NewFields

Ammonia and Sulfide Analysis Record

Page 1 of 1

Client/Project: K-PN	**Organism:** Eohs	**Test Duration (days):** 10

PRETEST / INITIAL / [✓ FINAL] / OTHER (circle one)

[✓ OVERLYING (OV)] / [✓ POREWATER (PW)] (circle one) / Comments:

DAY of TEST: 10

Calibration Standards Temperature		
Date: 9/06/13	**Temperature:** 21.5	Sample temperature should be within ±1°C of standards temperature at time and date of analysis.

Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Temp °C	Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (mg/L)	Multi-plier	Calc-ulated Sulf. (mg/L)
ov. Control	Sw	9/06/13 JL	0.0242	20.6	9/06/13 JL	N	NA	NA	10	0.019	NA	NA
CARR-20	↓	↓	0.00	↓	↓	↓	↓	↓	↓	0.020	↓	↓
CR-02	↓	↓	5.97	↓	↓	↓	↓	↓	↓	0.019	↓	↓
SD0001K	↓	↓	0.899	↓	↓	↓	↓	↓	↓	0.031	↓	↓
SD0002K	↓	↓	1.25	↓	↓	↓	↓	↓	↓	0.016	↓	↓
SD0003K	↓	↓	2.06	↓	↓	↓	↓	↓	↓	0.015①	↓	↓
pw Control	↓	↓	0.0686	20.5	↓	↓	7.5	26	2ml	0.039	5	0.195
CARR20	↓	↓	0.153	↓	↓	↓	7.6	26	10	0.062	—	—
CR-02	↓	↓	4.25	↓	↓	↓	7.4	25	2	0.039	5	0.195
SD0001K	↓	↓	0.467	↓	↓	↓	6.9	26	5	0.131	2	0.262
SD0002K	↓	↓	1.06	↓	↓	↓	7.1	27	5	0.091	2	0.182
SD0003K	↓	↓	1.87	↓	↓	↓	7.0	28	10	0.065	—	—

① 0.015. JL 9/06/13

NewFields

ORGANISM RECEIPT LOG

Date: 8.23.13

Time: 1240

NewFields Batch No. NWA 3038

Organism / Project: Eohaustorius / K-Ply

Invoice Attached Yes [✓ No]

Source / Supplier: Northwestern Aquatic Sciences

Contact: Gary

No. Ordered: 1000

No. Received: 1100+

Source Batch: (Collection date, hatch date, etc.): Field

Condition of Organisms: (Good, fair, poor; describe.): Good

Approximate Size or Age: (Days from hatch, life stage, size class, etc.): 3-5 mm

Shipper: FedEx

B of L (Tracking No.) 8010 3069 3038

Condition of Container: (Good, fair, poor; describe.): Good

Received By: BH

Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	Number Dead or Moribund	Technician (Initials)
Multi	7.9	14.7	28.5	8.1	—	BH

Notes:

APPENDIX A.1.2

Eohaustorius estuarius

Amphipod Bioassay

Reference Toxicant Test

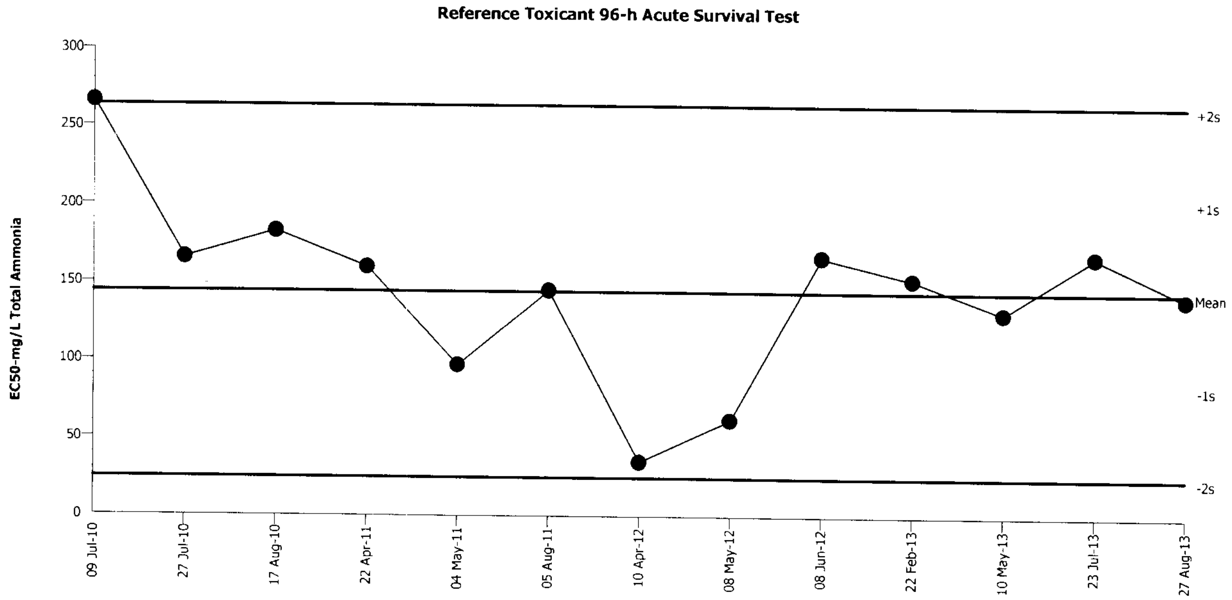
CETIS QC Plot

Report Date: 09 Sep-13 16:20 (1 of 1)

Reference Toxicant 96-h Acute Survival Test

NewFields

Test Type:	Survival	**Organism:**	Eohaustorius estuarius (Amphipod)	**Material:**	Total Ammonia
Protocol:	EPA/600/R-94/025 (1994)	**Endpoint:**	Proportion Survived	**Source:**	Reference Toxicant-REF



Mean:	144	**Count:**	12	**-1s Warning Limit:**	84.25	**-2s Action Limit:**	24.5
Sigma:	59.75	**CV:**	41.50%	**+1s Warning Limit:**	203.8	**+2s Action Limit:**	263.5

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2010	Jul	9	15:20	265.9	121.9	2.041	(+)	(+)	02-9263-1875	13-7083-7088
2			27	14:50	165.5	21.52	0.3602			16-3262-6250	12-1070-3879
3		Aug	17	16:00	182.5	38.54	0.6451			00-5947-2918	13-7468-5586
4	2011	Apr	22	16:45	159.7	15.66	0.2622			12-3251-7366	15-6923-8618
5		May	4	14:20	96.78	-47.22	-0.7903			15-9053-5291	03-3498-4458
6		Aug	5	14:35	144.9	0.8591	0.01438			05-3970-3796	17-5474-7748
7	2012	Apr	10	15:10	34.72	-109.3	-1.829	(-)		02-5902-8958	20-3951-0452
8		May	8	14:30	61.87	-82.13	-1.375	(-)		20-1853-8108	14-9890-9529
9		Jun	8	15:30	166.5	22.49	0.3763			03-4756-9479	07-8270-3224
10	2013	Feb	22	11:40	152.2	8.219	0.1375			09-9358-3146	14-0757-4516
11		May	10	14:20	130.8	-13.24	-0.2217			01-9831-6628	02-4493-3987
12		Jul	23	15:10	167.1	23.14	0.3873			15-9850-7427	05-2897-2730
13		Aug	27	12:10	140.4	-3.607	-0.06037			20-8540-9997	05-1258-2331

Analyst: QA:

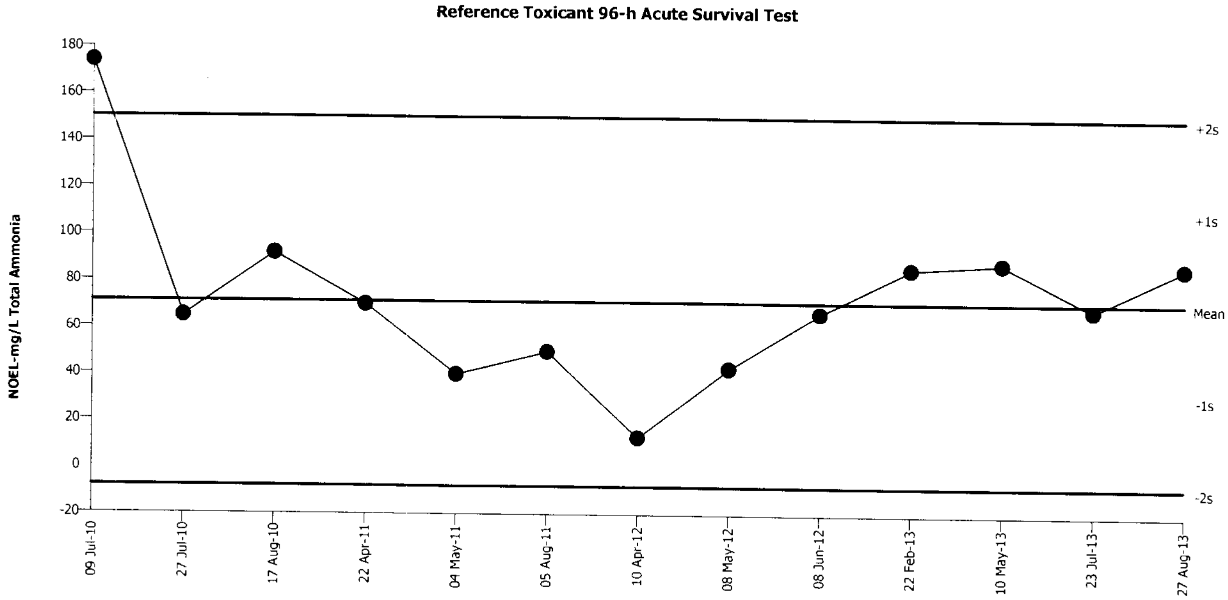
CETIS QC Plot

Report Date: 09 Sep-13 16:20 (1 of 1)

Reference Toxicant 96-h Acute Survival Test

NewFields

Test Type:	Survival	**Organism:**	Eohaustorius estuarius (Amphipod)	**Material:**	Total Ammonia
Protocol:	EPA/600/R-94/025 (1994)	**Endpoint:**	Proportion Survived	**Source:**	Reference Toxicant-REF



Mean:	71.12	**Count:**	12	**-1s Warning Limit:**	31.57	**-2s Action Limit:**	-7.98
Sigma:	39.55	**CV:**	55.60%	**+1s Warning Limit:**	110.7	**+2s Action Limit:**	150.2

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2010	Jul	9	15:20	174	102.9	2.601	(+)	(+)	02-9263-1875	21-0926-0699
2			27	14:50	64.7	-6.42	-0.1623			16-3262-6250	07-8105-4494
3		Aug	17	16:00	91.6	20.48	0.5178			00-5947-2918	19-8213-9681
4	2011	Apr	22	16:45	69.8	-1.32	-0.03338			12-3251-7366	16-4565-4919
5		May	4	14:20	39.8	-31.32	-0.7919			15-9053-5291	14-1177-0441
6		Aug	5	14:35	49.6	-21.52	-0.5441			05-3970-3796	20-5970-4725
7	2012	Apr	10	15:10	13	-58.12	-1.47	(-)		02-5902-8958	03-7154-8292
8		May	8	14:30	42.6	-28.52	-0.7211			20-1853-8108	20-5519-2940
9		Jun	8	15:30	66.4	-4.72	-0.1193			03-4756-9479	03-6674-9041
10	2013	Feb	22	11:40	85.6	14.48	0.3661			09-9358-3146	06-2817-6220
11		May	10	14:20	88	16.88	0.4268			01-9831-6628	03-9560-5903
12		Jul	23	15:10	68.3	-2.82	-0.0713			15-9850-7427	18-8212-0119
13		Aug	27	12:10	86.4	15.28	0.3863			20-8540-9997	03-1133-2124

Analyst: JL QA: CR

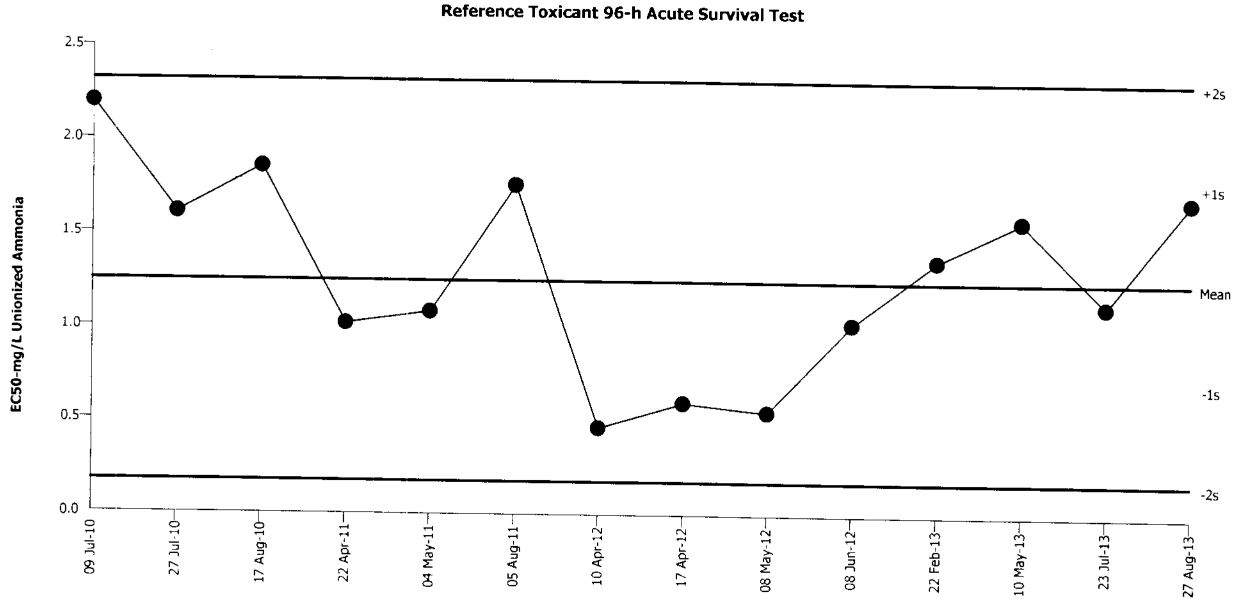
CETIS QC Plot

Report Date: 09 Sep-13 16:24 (1 of 1)

Reference Toxicant 96-h Acute Survival Test

NewFields

Test Type: Survival
Protocol: EPA/600/R-94/025 (1994)
Organism: Eohaustorius estuarius (Amphipod)
Endpoint: Proportion Survived
Material: Unionized Ammonia
Source: Reference Toxicant-REF



Mean: 1.248
Sigma: 0.5364
Count: 13
CV: 43.00%
-1s Warning Limit: 0.7116
+1s Warning Limit: 1.784
-2s Action Limit: 0.1752
+2s Action Limit: 2.321

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2010	Jul	9	15:20	2.198	0.9495	1.77	(+)		01-7209-8485	05-8082-3474
2			27	14:50	1.608	0.3604	0.6719			00-7007-0295	03-9110-2709
3		Aug	17	16:00	1.854	0.6063	1.13	(+)		04-9660-1658	10-4250-3896
4	2011	Apr	22	16:45	1.017	-0.2306	-0.4299			03-6965-3395	14-3447-2473
5		May	4	14:20	1.081	-0.1668	-0.3109			18-8723-9922	17-9305-2155
6		Aug	5	14:35	1.76	0.5122	0.9549			17-9542-0646	06-2792-7024
7	2012	Apr	10	15:10	0.4636	-0.7844	-1.462	(-)		18-7283-5013	07-7471-6807
8			17	15:45	0.5982	-0.6498	-1.211	(-)		18-5229-3668	10-4921-5938
9		May	8	14:30	0.5509	-0.6971	-1.3	(-)		15-4565-2403	06-1396-7211
10		Jun	8	15:30	1.024	-0.2237	-0.4171			03-7901-3036	07-6844-7156
11	2013	Feb	22	11:40	1.364	0.1162	0.2166			10-3861-9695	21-2507-0831
12		May	10	14:20	1.578	0.3298	0.6149			05-8857-3753	18-2954-4563
13		Jul	23	15:10	1.126	-0.1221	-0.2276			08-8059-3744	12-6137-6954
14		Aug	27	12:10	1.689	0.4413	0.8227			18-3860-3992	18-0374-3993

Analyst:

QA:

CETIS QC Plot

Report Date: 09 Sep-13 16:24 (1 of 1)

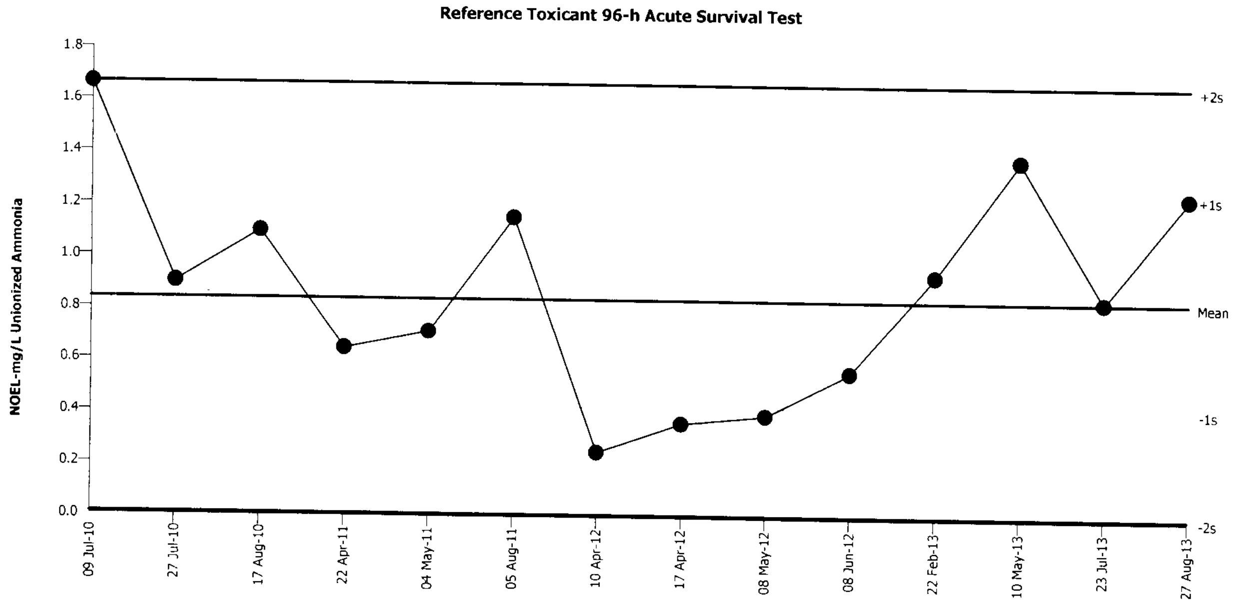
Reference Toxicant 96-h Acute Survival Test

NewFields

Test Type: Survival
Protocol: EPA/600/R-94/025 (1994)

Organism: Eohaustorius estuarius (Amphipod)
Endpoint: Proportion Survived

Material: Unionized Ammonia
Source: Reference Toxicant-REF



Mean:	0.8372	**Count:**	13	**-1s Warning Limit:**	0.4228	**-2s Action Limit:**	0.0084
Sigma:	0.4144	**CV:**	49.50%	**+1s Warning Limit:**	1.252	**+2s Action Limit:**	1.666

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2010	Jul	9	15:20	1.665	0.8278	1.998	(+)		01-7209-8485	15-5728-8112
2			27	14:50	0.9	0.0628	0.1515			00-7007-0295	13-8034-1240
3		Aug	17	16:00	1.096	0.2588	0.6245			04-9660-1658	04-8886-1755
4	2011	Apr	22	16:45	0.644	-0.1932	-0.4662			03-6965-3395	08-9559-0930
5		May	4	14:20	0.71	-0.1272	-0.3069			18-8723-9922	06-9505-1415
6		Aug	5	14:35	1.152	0.3148	0.7597			17-9542-0646	01-3764-6854
7	2012	Apr	10	15:10	0.249	-0.5882	-1.419	(-)		18-7283-5013	17-8032-8770
8			17	15:45	0.36	-0.4772	-1.152	(-)		18-5229-3668	21-3980-0168
9		May	8	14:30	0.393	-0.4442	-1.072	(-)		15-4565-2403	07-1675-0393
10		Jun	8	15:30	0.56	-0.2772	-0.6689			03-7901-3036	09-3097-7160
11	2013	Feb	22	11:40	0.935	0.0978	0.236			10-3861-9695	14-6175-2687
12		May	10	14:20	1.38	0.5428	1.31	(+)		05-8857-3753	12-0577-0060
13		Jul	23	15:10	0.839	0.0018	0.004344			08-8059-3744	14-8468-9199
14		Aug	27	12:10	1.242	0.4048	0.9768			18-3860-3992	13-4279-2307

Analyst: JV QA: CR

CETIS Summary Report

Report Date:	09 Sep-13 16:20 (p 1 of 1)
Test Code:	7C4CD4CD | 20-8540-9997

Reference Toxicant 96-h Acute Survival Test

NewFields

Batch ID:	07-6407-4119	**Test Type:**	Survival	**Analyst:**	
Start Date:	27 Aug-13 12:10	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	31 Aug-13 13:35	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Duration:	4d 1h	**Source:**	Northwestern Aquatic Science, OR	**Age:**	

Sample ID:	04-5394-3157	**Code:**	1B0E9F75	**Client:**	Internal Lab
Sample Date:	27 Sep-11	**Material:**	Total Ammonia	**Project:**	Reference Toxicant
Receive Date:	27 Sep-11	**Source:**	Reference Toxicant		
Sample Age:	700d 12h	**Station:**	p110927.150		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
03-1133-2124	Proportion Survived	86.4	169	120.8	26.6%		Bonferroni Adj t Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
05-1258-2331	Proportion Survived	EC50	140.4	123.8	159.2		Spearman-Kärber

Proportion Survived Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	1	1	1	1	1	0	0	0.0%	0.0%
22.1		3	1	1	1	1	1	0	0	0.0%	0.0%
43.2		3	0.9333	0.7899	1	0.9	1	0.03333	0.05774	6.19%	6.67%
86.4		3	1	1	1	1	1	0	0	0.0%	0.0%
169		3	0.3	0	1	0.1	0.7	0.2	0.3464	115.5%	70.0%
318		3	0	0	0	0	0	0	0		100.0%

Proportion Survived Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	1	1
22.1		1	1	1
43.2		1	0.9	0.9
86.4		1	1	1
169		0.1	0.1	0.7
318		0	0	0

Proportion Survived Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	10/10	10/10	10/10
22.1		10/10	10/10	10/10
43.2		10/10	9/10	9/10
86.4		10/10	10/10	10/10
169		1/10	1/10	7/10
318		0/10	0/10	0/10

Analyst: JL QA: AR

CETIS Test Data Worksheet

Report Date: 09 Sep-13 16:19 (p 1 of 1)
Test Code: 20-8540-9997/7C4CD4CD

Reference Toxicant 96-h Acute Survival Test

NewFields

Start Date: 27 Aug-13 12:10
End Date: 31 Aug-13 13:35
Sample Date: 27 Sep-11

Species: Eohaustorius estuarius
Protocol: EPA/600/R-94/025 (1994)
Material: Total Ammonia

Sample Code: 1B0E9F75
Sample Source: Reference Toxicant
Sample Station: p110927.150

C-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	2	10	10	
0	D	2	5	10	10	
0	D	3	6	10	10	
22.1		1	14	10	10	
22.1		2	13	10	10	
22.1		3	9	10	10	
43.2		1	16	10	10	
43.2		2	8	10	9	
43.2		3	7	10	9	
86.4		1	3	10	10	
86.4		2	12	10	10	
86.4		3	15	10	10	
169		1	10	10	1	
169		2	11	10	1	
169		3	1	10	7	
318		1	18	10	0	
318		2	4	10	0	
318		3	17	10	0	

Analyst:________ QA:________

CETIS Summary Report

Report Date:	09 Sep-13 16:23 (p 1 of 1)
Test Code:	6D96DED8 | 18-3860-3992

Reference Toxicant 96-h Acute Survival Test

NewFields

Batch ID:	00-1984-1085	**Test Type:**	Survival	**Analyst:**	
Start Date:	27 Aug-13 12:10	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Water
Ending Date:	31 Aug-13 13:35	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Duration:	4d 1h	**Source:**	Northwestern Aquatic Science, OR	**Age:**	

Sample ID:	00-4284-8278	**Code:**	28DD016	**Client:**	Internal Lab
Sample Date:	27 Sep-11	**Material:**	Unionized Ammonia	**Project:**	Reference Toxicant
Receive Date:	27 Sep-11	**Source:**	Reference Toxicant		
Sample Age:	700d 12h	**Station:**	p110927.150		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
13-4279-2307	Proportion Survived	1.242	2.023	1.585	26.6%		Bonferroni Adj t Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
18-0374-3993	Proportion Survived	EC50	1.689	1.572	1.815		Spearman-Kärber

Proportion Survived Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	1	1	1	1	1	0	0	0.0%	0.0%
0.41		3	1	1	1	1	1	0	0	0.0%	0.0%
0.814		3	0.9333	0.7899	1	0.9	1	0.03333	0.05774	6.19%	6.67%
1.242		3	1	1	1	1	1	0	0	0.0%	0.0%
2.023		3	0.3	0	1	0.1	0.7	0.2	0.3464	115.5%	70.0%
2.376		3	0	0	0	0	0	0	0		100.0%

Proportion Survived Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	1	1
0.41		1	1	1
0.814		1	0.9	0.9
1.242		1	1	1
2.023		0.1	0.1	0.7
2.376		0	0	0

Proportion Survived Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	10/10	10/10	10/10
0.41		10/10	10/10	10/10
0.814		10/10	9/10	9/10
1.242		10/10	10/10	10/10
2.023		1/10	1/10	7/10
2.376		0/10	0/10	0/10

Analyst: JL QA: CR

CETIS Test Data Worksheet

Report Date: 09 Sep-13 16:23 (p 1 of 1)
Test Code: 18-3860-3992/6D96DED8

Reference Toxicant 96-h Acute Survival Test

NewFields

Start Date: 27 Aug-13 12:10
End Date: 31 Aug-13 13:35
Sample Date: 27 Sep-11

Species: Eohaustorius estuarius
Protocol: EPA/600/R-94/025 (1994)
Material: Unionized Ammonia

Sample Code: 28DD016
Sample Source: Reference Toxicant
Sample Station: p110927.150

C-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	12	10	10	
0	D	2	16	10	10	
0	D	3	1	10	10	
0.41		1	8	10	10	
0.41		2	2	10	10	
0.41		3	13	10	10	
0.814		1	4	10	10	
0.814		2	6	10	9	
0.814		3	3	10	9	
1.242		1	10	10	10	
1.242		2	11	10	10	
1.242		3	9	10	10	
2.023		1	5	10	1	
2.023		2	18	10	1	
2.023		3	15	10	7	
2.376		1	7	10	0	
2.376		2	14	10	0	
2.376		3	17	10	0	

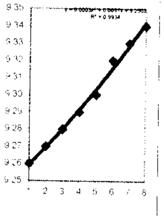
Analyst: JL

QA: CR

CLIENT:	Internal	Date of Test:	27-Aug-13
PROJECT:	RT	Test Type:	*Eoh*
COMMENTS:			

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH

Integer:	I-factor
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



	Sample	Mod *NH3T (mg/L)*	*salinity (ppt)*	*pH*	*temp (C)*	temp (K)	i-factor	Mod **NH3U (mg/L)**
	Target / Sample Name	Actual	22.9	8.0	24.1	**297.26**	**9.3053**	**#VALUE!**
	Example 3.5	2.000	10.0	7.5	5.0	**278.16**	**9.2750**	**0.008**
1								
2	15	22.1	[illegible]	[illegible]	[illegible]	288.86	9.3270	**0.410**
3	30	43.2	[illegible]	[illegible]	[illegible]	289.06	9.3270	**0.814**
4	60	86.4	[illegible]	[illegible]	[illegible]	288.46	9.3270	**1.242**
5	120	169	[illegible]	[illegible]	[illegible]	289.06	9.3270	**2.023**
6	240	318	[illegible]	[illegible]	[illegible]	288.86	9.3270	**2.376**
7								
8								
9								
10								
11								
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13								
14								
15								
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NewFields Ammonia Reference Toxicant Test Water Quality Data Sheet

CLIENT Floyd Snider	PROJECT K-Ply	SPECIES *Eohaustorius estuarius*	NEWFIELDS LABORATORY Port Gamble .
NEWFIELDS JOB NUMBER	PROJECT MANAGER B. Hester	QUANTITY OF STOCK: See	QUANTITY OF DILUENT: 750mL
		ACTUAL: spiking worksheet	ACTUAL: 750.0g
TEST ID P110927.150	LOT #: 111079	TEST START DATE 8/27/13	TIME 1210

PROTOCOL USEPA/USCOE 1991

INIT CR

DATE PREP 8/27/13

TEST END DATE 9/06/13

TIME 1335

WATER QUALITY DATA

TEST CONDITIONS					DO (mg/L)		TEMP(C)		SAL (ppt)		pH		TECHNICIAN	AMMONIA			SULFIDES		
					> 5.0		15 ± 1		30 ± 2		7.8 ± 0.5								
CLIENT/ NEWFIELDS ID	CONCENTRATION		DAY	REP	D.O.		TEMP.		SALINITY		pH		WQ TECH/ DATE	AMMONIA		Tech	SULFIDES		Tech
	value	units			meter	mg/L	meter	°C	meter	ppt	meter	unit		METER	mg/L		meter	mg/L	
Ref.Tox.-ammonia	0	mg/L	0	Stock	6	7.7	6	15.5	2	31	5	8.1	MMB 8/27	3	0.03				
			4	1	6	5.0	6	16.0	2	30	5	7.3	HE 8/31						
			6	2	6	7.2	6	15.3	2	31	5	7.9	JL 9/02						
			8	3	6	6.7	6	14.8	2	31	5	8.1	MMB 9/4						
			10	1	6	7.4	6	15.1	2	31	5	8.3	JL 9/06						
Ref.Tox.-ammonia	15	mg/L	0	Stock	6	7.9	6	15.7	2	31	5	7.9	MMB 8/27	3	22.1				
			4	1	6	6.6	6	16.4	2	31	5	7.8	HE 8/31						
			6	2	6	6.7	6	15.4	2	31	5	7.9	JL 9/02						
			8	3	6	7.5	6	15.3	2	31	5	8.2	MMB 9/4						
			10	1	6	7.4	6	15.0	2	31	5	8.2	JL 9/06						
Ref.Tox.-ammonia	30	mg/L	0	Stock	6	7.8	6	15.9	2	31	5	7.9	MMB 8/27	3	43.2				
			4	1	6	7.1	6	16.3	2	31	5	7.8	HE 8/31						
			6	2	6	6.9	6	15.5	2	31	5	~~7.8~~ 7.9 ①	JL 9/02						
			8	3	6	7.5	6	15.5	2	31	5	8.2	MMB 9/4						
			10	1	6	7.5	6	14.7	2	31	5	8.2	JL 9/06						
Ref.Tox.-ammonia	60	mg/L	0	Stock	6	7.8	2	15.3	2	31	5	7.8	MMB 8/27	3	86.4				
			4	1	6	6.7	2	15.8	2	31	5	7.8	HE 8/31						
			6	2	6	7.5	6	15.8	2	31	5	7.9	JL 9/02						
			8	3	6	7.7	6	15.2	2	31	5	8.2	MMB 9/4						
			10	1	6	7.8	6	14.6	2	31	5	8.2	JL 9/06						
Ref.Tox.-ammonia	120	mg/L	0	Stock	6	7.9	6	15.9	2	31	5	7.7	MMB 8/27	3	169				
			4	1	6	7.2	6	16.2	2	31	5	7.8	HE 8/31						
			6	3 ~~2~~	6	7.6	6	15.3	2	31	5	7.9	JL 9/02						
			8	3															
			10	1															
Ref.Tox.-ammonia	240	mg/L	0	Stock	6	8.0	6	15.7	2	31	5	7.5	MMB 8/27	3	318				
			4	2 ~~1~~	6	7.4	6	16.3	2	31	5	7.6	HE 8/31						
			6	2															
			8	3															
			10	1															

① WC HE 8/31

NewFields

Ammonia Reference Toxicant Test Survival Data Sheet

CLIENT	PROJECT	NEWFIELDS JOB NO.	SPECIES		
			Eohaustorius estuarius		
			PROJECT MANAGER	MEC LABORATORY	PROTOCOL
				Port Gamble	USEPA/USCOE 1991

SURVIVAL & BEHAVIOR DATA

OBSERVATION KEY
N = Normal
LOE = Loss of equilibium
Q = Quinscent
DC = Discoloration
NB = No body
F = Floating on surface

INITIAL # OF ORGANISMS: 10

CLIENT/ NEWFIELDS ID	CONC. value	units	REP	INITIAL NUMBER	DAY 1			DAY 2			DAY 3			DAY 4			DAY 5			DAY 6			DAY 7			DAY 8			DAY 9			DAY 10		
				DATE	8/28/13			8/29			8/30			8/31			9/01			9/02			9/3			9/4			9/05			9/06		
				TECHNICIAN	MMB			GR			JL			JL			JL			JL			MMB			MMB			JL			JL		
					#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS
Ref.Tox.- Ammonia	0	mg/L	1		10	0	N	10	0	N①	10	0	N	10	0	N	10	0	N	9	1	N	9	0	N	8	1	N	8	0	N	7	1	N
			2		10	0	↓	10	0	↓	10	0	↓	10	0	↓	10	0	↓	10	0	↓	9	1	N	9	0	↓	9	0	↓	8	1	↓
			3		10	0	↓	10	0	↓	10	0	↓	10	0	2F	10	0	2F	9	1	↓	8	0	NB	8	0	↓	6	2	↓	2	4	↓
Ref.Tox.- Ammonia	15	mg/L	1		10	0	N	10	0	2F	10	0	N	10	0	N	10	0	N	9	1	N	8	1	N	8	0	N	7	1	N	7	0	N
			2		10	0	1F	10	0	1F	10	0	↓	10	0	↓	10	0	1F	8	2	2F	7	1	1F	7	0	↓	5	2	↓	4	1	↓
			3		10	0	N	10	0	2F①	10	0	2F	10	0	2F	10	0	1F	10	0	N	10	0	N	10	0	↓	10	0	↓	9	1	↓
Ref.Tox.- Ammonia	30	mg/L	1		10	0	1F	10	0	1F	10	0	N	10	0	1F	10	0	N	10	0	N	10	0	N	10	0	N	10	0	N	9	1	N
			2		10	0	N	9	1	1F	9	0	↓	9	0	N	9	0	↓	8	1	↓	8	0	↓	8	0	↓	7	1	↓	7	0	↓
			3		10	0	N	10	0	1F	10	0	1F	9	1	1F	9	0	↓	9	0	↓	9	0	↓	8	1	↓	7	1	↓	2	3	↓
Ref.Tox.- Ammonia	60	mg/L	1		10	0	2F	10	0	1F	10	0	2F	10	0	N	10	0	1F	8	2	N	7	1	N	4	3	N	4	0	Q	3	1	Q
			2		10	0	2F	10	0	2F	10	0	1F	10	0	1F	10	0	1F	9	1	↓	9	0	Q	6	3	Q	4	2	↓	0	4	NA
			3		10	0	1F	10	0	1F	10	0	N	10	0	N	8	2	N	7	1	1F	6	1	Q	5	1	Q	2	3	↓	0	2	↓
Ref.Tox.- Ammonia	120	mg/L	1		10	0	Q	7	3	Q①	5	2	Q	1	4	Q	1	0	Q	0	1	NA	—	—	—									
			2		10	0	↓	5	5	↓	1	4	↓	1	0	↓	0	1	NA	—	—	—	—	—	—									
			3		10	0	↓	8	2	↓①	7	1	↓	7	0	↓	1	6	Q	1	0	Q	0	1	N									
Ref.Tox.- Ammonia	240	mg/L	1		5	5	Q	0	5	Q	—	—	—	—	—	—																		
			2		5	5	↓	1	4	↓①	1	0	Q	0	1	NA																		
			3		2	8	↓	0	2	↓	—	—	—	—	—	—																		

①Babies present GR 8/29

NewFields Ammonia Reference Toxicant Spiking Worksheet

Eoh

~~Amp~~ NH_3 RT

Assumptions in Model
Stock ammonia concentration is 10,000 mg/L = 10 mg/mL

Actual Reading
6820

Test Solutions			Volume of stock to reach desired concentration	
Measured Concentration	Desired Concentration	Volume		
mg/L	mg/L	mL	mL stock to increase	
			[redacted]	SALT WATER
	240	750	[redacted]	39.589
	120	750	[redacted]	19.795
	60	750	[redacted]	9.897
	30	750	[redacted]	4.949
	15	750	[redacted]	2.474
	0	750	[redacted]	0.000
			[redacted]	0.000
			[redacted]	0.000

APPENDIX A.2.1

Neanthes arenaceodentata
Juvenile Polychaete Bioassay
Laboratory Data Sheets

NewFields

20-DAY SOLID PHASE BIOASSAY
OBSERVATION DATASHEET

CLIENT	PROJECT	JOB N0.	PROJECT MANAGER	NEWFIELDS LABORATORY	PROTOCOL	SPECIES
FloydSnider	K Ply	0	B. Hester	Port Gamble Bath 7	PSEP 1995	*Neanthes arenaceodentata*

ENDPOINT DATA & OBSERVATIONS

N = Normal
#E = Emergence
#M = Mortality
G = Growth
(fungal, bacterial, or algal)
D = No Air Flow (DO?)
F = Floating on Surface
TC = Too Cloudy
U=Excess food

INITIAL # OF ORGANISMS: 5

CLIENT NEWFIELDS ID	REP	JAR	Date and Initials / INITIAL # (if differs)	8/30 JL 1	8/31 JL 2	9/01 JL 3	9/02 JL 4	9/3 MMB 5	9/4 MMB 6	9/05 JL 7	9/06 JL 8	9/07 JL 9	9/08 JL 10	9/9 MMB 11	9/10 JL 12	9/11 MMB 13	9/12 MMB 14	9/13 GR 15	9/14 JL 16	9/15 JL 17	9/16 MMB 18	9/17 JL 19	9/18 MMB 20	NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)	ASHED WEIGHT (mg)
Control /	1			U	U	U	U	U	N	U	U	U	N	N	N	N	N	N	N	N	N	N	N	5	^{1} 144.30	243.01	173.97
	2			↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	2E	↓	5	^{2} 138.85	248.92	178.35
	3			↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	2E	↓	5	^{3} 156.27	234.03	179.05
	4			↓	↓	↓	↓	↓	↓	↓	u, G	u, G	G 1E	G	G	↓	↓	↓	↓	↓	↓	1E	↓	5	^{4} 164.65	253.51	188.35
	5			↓	↓	↓	↓	↓	↓	↓	U	U	N	N	N	↓	↓	↓	↓	↓	↓	N	↓	5	^{5} 162.25	236.31	182.92
CARR20 /	1			↓	↓	↓	↓	U	N	↓	↓	↓	↓	N	↓	↓	↓	U	G	G	G	G	G	5	^{6} 149.66	223.24	167.53
	2			u/G	↓	↓	↓	↓	↓	↓	↓	u/G	↓	↓	↓	↓	↓	N	↓	↓	↓	↓	↓	5	^{7} 144.04	211.08	162.63
	3			U	↓	↓	↓	↓	↓	↓	↓	U	↓	↓	↓	↓	↓	N	↓	↓	↓	↓	G, 1E	5	^{8} 143.52	233.83	170.51
	4			↓	u G	u G	u G	u, G	G	G u,	↓	u G	↓	↓	↓	↓	↓	U	↓	↓	↓	↓	G	5	^{9} 137.09	208.56	159.07
	5			↓	U	U	U	U	N	U	↓	u G	↓	↓	↓	↓	↓	N	↓	↓	↓	↓	↓	5	^{10} 146.04	244.96	171.23
CR 02 /	1			↓	↓	↓	↓	U	N	↓	↓	U	↓	N	↓	↓	1E, N	↓	G	G	1E	G	N	5	^{11} 144.59	251.52	186.59
	2			↓	↓	↓	↓	↓	↓	↓	↓	u G	↓	① ~~G~~ N	↓	↓	N	↓	N	N	N	N	↓	5	^{12} 141.98	243.16	174.80
	3			↓	↓	↓	N	↓	↓	↓	↓	U	↓	① ~~G~~ N	↓	↓	↓	↓	G	G	G, 1E	G	↓	5	^{13} 173.54	263.54	201.32
	4			↓	↓	↓	U	↓	↓	↓	↓	↓	↓	N	↓	↓	↓	↓	↓	↓	N	N	G, 1E	5	^{14} 155.55	235.37	180.83
	5			↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	N	↓	↓	↓	↓	1E	N	N	↓	N	5	^{15} 125.66	193.18	144.39

	Rep	Number	Tare Weight (mg)	Dry Weight (mg)	Ashed Weight (mg)
Initial Biomass	1	5	96.91	102.97 ②	
	2	5	91.75	112.77	
	3	5	103.69	127.58	

Comments:

	Tare wt. (mg)	Dry wt. (mg)	Ashed wt. (mg)
②	194.26	200.08	195.81
	152.33	157.34	153.40
	200.19	205.77	201.29

① WC, MMB 9/9/13
② Worms not properly rinsed for measurements on left
-weights on right correct and used for comparisons

20-DAY SOLID PHASE BIOASSAY
OBSERVATION DATASHEET

CLIENT	PROJECT	JOB N0.	PROJECT MANAGER	NEWFIELDS LABORATORY	PROTOCOL	SPECIES
FloydSnider	K Ply	0	B. Hester	Port Gamble Bath 7	PSEP 1995	*Neanthes arenaceodentata*

ENDPOINT DATA & OBSERVATIONS

N = Normal
#E = Emergence
#M = Mortality
G = Growth
(fungal, bacterial, or algal)
D = No Air Flow (DO?)
F = Floating on Surface
TC = Too Cloudy
U=Excess food

INITIAL # OF ORGANISMS: 5

CLIENT NEWFIELDS ID	REP	JAR	Date and Initials / INITIAL # (if differs)	8/30 JL 1	8/31 JL 2	9/01 JL 3	9/02 JL 4	9/3 MMB 5	9/4 MMB 6	9/05 JL 7	9/06 JL 8	9/07 JL 9	9/08 JL 10	9/9 MMB 11	9/10 JL 12	9/11 MMB 13	9/12 MMB 14	9/13 GP 15	9/14 JL 16	9/15 JL 17	9/16 MMB 18	9/17 JL 19	9/18 JL 20	NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)	ASHED WEIGHT (mg)
SD0001K /	1			U	U	U	U	U	N	U	u, G	u, G	G	N	G	G	IE, G	G, U	G	G	N	N	G	5	16 129.29	198.13	140.79
	2			↓	↓	↓	↓	↓	↓	u, G	U	U	N	↓	N	N	N	N	IE	N	↓	↓	N	5	17 129.24	219.95	149.89
	3			↓	↓	↓	↓	↓	↓	U	↓	↓	G	↓	↓	↓	↓	↓	G	↓	↓	IE	↓	5	18 133.84	204.34	151.07
	4			↓	↓	↓	↓	U, G	G	u, G	u, G	G	N	↓	↓	↓	↓	↓	↓	G	↓	N	G	5	19 153.66	245.92	175.26
	5			u, 2E	↓	↓	↓	U, G	G	U	U	u, G	↓	IE	G	↓	↓	↓	↓	↓	↓	↓	N	5	20 135.12	219.09	153.15
SD0002K /	1			U	↓	↓	↓	U	N	↓	u, G	u, G	G	N	G	G	G	G	G	G	N	N	G	5	21 140.83	226.11	161 61
	2			↓	↓	↓	↓	↓	↓	↓	u, G	u, G	G	G	G	↓	G	↓	↓	↓	↓	↓	↓	5	22 124.69	203.36	145.91
	3			↓	↓	↓	↓	↓	↓	↓	U	U	G	G	G	↓	IE, G	↓	↓	N	↓	↓	↓	5	23 144.79	224.74	162.00
	4			↓	↓	↓	↓	U, G	G	↓	↓	↓	N	N	G	↓	G	↓	↓	G, IE	↓	↓	G, IE	5, ~~IE~~①	24 152.86	245.62	171.47
	5			↓	↓	↓	↓	U	N	↓	u, G	u, G	↓	N	G	↓	G	↓, U	G, IE	G		↓	G	5	25 14829	230.57	167.04
SD0003K /	1			↓	↓	↓	↓	U, G	G	u, G	u, G	u, G	G	G	G, IE	G	G	G	G	G	G	G	G	5	26 147.54	249.92	173.44
	2			↓	↓	↓	↓	U, G	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	G, IE	G, IE	↓	5	27 140.63	221.03	156.58
	3			↓	↓	↓	↓	U, G	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	G	G	↓	5	28 146.35	249.15	169.76
	4			↓	↓	↓	↓	U, G	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	G, IE	↓	↓	↓	↓	5	29 138.47	222.91	157.33
	5			↓	↓	u, G	u, G	U, G	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	G	↓	↓	G, IE	↓	5	30 150.45	236.70	170.17

31 137.15
32 142.02
33 149.48

① WL. JL 9/18/13

NewFields

20 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATASHEET

CLIENT	PROJECT	START TIME/ END TIME	DILUTION WATER BATCH	PROTOCOL	TEST START DATE
FloydSnider	K Ply	1030 / 0930	FSW082813.01	PSEP 1995	29-Aug-2013
JOB NUMBER	**PROJECT MANAGER**	**NEWFIELDS LABORATORY**	**TEMP. RECDR./HOBO#**	**TEST SPECIES**	**TEST END DATE**
0	B. Hester		NA	*Neanthes arenaceodentata*	18-Sep-2013

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L) > 4.6		TEMP (C) 20 ± 1		SALINITY (ppt) 28 ± 2		pH 8.0±1.0				
				D.O.		TEMP		SALINITY		pH		WATER RENEWAL	Feeding	TECH/DATE
CLIENT/NEWFIELDS ID	DAY	REP	JAR	meter	mg/L	meter	°C	meter	ppt	meter	unit			
Control /	0	Surr	24	6	7.6	6	20.0	2	28	5	7.9		JL	HK 8/29
Control /	1	Surr	24	6	7.2	6	19.9	2	28	5	7.9			JL 8/30
Control /	2	Surr	24	6	7.4	6	19.9	2	28	5	① ~~7~~ 8.0		JL	HK 8/31
Control /	3	Surr	24	6	7.0	6	20.0	2	28	5	7.8	JL		JL 9/01
Control /	4	Surr	24	6	7.2	6	20.2	2	28	5	8.0		JL	JL 9/02
Control /	5	Surr	24	6	7.2	6	20.1	2	28	5	8.0			MMB 9/3
Control /	6	Surr	24	6	7.4	6	19.8	2	28	5	8.1	MMB	MMB	MMB 9/4
Control /	7	Surr	24	6	7.3	6	19.5	2	28	5	7.8			JL 9/05
Control /	8	Surr	24	6	7.3	6	19.5	2	28	5	8.0		JL	JL 9/06
Control /	9	Surr	24	6	7.0	6	② 22.9	2	28	5	8.1	JL		JL 9/07
Control /	10	Surr	24	6	7.4	6	20.1	2	28	5	8.2		JL	JL 9/08
Control /	11	Surr	24	6	7.7	6	19.7	2	28	5	8.0			MMB 9/9
Control /	12	Surr	24	6	7.3	6	20.3	2	28	5	8.0	JL	JL	JL 9/10
Control /	13	Surr	24	7	8.7	7	20.4	2	28	5	7.9			MMB 9/11
Control /	14	Surr	24	7	7.4	7	20.4	2	28	5	8.0		MMB	MMB 9/12
Control /	15	Surr	24	7	7.5	7	20.3	2	28	5	8.0	CR		CR 9/13
Control /	16	Surr	24	7	7.3	7	20.4	2	28	5	8.1		JL	JL 9/14
Control /	17	Surr	24	7	7.2	7	20.4	2	28	5	7.9			JL 9/15
Control /	18	Surr	24	7	7.3	7	20.4	2	28	5	8.0	MMB	MMB	MMB 9/16
Control /	19	Surr	24	7	7.2	7	20.2	2	28	5	7.9			JL 9/17
Control /	20	Surr	24	7	7.3	7	20.3	2	28	5	7.9			JL 9/18

① Mr HK 8/31

② Bath temp. adjusted down to 20.5°C. JL 9/07/13

NewFields

20 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATASHEET

CLIENT FloydSnider	PROJECT K Ply	START TIME/ END TIME 1030 / 0930	DILUTION WATER BATCH FSW082813.01	PROTOCOL PSEP 1995	TEST START DATE 29-Aug-2013
JOB NUMBER 0	PROJECT MANAGER B. Hester	NEWFIELDS LABORATORY	TEMP. RECDR./HOBO# NA	TEST SPECIES *Neanthes arenaceodentata*	TEST END DATE 18-Sep-2013

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L) > 4.6		TEMP (C) 20 ± 1		SALINITY (ppt) 28 ± 2		pH 8.0±1.0				
				D.O.		TEMP		SALINITY		pH				
CLIENT/NEWFIELDS ID	DAY	REP	JAR	meter	mg/L	meter	°C	meter	ppt	meter	unit	WATER RENEWAL	Feeding	TECH/DATE
CARR20 /	0	Surr	19	6	7.5	6	20.2	2	28	5	7.9		JL	HE 8/29
CARR20 /	1	Surr	19	6	7.2	6	20.0	2	28	5	8.0			JL 8/30
CARR20 /	2	Surr	19	6	7.3	6	20.0	2	28	5	8.2		JL	HE 8/31
CARR20 /	3	Surr	19	6	① 1.1	6	20.1	2	28	5	7.6	JL		JL 9/01
CARR20 /	4	Surr	19	6	7.3	6	20.1	2	28	5	8.2		JL	JL 9/02
CARR20 /	5	Surr	19	6	7.4	6	20.1	2	28	5	8.3			MMB 9/3
CARR20 /	6	Surr	19	6	7.3	6	20.0	2	28	5	8.2	MMB	MMB	MMB 9/4
CARR20 /	7	Surr	19	6	7.1	6	19.6	2	28	5	7.8			JL 9/05
CARR20 /	8	Surr	19	6	7.3	6	19.6	2	28	5	8.2		JL	JL 9/06
CARR20 /	9	Surr	19	6	65	6	② 22.8	2	28	5	8.1	JL		JL 9/07
CARR20 /	10	Surr	19	6	7.0	6	20.0	2	28	5	8.2		JL	JL 9/08
CARR20 /	11	Surr	19	6	7.1	6	19.9	2	28	5	8.1			MMB 9/9
CARR20 /	12	Surr	19	6	6.8	6	19.9	2	28	5	8.1	JL	JL	JL 9/10
CARR20 /	13	Surr	19	7	7.6	7	20.5	2	28	5	7.8			MMB 9/11
CARR20 /	14	Surr	19	7	6.9	7	20.4	2	28	5	8.1		MMB	MMB 9/12
CARR20 /	15	Surr	19	7	6.7	7	20.4	2	28	5	8.0	CR		CR 9/13
CARR20 /	16	Surr	19	7	6.8	7	20.3	2	28	5	8.1		JL	JL 9/14
CARR20 /	17	Surr	19	7	6.5	7	20.4	2	28	5	7.9			JL 9/15
CARR20 /	18	Surr	19	7	6.7	7	20.3	2	28	5	7.9	MMB	MMB	MMB 9/16
CARR20 /	19	Surr	19	7	6.6	7	20.2	2	28	5	7.9			JL 9/17
CARR20 /	20	Surr	19	7	6.9	7	20.2	2	28	5	7.9			JL 9/18

① Airline restored to chamber. JL 9/01/13 Remeasured at 6.3 mg/L after renewal.

② Bath temp. adjusted down to 20.5 °C JL 9/07/13.

NewFields

20 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATASHEET

CLIENT FloydSnider	PROJECT K Ply	START TIME/ END TIME 1030 / 0930	DILUTION WATER BATCH FSW082813.01	PROTOCOL PSEP 1995	TEST START DATE 29-Aug-2013
JOB NUMBER 0	PROJECT MANAGER B. Hester	NEWFIELDS LABORATORY	TEMP. RECDR./HOBO# NA	TEST SPECIES *Neanthes arenaceodentata*	TEST END DATE 18-Sep-2013

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L) > 4.6		TEMP (C) 20 ± 1		SALINITY (ppt) 28 ± 2		pH 8.0±1.0				
				D.O.		TEMP		SALINITY		pH		WATER RENEWAL	Feeding	TECH/DATE
CLIENT/NEWFIELDS ID	DAY	REP	JAR	meter	mg/L	meter	°C	meter	ppt	meter	unit			
CR 02 /	0	Surr	16	6	7.4	6	20.1	2	28	5	7.9		JL	HE 8/29
CR 02 /	1	Surr	16	6	7.1	6	20.1	2	28	5	7.9			JL 8/30
CR 02 /	2	Surr	16	6	7.4	6	20.0	2	28	5	8.0		JL	HE 8/31
CR 02 /	3	Surr	16	6	7.0	6	20.1	2	28	5	7.8	JL		JL 9/01
CR 02 /	4	Surr	16	6	7.3	6	20.2	2	28	5	8.1		OL	JL 9/02
CR 02 /	5	Surr	16	6	7.2	6	20.1	2	28	5	8.1			MMB 9/3
CR 02 /	6	Surr	16	6	7.3	6	20.0	2	28	5	8.1	MMB	MMB	MMB 9/4
CR 02 /	7	Surr	16	6	7.1	6	19.6	2	28	5	7.8			JL 9/05
CR 02 /	8	Surr	16	6	7.2	6	19.6	2	28	5	8.1		JL	JL 9/06
CR 02 /	9	Surr	16	6	6.7	6	① 21.8	2	28	5	8.2	JL		JL 9/07
CR 02 /	10	Surr	16	6	7.3	6	19.9	2	28	5	8.3		JL	JL 9/08
CR 02 /	11	Surr	16	6	7.4	6	19.8	2	28	5	8.1			MMB 9/9
CR 02 /	12	Surr	16	6	7.1	6	20.0	2	28	5	8.1	JL	JL	JL 9/10
CR 02 /	13	Surr	16	7	8.3	7	20.4	2	28	5	8.0			MMB 9/11
CR 02 /	14	Surr	16	7	7.1	7	20.4	2	28	5	8.2		MMB	MMB 9/12
CR 02 /	15	Surr	16	7	7.1	7	20.3	2	28	5	8.1	CR		CR 9/13
CR 02 /	16	Surr	16	7	7.1	7	202	2	28	5	8.1		JL	JL 9/14
CR 02 /	17	Surr	16	7	7.0	7	20.4	2	28	5	8.0			JL 9/15
CR 02 /	18	Surr	16	7	7.1	7	20.3	2	28	5	8.0	MMB	MMB	MMB 9/16
CR 02 /	19	Surr	16	7	6.9	7	20.1	2	28	5	7.9			JL 9/17
CR 02 /	20	Surr	16	7	7.2	7	20.2	2	28	5	8.0			JL 9/18

① Bath temp. adjusted down to 20.5°C. JL 9/07/13

NewFields

20 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATASHEET

CLIENT	PROJECT	START TIME/ END TIME	DILUTION WATER BATCH	PROTOCOL	TEST START DATE
FloydSnider	K Ply	1030 / 0930	FSW082813.01	PSEP 1995	29-Aug-2013
JOB NUMBER	**PROJECT MANAGER**	**NEWFIELDS LABORATORY**	**TEMP. RECDR./HOBO#**	**TEST SPECIES**	**TEST END DATE**
0	B. Hester		NA	*Neanthes arenaceodentata*	18-Sep-2013

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L) > 4.6		TEMP (C) 20 ± 1		SALINITY (ppt) 28 ± 2		pH 8.0±1.0				
CLIENT/NEWFIELDS ID	DAY	REP	JAR	D.O.		TEMP		SALINITY		pH		WATER RENEWAL	Feeding	TECH/DATE
				meter	mg/L	meter	°C	meter	ppt	meter	unit			
SD0001K /	0	Surr	23	6	7.4	6	20.1	2	28	5	7.7		JL	Hz 8/29
SD0001K /	1	Surr	23	6	6.8	6	20.0	2	28	5	7.8			JL 8/30
SD0001K /	2	Surr	23	6	7.2	6	20.0	2	28	5	8.1		JL	Hz 8/31
SD0001K /	3	Surr	23	6	6.5	6	20.0	2	28	5	8.0	JL		JL 9/01
SD0001K /	4	Surr	23	6	6.8	6	20.2	2	28	5	8.4		JL	JL 9/02
SD0001K /	5	Surr	23	6	6.4	6	20.1	2	28	5	8.5			MMB 9/3
SD0001K /	6	Surr	23	6	7.3	6	20.0	2	28	5	8.5	MMB	MMB	MMB 9/4
SD0001K /	7	Surr	23	6	7.2	6	19.5	2	28	5	8.2			JL 9/05
SD0001K /	8	Surr	23	6	7.2	6	19.6	2	28	5	8.4		JL	JL 9/06
SD0001K /	9	Surr	23	6	6.7	6	① 22.8	2	28	5	8.4	JL		JL 9/07
SD0001K /	10	Surr	23	6	7.2	6	20.0	2	28	5	8.4		JL	JL 9/08
SD0001K /	11	Surr	23	6	7.5	6	19.9	2	28	5	8.2			MMB 9/9
SD0001K /	12	Surr	23	6	7.2	6	20.0	2	28	5	8.2	JL	JL	JL 9/10
SD0001K /	13	Surr	23	② ~~6~~ 7	8.4	② ~~6~~ 7	20.5	2	28	5	8.0			MMB 9/11
SD0001K /	14	Surr	23	7	7.1	7	20.4	2	28	5	8.2		MMB	MMB 9/12
SD0001K /	15	Surr	23	7	7.1	7	20.4	2	28	5	8.1	CR		CR 9/13
SD0001K /	16	Surr	23	③ ~~6~~ 7	7.1	7	20.4	2	28	5	8.1		JL	JL 9/14
SD0001K /	17	Surr	23	7	7.0	7	20.4	2	29	5	7.9			JL 9/15
SD0001K /	18	Surr	23	7	7.0	7	20.4	2	28	5	7.9	MMB	MMB	MMB 9/16
SD0001K /	19	Surr	23	7	6.9	7	20.2	2	28	5	7.9			JL 9/17
SD0001K /	20	Surr	23	7	7.1	7	20.3	2	28	5	7.9			JL 9/18

① Bath temp. adjusted down to 20.5 °C. JL 9/07/13.
② wrong meter MMB 9/11/13
③ wrong meter. JL 9/14/13

NewFields

20 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATASHEET

CLIENT FloydSnider	PROJECT K Ply	START TIME/ END TIME 1030 / 0930	DILUTION WATER BATCH FSW082813.01	PROTOCOL PSEP 1995	TEST START DATE 29-Aug-2013
JOB NUMBER 0	PROJECT MANAGER B. Hester	NEWFIELDS LABORATORY	TEMP. RECDR./HOBO# NA	TEST SPECIES *Neanthes arenaceodentata*	TEST END DATE 18-Sep-2013

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L) > 4.6		TEMP (C) 20 ± 1		SALINITY (ppt) 28 ± 2		pH 8.0±1.0				
				D.O.		TEMP		SALINITY		pH				
CLIENT/NEWFIELDS ID	DAY	REP	JAR	meter	mg/L	meter	°C	meter	ppt	meter	unit	WATER RENEWAL	Feeding	TECH/DATE
SD0002K /	0	Surr	7	6	7.3	6	19.9	2	28	5	7.8		JL	JL 8/29
SD0002K /	1	Surr	7	6	7.2	6	19.9	2	28	5	8.0			JL 8/30
SD0002K /	2	Surr	7	6	7.2	6	19.6	2	28	5	8.0		JL	JL 8/31
SD0002K /	3	Surr	7	6	7.2	6	19.9	2	28	5	8.0	JL		JL 9/01
SD0002K /	4	Surr	7	6	7.3	6	20.0	2	28	5	8.3		JL	JL 9/02
SD0002K /	5	Surr	7	6	7.3	6	20.0	2	28	5	8.4			MMB 9/3
SD0002K /	6	Surr	7	6	7.4	6	19.9	2	28	5	8.3	MMB	MMB	MMB 9/4
SD0002K /	7	Surr	7	6	7.3	6	19.6	2	28	5	8.0			JL 9/05
SD0002K /	8	Surr	7	6	7.4	6	19.6	2	28	5	8.3		JL	JL 9/06
SD0002K /	9	Surr	7	6	6.5	6	① 22.5	2	28	5	8.0	JL		JL 9/07
SD0002K /	10	Surr	7	6	7.2	6	19.4	2	28	5	8.0		JL	JL 9/08
SD0002K /	11	Surr	7	6	7.2	6	19.6	2	29	5	7.9			MMB 9/9
SD0002K /	12	Surr	7	6	6.8	6	20.1	2	28	5	7.8	JL	JL	JL 9/10
SD0002K /	13	Surr	7	② ~~6~~ 7	8.0	② ~~6~~ 7	20.4	2	28	5	7.7			MMB 9/11
SD0002K /	14	Surr	7	7	6.9	7	20.4	2	28	5	8.0		MMB	MMB 9/12
SD0002K /	15	Surr	7	7	6.8	7	20.3	2	28	5	7.8	CR		CR 9/13
SD0002K /	16	Surr	7	③ ~~6~~ 7	7.0	7	19.9	2	29	5	7.9		JL	JL 9/14
SD0002K /	17	Surr	7	7	6.6	7	20.2	2	29	5	7.7			JL 9/15
SD0002K /	18	Surr	7	7	6.9	7	20.2	2	28	5	7.8	MMB	MMB	MMB 9/16
SD0002K /	19	Surr	7	7	6.7	7	20.2	2	28	5	7.8			JL 9/17
SD0002K /	20	Surr	7	7	6.9	7	20.2	2	28	5	7.8			JL 9/18

① Bath adjusted down to 20.5°C. JL 9/07/13

② Wrong meter, MMB 9/11/13.

③ Wrong meter. JL 9/14/13.

NewFields

20 DAY SOLID PHASE BIOASSAY
WATER QUALITY DATASHEET

CLIENT FloydSnider	PROJECT K Ply	START TIME/ END TIME 1030 / 0930	DILUTION WATER BATCH FSW082813.01	PROTOCOL PSEP 1995	TEST START DATE 29-Aug-2013
JOB NUMBER 0	PROJECT MANAGER B. Hester	NEWFIELDS LABORATORY	TEMP. RECDR./HOBO# NA	TEST SPECIES *Neanthes arenaceodentata*	TEST END DATE 18-Sep-2013

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L) > 4.6		TEMP (C) 20 ± 1		SALINITY (ppt) 28 ± 2		pH 8.0±1.0				
				D.O.		TEMP		SALINITY		pH				
CLIENT/NEWFIELDS ID	DAY	REP	JAR	meter	mg/L	meter	°C	meter	ppt	meter	unit	WATER RENEWAL	Feeding	TECH/DATE
SD0003K /	0	Surr	20	6	① ~~20~~ 7.4	6	20.1	2	28	5	7.9		JL	HE 8/29
SD0003K /	1	Surr	20	6	7.2	6	20.0	2	28	5	8.0			JL 8/30
SD0003K /	2	Surr	20	6	7.4	6	19.9	2	28	5	8.3		JL	HE 8/31
SD0003K /	3	Surr	20	6	7.1	6	19.9	2	28	5	8.2	JL		JL ② ~~8~~ 9/01
SD0003K /	4	Surr	20	6	7.3	6	20.1	2	28	5	8.5		JL	JL 9/02
SD0003K /	5	Surr	20	6	7.3	6	20.1	2	28	5	8.7			MMB 9/3
SD0003K /	6	Surr	20	6	7.3	6	20.1	2	28	5	8.5	MMB	MMB	MMB 9/4
SD0003K /	7	Surr	20	6	7.3	6	19.5	2	28	5	8.1			JL 9/05
SD0003K /	8	Surr	20	6	7.2	6	19.6	2	28	5	8.3		JL	JL 9/06
SD0003K /	9	Surr	20	6	6.4	6 ③	22.8	2	28	5	8.1	JL		JL 9/07
SD0003K /	10	Surr	20	6	7.0	6	20.0	2	28	5	8.2		JL	JL 9/08
SD0003K /	11	Surr	20	6	7.2	6	19.8	2	28	5	7.9			MMB 9/9
SD0003K /	12	Surr	20	6	7.0	6	19.8	2	28	5	7.9	JL	JL	JL 9/10
SD0003K /	13	Surr	20	④ ~~6~~ 7	7.9	④ ~~6~~ 7	20.5	2	28	5	7.7			MMB 9/11
SD0003K /	14	Surr	20	7	6.9	7	20.4	2	28	5	7.9		MMB	MMB 9/12
SD0003K /	15	Surr	20	7	6.8	7	20.4	2	28	5	7.8	CR		CR 9/13
SD0003K /	16	Surr	20	7	6.8	7	20.4	2	28	5	7.8		JL	JL 9/14
SD0003K /	17	Surr	20	7	6.3 ~~6.5~~ ⑤	7	20.4	2	28	5	7.6 ~~7.9~~ ⑤			JL 9/15
SD0003K /	18	Surr	20	7	6.5	7	20.4	2	28	5	7.6	MMB	MMB	MMB 9/16
SD0003K /	19	Surr	20	7	7.0	7	20.1	2	28	5	7.8			JL 9/17
SD0003K /	20	Surr	20	7	7.2	7	20.3	2	28	5	7.8			JL 9/18

① WC HE 8/29 ② WD. JL 9/01/13. ③ Bath temp. adjusted down to 20.5 °C. JL 9/07/13.

④ Wrong meter. MMB 9/11/13 ⑤ WP. JL 9/15/13.

NewFields **Ammonia and Sulfide Analysis Record** Page ____of____

Client/Project: K-Ply	**Organism:** Neanthes arenaceodentata	**Test Duration (days):** 20

PRETEST / [✓ **INITIAL**] / **FINAL** / **OTHER (circle one)** **DAY of TEST:** 0

[✓ **OVERLYING (OV)**] / [✓ **POREWATER (PW)**] **(circle one) / Comments:** ______________________

Calibration Standards Temperature		
Date: 8/29/13	**Temperature:** 21.6	Sample temperature should be within ±1°C of standards temperature at time and date of analysis.

Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Temp °C	Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (mg/L)	Multi-plier	Calc-ulated Sulf. (mg/L)
OV. Control	Swr.	8/29/13 JC	0.108	20.6	8/29/13 JC	N			10	0.005	NA	NA
CR-02	↓	↓	2.77	↓	↓	↓			↓	0.015	↓	↓
CARR-20			3.98							0.004		
SD0001K			1.60							0.026		
SD0002K			0.983							0.012		
SD0003K			1.09							0.010		
PW. Control			0.252	21.0			7.4	26	1	0.017	10	0.170
CR-02			19.5	22.0			7.5	28	10	0.083	NA	NA
CARR-20			21.2	↓			7.6	26	2	0.154	5	0.77
SD0001K			7.29				7.4	29	10	0.170	NA	NA
SD0002K			3.56				7.4	28	10	0.381	↓	↓
SD0003K			6.53				7.5	29	10	0.153		

NewFields **Ammonia and Sulfide Analysis Record** Page 1 of 1

Client/Project: Floyd Snider / K-Ply	**Organism:** Neanthes	**Test Duration (days):** 20

PRETEST / ~~INITIAL~~ / [✓ FINAL] / OTHER (circle one) DAY of TEST: 20

[✓ OVERLYING (OV)] / [✓ POREWATER (PW)] (circle one) / Comments: ______

Calibration Standards Temperature		
Date: 9/18/13	**Temperature:** 21.5	Sample temperature should be within ±1°C of standards temperature at time and date of analysis.

Sample ID or Description	Conc. or Rep	Date of Sampling and Initials	Ammonia Value (mg/L)	Temp °C	Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (mg/L)	Multi-plier	Calc-ulated Sulf. (mg/L)
OV. Control	Surr.	9/18/13 JC	3.88	20.5	9/19/13 JE	N	NA	NA	10	0.017	NA	NA
Carr 20	↓	↓	4.85	↓	↓	↓	↓	↓	↓	0.012	↓	↓
CR-02	↓	↓	0.177	↓	↓	↓	↓	↓	↓	0.014	↓	↓
SD00001K	↓	↓	0.171	↓	↓	↓	↓	↓	↓	0.012	↓	↓
SD00002K	↓	↓	0.0658	↓	↓	↓	↓	↓	↓	0.007	↓	↓
SD00003K	↓	↓	0.232	↓	↓	↓	↓	↓	↓	0.012	↓	↓
PW Control	↓	↓	①		9/18/13 MMB	↓	7.5	~~28~~ 28②	2	0.024	5	0.120
Carr 20	↓	↓	①		↓	↓	7.3	28	~~25~~	0.034	52	0.170
CR-02	↓	↓	2.77	22	↓	↓	6.5	28	5	0.052	2	0.104
SD00001K	↓	↓	2.32	↓	↓	↓	6.8	28	5	0.082	2	0.164
SD00002K	↓	↓	0.607	↓	↓	↓	7.0	28	2	③ ~~0.042~~ 0.040	5	0.200
SD00003K	↓	↓	1.65	↓	↓	↓	7.0	27	2	0.063	5	0.315

① Insufficient PW collected for Analyses ② I.E. JE 9/18

NewFields

ORGANISM RECEIPT LOG

Date: 8/29/13

Time: 0930

NewFields Batch No. ATS 082913

Organism / Project: Neanthes / K-Ply

Invoice Attached [✓ Yes] No

Source / Supplier: Aquatic Tox. Support

Contact: On File

No. Ordered: 400

No. Received: ~440

Source Batch: (Collection date, hatch date, etc.): Emerged 8/14/13

Condition of Organisms: (Good, fair, poor; describe.): Good

Approximate Size or Age: (Days from hatch, life stage, size class, etc.): 3-5 mm, 15 days

Shipper: NewFields Courier

B of L (Tracking No.) NA

Condition of Container: (Good, fair, poor; describe.): Good

Received By: JL

Container	D.O. (mg/L)	Temp. (°C)	Cond. or [✓ Sal.] (Include Units)	pH (Units)	Number Dead or Moribund	Technician (Initials)
1	14.8	20.9	31 ppt	7.2	0	JL

Notes:

APPENDIX A.2.2

Neanthes arenaceodentata

Juvenile Polychaete Bioassay

Reference Toxicant Test

CETIS QC Plot

Report Date: 05 Sep-13 12:31 (1 of 1)

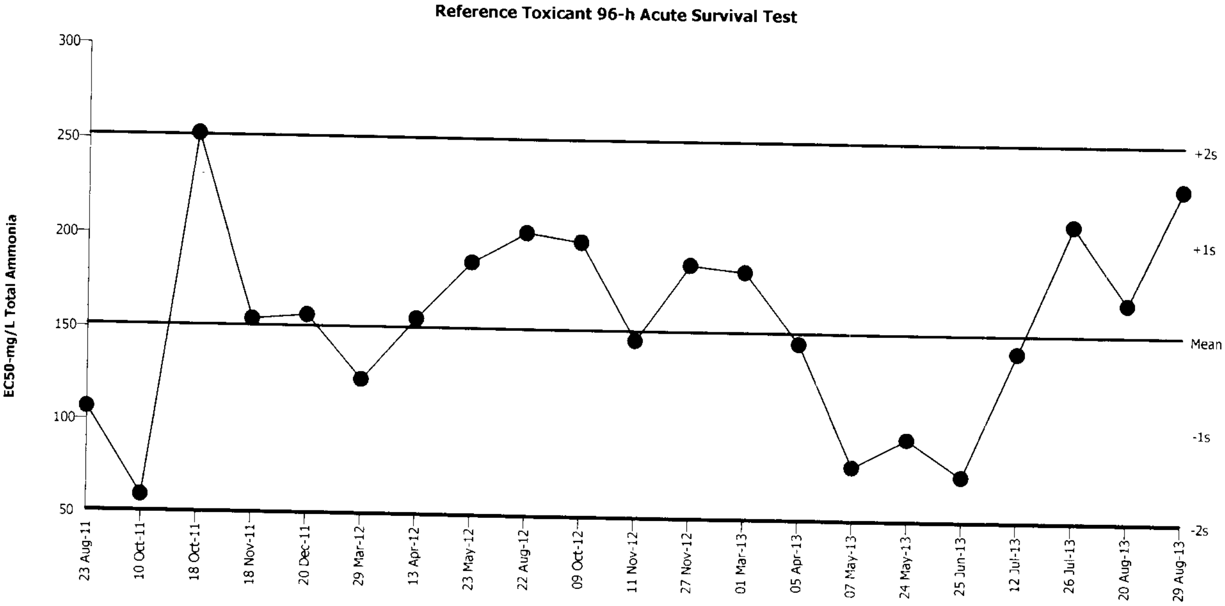
Reference Toxicant 96-h Acute Survival Test

NewFields

Test Type: Survival
Protocol: PSEP (1995)

Organism: Neanthes arenaceodentata (Polycha
Endpoint: Proportion Survived

Material: Total Ammonia
Source: Reference Toxicant-REF



Mean: 151.5
Sigma: 50.26

Count: 20
CV: 33.20%

-1s Warning Limit: 101.2
+1s Warning Limit: 201.8

-2s Action Limit: 50.98
+2s Action Limit: 252

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2011	Aug	23	11:00	106.6	-44.94	-0.8942			19-2308-3344	15-0713-7604
2		Oct	10	15:35	59.38	-92.12	-1.833	(-)		06-7843-9085	12-6856-6267
3			18	14:35	252.7	101.2	2.013	(+)	(+)	20-2964-2236	02-6630-2269
4		Nov	18	14:45	154.8	3.342	0.06649			07-1336-6281	16-3327-5847
5		Dec	20	14:25	157.3	5.831	0.116			13-2009-7329	09-6676-8731
6	2012	Mar	29	14:15	123	-28.53	-0.5677			09-7385-3936	17-7765-0407
7		Apr	13	14:00	156.2	4.727	0.09404			19-8365-3565	12-2419-3140
8		May	23	13:50	186.8	35.3	0.7023			07-1703-6447	03-0067-3412
9		Aug	22	11:00	202.7	51.16	1.018	(+)		02-2456-0921	14-8617-5684
10		Oct	9	14:00	198.3	46.76	0.9304			09-2476-6828	10-7898-4816
11		Nov	11	16:00	146.3	-5.187	-0.1032			05-7907-0031	15-4959-5175
12			27	16:05	187.1	35.6	0.7082			11-0295-5053	21-1714-9848
13	2013	Mar	1	14:40	183.7	32.21	0.6408			16-0938-7761	05-5518-0938
14		Apr	5	10:40	145.7	-5.836	-0.1161			12-4084-6308	11-0088-3368
15		May	7	13:00	79.7	-71.8	-1.429	(-)		03-6682-4675	04-2369-0564
16			24	11:30	94.89	-56.61	-1.126	(-)		19-1651-0673	18-8601-2491
17		Jun	25	14:13	75.13	-76.37	-1.519	(-)		08-9049-5052	01-8172-0753
18		Jul	12	13:20	141.9	-9.567	-0.1903			14-1288-0905	06-4191-8012
19			26	12:00	209.7	58.21	1.158	(+)		21-1882-7830	07-5315-7472
20		Aug	20	15:45	168.6	17.15	0.3411			00-0072-4465	03-0193-2385
21			29	13:40	229.1	77.63	1.545	(+)		00-4506-4349	11-1553-1817

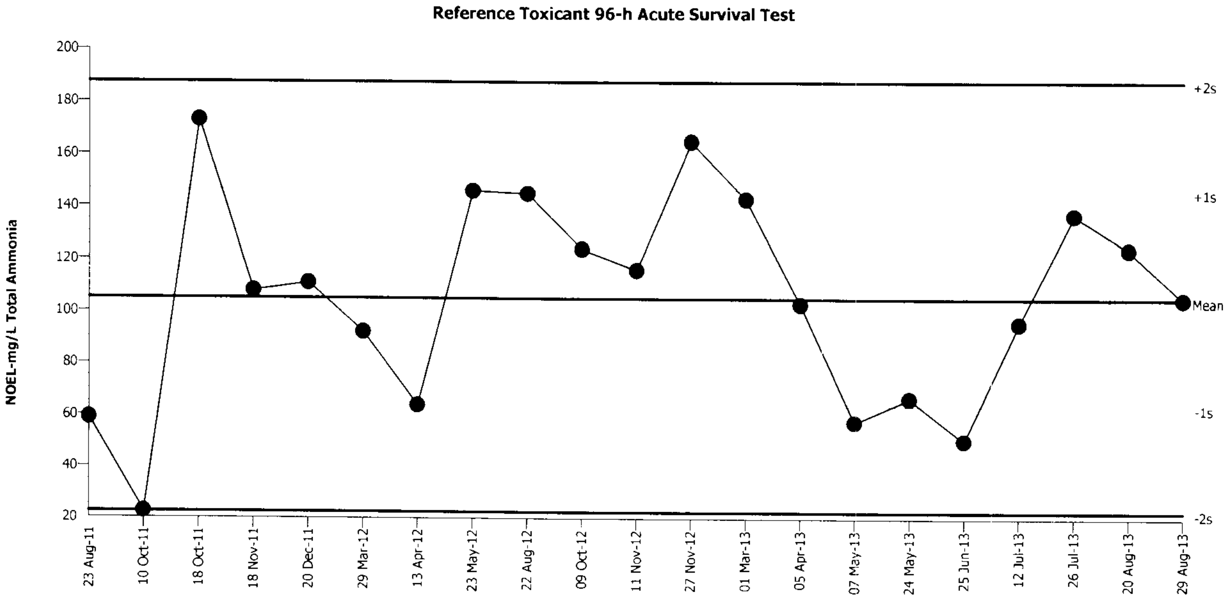
Analyst: JL QA: CR

CETIS QC Plot

Report Date: 05 Sep-13 12:31 (1 of 1)

Reference Toxicant 96-h Acute Survival Test **NewFields**

Test Type:	Survival	**Organism:**	Neanthes arenaceodentata (Polycha	**Material:**	Total Ammonia
Protocol:	PSEP (1995)	**Endpoint:**	Proportion Survived	**Source:**	Reference Toxicant-REF



Mean:	105.1	**Count:**	20	**-1s Warning Limit:**	63.78	**-2s Action Limit:**	22.46
Sigma:	41.32	**CV:**	39.30%	**+1s Warning Limit:**	146.4	**+2s Action Limit:**	187.7

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2011	Aug	23	11:00	58.9	-46.2	-1.118	(-)		19-2308-3344	00-4985-4824
2		Oct	10	15:35	22.5	-82.6	-1.999	(-)		06-7843-9085	04-4902-3567
3			18	14:35	173	67.9	1.643	(+)		20-2964-2236	18-1232-0295
4		Nov	18	14:45	108	2.9	0.07018			07-1336-6281	00-5718-5578
5		Dec	20	14:25	111	5.9	0.1428			13-2009-7329	14-4698-1316
6	2012	Mar	29	14:15	92.2	-12.9	-0.3122			09-7385-3936	12-4682-6521
7		Apr	13	14:00	63.9	-41.2	-0.9971			19-8365-3565	05-2732-2674
8		May	23	13:50	146	40.9	0.9898			07-1703-6447	01-7113-3932
9		Aug	22	11:00	145	39.9	0.9656			02-2456-0921	08-5116-1008
10		Oct	9	14:00	124	18.9	0.4574			09-2476-6828	01-8486-9232
11		Nov	11	16:00	116	10.9	0.2638			05-7907-0031	20-7001-2062
12			27	16:05	165	59.9	1.45	(+)		11-0295-5053	20-4892-3773
13	2013	Mar	1	14:40	143	37.9	0.9172			16-0938-7761	07-7870-4978
14		Apr	5	10:40	103	-2.1	-0.05082			12-4084-6308	12-0348-0416
15		May	7	13:00	57.6	-47.5	-1.15	(-)		03-6682-4675	13-3264-9963
16			24	11:30	66.7	-38.4	-0.9293			19-1651-0673	19-7443-7088
17		Jun	25	14:13	50.4	-54.7	-1.324	(-)		08-9049-5052	06-0503-5931
18		Jul	12	13:20	95.6	-9.5	-0.2299			14-1288-0905	07-0996-7321
19			26	12:00	137	31.9	0.772			21-1882-7830	14-5107-6466
20		Aug	20	15:45	124	18.9	0.4574			00-0072-4465	04-2226-9652
21			29	13:40	105	-0.1	-0.00242			00-4506-4349	03-1605-8937

Analyst: JL QA: CR

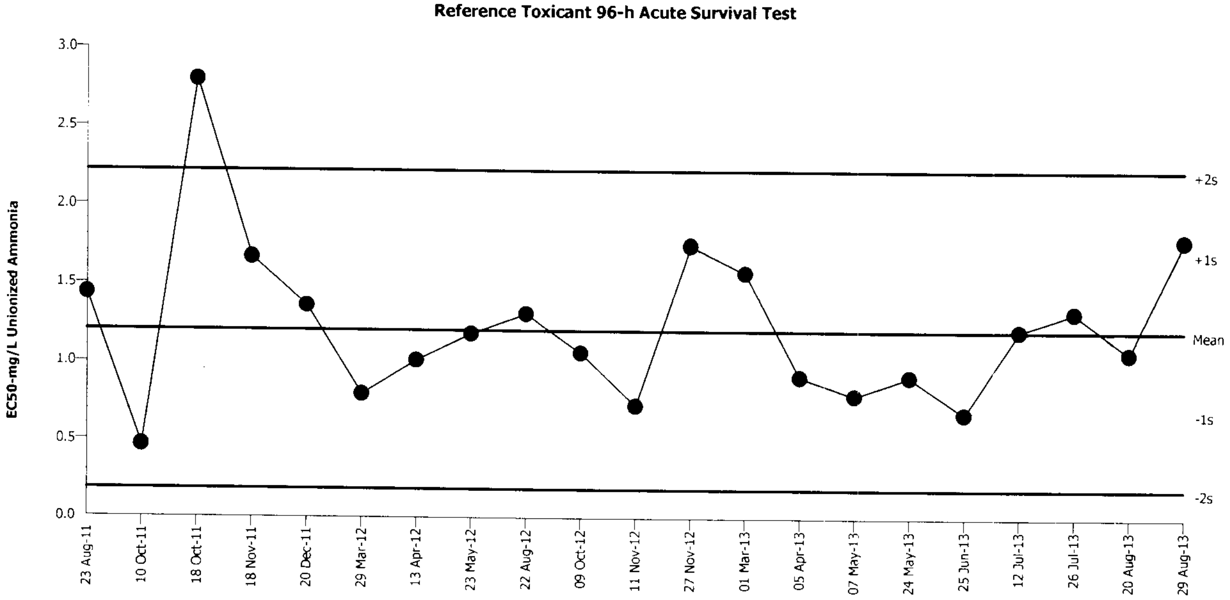
CETIS QC Plot

Report Date: 05 Sep-13 14:29 (1 of 1)

Reference Toxicant 96-h Acute Survival Test

NewFields

Test Type: Survival
Protocol: PSEP (1995)
Organism: Neanthes arenaceodentata (Polycha
Endpoint: Proportion Survived
Material: Unionized Ammonia
Source: Reference Toxicant-REF



Mean: 1.202
Sigma: 0.5084
Count: 20
CV: 42.30%
-1s Warning Limit: 0.6936
+1s Warning Limit: 1.71
-2s Action Limit: 0.1852
+2s Action Limit: 2.219

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2011	Aug	23	11:00	1.436	0.2341	0.4605			09-3666-1661	07-6184-3703
2		Oct	10	15:35	0.4667	-0.7353	-1.446	(-)		04-4548-8932	08-5329-1975
3			18	14:35	2.797	1.595	3.137	(+)	(+)	05-4042-6561	09-4508-3623
4		Nov	18	14:45	1.667	0.4651	0.9149			07-2418-7894	04-3530-8185
5		Dec	20	14:25	1.359	0.157	0.3088			01-5692-9953	01-3178-0533
6	2012	Mar	29	14:15	0.7959	-0.4061	-0.7988			11-8184-4663	15-1974-6098
7		Apr	13	14:00	1.012	-0.1901	-0.3739			19-8413-7608	13-2594-7323
8		May	23	13:50	1.183	-0.01869	-0.03677			00-6722-3532	08-3889-1635
9		Aug	22	11:00	1.31	0.1082	0.2128			12-2636-9338	18-2386-8444
10		Oct	9	14:00	1.063	-0.1389	-0.2731			11-5377-0688	17-8993-7878
11		Nov	11	16:00	0.7276	-0.4744	-0.9331			14-7469-3886	03-0259-8994
12			27	16:05	1.746	0.5436	1.069	(+)		08-6061-4466	00-3182-3735
13	2013	Mar	1	14:40	1.573	0.3714	0.7305			18-8051-2966	06-9085-4102
14		Apr	5	10:40	0.9122	-0.2898	-0.57			03-5469-7681	20-0412-7755
15		May	7	13:00	0.794	-0.408	-0.8025			11-4883-5754	10-2519-8358
16			24	11:30	0.9143	-0.2877	-0.5659			03-1268-0321	17-3627-5339
17		Jun	25	14:30	0.6782	-0.5238	-1.03	(-)		07-6412-1006	01-8270-7142
18		Jul	12	13:20	1.207	0.00519	0.01021			06-2793-5359	03-5477-0692
19			26	12:00	1.324	0.1217	0.2394			08-3568-6719	13-1071-7473
20		Aug	20	15:45	1.065	-0.1366	-0.2687			11-8125-8700	06-3963-9074
21			29	13:40	1.779	0.5769	1.135	(+)		06-4372-6299	20-5863-7836

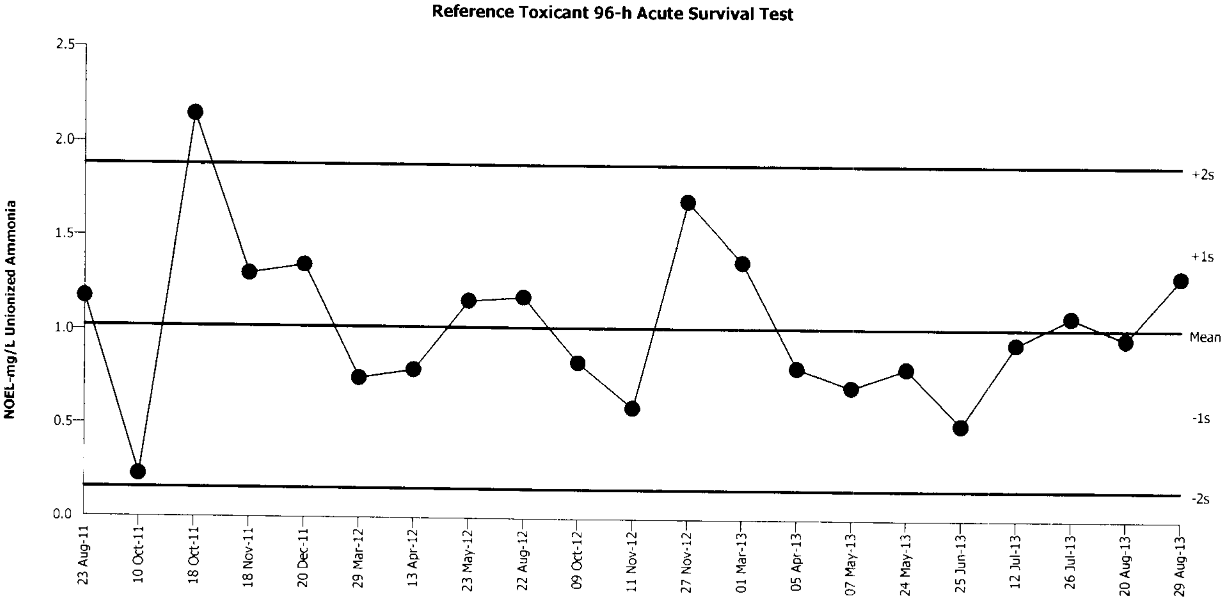
Analyst: JL QA: GR

CETIS QC Plot

Report Date: 05 Sep-13 14:29 (1 of 1)

Reference Toxicant 96-h Acute Survival Test **NewFields**

Test Type:	Survival	**Organism:**	Neanthes arenaceodentata (Polycha	**Material:**	Unionized Ammonia
Protocol:	PSEP (1995)	**Endpoint:**	Proportion Survived	**Source:**	Reference Toxicant-REF



Mean:	1.021	**Count:**	20	**-1s Warning Limit:**	0.59	**-2s Action Limit:**	0.159
Sigma:	0.431	**CV:**	42.20%	**+1s Warning Limit:**	1.452	**+2s Action Limit:**	1.883

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2011	Aug	23	11:00	1.176	0.155	0.3596			09-3666-1661	00-3462-6374
2		Oct	10	15:35	0.228	-0.793	-1.84	(-)		04-4548-8932	20-7967-8150
3			18	14:35	2.146	1.125	2.61	(+)	(+)	05-4042-6561	09-7290-5956
4		Nov	18	14:45	1.303	0.282	0.6543			07-2418-7894	02-8881-3753
5		Dec	20	14:25	1.35	0.329	0.7633			01-5692-9953	10-0045-4747
6	2012	Mar	29	14:15	0.747	-0.274	-0.6357			11-8184-4663	00-5057-1480
7		Apr	13	14:00	0.793	-0.228	-0.529			19-8413-7608	05-2899-5573
8		May	23	13:50	1.162	0.141	0.3271			00-6722-3532	11-8382-8902
9		Aug	22	11:00	1.183	0.162	0.3759			12-2636-9338	02-6993-9000
10		Oct	9	14:00	0.836	-0.185	-0.4292			11-5377-0688	14-5701-8660
11		Nov	11	16:00	0.596	-0.425	-0.9861			14-7469-3886	17-5882-8497
12			27	16:05	1.693	0.672	1.559	(+)		08-6061-4466	05-8355-5463
13	2013	Mar	1	14:40	1.373	0.352	0.8167			18-8051-2966	09-6023-4535
14		Apr	5	10:40	0.811	-0.21	-0.4872			03-5469-7681	20-7653-9268
15		May	7	13:00	0.71	-0.311	-0.7216			11-4883-5754	20-7240-7121
16			24	11:30	0.81	-0.211	-0.4896			03-1268-0321	20-4684-2719
17		Jun	25	14:30	0.51	-0.511	-1.186	(-)		07-6412-1006	18-2969-6397
18		Jul	12	13:20	0.943	-0.078	-0.181			06-2793-5359	18-9450-4090
19			26	12:00	1.087	0.066	0.1531			08-3568-6719	20-5296-6252
20		Aug	20	15:45	0.97	-0.051	-0.1183			11-8125-8700	00-8450-2616
21			29	13:40	1.301	0.28	0.6497			06-4372-6299	17-0691-0612

Analyst: JL QA:

CETIS Summary Report

Report Date: 05 Sep-13 10:50 (p 1 of 1)
Test Code: 2AFA09D | 00-4506-4349

Reference Toxicant 96-h Acute Survival Test

NewFields

Batch ID: 01-8887-4364
Start Date: 29 Aug-13 13:40
Ending Date: 02 Sep-13 13:00
Duration: 95h

Test Type: Survival
Protocol: PSEP (1995)
Species: Neanthes arenaceodentata
Source: Aquatic Toxicology Support

Analyst:
Diluent: Laboratory Seawater
Brine: Not Applicable
Age:

Sample ID: 01-5656-9147
Sample Date: 27 Sep-11
Receive Date: 27 Sep-11
Sample Age: 702d 14h

Code: 9550E3B
Material: Total Ammonia
Source: Reference Toxicant
Station: P110927.153

Client: Internal Lab
Project: Reference Toxicant

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
03-1605-8937	Proportion Survived	105	201	145.3	13.9%		Bonferroni Adj t Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
11-1553-1817	Proportion Survived	EC50	229.1	205.5	255.5		Spearman-Kärber

Proportion Survived Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	1	1	1	1	1	0	0	0.0%	0.0%
27		3	1	1	1	1	1	0	0	0.0%	0.0%
53.9		3	1	1	1	1	1	0	0	0.0%	0.0%
105		3	1	1	1	1	1	0	0	0.0%	0.0%
201		3	0.7	0.2032	1	0.5	0.9	0.1155	0.2	28.57%	30.0%
386		3	0	0	0	0	0	0	0		100.0%

Proportion Survived Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	1	1
27		1	1	1
53.9		1	1	1
105		1	1	1
201		0.9	0.7	0.5
386		0	0	0

Proportion Survived Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	10/10	10/10	10/10
27		10/10	10/10	10/10
53.9		10/10	10/10	10/10
105		10/10	10/10	10/10
201		9/10	7/10	5/10
386		0/10	0/10	0/10

Analyst: JL QA:

CETIS Summary Report

Report Date: 05 Sep-13 11:12 (p 1 of 1)
Test Code: 265E7BDB | 06-4372-6299

Reference Toxicant 96-h Acute Survival Test

NewFields

Batch ID:	13-8206-9525	**Test Type:**	Survival	**Analyst:**	
Start Date:	29 Aug-13 13:40	**Protocol:**	PSEP (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	02 Sep-13 13:00	**Species:**	Neanthes arenaceodentata	**Brine:**	Not Applicable
Duration:	95h	**Source:**	Aquatic Toxicology Support	**Age:**	

Sample ID:	16-5246-9217	**Code:**	627EADE1	**Client:**	Internal Lab
Sample Date:	27 Sep-11	**Material:**	Unionized Ammonia	**Project:**	Reference Toxicant
Receive Date:	27 Sep-11	**Source:**	Reference Toxicant		
Sample Age:	702d 14h	**Station:**	P110927.153		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
17-0691-0612	Proportion Survived	1.301	1.578	1.433	13.9%		Bonferroni Adj t Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
20-5863-7836	Proportion Survived	EC50	1.779	1.689	1.873		Spearman-Kärber

Proportion Survived Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	1	1	1	1	1	0	0	0.0%	0.0%
0.522		3	1	1	1	1	1	0	0	0.0%	0.0%
0.832		3	1	1	1	1	1	0	0	0.0%	0.0%
1.301		3	1	1	1	1	1	0	0	0.0%	0.0%
1.578		3	0.7	0.2032	1	0.5	0.9	0.1155	0.2	28.57%	30.0%
2.414		3	0	0	0	0	0	0	0		100.0%

Proportion Survived Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	1	1
0.522		1	1	1
0.832		1	1	1
1.301		1	1	1
1.578		0.9	0.7	0.5
2.414		0	0	0

Proportion Survived Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	10/10	10/10	10/10
0.522		10/10	10/10	10/10
0.832		10/10	10/10	10/10
1.301		10/10	10/10	10/10
1.578		9/10	7/10	5/10
2.414		0/10	0/10	0/10

Analyst: JL QA: CR

CETIS Test Data Worksheet

Report Date: 05 Sep-13 10:44 (p 1 of 1)
Test Code: 00-4506-4349/2AFA09D

Reference Toxicant 96-h Acute Survival Test

NewFields

Start Date: 29 Aug-13 13:40
End Date: 02 Sep-13 13:00
Sample Date: 27 Sep-11

Species: Neanthes arenaceodentata
Protocol: PSEP (1995)
Material: Total Ammonia

Sample Code: 9550E3B
Sample Source: Reference Toxicant
Sample Station: P110927.153

C-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	7	10	10	
0	D	2	8	10	10	
0	D	3	1	10	10	
27		1	4	10	10	
27		2	9	10	10	
27		3	17	10	10	
53.9		1	15	10	10	
53.9		2	14	10	10	
53.9		3	11	10	10	
105		1	3	10	10	
105		2	12	10	10	
105		3	2	10	10	
201		1	6	10	9	
201		2	13	10	7	
201		3	16	10	5	
386		1	5	10	0	
386		2	10	10	0	
386		3	18	10	0	

Analyst: JL

QA: CR

CETIS Test Data Worksheet

Report Date: 05 Sep-13 11:11 (p 1 of 1)
Test Code: 06-4372-6299/265E7BDB

Reference Toxicant 96-h Acute Survival Test

NewFields

Start Date: 29 Aug-13 13:40
End Date: 02 Sep-13 13:00
Sample Date: 27 Sep-11

Species: Neanthes arenaceodentata
Protocol: PSEP (1995)
Material: Unionized Ammonia

Sample Code: 627EADE1
Sample Source: Reference Toxicant
Sample Station: P110927.153

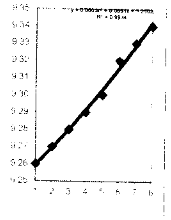
C-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	16	10	10	
0	D	2	9	10	10	
0	D	3	18	10	10	
0.522		1	12	10	10	
0.522		2	11	10	10	
0.522		3	4	10	10	
0.832		1	13	10	10	
0.832		2	2	10	10	
0.832		3	7	10	10	
1.301		1	3	10	10	
1.301		2	6	10	10	
1.301		3	1	10	10	
1.578		1	5	10	9	
1.578		2	14	10	7	
1.578		3	17	10	5	
2.414		1	8	10	0	
2.414		2	10	10	0	
2.414		3	15	10	0	

Analyst: JL QA: GR

CLIENT:	Internal	Date of Test:	29-Aug-13
PROJECT:	RT	Test Type:	*Neanthes*
COMMENTS:			

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding NH3T, salinity, temperature, and pH

Integer:	I-factor
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



	Sample	Mod NH3T (mg/L)	salinity (ppt)	pH	temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
	Target / Sample Name	Actual	22.9	8.0	24.1	**297.26**	**9.3053**	**#VALUE!**
	Example 3.5	2.000	10.0	7.5	5.0	**278.16**	**9.2750**	**0.008**
1								
2	15	27				292.26	9.3187	**0.522**
3	30	53.9				292.26	9.3187	**0.832**
4	60	105				292.36	9.3187	**1.301**
5	120	201				292.36	9.3187	**1.578**
6	240	386				292.46	9.3214	**2.414**
7								
8								
9								
10								
11								
12								
13								
14								
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NewFields 96-HOUR REFERENCE TOXICANT TEST WATER QUALITY DATASHEET

CLIENT	PROJECT	SPECIES	NEWFIELDS LABORATORY		PROTOCOL
FloydSnider	K Ply	*Neanthes arenaceodentata*	Port Gamble Bath 7		PSEP 1995
NEWFIELDS JOB NUMBER	**PROJECT MANAGER**	**TEST START DATE:**	**TIME**	**TEST END DATE**	**TIME**
0	B. Hester	29Aug13	1340	02Sep13	1300
Test ID	**LOT #:**				
8110927.153	111079				

WATER QUALITY DATA

DILTIN.WAT.BATCH	TEMP REC#	REFERENCE TOX. MATERIAL	REFERENCE TOXICANT
FSW082813.01		ammonium chloride	ammonia - TAN

TEST CONDITIONS					DO (mg/L)		TEMP(C)		SAL (ppt)		pH		TECHNICIAN	
					> 4.6		20 ± 1		28 ± 2		7 - 9			
CLIENT/ NEWFIELDS ID	CONCENTRATION		DAY	REP	D.O.		TEMP.		SALINITY		pH		WQ TECH	
	value	units			meter	mg/L	meter	°C	meter	ppt	meter	unit		
Ref.Tox.- ammonia - TAN Target:	0	mg/L	0	Stock	6	7.7	6	① ~~18.5~~ 19.0	2	28	5	7.8	HE	8/29
Actual:			4	Rep	6	7.0	6	20.3	2	28	5	8.1	JL	9/02
Ref.Tox.- ammonia - TAN Target:	15	mg/L	0	Stock	6	7.8	6	19.1	2	28	5	7.8	HE	8/29
Actual:			4	Rep	6	6.9	6	20.3	2	28	5	8.0	JL	9/02
Ref.Tox.- ammonia - TAN Target:	30	mg/L	0	Stock	6	7.8	6	19.1	2	28	5	7.7	HE	8/29
Actual:			4	Rep	6	7.1	6	20.3	2	28	5	8.0	JL	9/02
Ref.Tox.- ammonia - TAN Target:	60	mg/L	0	Stock	6	7.8	6	19.2	2	28	5	7.6	HE	8/29
Actual:			4	Rep	6	7.2	6	20.3	2	28	5	8.0	JL	9/02
Ref.Tox.- ammonia - TAN Target:	120	mg/L	0	Stock	6	7.7	6	19.2	2	29	5	7.4	HE	8/29
Actual:			4	Rep	6	6.9	6	20.3	2	28	5	7.9	JL	9/02
Ref.Tox.- ammonia - TAN Target:	240	mg/L	0	Stock	6	7.7	6	19.3	2	29	5	7.3	HE	8/29
Actual:			4	Rep										

① MR HE 8/29

NewFields 9 IOUR REFERENCE TOXICAN EST
OBSERVATION DATASHEET

CLIENT FloydSnider	**PROJECT** K Ply	**NEWFIELDS JOB #** 0	**PROJECT MANAGER** B. Hester	**NEWFIELDS LAB** Port Gamble Bath 7	**PROTOCOL** PSEP 1995

SPECIES *Neanthes arenaceodentata*

SURVIVAL & BEHAVIOR DATA

OBSERVATIONS KEY
N = normal
Q = quiescent
D = Discolored
F = Floating on surface

INITIAL # OF ORGANISMS 10

					DAY 1			DAY 2			DAY 3			DAY 4		
					DATE 8/30/13			DATE 8/31			DATE 9/01			DATE 9/02		
					TECHNICIAN JL			TECHNICIAN JL			TECHNICIAN JL			TECHNICIAN JV		
CLIENT/ NEWFIELDS ID	CONC. value	CONC. units	REP	INITIAL # if differs	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS
Ref.Tox.- ammonia - TAN	0	mg/L	1		10	0	N	10	0	N	10	0	N	10	0	N
			2		10	0	|	10	0	|	10	0	|	10	0	|
			3		10	0	↓	10	0	↓	10	0	↓	10	0	↓
Ref.Tox.- ammonia - TAN	15	mg/L	1		10	0	N	10	0	N	10	0	N	10	0	N
			2		10	0	|	10	0	|	10	0	|	10	0	|
			3		10	0	↓	10	0	↓	10	0	↓	10	0	↓
Ref.Tox.- ammonia - TAN	30	mg/L	1		10	0	N	10	0	N	10	0	N	10	0	N
			2		10	0	|	10	0	|	10	0	|	10	0	|
			3		10	0	↓	10	0	↓	10	0	↓	10	0	↓
Ref.Tox.- ammonia - TAN	60	mg/L	1		10	0	N	10	0	N	10	0	N	10	0	Q
			2		10	0	|	10	0	|	10	0	|	10	0	|
			3		10	0	↓	10	0	↓	10	0	↓	10	0	↓
Ref.Tox.- ammonia - TAN	120	mg/L	1		10	0	Q	10	0	Q	10	0	Q	9	1	Q
			2		10	0	|	10	0	|	10	0	|	7	3	|
			3		10	0	↓	10	0	↓	10	0	↓	5	5	↓
Ref.Tox.- ammonia - TAN	240	mg/L	1		10	0	Q	0	10	NA						
			2		10	0	|	0	10	|						
			3		10	0	↓	0	10	↓						

NewFields Ammonia Reference Toxicant Spiking Worksheet

Neanthes NH_3 RT

Assumptions in Model
Stock ammonia concentration is 10,000 mg/L = 10 mg/mL

Actual Reading reading from
6820

Test Solutions			Volume of stock to reach desired concentration	
Measured Concentration	Desired Concentration	Volume		
mg/L	mg/L	mL	mL stock to increase	
			[redacted]	SALT WATER (mL)
386	**240**	750	[redacted]	**39.589**
201	**120**	750	[redacted]	**19.795**
105	**60**	750	[redacted]	**9.897**
53.9	**30**	750	[redacted]	**4.949**
27.0	**15**	750	[redacted]	**2.474**
0.0378	0		[redacted]	
			[redacted]	
			[redacted]	

APPENDIX A.3.1

Mytilus galloprovincialis

Benthic Larval Bioassay

Laboratory Data Sheets

NewFields

LARVAL DEVELOPMENT TEST
ENDPOINT DATA

			SPECIES *Mytilus galloprovincialis*		
CLIENT Floyd Snider	PROJECT K-Ply	JOB NUMBER 860.0093.000	PROJECT MANAGER B. Hester	NEWFIELDS LAB / LOCATION Port Gamble / Bath 7	PROTOCOL PSEP (1995)
ORGANISM BATCH TS 4580		TEST START DATE: 8/28/13	TIME 1650	TEST END DATE: 8/30/13	TIME 1700

LARVAL OBSERVATION DATA

CLIENT/ NEWFIELDS ID	REP	NUMBER NORMAL	NUMBER	DATE	TECHNICIAN	COMMENTS
STOCKING DENSITY	1		317	~~8/27/13~~ ①	CR	
	2		331			
	3		358			
	4		334			
	5		337	↓	↓	
Control /	1	331	15	~~8/26/13~~ ①	CR	
	2	330	20			
	3	317	12			
	4	317	16			
	5	303	21			
CARR20 /	1	77	216			
	2	206	93			
	3	305	14			
	4	152	146			
	5	261	77			
CR 02 /	1	234	4			
	2	277	7			
	3	287	8			
	4	291	6			
	5	263	3			
SD0001K /	1	253	10			
	2	262	7			
	3	272	10			
	4	278	18			
	5	301	9	↓	↓	

① Wrong date test counted 9/2-9/3/13

NewFields

LARVAL DEVELOPMENT TEST
ENDPOINT DATA

			SPECIES *Mytilus galloprovincialis*		
CLIENT Floyd Snider	PROJECT K-Ply	JOB NUMBER 860.0093.000	PROJECT MANAGER B. Hester	NEWFIELDS LAB / LOCATION Port Gamble / Bath 7	PROTOCOL PSEP (1995)
ORGANISM BATCH TS 4580	TEST START DATE: 8/28/13	TIME 1650	TEST END DATE: 8/30/13	TIME 1700	

LARVAL OBSERVATION DATA

CLIENT/ NEWFIELDS ID	REP	NUMBER NORMAL	NUMBER	DATE	TECHNICIAN	COMMENTS
SD0002K /	1	225	49	~~8/28/13~~①	CR	
	2	277	10			
	3	257	20			
	4	276	15			
	5	200	57			
SD0003K /	1	270	5			
	2	284	9			
	3	261	22			
	4	225	11			
	5	269	12	↓	↓	

①Wrong date test counted 9/2-9/3/13

NewFields

LARVAL DEVELOPMENT TEST
WATER QUALITY DATA

CLIENT	PROJECT	SPECIES		NEWFIELDS LAB / LOCATION	PROTOCOL
Floyd Snider	K-Ply	*Mytilus galloprovincialis*		Port Gamble / Bath 7	PSEP (1995)
JOB NUMBER	PROJECT MANAGER	TEST START DATE	TIME	TEST END DATE	TIME
860.0093.000	B. Hester	28Aug13	1650	8/30/13	1700

* Day 3&4 observations needed only if development endpoint not met by day 2

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L) >5.0		Temp (°C) 16 ± 1		Sal (ppt) 28 ± 1		pH 7 - 9		Ammonia NA		Sulfide NA		TECH	DATE
				D.O.		TEMP.		SALINITY		pH		AMMONIA		SULFIDE			
CLIENT/ NEWFIELDS ID	DAY	Random #	REP	meter	mg/L	meter	°C	meter	ppt	meter	unit	Techn.	mg/L (total)	Techn.	mg/L (Total)		
Control /	0	24	WQ Surr	6	7.6	6	16.2	2	29	5	7.8	MMB	0.0622	MMB	0.00	MMB	8/28
Control /	1	24	WQ Surr	6	③ [illegible]		15.3	2	29	5	7.9					TK	8/29
Control /	2	24	WQ Surr	6	8.0	6	15.6	2	29	5	8.0	JL	0.0647	JL	0.023	JL	8/30
Control /	3	24	WQ Surr														
Control /	4	24	WQ Surr														
CARR20 /	0	19	WQ Surr	6	6.4	6	16.3	2	29	5	7.9	MMB	~~0.210~~ 0.248 ①	MMB	0.112	MMB	8/28
CARR20 /	1	19	WQ Surr	6	② ~~6~~ 8.0	6	15.7	2	29	5	7.9					TK	8/29
CARR20 /	2	19	WQ Surr	6	7.3	6	16.8	2	29	5	7.9	JL	0.0839	JL	0.025	JL	8/30
CARR20 /	3	19	WQ Surr														
CARR20 /	4	19	WQ Surr														
CR 02 /	0	16	WQ Surr	6	6.8	6	16.4	2	29	5	7.9	MMB	0.210	MMB	0.117	MMB	8/28
CR 02 /	1	16	WQ Surr	6	7.5	6	17.1	2	29	5	7.8					TK	8/29
CR 02 /	2	16	WQ Surr	6	7.7	6	16.8	2	29	5	7.9	JL	0.0167	JL	0.030	JL	8/30
CR 02 /	3	16	WQ Surr														
CR 02 /	4	16	WQ Surr														

① WC, MMB 8/28/13 ② WC TK 8/29 ③ WLT: value 8.1 TK 8/29

NewFields

LARVAL DEVELOPMENT TEST
WATER QUALITY DATA

CLIENT	PROJECT	SPECIES		NEWFIELDS LAB / LOCATION	PROTOCOL
Floyd Snider	K-Ply	*Mytilus galloprovincialis*		Port Gamble / Bath 7	PSEP (1995)
JOB NUMBER	PROJECT MANAGER	TEST START DATE	TIME	TEST END DATE	TIME
860.0093.000	B. Hester	28Aug13	1650	8/30/13	1700

* Day 3&4 observations needed only if development endpoint not met by day 2

WATER QUALITY DATA

TEST CONDITIONS				DO (mg/L) >5.0		Temp (°C) 16 ± 1		Sal (ppt) 28 ± 1		pH 7 - 9		Ammonia NA		Sulfide NA		TECH	DATE
CLIENT/ NEWFIELDS ID	DAY	Random #	REP	D.O.		TEMP.		SALINITY		pH		AMMONIA		SULFIDE			
				meter	mg/L	meter	°C	meter	ppt	meter	unit	Techn.	mg/L (total)	Techn.	mg/L (Total)		
SD0001K /	0	23	WQ Surr	6	6.0	6	16.6	2	29	5	7.8	MMB	0.104	MMB	0.170	MMB	8/28
SD0001K /	1	23	WQ Surr	6	8.0	6	15.8	2	29	5	7.9					[illegible]	8/29
SD0001K /	2	23	WQ Surr	6	7.8	6	16.2	2	29	5	8.0	JL	0.0546	JL	0.042	JL	8/30
SD0001K /	3	23	WQ Surr														
SD0001K /	4	23	WQ Surr														
SD0002K /	0	7	WQ Surr	6	6.1	6	16.5	2	29	5	7.8	MMB	0.0616	MMB	0.125	MMB	8/28
SD0002K /	1	7	WQ Surr	6	7.4	6	17.0	2	29	5	7.7					[illegible]	8/29
SD0002K /	2	7	WQ Surr	6	7.6	6	16.8	2	29	5	7.8	JL	0.0210	JL	0.019	JL	8/30
SD0002K /	3	7	WQ Surr														
SD0002K /	4	7	WQ Surr														
SD0003K /	0	20	WQ Surr	6	5.7	6	16.7	2	29	5	7.8	MMB	0.0746	MMB	0.127	MMB	8/28
SD0003K /	1	20	WQ Surr	6	8.0	6	15.4	2	29	5	7.8					[illegible]	8/29
SD0003K /	2	20	WQ Surr	6	8.1	6	15.8	2	29	5	7.9	JL	0.00	JL	0.010	JL	8/30
SD0003K /	3	20	WQ Surr														
SD0003K /	4	20	WQ Surr														

NewFields

LARVAL DEVELOPMENT TEST INITIATION DATA SHEET

CLIENT	PROJECT	JOB NUMBER	PROJECT MANAGER	LABORATORY	PROTOCOL
Floyd Snider	K-Ply	860.0093.000	B. Hester	Port Gamble Bath 7	PSEP (1995)

TEST ORGANISM SPAWNING DATA

SPECIES *Mytilus galloprovincialis*			
SUPPLIER Taylor Shellfish			ORGANISM BATCH TS 4580
DATE RECEIVED 8.27.13		TIME RECEIVED 1200	DATE USED 8.28.13
SPAWNING METHOD feed/heat shock		INITIAL SPAWNING TIME 1430	FINAL SPAWNING TIME 1457
MALES 3	FEMALES 5	SPERM VIABILITY fair	EGG CONDITION Good
BEGIN FERTILIZATION 1457		END FERTILIZATION 1650	CONDITION OF EMBRYOS Good

SAMPLE STORAGE 4 Degrees Celsius - dark
SEDIMENT TREATMENT none
TEST CHAMBERS 1 L Mason Jars
EXPOSURE VOLUME 900mL seawater / 18g Sediment
TIME OF SHAKE 1215-1230
TIME OF INITIATION 1650

SPECIAL CONDITIONS

UV LIGHT EXPOSURE (YES/NO)	AERATION FROM TEST INITIATION (YES/NO)
No	No
SCREEN TUBE TEST (YES/NO)	**OTHER (EXPLAIN)**
No	Resuspension

EMBRYO DENSITY CALCULATIONS

65 x 100 = 6500 embryos/mL

Target

$\frac{27,000}{6500} = 4.15$

deliver 4.15 mL/chamber

RT

$\frac{2700}{6500} = 0.415 \cdot 100 mL = 42 mL$ egg stock

58 mL C-H_2O

deliver

0.100 mL/vial

NewFields

ORGANISM RECEIPT LOG

Date: 8.27.13

Time: 1200

NewFields Batch No. TS 4580

Organism / Project: M. galloprovincialis / K-Ply

Invoice Attached Yes [✓ No]

Source / Supplier: Taylor Shellfish

Contact: Karen Underwood

No. Ordered: 1 batch

No. Received: 1 batch

Source Batch: (Collection date, hatch date, etc.): Field

Condition of Organisms: (Good, fair, poor; describe.): Good Lots of immature seed

Approximate Size or Age: (Days from hatch, life stage, size class, etc.): Adult

Shipper: UPS

B of L (Tracking No.) 1Z 98X 6850100034580

Condition of Container: (Good, fair, poor; describe.): Good

Received By: BH

Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	Number Dead or Moribund	Technician (Initials)
1	—	11.3	—	—	—	BH

Notes: transported dry w/ blu ice packs

APPENDIX A.3.2

Mytilus galloprovincialis

Benthic Larval Bioassay

Reference Toxicant Test

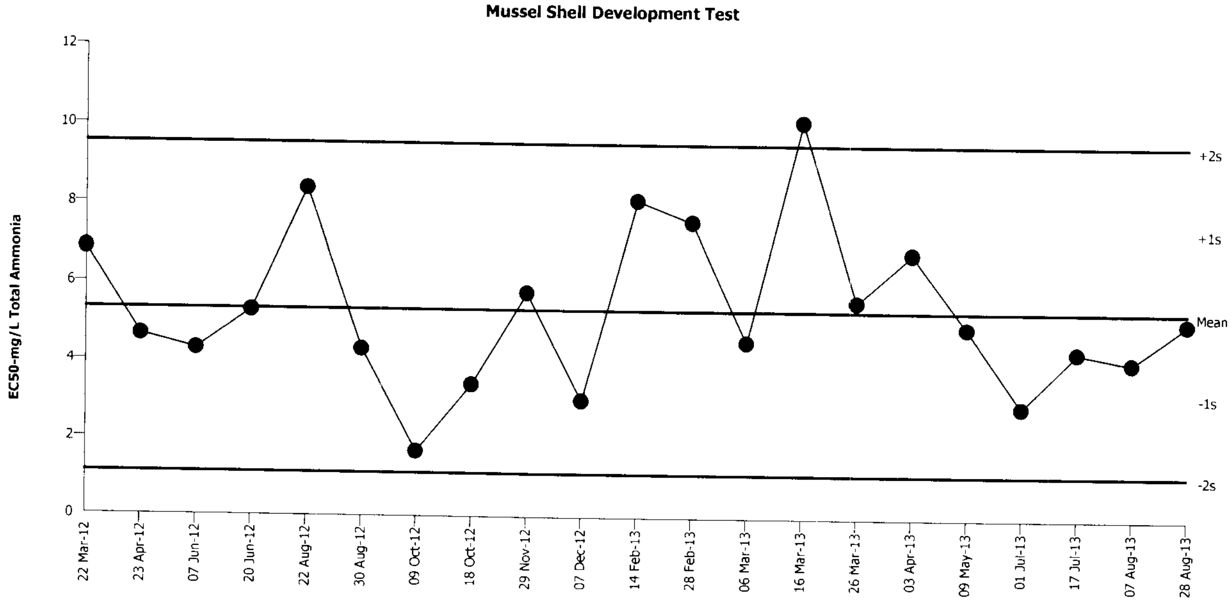
CETIS QC Plot

Report Date: 09 Oct-13 14:35 (1 of 1)

Mussel Shell Development Test

NewFields

Test Type:	Development-Survival	**Organism:**	Mytilus galloprovincialis (Bay Mussel	**Material:**	Total Ammonia
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	Combined Proportion Normal	**Source:**	Reference Toxicant-REF



Mean:	5.33	**Count:**	20	**-1s Warning Limit:**	3.226	**-2s Action Limit:**	1.122
Sigma:	2.104	**CV:**	39.50%	**+1s Warning Limit:**	7.434	**+2s Action Limit:**	9.538

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	Mar	22	12:15	6.852	1.522	0.7232			08-5068-3541	09-7191-1867
2		Apr	23	18:45	4.66	-0.6696	-0.3183			02-7458-4371	07-2969-7564
3		Jun	7	18:15	4.304	-1.026	-0.4879			20-4612-5080	14-0164-5214
4			20	17:50	5.296	-0.03424	-0.01627			21-1169-3016	00-2068-7937
5		Aug	22	16:05	8.376	3.046	1.448	(+)		03-0988-3309	14-8872-2540
6			30	17:50	4.311	-1.019	-0.4844			00-6833-5106	09-9193-8473
7		Oct	9	18:00	1.678	-3.652	-1.736	(-)		06-6024-3093	07-1414-6248
8			18	18:00	3.41	-1.92	-0.9126			07-3550-9263	15-5292-9085
9		Nov	29	17:45	5.775	0.4445	0.2113			04-0681-3114	00-7625-5304
10		Dec	7	18:50	3.016	-2.314	-1.1	(-)		15-7850-6619	03-0562-1566
11	2013	Feb	14	17:40	8.112	2.782	1.322	(+)		02-6193-4857	04-9672-9086
12			28	21:20	7.574	2.244	1.066	(+)		06-9403-7957	07-8992-4017
13		Mar	6	16:45	4.538	-0.7923	-0.3766			20-1267-3706	09-5346-5604
14			16	17:45	10.13	4.797	2.28	(+)	(+)	14-2253-0526	18-0087-0374
15			26	18:15	5.579	0.2491	0.1184			03-8532-3895	00-6308-0782
16		Apr	3	0:00	6.805	1.475	0.7012			10-3604-5723	04-8356-0800
17		May	9	17:15	4.927	-0.4033	-0.1917			00-6360-9095	16-4147-0802
18		Jul	1	19:00	2.895	-2.435	-1.157	(-)		19-5961-2730	13-0986-6895
19			17	17:55	4.313	-1.017	-0.4832			18-2536-1347	00-8750-2223
20		Aug	7	19:00	4.051	-1.279	-0.608			04-7788-4843	09-8595-7999
21			28	16:55	5.063	-0.2673	-0.127			19-6611-9162	04-7207-2891

Analyst: CR QA: CR

CETIS QC Plot

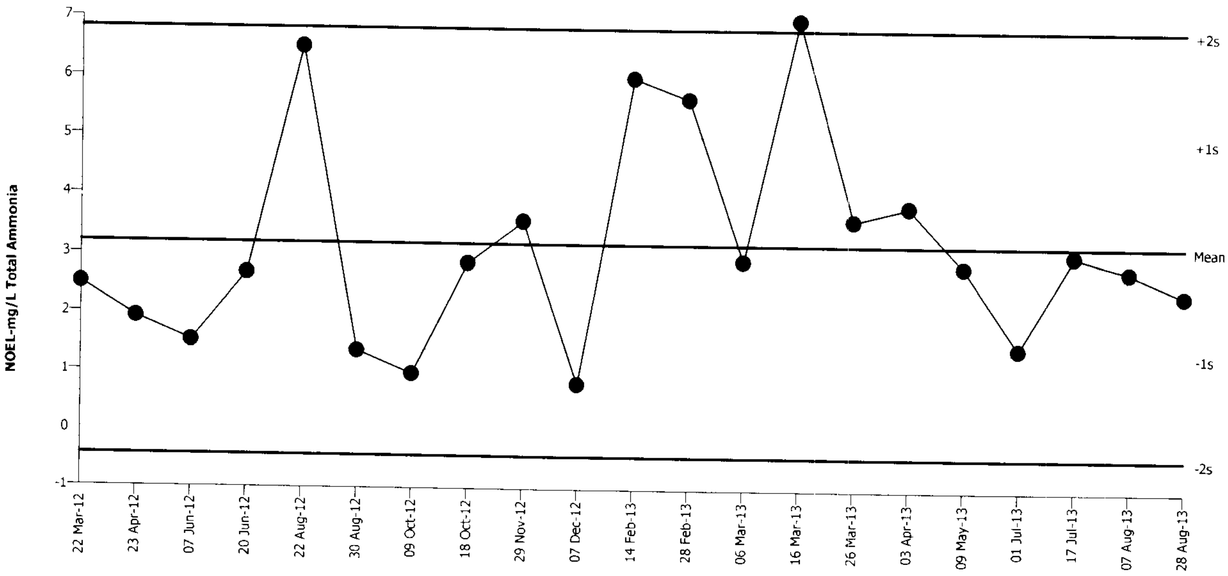
Report Date: 10 Oct-13 09:21 (1 of 1)

Mussel Shell Development Test

NewFields

Test Type:	Development-Survival	**Organism:**	Mytilus galloprovincialis (Bay Mussel	**Material:**	Total Ammonia
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	Combined Proportion Normal	**Source:**	Reference Toxicant-REF

Mussel Shell Development Test



Mean:	3.195	**Count:**	20	**-1s Warning Limit:**	1.38	**-2s Action Limit:**	-0.435
Sigma:	1.815	**CV:**	56.80%	**+1s Warning Limit:**	5.01	**+2s Action Limit:**	6.825

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	Mar	22	12:15	2.5	-0.695	-0.3829			08-5068-3541	14-6034-1614
2		Apr	23	18:45	1.92	-1.275	-0.7025			02-7458-4371	11-3829-0609
3		Jun	7	18:15	1.52	-1.675	-0.9229			20-4612-5080	06-0541-2169
4			20	17:50	2.68	-0.515	-0.2837			21-1169-3016	01-0499-1137
5		Aug	22	16:05	6.5	3.305	1.821	(+)		03-0988-3309	04-0917-6749
6			30	17:50	1.36	-1.835	-1.011	(-)		00-6833-5106	03-2629-4542
7		Oct	9	18:00	0.973	-2.222	-1.224	(-)		06-6024-3093	07-8913-5319
8			18	18:00	2.87	-0.325	-0.1791			07-3550-9263	18-1681-7487
9		Nov	29	17:45	3.58	0.385	0.2121			04-0681-3114	19-0538-4174
10		Dec	7	18:50	0.817	-2.378	-1.31	(-)		15-7850-6619	13-6604-7958
11	2013	Feb	14	17:40	6	2.805	1.545	(+)		02-6193-4857	07-3889-4891
12			28	21:20	5.65	2.455	1.353	(+)		06-9403-7957	16-1498-7518
13		Mar	6	16:45	2.93	-0.265	-0.146			20-1267-3706	13-0769-0097
14			16	17:45	6.99	3.795	2.091	(+)	(+)	14-2253-0526	09-1011-9616
15			26	18:15	3.62	0.425	0.2342			03-8532-3895	01-1639-1779
16		Apr	3	0:00	3.85	0.655	0.3609			10-3604-5723	13-5448-8759
17		May	9	17:15	2.85	-0.345	-0.1901			00-6360-9095	00-7540-8630
18		Jul	1	19:00	1.46	-1.735	-0.9559			19-5961-2730	20-9160-8614
19			17	17:55	3.05	-0.145	-0.07989			18-2536-1347	04-3468-0815
20		Aug	7	19:00	2.79	-0.405	-0.2231			04-7788-4843	18-8631-2521
21			28	16:55	2.39	-0.805	-0.4435			19-6611-9162	06-3129-4473

Analyst:____ QA:____

CETIS Summary Report

Report Date: 09 Oct-13 14:34 (p 1 of 1)
Test Code: 753098FA | 19-6611-9162

Mussel Shell Development Test

NewFields

Batch ID:	04-0705-0482	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	28 Aug-13 16:55	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Aug-13 17:05	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	04-3161-6498	**Code:**	19B9F1F2	**Client:**	Internal Lab
Sample Date:	27 Sep-11	**Material:**	Total Ammonia	**Project:**	Reference Toxicant
Receive Date:	27 Sep-11	**Source:**	Reference Toxicant		
Sample Age:	701d 17h	**Station:**	P110927.160		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
06-3129-4473	Combined Proportion Norm	2.39	4.7	3.352	22.3%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
04-7207-2891	Combined Proportion Norm	EC50	5.063	4.95	5.179		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
06-3129-4473	Combined Proportion Norm	PMSD	0.2226	NL - 0.25	No	Passes Acceptability Criteria

Combined Proportion Normal Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	0.9121	0.7215	1	0.8589	1	0.04429	0.07671	8.41%	0.0%
1.06		3	0.9366	0.8113	1	0.8988	0.9939	0.02912	0.05044	5.39%	-2.69%
2.39		3	0.9744	0.8645	1	0.9233	1	0.02556	0.04428	4.54%	-6.84%
4.7		3	0.544	0.1858	0.9021	0.3988	0.6871	0.08324	0.1442	26.51%	40.36%
10		3	0	0	0	0	0	0	0		100.0%
19.3		3	0	0	0	0	0	0	0		100.0%

Combined Proportion Normal Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	0.8773	0.8589
1.06		0.9939	0.8988	0.9172
2.39		1	0.9233	1
4.7		0.546	0.3988	0.6871
10		0	0	0
19.3		0	0	0

Combined Proportion Normal Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	398/398	286/326	280/326
1.06		324/326	293/326	299/326
2.39		410/410	301/326	333/333
4.7		178/326	130/326	224/326
10		0/326	0/326	0/326
19.3		0/326	0/326	0/326

Analyst:______ QA:______

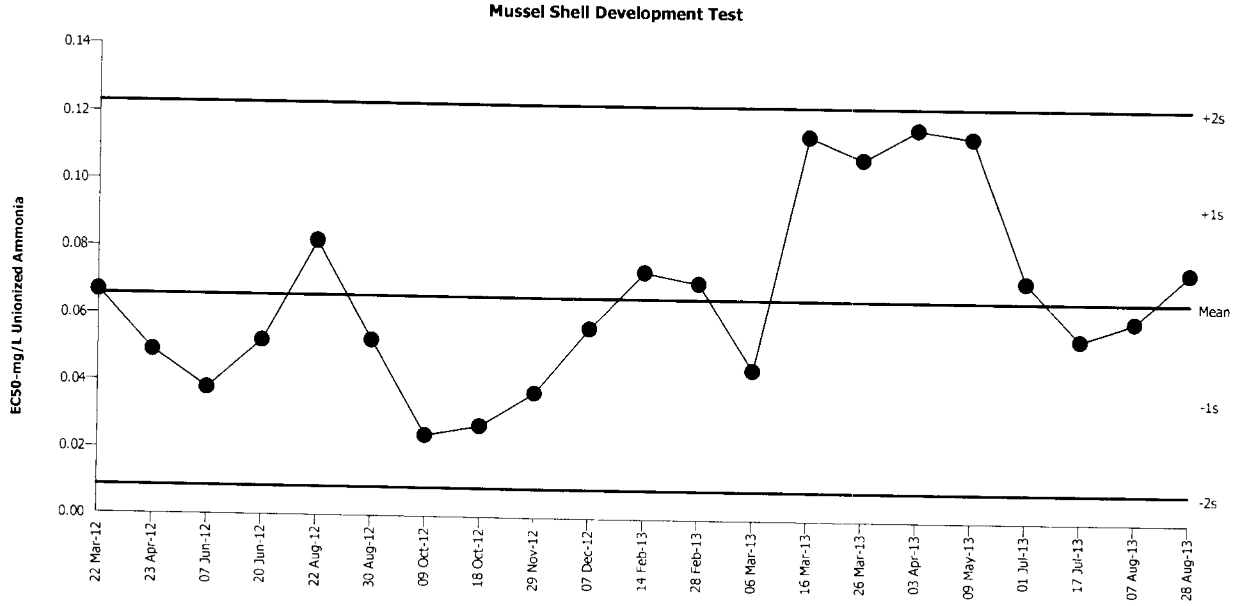
CETIS QC Plot

Report Date: 09 Oct-13 14:42 (1 of 1)

Mussel Shell Development Test

NewFields

Test Type:	Development-Survival	**Organism:**	Mytilus galloprovincialis (Bay Mussel	**Material:**	Unionized Ammonia
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	Combined Proportion Normal	**Source:**	Reference Toxicant-REF



Mean:	0.06586	**Count:**	20	**-1s Warning Limit:**	0.03725	**-2s Action Limit:**	0.00864
Sigma:	0.02861	**CV:**	43.40%	**+1s Warning Limit:**	0.09447	**+2s Action Limit:**	0.1231

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	Mar	22	12:15	0.0669	0.001038	0.0363			16-8530-3093	20-6643-2329
2		Apr	23	18:45	0.04914	-0.01672	-0.5844			11-9474-8117	17-4324-5637
3		Jun	7	18:15	0.03798	-0.02788	-0.9745			14-3239-7455	05-6059-9571
4			20	17:50	0.05226	-0.0136	-0.4754			16-3362-6154	15-3244-5350
5		Aug	22	16:05	0.08186	0.016	0.5592			19-7550-7456	08-0736-4891
6			30	17:50	0.05265	-0.01321	-0.4616			18-5169-0947	02-7047-2220
7		Oct	9	18:00	0.02443	-0.04143	-1.448	(-)		08-9570-9100	07-8331-5723
8			18	18:00	0.02739	-0.03847	-1.345	(-)		18-9514-2443	00-3905-9363
9		Nov	29	17:45	0.03751	-0.02835	-0.9909			15-6645-8664	13-4294-0618
10		Dec	7	18:50	0.0569	-0.00896	-0.3131			11-6006-3509	05-8108-8018
11	2013	Feb	14	17:40	0.07388	0.008024	0.2805			14-1890-1951	14-7902-0800
12			28	21:20	0.0707	0.004842	0.1692			19-4434-4552	11-0678-0085
13		Mar	6	16:45	0.04499	-0.02087	-0.7295			18-3418-4255	07-5324-7355
14			16	16:10	0.1144	0.04859	1.698	(+)		11-4894-2693	12-9463-9515
15			26	18:15	0.1079	0.04202	1.469	(+)		10-2444-9875	09-9596-0674
16		Apr	3	0:00	0.1168	0.05099	1.782	(+)		20-6076-9735	05-3848-1619
17		May	9	17:15	0.1144	0.04854	1.697	(+)		14-3450-0734	06-3515-6667
18		Jul	1	19:00	0.07187	0.006011	0.2101			10-8846-7294	05-7595-2849
19			17	17:55	0.0548	-0.01106	-0.3866			10-3414-5102	08-1738-2772
20		Aug	7	19:00	0.06027	-0.00559	-0.1954			10-7217-0339	06-7338-0554
21			28	16:55	0.07491	0.009045	0.3162			19-6745-0030	16-9398-7287

Analyst: CR QA: CR

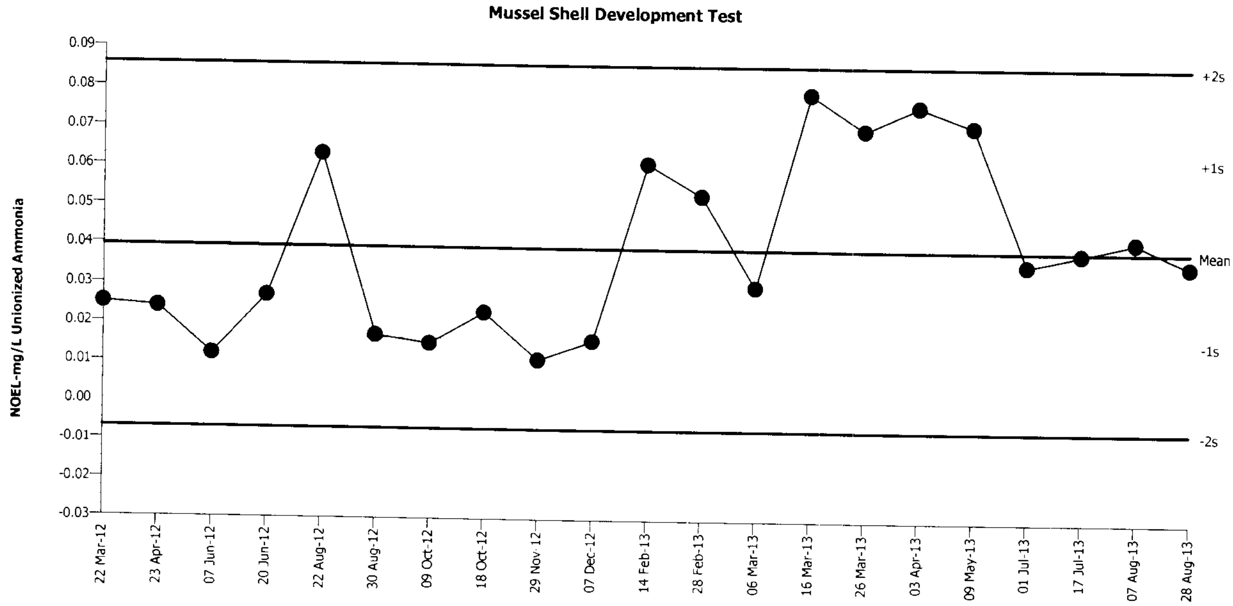
CETIS QC Plot

Report Date: 10 Oct-13 09:21 (1 of 1)

Mussel Shell Development Test

NewFields

Test Type:	Development-Survival	**Organism:**	Mytilus galloprovincialis (Bay Mussel	**Material:**	Unionized Ammonia
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	Combined Proportion Normal	**Source:**	Reference Toxicant-REF



Mean:	0.0395	**Count:**	20	**-1s Warning Limit:**	0.0163	**-2s Action Limit:**	-0.0069
Sigma:	0.0232	**CV:**	58.70%	**+1s Warning Limit:**	0.0627	**+2s Action Limit:**	0.0859

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	Mar	22	12:15	0.025	-0.0145	-0.625			16-8530-3093	00-2118-8798
2		Apr	23	18:45	0.024	-0.0155	-0.6681			11-9474-8117	16-8822-0741
3		Jun	7	18:15	0.012	-0.0275	-1.185	(-)		14-3239-7455	06-8748-6189
4			20	17:50	0.027	-0.0125	-0.5388			16-3362-6154	07-4796-6258
5		Aug	22	16:05	0.063	0.0235	1.013	(+)		19-7550-7456	17-2049-3239
6			30	17:50	0.017	-0.0225	-0.9698			18-5169-0947	11-3246-0073
7		Oct	9	18:00	0.015	-0.0245	-1.056	(-)		08-9570-9100	07-1156-4394
8			18	18:00	0.023	-0.0165	-0.7112			18-9514-2443	05-5566-0485
9		Nov	29	17:45	0.011	-0.0285	-1.228	(-)		15-6645-8664	07-1864-3452
10		Dec	7	18:50	0.016	-0.0235	-1.013	(-)		11-6006-3509	00-2066-3271
11	2013	Feb	14	17:40	0.061	0.0215	0.9267			14-1890-1951	16-6372-1200
12			28	21:20	0.053	0.0135	0.5819			19-4434-4552	04-8125-6089
13		Mar	6	16:45	0.03	-0.0095	-0.4095			18-3418-4255	11-0229-7491
14			16	16:10	0.079	0.0395	1.703	(+)		11-4894-2693	17-8368-9370
15			26	18:15	0.07	0.0305	1.315	(+)		10-2444-9875	00-8976-6127
16		Apr	3	0:00	0.076	0.0365	1.573	(+)		20-6076-9735	14-2423-4592
17		May	9	17:15	0.071	0.0315	1.358	(+)		14-3450-0734	19-5425-3899
18		Jul	1	19:00	0.036	-0.0035	-0.1509			10-8846-7294	11-2659-9719
19			17	17:55	0.039	-0.0005	-0.02155			10-3414-5102	05-6701-2859
20		Aug	7	19:00	0.042	0.0025	0.1078			10-7217-0339	15-9321-6181
21			28	16:55	0.036	-0.0035	-0.1509			19-6745-0030	11-4907-1298

Analyst:______ QA:______

CETIS Summary Report

Report Date: 09 Oct-13 14:42 (p 1 of 1)
Test Code: 7544E7AE | 19-6745-0030

Mussel Shell Development Test

NewFields

Batch ID:	04-0705-0482	**Test Type:**	Development-Survival	**Analyst:**	
Start Date:	28 Aug-13 16:55	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	30 Aug-13 17:05	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Taylor Shellfish	**Age:**	

Sample ID:	21-3741-7198	**Code:**	7F6665EE	**Client:**	Internal Lab
Sample Date:	27 Sep-11	**Material:**	Unionized Ammonia	**Project:**	Reference Toxicant
Receive Date:	27 Sep-11	**Source:**	Reference Toxicant		
Sample Age:	701d 17h	**Station:**	P110927.160		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
11-4907-1298	Combined Proportion Norm	0.036	0.069	0.04984	22.3%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	mg/L	95% LCL	95% UCL	TU	Method
16-9398-7287	Combined Proportion Norm	EC50	0.07491	0.07325	0.0766		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
11-4907-1298	Combined Proportion Norm	PMSD	0.2226	NL - 0.25	No	Passes Acceptability Criteria

Combined Proportion Normal Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	0.9121	0.7215	1	0.8589	1	0.04429	0.07671	8.41%	0.0%
0.016		3	0.9366	0.8113	1	0.8988	0.9939	0.02912	0.05044	5.39%	-2.69%
0.036		3	0.9744	0.8645	1	0.9233	1	0.02556	0.04428	4.54%	-6.84%
0.069		3	0.544	0.1858	0.9021	0.3988	0.6871	0.08324	0.1442	26.51%	40.36%
0.148		3	0	0	0	0	0	0	0		100.0%
0.227		3	0	0	0	0	0	0	0		100.0%

Combined Proportion Normal Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	0.8773	0.8589
0.016		0.9939	0.8988	0.9172
0.036		1	0.9233	1
0.069		0.546	0.3988	0.6871
0.148		0	0	0
0.227		0	0	0

Combined Proportion Normal Binomials

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	398/398	286/326	280/326
0.016		324/326	293/326	299/326
0.036		410/410	301/326	333/333
0.069		178/326	130/326	224/326
0.148		0/326	0/326	0/326
0.227		0/326	0/326	0/326

Analyst: CR QA: CR

NewFields LARVAL DEVELOPMENT TEST

AMMONIA REF TOX OBSERVATION SHEET

CLIENT Floyd Snider	PROJECT K-Ply	JOB NUMBER 860.0093.000	SPECIES *Mytilus galloprovincialis*			
			PROJECT MANAGER B. Hester	NEWFIELDS LAB / LOCATION Port Gamble / Incubator	PROTOCOL PSEP (1995)	
TEST ID P110927.160	ORGANISM BATCH TS4580	TEST START DATE: 8/28/13	TIME 1655	TEST END DATE: 8/30/13	TIME 1705	

LARVAL OBSERVATION DATA

CLIENT/ NEWFIELDS ID	CONC. value	CONC. units	VIAL NUMBER	REP	NUMBER NORMAL	NUMBER ABNORMAL	DATE	TECHNICIAN	COMMENTS
Ref.Tox. - Ammonia	0	mg/L		1	398	21	9/3/13	CR	
				2	286	15	↓	↓	
				3	280	14			
Ref.Tox. - Ammonia	0.75	mg/L		1	324	15			
				2	293	16			
				3	299	13			
Ref.Tox. - Ammonia	1.5	mg/L		1	410	21			
				2	301	19			
				3	333	11			
Ref.Tox. - Ammonia	3	mg/L		1	178	136			
				2	130	160			
				3	224	96			
Ref.Tox. - Ammonia	6	mg/L		1	0	316			
				2	0	314			
				3	0	272			
Ref.Tox. - Ammonia	12	mg/L		1	0	298			
				2	0	305			
				3	0	272			

STOCKING DENSITY		1		315	9/3/13	CR	
		2		346	↓	↓	
		3		316			

NewFields

LARVAL DEVELOPMENT TEST
AMMONIA REF TOX WQ

CLIENT Floyd Snider	PROJECT K-Ply	SPECIES *Mytilus galloprovincialis*	NEWFIELDS LAB / LOCATION Port Gamble / Incubator	PROTOCOL PSEP (1995)
JOB NUMBER 860.0093.000	PROJECT MANAGER B. Hester	TEST START DATE: 28Aug13	TIME 1655	TEST END DATE 8/30/13
TEST ID PI10927.160	LOT #: 111079			TIME 1705

WATER QUALITY DATA

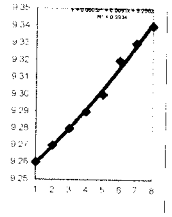
DILTIN.WAT.BATCH	ORGANISM BATCH	REFERENCE TOX. MATERIAL	REFERENCE TOXICANT
FSW082813.01		Ammonium chloride	Ammonia

CLIENT/ NEWFIELDS ID	CONCENTRATION value	CONCENTRATION units	DAY	REP	DO (mg/L) >5.0 D.O. meter	DO (mg/L) >5.0 D.O. mg/L	TEMP(C) 16 ± 1 TEMP. meter	TEMP(C) 16 ± 1 TEMP. °C	SAL (ppt) 28 ± 1 SALINITY meter	SAL (ppt) 28 ± 1 SALINITY ppt	pH 7 - 9 pH meter	pH 7 - 9 pH unit	TECH.	DATE
Ref.Tox.-Ammonia	Target:		0	Stock	6	7.7	6	16.0	2	28	5	7.8	NMB	8/28
	0	mg/L	1	Stock	6	7.7	6	16.8	2	27	5	7.6	JH	8/29
	Actual:		2	Stock	6	8.0	6	15.3	2	27	5	7.8	JL	8/30
	0.0622		3	Stock										
			4	Stock										
Ref.Tox.-Ammonia	Target:		0	Stock	6	7.8	6	15.8	2	28	5	7.8	NMB	8/28
	0.75	mg/L	1	Stock	6	8.0	6	15.8	2	28	5	7.6	JH	8/29
	Actual:		2	Stock	6	8.0	6	14.9	2	28	5	7.8	JL	8/30
	1.06		3	Stock										
			4	Stock										
Ref.Tox.-Ammonia	Target:		0	Stock	6	7.8	6	15.6	2	28	5	7.8	NMB	8/28
	1.5	mg/L	1	Stock	6	8.0	6	15.3	2	28	5	7.6	JH	8/29
	Actual:		2	Stock	6	8.2	6	14.7	2	28	5	7.8	JL	8/3
	2.39		3	Stock										
			4	Stock										
Ref.Tox.-Ammonia	Target:		0	Stock	6	7.8	6	15.4	2	28	5	7.8	NMB	8/28
	3	mg/L	1	Stock	6	8.0	6	15.2	2	28	5	7.6	JH	8/29
	Actual:		2	Stock	6	8.2	6	14.5	2	28	5	7.8	JL	8/30
	4.70		3	Stock										
			4	Stock										
Ref.Tox.-Ammonia	Target:		0	Stock	6	7.8	6	15.4	2	28	5	7.8	NMB	8/28
	6	mg/L	1	Stock	6	8.1	6	15.1	2	28	5	7.6	JH	8/29
	Actual:		2	Stock	6	8.3	6	14.7	2	28	5	7.7	JL	8/30
	10.0		3	Stock										
			4	Stock										
Ref.Tox.-Ammonia	Target:		0	Stock	6	7.9	6	15.4	2	28	5	7.7	NMB	8/28
	12	mg/L	1	Stock	6	8.1	6	15.1	2	28	5	7.6	JH	8/29
	Actual:		2	Stock	6	8.2	6	14.9	2	28	5	7.7	JL	8/30
	19.3		3	Stock										
			4	Stock										

CLIENT:	Internal	Date of Test:	28-Aug-13
PROJECT:	RT	Test Type:	*Mytilus galloprovincialis*
COMMENTS:			

To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding [illegible], and [illegible]

Integer:	I-factor
1	9.26
2	9.27
3	9.28
4	9.29
5	9.30
6	9.32
7	9.33
8	9.34



	Sample	Meas. NH3 (mg/L)	Salinity (ppt)	pH	Temp (C)	temp (K)	i-factor	Mod NH3U (mg/L)
	Target / Sample Name	Actual	22.9	8.0	24.1	297.26	9.3053	#VALUE!
	Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	0.008
1								
2	0.75	1.06				288.96	9.3187	0.016
3	1.5	2.39				288.76	9.3187	0.036
4	3	4.7				288.56	9.3187	0.069
5	6	10				288.56	9.3187	0.148
6	12	19.3				288.56	9.3187	0.227
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APPENDIX B

STATISTICAL COMPARISONS

Test	Endpoint	Treatment	Comparison	Prob Normal	Prob Homogeneous	Run Type	Prob T	Significant?	One-tailed T-test
Bivalve Development	Percent Normal Development	CARR20	Control	0.903	0.064	T-test Unequal Var	2.00E-02	Yes	Treatment < Comparison
Bivalve Development	Percent Normal Development	CR-02	Control	0.229	0.832	T-test Equal Var	6.00E-03	Yes	Treatment < Comparison
Bivalve Development	Percent Normal Development	SD0001K	CR-02	0.999	0.719	T-test Equal Var	0.578		Treatment >= Comparison
Bivalve Development	Percent Normal Development	SD0002K	CR-02	0.23	0.404	T-test Equal Var	0.114		Treatment >= Comparison
Bivalve Development	Percent Normal Development	SD0003K	CR-02	0.122	0.667	T-test Equal Var	0.266		Treatment >= Comparison
Eohaustorius estuarius	Percent Survival	CARR20	Control	0.169	0.094	T-test Unequal Var	0.09		Treatment >= Comparison
Eohaustorius estuarius	Percent Survival	CR-02	Control	0.281	0.184	T-test Equal Var	0.098		Treatment >= Comparison
Eohaustorius estuarius	Percent Survival	SD0003K	CARR20	0.081	0.806	T-test Equal Var	7.30E-01		Treatment >= Comparison
Eohaustorius estuarius	Percent Survival	SD0002K	CARR20	0.017	0.255	Mann-Whitney	0.705		Treatment >= Comparison
Eohaustorius estuarius	Percent Survival	SD0001K	CR-02	0.021	0.184	Mann-Whitney	0.5		Treatment >= Comparison
Neanthes arenaceodentata	AFDW Growth (mg/ind/day)	CARR20	Control	0.252	0.553	T-test Equal Var	0.235		Treatment >= Comparison
Neanthes arenaceodentata	AFDW Growth (mg/ind/day)	CR-02	Control	0.134	0.889	T-test Equal Var	0.293		Treatment >= Comparison
Neanthes arenaceodentata	AFDW Growth (mg/ind/day)	SD0002K	CARR20	0.472	0.168	T-test Equal Var	0.861		Treatment >= Comparison
Neanthes arenaceodentata	AFDW Growth (mg/ind/day)	SD0003K	CARR20	0.338	0.352	T-test Equal Var	0.97		Treatment >= Comparison
Neanthes arenaceodentata	AFDW Growth (mg/ind/day)	SD0001K	CR-02	0.141	0.986	T-test Equal Var	0.759		Treatment >= Comparison
Neanthes arenaceodentata	Individual Growth Rate (mg/ind/day)	CARR20	Control	0.217	0.976	T-test Equal Var	0.159		Treatment >= Comparison
Neanthes arenaceodentata	Individual Growth Rate (mg/ind/day)	CR-02	Control	0.685	0.882	T-test Equal Var	4.68E-01		Treatment >= Comparison
Neanthes arenaceodentata	Individual Growth Rate (mg/ind/day)	SD0002K	CARR20	0.646	0.019	T-test Unequal Var	0.692		Treatment >= Comparison
Neanthes arenaceodentata	Individual Growth Rate (mg/ind/day)	SD0003K	CARR20	0.082	0.357	T-test Equal Var	0.904		Treatment >= Comparison
Neanthes arenaceodentata	Individual Growth Rate (mg/ind/day)	SD0001K	CR-02	0.613	0.461	T-test Equal Var	0.196		Treatment >= Comparison

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                           P:\_K Ply Bioassay Statistical Comparison                           1
                           T-test Results, This is a 2-tailed result
                               See Summary Page for 1-tail Result
                                                                13:39 Thursday, October 10, 2013

-------- Test=Bivalve Development Endpoint=Percent Normal Development Treatment=CARR20 ---------

                                      The TTEST Procedure

                                       Variable:  result

          group          N        Mean     Std Dev     Std Err     Minimum     Maximum

          Control        5      1.3645      0.0849      0.0380      1.2541      1.4565
          Reference      5      0.9381      0.3247      0.1452      0.5131      1.3546
          Diff (1-2)            0.4265      0.2373      0.1501

 group         Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

 Control                          1.3645      1.2591   1.4700      0.0849      0.0509   0.2440
 Reference                        0.9381      0.5349   1.3412      0.3247      0.1945   0.9330
 Diff (1-2)    Pooled             0.4265      0.0804   0.7726      0.2373      0.1603   0.4546
 Diff (1-2)    Satterthwaite      0.4265      0.0287   0.8242

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8       2.84      0.0218
                  Satterthwaite    Unequal      4.5444       2.84      0.0404

                                     Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4      14.63    0.0235
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--------- Test=Bivalve Development Endpoint=Percent Normal Development Treatment=CR-02 ---------

                                      The TTEST Procedure

                                       Variable:  result

          group          N        Mean     Std Dev     Std Err     Minimum     Maximum

          Control        5      1.3645      0.0849      0.0380      1.2541      1.4565
          Reference      5      1.1749      0.0970      0.0434      1.0267      1.2679
          Diff (1-2)            0.1897      0.0911      0.0576

 group         Method                Mean      95% CL Mean        Std Dev      95% CL Std Dev

 Control                           1.3645      1.2591   1.4700      0.0849      0.0509   0.2440
 Reference                         1.1749      1.0545   1.2953      0.0970      0.0581   0.2787
 Diff (1-2)    Pooled              0.1897      0.0568   0.3226      0.0911      0.0616   0.1746
 Diff (1-2)    Satterthwaite       0.1897      0.0564   0.3230

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8       3.29      0.0110
                  Satterthwaite    Unequal      7.8625       3.29      0.0113

                                     Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4       1.30    0.8028
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                          T-test Results, This is a 2-tailed result
                              See Summary Page for 1-tail Result
                                                                13:39 Thursday, October 10, 2013

------------- Test=Eohaustorius estrua Endpoint=Percent Survival Treatment=CARR20 --------------

                                      The TTEST Procedure

                                       Variable:  result

          group           N          Mean      Std Dev      Std Err      Minimum      Maximum

          Control         5        1.5257       0.1009       0.0451       1.3453       1.5708
          Reference       5        1.3970       0.1635       0.0731       1.2490       1.5708
          Diff (1-2)               0.1287       0.1358       0.0859

 group          Method               Mean        95% CL Mean         Std Dev       95% CL Std Dev

 Control                           1.5257       1.4005    1.6509      0.1009       0.0604    0.2898
 Reference                         1.3970       1.1940    1.5999      0.1635       0.0979    0.4697
 Diff (1-2)     Pooled             0.1287      -0.0694    0.3268      0.1358       0.0917    0.2602
 Diff (1-2)     Satterthwaite      0.1287      -0.0765    0.3339

                  Method           Variances         DF     t Value    Pr > |t|

                  Pooled           Equal              8        1.50      0.1724
                  Satterthwaite    Unequal       6.6601        1.50      0.1799

                                     Equality of Variances

                       Method        Num DF     Den DF     F Value    Pr > F

                       Folded F           4          4        2.63    0.3723
```

```
-------------- Test=Eohaustorius estrua Endpoint=Percent Survival Treatment=CR-02 --------------

                                      The TTEST Procedure

                                       Variable:  result

          group            N         Mean      Std Dev      Std Err      Minimum      Maximum

          Control          5       1.5257       0.1009       0.0451       1.3453       1.5708
          Reference        5       1.4011       0.1702       0.0761       1.1731       1.5708
          Diff (1-2)               0.1246       0.1399       0.0885

 group         Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

 Control                          1.5257      1.4005   1.6509      0.1009      0.0604   0.2898
 Reference                        1.4011      1.1898   1.6123      0.1702      0.1019   0.4889
 Diff (1-2)    Pooled             0.1246     -0.0793   0.3286      0.1399      0.0945   0.2679
 Diff (1-2)    Satterthwaite      0.1246     -0.0878   0.3371

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8       1.41      0.1965
                  Satterthwaite    Unequal      6.5017       1.41      0.2048

                                     Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4       2.85    0.3352
```

```
--------- Test=Neanthes arenaceode Endpoint=AFDW Growth (mg/ind/day) Treatment=CARR20 ----------

                                      The TTEST Procedure

                                       Variable:  result

          group          N        Mean     Std Dev     Std Err     Minimum     Maximum

          Control        5      0.5840      0.0798      0.0357      0.4916      0.6634
          Reference      5      0.5391      0.1054      0.0471      0.4422      0.6950
          Diff (1-2)            0.0449      0.0935      0.0591

 group        Method               Mean      95% CL Mean        Std Dev       95% CL Std Dev

 Control                          0.5840      0.4850   0.6830      0.0798      0.0478   0.2292
 Reference                        0.5391      0.4082   0.6700      0.1054      0.0632   0.3029
 Diff (1-2)    Pooled             0.0449     -0.0914   0.1812      0.0935      0.0631   0.1791
 Diff (1-2)    Satterthwaite      0.0449     -0.0932   0.1830

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8       0.76      0.4695
                  Satterthwaite    Unequal      7.4491       0.76      0.4711

                                     Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4       1.75    0.6021
```

```
---------- Test=Neanthes arenaceode Endpoint=AFDW Growth (mg/ind/day) Treatment=CR-02 ----------

                                     The TTEST Procedure

                                      Variable:  result

         group           N         Mean      Std Dev      Std Err      Minimum      Maximum

         Control         5       0.5840       0.0798       0.0357       0.4916       0.6634
         Reference       5       0.5554       0.0798       0.0357       0.4456       0.6413
         Diff (1-2)              0.0286       0.0798       0.0504

group         Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

Control                          0.5840      0.4850   0.6830      0.0798      0.0478   0.2292
Reference                        0.5554      0.4564   0.6544      0.0798      0.0478   0.2292
Diff (1-2)    Pooled             0.0286     -0.0877   0.1449      0.0798      0.0539   0.1528
Diff (1-2)    Satterthwaite      0.0286     -0.0877   0.1449

                 Method           Variances        DF    t Value    Pr > |t|

                 Pooled           Equal             8       0.57      0.5865
                 Satterthwaite    Unequal           8       0.57      0.5865

                                   Equality of Variances

                      Method       Num DF    Den DF    F Value    Pr > F

                      Folded F          4         4       1.00    1.0000
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                           T-test Results, This is a 2-tailed result
                               See Summary Page for 1-tail Result
                                                              13:39 Thursday, October 10, 2013

-------- Test=Neanthes arenaceode Endpoint=Individual Growth Rate (mg Treatment=CARR20 ---------

                                      The TTEST Procedure

                                       Variable:  result

         group            N          Mean      Std Dev      Std Err      Minimum      Maximum

         Control          5        0.8442       0.1486       0.0665       0.6859       1.0460
         Reference        5        0.7479       0.1366       0.0611       0.6157       0.9345
         Diff (1-2)                0.0963       0.1427       0.0903

group          Method                  Mean        95% CL Mean         Std Dev       95% CL Std Dev

Control                              0.8442       0.6597    1.0288      0.1486       0.0891    0.4271
Reference                            0.7479       0.5784    0.9175      0.1366       0.0818    0.3924
Diff (1-2)     Pooled                0.0963      -0.1119    0.3044      0.1427       0.0964    0.2734
Diff (1-2)     Satterthwaite         0.0963      -0.1121    0.3047

                  Method           Variances         DF     t Value    Pr > |t|

                  Pooled           Equal              8        1.07      0.3173
                  Satterthwaite    Unequal       7.9431        1.07      0.3175

                                     Equality of Variances

                       Method       Num DF     Den DF     F Value    Pr > F

                       Folded F          4          4        1.18    0.8733
```

```
--------- Test=Neanthes arenaceode Endpoint=Individual Growth Rate (mg Treatment=CR-02 ---------

                                      The TTEST Procedure

                                       Variable:  result

          group          N        Mean     Std Dev     Std Err     Minimum     Maximum

          Control        5      0.8442      0.1486      0.0665      0.6859      1.0460
          Reference      5      0.8362      0.1594      0.0713      0.6205      1.0146
          Diff (1-2)           0.00802      0.1541      0.0975

 group         Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

 Control                          0.8442      0.6597   1.0288      0.1486      0.0891   0.4271
 Reference                        0.8362      0.6383   1.0341      0.1594      0.0955   0.4581
 Diff (1-2)    Pooled            0.00802     -0.2168   0.2328      0.1541      0.1041   0.2953
 Diff (1-2)    Satterthwaite     0.00802     -0.2169   0.2330

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8       0.08      0.9364
                  Satterthwaite    Unequal      7.9612       0.08      0.9365

                                     Equality of Variances

                       Method       Num DF    Den DF    F Value    Pr > F

                       Folded F          4         4       1.15    0.8955
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                          T-test Results, This is a 2-tailed result
                              See Summary Page for 1-tail Result
                                                                    13:39 Thursday, October 10, 2013

------------- Test=Eohaustorius estrua Endpoint=Percent Survival Treatment=SD0003K -------------

                                      The TTEST Procedure

                                       Variable:  Result

          group           N          Mean       Std Dev       Std Err       Minimum       Maximum

          CARR20          5        1.3970        0.1635        0.0731        1.2490        1.5708
          Test            5        1.4613        0.1537        0.0687        1.2490        1.5708
          Diff (1-2)              -0.0644        0.1586        0.1003

 group          Method               Mean        95% CL Mean          Std Dev        95% CL Std Dev

 CARR20                            1.3970       1.1940    1.5999       0.1635       0.0979    0.4697
 Test                              1.4613       1.2705    1.6522       0.1537       0.0921    0.4416
 Diff (1-2)     Pooled            -0.0644      -0.2957    0.1670       0.1586       0.1072    0.3039
 Diff (1-2)     Satterthwaite     -0.0644      -0.2959    0.1672

                  Method           Variances        DF     t Value    Pr > |t|

                  Pooled           Equal             8       -0.64      0.5392
                  Satterthwaite    Unequal      7.9698       -0.64      0.5393

                                     Equality of Variances

                       Method       Num DF     Den DF     F Value    Pr > F

                       Folded F          4          4        1.13    0.9078
```

```
--------- Test=Neanthes arenaceode Endpoint=AFDW Growth (mg/ind/day) Treatment=SD0002K ---------

                                     The TTEST Procedure

                                      Variable:  Result

          group           N         Mean      Std Dev      Std Err      Minimum      Maximum

          CARR20          5       0.5391       0.1054       0.0471       0.4422       0.6950
          Test            5       0.6024       0.0606       0.0271       0.5322       0.6992
          Diff (1-2)             -0.0633       0.0860       0.0544

 group         Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

 CARR20                           0.5391      0.4082   0.6700      0.1054      0.0632   0.3029
 Test                             0.6024      0.5272   0.6777      0.0606      0.0363   0.1741
 Diff (1-2)    Pooled            -0.0633     -0.1887   0.0621      0.0860      0.0581   0.1647
 Diff (1-2)    Satterthwaite     -0.0633     -0.1945   0.0678

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8      -1.16      0.2776
                  Satterthwaite    Unequal       6.383      -1.16      0.2858

                                    Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4       3.03    0.3088
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                    T-test Results, This is a 2-tailed result
                        See Summary Page for 1-tail Result
                                                    13:39 Thursday, October 10, 2013

--------- Test=Neanthes arenaceode Endpoint=AFDW Growth (mg/ind/day) Treatment=SD0003K ---------

                                 The TTEST Procedure

                                  Variable:  Result

         group          N        Mean     Std Dev     Std Err     Minimum     Maximum

         CARR20         5      0.5391      0.1054      0.0471      0.4422      0.6950
         Test           5      0.6626      0.0692      0.0309      0.6022      0.7516
         Diff (1-2)           -0.1235      0.0892      0.0564

 group          Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

 CARR20                            0.5391      0.4082   0.6700      0.1054      0.0632   0.3029
 Test                              0.6626      0.5767   0.7484      0.0692      0.0414   0.1988
 Diff (1-2)     Pooled            -0.1235     -0.2535  0.00657      0.0892      0.0602   0.1708
 Diff (1-2)     Satterthwaite     -0.1235     -0.2572   0.0102

                 Method           Variances        DF    t Value    Pr > |t|

                 Pooled           Equal             8      -2.19      0.0600
                 Satterthwaite    Unequal      6.9055      -2.19      0.0652

                                Equality of Variances

                      Method       Num DF     Den DF     F Value    Pr > F

                      Folded F          4          4        2.32    0.4344
```

```
-------- Test=Neanthes arenaceode Endpoint=Individual Growth Rate (mg Treatment=SD0002K --------

                                     The TTEST Procedure

                                      Variable:  Result

         group           N         Mean      Std Dev      Std Err      Minimum      Maximum

         CARR20          5       0.7479       0.1366       0.0611       0.6157       0.9345
         Test            5       0.7832       0.0561       0.0251       0.7320       0.8729
         Diff (1-2)             -0.0352       0.1044       0.0660

group         Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

CARR20                           0.7479      0.5784   0.9175      0.1366      0.0818   0.3924
Test                             0.7832      0.7135   0.8528      0.0561      0.0336   0.1612
Diff (1-2)    Pooled            -0.0352     -0.1875   0.1170      0.1044      0.0705   0.2000
Diff (1-2)    Satterthwaite     -0.0352     -0.2020   0.1315

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8      -0.53      0.6080
                  Satterthwaite    Unequal      5.3132      -0.53      0.6151

                                    Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4       5.92    0.1131
```

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                          T-test Results, This is a 2-tailed result
                              See Summary Page for 1-tail Result
                                                                13:39 Thursday, October 10, 2013

-------- Test=Neanthes arenaceode Endpoint=Individual Growth Rate (mg Treatment=SD0003K --------

                                     The TTEST Procedure

                                      Variable:  Result

         group          N         Mean      Std Dev      Std Err      Minimum      Maximum

         CARR20         5       0.7479       0.1366       0.0611       0.6157       0.9345
         Test           5       0.8578       0.1056       0.0472       0.7493       0.9733
         Diff (1-2)            -0.1099       0.1221       0.0772

 group         Method                Mean        95% CL Mean         Std Dev       95% CL Std Dev

 CARR20                            0.7479      0.5784    0.9175       0.1366       0.0818    0.3924
 Test                              0.8578      0.7267    0.9890       0.1056       0.0633    0.3036
 Diff (1-2)    Pooled             -0.1099     -0.2879    0.0681       0.1221       0.0825    0.2339
 Diff (1-2)    Satterthwaite      -0.1099     -0.2899    0.0701

                  Method           Variances        DF     t Value    Pr > |t|

                  Pooled           Equal             8       -1.42      0.1924
                  Satterthwaite    Unequal      7.5252       -1.42      0.1947

                                    Equality of Variances

                       Method       Num DF     Den DF     F Value    Pr > F

                       Folded F          4          4        1.67    0.6311
```

```
------------- Test=Eohaustorius estrua Endpoint=Percent Survival Treatment=SD0002K -------------

                                     The NPAR1WAY Procedure

                        Wilcoxon Scores (Rank Sums) for Variable Result
                                  Classified by Variable group

                                   Sum of      Expected       Std Dev            Mean
             group        N        Scores      Under H0      Under H0           Score
             ----------------------------------------------------------------------
             CARR20       5         24.50         27.50      4.472136            4.90
             Test         5         30.50         27.50      4.472136            6.10

                               Average scores were used for ties.


                                   Wilcoxon Two-Sample Test

                                 Statistic             24.5000

                                 Normal Approximation
                                 Z                     -0.5590
                                 One-Sided Pr <  Z      0.2881
                                 Two-Sided Pr > |Z|     0.5762

                                 t Approximation
                                 One-Sided Pr <  Z      0.2949
                                 Two-Sided Pr > |Z|     0.5898

                           Z includes a continuity correction of 0.5.


                                      Kruskal-Wallis Test

                                 Chi-Square             0.4500
                                 DF                          1
                                 Pr > Chi-Square        0.5023
```

```
-------- Test=Bivalve Development Endpoint=Percent Normal Development Treatment=SD0001K --------

                                      The TTEST Procedure

                                       Variable:  Result

          group          N        Mean     Std Dev     Std Err     Minimum     Maximum

          CR-02          5      1.1749      0.0970      0.0434      1.0267      1.2679
          Test           5      1.1868      0.0883      0.0395      1.0972      1.3276
          Diff (1-2)           -0.0119      0.0927      0.0586

 group         Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

 CR-02                            1.1749      1.0545   1.2953      0.0970      0.0581   0.2787
 Test                             1.1868      1.0772   1.2964      0.0883      0.0529   0.2536
 Diff (1-2)    Pooled            -0.0119     -0.1471   0.1233      0.0927      0.0626   0.1776
 Diff (1-2)    Satterthwaite     -0.0119     -0.1473   0.1235

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8      -0.20      0.8440
                  Satterthwaite    Unequal        7.93      -0.20      0.8441

                                     Equality of Variances

                       Method      Num DF     Den DF     F Value    Pr > F

                       Folded F         4          4        1.21    0.8595
```

```
-------- Test=Bivalve Development Endpoint=Percent Normal Development Treatment=SD0002K --------

                                      The TTEST Procedure

                                       Variable:  Result

          group          N        Mean     Std Dev     Std Err     Minimum     Maximum

          CR-02          5      1.1749      0.0970      0.0434      1.0267      1.2679
          Test           5      1.0822      0.1252      0.0560      0.9128      1.1975
          Diff (1-2)            0.0926      0.1120      0.0708

 group         Method               Mean       95% CL Mean        Std Dev       95% CL Std Dev

 CR-02                            1.1749      1.0545   1.2953      0.0970      0.0581   0.2787
 Test                             1.0822      0.9267   1.2377      0.1252      0.0750   0.3598
 Diff (1-2)    Pooled             0.0926     -0.0707   0.2560      0.1120      0.0756   0.2145
 Diff (1-2)    Satterthwaite      0.0926     -0.0725   0.2578

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8       1.31      0.2272
                  Satterthwaite    Unequal       7.529       1.31      0.2294

                                     Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4       1.67    0.6327
```

```
-------- Test=Bivalve Development Endpoint=Percent Normal Development Treatment=SD0003K --------

                                      The TTEST Procedure

                                       Variable:  Result

          group          N         Mean      Std Dev      Std Err      Minimum      Maximum

          CR-02          5       1.1749       0.0970       0.0434       1.0267       1.2679
          Test           5       1.1367       0.0872       0.0390       0.9955       1.2311
          Diff (1-2)             0.0381       0.0922       0.0583

 group          Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

 CR-02                             1.1749      1.0545   1.2953      0.0970      0.0581   0.2787
 Test                              1.1367      1.0284   1.2450      0.0872      0.0522   0.2506
 Diff (1-2)     Pooled             0.0381     -0.0964   0.1726      0.0922      0.0623   0.1767
 Diff (1-2)     Satterthwaite      0.0381     -0.0966   0.1729

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8       0.65      0.5315
                  Satterthwaite    Unequal      7.9115       0.65      0.5317

                                     Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4       1.24    0.8419
```

```
--------- Test=Neanthes arenaceode Endpoint=AFDW Growth (mg/ind/day) Treatment=SD0001K ---------

                                      The TTEST Procedure

                                       Variable:  Result

          group          N        Mean     Std Dev     Std Err     Minimum     Maximum

          CR-02          5      0.5554      0.0798      0.0357      0.4456      0.6413
          Test           5      0.5922      0.0779      0.0348      0.4904      0.6643
          Diff (1-2)           -0.0368      0.0788      0.0499

 group         Method               Mean       95% CL Mean        Std Dev      95% CL Std Dev

 CR-02                            0.5554      0.4564   0.6544      0.0798      0.0478   0.2292
 Test                             0.5922      0.4955   0.6890      0.0779      0.0467   0.2239
 Diff (1-2)    Pooled            -0.0368     -0.1518   0.0781      0.0788      0.0533   0.1510
 Diff (1-2)    Satterthwaite     -0.0368     -0.1518   0.0782

                  Method           Variances        DF    t Value    Pr > |t|

                  Pooled           Equal             8      -0.74      0.4811
                  Satterthwaite    Unequal      7.9957      -0.74      0.4811

                                     Equality of Variances

                       Method      Num DF    Den DF    F Value    Pr > F

                       Folded F         4         4       1.05    0.9650
```

```
-------- Test=Neanthes arenaceode Endpoint=Individual Growth Rate (mg Treatment=SD0001K --------

                                     The TTEST Procedure

                                      Variable:  Result

         group          N          Mean      Std Dev      Std Err      Minimum      Maximum

         CR-02          5        0.8362       0.1594       0.0713       0.6205       1.0146
         Test           5        0.7579       0.1104       0.0494       0.6337       0.8679
         Diff (1-2)              0.0783       0.1371       0.0867

 group          Method               Mean        95% CL Mean         Std Dev       95% CL Std Dev

 CR-02                             0.8362      0.6383   1.0341       0.1594       0.0955   0.4581
 Test                              0.7579      0.6208   0.8950       0.1104       0.0662   0.3173
 Diff (1-2)     Pooled             0.0783     -0.1216   0.2783       0.1371       0.0926   0.2627
 Diff (1-2)     Satterthwaite      0.0783     -0.1260   0.2827

                  Method           Variances        DF     t Value    Pr > |t|

                  Pooled           Equal             8        0.90      0.3927
                  Satterthwaite    Unequal      7.1201        0.90      0.3959

                                    Equality of Variances

                       Method       Num DF     Den DF     F Value    Pr > F

                       Folded F          4          4        2.08    0.4944
```

```
------------- Test=Eohaustorius estrua Endpoint=Percent Survival Treatment=SD0001K -------------

                                    The NPAR1WAY Procedure

                         Wilcoxon Scores (Rank Sums) for Variable Result
                                  Classified by Variable group

                                  Sum of      Expected       Std Dev          Mean
             group        N       Scores      Under H0      Under H0         Score
             ---------------------------------------------------------------------
             CR-02        5         28.0         27.50      4.183300          5.60
             Test         5         27.0         27.50      4.183300          5.40

                              Average scores were used for ties.


                                   Wilcoxon Two-Sample Test

                                 Statistic             28.0000

                                 Normal Approximation
                                 Z                      0.0000
                                 One-Sided Pr <  Z      0.5000
                                 Two-Sided Pr > |Z|     1.0000

                                 t Approximation
                                 One-Sided Pr <  Z      0.5000
                                 Two-Sided Pr > |Z|     1.0000

                           Z includes a continuity correction of 0.5.


                                      Kruskal-Wallis Test

                                 Chi-Square             0.0143
                                 DF                          1
                                 Pr > Chi-Square        0.9049
```

APPENDIX C

CHAIN-OF-CUSTODY FORMS

CHAIN C JSTODY FORM

Page 1 of 1

integral consulting inc.

Project: C1146 – POPA – KPLY

Samplers: SEXTON, WODZICKI, ESTELLA

Integral Contact: Jane Sexton

Office: Seattle WA

Phone: 206-957-0342

Ship to: Lab Name: New Fields

Address: 4729 NE View Drive

Port Gamble, WA 98352

Contact: Bill Gardiner

Phone: 360-501-3376

					ANALYSES REQUESTED										
Sample No.	Tag No.	**Date**	**Time**	**Matrix**	10 day amphipod	Larval development with resuspension	20-day Neanthes						**Extra Container**	**Archive**	**Comments**
SD0001K	21514	7/9/13	1119	SD	✓										HOLD FOR FIS
	21515					✓	✓								AUTHORIZATION
↓	21516		↓												
SD0002K	21523		1421		✓										
	21524					✓									
↓	21525		↓				✓								
SD0003K	21532		1312		✓										
	21533					✓									
↓	21534	↓	↓	↓			✓								↓ ↓

J. Sexton 7/9/13

Analysis Turn Time: [✓ Normal] Rush **Rush Results Needed By:**

Shipped by: Courier **Shipping Tracking No.**

Condition of Samples Upon Receipt: **Custody Seal Intact?**

Relinquished by: Jane Sexton *(signature)* **Date/Time:** 7/10/13 1611 **Received by:** *(signature)* **Date/Time:** 7.10.13 1611

Relinquished by: *(signature)* **Date/Time:** **Received by:** *(signature)* **Date/Time:**

Matrix Code:	GW - Groundwater
SL - Soil	SW - Surface water
SD -Sediment	Other:

Special Instructions:

Annapolis
200 Harry S. Truman Pkwy
Suite 330
Annapolis, MD 21401

Denver
285 Century Place
Suite 190
Louisville, CO 80027

Portland, Oregon
319 SW Washington St
Suite 1150
Portland, OR 97204

Honolulu
3465 Waialae Ave
Suite 380
Honolulu, HI 96816

Seattle
411 1st Ave S
Suite 550
Seattle, WA 98104

Portland, Maine
45 Exchange St
Suite 200
Portland, ME 04101

Olympia
1205 West Bay Dr NW
Olympia, WA 98502

NEWFIELDS

NewFields Northwest, LLC.
Shipping: 472 View Dr.
Mailing: P.O. Box 216
Port Gamble, WA. 98364
Tel: (360) 297-6040, Fax: (360)297-7268

CHAIN OF CUSTODY

Destination Lab: NewFields
Destination Contact: B. Gardiner
Date: 6/25/13
Turn-Around-Time: NA

Project Name: Port Angeles Harbor
Contract/PO:

Sample Originator: NewFields
Contact Name: M. Bacon
Address: Same as above
Phone:
Fax:
E-mail: mbacon@newfields.com

Report Results To: NA
Contact Name:
Address:

Phone: NA
Fax:
Email:

Invoicing To:

Comments or Special Instructions:

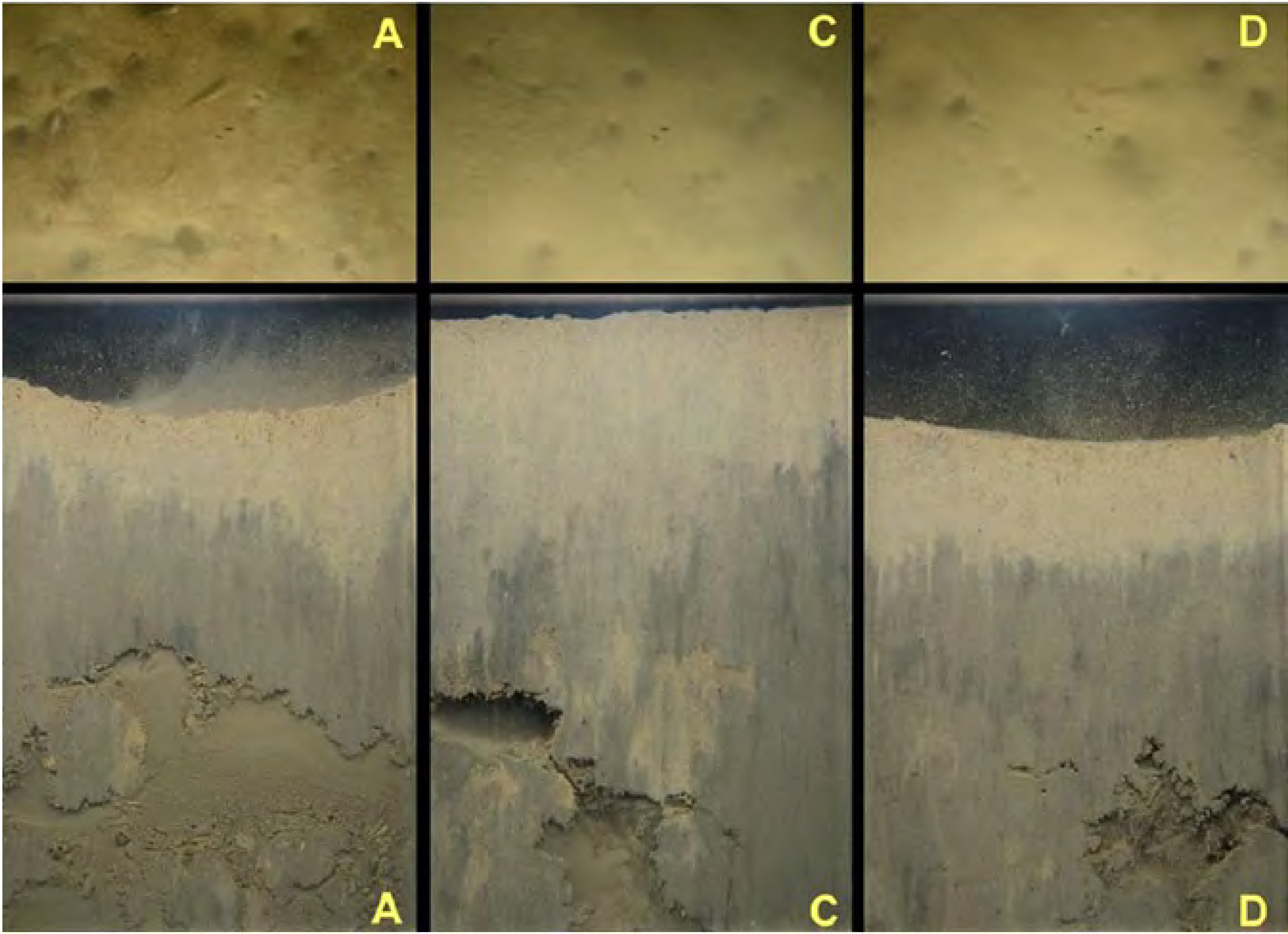
No.	Sample ID	Matrix	No. & Type of Container	Date & Time	Analysis: Ref Sed Collection						Preservation	Sample Temp Upon Receipt	LAB ID
1	CR-12 (10% fines)	SS	1 5 gallon bag	6/25/13 1420	X						4 C		
2	CARR 20 (30% fines)	↓	↓	6/25/13 1235	X						↓		
3	CR02 (58% fines)	↓	↓	6/25/13 1610	X								
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

	Relinquished by:	Recieved by:	Relinquished by:	Recieved by:
Print Name:	Mary Bacon	Jay Word		
Signature:	MBacon	JayWord		
Affiliation:	NewFields	NewFields		
Date/Time:	6/25/13 1835	6/25/13 1835		

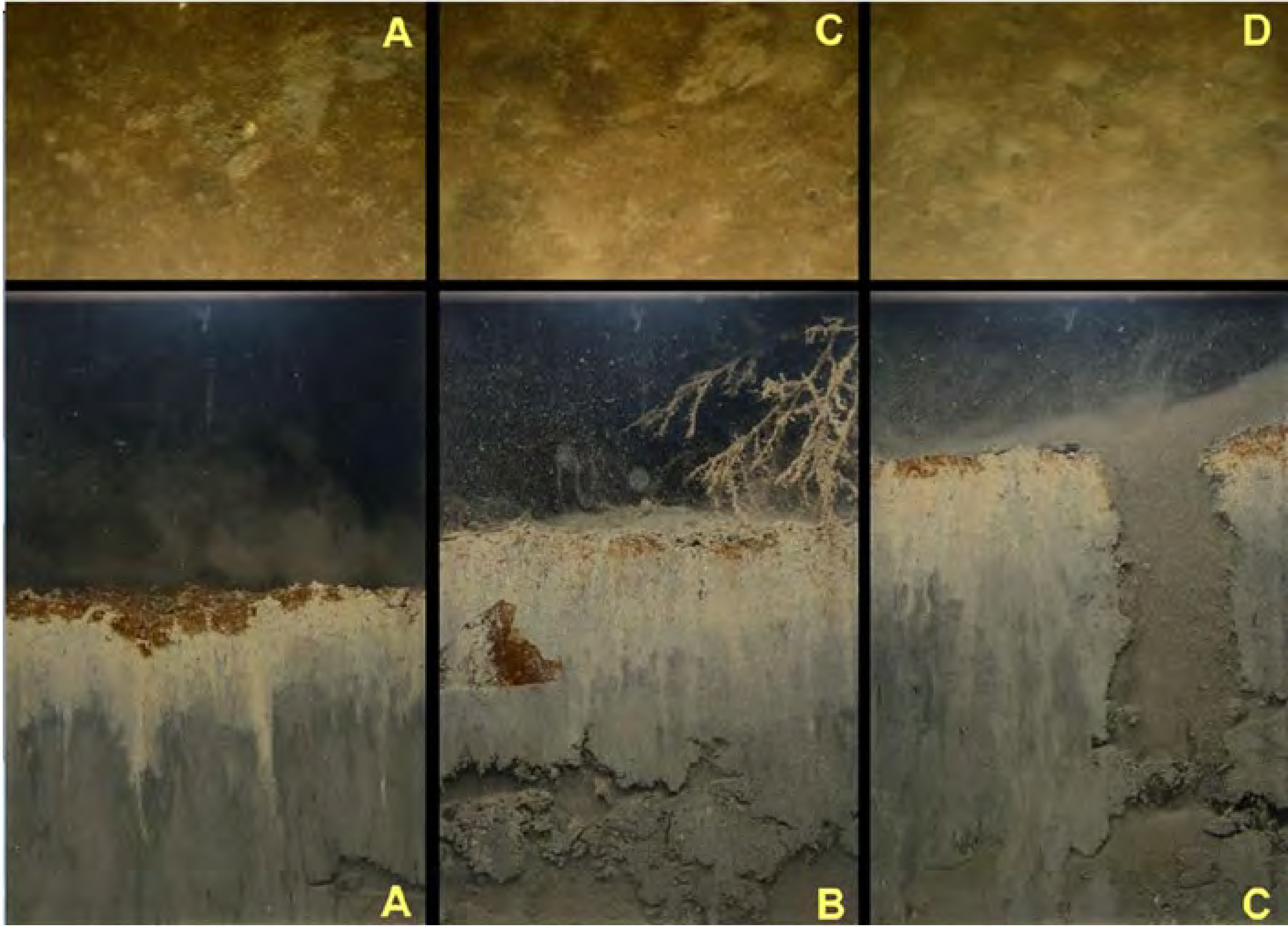
Matrix Codes
FW = Fresh Water
WW = Waste Water
SB = Salt & Brackish Water
SS = Soil & Sediment
TS = plant & Animal Tissue
OT = Other

WHITE - return to originator • YELLOW - lab • PINK - retained by originator

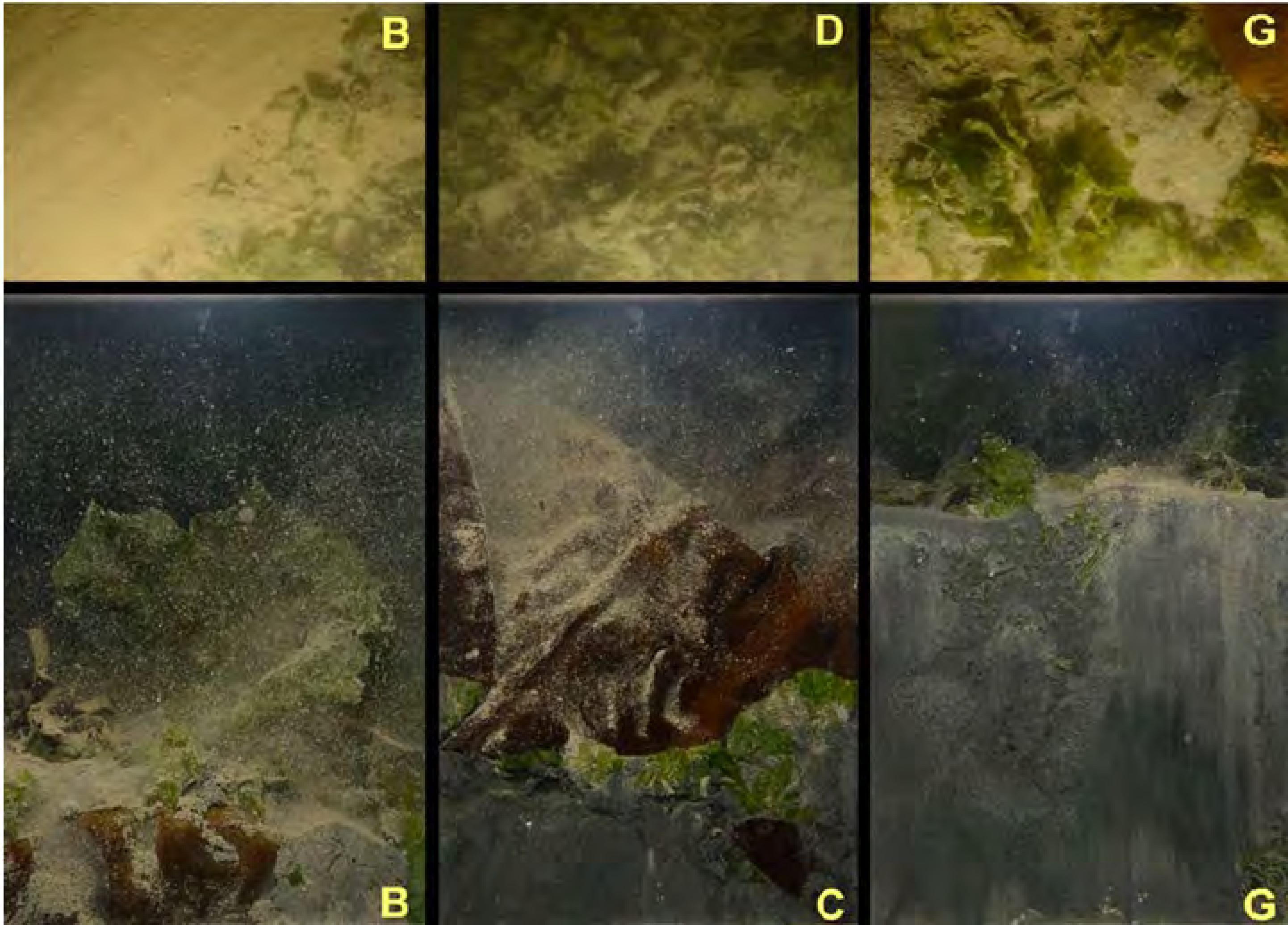
KSS1



KSS2



KSS3



INCH 1 2 3 4 5 6

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

Name Jane Sexton
Integral Consulting Inc.
Address 411 1st Ave. S. #550
Seattle WA 98104
Phone (206) 230-9600

Project C1146 – Offshore of Former
K Ply facility

POPA-KPLY

Jane Sexton
Managing Scientist

411 1st Avenue S, Suite 550
Seattle, WA 98104

206.230.9600 Main
206.957.0342 Direct
206.230.9601 Fax

jsexton@integral-corp.com
www.integral-corp.com

integral
consulting inc.

CONTENTS

PAGE	REFERENCE	DATE
	2 oz w/ zinc acetate; no headspace for sulfides	
	4 oz no headspace for TVS	
	8 oz Amber for PCBs/PCDD/PCDF	
	8 oz grain size, total solids, TOC	
	16 oz ammonia, butyltins, TPH, metals, SVOCs	
	8 oz Archive	
	1 gal Amphipod bioassay	
	1 L Larval bioassay w/ resuspension	
	1 gal Neanthes bioassay	
	⊛ Bioassay test sediment on hold at lab until directed by Floyd | Snider.	

Tuesday, July 9, 2013
Weather: cool (55-60°), clear with slight wind
Crew: Sexton, Wodzicki, Estella (Integral)
Charlie Eaton + Chris Eaton (BioMarine)

1045 Bottles for sediment samples arrive at the marina by courier. H&S meeting and decon van Veen grab and sediment compositing equipment

1119 Collect 1st grab at Station KSS-1. 15 cm pen. 7.5YR 2.5/1 throughout with thin redox layer on surface 2.5Y 4/2. sulfide odor. large piece of Kelp on surface of grab. silt with some clay. trace sand. snail or possibly sm. hermit crab on Kelp. 20% moisture. no organic debris. no wood debris.

1129 2nd grab - water only.

1132 3rd grab - 17 cm penetration. Same description as Grab #1.

1149 4th grab - water grab only some Kelp.

1152 5th grab - Wash out van Veen; retry collect 15 cm pen. same description as grab #1

g-s = 53% FINES.
Zn acetate = Lot #: 3-122-001
Container #: 27823

STATION KSS-1

Sample#	Tag #	Date	Time	Analysis	Jar
SD0001K	21508	7/9/13	1119	Total sulfides	2oz
	21509			TVS (no head)	4oz.
	21510			GS, TS, TOC	8oz
	21511			SVOCs, Am, BuTin, TPH, metals	16oz
	21512			PCBs/PCDD/Fs	8oz
	21513			Archive	8oz
	21514			Amphipod-Hold	1g
	21515			Larval-Hold	1L
	21516			Neathes-Hold	1ga

1230 Lunch break

1312 Collect 1st grab at Station KSS-3 14 cm pen. 10YR 2/1 throughout with spots of 2.5Y 5/4 redox layer on surface. Ulva on surface. several small dungeness crabs <1 inch. spot prawn small + ghost shrimp ≃ 6 inches. no odor. Silty sand. no organic debris. no wood debris ≈ 20% moisture

1331 Collect 2nd grab. 11 cm pen. on 1/2 van Veen grab; only 1/2 of van Veen sediment collected due to under penetration in other half of grab. 5 small crabs <1 in. more silt and less sand, otherwise same description as grab #1 with <5% wood debris

g-s =
Zn acetate = Lot #: 3-122-001
Container #: 27843

1340 Collect 3rd grab, 15 cm penetration. Same description as grab #1 with 3 small crabs.

STATION KSS-3

Sample #	Tag #	Date	Time	Analysis	Jar
SD0003K	21526	7/9/13	1312	Total sulfides	2oz
↓	21527	↓	↓	TVS (no head)	4oz
↓	21528	↓	↓	GS, TS, TOC	8oz
↓	21529	↓	↓	Am, BuTin, TPH metals, SVOCs	16oz
↓	21530	↓	↓	PCBs + PCDD/F	8oz
↓	21531	↓	↓	Archive	8oz
↓	21532	↓	↓	Amphipod	1gal
↓	21533	↓	↓	Larval	1L
↓	21534	↓	↓	Neanthes	1gal

1400 J. Sexton spoke with Tucker Stevens (Floyd/Snider). Station KSS-2 has a dolphin for mooring at the provided coordinate. In consultation with T. Stevens, it was decided to move the station 20 Meter to the SE directly offshore of outfall.

48°57.4260′ N
123°26.3830′ W

1421 Collect 1st grab at repositioned Station **KSS-2** 15 cm pen. 10 YR 5/2 thin redox

cont. next pg →

(Station KSS-2 cont.)

layer with 7.5 YR 4/1 throughout approx 30% fine wood debris with a few pieces of bark. 20% moisture. Shell frags. normal odor. sandy silt

g-s =

Zn acetate = Lot #: 3-122-001
Container #: 27792

1438 Collect 2nd grab at station. 17 cm pen. Same color + moisture content as 1st grab, but approx 40% fine wood + organic debris. shell frags. no odor. silt with little sand

1449 Collect 3rd grab, 17 cm pen. same descrip as previous grab, but large ghost shrimp approx 8-10 inches in length caught in jaws of van Veen.

STATION KSS-2

Sample #	Tag #	Date	Time	Analysis	Jar
SD0002K	21517	7/9/13	1421	Total sulfides	2oz
↓	21518	↓	↓	TVS (no head)	4oz
↓	21519	↓	↓	GS, TS, TOC	8oz
↓	21520	↓	↓	Am, BuTin, TPH metals, SVOCs	16oz
↓	21521	↓	↓	PCBs + PCDD/F	8oz
↓	21522	↓	↓	Archive	8oz

cont. next pg →

STATION KSS-2 (cont.)

Station KSS-2

Sample #	Tag #	Date	Time	Analysis	Jar
SD0002K	21523	7/9/13	1421	Amphipod	1 gal
↓	21524	↓	↓	Larval	1 L
	21525			Neanthes	1 gal

1530 Back at dock, demob gear, rinse vanVeen with freshwater.
End of Day

J. Sexton
7/9/13

☒

RECEIVED
JUL 31 2013
BY:

Germano & ASSOCIATES, INC.

MEMORANDUM

to: Tucker Stevens

from: Joe Germano

re: PoPA – Kply

date: July 28, 2013

Dear Tucker,

Enclosed please find a CD with high-resolution jpg files of all the SPI and Plan View images collected at the 3 K-Ply stations specified in your memo of June 18; these were collected as part of the Port Angeles survey performed by Germano & Associates, Inc. on the R/V Kittiwake during the week of July 15.

The KPly stations were sampled on Wednesday, July 17; our efforts are outlined in the field log below:

Station	Replicate	Frame #	Time	Depth (m)	# of weights	Stop Collar Settings
KSS-1	A	338	10:05	9.2	2	15
	B	339	10:07	9.0		
	C	340	10:08	11.2		
	D	341	10:10	9.6		
KSS-2	A	342	10:16	8.0	2	15
	B	343	10:17	11.6		
	C	344	10:18	8.0		
	D	345	10:20	7.6		
KSS-3	A	346	10:25	7.8	2	15
	B	347	10:26	9.4		
	C	348	10:28	7.2		
	D	349	10:32	9.2		
	DOWNLOAD					
KSS-3	E	350	10:50	9.6	4	16
	F	351	10:51	8.2		
	G	352	10:53	6.8		
	H	353	10:54	8.2		

The third station was sampled a second time with different camera settings given the low prism penetration we obtained on the first sampling attempt (which is the reason there are 8 replicate images for the 3rd station for both SPI and PV image files).

If you have any questions or need additional information, please do not hesitate to contact me.

K Ply Site

Draft Supplemental Data Collection Technical Memorandum

Appendix F

Core Photography and Grain Size Curves (PTS Labs)

PTS
Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

November 26, 2013

Tom Colligan
Floyd/Snider
601 Union St., Suite 600
Seattle, WA 98101

Re: PTS File No: 43617
Physical Properties Data
Part of Port Angeles KPLY Site RI; POPA-KPLY AO TASK2C

Dear Mr. Colligan:

Please find enclosed report of Physical Properties data from analysis conducted on cores received from your Part of Port Angeles KPLY Site RI; POPA-KPLY AO TASK2C project. All analyses were performed by applicable ASTM, EPA, or API methodologies. Electronic versions of the core images and physical properties report have been uploaded to PTS Laboratories drop box. The cores remain in frozen storage and will be held indefinitely. Please note that core storage will be billed quarterly beginning March 1, 2014.

PTS Laboratories Inc. appreciates the opportunity to be of service. If you have any questions or require additional information, please contact Morgan Richards at (562) 347-2509

Sincerely,
PTS Laboratories, Inc.

Michael Mark Brady, P.G.
District Manager

Encl.

PTS Laboratories

Project Name: **Part of Port Angeles KPLY Site RI**
Project Number: **POPA-KPLY AO TASK2C**

PTS File No: **43617**
Client: **Floyd/Snider**

TEST PROGRAM - 20131031

CORE ID	Depth ft.	Core Recovery ft.	Slab and Core Photo	Grain Size Analyses	Pore Fluid Saturation Package	A/W Drng. Capillarity Pkg.	Free Product Mobility	Residual Saturation by Water Drive	Fluid Properties Pkg.	Notes
Method:		**Plugs:**	1/4:3/4	Grab	Vert. 1.5"	Hor. 1"	Hor. 1.5"	Vert. 1.5"	Bulk	Keep core frozen
Date Received: 20130920										
PF-7-0-4	**0-4**	**1.30**	**2**							
PF-7-6.5-10	**6.5-10**	**1.70**	**3**	**6.5-6.7**	**6.5-6.7**					
PF-5-6.5-8	**6.5-8**	**1.50**	**2**							
K-15-9.5-11	**9.5-11**	**1.70**	**3**	**10.6-10.8**	**10.6-10.8**					
EW-2-A-10.5-12	**10.5-12**	**1.70**	**3**	**11.5-11.7**	**11.5-11.7**					
K-59-10.5-12	**10.5-12**	**1.70**	**3**							
PZ-06-A-3.5-5.5	**3.5-5.5**	**1.50**	**2**	**4.5-4.7**	**4.5-4.7**					
PZ-06-A-8-9.5	**8-9.5**	**1.50**	**2**	**9.3-9.5**	**9.3-9.5**					
K-27-9.5-11.5	**9.5-11.5**	**1.50**	**3**	**9.8-10.0**	**9.8-10.0**					
TOTALS:	**9 cores**	**14.10**	**23**	**6**	**6**					**23**

Laboratory Test Program Notes

Contaminant identification:

Sample locations to be selected by Floyd/Snider personnel from core photography.

* Analyses to be conducted by PTS Subcontract Consultant.

PTS Laboratories

PTS File No: 43617
Client: Floyd/Snider
Report Date: 11/26/13

PHYSICAL PROPERTIES DATA - PORE FLUID SATURATIONS

Project Name: Part of Port Angeles KPLY Site RI
Project No: POPA-KPLY AO TASK2C

		METHODS:	**API RP 40 / ASTM D2216**	**API RP 40**		**API RP 40**		**API RP 40**	
				DENSITY		POROSITY, %Vb (2)		PORE FLUID SATURATIONS, % Pv (3)	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	MOISTURE CONTENT, % weight	DRY BULK, g/cc	GRAIN, g/cc	TOTAL	AIR FILLED	WATER	NAPL
PF-7-6.5-10	6.6	V	19.0	1.67	2.73	39.0	7.5	77.5	3.3
K-15-9.5-11	10.7	V	20.3	1.60	2.72	41.3	8.8	73.7	5.0
EW-2-A-10.5-12	11.6	V	14.4	1.71	2.73	37.4	10.0	22.4	50.7
PZ-06-A-3.5-5.5	4.6	V	45.3	1.19	2.68	55.5	1.0	88.4	9.8
PZ-06-A-8-9.5	9.4	V	13.7	1.94	2.72	28.7	1.7	85.3	8.7
K-27-9.5-11.5	9.9	V	35.2	1.17	2.69	56.4	14.4	65.4	9.1

(1) Sample Orientation: H = horizontal; V = vertical; R = remold

(2) Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.

(3) Fluid density used to calculate pore fluid saturations: Water = 0.9996 g/cc, NAPL = 0.8600 g/cc.

Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Part of Port Angeles KPLY Site RI
PROJECT NO: POPA-KPLY AO TASK2C

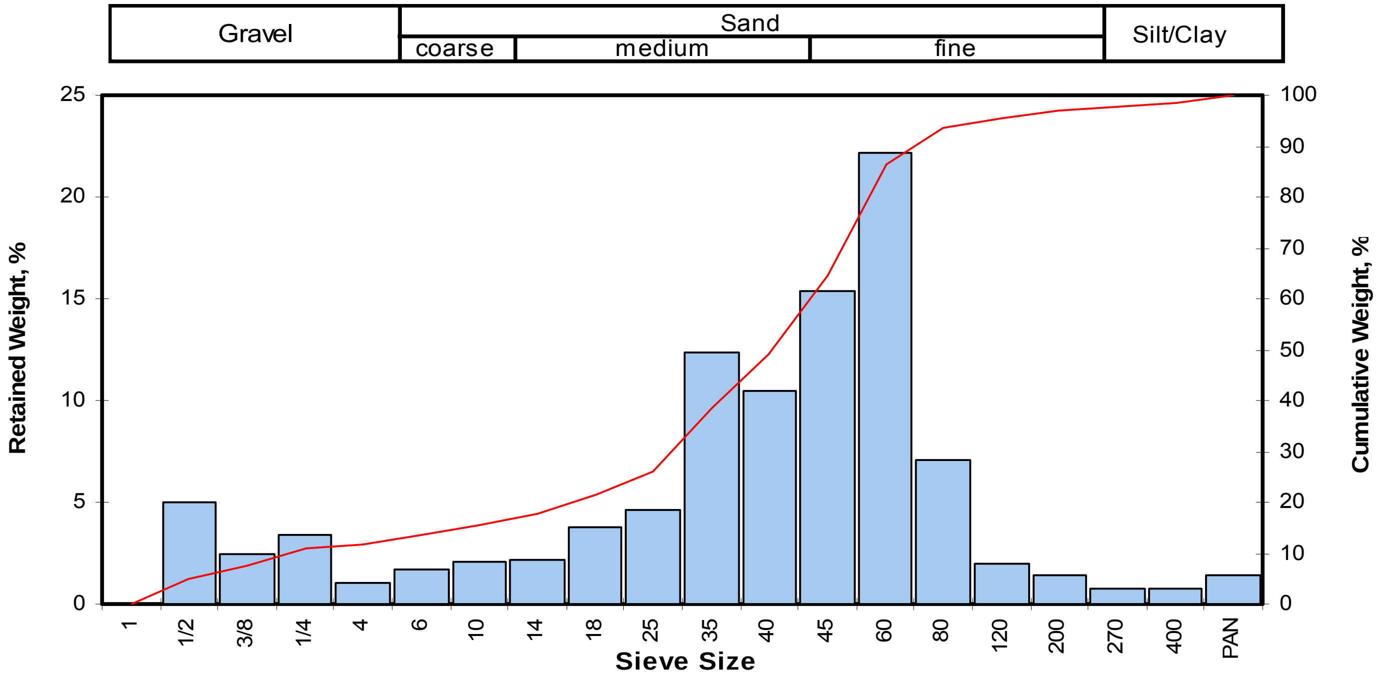
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
					Sand Size					
				Gravel	Coarse	Medium	Fine	Silt	Clay	
PF-7-6.5-10	6.7	Medium sand	0.416	11.85	3.76	33.42	48.03	(2)	(2)	2.93
K-15-9.5-11	10.8	Fine sand	0.253	2.98	4.10	27.00	59.53	(2)	(2)	6.39
EW-2-A-10.5-12	11.8	Medium sand	0.343	1.26	3.44	36.72	54.42	(2)	(2)	4.16
PZ-06-A-3.5-5.5	4.7	Silt	0.066	0.00	0.00	0.00	41.83	55.27	2.90	58.17
PZ-06-A-8-9.5	9.2	Fine sand	0.180	0.72	0.98	21.28	66.56	(2)	(2)	10.46
K-27-9.5-11.5	9.75	Silt	0.037	0.00	0.00	3.85	18.88	67.97	9.31	77.28

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fractions

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Floyd/Snider	**PTS File No:**	43617
Project:	Part of Port Angeles KPLY Site RI	**Sample ID:**	PF-7-6.5-10
Project No:	POPA-KPLY AO TASK2C	**Depth, ft:**	6.7



Opening		Phi of	U.S.	Sample	Incremental	Cumulative
			Sieve	Weight	Weight,	Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	3.03	5.02	5.02
0.3740	9.500	-3.25	3/8	1.47	2.44	7.46
0.2500	6.351	-2.67	1/4	2.03	3.37	10.83
0.1873	4.757	-2.25	4	0.62	1.03	11.85
0.1324	3.364	-1.75	6	1.01	1.67	13.53
0.0787	2.000	-1.00	10	1.26	2.09	15.62
0.0557	1.414	-0.50	14	1.31	2.17	17.79
0.0394	1.000	0.00	18	2.26	3.75	21.54
0.0278	0.707	0.50	25	2.81	4.66	26.19
0.0197	0.500	1.00	35	7.44	12.33	38.53
0.0166	0.420	1.25	40	6.34	10.51	49.04
0.0139	0.354	1.50	45	9.25	15.33	64.37
0.0098	0.250	2.00	60	13.35	22.13	86.51
0.0070	0.177	2.50	80	4.29	7.11	93.62
0.0049	0.125	3.00	120	1.22	2.02	95.64
0.0029	0.074	3.75	200	0.86	1.43	97.07
0.0021	0.053	4.25	270	0.46	0.76	97.83
0.0015	0.037	4.75	400	0.44	0.73	98.56
			PAN	0.87	1.44	100.00
TOTALS				60.32	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-3.65	0.4938	12.541
10	-2.81	0.2760	7.011
16	-0.91	0.0741	1.881
25	0.37	0.0304	0.773
40	1.04	0.0192	0.488
50	1.27	0.0164	0.416
60	1.43	0.0146	0.371
75	1.74	0.0118	0.299
84	1.94	0.0102	0.260
90	2.25	0.0083	0.211
95	2.84	0.0055	0.139

Measure	Trask	Inman	Folk-Ward
Median, phi	1.27	1.27	1.27
Median, in.	0.0164	0.0164	0.0164
Median, mm	0.416	0.416	0.416
Mean, phi	0.90	0.52	0.77
Mean, in.	0.0211	0.0275	0.0232
Mean, mm	0.536	0.699	0.588
Sorting	1.607	1.428	1.697
Skewness	1.156	-0.525	-0.520
Kurtosis	0.035	1.273	1.944

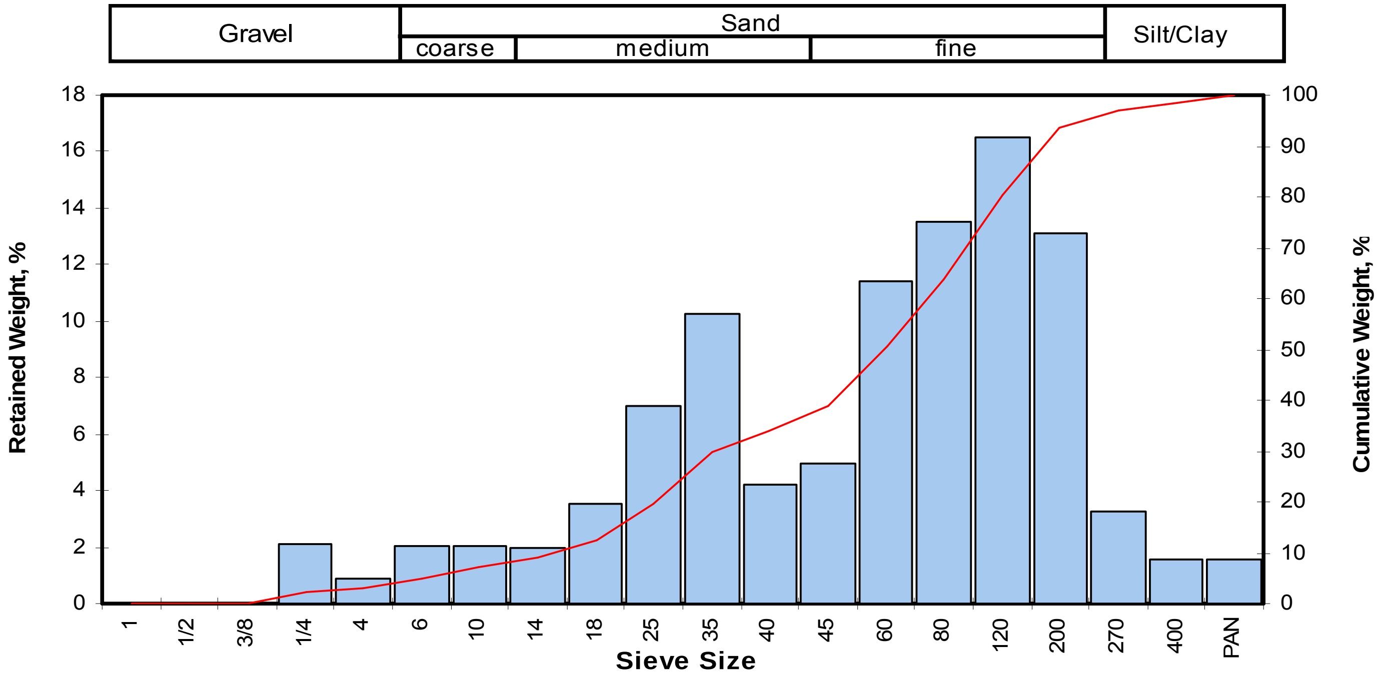
Grain Size Description (ASTM-USCS Scale)	Medium sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	11.85
Coarse Sand	10	3.76
Medium Sand	40	33.42
Fine Sand	200	48.03
Silt/Clay	<200	2.93
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Floyd/Snider	**PTS File No:**	43617
Project:	Part of Port Angeles KPLY Site RI	**Sample ID:**	K-15-9.5-11
Project No:	POPA-KPLY AO TASK2C	**Depth, ft:**	10.8



Opening		Phi of	U.S.	Sample	Incremental	Cumulative
Inches	**Millimeters**	**Screen**	**Sieve No.**	**Weight grams**	**Weight, percent**	**Weight, percent**
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	1.15	2.12	2.12
0.1873	4.757	-2.25	4	0.47	0.87	2.98
0.1324	3.364	-1.75	6	1.11	2.04	5.03
0.0787	2.000	-1.00	10	1.11	2.05	7.08
0.0557	1.414	-0.50	14	1.06	1.95	9.03
0.0394	1.000	0.00	18	1.92	3.54	12.57
0.0278	0.707	0.50	25	3.81	7.02	19.59
0.0197	0.500	1.00	35	5.58	10.28	29.86
0.0166	0.420	1.25	40	2.29	4.22	34.08
0.0139	0.354	1.50	45	2.68	4.94	39.02
0.0098	0.250	2.00	60	6.19	11.40	50.42
0.0070	0.177	2.50	80	7.34	13.52	63.94
0.0049	0.125	3.00	120	8.98	16.54	80.48
0.0029	0.074	3.75	200	7.13	13.13	93.61
0.0021	0.053	4.25	270	1.78	3.28	96.89
0.0015	0.037	4.75	400	0.86	1.58	98.47
			PAN	0.83	1.53	100.00
TOTALS				54.29	100.00	100.00

Cumulative Weight Percent greater than			
Weight	**Phi**	**Particle Size**	
percent	**Value**	**Inches**	**Millimeters**
5	-1.76	0.1331	3.380
10	-0.36	0.0506	1.286
16	0.24	0.0332	0.844
25	0.76	0.0232	0.589
40	1.54	0.0135	0.343
50	1.98	0.0100	0.253
60	2.35	0.0077	0.196
75	2.83	0.0055	0.140
84	3.20	0.0043	0.109
90	3.54	0.0034	0.086
95	3.96	0.0025	0.064

Measure	Trask	Inman	Folk-Ward
Median, phi	1.98	1.98	1.98
Median, in.	0.0100	0.0100	0.0100
Median, mm	0.253	0.253	0.253
Mean, phi	1.46	1.72	1.81
Mean, in.	0.0144	0.0119	0.0112
Mean, mm	0.365	0.303	0.285
Sorting	2.050	1.478	1.606
Skewness	1.135	-0.175	-0.241
Kurtosis	0.187	0.934	1.132

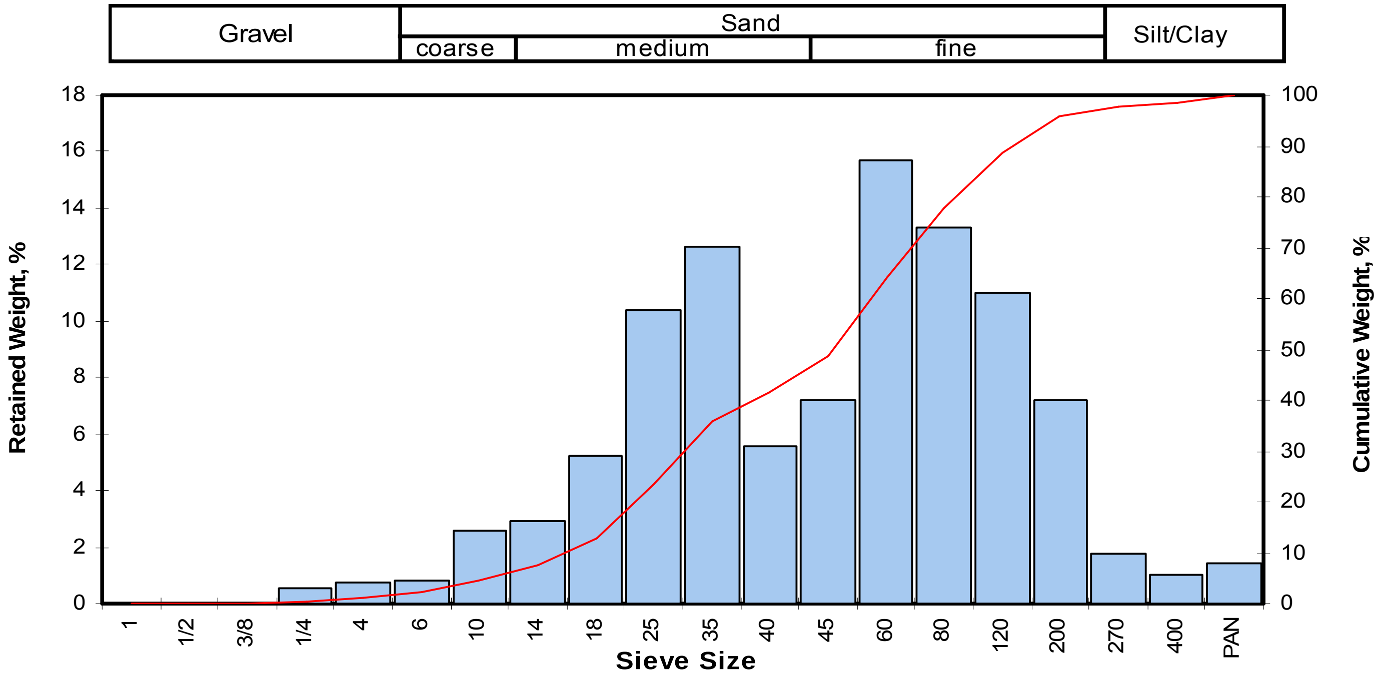
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	2.98
Coarse Sand	10	4.10
Medium Sand	40	27.00
Fine Sand	200	59.53
Silt/Clay	<200	6.39
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Floyd/Snider	**PTS File No:**	43617
Project:	Part of Port Angeles KPLY Site RI	**Sample ID:**	EW-2-A-10.5-12
Project No:	POPA-KPLY AO TASK2C	**Depth, ft:**	11.8



Opening		Phi of	U.S.	Sample	Incremental	Cumulative
Inches	Millimeters	Screen	Sieve No.	Weight grams	Weight, percent	Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.34	0.52	0.52
0.1873	4.757	-2.25	4	0.48	0.74	1.26
0.1324	3.364	-1.75	6	0.55	0.84	2.10
0.0787	2.000	-1.00	10	1.69	2.60	4.70
0.0557	1.414	-0.50	14	1.88	2.89	7.59
0.0394	1.000	0.00	18	3.42	5.25	12.84
0.0278	0.707	0.50	25	6.76	10.38	23.22
0.0197	0.500	1.00	35	8.22	12.62	35.85
0.0166	0.420	1.25	40	3.63	5.58	41.42
0.0139	0.354	1.50	45	4.68	7.19	48.61
0.0098	0.250	2.00	60	10.21	15.68	64.29
0.0070	0.177	2.50	80	8.69	13.35	77.64
0.0049	0.125	3.00	120	7.18	11.03	88.67
0.0029	0.074	3.75	200	4.67	7.17	95.84
0.0021	0.053	4.25	270	1.13	1.74	97.57
0.0015	0.037	4.75	400	0.65	1.00	98.57
			PAN	0.93	1.43	100.00
TOTALS				65.11	100.00	100.00

Cumulative Weight Percent greater than

Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-0.95	0.0760	1.929
10	-0.27	0.0475	1.206
16	0.15	0.0354	0.900
25	0.57	0.0265	0.673
40	1.19	0.0173	0.439
50	1.54	0.0135	0.343
60	1.86	0.0108	0.275
75	2.40	0.0075	0.189
84	2.79	0.0057	0.145
90	3.14	0.0045	0.113
95	3.66	0.0031	0.079

Measure	Trask	Inman	Folk-Ward
Median, phi	1.54	1.54	1.54
Median, in.	0.0135	0.0135	0.0135
Median, mm	0.343	0.343	0.343
Mean, phi	1.21	1.47	1.49
Mean, in.	0.0170	0.0142	0.0140
Mean, mm	0.431	0.361	0.355
Sorting	1.886	1.318	1.358
Skewness	1.041	-0.056	-0.069
Kurtosis	0.222	0.749	1.032

Grain Size Description (ASTM-USCS Scale)	Medium sand (based on Mean from Trask)

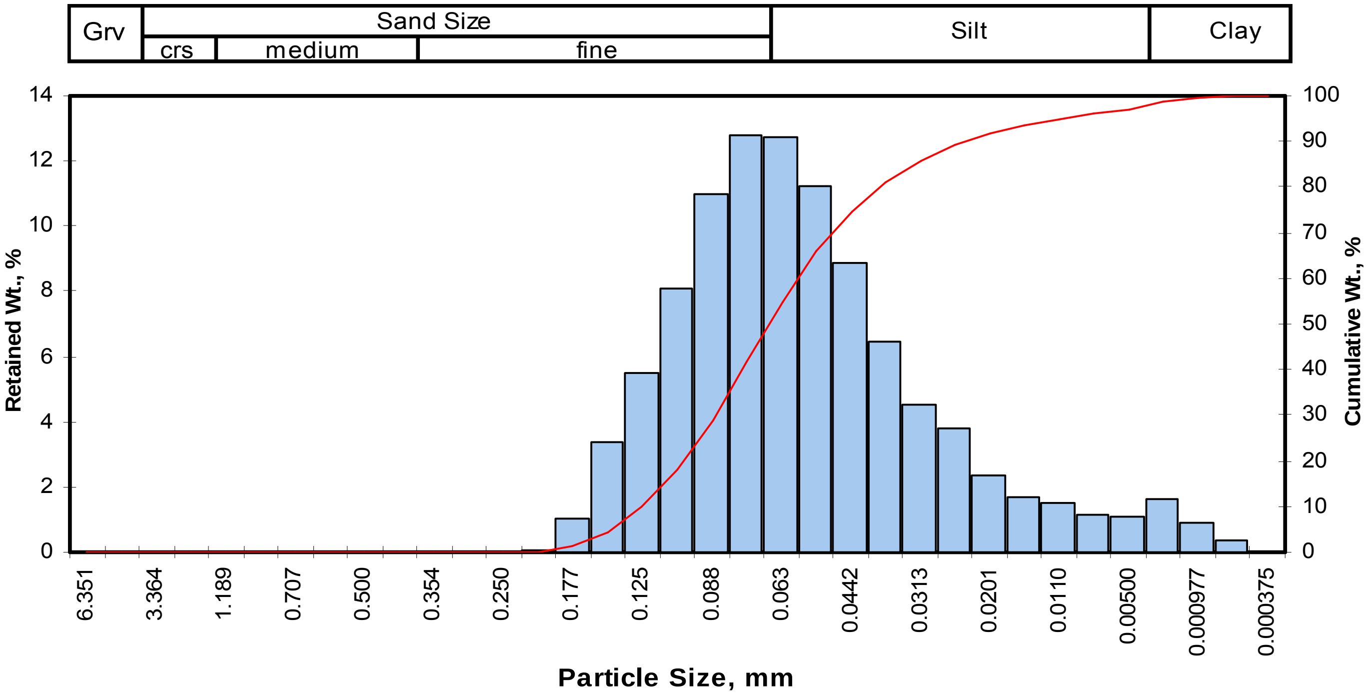
Description	Retained on Sieve #	Weight Percent
Gravel	4	1.26
Coarse Sand	10	3.44
Medium Sand	40	36.72
Fine Sand	200	54.42
Silt/Clay	<200	4.16
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: Floyd/Snider
Project: Part of Port Angeles KPLY Site RI
Project No: POPA-KPLY AO TASK2C

PTS File No: 43617
Sample ID: PZ-06-A-3.5-5.5
Depth, ft: 4.7



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.05	0.05	0.05
0.0070	0.177	2.50	80	1.04	1.04	1.09
0.0059	0.149	2.75	100	3.37	3.37	4.46
0.0049	0.125	3.00	120	5.46	5.46	9.92
0.0041	0.105	3.25	140	8.10	8.10	18.03
0.0035	0.088	3.50	170	11.00	11.00	29.03
0.0029	0.074	3.75	200	12.80	12.80	41.83
0.0025	0.063	4.00	230	12.70	12.70	54.54
0.0021	0.053	4.25	270	11.20	11.20	65.74
0.00174	0.0442	4.50	325	8.84	8.84	74.58
0.00146	0.0372	4.75	400	6.46	6.46	81.05
0.00123	0.0313	5.00	450	4.52	4.52	85.57
0.000986	0.0250	5.32	500	3.80	3.80	89.37
0.000790	0.0201	5.64	635	2.33	2.33	91.70
0.000615	0.0156	6.00		1.68	1.68	93.38
0.000435	0.0110	6.50		1.49	1.49	94.87
0.000308	0.00781	7.00		1.12	1.12	95.99
0.000197	0.00500	7.65		1.11	1.11	97.10
0.000077	0.00195	9.00		1.61	1.61	98.71
0.000038	0.000977	10.00		0.88	0.88	99.59
0.000019	0.000488	11.00		0.38	0.38	99.97
0.000015	0.000375	11.38		0.03	0.03	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.77	0.0058	0.146
10	3.00	0.0049	0.125
16	3.19	0.0043	0.110
25	3.41	0.0037	0.094
40	3.71	0.0030	0.076
50	3.91	0.0026	0.066
60	4.12	0.0023	0.057
75	4.52	0.0017	0.044
84	4.91	0.0013	0.033
90	5.41	0.0009	0.024
95	6.56	0.0004	0.011

Measure	Trask	Inman	Folk-Ward
Median, phi	3.91	3.91	3.91
Median, in.	0.0026	0.0026	0.0026
Median, mm	0.066	0.066	0.066
Mean, phi	3.86	4.05	4.00
Mean, in.	0.0027	0.0024	0.0025
Mean, mm	0.069	0.060	0.062
Sorting	1.468	0.863	1.005
Skewness	0.965	0.162	0.281
Kurtosis	0.249	1.192	1.400

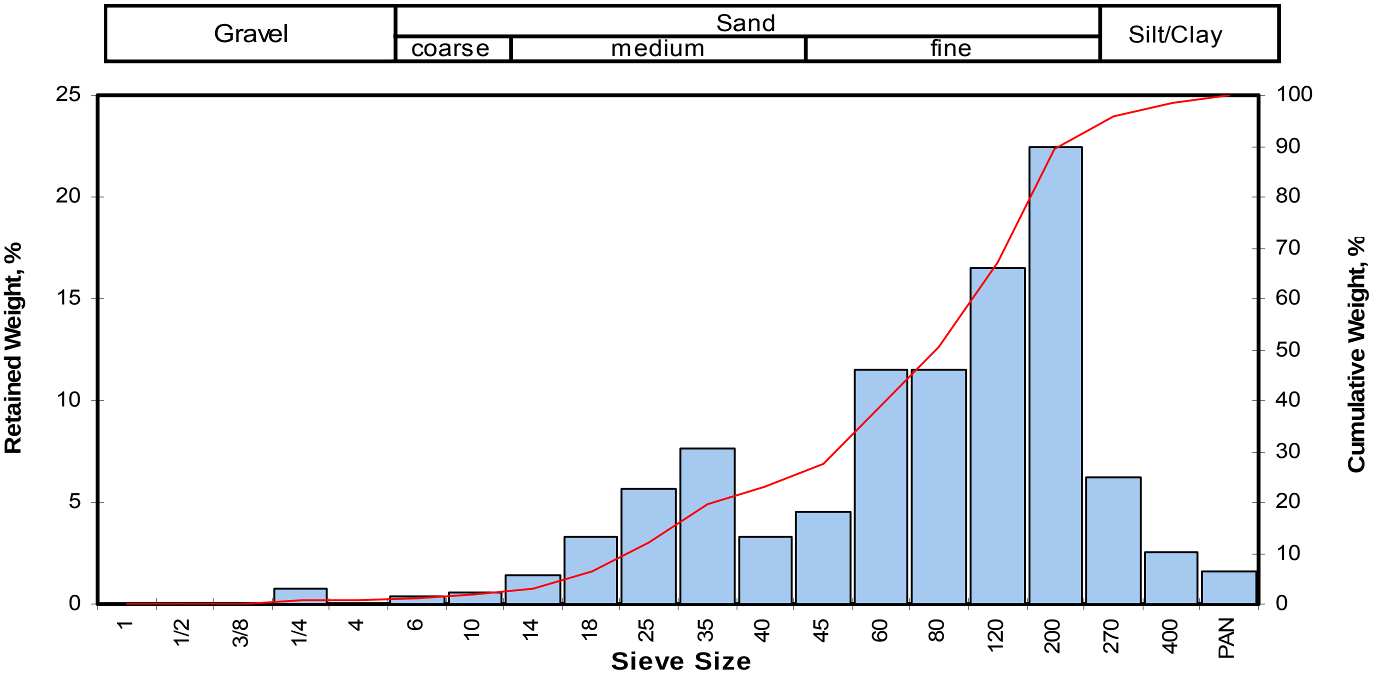
Grain Size Description (ASTM-USCS Scale)	Silt (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	41.83
Silt	>0.005 mm	55.27
Clay	<0.005 mm	2.90
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Floyd/Snider	**PTS File No:**	43617
Project:	Part of Port Angeles KPLY Site RI	**Sample ID:**	PZ-06-A-8-9.5
Project No:	POPA-KPLY AO TASK2C	**Depth, ft:**	9.2



Opening		Phi of	U.S.	Sample	Incremental	Cumulative
			Sieve	Weight	Weight,	Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.31	0.72	0.72
0.1873	4.757	-2.25	4	0.00	0.00	0.72
0.1324	3.364	-1.75	6	0.16	0.37	1.10
0.0787	2.000	-1.00	10	0.26	0.61	1.70
0.0557	1.414	-0.50	14	0.62	1.45	3.15
0.0394	1.000	0.00	18	1.40	3.27	6.42
0.0278	0.707	0.50	25	2.43	5.67	12.09
0.0197	0.500	1.00	35	3.26	7.61	19.70
0.0166	0.420	1.25	40	1.41	3.29	22.99
0.0139	0.354	1.50	45	1.96	4.57	27.56
0.0098	0.250	2.00	60	4.94	11.53	39.09
0.0070	0.177	2.50	80	4.93	11.51	50.60
0.0049	0.125	3.00	120	7.07	16.50	67.09
0.0029	0.074	3.75	200	9.62	22.45	89.54
0.0021	0.053	4.25	270	2.68	6.25	95.80
0.0015	0.037	4.75	400	1.11	2.59	98.39
			PAN	0.69	1.61	100.00
TOTALS				42.85	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-0.22	0.0458	1.162
10	0.32	0.0316	0.803
16	0.76	0.0233	0.592
25	1.36	0.0153	0.390
40	2.04	0.0096	0.243
50	2.47	0.0071	0.180
60	2.79	0.0057	0.145
75	3.26	0.0041	0.104
84	3.56	0.0033	0.085
90	3.79	0.0029	0.072
95	4.19	0.0022	0.055

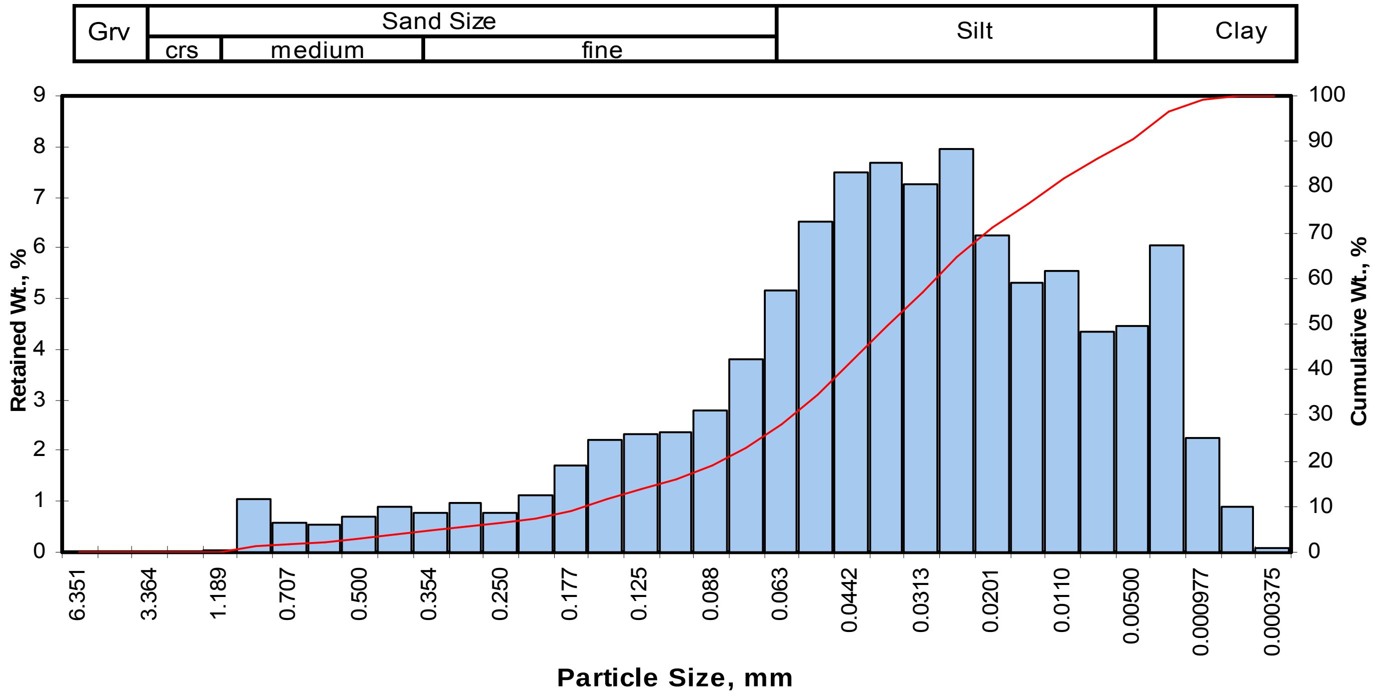
Measure	Trask	Inman	Folk-Ward
Median, phi	2.47	2.47	2.47
Median, in.	0.0071	0.0071	0.0071
Median, mm	0.180	0.180	0.180
Mean, phi	2.02	2.16	2.27
Mean, in.	0.0097	0.0088	0.0082
Mean, mm	0.247	0.224	0.208
Sorting	1.935	1.404	1.369
Skewness	1.119	-0.223	-0.223
Kurtosis	0.195	0.568	0.948

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.72
Coarse Sand	10	0.98
Medium Sand	40	21.28
Fine Sand	200	66.56
Silt/Clay	<200	10.46
	Total	100

Particle Size Analysis - ASTM D4464M

Client:	Floyd/Snider	**PTS File No:**	43617
Project:	Part of Port Angeles KPLY Site RI	**Sample ID:**	K-27-9.5-11.5
Project No:	POPA-KPLY AO TASK2C	**Depth, ft:**	9.75



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	**Millimeters**	**Screen**	**No.**	**grams**	**percent**	**percent**
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.04	0.04	0.04
0.0331	0.841	0.25	20	1.06	1.06	1.10
0.0278	0.707	0.50	25	0.59	0.59	1.69
0.0234	0.595	0.75	30	0.55	0.55	2.24
0.0197	0.500	1.00	35	0.71	0.71	2.95
0.0166	0.420	1.25	40	0.90	0.90	3.85
0.0139	0.354	1.50	45	0.79	0.79	4.63
0.0117	0.297	1.75	50	0.97	0.97	5.60
0.0098	0.250	2.00	60	0.79	0.79	6.39
0.0083	0.210	2.25	70	1.11	1.11	7.50
0.0070	0.177	2.50	80	1.72	1.72	9.22
0.0059	0.149	2.75	100	2.22	2.22	11.44
0.0049	0.125	3.00	120	2.32	2.32	13.76
0.0041	0.105	3.25	140	2.36	2.36	16.12
0.0035	0.088	3.50	170	2.80	2.80	18.92
0.0029	0.074	3.75	200	3.80	3.80	22.72
0.0025	0.063	4.00	230	5.18	5.18	27.90
0.0021	0.053	4.25	270	6.52	6.52	34.42
0.00174	0.0442	4.50	325	7.50	7.50	41.92
0.00146	0.0372	4.75	400	7.70	7.70	49.61
0.00123	0.0313	5.00	450	7.24	7.24	56.85
0.000986	0.0250	5.32	500	7.95	7.95	64.80
0.000790	0.0201	5.64	635	6.24	6.24	71.04
0.000615	0.0156	6.00		5.32	5.32	76.36
0.000435	0.0110	6.50		5.53	5.53	81.89
0.000308	0.00781	7.00		4.35	4.35	86.23
0.000197	0.00500	7.65		4.46	4.46	90.69
0.000077	0.00195	9.00		6.07	6.07	96.76
0.000038	0.000977	10.00		2.26	2.26	99.02
0.000019	0.000488	11.00		0.90	0.90	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	**Phi**	**Particle Size**	
percent	**Value**	**Inches**	**Millimeters**
5	1.59	0.0130	0.331
10	2.59	0.0066	0.166
16	3.24	0.0042	0.106
25	3.86	0.0027	0.069
40	4.44	0.0018	0.046
50	4.76	0.0014	0.037
60	5.13	0.0011	0.029
75	5.91	0.0007	0.017
84	6.74	0.0004	0.009
90	7.54	0.0002	0.005
95	8.61	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	4.76	4.76	4.76
Median, in.	0.0014	0.0014	0.0014
Median, mm	0.037	0.037	0.037
Mean, phi	4.55	4.99	4.91
Mean, in.	0.0017	0.0012	0.0013
Mean, mm	0.043	0.031	0.033
Sorting	2.034	1.753	1.939
Skewness	0.920	0.129	0.113
Kurtosis	0.162	1.000	1.403
Grain Size Description (ASTM-USCS Scale)	Silt (based on Mean from Trask)		

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	3.85
Fine Sand	200	18.88
Silt	>0.005 mm	67.97
Clay	<0.005 mm	9.31
	Total	**100**

SAMPLE CHAIN OF CUSTODY

43617

Page # 1 of 1

Send Report To Tom Colligan tom.colligan@floydsnider.com
Company Floyd|Snider
Address 601 Union St, Ste 600
City, State, ZIP Seattle, WA 98101
Phone # 206-292-2078 Fax #

SAMPLERS (*signature*)

PROJECT NAME/NO.
Port of Port Angeles
KPly Site RI

PO#
POPA-KPly
AO T.2C

REMARKS – pls send results to Floyd|Snider as shown at left ←

TURNAROUND TIME
☒ Standard (2 Weeks)
☐ RUSH
Rush charges authorized by

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Return samples
☒ Will call with instructions

						ANALYSES REQUESTED												
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by8260	SVOCs by 8270	HFS	UV Photography	HOLD for pore fluid sat.					Notes
✓ PF-7-0-4		9/19/13	0845	soil	1							X	X					
✓ PF-7-6.5-10		9/19/13	0900	soil	1							X	X					
✓ PF-5-6.5-8		9/19/13	0945	soil	1							X	X					
✓ K-15-9.5-11		9/19/13	1130	soil	1							X	X					
✓ EW-2-A-10.5-12		9/19/13	1025	soil	1							X	X					
✓ K-59-10.5-12		9/19/13	1100	soil	1							X	X					
✓ PZ-06-A-3.5-5.5		9/19/13	1215	soil	1							X	X					
✓ PZ-06-A-8-9.5		9/19/13	1230	soil	1							X	X					
✓ K-27-9.5-11.5		9/19/13	1430	soil	1							X	X					

To: PTS Laboratories Inc
~~Friedman & Bruya, Inc.~~
~~3012 16th Avenue West~~
8100 Secura Way
~~Seattle, WA 98119-2029~~
Santa Fe Springs, CA 90670
Ph. ~~(206) 285-8282~~
(562) 347-2500
Fax ~~(206) 283-5044~~
(562) 907-3610
FORMS\COC\COC.DOC

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Kristin Anderson	Floyd|Snider	9/19/13	1430
Received by:	Robert Rojo	PTS LABS	9/20/13	9:32
Relinquished by:				
Received by:				

-16°F

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PTS File No.: 43617

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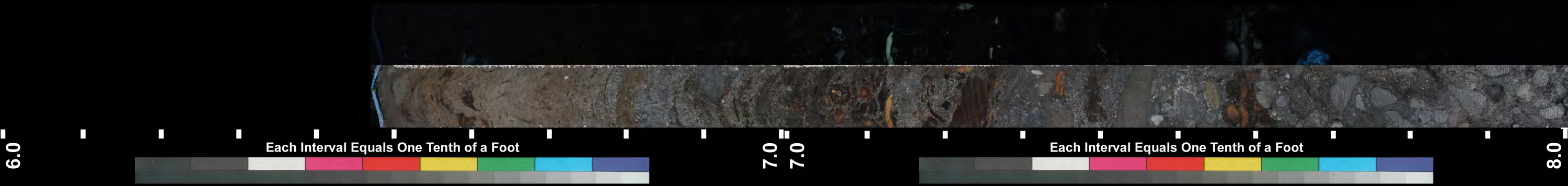

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Project ID: POPA-KPLY AO TASK2C   Boring ID: PF-5

Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: PF-5

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Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: PF-7

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Project ID: POPA-KPLY AO TASK2C   Boring ID: K-15

Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: EW-2-A

Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: EW-2-A

Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: EW-2-A

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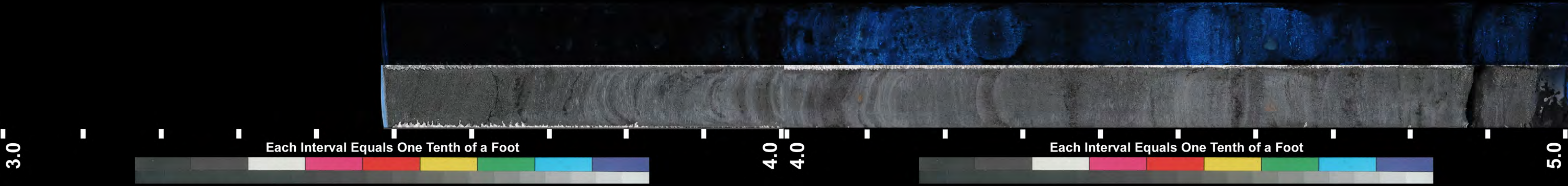

Each Interval Equals One Tenth of a Foot

Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: PZ-06-A

Each Interval Equals One Tenth of a Foot

Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: PZ-06-A

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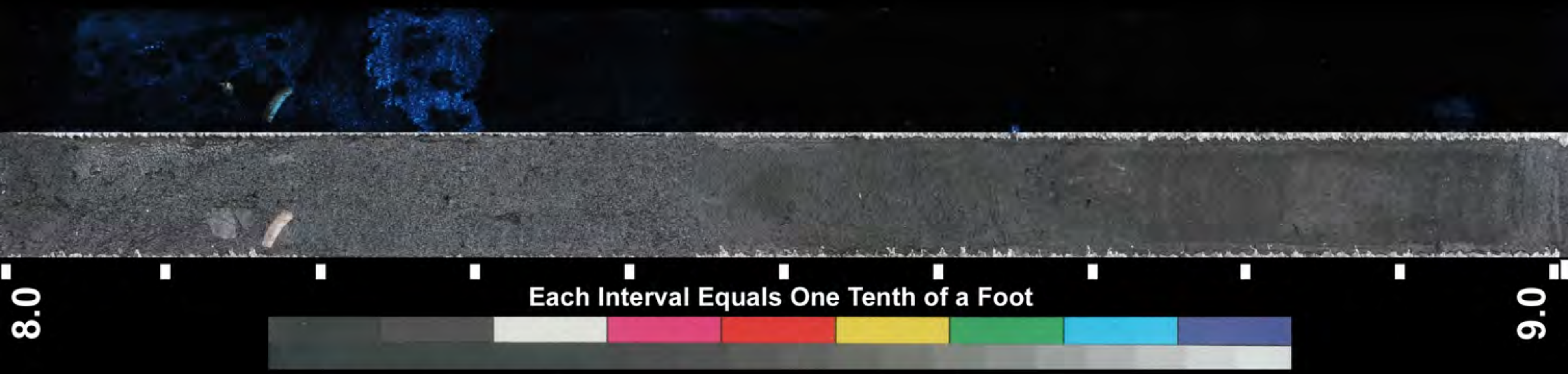

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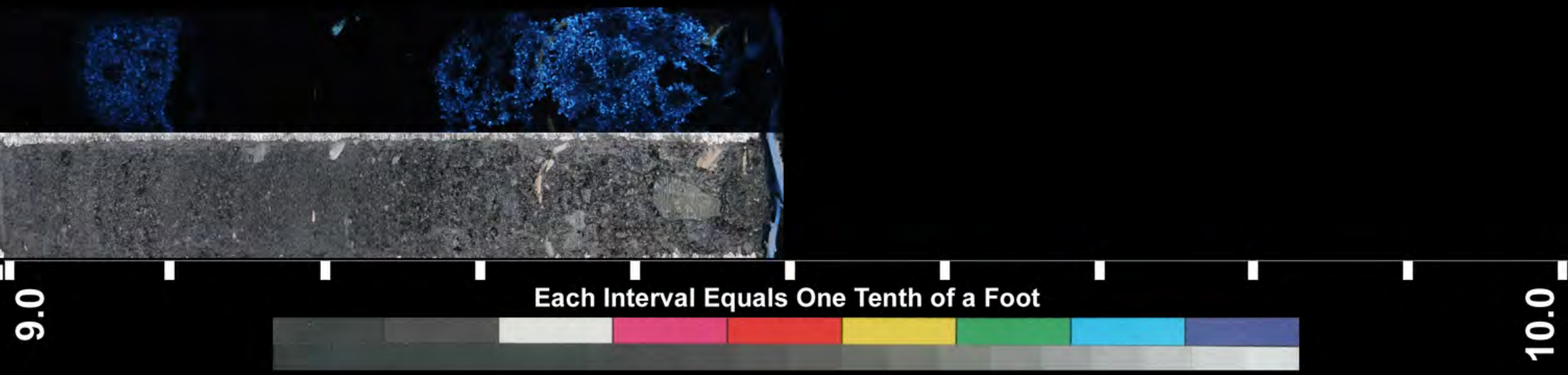

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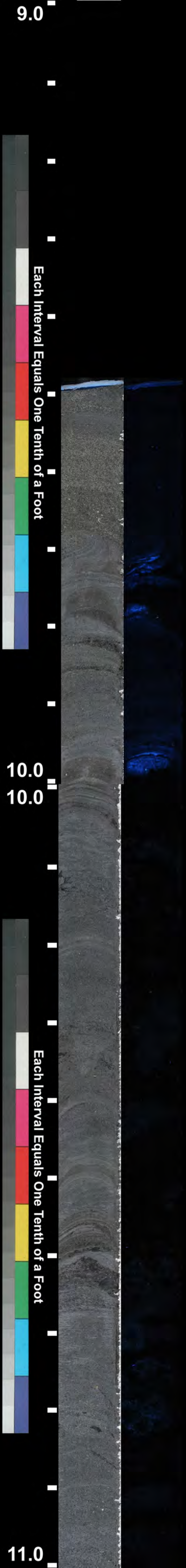

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Project ID: POPA-KPLY AO TASK2C Boring ID: K-27

Project: Part of Port Angeles KPLY Site RI
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Project ID: POPA-KPLY AO TASK2C   Boring ID: K-15

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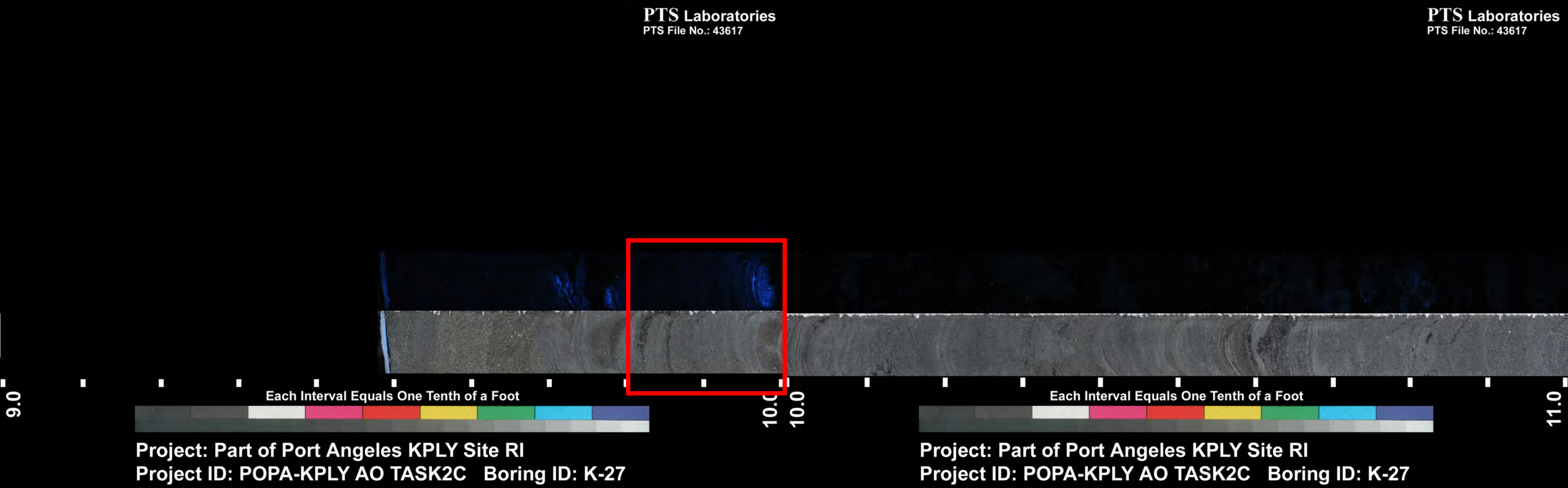
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PTS Laboratories
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Each Interval Equals One Tenth of a Foot
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Each Interval Equals One Tenth of a Foot
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Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C Boring ID: K-27
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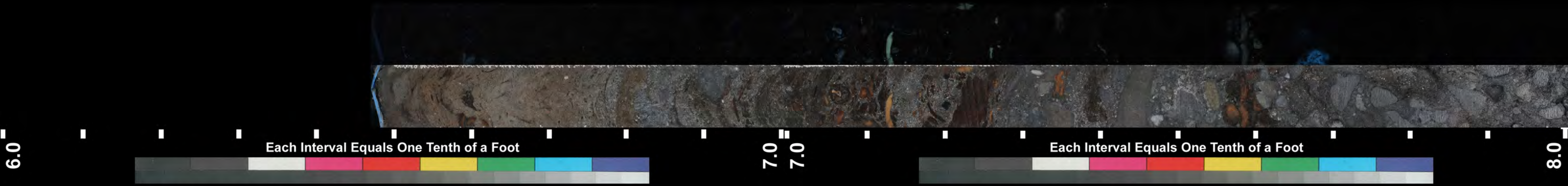

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Project ID: POPA-KPLY AO TASK2C   Boring ID: PF-5

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Project ID: POPA-KPLY AO TASK2C   Boring ID: PF-5

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Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: PF-7

Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C   Boring ID: PF-7


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Each Interval Equals One Tenth of a Foot
Project: Part of Port Angeles KPLY Site RI
Project ID: POPA-KPLY AO TASK2C Boring ID: PF-7
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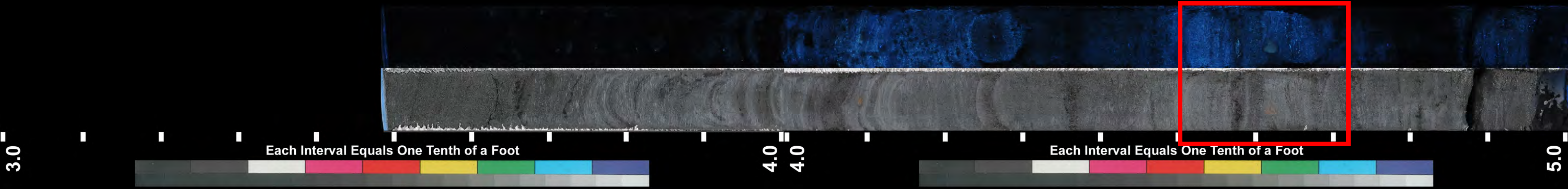

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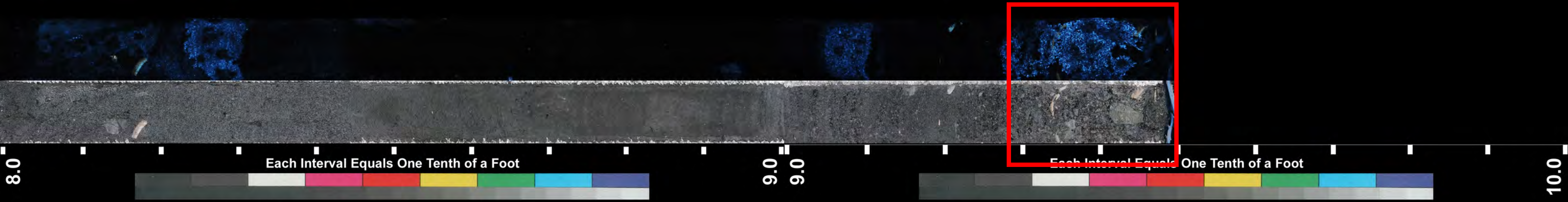

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