Appendix D-1

Environmental Sampling and Analysis Plan for Bank Sediment Sampling

Olympic Pipeline Gasoline Spill

Conway, WA 12/10/2023

Environmental Sampling and Analysis Plan (SAP) for Bank Sediment Sampling

Version 1.4

Prepared on Behalf of:

Olympic Pipeline

Prepared By:

CTEH, LLC

5120 Northshore Drive

Little Rock, AR 72118

501-801-8500

December 23, 2023

	Name/Organization	Signature	Date Signed
Prepared by:	Tony Palagyi - CTEH		
Reviewed by:	Andrew Henault - CTEH		
Approved by:			
Approved by:			
Approved by:			

1.0 Introduction and Purpose

This Sampling and Analysis Plan (SAP) was prepared by CTEH®, LLC. on behalf of Olympic Pipeline Company (Olympic) to provide environmental sampling work plans related to the Olympic Pipeline Gasoline Spill in Conway, WA . The incident occurred on December 10, 2023. The approximate location of the release site is 19651 SR 534, Conway, WA. The location of the incident is depicted on the Site Location Map in Appendix A.

The objectives of the environmental investigation and proposed sampling for defining this emergency response:

- Sampling to determine the presence or absence of a gasoline constituents within the area of concern;
- Sampling to characterize gasoline constituents within the area of concern;
- Sampling to estimate contamination levels within the area of concern;
- Sampling to delineate contamination area(s) within the site;
- Sampling to determine the location of hot spots within the area of concern;
- Sampling to confirm contamination migration from the site;
- Sampling to delineate the degree of contamination migration from the site;

2.0 Health and Safety

CTEH sampling personnel will review and adhere to the site-specific Health and Safety Plan. Sampling and documentation activities will be conducted only under weather and other environmental conditions that do not create an unsafe working environment.

3.0 Data Quality Objectives

The data collected during field activities will be used to assess potential exposures to human health and the environment to constituents potentially related to the release.

A strategic planning approach based on scientific method will be employed for data collection activities providing a systematic procedure to ensure the type, quantity and quality of data used in decision-making will be appropriate for the intended application. All samples will be submitted to the analytical laboratory for a Level II data quality package.

4.0 Sediment Sampling

Shoreline sediment grab samples are to be collected to document the extent of contamination originating from the Incident. Sediment samples will be collected at the source area and approximately every 0.5 mile downstream to the end tide gate at Cedardale, concentrating on areas of maximum sheen. Background sediment samples will be co-located with background surface water samples. Shoreline sediment samples will be collected from areas with obvious signs of oiling/or sheen on both sides of the river, beginning near the source area and moving downstream. Sediment samples will be collected at least every 0.5 mile to the tide gate. Additionally, samples will be collected from areas of recreational access and livestock

watering locations. All samples will be analyzed using Northwest Total Petroleum Hydrocarbon Identification Analytical Method (NWTPH-HCID). A sample location map is attached as Appendix A.

4.1 Sediment Sampling Methodology and Analysis

Sediment samples from each location will be collected by stainless steel spoons or hand trowels. For samples submitted in the laboratory supplied soil jars, the sample containers will be completely filled to minimize headspace. Samples will be collected after vegetation, rocks, litter, and other non-native soil material which may bias the sample are carefully removed. The depth below ground surface at which each sample is collected will be recorded in a logbook and SIERA. Additionally, the final report will clearly state the depth at which each sample was collected.

All samples will be submitted under strict chain-of-custody to Pace Analytical, a NELAP accredited laboratory, for laboratory analysis. The planned analysis for samples are listed below in Table 1.

Table 1 Sediment Sampling Summary

Analysis	Method	Sample Container	Preservative	Hold Time
Total Petroleum Hydrocarbons (TPH)	NWTPH-Gx	Terracore; 2 x 40 mL VOA	Ice, maintained at 0-6°C	14 days
Volatile Organic Compounds (VOCs) including BTEX	US EPA 8260D	Terracore; 2 x 40 mL VOA	Ice, maintained at 0-6oC	14 days

4.2 Location and Frequency

Shoreline sediment samples will be collected to determine whether gasoline released from this incident has impacted nearby soils/sediments.

Initially proposed shoreline sediment locations may include the following:

- immediately adjacent to the Site;
- downstream of the Site;
- At Public Access Areas such as boat launches, recreational areas, etc.
- In areas specifically requested by agencies or incident command

Sediment samples will be collected one time initially at each location. Subsequent samples may be collected, as deemed necessary, once initial analysis results have been received and compared to relative screening values.. Additional sampling locations may be added as appendices based on a review of the preliminary results and/or a change in operational areas and activities.

4.3 Addendum to Environmental Sampling and Analysis Plan (SAP) for Bank Sediment Sampling

To determine if free product as gasoline has migrated under Hill Ditch to the farm field west of the spill site a soil gas survey will be conducted as an addition to the sediment sampling plan. Based on field observations it is predicted that groundwater in the vicinity of Hill Ditch will be shallow (<6'). Should

gasoline be present on the groundwater, volatile gasoline constituents should be detected by soil gas probes inserted to approximately 3' below ground surface (bgs) above the shallow groundwater. It is proposed that four (4) probes be installed in the field west of the dike on Hill Ditch (see Figure 1 – Map of Soil Gas Probe Locations). These probes will remain accessible to allow for Photoionization Detector (PID) readings and collection of vapor samples over time. Should elevated levels of gasoline vapors be encountered additional efforts will be made to determine the source and migration pathways. Soil gas surveys will be conducting using U.S. Environmental Protection Agency Laboratory Services & Applied Science Division Standard Operating Procedures for Soil Gas Surveys.

5.0 Quality Assurance

Sampling will be carried out in conjunction with a well-defined quality assurance (QA) program. The goal of the field QA program is to document that samples are collected without the effects of accidental cross- or systematic contamination and refers to the sampling, analysis, and data validation procedures for generating valid and defensible data. To provide QA for the proposed sampling event, the following sampling, analysis, and data validation procedures will be performed:

5.1 Field Calibration

Instruments used in the field as part of this sampling event are anticipated to consist of GPS units, digital cameras, and handheld data collection devices such as tablets/smart phones. Other equipment should not require field calibration. Operators of each piece of equipment are responsible for maintaining (including proper battery charge) and operating this equipment such that it conforms to each respective manufacturer's specifications.

5.2 Field Duplicate Sample

For approximately every ten samples collected in the field, one field duplicate will be collected and submitted for laboratory analyses to verify the reproducibility of the sampling methods. Field duplicates will be prepared by separately submitting an aliquot from the same sample location to the laboratory for analysis consistent with the prescribed analyses. The submitted duplicate will be submitted such that the laboratory is not aware that it is a duplicate (i.e., the sample ID will not identify it as a "duplicate" for any specific sample location). At least one field duplicate will be collected each day that samples are collected.

5.3 Field Split Samples

Field split samples refer to samples collected by the regulatory agency or its designee from the same sampling location and independently submitted to a different laboratory for analysis. Field split samples may be collected at the discretion of representatives of the regulatory agency or Incident Command.

5.4 Laboratory QA

Laboratory quality control procedures will be conducted in a manner consistent with relevant State and federal regulatory guidance. Deliverables will contain the supporting documentation necessary for data

validation. Internal laboratory quality control checks will include method blanks, matrix spikes (and matrix spike duplicates), surrogate samples, calibration standards, and laboratory control standards (LCSs).

5.5 Matrix Spike/Matrix Spike Duplicate Sample

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples refer to field samples spiked with the analytes of interest prior to being analyzed at the laboratory to gauge the quality of analysis. Approximately one in twenty samples will be analyzed as MS/MSD samples.

5.6 Data Validation

Validation of the data generated by the laboratory performing the analyses will include at a minimum sample holding times, accuracy, precision, contamination of field generated or laboratory method blanks, and surrogate compound recovery. Accuracy will be determined by evaluating LCS and MS recovery. Precision will be determined by evaluating laboratory and field duplicate samples. Level II data verification will be performed on 100% of the samples.

6.0 Decontamination Procedures

Decontamination procedures refer to the steps undertaken to minimize the potential for offsite contamination and cross-contamination between individual sampling locations. Prior to collecting any sample for this release the following decontamination procedures will be undertaken: non-disposable sampling equipment such as stainless-steel hand trowels which come into contact with sampling media will be decontaminated using a bristled brush and a solution comprised of a laboratory grade, non-phosphate detergent (e.g., Alconox or Liquinox) and deionized water. Depending on ancillary activities being conducted for the response to this release, the decontamination of sampling equipment will be conducted over poly sheeting at the sample location or in a nearby designated area. The sampling equipment to be decontaminated will first be placed in a bucket containing the detergent solution and thoroughly washed using a bristled brush. The items will then be transferred to the second 5-gallon bucket containing deionized water for rinsing. Following the initial rinsing, the item will be held over the third 5-gallon bucket while deionized water is carefully decanted over each item. Decontaminated items will be wrapped in clean aluminum foil for transit to the next sampling location.

Nitrile gloves will be worn by sampling personnel and changed between activities at each discrete sample collection location. Previously worn nitrile gloves will be discarded in appropriate waste receptacles with other PPE.

7.0 Sampling Waste Disposal

Decontamination fluids and contaminated Personal Protective Equipment (PPE) will be containerized and collected at the designated onsite waste staging area as needed.

All produced waste onsite will be managed and disposed of in a manner consistent with all regulatory guidelines and requirements.

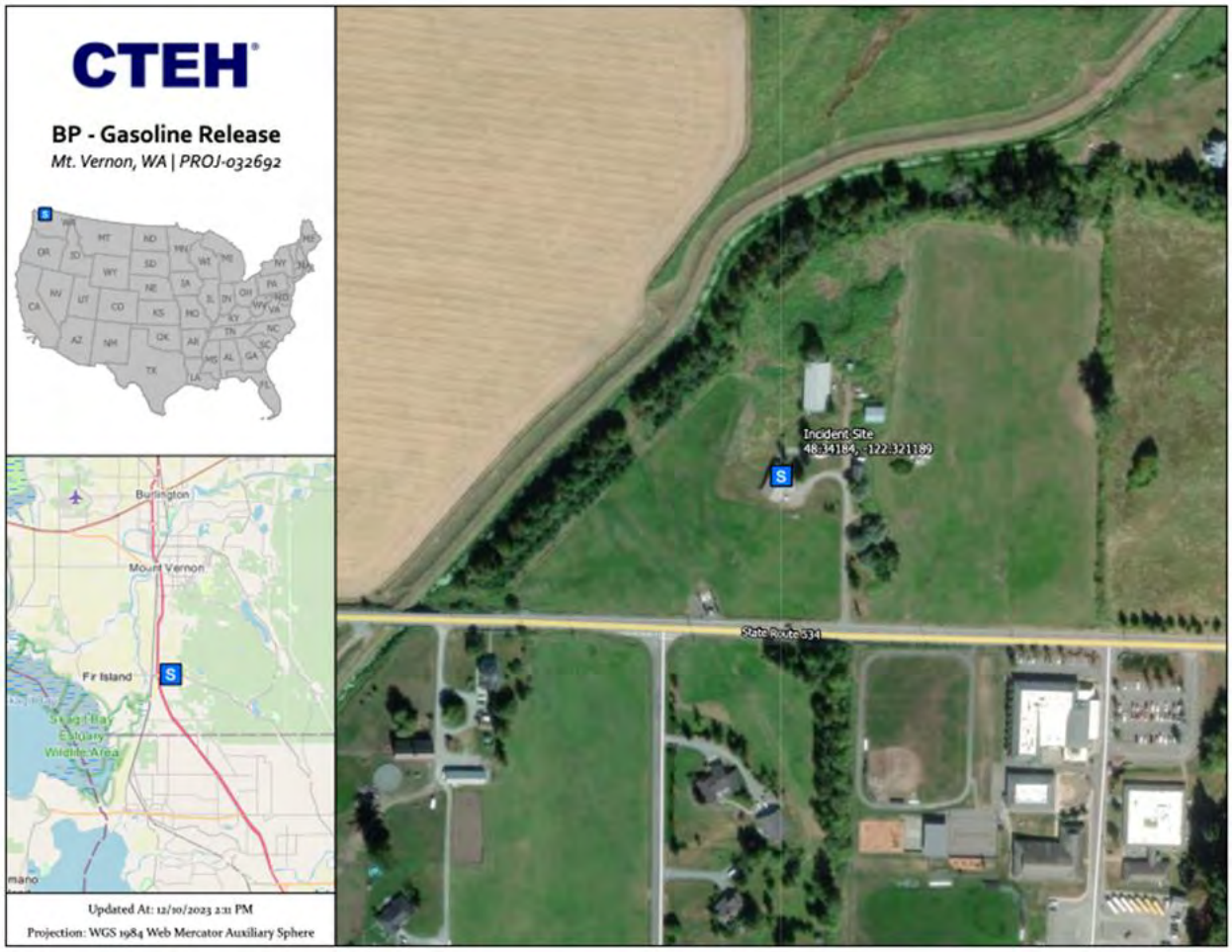
8.0 Data Analysis

To assess the potential impact from the incident, the results of sampling will be reviewed for the presence/absence of these compounds, and should they be found, the concentrations of these parameters relative to appropriate regulatory standards. The results of laboratory analyses will be provided to the Olympic Pipeline Company and property owners upon request.

9.0 Records Management

Records management refers to the procedures for generating, controlling, and archiving project-specific records and records of field activities. Project records, particularly those that are anticipated to be used as evidentiary data, directly support current or ongoing technical studies and activities, and provide historical evidence needed for later reviews and analyses, will be legible, identifiable, retrievable and protected against damage, deterioration, or loss on a centralized electronic database. Handwritten records will be written in indelible ink. Records will likely include, but are not limited to, the following: bound field notebooks on pre-numbered pages, sample collection forms, personnel qualification and training forms, sample location maps, equipment maintenance and calibration forms, chain-of-custody forms, maps and drawings, transportation and disposal documents, reports issued as a result of the work, procedures used, correspondences, and any deviations from the procedural records. Documentation errors will be corrected by drawing a single line through the error so it remains legible and will be initialed by the responsible individual, along with the date of change, and the correction will be written adjacent to the error.

Appendix A: Site Location Map



Appendix D-2

Division B Characterization Plan

Olympic Pipeline Gasoline Spill
Conway, WA 12/10/2023

Division B Characterization Plan

Version 1.0

Prepared on Behalf of:

Olympic Pipeline

Prepared By:

CTEH, LLC

5120 Northshore Drive

Little Rock, AR 72118

501-801-8500

December 21, 2023

	Name/Organization	Signature	Date Signed
Prepared by:	Helen Dubach, CTEH		12/21/2023
Reviewed by:			
Approved by:			
Approved by:			
Approved by:			

Introduction and Purpose

This Division B Characterization Plan was prepared by CTEH®, LLC. on behalf of Olympic Pipeline Company (Olympic) to provide guidance for sediment transect sampling work related to the Olympic Pipeline Gasoline Spill in Conway, WA. This plan also includes details of a proposed non-kill fish survey to be conducted upstream of the spill site in Hill Ditch. The incident occurred on December 10, 2023. The approximate location of the release site is 19651 SR 534, Conway, WA. The location of the incident is depicted on the Site Location Map in Appendix A.

The objectives of the environmental investigation and proposed sampling for defining this emergency response:

1. The collection of sediment samples along transects running perpendicular to Hill Ditch to better understand composition of sediments and to delineate the extent and nature of potential gasoline impacts.
2. Evaluate the existence of potential non-point source contaminants that may be present in the sediments such as semi-volatile organic compounds (SVOCs), Polynuclear Aromatic Hydrocarbons (PAHs) and metals which may be pertinent to potential dredging and dredge material usage.
3. Where possible, collect sufficient samples along the transect to develop a contour map of the base of Hill Ditch in the vicinity of the spill site.
4. The collection of upstream/background samples to determine a baseline and develop the range of potential background concentrations for comparative purposes and to distinguish between target analytes related to this incident and non-related targe analytes.
5. Complete a non-kill fish survey using seines to collect and speciate fish present in Hill Ditch upstream of the project site.
6. Maintain close communication with interested response/state/tribal/community entities regarding the survey and results.

Health and Safety

CTEH sampling personnel will review and adhere to the site-specific Health and Safety Plan. Sampling and documentation activities will be conducted only under weather and other environmental conditions that do not create an unsafe working environment.

Data Quality Objectives

The data collected during field activities will be used to assess potential exposures to human health and the environment to constituents potentially related to the release.

A strategic planning approach based on scientific method will be employed for data collection activities providing a systematic procedure to ensure the type, quantity and quality of data used in decision-making will be appropriate for the intended application. All samples will be submitted to the analytical laboratory for a Level II data quality package.

Sediment Sampling

1.1 Sediment Sampling Methodology and Analysis

Sediment samples from each location will be collected using stainless steel sampling equipment (i.e. Ponar Grab Sampler). For samples submitted in the laboratory supplied containers, the sample containers will be completely filled to minimize headspace.

Background samples will be collected from areas near the site that have not been impacted by any of the activities associated with onsite operations or the incident.

All samples will be submitted under strict chain-of-custody to Pace Analytical, a TNI accredited laboratory, for laboratory analysis. The planned analysis for sediment samples are listed below in Table 1.

Table 1 Sediment Sampling Summary

Analysis	Method	Sample Container	Preservative	Hold Time
Total Petroleum Hydrocarbons (TPH)	NWTPH-Gx	Terracore; 2 x 40 mL VOA	Ice, maintained at 0-6°C	14 days
Volatile Organic Compounds (VOCs)	US EPA 8260	Terracore; 2 x 40 mL VOA	Methanol; Ice, maintained at 0-6°C	14 days
Semi Volatile Organic Compounds (SVOCs)	US EPA 8270	1 x 4oz. Glass	Ice, maintained at 0-6°C	14 days
Metals (RCRA-8)	EPA Method 6010/6020, and 7471	1 x 8oz glass jar	Ice, maintained at 0-6°C	180 days, except mercury: 28 days
TCLP VOCs (benzene only)	Prep: SW-846 Method 1311 Analytical: EPA Method 8260	1 x 4oz glass container	Ice, maintained at 0-6°C	14 days to extraction, 14 days to analysis
TCLP Metals (RCRA-8)	Prep: SW-846 Method 1311 Analytical: EPA Method 6010/6020, and 7471	1 x 8oz glass jar	Ice, maintained at 0-6°C	180 days to extraction, 180 days to analysis, except mercury:28 days to extraction, 28 days to analysis

1.2 Location and Frequency

Sediment samples will be collected from Hill Ditch near and downstream from the Site, as well as upstream from the Site to establish background concentrations. Sample transects have been developed and identified in the Hill Creek Sediment Sampling Transect Map in Appendix B. A minimum of (3) sediment samples will be collected at each transect: To assist in defining the bottom contour of the ditch, two locations will have five (5) samples at equidistance (to the extent possible) intervals across the ditch.

- Approx. 2m into the creek from the water level at the left descending bank;
- Centerline of the creek; and
- Approx. 2m into the creek from the water level at the right descending bank.

Sediment samples will be collected one time initially at each location. Subsequent samples may be collected, as required for statistical representativeness. Additional sampling locations may be added as appendices based on a review of the preliminary results and/or a change in operational areas and activities.

Non-Kill Fish Survey Introduction

Hill Ditch is a known salmonid waterway with five (5) known species traversing or residing in the area at different times of the year. The species known to utilize the creek are Coho Salmon, Chum Salmon, Sockeye Salmon, Steelhead and Coastal Cutthroats. Population sizes are unknown however juvenile and adult fish have been seen during response activities. In an effort to understand which species may be present at the time of the spill, a non-kill fish survey will be conducted approximately 100 meters upstream of the spill site.

5.1 Fish Survey Methods

The survey will use a 50' x 8' weighted seine net with ropes attached to each corner. Survey team members will be positioned on each side of Hill Ditch. The seine will be anchored along one side of the ditch with the weighted end along the substrate against the bank upstream of the spill site. The ropes will be tossed to the other side of the bank and the seine will be carefully dragged across the channel. The seine and any captured fish will be pulled together and gently lifted out of the water column and onto the opposite bank. Any fish collected will be transferred to a bucket with fresh stream water. Fish will be counted, identified by species and size. Efforts will be made to minimize handling of the net and fish while consolidating and collecting fish into buckets. Fish will be photo-documented to the extent possible while minimizing potential for injury. Once fish have been sorted and sized they will be released back into Hill Ditch by carefully lowering the collection buckets into the water column, limiting disturbance to individual fish. Once captured fish are placed back into the stream the process will be repeated by tossing the ropes to the opposite bank. If a limited number of fish are captured in the seine and identification and sizing can be completed without removal the fish will not be removed from the water and released directly from the net into the water once documentation is complete. A summary report discussing the survey will be completed along with an inventory of fish captured and returned to the water.

Quality Assurance

Sampling will be carried out in conjunction with a well-defined quality assurance (QA) program. The goal of the field QA program is to document that samples are collected without the effects of accidental cross- or systematic contamination and refers to the sampling, analysis, and data validation procedures for generating valid and defensible data. To provide QA for the proposed sampling event, the following sampling, analysis, and data validation procedures will be performed:

1.3 Field Calibration

Instruments used in the field as part of this sampling event are anticipated to consist of GPS units, digital cameras, and handheld data collection devices such as tablets/smart phones. Other equipment should not require field calibration. Operators of each piece of equipment are responsible for maintaining (including proper battery charge) and operating this equipment such that it conforms to each respective manufacturer's specifications.

1.4 Field Duplicate Sample

For approximately every ten samples collected in the field, one field duplicate will be collected and submitted for laboratory analyses to verify the reproducibility of the sampling methods. Field duplicates will be prepared by separately submitting an aliquot from the same sample location to the laboratory for analysis consistent with the prescribed analyses. The submitted duplicate will be submitted such that the laboratory is not aware that it is a duplicate (i.e., the sample ID will not identify it as a "duplicate" for any specific sample location). At least one field duplicate will be collected each day that samples are collected.

1.5 Field Split Samples

Field split samples refer to samples collected by the regulatory agency or its designee from the same sampling location and independently submitted to a different laboratory for analysis. Field split samples may be collected at the discretion of representatives of the regulatory agency or Incident Command.

1.6 Laboratory QA

Laboratory quality control procedures will be conducted in a manner consistent with relevant State and federal regulatory guidance. Deliverables will contain the supporting documentation necessary for data validation. Internal laboratory quality control checks will include method blanks, matrix spikes (and matrix spike duplicates), surrogate samples, calibration standards, and laboratory control standards (LCSs).

1.7 Matrix Spike/Matrix Spike Duplicate Sample

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples refer to field samples spiked with the analytes of interest prior to being analyzed at the laboratory to gauge the quality of analysis. Approximately one in twenty samples will be analyzed as MS/MSD samples.

1.8 Data Validation

Validation of the data generated by the laboratory performing the analyses will include at a minimum sample holding times, accuracy, precision, contamination of field generated or laboratory method blanks, and surrogate compound recovery. Accuracy will be determined by evaluating LCS and MS recovery. Precision will be determined by evaluating laboratory and field duplicate samples. Level II data verification will be performed on 100% of the samples.

Decontamination Procedures

Decontamination procedures refer to the steps undertaken to minimize the potential for offsite contamination and cross-contamination between individual sampling locations. Prior to collecting any sample for this spill incident, the following decontamination procedures will be undertaken: non-disposable sampling equipment such as stainless-steel hand trowels which come into contact with sampling media will be decontaminated using a bristled brush and a solution comprised of a laboratory grade, non-phosphate detergent (e.g., Alconox or Liquinox) and deionized water. For trace organics, a solvent rinse will be added to the decontamination procedures. A spray bottle with >90% isopropanol will serve as a final rinse and then the equipment will be allowed to air dry. See page 8 of the following EPA guidance: Field Equipment Cleaning and Decontamination | US EPA.

Depending on ancillary activities being conducted for the response to this spill incident, the decontamination of sampling equipment will be conducted over poly sheeting at the sample location or in a nearby designated area. The sampling equipment to be decontaminated will first be placed in a bucket containing the detergent solution and thoroughly washed using a bristled brush. The items will then be transferred to the second 5-gallon bucket containing deionized water for rinsing. Following the initial rinsing, the item will be held over the third 5-gallon bucket while deionized water is carefully decanted over each item. Decontaminated items will be wrapped in clean aluminum foil for transit to the next sampling location.

Nitrile gloves will be worn by sampling personnel and changed between activities at each discrete sample collection location. Previously worn nitrile gloves will be discarded in appropriate waste receptacles with other PPE.

Sampling Waste Disposal

Decontamination fluids and contaminated Personal Protective Equipment (PPE) will be containerized and collected at the designated onsite waste staging area as needed.

All produced waste onsite will be managed and disposed of in a manner consistent with all regulatory guidelines and requirements.

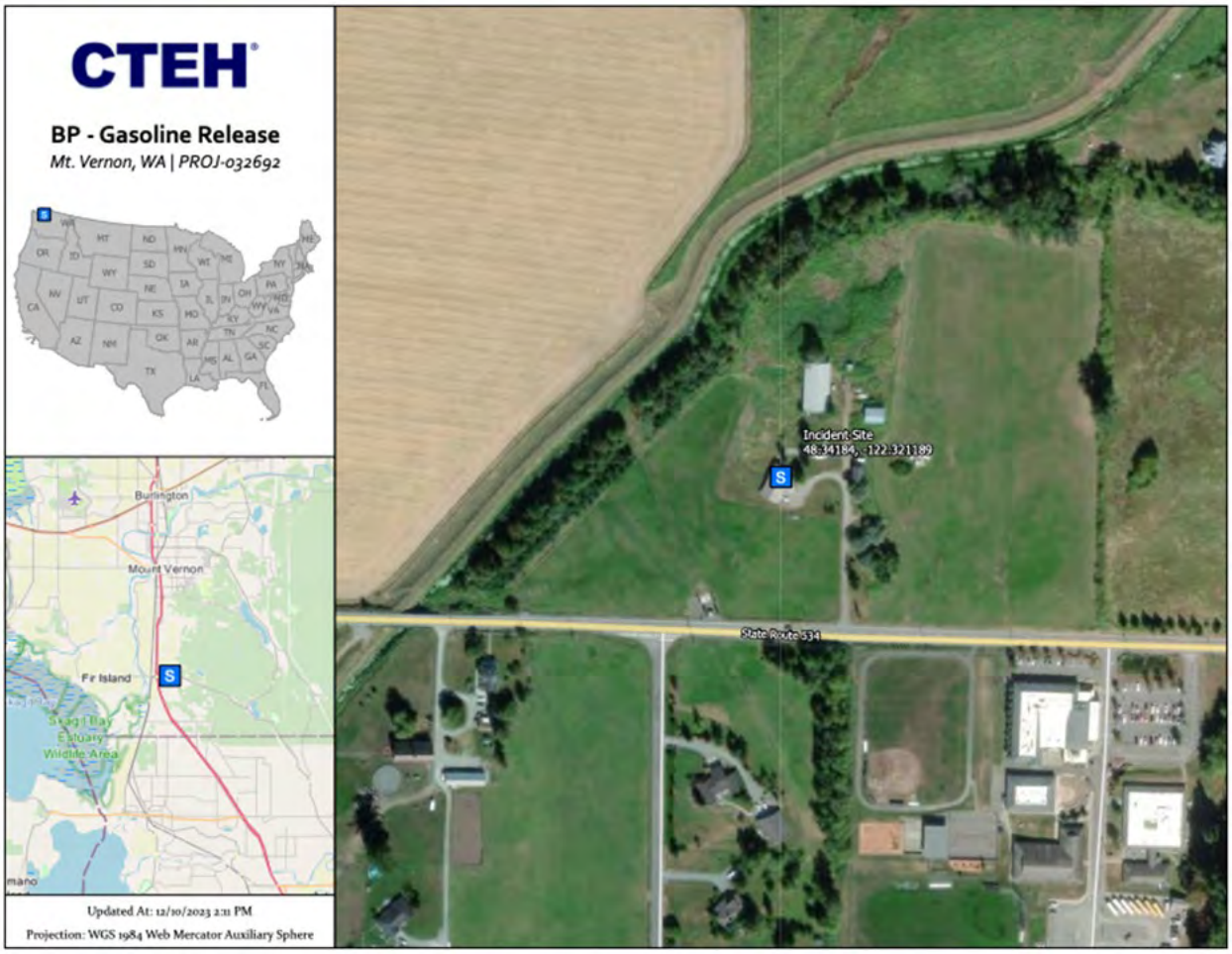
Data Analysis

To assess the potential impact from the incident, the results of sampling will be reviewed for the presence/absence of these compounds, and should they be found, the concentrations of these parameters will be evaluated relative to appropriate regulatory standards. The results of laboratory analyses will be provided to the Olympic Pipeline Company and property owners upon request.

Records Management

Records management refers to the procedures for generating, controlling, and archiving project-specific records and records of field activities. Project records, particularly those that are anticipated to be used as evidentiary data, directly support current or ongoing technical studies and activities, and provide historical evidence needed for later reviews and analyses, will be legible, identifiable, retrievable and protected against damage, deterioration, or loss on a centralized electronic database. Handwritten records will be written in indelible ink. Records will likely include, but are not limited to, the following: bound field notebooks on pre-numbered pages, sample collection forms, personnel qualification and training forms, sample location maps, equipment maintenance and calibration forms, chain-of-custody forms, maps and drawings, transportation and disposal documents, reports issued as a result of the work, procedures used, correspondences, and any deviations from the procedural records. Documentation errors will be corrected by drawing a single line through the error so it remains legible and will be initialed by the responsible individual, along with the date of change, and the correction will be written adjacent to the error.

Appendix A: Site Location Map


CTEH
BP - Gasoline Release
Mt. Vernon, WA | PROJ-032692
Burlington
Mount Vernon
Fir Island
Skagit Bay Estuary Wildlife Area
Updated At: 12/10/2023 2:21 PM
Projection: WGS 1984 Web Mercator Auxiliary Sphere
Incident Site
48.34184, -122.321189
State Route 534

Appendix B: Hill Creek Sediment Sampling Transect Map

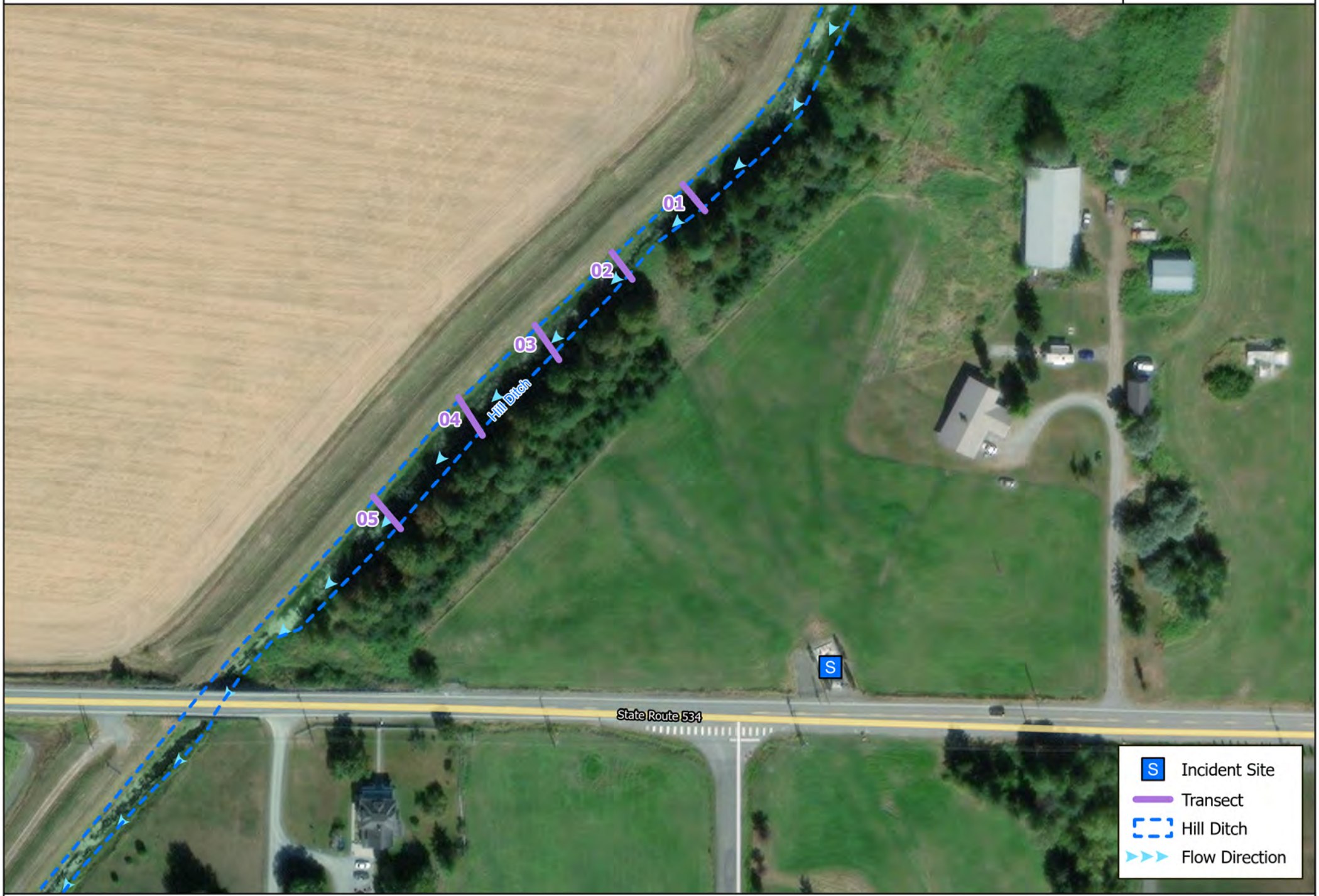
Hill Creek Sediment Sampling Transect Map

BP Gasoline Release

0 50 100 200 Feet

N

Project: PROJ-032692
Client: BP
City: Mt. Vernon, WA
County: Skagit



Projection: NAD 1983 2011 UTM Zone 10N Datum: NAD 1983 2011

Updated At: 12/21/2023 4:17 PM

Appendix D-3

Sediment Sampling Locations Map

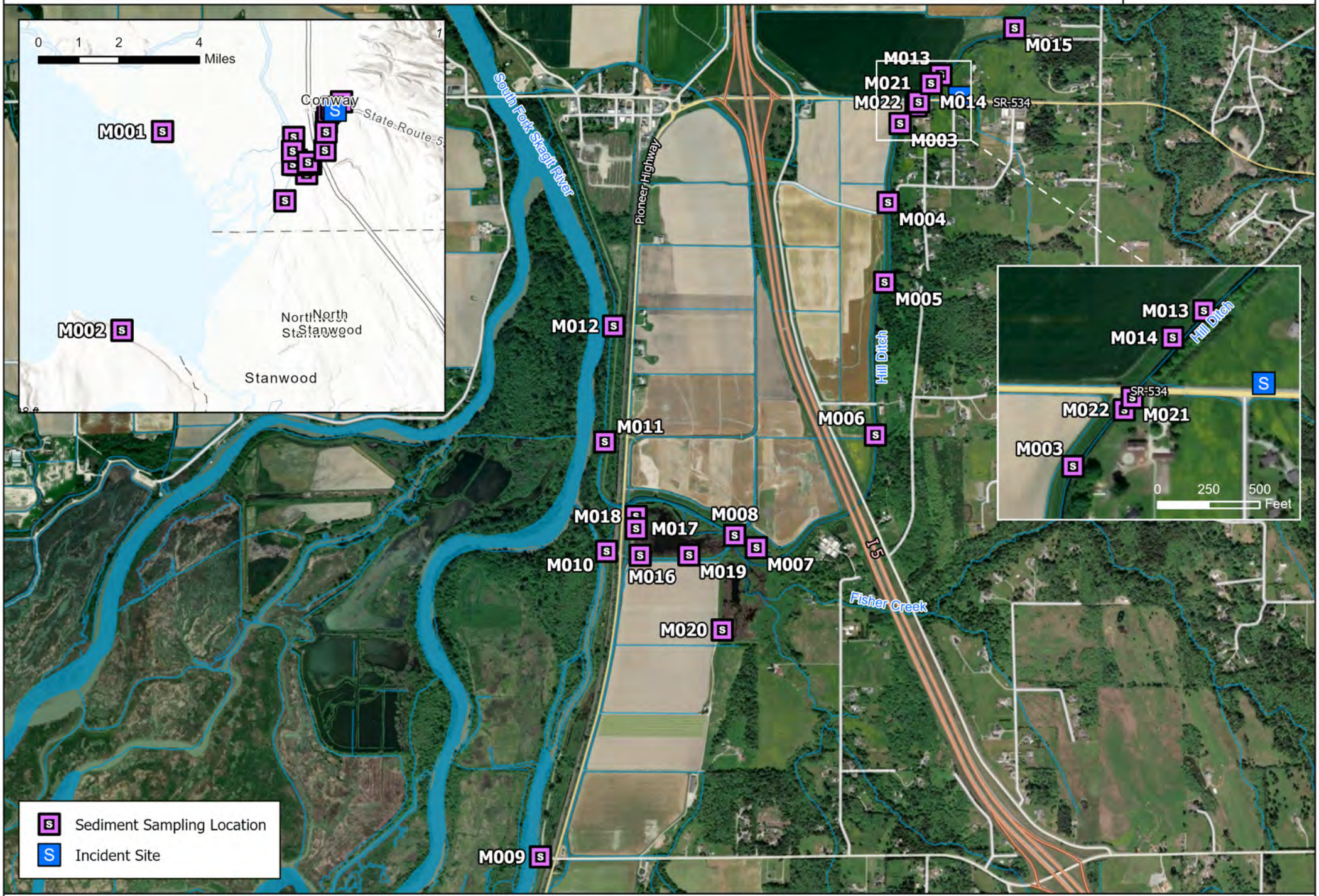
Sediment Sampling Locations

Olympic Pipeline Gasoline Spill - Conway, WA

0 0.25 0.5 1 Miles

N

Project: PROJ-032692
Client: BP
City: Mt. Vernon, WA
County: Skagit



Projection: NAD 1983 2011 UTM Zone 10N Datum: NAD 1983 2011

Updated At: 7/22/2024 2:46 PM

Hill Ditch Transect Sediment Sampling Locations

Olympic Pipeline Gasoline Spill - Conway WA

0 25 50 100 Feet

N

Project: PROJ-032692
Client: BP
City: Mt. Vernon, WA
County: Skagit

Projection: NAD 1983 2011 UTM Zone 10N Datum: NAD 1983 2011

Updated At: 7/24/2024 11:56 AM

Appendix D-4

Sediment Sampling Results Summaries

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M001		M002
			Fir Island Farms Reserve Unit, end of trail in area that had previously been covered by the high tide.		English Boom Trail County Park, on the beach along the shoreline, approximately 80 ft SE from the beach entrance
			12/20/2023		12/20/2023
Analytical Method	**Analyte**	**Screening Value (µg/kg)**	MTWA1220M001	MTWA1220N001	MTWA1220M002
8260D	Benzene	30 µg/kg [1]	< 1.06 µg/kg	< 0.811 µg/kg	< 0.505 µg/kg
	Ethylbenzene	6000 µg/kg [1]	< 1.68 µg/kg	< 1.28 µg/kg	< 0.796 µg/kg
	Toluene	7000 µg/kg [1]	< 2.96 µg/kg	< 2.26 µg/kg	< 1.4 µg/kg
	Xylenes, Total	9000 µg/kg [1]	< 2.01 µg/kg	< 1.53 µg/kg	< 0.951 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	< 2,420 µg/kg	< 1,950 µg/kg	< 1,040 µg/kg

[1] Washington State Model Toxic Control Act (MTCA) - Method A Soil Cleanup Levels for Unrestricted Land Use

Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).

Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:

B: The same analyte is found in the associated blank.

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M003								
			Approx 150 yards SW of Hwy 534 bridge								
			12/20/2023	12/21/2023	12/22/2023	12/24/2023		12/28/2023	12/29/2023	12/30/2023	3/26/2024
Analytical Method	Analyte	Screening Value (µg/kg)	MTWA1220M003	MTWA1221M003	MTWA1222M003	MTWA1224M003	MTWA1224N003	MTWA1228M003	MTWA1229M003	MTWA1230M003	MTWA0326M003
8260D	Benzene	30 µg/kg [1]	< 1.61 µg/kg	< 2.16 µg/kg	< 1.75 µg/kg	< 1.15 µg/kg	< 1.1 µg/kg	< 1.58 µg/kg	< 1.19 µg/kg	< 1.31 µg/kg	< 1.28 µg/kg
	Ethylbenzene	6000 µg/kg [1]	14.8 µg/kg (J)	< 3.4 µg/kg	< 2.77 µg/kg	5.72 µg/kg (J)	4.71 µg/kg (J)	< 2.49 µg/kg	< 1.88 µg/kg	3.08 µg/kg (J)	< 2.02 µg/kg
	Toluene	7000 µg/kg [1]	22.1 µg/kg (J)	8.68 µg/kg (J)	7.79 µg/kg (J)	11.4 µg/kg (J)	15.4 µg/kg	< 4.39 µg/kg	< 3.64 µg/kg	4.78 µg/kg (J)	< 3.56 µg/kg
	Xylenes, Total	9000 µg/kg [1]	171 µg/kg (J)	23.9 µg/kg (J)	17.3 µg/kg (J)	40.3 µg/kg	31.1 µg/kg	< 2.97 µg/kg	49.2 µg/kg	30.1 µg/kg	4.18 µg/kg (J)
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	< 4,440 µg/kg	4,050 µg/kg (J)	< 5,120 µg/kg	< 3,700 µg/kg	< 3,980 µg/kg	< 4,490 µg/kg	3,010 µg/kg (J)	< 8,120 µg/kg	< 2,430 µg/kg

[1] Washington State Model Toxic Control Act (MTCA) - Method A Soil Cleanup Levels for Unrestricted Land Use

Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).

Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:

B: The same analyte is found in the associated blank.

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Detection

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M004								
			North side of Conway Hill Rd bridge								
			12/20/2023	12/21/2023	12/22/2023	12/24/2023	12/28/2023	12/29/2023		12/30/2023	3/26/2024
Analytical Method	**Analyte**	**Screening Value (µg/kg)**	MTWA1220M004	MTWA1221M004	MTWA1222M004	MTWA1224M004	MTWA1228M004	MTWA1229M004	MTWA1229N004	MTWA1230M004	MTWA0326M004
8260D	Benzene	30 µg/kg [1]	< 4.26 µg/kg	< 2.84 µg/kg	< 0.827 µg/kg	< 1.39 µg/kg	< 0.765 µg/kg	< 0.822 µg/kg	< 1.18 µg/kg	< 0.796 µg/kg	< 0.98 µg/kg
	Ethylbenzene	6000 µg/kg [1]	< 6.73 µg/kg	5.63 µg/kg (J)	< 1.3 µg/kg	< 2.19 µg/kg	< 1.21 µg/kg	< 1.3 µg/kg	< 1.86 µg/kg	< 1.26 µg/kg	< 1.55 µg/kg
	Toluene	7000 µg/kg [1]	17.2 µg/kg (J)	24.3 µg/kg (J)	< 2.3 µg/kg	6.38 µg/kg (J)	< 2.13 µg/kg	< 2.29 µg/kg	< 3.29 µg/kg	14 µg/kg	< 2.73 µg/kg
	Xylenes, Total	9000 µg/kg [1]	27.9 µg/kg (J)	56.8 µg/kg (J)	1.77 µg/kg (J)	13.7 µg/kg (J)	< 1.44 µg/kg	1.68 µg/kg (J)	< 2.22 µg/kg	< 1.5 µg/kg	< 1.84 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	< 7,770 µg/kg	< 5,220 µg/kg	< 1,460 µg/kg	< 2,430 µg/kg	< 1,540 µg/kg	< 1,480 µg/kg	< 2,230 µg/kg	< 2,730 µg/kg	< 1,770 µg/kg

[1] Washington State Model Toxic Control Act (MTCA) - Method A Soil Cleanup Levels for Unrestricted Land Use

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Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:

B: The same analyte is found in the associated blank.

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Detection

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M005								
			Along Hill ditch, approximately 0.3 mi downstream and S of the Conway Hill Rd bridge (W003)								
			12/20/2023	12/21/2023	12/22/2023	12/24/2023		12/28/2023	12/29/2023	12/30/2023	3/26/2024
Analytical Method	Analyte	Screening Value (µg/kg)	MTWA1220M005	MTWA1221M005	MTWA1222M005	MTWA1224M005	MTWA1224N005	MTWA1228M005	MTWA1229M005	MTWA1230M005	MTWA0326M005
8260D	Benzene	30 µg/kg [1]	< 2.58 µg/kg	< 2.2 µg/kg	< 1.94 µg/kg	< 1.83 µg/kg	< 2.07 µg/kg	< 2.18 µg/kg	< 2.26 µg/kg	< 2.46 µg/kg	< 3.26 µg/kg
	Ethylbenzene	6000 µg/kg [1]	< 4.06 µg/kg	< 3.47 µg/kg	< 3.06 µg/kg	< 2.89 µg/kg	< 3.27 µg/kg	< 3.45 µg/kg	< 3.56 µg/kg	< 3.89 µg/kg	< 5.13 µg/kg
	Toluene	7000 µg/kg [1]	12.8 µg/kg (J)	8.47 µg/kg (J)	< 5.42 µg/kg	< 5.1 µg/kg	< 5.74 µg/kg	< 6.09 µg/kg	< 6.3 µg/kg	< 6.83 µg/kg	< 9.08 µg/kg
	Xylenes, Total	9000 µg/kg [1]	29.8 µg/kg (J)	13.1 µg/kg (J)	< 3.65 µg/kg	< 3.45 µg/kg	7.1 µg/kg (J)	< 4.12 µg/kg	< 4.25 µg/kg	< 4.62 µg/kg	< 6.13 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	< 7,100 µg/kg	< 3,910 µg/kg	< 3,380 µg/kg	< 6,480 µg/kg	< 4,210 µg/kg	< 4,940 µg/kg	< 4,130 µg/kg	< 5,790 µg/kg	< 3,150 µg/kg

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Detection

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M006								
			Approximately 575 feet south of residential bridge off of Cedardale Rd								
			12/20/2023	12/21/2023	12/22/2023		12/24/2023	12/28/2023	12/29/2023	12/30/2023	3/26/2024
Analytical Method	Analyte	Screening Value (µg/kg)	MTWA1220M006	MTWA1221M006	MTWA1222M006	MTWA1222N006	MTWA1224M006	MTWA1228M006	MTWA1229M006	MTWA1230M006	MTWA0326M006
8260D	Benzene	30 µg/kg [1]	< 2.5 µg/kg	< 2.76 µg/kg	< 2.71 µg/kg	< 3.96 µg/kg	< 2.43 µg/kg	< 2.63 µg/kg	< 2.73 µg/kg	< 2.81 µg/kg	< 9.35 µg/kg
	Ethylbenzene	6000 µg/kg [1]	< 3.94 µg/kg	< 4.36 µg/kg	< 4.28 µg/kg	< 6.24 µg/kg	< 3.83 µg/kg	< 4.15 µg/kg	6.27 µg/kg (J)	< 4.44 µg/kg	< 14.7 µg/kg
	Toluene	7000 µg/kg [1]	10.3 µg/kg (J)	< 7.7 µg/kg	7.99 µg/kg (J)	< 11 µg/kg	8.19 µg/kg (J)	< 7.31 µg/kg	< 12.1 µg/kg	< 7.82 µg/kg	< 26 µg/kg
	Xylenes, Total	9000 µg/kg [1]	17.5 µg/kg (J)	12.7 µg/kg (J)	7.81 µg/kg (J)	< 7.44 µg/kg	12.6 µg/kg (J)	< 4.98 µg/kg	< 13.1 µg/kg	8.72 µg/kg (J)	< 17.6 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	< 4,450 µg/kg	< 5,130 µg/kg	< 4,780 µg/kg	< 7,770 µg/kg	< 4,350 µg/kg	< 5,500 µg/kg	< 4,800 µg/kg	< 8,640 µg/kg	< 4,240 µg/kg

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Detection

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M007								
			Approximately 150 yards SE of confluence on Hill Ditch								
			12/20/2023	12/21/2023	12/22/2023	12/24/2023	12/28/2023	12/29/2023	12/30/2023		3/26/2024
Analytical Method	**Analyte**	**Screening Value (µg/kg)**	MTWA1220M007	MTWA1221M007	MTWA1222M007	MTWA1224M007	MTWA1228M007	MTWA1229M007	MTWA1230M007	MTWA1230N007	MTWA0326M007
8260D	Benzene	30 µg/kg [1]	< 1.18 µg/kg	< 1.2 µg/kg	< 1.14 µg/kg	< 0.983 µg/kg	< 1.45 µg/kg	< 1.05 µg/kg	< 1.76 µg/kg	< 1.79 µg/kg	< 5.5 µg/kg
	Ethylbenzene	6000 µg/kg [1]	< 1.87 µg/kg	< 1.89 µg/kg	< 1.8 µg/kg	< 1.55 µg/kg	< 2.29 µg/kg	< 1.65 µg/kg	< 2.78 µg/kg	< 2.83 µg/kg	< 8.69 µg/kg
	Toluene	7000 µg/kg [1]	< 3.29 µg/kg	< 3.34 µg/kg	< 3.18 µg/kg	< 2.74 µg/kg	< 4.04 µg/kg	< 2.91 µg/kg	< 4.9 µg/kg	< 4.97 µg/kg	< 15.3 µg/kg
	Xylenes, Total	9000 µg/kg [1]	< 2.23 µg/kg	< 2.26 µg/kg	< 2.15 µg/kg	< 1.85 µg/kg	< 2.73 µg/kg	< 1.97 µg/kg	< 3.33 µg/kg	< 3.39 µg/kg	< 10.4 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	< 2,070 µg/kg	< 2,320 µg/kg	< 2,080 µg/kg	< 2,770 µg/kg	< 3,110 µg/kg	< 1,890 µg/kg	< 4,350 µg/kg	< 3,990 µg/kg	< 3,230 µg/kg

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Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M008								
			North edge of hill ditch, approximately 20 yards downstream of confluence								
			12/20/2023	12/21/2023	12/22/2023		12/24/2023	12/28/2023	12/29/2023	12/30/2023	3/26/2024
Analytical Method	**Analyte**	**Screening Value (µg/kg)**	MTWA1220M008	MTWA1221M008	MTWA1222M008	MTWA1222N008	MTWA1224M008	MTWA1228M008	MTWA1229M008	MTWA1230M008	MTWA0326M008
8260D	Benzene	30 µg/kg [1]	< 1.78 µg/kg	< 0.9 µg/kg	< 2.03 µg/kg	< 1.44 µg/kg	< 1.71 µg/kg	< 0.93 µg/kg	< 1.51 µg/kg	< 2.14 µg/kg	< 15.3 µg/kg
	Ethylbenzene	6000 µg/kg [1]	< 2.81 µg/kg	< 1.42 µg/kg	< 3.21 µg/kg	< 2.27 µg/kg	< 2.71 µg/kg	< 1.47 µg/kg	< 2.38 µg/kg	< 3.38 µg/kg	< 24.2 µg/kg
	Toluene	7000 µg/kg [1]	< 4.94 µg/kg	2.97 µg/kg (J)	< 5.66 µg/kg	< 4.01 µg/kg	< 4.76 µg/kg	< 2.58 µg/kg	< 6.45 µg/kg	< 5.95 µg/kg	< 42.9 µg/kg
	Xylenes, Total	9000 µg/kg [1]	< 3.34 µg/kg	3.35 µg/kg (J)	< 3.83 µg/kg	< 2.71 µg/kg	< 3.23 µg/kg	< 1.75 µg/kg	< 3.62 µg/kg	5.75 µg/kg (J)	< 28.9 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	< 3,750 µg/kg	< 1,630 µg/kg	< 4,070 µg/kg	< 2,780 µg/kg	< 3,170 µg/kg	< 2,040 µg/kg	< 2,730 µg/kg	< 5,490 µg/kg	< 3,380 µg/kg

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Detection

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

Analytical Method	Analyte	Screening Value (µg/kg)	M009 Skagit River at Milltown Rd boat launch 12/20/2023 MTWA1220M009	M010 Skagit River, off of Pioneer Hwy; approx 200 yds south of Pioneer Hwy bridge over flowpath 12/20/2023 MTWA1220M010	M011 Approximately 0.80 miles downstream of South Fork Skagit River 12/20/2023 MTWA1220M011	M012 Approximately 0.5 miles downstream of South Fork Skagit River 12/20/2023 MTWA1220M012
8260D	Benzene	30 µg/kg [1]	1.22 µg/kg (J)	< 1.21 µg/kg	< 1.39 µg/kg	< 0.98 µg/kg
	Ethylbenzene	6000 µg/kg [1]	< 1.8 µg/kg	< 1.91 µg/kg	< 2.19 µg/kg	< 1.55 µg/kg
	Toluene	7000 µg/kg [1]	3.48 µg/kg (J)	4.67 µg/kg (J)	4.97 µg/kg (J)	4.91 µg/kg (J)
	Xylenes, Total	9000 µg/kg [1]	< 2.14 µg/kg	< 2.28 µg/kg	< 2.61 µg/kg	< 1.85 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	< 2,360 µg/kg	< 2,230 µg/kg	< 2,480 µg/kg	< 2,010 µg/kg

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Detection

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M013						
			40 yards south of the pipe line right of way on the West Bank						
			12/21/2023	12/22/2023	12/24/2023	12/29/2023	12/30/2023	12/31/2023	3/26/2024
Analytical Method	**Analyte**	**Screening Value (µg/kg)**	MTWA1221M013	MTWA1222M013	MTWA1224M013	MTWA1229M013	MTWA1230M013	MTWA1231M013	MTWA0326M013
8260D	Benzene	30 µg/kg [1]	17.3 µg/kg (J)	3.16 µg/kg	3.26 µg/kg (J)	< 1.93 µg/kg	< 1.98 µg/kg	< 1.97 µg/kg	< 7.58 µg/kg
	Ethylbenzene	6000 µg/kg [1]	202 µg/kg (J)	72.5 µg/kg	89.5 µg/kg (J)	< 3.05 µg/kg	< 3.12 µg/kg	9.41 µg/kg (J)	< 12 µg/kg
	Toluene	7000 µg/kg [1]	799 µg/kg (J)	213 µg/kg	189 µg/kg (J)	< 10.9 µg/kg	12.4 µg/kg (J)	34.7 µg/kg (J)	< 21.1 µg/kg
	Xylenes, Total	9000 µg/kg [1]	1,250 µg/kg (J)	480 µg/kg	589 µg/kg (J)	< 30.4 µg/kg	42.7 µg/kg (J)	62.1 µg/kg (J)	18.3 µg/kg (J)
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	10,100 µg/kg (J)	< 4,300 µg/kg	< 6,520 µg/kg	< 3,480 µg/kg	< 4,160 µg/kg	< 4,360 µg/kg	< 3,520 µg/kg

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Detection

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			M014						
			100 yards north of the SR-534 bridge on the West Bank						
Analytical Method	Analyte	Screening Value (µg/kg)	12/21/2023 MTWA1221M014	12/22/2023 MTWA1222M014	12/24/2023 MTWA1224M014	12/29/2023 MTWA1229M014	12/30/2023 MTWA1230M014	12/31/2023 MTWA1231M014	3/26/2024 MTWA0326M014
8260D	Benzene	30 µg/kg [1]	1.66 µg/kg (J)	3.65 µg/kg	1.14 µg/kg (J)	1.81 µg/kg (J)	< 1.87 µg/kg	< 1.11 µg/kg	< 7.58 µg/kg
	Ethylbenzene	6000 µg/kg [1]	107 µg/kg	48.9 µg/kg	34.4 µg/kg	15.1 µg/kg	17.6 µg/kg (J)	10.7 µg/kg	< 12 µg/kg
	Toluene	7000 µg/kg [1]	119 µg/kg	154 µg/kg	59.6 µg/kg	67.1 µg/kg	73.9 µg/kg (J)	55.3 µg/kg	< 21.1 µg/kg
	Xylenes, Total	9000 µg/kg [1]	972 µg/kg	328 µg/kg	269 µg/kg	97.7 µg/kg	133 µg/kg (J)	75.8 µg/kg	15.8 µg/kg (J)
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	16,900 µg/kg	< 6,380 µg/kg	< 6,620 µg/kg	< 2,140 µg/kg	< 5,060 µg/kg	< 3,140 µg/kg	< 4,160 µg/kg

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Detection

Non-detection

Laboratory Results | Bank Sediment

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

Analytical Method	Analyte	Screening Value (µg/kg)	M015 Approx 0.2 miles N of Hwy 534, NW bank of Hill ditch 12/21/2023 MTWA1221M015	M016 SW corner of Fisher Slough, approximately 20 yards inside banked levee 12/21/2023 MTWA1221M016	M017 West side of Fisher Slough 12/21/2023 MTWA1221M017	M018 Northwest corner of Fisher Slough 12/21/2023 MTWA1221M018	M019 Fisher Slough, along levy approximately 0.2 mi E of Pioneer Hwy 12/21/2023 MTWA1221M019	M020 Fisher Slough, SW corner of bottom half of slough, approximately 30 yds E of the levee 12/23/2023 MTWA1223M020	M021 5 yards south of the SR-534 bridge over Hill Ditch 1/10/2024 MTWA0110M021	M022 30 yards south of the SR-534 bridge over Hill Ditch 1/10/2024 MTWA0110M022
8260D	Benzene	30 µg/kg [1]	< 1.97 µg/kg	< 6.39 µg/kg	< 2.78 µg/kg	< 2.65 µg/kg	< 2.16 µg/kg	< 3.25 µg/kg	< 1.14 µg/kg	< 1.07 µg/kg
	Ethylbenzene	6000 µg/kg [1]	< 3.11 µg/kg	< 10.1 µg/kg	< 4.39 µg/kg	< 4.19 µg/kg	< 3.41 µg/kg	< 5.13 µg/kg	< 1.79 µg/kg	< 1.69 µg/kg
	Toluene	7000 µg/kg [1]	< 5.48 µg/kg	< 17.7 µg/kg	< 7.75 µg/kg	< 7.4 µg/kg	< 6.02 µg/kg	< 9.06 µg/kg	4.39 µg/kg (J)	5.58 µg/kg (J)
	Xylenes, Total	9000 µg/kg [1]	9.27 µg/kg (J)	< 12 µg/kg	< 5.24 µg/kg	5.38 µg/kg (J)	< 4.09 µg/kg	< 6.15 µg/kg	< 9.17 µg/kg	< 10.5 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	30000 µg/kg [1]	4,770 µg/kg (J)	< 18,400 µg/kg	< 7,730 µg/kg	< 4,480 µg/kg	< 4,090 µg/kg	< 8,700 µg/kg	< 1,920 µg/kg	< 1,930 µg/kg

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J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Detection

Non-detection

Laboratory Results | Transect Sediment (Ponar)

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

Detection
Non-detection
Non-detection > Screening Value
Not Analyzed

Analytical Method	Analyte	Media	Screening Value (mg/L)	Screening Value (µg/kg)	P001 Ponar transect 2, N bank upstream; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P001	P002 Ponar transect 2, middle; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P002	P003 Ponar transect 2, S bank upstream; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P003	P004 N bank downstream; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P004	P005 S bank downstream; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P005	P006 Ponar transect 3, N bank; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P006
6010D	Arsenic	Solid	-	20000 µg/kg [1]	10,100 µg/kg (J)	8,680 µg/kg	9,200 µg/kg (J)	5,610 µg/kg (J)	9,560 µg/kg	8,200 µg/kg
		TCLP	5[2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Barium	Solid	-	NA	138,000 µg/kg	129,000 µg/kg	137,000 µg/kg	112,000 µg/kg	117,000 µg/kg	135,000 µg/kg
		TCLP	100[2]	100 mg/L [2]	0.429 mg/L	0.473 mg/L	0.422 mg/L	0.423 mg/L	0.367 mg/L	0.428 mg/L
	Cadmium	Solid	-	2000 µg/kg [1]	< 238 µg/kg	< 166 µg/kg	< 225 µg/kg	< 169 µg/kg	< 199 µg/kg	< 184 µg/kg
		TCLP	1[2]	1 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Chromium	Solid	-	NA	52,000 µg/kg	51,600 µg/kg	53,500 µg/kg	44,500 µg/kg	43,700 µg/kg	51,300 µg/kg
		TCLP	5[2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Lead	Solid	-	250000 µg/kg [1]	14,100 µg/kg	15,000 µg/kg	14,100 µg/kg	11,100 µg/kg	12,200 µg/kg	14,300 µg/kg
		TCLP	5[2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Selenium	Solid	-	NA	< 3,850 µg/kg	< 2,690 µg/kg	< 3,640 µg/kg	< 2,750 µg/kg	< 3,230 µg/kg	< 2,990 µg/kg
		TCLP	1[2]	1 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Silver	Solid	-	NA	< 640 µg/kg	< 448 µg/kg	< 606 µg/kg	< 457 µg/kg	< 537 µg/kg	< 496 µg/kg
		TCLP	5[2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
7470A	Mercury	TCLP	0.2[2]	0.2 mg/L [2]	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L
7471B	Mercury	Solid	-	2000 µg/kg [1]	106 µg/kg (J)	90.5 µg/kg (J)	87.2 µg/kg (J)	79.9 µg/kg (J)	80.2 µg/kg (J)	119 µg/kg (J)
8260D	Benzene	Solid	-	30 µg/kg [1]	< 4.81 µg/kg	< 3.04 µg/kg	< 4.41 µg/kg	< 3.22 µg/kg	4.6 µg/kg (J)	4.91 µg/kg (J)
		TCLP	0.5[2]	0.5 mg/L [2]	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L
	Ethylbenzene	Solid	-	6000 µg/kg [1]	14.7 µg/kg (J)	12.6 µg/kg (J)	29.3 µg/kg	18.6 µg/kg	28.7 µg/kg	41.4 µg/kg
	Toluene	Solid	-	7000 µg/kg [1]	90.5 µg/kg	60.5 µg/kg	136 µg/kg	106 µg/kg	174 µg/kg	227 µg/kg
	Xylenes, Total	Solid	-	9000 µg/kg [1]	82.6 µg/kg (B)	77.8 µg/kg (B)	138 µg/kg (B)	114 µg/kg (B)	142 µg/kg	216 µg/kg
8270E	1,2-Dichlorobenzene	Solid	-	NA	< 49.8 µg/kg	< 34.8 µg/kg	< 47.1 µg/kg	< 35.5 µg/kg	< 41.7 µg/kg	< 38.6 µg/kg
	1,2,4-Trichlorobenzene	Solid	-	NA	< 52.4 µg/kg	< 36.7 µg/kg	< 49.6 µg/kg	< 37.4 µg/kg	< 44 µg/kg	< 40.7 µg/kg
	1,3-Dichlorobenzene	Solid	-	NA	< 50.9 µg/kg	< 35.6 µg/kg	< 48.2 µg/kg	< 36.3 µg/kg	< 42.7 µg/kg	< 39.5 µg/kg
	1,4-Dichlorobenzene	Solid	-	NA	< 50 µg/kg	< 34.9 µg/kg	< 47.3 µg/kg	< 35.6 µg/kg	< 41.9 µg/kg	< 38.7 µg/kg
	2-Chloronaphthalene	Solid	-	NA	< 29.5 µg/kg	< 20.6 µg/kg	< 27.9 µg/kg	< 21 µg/kg	< 24.7 µg/kg	< 22.9 µg/kg
	2-Chlorophenol	Solid	-	NA	< 55.5 µg/kg	< 38.8 µg/kg	< 52.5 µg/kg	< 39.6 µg/kg	< 46.5 µg/kg	< 43 µg/kg
	2-Nitrophenol	Solid	-	NA	< 60 µg/kg	< 42 µg/kg	< 56.8 µg/kg	< 42.8 µg/kg	< 50.3 µg/kg	< 46.5 µg/kg
	2,2-Oxybis(1-Chloropropane)	Solid	-	NA	< 72.6 µg/kg	< 50.8 µg/kg	< 68.7 µg/kg	< 51.8 µg/kg	< 60.9 µg/kg	< 56.3 µg/kg
	2,4-Dichlorophenol	Solid	-	NA	< 48.9 µg/kg	< 34.2 µg/kg	< 46.3 µg/kg	< 34.9 µg/kg	< 41 µg/kg	< 37.9 µg/kg
	2,4-Dimethylphenol	Solid	-	NA	< 43.9 µg/kg	< 30.7 µg/kg	< 41.5 µg/kg	< 31.3 µg/kg	< 36.8 µg/kg	< 34 µg/kg
	2,4-Dinitrophenol	Solid	-	NA	< 393 µg/kg	< 275 µg/kg	< 372 µg/kg	< 280 µg/kg	< 329 µg/kg	< 305 µg/kg
	2,4-Dinitrotoluene	Solid	-	NA	< 48.2 µg/kg	< 33.7 µg/kg	< 45.5 µg/kg	< 34.3 µg/kg	< 40.4 µg/kg	< 37.3 µg/kg
	2,4,6-Trichlorophenol	Solid	-	NA	< 54 µg/kg	< 37.7 µg/kg	< 51 µg/kg	< 38.5 µg/kg	< 45.2 µg/kg	< 41.8 µg/kg
	2,6-Dinitrotoluene	Solid	-	NA	< 55 µg/kg	< 38.4 µg/kg	< 52 µg/kg	< 39.2 µg/kg	< 46.1 µg/kg	< 42.6 µg/kg
	3,3-Dichlorobenzidine	Solid	-	NA	< 62 µg/kg	< 43.4 µg/kg	< 58.7 µg/kg	< 44.2 µg/kg	< 52 µg/kg	< 48.1 µg/kg
	4-Bromophenyl-phenylether	Solid	-	NA	< 59 µg/kg	< 41.3 µg/kg	< 55.8 µg/kg	< 42.1 µg/kg	< 49.5 µg/kg	< 45.7 µg/kg
	4-Chloro-3-methylphenol	Solid	-	NA	< 54.5 µg/kg	< 38.1 µg/kg	< 51.5 µg/kg	< 38.8 µg/kg	< 45.7 µg/kg	< 42.2 µg/kg
	4-Chlorophenyl-phenylether	Solid	-	NA	< 58.5 µg/kg	< 40.9 µg/kg	< 55.3 µg/kg	< 41.7 µg/kg	< 49 µg/kg	< 45.3 µg/kg
	4-Nitrophenol	Solid	-	NA	< 52.4 µg/kg	< 36.7 µg/kg	< 49.6 µg/kg	< 37.4 µg/kg	< 44 µg/kg	< 40.7 µg/kg
	4,6-Dinitro-2-methylphenol	Solid	-	NA	< 381 µg/kg	< 266 µg/kg	< 360 µg/kg	< 271 µg/kg	< 319 µg/kg	< 295 µg/kg
	Acenaphthene	Solid	-	NA	< 27.2 µg/kg	< 19 µg/kg	< 25.7 µg/kg	< 19.4 µg/kg	< 22.8 µg/kg	< 21.1 µg/kg
	Acenaphthylene	Solid	-	NA	< 23.6 µg/kg	< 16.5 µg/kg	< 22.4 µg/kg	< 16.9 µg/kg	< 19.8 µg/kg	< 18.3 µg/kg
	Anthracene	Solid	-	NA	< 29.9 µg/kg	< 20.9 µg/kg	< 28.3 µg/kg	< 21.3 µg/kg	< 25.1 µg/kg	< 23.2 µg/kg
	Benzidine	Solid	-	NA	< 316 µg/kg	< 221 µg/kg	< 299 µg/kg	< 225 µg/kg	< 265 µg/kg	< 245 µg/kg
	Benzo(a)anthracene	Solid	-	NA	< 29.6 µg/kg	< 20.7 µg/kg	< 28 µg/kg	< 21.1 µg/kg	< 24.8 µg/kg	< 22.9 µg/kg
	Benzo(a)pyrene	Solid	-	100 µg/kg [1]	< 31.2 µg/kg	< 21.8 µg/kg	< 29.5 µg/kg	< 22.3 µg/kg	< 26.2 µg/kg	< 24.2 µg/kg
	Benzo(b)fluoranthene	Solid	-	NA	< 31.3 µg/kg	< 21.9 µg/kg	< 29.6 µg/kg	< 22.3 µg/kg	< 26.3 µg/kg	< 24.3 µg/kg
	Benzo(g,h,i)perylene	Solid	-	NA	< 30.7 µg/kg	< 21.5 µg/kg	< 29 µg/kg	< 21.9 µg/kg	< 25.7 µg/kg	< 23.8 µg/kg
	Benzo(k)fluoranthene	Solid	-	NA	< 29.9 µg/kg	< 20.9 µg/kg	< 28.2 µg/kg	< 21.3 µg/kg	< 25 µg/kg	< 23.1 µg/kg
	Benzylbutyl phthalate	Solid	-	NA	< 52.4 µg/kg	< 36.7 µg/kg	< 49.6 µg/kg	< 37.4 µg/kg	< 44 µg/kg	< 40.7 µg/kg
	Bis(2-chlorethoxy)methane	Solid	-	NA	< 50.4 µg/kg	< 35.3 µg/kg	< 47.7 µg/kg	< 36 µg/kg	< 42.3 µg/kg	< 39.1 µg/kg
	Bis(2-chloroethyl)ether	Solid	-	NA	< 55.5 µg/kg	< 38.8 µg/kg	< 52.5 µg/kg	< 39.6 µg/kg	< 46.5 µg/kg	< 43 µg/kg
	Bis(2-ethylhexyl)phthalate	Solid	-	NA	< 213 µg/kg	< 149 µg/kg	< 201 µg/kg	< 152 µg/kg	< 178 µg/kg	< 165 µg/kg
	Chrysene	Solid	-	NA	< 33.4 µg/kg	< 23.3 µg/kg	< 31.6 µg/kg	< 23.8 µg/kg	< 28 µg/kg	< 25.9 µg/kg
	Di-n-butyl phthalate	Solid	-	NA	< 57.5 µg/kg	< 40.2 µg/kg	< 54.4 µg/kg	< 41 µg/kg	< 48.2 µg/kg	< 44.6 µg/kg
	Di-n-octyl phthalate	Solid	-	NA	< 113 µg/kg	< 79.3 µg/kg	< 107 µg/kg	< 80.9 µg/kg	< 95.1 µg/kg	< 88 µg/kg
	Dibenz(a,h)anthracene	Solid	-	NA	< 46.5 µg/kg	< 32.5 µg/kg	< 44 µg/kg	< 33.2 µg/kg	< 39 µg/kg	< 36.1 µg/kg
	Diethyl phthalate	Solid	-	NA	< 55.5 µg/kg	< 38.8 µg/kg	< 52.5 µg/kg	< 39.6 µg/kg	< 46.5 µg/kg	< 43 µg/kg
	Dimethyl phthalate	Solid	-	NA	< 356 µg/kg	< 249 µg/kg	< 337 µg/kg	< 254 µg/kg	< 298 µg/kg	< 276 µg/kg
	Fluoranthene	Solid	-	NA	< 30.3 µg/kg	< 21.2 µg/kg	< 28.7 µg/kg	< 21.6 µg/kg	< 25.4 µg/kg	< 23.5 µg/kg
	Fluorene	Solid	-	NA	< 27.3 µg/kg	< 19.1 µg/kg	< 25.8 µg/kg	< 19.5 µg/kg	< 22.9 µg/kg	< 21.2 µg/kg
	Hexachloro-1,3-butadiene	Solid	-	NA	< 56.5 µg/kg	< 39.5 µg/kg	< 53.4 µg/kg	< 40.3 µg/kg	< 47.4 µg/kg	< 43.8 µg/kg
	Hexachlorobenzene	Solid	-	NA	< 59.5 µg/kg	< 41.6 µg/kg	< 56.3 µg/kg	< 42.4 µg/kg	< 49.9 µg/kg	< 46.1 µg/kg
	Hexachlorocyclopentadiene	Solid	-	NA	< 88.2 µg/kg	< 61.7 µg/kg	< 83.5 µg/kg	< 62.9 µg/kg	< 74 µg/kg	< 68.4 µg/kg
	Hexachloroethane	Solid	-	NA	< 66.1 µg/kg	< 46.2 µg/kg	< 62.5 µg/kg	< 47.1 µg/kg	< 55.4 µg/kg	< 51.2 µg/kg
	Indeno(1,2,3-cd)pyrene	Solid	-	NA	< 47.5 µg/kg	< 33.2 µg/kg	< 44.9 µg/kg	< 33.8 µg/kg	< 39.8 µg/kg	< 36.8 µg/kg
	Isophorone	Solid	-	NA	< 51.4 µg/kg	< 36 µg/kg	< 48.6 µg/kg	< 36.7 µg/kg	< 43.1 µg/kg	< 39.9 µg/kg
	n-Nitrosodi-n-propylamine	Solid	-	NA	< 56 µg/kg	< 39.1 µg/kg	< 52.9 µg/kg	< 39.9 µg/kg	< 46.9 µg/kg	< 43.4 µg/kg
	n-Nitrosodimethylamine	Solid	-	NA	< 249 µg/kg	< 174 µg/kg	< 236 µg/kg	< 178 µg/kg	< 209 µg/kg	< 193 µg/kg
	n-Nitrosodiphenylamine	Solid	-	NA	< 127 µg/kg	< 88.9 µg/kg	< 120 µg/kg	< 90.6 µg/kg	< 107 µg/kg	< 98.5 µg/kg
	Naphthalene	Solid	-	5000 µg/kg [1]	< 42.2 µg/kg	< 29.5 µg/kg	< 39.9 µg/kg	< 30.1 µg/kg	< 35.3 µg/kg	< 32.7 µg/kg
	Nitrobenzene	Solid	-	NA	< 58.5 µg/kg	< 40.9 µg/kg	< 55.3 µg/kg	< 41.7 µg/kg	< 49 µg/kg	< 45.3 µg/kg
	Pentachlorophenol	Solid	-	NA	< 45.2 µg/kg	< 31.6 µg/kg	< 42.7 µg/kg	< 32.2 µg/kg	< 37.9 µg/kg	< 35 µg/kg
	Phenanthrene	Solid	-	NA	< 33.3 µg/kg	< 23.3 µg/kg	< 31.5 µg/kg	< 23.8 µg/kg	< 27.9 µg/kg	< 25.8 µg/kg
	Phenol	Solid	-	NA	< 67.6 µg/kg	< 47.3 µg/kg	< 63.9 µg/kg	< 48.2 µg/kg	< 56.7 µg/kg	< 52.4 µg/kg
	Pyrene	Solid	-	NA	< 32.7 µg/kg	< 22.8 µg/kg	< 30.9 µg/kg	< 23.3 µg/kg	< 27.4 µg/kg	< 25.3 µg/kg
NWTPHDX-SGT	Diesel Range Organics (DRO)	Solid	-	2000000 µg/..	NA	NA	NA	NA	NA	NA
	Residual Range Organics (RRO)	Solid	-	2000000 µg/..	NA	NA	NA	NA	NA	NA
NWTPHGX	Gasoline Range Organics-NWTPH	Solid	-	30000 µg/kg [1]	9,620 µg/kg (BJ)	6,290 µg/kg (BJ)	16,100 µg/kg (BJ)	5,950 µg/kg (BJ)	< 7,210 µg/kg	7,270 µg/kg (BJ)
		WG22329..	NA	30000 µg/kg [1]	NA	NA	NA	NA	NA	NA

[1] Washington State Model Toxic Control Act (MTCA) - Method A Soil Cleanup Levels for Unrestricted Land Use

Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).

Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:

B: The same analyte is found in the associated blank.

J: Result is estimated between the laboratory method detection limit and reporting limit.

Laboratory Results | Transect Sediment (Ponar)

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

Detection
Non-detection
Non-detection > Screening Value
Not Analyzed

Analytical Method	Analyte	Media	Screening Value (mg/L)	Screening Value (µg/kg)	P007 Ponar transect 3, middle; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P007	P008 Ponar transect 3, S bank; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P008	P009 Ponar transect 4, N bank upstream; bottom of Hill ditch, adjacent to zone A2 12/27/2023 MTWA1227P009	P010 Ponar transect 4, middle; bottom of Hill Ditch, adjacent to zone A2 12/27/2023 MTWA1227P010	P011 Transect 4-W side of channel 12/29/2023 MTWA1229P011	P012 Transect 4-Center 12/29/2023 MTWA1229P012
6010D	Arsenic	Solid	-	20000 µg/kg [1]	9,070 µg/kg	6,200 µg/kg (J)	9,180 µg/kg	9,720 µg/kg	5,250 µg/kg (J)	8,240 µg/kg (J)
		TCLP	5 [2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Barium	Solid	-	NA	149,000 µg/kg	113,000 µg/kg	135,000 µg/kg	153,000 µg/kg	116,000 µg/kg	215,000 µg/kg
		TCLP	100 [2]	100 mg/L [2]	0.4 mg/L	0.348 mg/L	0.33 mg/L	0.444 mg/L	0.384 mg/L	0.512 mg/L
	Cadmium	Solid	-	2000 µg/kg [1]	< 207 µg/kg	< 175 µg/kg	< 191 µg/kg	< 211 µg/kg	< 151 µg/kg	< 280 µg/kg
		TCLP	1 [2]	1 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Chromium	Solid	-	NA	79,500 µg/kg	43,900 µg/kg	56,800 µg/kg	60,600 µg/kg	48,100 µg/kg	80,500 µg/kg
		TCLP	5 [2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Lead	Solid	-	250000 µg/kg [1]	15,400 µg/kg	11,700 µg/kg	16,000 µg/kg	16,200 µg/kg	13,000 µg/kg	20,100 µg/kg
		TCLP	5 [2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Selenium	Solid	-	NA	< 3,360 µg/kg	< 2,830 µg/kg	< 3,100 µg/kg	< 3,430 µg/kg	< 2,460 µg/kg	< 4,550 µg/kg
		TCLP	1 [2]	1 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Silver	Solid	-	NA	< 559 µg/kg	< 471 µg/kg	< 516 µg/kg	< 570 µg/kg	< 408 µg/kg	< 756 µg/kg
		TCLP	5 [2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
7470A	Mercury	TCLP	0.2 [2]	0.2 mg/L [2]	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L
7471B	Mercury	Solid	-	2000 µg/kg [1]	114 µg/kg (J)	86.1 µg/kg (J)	116 µg/kg (J)	125 µg/kg (J)	107 µg/kg (J)	176 µg/kg (J)
8260D	Benzene	Solid	-	30 µg/kg [1]	< 4.14 µg/kg	7.02 µg/kg (J)	< 3.73 µg/kg	< 4.27 µg/kg	< 2.82 µg/kg	< 5.97 µg/kg
		TCLP	0.5 [2]	0.5 mg/L [2]	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L
	Ethylbenzene	Solid	-	6000 µg/kg [1]	13.3 µg/kg (J)	14.5 µg/kg (J)	< 5.89 µg/kg	< 6.74 µg/kg	< 4.45 µg/kg	< 9.43 µg/kg
	Toluene	Solid	-	7000 µg/kg [1]	63.8 µg/kg	68.5 µg/kg	< 10.4 µg/kg	< 11.9 µg/kg	< 7.87 µg/kg	< 16.7 µg/kg
	Xylenes, Total	Solid	-	9000 µg/kg [1]	75.7 µg/kg (B)	81.8 µg/kg (B)	< 7 µg/kg	13.7 µg/kg (BJ)	9.49 µg/kg (JJ3)	17.6 µg/kg (J)
8270E	1,2-Dichlorobenzene	Solid	-	NA	< 43.4 µg/kg	< 36.6 µg/kg	< 40.1 µg/kg	< 44.3 µg/kg	< 31.7 µg/kg	< 58.7 µg/kg
	1,2,4-Trichlorobenzene	Solid	-	NA	< 45.8 µg/kg	< 38.6 µg/kg	< 42.3 µg/kg	< 46.7 µg/kg	< 33.4 µg/kg	< 61.9 µg/kg
	1,3-Dichlorobenzene	Solid	-	NA	< 44.5 µg/kg	< 37.4 µg/kg	< 41 µg/kg	< 45.3 µg/kg	< 32.5 µg/kg	< 60.1 µg/kg
	1,4-Dichlorobenzene	Solid	-	NA	< 43.6 µg/kg	< 36.7 µg/kg	< 40.3 µg/kg	< 44.5 µg/kg	< 31.9 µg/kg	< 59 µg/kg
	2-Chloronaphthalene	Solid	-	NA	< 25.7 µg/kg	< 21.7 µg/kg	< 23.8 µg/kg	< 26.2 µg/kg	< 18.8 µg/kg	< 34.8 µg/kg
	2-Chlorophenol	Solid	-	NA	< 48.4 µg/kg	< 40.8 µg/kg	< 44.7 µg/kg	< 49.4 µg/kg	< 35.4 µg/kg	< 65.5 µg/kg
	2-Nitrophenol	Solid	-	NA	< 52.4 µg/kg	< 44.1 µg/kg	< 48.4 µg/kg	< 53.4 µg/kg	< 38.3 µg/kg	< 70.8 µg/kg
	2,2-Oxybis(1-Chloropropane)	Solid	-	NA	< 63.4 µg/kg	< 53.4 µg/kg	< 58.5 µg/kg	< 64.6 µg/kg	< 46.3 µg/kg	< 85.7 µg/kg
	2,4-Dichlorophenol	Solid	-	NA	< 42.7 µg/kg	< 36 µg/kg	< 39.4 µg/kg	< 43.5 µg/kg	< 31.2 µg/kg	< 57.7 µg/kg
	2,4-Dimethylphenol	Solid	-	NA	< 38.3 µg/kg	< 32.3 µg/kg	< 35.4 µg/kg	< 39 µg/kg	< 28 µg/kg	< 51.8 µg/kg
	2,4-Dinitrophenol	Solid	-	NA	< 343 µg/kg	< 289 µg/kg	< 317 µg/kg	< 350 µg/kg	< 250 µg/kg	< 464 µg/kg
	2,4-Dinitrotoluene	Solid	-	NA	< 42 µg/kg	< 35.4 µg/kg	< 38.8 µg/kg	< 42.8 µg/kg	< 30.7 µg/kg	< 56.8 µg/kg
	2,4,6-Trichlorophenol	Solid	-	NA	< 47.1 µg/kg	< 39.7 µg/kg	< 43.5 µg/kg	< 48 µg/kg	< 34.4 µg/kg	< 63.7 µg/kg
	2,6-Dinitrotoluene	Solid	-	NA	< 48 µg/kg	< 40.4 µg/kg	< 44.3 µg/kg	< 48.9 µg/kg	< 35 µg/kg	< 64.9 µg/kg
	3,3-Dichlorobenzidine	Solid	-	NA	< 54.1 µg/kg	< 45.6 µg/kg	< 50 µg/kg	< 55.2 µg/kg	< 39.5 µg/kg	< 73.2 µg/kg
	4-Bromophenyl-phenylether	Solid	-	NA	< 51.5 µg/kg	< 43.4 µg/kg	< 47.5 µg/kg	< 52.5 µg/kg	< 37.6 µg/kg	< 69.6 µg/kg
	4-Chloro-3-methylphenol	Solid	-	NA	< 47.5 µg/kg	< 40 µg/kg	< 43.9 µg/kg	< 48.5 µg/kg	< 34.7 µg/kg	< 64.3 µg/kg
	4-Chlorophenyl-phenylether	Solid	-	NA	< 51.1 µg/kg	< 43 µg/kg	< 47.1 µg/kg	< 52 µg/kg	< 37.3 µg/kg	< 69 µg/kg
	4-Nitrophenol	Solid	-	NA	< 45.8 µg/kg	< 38.6 µg/kg	< 42.3 µg/kg	< 46.7 µg/kg	< 33.4 µg/kg	< 61.9 µg/kg
	4,6-Dinitro-2-methylphenol	Solid	-	NA	< 332 µg/kg	< 280 µg/kg	< 307 µg/kg	< 339 µg/kg	< 243 µg/kg	< 449 µg/kg
	Acenaphthene	Solid	-	NA	< 23.7 µg/kg	< 20 µg/kg	< 21.9 µg/kg	< 24.2 µg/kg	< 17.3 µg/kg	< 32.1 µg/kg
	Acenaphthylene	Solid	-	NA	< 20.6 µg/kg	< 17.4 µg/kg	< 19.1 µg/kg	< 21 µg/kg	< 15.1 µg/kg	< 27.9 µg/kg
	Anthracene	Solid	-	NA	< 26.1 µg/kg	< 22 µg/kg	< 24.1 µg/kg	< 26.6 µg/kg	< 19.1 µg/kg	< 35.3 µg/kg
	Benzidine	Solid	-	NA	< 276 µg/kg	< 232 µg/kg	< 254 µg/kg	< 281 µg/kg	< 201 µg/kg	< 373 µg/kg
	Benzo(a)anthracene	Solid	-	NA	< 25.8 µg/kg	< 21.8 µg/kg	< 23.9 µg/kg	< 26.3 µg/kg	< 18.9 µg/kg	< 34.9 µg/kg
	Benzo(a)pyrene	Solid	-	100 µg/kg [1]	< 27.2 µg/kg	< 23 µg/kg	< 25.2 µg/kg	< 27.8 µg/kg	< 19.9 µg/kg	< 36.8 µg/kg
	Benzo(b)fluoranthene	Solid	-	NA	< 27.3 µg/kg	< 23 µg/kg	< 25.2 µg/kg	< 27.9 µg/kg	< 20 µg/kg	< 37 µg/kg
	Benzo(g,h,i)perylene	Solid	-	NA	< 26.8 µg/kg	< 22.6 µg/kg	< 24.7 µg/kg	< 27.3 µg/kg	< 19.6 µg/kg	< 36.2 µg/kg
	Benzo(k)fluoranthene	Solid	-	NA	< 26.1 µg/kg	< 22 µg/kg	< 24.1 µg/kg	< 26.6 µg/kg	< 19 µg/kg	< 35.2 µg/kg
	Benzylbutyl phthalate	Solid	-	NA	< 45.8 µg/kg	< 38.6 µg/kg	< 42.3 µg/kg	< 46.7 µg/kg	< 33.4 µg/kg	< 61.9 µg/kg
	Bis(2-chlorethoxy)methane	Solid	-	NA	< 44 µg/kg	< 37.1 µg/kg	< 40.6 µg/kg	< 44.9 µg/kg	< 32.2 µg/kg	< 59.5 µg/kg
	Bis(2-chloroethyl)ether	Solid	-	NA	< 48.4 µg/kg	< 40.8 µg/kg	< 44.7 µg/kg	< 49.4 µg/kg	< 35.4 µg/kg	< 65.5 µg/kg
	Bis(2-ethylhexyl)phthalate	Solid	-	NA	< 186 µg/kg	< 156 µg/kg	< 171 µg/kg	< 189 µg/kg	< 136 µg/kg	< 251 µg/kg
	Chrysene	Solid	-	NA	< 29.1 µg/kg	< 24.5 µg/kg	< 26.9 µg/kg	< 29.7 µg/kg	< 21.3 µg/kg	< 39.4 µg/kg
	Di-n-butyl phthalate	Solid	-	NA	< 50.2 µg/kg	< 42.3 µg/kg	< 46.3 µg/kg	< 51.1 µg/kg	< 36.7 µg/kg	< 67.8 µg/kg
	Di-n-octyl phthalate	Solid	-	NA	< 99 µg/kg	< 83.4 µg/kg	< 91.4 µg/kg	< 101 µg/kg	< 72.3 µg/kg	< 134 µg/kg
	Dibenz(a,h)anthracene	Solid	-	NA	< 40.6 µg/kg	< 34.2 µg/kg	< 37.5 µg/kg	< 41.4 µg/kg	< 29.7 µg/kg	< 54.9 µg/kg
	Diethyl phthalate	Solid	-	NA	< 48.4 µg/kg	< 40.8 µg/kg	< 44.7 µg/kg	< 49.4 µg/kg	< 35.4 µg/kg	< 65.5 µg/kg
	Dimethyl phthalate	Solid	-	NA	< 311 µg/kg	< 262 µg/kg	< 287 µg/kg	< 317 µg/kg	< 227 µg/kg	< 420 µg/kg
	Fluoranthene	Solid	-	NA	< 26.5 µg/kg	< 22.3 µg/kg	< 24.4 µg/kg	< 27 µg/kg	< 19.3 µg/kg	< 35.8 µg/kg
	Fluorene	Solid	-	NA	< 23.9 µg/kg	< 20.1 µg/kg	< 22 µg/kg	< 24.3 µg/kg	< 17.4 µg/kg	< 32.3 µg/kg
	Hexachloro-1,3-butadiene	Solid	-	NA	< 49.3 µg/kg	< 41.5 µg/kg	< 45.5 µg/kg	< 50.3 µg/kg	< 36 µg/kg	< 66.7 µg/kg
	Hexachlorobenzene	Solid	-	NA	< 51.9 µg/kg	< 43.8 µg/kg	< 47.9 µg/kg	< 52.9 µg/kg	< 37.9 µg/kg	< 70.2 µg/kg
	Hexachlorocyclopentadiene	Solid	-	NA	< 77 µg/kg	< 64.9 µg/kg	< 71.1 µg/kg	< 78.5 µg/kg	< 56.3 µg/kg	< 104 µg/kg
	Hexachloroethane	Solid	-	NA	< 57.7 µg/kg	< 48.6 µg/kg	< 53.2 µg/kg	< 58.8 µg/kg	< 42.1 µg/kg	< 78 µg/kg
	Indeno(1,2,3-cd)pyrene	Solid	-	NA	< 41.4 µg/kg	< 34.9 µg/kg	< 38.2 µg/kg	< 42.2 µg/kg	< 30.3 µg/kg	< 56 µg/kg
	Isophorone	Solid	-	NA	< 44.9 µg/kg	< 37.8 µg/kg	< 41.4 µg/kg	< 45.8 µg/kg	< 32.8 µg/kg	< 60.7 µg/kg
	n-Nitrosodi-n-propylamine	Solid	-	NA	< 48.9 µg/kg	< 41.2 µg/kg	< 45.1 µg/kg	< 49.8 µg/kg	< 35.7 µg/kg	< 66.1 µg/kg
	n-Nitrosodimethylamine	Solid	-	NA	< 217 µg/kg	< 183 µg/kg	< 201 µg/kg	< 222 µg/kg	< 159 µg/kg	< 294 µg/kg
	n-Nitrosodiphenylamine	Solid	-	NA	< 111 µg/kg	< 93.4 µg/kg	< 102 µg/kg	< 113 µg/kg	< 81 µg/kg	< 150 µg/kg
	Naphthalene	Solid	-	5000 µg/kg [1]	< 36.8 µg/kg	< 31 µg/kg	71.1 µg/kg (J)	< 37.5 µg/kg	< 26.9 µg/kg	< 49.8 µg/kg
	Nitrobenzene	Solid	-	NA	< 51.1 µg/kg	< 43 µg/kg	< 47.1 µg/kg	< 52 µg/kg	< 37.3 µg/kg	< 69 µg/kg
	Pentachlorophenol	Solid	-	NA	< 39.4 µg/kg	< 33.2 µg/kg	< 36.4 µg/kg	< 40.2 µg/kg	< 28.8 µg/kg	< 53.3 µg/kg
	Phenanthrene	Solid	-	NA	< 29.1 µg/kg	< 24.5 µg/kg	< 26.9 µg/kg	< 29.7 µg/kg	< 21.3 µg/kg	< 39.3 µg/kg
	Phenol	Solid	-	NA	< 59 µg/kg	< 49.7 µg/kg	< 54.5 µg/kg	< 60.1 µg/kg	< 43.1 µg/kg	< 79.7 µg/kg
	Pyrene	Solid	-	NA	< 28.5 µg/kg	< 24 µg/kg	< 26.3 µg/kg	< 29.1 µg/kg	< 20.8 µg/kg	< 38.6 µg/kg
NWTPHDX-SGT	Diesel Range Organics (DRO)	Solid	-	2000000 µg/..	NA	NA	NA	NA	NA	NA
	Residual Range Organics (RRO)	Solid	-	2000000 µg/..	NA	NA	NA	NA	NA	NA
NWTPHGX	Gasoline Range Organics-NWTPH	Solid	-	30000 µg/kg [1]	11,500 µg/kg (BJ)	13,100 µg/kg (BJ)	7,460 µg/kg (BJ)	< 7,590 µg/kg	10,000 µg/kg (BJ)	11,900 µg/kg (BJ)
		WG22329..	NA	30000 µg/kg [1]	NA	NA	NA	NA	NA	NA

[1] Washington State Model Toxic Control Act (MTCA) - Method A Soil Cleanup Levels for Unrestricted Land Use

Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).

Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:

B: The same analyte is found in the associated blank.

J: Result is estimated between the laboratory method detection limit and reporting limit.

Laboratory Results | Transect Sediment (Ponar)

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

Detection
Non-detection
Non-detection > Screening Value
Not Analyzed

Analytical Method	Analyte	Media	Screening Value (mg/L)	Screening Value (µg/kg)	P013 Transect 4-E side of channel 12/29/2023 MTWA1229P013	P014 Transect 5-W side of channel 12/29/2023 MTWA1229P014	P015 Transect 5-Center 12/29/2023 MTWA1229P015	P016 Transect 5-E side of channel 12/29/2023 MTWA1229P016	P017 Background sample; Hill Ditch, approximately 0.25 miles upstream of Division B 12/29/2023 MTWA1229P017	 MTWA1229Q017
6010D	Arsenic	Solid	-	20000 µg/kg [1]	4,840 µg/kg (J)	4,520 µg/kg (J)	6,770 µg/kg (J)	7,140 µg/kg (J)	2,420 µg/kg (J)	1,870 µg/kg (J)
		TCLP	5 [2]	5 mg/L [2]	< 0.033 mg/L	0.383 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Barium	Solid	-	NA	146,000 µg/kg	125,000 µg/kg	157,000 µg/kg	180,000 µg/kg	63,600 µg/kg	49,200 µg/kg
		TCLP	100 [2]	100 mg/L [2]	0.436 mg/L	0.447 mg/L	0.478 mg/L	0.475 mg/L	0.428 mg/L	0.407 mg/L
	Cadmium	Solid	-	2000 µg/kg [1]	< 188 µg/kg	< 173 µg/kg	< 222 µg/kg	< 205 µg/kg	< 98.4 µg/kg	< 64.1 µg/kg
		TCLP	1 [2]	1 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Chromium	Solid	-	NA	56,800 µg/kg	49,300 µg/kg	62,200 µg/kg	70,400 µg/kg	40,300 µg/kg	18,700 µg/kg
		TCLP	5 [2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Lead	Solid	-	250000 µg/kg [1]	15,700 µg/kg	14,200 µg/kg	16,800 µg/kg	19,800 µg/kg	8,000 µg/kg	5,760 µg/kg
		TCLP	5 [2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Selenium	Solid	-	NA	< 3,040 µg/kg	< 2,810 µg/kg	< 3,600 µg/kg	< 3,330 µg/kg	< 1,600 µg/kg	< 1,040 µg/kg
		TCLP	1 [2]	1 mg/L [2]	< 0.033 mg/L	0.125 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
	Silver	Solid	-	NA	< 506 µg/kg	< 468 µg/kg	< 599 µg/kg	< 553 µg/kg	< 265 µg/kg	< 173 µg/kg
		TCLP	5 [2]	5 mg/L [2]	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L	< 0.033 mg/L
7470A	Mercury	TCLP	0.2 [2]	0.2 mg/L [2]	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L	< 0.0033 mg/L
7471B	Mercury	Solid	-	2000 µg/kg [1]	134 µg/kg (J)	112 µg/kg (J)	151 µg/kg (J)	144 µg/kg (J)	38.6 µg/kg (J)	25.4 µg/kg (J)
8260D	Benzene	Solid	-	30 µg/kg [1]	< 3.59 µg/kg	< 4.05 µg/kg	< 4.62 µg/kg	< 4.23 µg/kg	< 1.58 µg/kg	1.71 µg/kg (J)
		TCLP	0.5 [2]	0.5 mg/L [2]	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L	< 0.0167 mg/L
	Ethylbenzene	Solid	-	6000 µg/kg [1]	< 5.68 µg/kg	< 6.39 µg/kg	< 7.29 µg/kg	< 6.67 µg/kg	< 2.5 µg/kg	< 1.29 µg/kg
	Toluene	Solid	-	7000 µg/kg [1]	< 9.98 µg/kg	< 11.3 µg/kg	< 12.8 µg/kg	< 11.7 µg/kg	5.18 µg/kg (J)	2.92 µg/kg (J)
	Xylenes, Total	Solid	-	9000 µg/kg [1]	18.5 µg/kg (J)	< 7.61 µg/kg	< 8.69 µg/kg	16.3 µg/kg (J)	< 2.98 µg/kg	< 1.54 µg/kg
8270E	1,2-Dichlorobenzene	Solid	-	NA	< 39.3 µg/kg	< 36.3 µg/kg	< 46.6 µg/kg	< 43 µg/kg	< 20.6 µg/kg	< 13.4 µg/kg
	1,2,4-Trichlorobenzene	Solid	-	NA	< 41.4 µg/kg	< 38.3 µg/kg	< 49.1 µg/kg	< 45.3 µg/kg	< 21.7 µg/kg	< 14.1 µg/kg
	1,3-Dichlorobenzene	Solid	-	NA	< 40.3 µg/kg	< 37.2 µg/kg	< 47.6 µg/kg	< 44 µg/kg	< 21.1 µg/kg	< 13.7 µg/kg
	1,4-Dichlorobenzene	Solid	-	NA	< 39.5 µg/kg	< 36.5 µg/kg	< 46.7 µg/kg	< 43.1 µg/kg	< 20.7 µg/kg	< 13.5 µg/kg
	2-Chloronaphthalene	Solid	-	NA	< 23.3 µg/kg	< 21.5 µg/kg	< 27.6 µg/kg	< 25.5 µg/kg	< 12.2 µg/kg	< 7.96 µg/kg
	2-Chlorophenol	Solid	-	NA	< 43.8 µg/kg	< 40.5 µg/kg	< 51.9 µg/kg	< 47.9 µg/kg	< 23 µg/kg	< 15 µg/kg
	2-Nitrophenol	Solid	-	NA	< 47.4 µg/kg	< 43.8 µg/kg	< 56.1 µg/kg	< 51.8 µg/kg	< 24.9 µg/kg	< 16.2 µg/kg
	2,2-Oxybis(1-Chloropropane)	Solid	-	NA	< 57.4 µg/kg	< 53 µg/kg	< 67.9 µg/kg	< 62.7 µg/kg	< 30.1 µg/kg	< 19.6 µg/kg
	2,4-Dichlorophenol	Solid	-	NA	< 38.7 µg/kg	< 35.7 µg/kg	< 45.8 µg/kg	< 42.2 µg/kg	< 20.3 µg/kg	< 13.2 µg/kg
	2,4-Dimethylphenol	Solid	-	NA	< 34.7 µg/kg	< 32 µg/kg	< 41 µg/kg	< 37.9 µg/kg	< 18.2 µg/kg	< 11.8 µg/kg
	2,4-Dinitrophenol	Solid	-	NA	< 310 µg/kg	< 287 µg/kg	< 367 µg/kg	< 339 µg/kg	< 163 µg/kg	< 106 µg/kg
	2,4-Dinitrotoluene	Solid	-	NA	< 38.1 µg/kg	< 35.2 µg/kg	< 45.1 µg/kg	< 41.6 µg/kg	< 20 µg/kg	< 13 µg/kg
	2,4,6-Trichlorophenol	Solid	-	NA	< 42.6 µg/kg	< 39.4 µg/kg	< 50.5 µg/kg	< 46.6 µg/kg	< 22.4 µg/kg	< 14.6 µg/kg
	2,6-Dinitrotoluene	Solid	-	NA	< 43.4 µg/kg	< 40.1 µg/kg	< 51.4 µg/kg	< 47.5 µg/kg	< 22.8 µg/kg	< 14.8 µg/kg
	3,3-Dichlorobenzidine	Solid	-	NA	< 49 µg/kg	< 45.3 µg/kg	< 58 µg/kg	< 53.6 µg/kg	< 25.7 µg/kg	< 16.7 µg/kg
	4-Bromophenyl-phenylether	Solid	-	NA	< 46.6 µg/kg	< 43.1 µg/kg	< 55.2 µg/kg	< 50.9 µg/kg	< 24.5 µg/kg	< 15.9 µg/kg
	4-Chloro-3-methylphenol	Solid	-	NA	< 43 µg/kg	< 39.8 µg/kg	< 50.9 µg/kg	< 47 µg/kg	< 22.6 µg/kg	< 14.7 µg/kg
	4-Chlorophenyl-phenylether	Solid	-	NA	< 46.2 µg/kg	< 42.7 µg/kg	< 54.7 µg/kg	< 50.5 µg/kg	< 24.2 µg/kg	< 15.8 µg/kg
	4-Nitrophenol	Solid	-	NA	< 41.4 µg/kg	< 38.3 µg/kg	< 49.1 µg/kg	< 45.3 µg/kg	< 21.7 µg/kg	< 14.1 µg/kg
	4,6-Dinitro-2-methylphenol	Solid	-	NA	< 301 µg/kg	< 278 µg/kg	< 356 µg/kg	< 329 µg/kg	< 158 µg/kg	< 103 µg/kg
	Acenaphthene	Solid	-	NA	< 21.5 µg/kg	< 19.8 µg/kg	< 25.4 µg/kg	< 23.5 µg/kg	< 11.3 µg/kg	< 7.33 µg/kg
	Acenaphthylene	Solid	-	NA	< 18.7 µg/kg	< 17.3 µg/kg	< 22.1 µg/kg	< 20.4 µg/kg	< 9.8 µg/kg	< 6.38 µg/kg
	Anthracene	Solid	-	NA	< 23.6 µg/kg	< 21.8 µg/kg	< 28 µg/kg	< 25.8 µg/kg	< 12.4 µg/kg	< 8.07 µg/kg
	Benzidine	Solid	-	NA	< 249 µg/kg	< 231 µg/kg	< 295 µg/kg	< 273 µg/kg	< 131 µg/kg	< 85.2 µg/kg
	Benzo(a)anthracene	Solid	-	NA	< 23.4 µg/kg	< 21.6 µg/kg	< 27.7 µg/kg	< 25.6 µg/kg	< 12.3 µg/kg	< 7.99 µg/kg
	Benzo(a)pyrene	Solid	-	100 µg/kg [1]	< 24.7 µg/kg	< 22.8 µg/kg	< 29.2 µg/kg	< 27 µg/kg	< 12.9 µg/kg	< 8.42 µg/kg
	Benzo(b)fluoranthene	Solid	-	NA	< 24.8 µg/kg	< 22.9 µg/kg	< 29.3 µg/kg	< 27 µg/kg	< 13 µg/kg	< 8.45 µg/kg
	Benzo(g,h,i)perylene	Solid	-	NA	< 24.3 µg/kg	< 22.4 µg/kg	< 28.7 µg/kg	< 26.5 µg/kg	< 12.7 µg/kg	< 8.29 µg/kg
	Benzo(k)fluoranthene	Solid	-	NA	< 23.6 µg/kg	< 21.8 µg/kg	< 27.9 µg/kg	< 25.8 µg/kg	< 12.4 µg/kg	< 8.05 µg/kg
	Benzylbutyl phthalate	Solid	-	NA	< 41.4 µg/kg	< 38.3 µg/kg	< 49.1 µg/kg	< 45.3 µg/kg	< 21.7 µg/kg	< 14.1 µg/kg
	Bis(2-chlorethoxy)methane	Solid	-	NA	< 39.9 µg/kg	< 36.8 µg/kg	< 47.2 µg/kg	< 43.5 µg/kg	< 20.9 µg/kg	< 13.6 µg/kg
	Bis(2-chloroethyl)ether	Solid	-	NA	< 43.8 µg/kg	< 40.5 µg/kg	< 51.9 µg/kg	< 47.9 µg/kg	< 23 µg/kg	< 15 µg/kg
	Bis(2-ethylhexyl)phthalate	Solid	-	NA	< 168 µg/kg	< 155 µg/kg	< 199 µg/kg	< 184 µg/kg	< 88.2 µg/kg	< 57.4 µg/kg
	Chrysene	Solid	-	NA	< 26.4 µg/kg	< 24.4 µg/kg	< 31.2 µg/kg	< 28.8 µg/kg	< 13.8 µg/kg	< 9.01 µg/kg
	Di-n-butyl phthalate	Solid	-	NA	< 45.4 µg/kg	< 42 µg/kg	< 53.8 µg/kg	< 49.6 µg/kg	< 23.8 µg/kg	< 15.5 µg/kg
	Di-n-octyl phthalate	Solid	-	NA	< 89.7 µg/kg	< 82.9 µg/kg	< 106 µg/kg	< 98 µg/kg	< 47 µg/kg	< 30.6 µg/kg
	Dibenz(a,h)anthracene	Solid	-	NA	< 36.8 µg/kg	< 34 µg/kg	< 43.5 µg/kg	< 40.2 µg/kg	< 19.3 µg/kg	< 12.6 µg/kg
	Diethyl phthalate	Solid	-	NA	< 43.8 µg/kg	< 40.5 µg/kg	< 51.9 µg/kg	< 47.9 µg/kg	< 23 µg/kg	< 15 µg/kg
	Dimethyl phthalate	Solid	-	NA	< 281 µg/kg	< 260 µg/kg	< 333 µg/kg	< 307 µg/kg	< 148 µg/kg	< 96.1 µg/kg
	Fluoranthene	Solid	-	NA	< 24 µg/kg	< 22.1 µg/kg	< 28.4 µg/kg	< 26.2 µg/kg	< 12.6 µg/kg	< 8.18 µg/kg
	Fluorene	Solid	-	NA	< 21.6 µg/kg	< 20 µg/kg	< 25.6 µg/kg	< 23.6 µg/kg	< 11.3 µg/kg	< 7.37 µg/kg
	Hexachloro-1,3-butadiene	Solid	-	NA	< 44.6 µg/kg	< 41.2 µg/kg	< 52.8 µg/kg	< 48.8 µg/kg	< 23.4 µg/kg	< 15.2 µg/kg
	Hexachlorobenzene	Solid	-	NA	< 47 µg/kg	< 43.5 µg/kg	< 55.7 µg/kg	< 51.4 µg/kg	< 24.7 µg/kg	< 16.1 µg/kg
	Hexachlorocyclopentadiene	Solid	-	NA	< 69.7 µg/kg	< 64.4 µg/kg	< 82.6 µg/kg	< 76.2 µg/kg	< 36.6 µg/kg	< 23.8 µg/kg
	Hexachloroethane	Solid	-	NA	< 52.2 µg/kg	< 48.2 µg/kg	< 61.8 µg/kg	< 57 µg/kg	< 27.4 µg/kg	< 17.8 µg/kg
	Indeno(1,2,3-cd)pyrene	Solid	-	NA	< 37.5 µg/kg	< 34.7 µg/kg	< 44.4 µg/kg	< 41 µg/kg	< 19.7 µg/kg	< 12.8 µg/kg
	Isophorone	Solid	-	NA	< 40.7 µg/kg	< 37.6 µg/kg	< 48.1 µg/kg	< 44.4 µg/kg	< 21.3 µg/kg	< 13.9 µg/kg
	n-Nitrosodi-n-propylamine	Solid	-	NA	< 44.2 µg/kg	< 40.9 µg/kg	< 52.4 µg/kg	< 48.3 µg/kg	< 23.2 µg/kg	< 15.1 µg/kg
	n-Nitrosodimethylamine	Solid	-	NA	< 197 µg/kg	< 182 µg/kg	< 233 µg/kg	< 215 µg/kg	< 103 µg/kg	< 67.2 µg/kg
	n-Nitrosodiphenylamine	Solid	-	NA	< 100 µg/kg	< 92.8 µg/kg	< 119 µg/kg	< 110 µg/kg	< 52.7 µg/kg	< 34.3 µg/kg
	Naphthalene	Solid	-	5000 µg/kg [1]	< 33.3 µg/kg	< 30.8 µg/kg	< 39.4 µg/kg	< 36.4 µg/kg	< 17.5 µg/kg	< 11.4 µg/kg
	Nitrobenzene	Solid	-	NA	< 46.2 µg/kg	< 42.7 µg/kg	< 54.7 µg/kg	< 50.5 µg/kg	< 24.2 µg/kg	< 15.8 µg/kg
	Pentachlorophenol	Solid	-	NA	< 35.7 µg/kg	< 33 µg/kg	< 42.3 µg/kg	< 39 µg/kg	< 18.7 µg/kg	< 12.2 µg/kg
	Phenanthrene	Solid	-	NA	< 26.3 µg/kg	< 24.3 µg/kg	< 31.2 µg/kg	< 28.8 µg/kg	< 13.8 µg/kg	< 8.99 µg/kg
	Phenol	Solid	-	NA	< 53.4 µg/kg	< 49.3 µg/kg	< 63.2 µg/kg	< 58.3 µg/kg	< 28 µg/kg	< 18.2 µg/kg
	Pyrene	Solid	-	NA	< 25.8 µg/kg	< 23.9 µg/kg	< 30.6 µg/kg	< 28.2 µg/kg	< 13.5 µg/kg	< 8.82 µg/kg
NWTPHDX-SGT	Diesel Range Organics (DRO)	Solid	-	2000000 µg/..	NA	NA	NA	NA	NA	NA
	Residual Range Organics (RRO)	Solid	-	2000000 µg/..	NA	NA	NA	NA	NA	NA
NWTPHGX	Gasoline Range Organics-NWTPH	Solid	-	30000 µg/kg [1]	8,240 µg/kg (BJ)	9,720 µg/kg (BJ)	9,310 µg/kg (J)	< 6,880 µg/kg	4,210 µg/kg (J)	1,600 µg/kg (J)
		WG22329..	NA	30000 µg/kg [1]	NA	NA	NA	NA	NA	NA

[1] Washington State Model Toxic Control Act (MTCA) - Method A Soil Cleanup Levels for Unrestricted Land Use

Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).

Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:

B: The same analyte is found in the associated blank.

J: Result is estimated between the laboratory method detection limit and reporting limit.

Laboratory Results | Transect Sediment (Ponar)

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

Detection
Non-detection
Non-detection > Screening Value
Not Analyzed

					P018		P019	P020
					Intersection of pipeline and hill ditch, south edge of right of way		Center of pipeline right of way in hill ditch	North part of the pipeline right of way in hill ditch
					2/22/2024		2/22/2024	2/22/2024
Analytical Method	Analyte	Media	Screening Value (mg/L)	Screening Value (µg/kg)	MTWA0222P018	MTWA0222Q018	MTWA0222P019	MTWA0222P020
6010D	Arsenic	Solid	-	20000 µg/kg [1]	NA	NA	NA	NA
		TCLP	5[2]	5 mg/L [2]	NA	NA	NA	NA
	Barium	Solid	-	NA	NA	NA	NA	NA
		TCLP	100[2]	100 mg/L [2]	NA	NA	NA	NA
	Cadmium	Solid	-	2000 µg/kg [1]	NA	NA	NA	NA
		TCLP	1[2]	1 mg/L [2]	NA	NA	NA	NA
	Chromium	Solid	-	NA	NA	NA	NA	NA
		TCLP	5[2]	5 mg/L [2]	NA	NA	NA	NA
	Lead	Solid	-	250000 µg/kg [1]	NA	NA	NA	NA
		TCLP	5[2]	5 mg/L [2]	NA	NA	NA	NA
	Selenium	Solid	-	NA	NA	NA	NA	NA
		TCLP	1[2]	1 mg/L [2]	NA	NA	NA	NA
	Silver	Solid	-	NA	NA	NA	NA	NA
		TCLP	5[2]	5 mg/L [2]	NA	NA	NA	NA
7470A	Mercury	TCLP	0.2[2]	0.2 mg/L [2]	NA	NA	NA	NA
7471B	Mercury	Solid	-	2000 µg/kg [1]	NA	NA	NA	NA
8260D	Benzene	Solid	-	30 µg/kg [1]	< 2.43 µg/kg	< 1.84 µg/kg	< 1.35 µg/kg	< 2.27 µg/kg
		TCLP	0.5[2]	0.5 mg/L [2]	NA	NA	NA	NA
	Ethylbenzene	Solid	-	6000 µg/kg [1]	< 3.84 µg/kg	< 2.91 µg/kg	< 2.13 µg/kg	< 3.58 µg/kg
	Toluene	Solid	-	7000 µg/kg [1]	20.7 µg/kg (J)	6.03 µg/kg (J)	4.91 µg/kg (J)	< 6.31 µg/kg
	Xylenes, Total	Solid	-	9000 µg/kg [1]	< 10.2 µg/kg	< 3.46 µg/kg	< 6.7 µg/kg	< 4.28 µg/kg
8270E	1,2-Dichlorobenzene	Solid	-	NA	NA	NA	NA	NA
	1,2,4-Trichlorobenzene	Solid	-	NA	NA	NA	NA	NA
	1,3-Dichlorobenzene	Solid	-	NA	NA	NA	NA	NA
	1,4-Dichlorobenzene	Solid	-	NA	NA	NA	NA	NA
	2-Chloronaphthalene	Solid	-	NA	NA	NA	NA	NA
	2-Chlorophenol	Solid	-	NA	NA	NA	NA	NA
	2-Nitrophenol	Solid	-	NA	NA	NA	NA	NA
	2,2-Oxybis(1-Chloropropane)	Solid	-	NA	NA	NA	NA	NA
	2,4-Dichlorophenol	Solid	-	NA	NA	NA	NA	NA
	2,4-Dimethylphenol	Solid	-	NA	NA	NA	NA	NA
	2,4-Dinitrophenol	Solid	-	NA	NA	NA	NA	NA
	2,4-Dinitrotoluene	Solid	-	NA	NA	NA	NA	NA
	2,4,6-Trichlorophenol	Solid	-	NA	NA	NA	NA	NA
	2,6-Dinitrotoluene	Solid	-	NA	NA	NA	NA	NA
	3,3-Dichlorobenzidine	Solid	-	NA	NA	NA	NA	NA
	4-Bromophenyl-phenylether	Solid	-	NA	NA	NA	NA	NA
	4-Chloro-3-methylphenol	Solid	-	NA	NA	NA	NA	NA
	4-Chlorophenyl-phenylether	Solid	-	NA	NA	NA	NA	NA
	4-Nitrophenol	Solid	-	NA	NA	NA	NA	NA
	4,6-Dinitro-2-methylphenol	Solid	-	NA	NA	NA	NA	NA
	Acenaphthene	Solid	-	NA	NA	NA	NA	NA
	Acenaphthylene	Solid	-	NA	NA	NA	NA	NA
	Anthracene	Solid	-	NA	NA	NA	NA	NA
	Benzidine	Solid	-	NA	NA	NA	NA	NA
	Benzo(a)anthracene	Solid	-	NA	NA	NA	NA	NA
	Benzo(a)pyrene	Solid	-	100 µg/kg [1]	NA	NA	NA	NA
	Benzo(b)fluoranthene	Solid	-	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene	Solid	-	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene	Solid	-	NA	NA	NA	NA	NA
	Benzylbutyl phthalate	Solid	-	NA	NA	NA	NA	NA
	Bis(2-chlorethoxy)methane	Solid	-	NA	NA	NA	NA	NA
	Bis(2-chloroethyl)ether	Solid	-	NA	NA	NA	NA	NA
	Bis(2-ethylhexyl)phthalate	Solid	-	NA	NA	NA	NA	NA
	Chrysene	Solid	-	NA	NA	NA	NA	NA
	Di-n-butyl phthalate	Solid	-	NA	NA	NA	NA	NA
	Di-n-octyl phthalate	Solid	-	NA	NA	NA	NA	NA
	Dibenz(a,h)anthracene	Solid	-	NA	NA	NA	NA	NA
	Diethyl phthalate	Solid	-	NA	NA	NA	NA	NA
	Dimethyl phthalate	Solid	-	NA	NA	NA	NA	NA
	Fluoranthene	Solid	-	NA	NA	NA	NA	NA
	Fluorene	Solid	-	NA	NA	NA	NA	NA
	Hexachloro-1,3-butadiene	Solid	-	NA	NA	NA	NA	NA
	Hexachlorobenzene	Solid	-	NA	NA	NA	NA	NA
	Hexachlorocyclopentadiene	Solid	-	NA	NA	NA	NA	NA
	Hexachloroethane	Solid	-	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene	Solid	-	NA	NA	NA	NA	NA
	Isophorone	Solid	-	NA	NA	NA	NA	NA
	n-Nitrosodi-n-propylamine	Solid	-	NA	NA	NA	NA	NA
	n-Nitrosodimethylamine	Solid	-	NA	NA	NA	NA	NA
	n-Nitrosodiphenylamine	Solid	-	NA	NA	NA	NA	NA
	Naphthalene	Solid	-	5000 µg/kg [1]	NA	NA	NA	NA
	Nitrobenzene	Solid	-	NA	NA	NA	NA	NA
	Pentachlorophenol	Solid	-	NA	NA	NA	NA	NA
	Phenanthrene	Solid	-	NA	NA	NA	NA	NA
	Phenol	Solid	-	NA	NA	NA	NA	NA
	Pyrene	Solid	-	NA	NA	NA	NA	NA
NWTPHDX-SGT	Diesel Range Organics (DRO)	Solid	-	2000000 µg/..	18,900 µg/kg (J)	8,050 µg/kg (J)	15,500 µg/kg	117,000 µg/kg (J)
	Residual Range Organics (RRO)	Solid	-	2000000 µg/..	< 9,280 µg/kg	< 7,380 µg/kg	< 6,290 µg/kg	< 9,270 µg/kg
NWTPHGX	Gasoline Range Organics-NWTPH	Solid	-	30000 µg/kg [1]	NA	NA	NA	NA
		WG22329..	NA	30000 µg/kg [1]	< 18,100 µg/kg	< 9,450 µg/kg	< 19,700 µg/kg	< 35,500 µg/kg

[1] Washington State Model Toxic Control Act (MTCA) - Method A Soil Cleanup Levels for Unrestricted Land Use

Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).

Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:

B: The same analyte is found in the associated blank.

J: Result is estimated between the laboratory method detection limit and reporting limit.

Appendix D-5

Sediment Sampling Results Maps

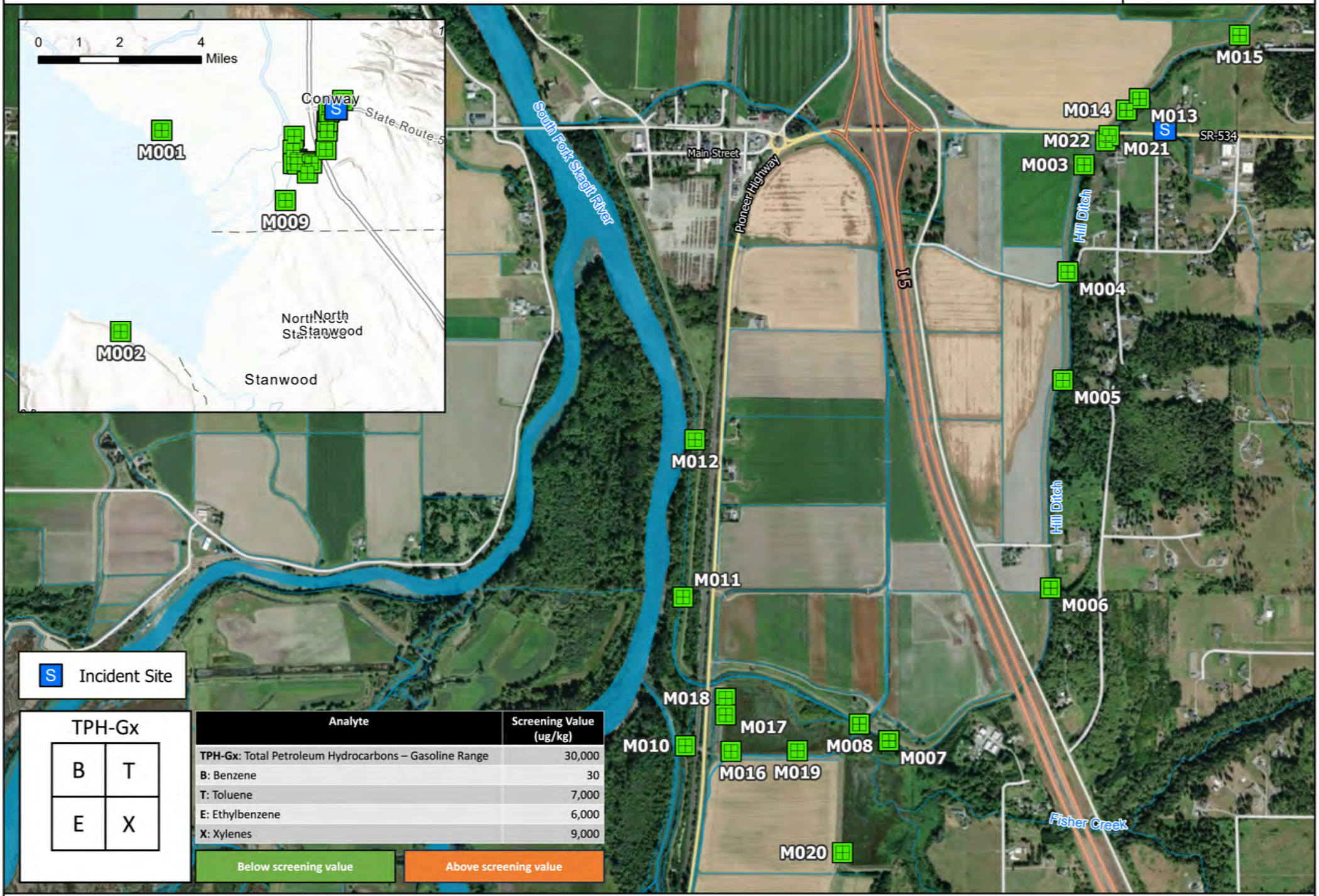
Sediment Sampling Results

Olympic Pipeline Gasoline Spill - Conway, WA

0 0.25 0.5 Miles

N

Project: PROJ-032692
Client: BP
City: Mt. Vernon, WA
County: Skagit



TPH-Gx

B	T
E	X

Analyte	Screening Value (ug/kg)
TPH-Gx: Total Petroleum Hydrocarbons – Gasoline Range	30,000
B: Benzene	30
T: Toluene	7,000
E: Ethylbenzene	6,000
X: Xylenes	9,000

Below screening value | Above screening value

Projection: NAD 1983 2011 UTM Zone 10N Datum: NAD 1983 2011

Appendix E

Bioassay Work Plan

Bioassay Sampling and Analysis Plan

Olympic Pipeline Gasoline Spill

Prepared for
Center for Toxicology and Environmental Health (CTEH)
5120 Northshore Drive
North Little Rock Arkansas, 72118

CTEH®

By
Enthalpy Analytical, San Diego
4340 Vandever Avenue
San Diego, California 92120

ENTHALPY ANALYTICAL
TOXICITY LABORATORY & CONSULTING

March 2024

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Table 1. Evaluation Criteria for Freshwater Sediment Bioassays

List of Attachments

Attachment A. CTEH *Olympic Pipeline Gasoline Spill Preliminary Hill Ditch Sediment (Ponar) Sampling Summary*
Attachment B. 28-day *H. azteca* and 10-day *C. dilutus* summary test conditions and test acceptability criteria

Section 1

Introduction

On December 10, 2023, Olympic Pipe Line Co LLC had a leak of gasoline from a vault near Highway 534 in Conway, WA. CTEH, LLC (CTEH) has provided health and safety and environmental sampling services to evaluate the presence of gasoline or gasoline constituents in Hill Ditch and nearby riparian and downstream waterbodies.

Subsequently, assessment and remedial activities were undertaken to delineate and remove contaminated soils to minimize future contamination of nearby freshwater waterbodies. The emergency remedial activities are currently underway and due to be completed by March 30, 2024.

At the request of the Washington State Department of Ecology (Ecology), at the conclusion of the upland remedial activities, sediment bioassay testing will be performed to assess whether the in-stream sediments adjacent to the spill site may have been negatively impacted.

1.1 Overview of Work Plan

This workplan contains information on the monitoring sites chosen for bioassay testing, sampling methodology, a description of the bioassay testing methods, and the data analysis scheme which will be used for decision making. Testing and data analysis will follow guidance outlined in the Sediment Management Standards (Chapter 137-204 WAC; SMS) and the Sediment Cleanup User's Manual (Third Revision, 2021; SCUM).

Section 2

Site Selection and Sampling Procedures

The incident site is located near Conway, Washington on the bank of a perennial stream identified as Hill Ditch (Figure 1).

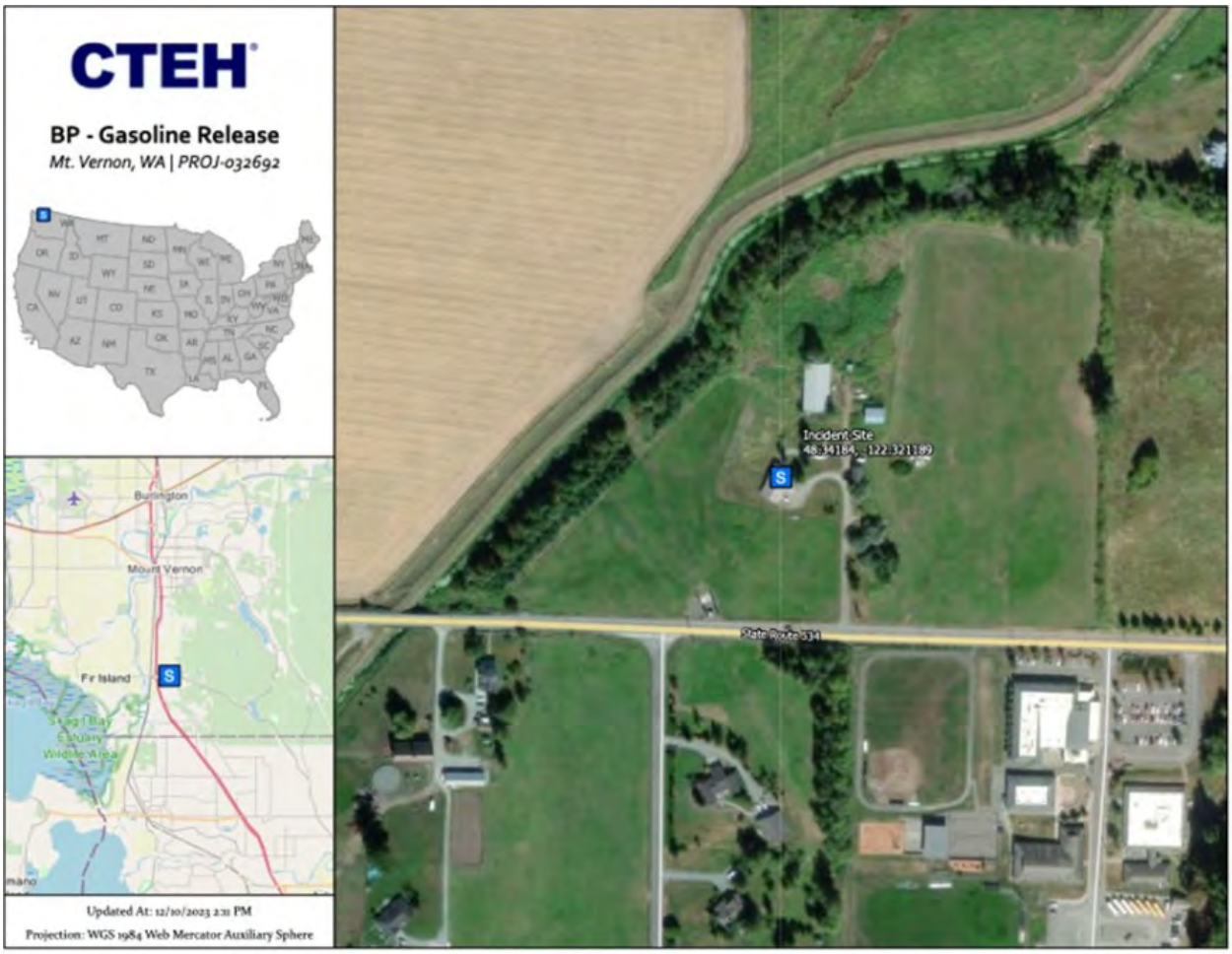

Figure 1: Aerial view of incident site

Ponar sediment sampling was undertaken after the incident along the shoreline and in the Hill Ditch waterway. Total Petroleum Hydrocarbons (TPH), Volatile Organic Compounds (VOC), including BTEX, Semi Volatile Organic Compounds (SVOCs), and metals were measured. A map of sampling locations and transects is displayed in Figure 2.

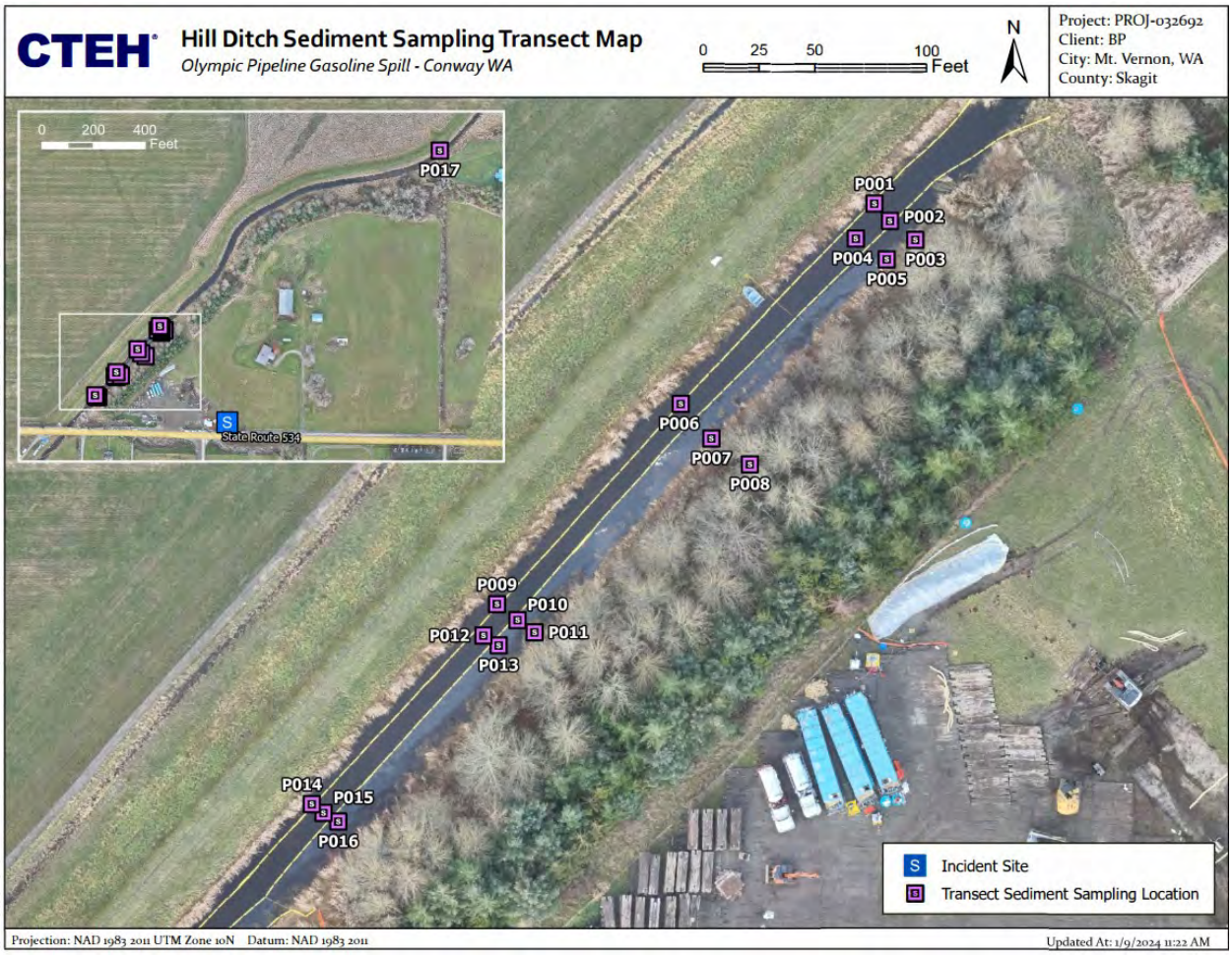

Figure 2. Sediment sampling locations in Hill Ditch

Full results of the chemical analysis performed on these sediment samples can be found in the CTEH *Olympic Pipeline Gasoline Spill Preliminary Hill Ditch Sediment (Ponar) Sampling Summary* report (CTEH, 2024; Attachment A).

In addition to the sediment sampling, soil samples have been intermittently collected from borings along the bank of Hill Ditch and the surrounding areas. An overlay of the soil boring results in terms of comparison to analyte screening levels and their colocation with the sediment ponar grabs has been provided in Figure 3.

Figure 3. Soil boring along Hill Ditch overlaid with ponar transects

The overlay shows screening level exceedances for BTEX in the soil quadrants SB-A18 and HA-A17 through HA-A12. Based on the analytical results collected from both ponar sediment sampling and soil borings, location P007 (bottom of Hill Ditch, middle of the waterway) will be selected as the sampling location for sediment to be collected and used in the bioassay exposures.

In addition to the P007 site sediment, a reference sample will also be collected for the purposes of comparison. The reference sample will be collected upstream of the spill site at P017 (Figure 2).

2.1 Sampling Procedures

In accordance with SCUM, sampling will be conducted with equipment suitable to collect sufficient volume and achieve sufficient penetration and depth. The top 10 centimeters (cm) of surface sediment will be collected and used for the bioassay tests. Sediment from each grab will be collected from the sampling device at least 5 cm away from the edge of the device to minimize the risk of contamination from any residues that remain on the sampling equipment after disinfection.

A sufficient number of sediment grabs will be collected to provide a total of 12 liters (L) of sediment per site for testing. If multiple grabs are required, sediments from each grabs will be composited into a single sediment composite in the field.

Sampling equipment will be decontaminated prior to collection by scrubbing with water and a phosphate free soap, followed by a rinse with deionized water. It is critical that the equipment is rinsed

sufficiently to avoid any detergents present in the sediment collected for bioassay testing. Sampling equipment will be decontaminated prior to sampling and between sampling sites; however, equipment will not be decontaminated between grab collections at any individual site.

A field log which includes the personnel involved in the sampling, the dates and times of collection, as well as the general weather conditions and any other relevant observations will be maintained. A sample log, which at a minimum will include: the station name, date, time, equipment, water depth and location coordinates will also be maintained. Field observations should be made that include the penetration depth, sediment color, odor, and presence of native organisms will be included. Large rocks, plant, and wood debris should be avoided and noted in the sampling log. If any deviations from the sampling plan based on field conditions are required, those will be noted.

Appropriate chain of custody will be observed throughout the sampling, transport, and eventual receipt of the samples by the testing laboratory.

2.1.1 Sediment Containers, Preservation, and Transport

Once collected and composited, sediments will be placed in 20L food grade polyethylene bags. The samples will be double bagged, with the top of each layer of bag zip tied with minimal headspace present. Both inner and outer sample bags will be labeled in indelible ink and include the site name, the collection time, and the collection date.

No chemical preservatives are to be used for sediment samples collected for bioassay testing. The samples should be immediately placed on wet ice and maintained at a temperature between 0 and 6 degrees Celsius (C) prior and during to transport to the laboratory.

The samples will be shipped to the laboratory as soon as possible following collection via overnight shipping service. Samples must be shipped packaged in a sufficient amount of wet ice to maintain the sediment at the recommended temperature of 0 and 6 degrees C during transport.

Section 3

Bioassay Testing and Data Analysis

Reference and site sediments will be evaluated using the freshwater amphipod *Hyalella azteca* (amphipod) and the freshwater midge *Chironomus dilutus* (midge). In accordance with the SMS, testing will include three toxicity test endpoints using at least two species, both an acute and a chronic test, and at least one sublethal endpoint. To that end, test exposures will include the midge 10-day mortality test (ASTM E1706-20, USEPA 2000) and the amphipod 28-day mortality and growth test (ASTM E1706-20) to assess site and reference sediments for potential impacts.

All bioassay testing will include both a negative control and a positive control. The negative control will consist of clean control sediment and the positive control will consist of a concurrent ammonium or copper chloride reference toxicant test. The site sediment and reference sediment will be tested concurrently with the same batch of test organisms and a single positive and negative control for the test batch. Summary tables of test conditions and test acceptability criteria for both bioassays are presented in Attachment B.

Prior to testing, all sediment samples will be thoroughly homogenized and sieved to either 0.5 millimeters (mm) or 1.0 mm to remove debris as well as native organisms which could interfere with test species. An aliquot of each test sediment will be centrifuged and the porewater will be analyzed

using in house benchtop measurement kits for total ammonia and total sulfides. If porewater values are found to be above species sensitivity levels, sediments may undergo twice daily water changes to purge the samples of sulfide and ammonia to remove them as confounding factors prior to testing. Purging will take place for as long as necessary to reduce the ammonia and/or sulfide concentrations to a level where toxicity related to those two constituents is not likely to occur. If only one (either the reference or P007) sample has elevated sulfide or ammonia, that sample will be purged prior to setting up the other sample so the tests can be initiated concurrently.

3.1 Data Analysis and Evaluation

Sediment test data will be analyzed using the GraphPad Prism statistical program (Version 6.05). Survival data, expressed as a proportion, will be arcsine square-root transformed prior to analysis to normalize the distribution of the data and satisfy statistical assumptions for analysis. Statistical assumptions will be evaluated prior to analysis using a Brown-Forsythe test for differences in variance and D'Agostino Pearson Omnibus test for normality. A One-Way Analysis of Variance (ANOVA) will be performed to determine if significant differences existed among mean survival of organisms exposed to test sediments relative to the lab control and reference sample. Unpaired *t*-test comparisons will be performed to identify significant differences ($p<0.05$) between the test sample and both the control and reference sample, if survival in either the test sample or reference is less than that of the control. If parametric assumptions are not met, the data will be initially tested with Kruskal-Wallis test, followed by the Mann-Whitney U-test.

In accordance with SCUM, results will be evaluated using the methodology outlined in Table 1.

Table 1- Evaluation Criteria for Freshwater Sediment Bioassays

Biological Test Endpoint	Performance Standard		Sediment Cleanup Objective (SCO)	Cleanup Screening Level (CSL)
	Control	Reference		
Hyalella azteca				
28-day Mortality	$M_C \leq 20\%$	$M_R \leq 30\%$	$M_T - M_R > 10\%$	$M_T - M_R > 25\%$
28-day Growth	$MIG_C > 0.15$ mg/individual	$MIG_R > 0.15$ mg/individual	$MIG_T / MIG_R < 0.75$	$MIG_T / MIG_R < 0.60$
Chironomus dilutus				
10-day Mortality	$M_C < 30\%$	$M_R < 30\%$	$M_T - M_R > 20\%$	$M_T - M_R > 30\%$

M=mortality; C=control; R=reference; T=test; F=final; MIG=mean individual growth at time final; mg=milligrams; all values are representative of mean performance averaged across test replicates

Both test and reference sediments will be compared to the negative control. However, to control for the possibility that test sediments may have been impacted prior to the spill event, clean up determinations will be based on comparing the performance in the test sediment (P007) to that of the reference sediment (P017). To our knowledge, neither the reference or site sediments have ever been subjected to or characterized using bioassays. Because the reference site has not been previously evaluated with bioassays, there is a possibility that it may not meet the performance standards outlined in Table 1.

If the results of the bioassay demonstrate that the test sediment, when compared to the reference sediment, fall within the SCO and CSL windows identified in Table 1, then no further action or testing will be required. If the results are above one or multiple categories outlined, further evaluation may be required.

3.2 Quality Assurance and Quality Control

Bioassay testing will be performed by Enthalpy Analytical's Environmental Toxicology and Consulting Laboratory in San Diego, California (Enthalpy). Enthalpy is an accredited bioassay laboratory by the Washington State Department of Ecology (Laboratory ID C552).

Testing will be conducted to the standards of the laboratory's internal Quality Assurance Manual and will meet or exceed the requirements of the EPA and ASTM test methods cited in the workplan.

Sediments will be tested as soon as practically possible, preferably within 2 weeks of collection. The maximum holding time for both test and reference sediments will be 8 weeks. It testing is not performed within 2 weeks of collection, sediments will be stored with zero headspace or under a nitrogen atmosphere. When not in use for testing, sediments will be stored in the dark at a temperature of 4 degrees C (+/- 2 degrees C).

If the sediment bioassay negative controls fail to meet the method specific performance standards outlined in Table 1, the tests may need to be repeated. Data will be thoroughly reviewed and evaluated to determine whether it is suitable for reporting. If the negative control meets the performance standards, regardless of the reference performance, the test will be considered valid for reporting.

The final deliverables will include a narrative report with an introduction, methods and materials, statistical analysis, results, QA/QC, and reference toxicant sections, in addition to all raw laboratory bench data and statistical outputs.

Section 4

References

State of Washington Department of Ecology, Sediment Management Standards, 2013. Chapter 173-204 WAC, Publication no. 13-09-055. Effective September 2013.

State of Washington Department of Ecology, Sediment Cleanup User's Manual (SCUM), 2021. *Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC*, Publication No. 12-09-057. Third Revision December 2021

ASTM, 2020. Standard Test Method for Measuing the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates, ASTM E1706-20

USEPA 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, EPA/600/R-99/064. March 2000.

CTEH, 2024. Olympic Pipeline Gasoline Spill Preliminary Fisher Slough Sampling Summary, PROJ-032692, January 4, 2024.

CTEH, 2024. Olympic Pipeline Gasoline Spill Preliminary Bank Sediment Sampling Summary, PROJ-032692, January 24, 2024.

CTEH, 2024. Olympic Pipeline Gasoline Spill Preliminary Hill Ditch Sediment (Ponar) Sampling Summary, PROJ-032692, January 23, 2024.

Attachment B

28-day *H. azteca* and 10-day *C. dilutus* summary test conditions and test acceptability criteria

Table 1. Toxicity Test Methodology and QA/QC Requirements for the 10-day Solid Phase Midge Larvae Toxicity Test

Test organism	Midge larvae *Chironomus dilutus* (formerly *C. tentans*)
Test organism age at initiation	7-10 days post hatch
Test duration; endpoints	10 days; survival
Test temperature	23 ± 1°C daily mean, 23 ± 3°C instantaneous limit
Photoperiod	16 hours light:8 hours dark
Light intensity	100 to 1000 lux
Test chamber	500-mL glass jar with screened drain hole
Sediment depth	2.5 cm
Overlying water volume	250 mL
Overlying water	Activated carbon filtered water
Overlying water renewal	Twice daily full volume exchanges using Zumwalt apparatus
Overlying water quality monitoring	pH, temperature, conductivity, and dissolved oxygen (DO) daily; hardness and alkalinity at test initiation and termination; total ammonia and total sulfides on Day 0 and Day 10
Number of organisms/chamber	10
Number of replicates	5, plus one surrogate test chamber for water quality readings
Feeding	Chambers fed 1 mL Tetrafin® suspension(0.60 g/100 mL) day -1 and days 7-9; 1 mL slurry (0.20 g/100 mL) days 0-3; 1 mL slurry (0.40 g/100 mL) days 4-6
Negative control	Beach sand collected from San Diego, CA; sieved through a 0.5-mm screen and rinsed with deionized water; 1 Tbsp soaked peat moss added to each chamber
Aeration	None unless DO falls below 2.5 mg/L or if sediments show rapid DO depletion during pretest equilibration; if continuous aeration is required, 2-3 bubbles per second
Test Protocol	ASTM E1706-20, EPA 600/R-99/064 (USEPA 2000) Method 100.2
Test acceptability criteria	≥ 80 percent mean control survival
Reference toxicant	Ammonium chloride; water-only exposure

cm – centimeter
°C – degrees Celsius
g **–** gram
L **–** Liter
mg – milligram
mL – milliliter
mm – millimeter
Tbsp **–** Tablespoon
USEPA – United States Environmental Protection Agency

Table 2. Toxicity Test Methodology and QA/QC Requirements for the 28-day Solid Phase Amphipod Toxicity Test

Test organism	Freshwater amphipod - *Hyalella azteca*
Test organism age at initiation	7-8 days
Test duration; endpoints	28 days; survival and growth
Test temperature	23 ± 1°C mean, 23 ± 3°C instantaneous limit
Photoperiod	16 hours light/8 hours dark
Light intensity	100 to 1000 lux
Test chamber	500-mL glass jar with screened drain hole
Sediment depth	2.5 cm
Overlying water volume	250 mL
Overlying water	Activated carbon filtered water
Overlying water renewal	Twice daily full volume exchanges using Zumwalt apparatus
Overlying water quality monitoring	pH, temperature, conductivity, and dissolved oxygen (DO) daily; hardness and alkalinity at test initiation and termination; total ammonia on Day 0 and Day 28; total sulfide on days 0 and 28.
Number of organisms/chamber	10
Number of replicates per sample	5, plus one surrogate test chamber for water quality readings
Feeding	Chambers fed 1 mL Yeast-Trout chow-Cereal leaves (YTC) daily and 1 mL Tetrafin® suspension (0.025 g/100 mL) week 1, (0.05 g/100 mL) week 2, (0.10 g/100 mL) week 3, and (0.15 g/100 mL) week 4
Negative control	Beach sand collected from San Diego, CA; sieved through a 0.5-mm screen and rinsed with deionized water
Aeration	None unless DO falls below 2.5 mg/L or if sediments show rapid DO depletion during pretest equilibration; if continuous aeration is required, 2-3 bubbles per second
Test Protocol	ASTM E1706-20
Test acceptability criteria	≥ 80 percent mean survival in control; mean dry weight in controls must be ≥ 0.35 mg/organism
Reference toxicant	Copper chloride; water-only exposure

cm – centimeter
°C – degrees Celsius
g – gram
L – Liter
mg – milligram
mL – milliliter
USEPA – United States Environmental Protection Agency

Appendix F-1

Well Water Sampling Plan

DOCUMENTATION - COVER SHEET

Olympic Pipeline Gasoline Spill Conway 12/10/23

Date: 17 December 2023

Document Control Name: Well Water Sampling Plan v.2

Prepared by: Robyn Whiteford

Preparer Role: Documentation Lead

Approvals

Responsible Party / Incident Commander	Terry Zimmerman	TZ	12/17/23 1209
	Print Name above	*Sign Above*	*Date Time*
Federal On-Scene Coordinator	Monica Tonel	Monica Tonel	12/17/2023 1207
	Print Name above	*Sign Above*	*Date Time*
Washington State On-Scene Coordinator	~~Madeline Fritzen~~ Robert Wells		12/17/23 1204
	Print Name above	*Sign Above*	*Date Time*
Local On-Scene Coordinator	Julie DeLosada/Charles Fleming	Charles Fleming	12/17/23 12:09
	Print Name above	*Sign Above*	*Date Time*
Tribal Coordinator	Shaun Beasley		12-17-2023 1458
	Print Name above	*Sign Above*	*Date Time*
Section Chief	Tony Hout	Tony Hout	18 Dec 23 1047
	Print Name above	*Sign Above*	*Date Time*
Unit Leader	Adam Tokarski		18 Dec 23 10:49
	Print Name above	*Sign Above*	*Date Time*

	Revision Record	
Change Date	Remove Insert Page Number(s)	Description of Change(s)
		This is revision 0. Describe subsequent revisions in this table.

Allen, Lisa (PROSOURCE IT)

From: Larson, Rikki
Sent: Sunday, December 17, 2023 10:58 AM
To: Allen, Lisa (PROSOURCE IT)
Subject: FW: Well Testing - need to add P
Attachments: Well+Water+Sampling+Plan.pdf

The below well, located at parcel P105575, and owned by Jeff & Amity Locken, address of 19510 State Route 534, is being added to the focus area list for well water monitoring. Homeowner states the primary use is agricultural, but the well serves as their backup water source.

From: ECY RE Spills EUL <EUL@ECY.WA.GOV>
Sent: Sunday, December 17, 2023 10:08 AM
To: Larson, Rikki <rikki.larson@bp.com>
Subject: FW: Well Testing - need to add P

> You don't often get email from eul@ecy.wa.gov. Learn why this is important

Alison Meyers, Ph.D. (she/her/hers)
Response Unit Supervisor SW Region
Spill Prevention, Preparedness, and Response Program
Washington Department of Ecology
PO Box 47775, Olympia, WA 98504-7775
Cell: 360-890-6875 | Email: alison.meyers@ecy.wa.gov

From: Stone, Joseph <Joseph.Stone@bp.com>
Sent: Sunday, December 17, 2023 10:06 AM
To: Orr, Sean (ECY) <sorr461@ECY.WA.GOV>; ECY RE Spills EUL <EUL@ECY.WA.GOV>
Subject: RE: Well Testing - need to add P

We need to add a well to the list. This is the big white farm house location across Hwy 534 from the Valve Site.

P105575
Jeff & Amity Locken
19510 State Route 534
Mount Vernon, WA 98274
360-770-2345
Amitylocken911@hotmail.com
Cell and text is best way to communicate with Amity.

They have a well not of record as it is old located near the barn. They do have city water as well.

Thanks.

Joe Stone, SR/WA
Right of Way Agent
BP Pipelines N.A. Inc.
Operating Agent for
Olympic Pipe Line Company LLC

(425) 981-2506 direct
joseph.stone@bp.com

From: Orr, Sean (ECY) <sorr461@ECY.WA.GOV>
Sent: Sunday, December 17, 2023 9:42 AM
To: Stone, Joseph <Joseph.Stone@bp.com>
Subject:

3 Scope of work

3.1 Focus Area

The current focus area, as defined in **Table 1**, includes potential well water sources within 2 a defined section of Hill Ditch. This focus area may be amended based on further understa the timeline, quantity, and site conditions at the Site. Property owners for these wells will l contacted to obtain authorized access for sampling.

Table 1: Well Locations

Address	Parcel	Description	Well or PUD	Cor
21498 Conway Hill Ln	P17005	Adjacent south of P17004	Well-AHG096	102 ft DO 122 ft., sor
21596 Snowden Place	P113276	Adjacent south of P17005	Well AGK728	87 ft DOH, 97 ft., som
21891 Cedardale Road	P17009	Near Snowden Pl & Snowden Ln Intersect	PUD-2014	Lower usa in 2022, as "well not u
21895 Cedardale Road	P16948	Near Snowden Pl & Snowden Ln Intersect	PUD 2000	High usage permit clai
19651 State Rt 534	P16711	North of school across SR 534	Well – no record	Closest to HIGH Prior
21462 Conway Hill Ln	P17004	Between Hill Ditch and Conway Hill Lane	Well – no record	
22448 Franklin Road	P17450	Snowden Pl & Cedardale	Well – no record	Short plat individual v as-built
22267 Cedardale Road	P17435	Snowden Pl & Cedardale	Well – no record	Septic as b next to dirc

Sean Orr
Spills Prevention, Preparedness and Response Program
Preparedness Planning Specialist

Email: sorr461@ecy.wa.gov
Phone (360) 280-6073

DOCUMENTATION – COVER SHEET

MP 46 Olympic Pipeline Gasoline Spill Conway 12/10/23

Date: 16 December 2023

Document Control Name: Well Water Sampling Plan

Prepared by: Robyn Whiteford

Preparer Role: Documentation Lead

Approvals

Responsible Party / Incident Commander	Terry Zimmerman		12/16/2023 1316
	Print Name above	*Sign Above*	*Date Time*
Federal On-Scene Coordinator	Monica Tonel	Monica Tonel	12/16/2023 1213
	Print Name above	*Sign Above*	*Date Time*
Washington State On-Scene Coordinator	~~Madeline Fritzen~~ Rob Walls		12/16/23 1249
	Print Name above	*Sign Above*	*Date Time*
Local On-Scene Coordinator	Julie DeLosada / Joan Cromley	Joan Cromley	12/16/23 1223
	Print Name above	*Sign Above*	*Date Time*
Tribal Coordinator	Shaun Beasley		12-16-2023 1246
	Print Name above	*Sign Above*	*Date Time*
Section Chief	Tony Hout	Tony Hout	16 Dec 23 1327
	Print Name above	*Sign Above*	*Date Time*
Unit Leader	Adam Tokarski		16/Dec/23 1405
	Print Name above	*Sign Above*	*Date Time*

	Revision Record		
Change Date	Remove Insert Page Number(s)		Description of Change(s)
			This is revision 0. Describe subsequent revisions in this table.

WELL WATER SAMPLING PLAN

Olympic Pipeline Gasoline Spill Conway 12/16/23

1 Objective

This document is intended to provide guidance for monitoring drinking water quality in the vicinity of the Olympic pipeline gasoline spill incident (Incident) near Conway, WA that occurred on December 10, 2023. In addition, guidance is also being provided for monitoring non-registered wells in the area that are assumed to be non-potable. The sampling program is intended to be developed in coordination with Olympic Pipe Line Company LLC, the Washington State Department of Ecology (Ecology), and Skagit County Public Health.

Ecology reviewed their records and Skagit County Public Health well records for the surrounding area and identified as many as four (4) potable water wells registries and potentially four (4) unregistered wells within 200 ft. of a defined section of Hill Ditch. This work plan specifies the tasks that will be conducted by Olympic Pipe Line Company to provide initial background data regarding the quality of water obtained from the water wells in the targeted area.

2 Well water sampling

Potable water samples will be collected from a tap that provides a source of cold drinking water. The tap will be opened and allowed to flow for 15 minutes prior to sample collection as described in Section 3.3.6. Sample containers provided by the laboratory will be filled directly from the tap.

Unregistered wells will be inspected to determine whether a representative water sample can be collected from it. If the well has a tap, the same method will be used as for potable water samples. If it does not have a tap, another sampling method will be considered such as bailing. The method used will be recorded on the Water Well Sampling Questionnaire and Sample Form in **Appendix A**.

It is anticipated that the following sample containers will be required:

- 2 x 40 mL Volatile Organic Analysis (VOA) bottles at each source, plus
- 3 x 40 mL HCl Volatile Organic Analysis (VOA) bottles at each source

As a leading indicator, Total Petroleum Hydrocarbons (TPH) will be analyzed using Washington State Department of Ecology field standard operating procedures (FSOPs) applying method NWTPH-Gx. It represents the product that is believed to have been released and is recommended for inclusion in the analyte list for submission of sample for laboratory analysis. Additionally, a sample for Volatile Organic Compounds (VOCs) including BTEX will be collected and held up to 14 days pending Environmental Unit review of the TPH analytical results. If the Environmental Unit determines that the VOCs including BTEX data is needed, then they will instruct the laboratory to analyze the samples using method 8260 within acceptable holding times.

The protocols established in this plan have been prepared to assist in sampling well water sources by identifying proximal water sources and the potential compounds of concern, establishing sampling procedures and a preliminary sampling schedule, and defining how results will be communicated to responding stakeholders and affected residents.

3 Scope of work

3.1 Focus Area

The current focus area, as defined in **Table 1**, includes potential well water sources within 200 ft. of a defined section of Hill Ditch. This focus area may be amended based on further understanding of the timeline, quantity, and site conditions at the Site. Property owners for these wells will be contacted to obtain authorized access for sampling.

Table 1: Well Locations

Address	Parcel	Description	Well or PUD	Comments
21498 Conway Hill Ln	P17005	Adjacent south of P17004	Well-AHG096	102 ft DOI, Screens to 122 ft., some clay
21596 Snowden Place	P113276	Adjacent south of P17005	Well-AGK728	87 ft DOH, screens to 97 ft., some clay
21891 Cedardale Road	P17009	Near Snowden Pl & Snowden Ln Intersect	PUD-2014	Lower usage since TOO in 2022; as-built labels "well not used"
21895 Cedardale Road	P16948	Near Snowden Pl & Snowden Ln Intersect	PUD-2000	High usage – septic permit claimed PUD also
19651 State Rt 534	P16711	North of school across SR 534	Well – no record	Closest to the spill. HIGH Priority
21462 Conway Hill Ln	P17004	Between Hill Ditch and Conway Hill Lane	Well – no record	
22448 Franklin Road	P17450	Snowden Pl & Cedardale	Well – no record	Short plat doc mentions individual well E of I-5/in as-built
22267 Cedardale Road	P17435	Snowden Pl & Cedardale	Well – no record	Septic as-built puts well next to ditch

Note: P17004 is a former Group B well shared with parcels P17005 and P113276. Well source was from spring.

Sampling Frequency and Duration

Potable water sampling will initially be conducted during the first week of the response. An additional round of potable water sampling will be conducted one week after the initial sampling. Non-potable water sources from unregistered wells shall also be sampled if suitable conditions exist that will allow a representative sample to be obtained.

After reviewing the water sample data, a potable water sampling frequency will be developed as needed. The sampling frequency may be revised once conditions of the release are better understood, or laboratory data indicates no impacts above criteria are detected in the groundwater. Subsequent or longer-term sampling will be further discussed and worked out with appropriate State and/or local agencies if necessary.

Private wells will be sampled at least once if provided access by the property/well owner. Additional samples will be collected if the resident/well owner will allow access and additional monitoring of their well. End points and decision criteria are presented in Table 2. If a result exceeds drinking water standards for a chemical of concern, the owner will be contacted, and multiple lines of evidence will be evaluated to determine if re-sampling is necessary prior to the next scheduled sampling event.

Table 2: Project Objectives

Investigation Question	Action
What are the analytical results from potable water at private potable well or transient public water system supply well compared to selected screening criteria for analytes that are associated with the incident (200 ft. from a defined section of Hill Ditch)? CTEH validated data and co-located data (if provided) will be reviewed. If results between CTEH and co-located samples (if provided) have an RPD (>40) that is significant, the CTEH validated data will take precedent.	If the analytical results for the compounds of concern are below the laboratory reporting limit and selected screening criteria, additional sampling may be conducted on a set frequency as warranted or recommended to discontinue. If analytical results for the compounds of concern exceed the laboratory reporting limit for an analyte associated with the incident, then the stakeholders and owner will be immediately notified, and re-sampling may be initiated based on an evaluation of all available information. In addition, bottled water may be provided for the resident.

3.1.1 EVALUATION OF DATA

If the analytical results for the compounds of concern are below the laboratory reporting limit and selected screening criteria, then additional sampling will be conducted on a schedule to be determined by the Environmental Unit until the field data indicates no risk to potable wells and any source removal is completed.

If analytical results for the compounds of concern exceed screening criteria for an analyte associated with the Incident, then the stakeholders and the well/property owner will be notified, and multiple lines of evidence will be evaluated. Re-sampling of the well will be initiated based on multiple lines of evidence, which may include, but are not limited to, co-located sample results, potential on-site sources, groundwater flow direction, nearby potable water sample results and/or monitoring well results, and other analytical and physical data from the Incident. In addition, bottled water may be provided for the resident.

3.2 Sample Locations and Access

Olympic Pipe Line's will request and obtain written access from applicable property owners prior to initiating sampling activities from the water sources identified in coordination with US EPA and Ecology.

3.2.1 PROPERTY IDENTIFICATION

Ecology and Skagit County Public Health conducted an initial search of databases for water wells within 200 ft. of the defined section of ditch. See **Table 1**.

3.3 Sample Collection and Field Activity Procedures

3.3.1 SCHEDULING

For wells selected for inclusion in the sampling program, Olympic Pipe Line Company or it's contractor will contact the owner directly to schedule sampling with the resident.

3.3.2 FIELD ACTIVITIES

The following process will be followed to collect potable water samples:

- Property surveys will be conducted as needed to the extent practicable to collect information regarding well design and usage including:
    - Water usage – potable and/or agricultural, etc.;
    - Well logs;
    - Location on property using Global Positioning System (GPS) technology, if possible. If the exact location of the well is beneath a structure or is otherwise obscured, then the nearest structure will be used as the location; and
    - Historical testing of water
- Sampling will be scheduled with property owners once access has been granted and sampling procedures have been approved by Olympic Pipe Line and regulatory agencies.

3.3.3 PREPARATION FOR FIELD ACTIVITIES

As part of field mobilization activities, the field sampling team will:

- Develop sampling list for the day in coordination with Olympic Pipe Line Company and regulatory agencies, as necessary;
- Designate a Safety Officer;
- Complete required health and safety paperwork and confirm field team members have completed required training;
- Gather appropriate PPE, including but not limited to nitrile gloves;

- Confirm sample bottles with appropriate preservatives, coolers and analyte-free deionized water are obtained, and sampling and sample arrival dates are communicated to the laboratories;
- Obtain required functional and calibrated field instruments, including health and safety equipment;
- Complete sample paperwork, including chain-of-custody forms and sample labels; and
- Obtain ice daily prior to beginning work for sample preservation.

3.3.4 WELL-OWNER QUESTIONNAIRE

If deemed necessary and relevant to site operations, a property survey may be conducted prior to the date of first sample collection or on the same date of sample collection when deemed appropriate, such as in the case of non-registered wells where no recorded information is available. The property survey will be reviewed with the well owner prior to subsequent sampling events to document any changes or additional information that may be available during those events.

The survey process will include filling out a well-owner questionnaire (**Appendix A**) with the property owner to obtain available information about the potable water source including:

- Presence of wells, springs, or cisterns;
- Well construction details as applicable (i.e., depth, construction material, installation date, etc.);
- Uses of water (irrigation, agricultural, residential, etc.) or if the well is not in use;
- Is the water treated onsite (i.e. for hardness or filtered), and which taps receive treated or untreated water;
- Septic system type and location (if present, known or identifiable) relative to well location;
- Determine if the well source has ever gone dry or if water supply is a concern;
- Water quality concerns or complaints if any; and
- Is there a water storage tank on the property and if so, tank capacity.

During the initial survey, the field technician will collect photos of the water supply system including plumbing, filtration systems that may be present, and storage tanks connected to the system. Photos will be collected of the heater and fuel storage units that may be present (i.e., heating oil tank, propane tank).

As part of the initial survey, photo documentation will be collected of the water supply (i.e., well, spring box, cistern). Details will be collected of the condition of the water supply as applicable (i.e., material, integrity, condition of the cap seal). Photos will be collected during the initial survey of the water supply and the surrounding area. During subsequent sampling events, photos will only be taken of the point of sample collection, and any changes in water supply system, heater and fuel storage units, and surrounding areas.

Once the survey is complete, a potable water sample will be collected from the property. If sampling is refused, the sampling team is unable to sample the location, or the information obtained through completing the survey is not considered relevant to response activities, the questionnaire may not be completed.

3.3.5 SAMPLING METHODS AND PROCEDURES

Potable water sampling will be completed in general accordance with the Washington State Department of Ecology analytical method NWTPH-Gx. The wells will be sampled using a method to collect valid and representative samples from a well water supply, as described in the SOPs.

3.3.5.1 Field Equipment Description, Testing/Inspection, Calibration and Maintenance

Field equipment will be inspected, tested, and calibrated daily (as applicable) prior to initiation of fieldwork by field sampling personnel and, if necessary, repairs will be made prior to equipment use. If equipment is not in the proper working condition, that piece of equipment will be repaired prior to use or taken out of service and replaced.

3.3.5.2 Field Documentation

Field documentation associated with investigation activities will be recorded on either digital or paper field forms and using geographic information system (GIS)/GPS documentation, when appropriate.

3.3.5.3 Field Logs

Field observations and measurements will be recorded and maintained on days that samples are collected to document field activities, including sample collection and management. Field observations and measurements will be recorded on paper and/or digital form. Deviations from applicable work plans will be documented in the field forms during sampling and data collection operations.

3.3.5.4 Chain-of-Custody Forms

Samples will have chain-of-custody (COC) forms, shipping documents, and sample logs prepared and retained. Field Quality Control (QC) samples will be documented in both the field forms and on sample COC forms. COC forms will be reviewed daily for completeness and a QC check of samples in each cooler compared to sample identifications (IDs) on the COC form.

3.3.5.5 Photographs

Photographs of field activities will also be used to document the field investigation. A photo log will be developed, and each photo in the log will include the location, date taken, and a brief description of the photo content.

3.3.5.6 Water Sampling Forms

A water sample collection form will be used to document sampling activities including but not limited to description of the sampling location, location of water treatment (before or after sample location), water purging duration, water quality parameter measurements, color or odor, and other observations.

3.3.5.7 Co-located Sampling

Co-located sampling may be conducted when sampling is concurrent with other agencies. Co-located sampling is when two sampling teams collect two individual sample sets from the same location, with the second sample set being collected after the first sample set is complete. This can result in a gap in sample time between the two sample sets. The samples will be submitted to separate laboratories.

3.3.6 GENERAL SAMPLING PROCEDURES

Prior to sampling, a 15-minute purge will be conducted in general accordance with the USEPA test methods and USEPA Potable *Water Supply Sampling* (ASBPROC-305-R4, 2019) protocols (**Appendix B**). If available, a multi-parameter meter will be used to record conventional water parameters at the sampling point. Water quality measurement instruments will be calibrated and used in accordance with manufacturer recommendations. Conventional field parameters to be measured include:

- Dissolved Oxygen (milligrams per Liter, mg/L);
- Oxidation Reduction Potential (millivolts, mV);
- pH (Standard Units);
- Specific Conductance (microSiemens per centimeter [µS/cm];
- Temperature (degrees Celsius, °C); and
- Turbidity (Nephelometric Turbidity Units, NTUs).

The sampling point will be selected from within the water piping system as close to the wellhead as possible but prior to the addition of water softeners, filters, treatment systems, and holding tanks when possible. If a sample cannot be collected prior to a water treatment device, the type of treatment device will be documented in the sampling form. Aerators and screens/fixtures attached to the faucet will be removed prior to sampling. The system will be purged by allowing cold water to run for at least 15 minutes. During purging, three sets of field parameters will be collected within the 15-minutes. If field measured water quality parameters have not stabilized after 15 minutes of purging, the sampler will document the condition, record the final field parameter values, and collect a sample.

The appropriate bottles for each analysis will be filled, labeled, documented, packaged, and shipped in accordance with industry standards and this document. A list of the sampling analyses and bottles is provided in **Table 3.**

Table 3: Water Sampling Parameters

Parameter	Method	Bottles	Hold Time
VOCs	NWTPH-Gx	2 – 40ml VOAs (ascorbic acid)	14 days
VOCs inc. BTEX	US EPA 8260	3 – 40 mL HCl VOAs (ascorbic acid)	14 days

[1] Addition of hydrochloric acid during sampling

3.3.6.1 Water Sampling from a Tap

Water samples will be collected directly from a faucet or pipe valve, with screens/fixtures removed or from the screenless/fixtureless faucet directly into laboratory-supplied bottle ware. If necessary, clean high- density polyethylene (HDPE) tubing can be connected to the tap/faucet to facilitate filling the bottles. The tubing will be connected to the tap/faucet via a properly decontaminated adapter with a ribbed nipple that will be screwed on the faucet outlet, if needed. The sample will be collected at the indoor or outdoor tap closest to the wellhead, prior to water treatment devices. If a sample cannot be collected prior to a water treatment device, then the type of treatment device will be documented in the sampling form.

3.3.7 SAMPLE PRESERVATION AND HANDLING

Samples intended for laboratory analysis will follow the procedures in this section for sample preservation and handling. Once each sample container is filled, the lid will be secured, and each sample container will be checked to ensure that it is sealed, labelled legibly, and externally clean. No custody seals will be placed on individual sample bottles. Sample containers will be packaged in a manner as to prevent breakage during shipment.

If sample coolers are being shipped directly to the laboratory, coolers will be prepared for shipment by taping the cooler drain shut (if present) and lining the bottom of the cooler with packing material or bubble wrap and a large plastic liner. Sample containers will be placed in the cooler in an upright position. Small uniformly sized containers will be stacked in an upright configuration and packing material will be placed between the layers. Plastic containers will be placed between glass containers where possible. Ice will be placed around and among the sample containers to cool samples to 4 (±2) degrees Celsius (°C) during shipment. The cooler will be filled with additional packing material to secure the containers.

The original COC form will be placed in a re-sealable plastic bag taped to the inside lid of the cooler. A copy of the COC form will be retained with the sampling form in the project files. The total number of coolers required to ship the samples will be recorded on the COC form. If multiple coolers are required to ship samples contained on a single COC form, then the original copy will be

placed in cooler one of X with copies (marked as such) placed in the additional coolers. Two signed and dated custody seals will be placed on the cooler lid. Packing tape (i.e., strapping tape) will be wrapped around the cooler to secure the sample shipment.

If the coolers are being picked up by the laboratory courier, the procedures above will be followed, except for the custody seals on the cooler lid. Custody seals will not be placed on cooler when being picked up by a laboratory courier.

Upon receipt of the samples, the analytical laboratory will open the cooler and will sign "received by laboratory" on each COC form. The laboratory will verify that the custody seals (if present) have not been previously broken. The laboratory will note the condition and temperature of the samples upon receipt and will identify discrepancies between the contents of the cooler and COC form. If there are discrepancies, the laboratory project manager will immediately call the sampling team lead to resolve the issue and note the resolution on the laboratory check-in sheet.

3.3.8 EQUIPMENT DECONTAMINATION PROCEDURES

Equipment decontamination will be performed for non-dedicated sampling equipment and instruments that come in contact with the potable water to prevent cross-contamination.

Decontamination activities will be performed away from sampling areas. Decontamination of non-disposable sampling equipment or instruments can be performed using water and Liquinox® or other appropriate non-phosphatic detergent in 5-gallon buckets. Following decontamination, fluids will be disposed in accordance with Section 4.3.9.

Decontamination of sampling equipment and instruments (i.e., water quality cups/probes etc.) will be prior to use and between sampling locations. Decontamination activities will be documented in the field notes.

3.3.9 WASTE MANAGEMENT

Investigation derived waste (IDW) generated during implementation of this Plan may include, but is not limited to:

- Personal Protective Equipment;
- Decontamination fluids; and
- General trash.

IDW will be handled in accordance with the waste management plan, and local, state, and federal regulations. Transportation and disposal of IDW will be coordinated with Olympic Pipe Line and Incident Command Center personnel.

3.4 Sample Analyses

Potable water samples will be analyzed for the analytes listed in **Table 3**. Analytes have been selected to be representative of chemicals released from the incident and standard volatile organic compounds.

3.5 Quality Assurance/Quality Control objectives

The following sections provide details regarding quality assurance/quality control (QA/QC) requirements specific to the potable water sampling.

The Data Quality Objectives (DQOs) process is a tool employed during the project planning stage to make sure that data generated from an investigation are appropriate and of sufficient quality to address the investigation objectives. The Environmental Unit Leader considered key components of the DQO process in developing investigation-specific work plans to guide the data collection efforts for the investigation.

3.6 Quality Control Checks

QA/QC samples will be collected during sampling activities including: equipment rinsate blanks, field duplicate samples, matrix spike/matrix spike duplicate (MS/MSD) samples, and field blanks. Criteria for the number and type of QA/QC samples to be collected are specified below and summarized in **Table 4**.

Field Duplicate Samples – One blind duplicate sample will be collected for every 10 samples or a minimum of one per matrix per sampling event. Duplicate samples will be prepared as blind duplicates and will be collected in two sets of identical, laboratory-prepared sample bottles. The primary and duplicate samples will be labelled as detailed in **Table 4**. Sample identifier information (i.e., sample times) will not be used to identify the duplicate samples. Actual sample identifiers for duplicate samples will be noted in the sampling form. The duplicate sample will be analyzed for the same parameters as the primary sample.

Trip Blank – One trip blank will be included in each cooler with VOC samples. A trip blank is a blank solution that is put in the same type of bottle used for VOC sampling and is kept with the set of sample bottles both before and after sample collection.

MS/MSD Samples – A sufficient volume of sample will be collected for use as the MS/MSD. MS/MSD samples will be collected to allow matrix spike samples to be run to assess the effects of matrix on the accuracy and precision of the analyses. One MS/MSD sample will be analyzed for every 20 groundwater samples collected or a minimum of one per sampling event. The MS/MSD sample will be analyzed for the same analytes as the primary sample, with the exception of parameters that are not amenable to MS/MSD. Laboratory duplicate analyses will be performed in

lieu of MS/MSD for parameters not amenable to spiking. At each location that an MS and MSD sample is being collected, two additional sets of bottles will be collected (three total bottle sets at that location).

Equipment Blanks (Rinsate Blanks) – One equipment (rinsate) blank will be collected a minimum of once per sampling event, when non-dedicated equipment is used. The equipment blank will be collected by pouring organic-free deionized water into or over the decontaminated sampling equipment (e.g., groundwater pump), then into the appropriate sample containers. The time and location of collecting the equipment will be noted in the Daily Field Activity Log. The sample will be analyzed for the same analytes as the sample collected from the location where the equipment blank is prepared. For PFAS sampling PFAS free water will be used for equipment blanks.

Field Blank Samples - One field blank per day for each sampling activity/event will be collected using organic-free water provided by the laboratory. Field blanks are used to assess the potential for cross- contamination of aqueous samples during sampling activities due to ambient conditions. It is also used to validate the cleanliness of sample containers. Field blank collection is recommended if known or suspected sources of contamination are located within close proximity to the sampling activities.
Laboratory supplied deionized water is utilized for field blank samples.

Table 4 Field Quality Control Sample Frequency

Field QC Sample	Acronym	Groundwater Frequency
Field Duplicate (blind)	DUP	1 per 10 samples or a minimum of one per matrix per sampling event.
Trip Blank	TB	1 per cooler containing VOC samples
Matrix Spike/Matrix Spike Duplicate	MS/MSD	1 per 20 samples or a minimum of one per matrix per sampling event.
Field Blank	FB	1 per day of sampling activity
Equipment Rinsate Blank	EB	1 per sampling event and prior to deploying/redeploying dedicated sample pumps

Notes: VOC - Volatile Organic Compounds; MS/MSD - Matrix Spike/Matrix Spike Duplicate

3.6.1 SAMPLE LABELS AND IDENTIFICATION SYSTEM

Sample IDs will be recorded on sample container labels, custody records, and field documents. Each sample container will have a sample label affixed and secured with clear package tape as necessary to ensure the label is not removed. Information on sample labels will be recorded in waterproof, non- erasable ink.

Water well samples collected for laboratory chemical analysis will be labelled as follows:

- Two-letter prefix describing the sampling program:
    - PW for Private Residential Wells sampling
        - Sample location ID
        - One-letter designation if multiple wells exist on a property (A-
- Date as YYYYMMDD

QA/QC sample nomenclature will utilize the acronyms in **Table 4**.

Examples:

PW-001-20231001 – this is a private well sampled on October 1, 2023

PW-001A-20231001 – More than one well exists on the property. This is one private well on the property sampled on October 1, 2023

PW-001B-20231001 – More than one well exists on the property. This is a second private well on the property sampled on October 1, 2023

PW-DUP-001-20231001 – this is a field Duplicate sample collected on October 1, 2023

PW-DUP-002-20231001 – this is a second field duplicate sample collected on October 1, 2023

4 Data Evaluation and Reporting

The results of the potable water sampling analysis will be reviewed following data validation and compared to selected screening screening levels derived from the USEPA Maximum Contaminant Levels (MCLs) in units of micrograms per liter (ug/L). MCLs are based on the US EPA Regional Screening Levels for Tapwater Table (TRI=1E-06, HQ=1) May 2023. For analytes without a published MCL value, the results will be compared to the Ecology's Residential Drinking Water Criteria – Table 1 – Groundwater: Residential and Non Residential (Part 201 Generic Cleanup Criteria and Screening Levels) and the USEPA Regional Screening Levels (RSLs) for carcinogenic ingestion and non-Cancer ingestion for children.

A summary of the selected screening criteria for the potential COPCs is presented in **Appendix C**. A report of all sampling events will be provided to Olympic Pipe Line Company, US EPA, and Ecology.

For private potable water wells, letters, supplemented by verbal communications will be used to provide owners with the analytical results from their respective water sources.

APPENDIX A

FIELD FORMS

Water Well Sampling Questionnaire and Sample Form

Well ID: _____ Date: _____ Time: _____

Weather: _____ Staff: _____

Well Survey

Name of person(s) interviewed: _____

Contact info of person(s) interviewed (phone, email, etc.): _____

Location/Address: _____

_____

Well use (drinking water, watering lawn/agriculture, nothing, etc.): _____

Well construction information (if known)

Location (part of property, etc.) _____

_____

Date installed: _____ Driller: _____ Depth: _____

Surface Casing materials/construction (circle): PVC Steel Other

If other, describe: _____

Is a well liner present (circle) Yes No

Pump Intake Depth: _____ Type of pump: Submersible Jet Other

If other describe: _____

Are copies of well records available from the homeowner? Yes No

Is a holding tank present? Yes No Tank Capacity (gal): _____

Is the water treated? Yes No

If yes, where is the treatment system: _____

Describe system: _____

Which taps affected: _____

Sketch of water distribution system from entry point, filter, etc. Indicate sample collection point.

Signature: _____ Date: _____

POTABLE WATER SAMPLING QUESTIONNAIRE AND SAMPLING FORM

LOCATION ID:

OBSERVATIONS:

FIELD TESTING EQUIPMENT: MAKE MODEL SERIAL NUMBER

Time	pH	Temp (°C)	Spec. Cond. (mS/cm)	D.O. (mg/L)	ORP (mV)	Turbidity (NTU)	Color	Other

SAMPLE LOCATION: _____

ESTIMATED FLOW RATE: _____ PURGING DURATION: _____

SAMPLE ID	CONTAINER TYPE	NO. CONTAINERS	ANALYSIS	DATE	TIME
	1L Amber	2	[1]SVOCs (8270)		
	40 mL VOA	3	[2]VOCs (524.2)		
	125 ml Plastic	1	[3]Metals (200.8)		

[1]NO ADDED PRESERVATIVE

[2]ASCORBIC + HYDROCHLORIC ACID PRESERVATIVE

[3]NITRIC ACID PRESERVATIVE

SIGNATURE: _____ DATE: _____

POTABLE WATER SAMPLING QUESTIONNAIRE AND SAMPLING FORM

DUPLICATE | **LOCATION ID:**

OBSERVATIONS:

FIELD TESTING EQUIPMENT: **MAKE** **MODEL** **SERIAL NUMBER**

Time	pH	Temp (°C)	Spec. Cond. (mS/cm)	D.O. (mg/L)	ORP (mV)	Turbidity (NTU)	Color	Other

SAMPLE LOCATION: _____

ESTIMATED FLOW RATE: _____ **PURGING DURATION:** _____

SAMPLE ID	CONTAINER TYPE	NO. CONTAINERS	ANALYSIS	DATE	TIME
	1L Amber	2	[1]SVOCs (8270)		
	40 mL VOA	3	[2]VOCs (524.2)		
	125 ml Plastic	1	[3]Metals (200.8)		
	1L Amber	2	[1]SVOCs (8270)		
	40 mL VOA	3	[2]VOCs (524.2)		
	125 ml Plastic	1	[3]Metals (200.8)		

[1]NO ADDED PRESERVATIVE

[2]ASCORBIC + HYDROCHLORIC ACID PRESERVATIVE

[3]NITRIC ACID PRESERVATIVE

SIGNATURE: _____ **DATE:** _____

POTABLE WATER SAMPLING QUESTIONNAIRE AND SAMPLING FORM

MS/MSD

LOCATION ID:

OBSERVATIONS:

FIELD TESTING EQUIPMENT: MAKE MODEL SERIAL NUMBER

Time	pH	Temp (°C)	Spec. Cond. (mS/cm)	D.O. (mg/L)	ORP (mV)	Turbidity (NTU)	Color	Other

SAMPLE LOCATION: _____

ESTIMATED FLOW RATE: _____ PURGING DURATION: _____

SAMPLE ID	CONTAINER TYPE	NO. CONTAINERS	ANALYSIS	DATE	TIME
	1L Amber	2	[1]SVOCs (8270)		
	40 mL VOA	3	[2]VOCs (524.2)		
	125 ml Plastic	1	[3]Metals (200.8)		

[1]NO ADDED PRESERVATIVE

[2]ASCORBIC + HYDROCHLORIC ACID PRESERVATIVE

[3]NITRIC ACID PRESERVATIVE

SIGNATURE: _____ DATE: _____

POTABLE WATER SAMPLING QUESTIONNAIRE AND SAMPLING FORM

Field Blank

LOCATION ID:

OBSERVATIONS:

FIELD TESTING EQUIPMENT: MAKE MODEL SERIAL NUMBER

Time	pH	Temp (°C)	Spec. Cond. (mS/cm)	D.O. (mg/L)	ORP (mV)	Turbidity (NTU)	Color	Other

SAMPLE LOCATION:

ESTIMATED FLOW RATE: PURGING DURATION:

SAMPLE ID	CONTAINER TYPE	NO. CONTAINERS	ANALYSIS	DATE	TIME
	1L Amber	2	[1]SVOCs (8270)		
	40 mL VOA	3	[2]VOCs (524.2)		
	125 ml Plastic	1	[3]Metals (200.8)		
	1L Amber	2	[1]SVOCs (8270)		
	40 mL VOA	3	[2]VOCs (524.2)		
	125 ml Plastic	1	[3]Metals (200.8)		

[1]NO ADDED PRESERVATIVE

[2]ASCORBIC + HYDROCHLORIC ACID PRESERVATIVE

[3]NITRIC ACID PRESERVATIVE

SIGNATURE: DATE:

APPENDIX B

Potable Water Supply Sampling SOP
(ASBPROC-305-R4)

Region 4 U.S. Environmental Protection Agency Laboratory Services and Applied Science Division Athens, Georgia	
Operating Procedure	
Title: **Potable Water Supply Sampling**	ID: **ASBPROC-305-R4** (Formerly SESDPROC-305)
Issuing Authority: Chief, Applied Science Branch	
Effective Date: June 11, 2019	

Purpose

This document describes general and specific procedures, methods and considerations to be used and observed when collecting samples from public and private potable water supplies.

Scope / Application

When collecting water samples from a "Potable Water Supply," the primary objective is to characterize the quality of the drinking water system. Sampling may be done for a variety reasons including assessing the safety and potability of the supply for both regulated and unregulated contaminants, or to assist in determining the source of any contamination that might have reached the system. Whenever health-based levels of contaminants are exceeded in potable water supply samples, the operators and/or users of the drinking water system need to be notified as soon as the finalized data is available.

An investigation often targets a specific analyte or group of analytes. Sampling protocols designed to meet the needs of the investigation's data quality objectives need to be used and detailed in the site-specific Sampling and Analysis Plan. For example, an investigation's objective might be to simulate worst-case conditions, so the sample design would include sampling the initial flush of water from the pipes.

EPA's National Primary Drinking Water Regulations (NPDWRs) are legally enforceable primary standards and treatment techniques that apply to public water systems by limiting the levels of contaminants in drinking water. When a public drinking water supply is being monitored for compliance with the NPDWRs, approved "drinking water" analytical methods are required. However, there are cases when using alternative analytical methods, such as EPA SW-846 methods, may be more appropriate. An example of using a non-drinking water method is when monitoring residential wells near a Superfund site where the homes have been provided an alternate drinking water source.

The procedures contained in this document are to be used by field personnel when collecting and handling potable water supply samples in the field. On the occasion that LSASD field personnel determine that any of the procedures described in this procedure are inappropriate, inadequate or impractical, and that another procedure must be used to obtain a potable water supply sample, the variant procedure will be documented in the field logbook, along with a description of the circumstances requiring its use.

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1.0 General Potable Water Sampling Guidance

1.1 Site Access / Owner Information

Before collecting samples from potable water supplies, permission from the property owner or resident is required. The Program Office requesting LSASD's assistance is responsible for obtaining site access prior to the field sampling investigation.

Applied Science Branch (ASB) staff are required to obtain the following information when collecting samples of potable drinking water:

- the name(s) of the resident(s), property owner or water supply operator
- the exact physical address of the sampling location
- the exact mailing address (if different from the physical address)
- the resident's / operator's home, work and mobile telephone numbers (when available)

The above information is required so the residents or water supply owner / operators can be informed of the analytical results of the sampling. Immediately upon receipt of potable water analytical data, Branch personnel shall carefully examine the results for the presence of contaminants that exceed NPDWR standards or other health advisory levels. If there are exceedances of health advisories, or of primary or secondary drinking water standards, the ASB Chief and the requesting program's Branch Chief should be immediately notified.

1.2 Laboratory Coordination

Collecting samples from residential potable wells or public drinking water supplies require close coordination with the laboratories conducting the analyses to ensure that data quality objectives are met. If a contract laboratory is used, the Project Leader should determine if a National Environmental Laboratory Accreditation Program (NELAP) certified Drinking Water laboratory is required along with the appropriate documentation for data verification and validation.

NPDWR standards and treatment techniques protect public health by limiting the levels of contaminants in drinking water. The types of regulated contaminants include microorganisms, disinfectants, disinfectant by-products, inorganic and organic chemicals, and radionuclides. Because of the types and numbers of contaminants of interest, there are many different tests and analytical methods used to quantify them. Due to the number of laboratories and instruments conducting various drinking water analyses, it is critical to closely coordinate with the laboratory conducting the analyses for all details of the potable water supply sampling. These details include sample containers, container filling, sample

volume, preservatives, dechlorination agents, holding times, sample handling procedures, and quality control samples.

Table 1 provides some of the common drinking water methods along with LSASD's capabilities and sample collection details. Since analytical methods and standard operating procedures are continuously revised, the Project Leader should verify that the version of the standard(s) is current prior to sampling.

1.3 Potable Water Sample Site Selection Considerations

- Taps selected for sample collection should be supplied with water from a service pipe connected directly to a water main in the segment of interest.
- Whenever possible, choose the tap closest to the water source, and prior to the water lines entering the residence, office, building, etc., and prior to any holding or pressurization tanks.
- The sampling tap must be protected from exterior contamination associated with being too close to a sink bottom or to the ground where contaminants may splash into the sample containers. Additionally, there must be adequate clearance so that the sample container does not touch the faucet, which is a potential source of contamination. If the tap is too close to the ground for direct collection into the appropriate container, it is acceptable to use a smaller container to transfer sample to a larger container. The smaller container should be made of similar material as the large container and should be pre-cleaned to the same standards.
- Leaking taps that allow water to discharge from around the valve stem handle and down the outside of the faucet are a potential source of contamination and should be avoided.
- Disconnect any hoses, filters, or aerators attached to the tap before sampling. In addition to these devices ability to alter the water chemistry, they can harbor a bacterial population if they are not routinely cleaned or replaced.
- Taps where the water flow is not constant should be avoided because temporary fluctuation in line pressure may cause clumps of microbial growth that are lodged in a pipe section or faucet connection to break loose. A smooth flowing water stream at moderate pressure (without splashing) should be used.
- The sample should be collected without changing the water flow. It may be appropriate to reduce the flow for the volatile organic compounds aliquot to minimize sample agitation.
- When both hot-water and cold-water taps are present at a proposed location, sample the cold-water tap.
- When the investigation's objective allows it, outside taps are more practical and efficient to sample than interior residential kitchen or bathroom faucets.
- Sampling outside taps during heavy precipitation or dusty conditions should be avoided.

Table 1. EPA's Region 4 Laboratory Services and Applied Science Division (LSASD) Capabilities for Drinking Water Methods

Analysis	Drinking Water Method	LSASD can analyze	Container	Preservative	Dechlorination	Holding Time	Filling	Ice
Total Residual Chlorine	SM4500-CL G-2011	In-situ	Glass vial	None	None	In-situ	Neck of container	N/A
Total / free chlorine test strips	various manufactures	In-situ	Plastic	None	None	In-situ	Neck of container	N/A
Nitrate (as N)	353.2	Yes	Plastic (2)	Sulfuric acid	None	28 days	Neck of container	<4° C
Nitrite (as N)	353.2	Yes	Plastic (2)	None	None	48 hours	Neck of container	<4° C
Total Oragnic Carbon	SM 5310	Yes	Glass / plastic	Sulfuric acid	None	28 days	Neck of container	<4° C
Metals	200.7 rev 4.4/ 200.8	Yes	Plastic - wide mouth	Nitric acid	None	6 mos	Neck of container	<4° C
Mercury	200.8 / 245.1	Yes	Plastic - wide mouth	None	None	28 days	Neck of container	<4° C
Fluoride	300.0	Yes	Plastic - wide mouth	None	None	28 days	Neck of container	<4° C
Bromide	300.0	Yes	Plastic - wide mouth	None	None	28 days	Neck of container	<4° C
Semi-Volatile Organic Compounds / Pesticides	525.2	Yes	Amber glass	Hydrochloric Acid	Sodium sulfite	14 days to extract, followed by 30 days	Neck of container	<4° C
Volatile Organic Compounds	524.4	Yes	40 ml glass vials	Maleic acid	Abscorbic acid	14 days	Zero headspace	<4° C
Total Trihalomethanes	524.4	Yes	40 ml glass vials	Maleic acid	Abscorbic acid	14 days	Zero headspace	<4° C
Haloacetic Acids (HAAs)	552.3	No	Amber glass	Ammonium chloride	None	14-28 days	Neck of container	<4° C
per&polyfluoroalkyl substances (PFAS)	537	No	250 ml polyproylene	None	Trizma	14-28 days	Neck of container	<10° C
Total coliform / E. coli	SM 9223 B-2004	No	Sterile plastic	None	Sodium thiosulfate	8 - 30 hours	100 ml line or neck	<10° C

Analyzing water samples using Drinking Water methods are non-routine analyses for the LSASD laboratory. Therefore, Drinking Water methods shall be specified when the project is scheduled with the lab and on the chain-of-custody when the samples arrive at the custody room.

1.4 Special Sampling and Handling Precautions

- A clean pair of new, non-powdered, disposable gloves shall be worn each time a different location is sampled, and the gloves should be donned immediately prior to sampling. The gloves should not come in contact with the media being sampled and should be changed any time during sample collection when their cleanliness is compromised.
- Samplers should be careful when handling acids and other preservatives and take necessary precautions by wearing gloves and eye protection.
- Do not rinse the bottle containing the preservatives or dechlorination agents before it is filled and avoid overfilling the container during the sampling process.
- During sample collection, make sure that the tap or spigot does not contact the sample container.
- Samples collected in zero-headspace vials (i.e. volatile organic analysis (VOA), or total trihalomethanes (TTHMs)) must not have any headspace (see Section 1.5). All other sample containers must be filled with an allowance for ullage. Some sample containers may have designated fill lines that indicate how much sample should be placed in them.
- All samples requiring preservation must be preserved as soon as practically possible, immediately after sample collection is ideal. Adequate mixing should be conducted to thoroughly mix the preservative with the sample.
- Samples requiring reduced temperature storage should be placed on ice immediately.

1.5 Specific Analyte Requirements

- VOAs and TTHMs: Samples should be collected with as little agitation or disturbance as possible. The vial should be filled so that there is a meniscus at the top of the vial and absolutely no bubbles or headspace should be present in the vial after it is capped. After the cap is securely tightened, the vial should be inverted and tapped on the palm of one hand to see if any undetected bubbles are dislodged. If a bubble or bubbles are present, the vial should be topped off using a minimal amount of sample to re-establish the meniscus. Care should be taken not to flush any preservative out of the vial during topping off. If, after topping off and capping the vial, bubbles are still present, a new vial should be obtained, and the sample re-collected.
- Biological Contaminants: Sample containers are sterile, so care must be taken not to contaminate the bottle or cap. Once the distribution line is flushed and the flow reduced, quickly open the container. DO NOT set the cap down and hold the cap by its outside edges only. Fill the sample bottle to just above the 100 mL line (leaving headspace) before promptly capping.
- Lead and Copper Rule Compliance Samples: Select a cold-water faucet for sampling which is free from devices that are designed to change the water

composition, such as water softeners or point of use filters. DO NOT remove any screens or aeration devices. If you are collecting a first-flush sample for lead/copper, allow the water to sit undisturbed in the water line for at least six hours. DO NOT intentionally flush the water line before the start of the six-hour period. Place a wide-mouth 1 L container under the faucet. Open the faucet and collect the first water out of the tap (initial flush). For more detailed sampling instructions, refer to the EPA's "Clarification of Recommended Tap Sampling Procedures for Purposes of the Lead and Copper Rule" at: https://www.epa.gov/sites/production/files/2016-02/documents/epa_lcr_sampling_memorandum_dated_february_29_2016_508.pdf.

1.6 Dechlorination Agents

Potable water samples that have been treated with chlorine require the addition of dechlorination agents for certain parameters to remove free chlorine and prevent analytical interference. ASB staff can check for the presence of chlorine in the potable water while they are in the field. Maleic acid is used to dechlorinate the samples being analyzed for Volatile Organic Compounds (VOCs) and THHMs. Sodium sulfite is used to dechlorinate the samples being analyzed for Semi-Volatile Organic Compounds. Sodium thiosulfate is used to dechlorinate samples being analyzed for bacteriological contaminants, and Trizma® is used to dechlorinate samples being analyzed for per & polyfluoroalkyl substances (PFAS). The laboratory conducting the analyses will be able to provide the correct dechlorination agent for the specific analysis of concern.

2.0 Flushing / Purging of Potable Water Supplies

1.1 Initial Flush, Flushing and Purging Goals

The objective of a study will determine how long to flush or purge a potable water supply, or if a stagnation period, where the potable water in the system is not used for a specific time, is required. Public health is paramount when sampling drinking water supplies and should always dictate the sample design. In general, flushing and purging are conducted to obtain representative samples of the potable water supply while a stagnant period followed by sampling the initial flush is used to collect samples representative of the potable water supply with contributions from the distribution system. It is important to note that longer flush / purge times may yield more representative samples of the water supply, but it may not be protective of the public consuming the potable water. People do not usually pour a glass of water after flushing their faucet for 15 minutes.

The sampling investigation objective(s) should be detailed in a site-specific Sampling and Analysis Plan along with the sampling and flushing / purging protocols; sample initial flush, sample after a designated flush period (i.e. 5 minutes), or sample after water quality parameters of the water supply stabilize.

1.2 Flushing and Purging Adequacy

Flushing is a term associated with municipal drinking water, whereas purging is more associated with residential and monitoring well sampling. Both are done to remove stagnant water in lines immediately prior to sampling. To determine when an adequate flush or purge has occurred, field investigators should monitor the water quality parameters such as temperature, pH, specific conductance and turbidity of the water removed during purging. For potable water supply sampling, it is recommended to purge the system until field quality parmeters are stabilized with the turbidity below five Nephelometric Turbidity Units (NTUs). Stabilization criteria for temperature, pH and specific conductance are for at least three consecutive measurements with the temperature constant (± 0.1° C), the pH remains constant (± 0.1 Standard Units) and the specific conductance varies no more than approximately five percent. If the parameters have not stabilized after 15 minutes, it is at the discretion of the project leader whether to collect a sample or to continue purging.

3.0 Potable Residential Well Sampling

3.1 Potable Well Sample Tap or Spigot

Ideally, the sample should be collected from a tap or spigot located at or near the well head or pump house and before the water supply is introduced into any storage tanks or treatment units. If the sample must be collected at a point in the water line beyond pressurization or holding tank, a sufficient volume of water should be purged to provide a complete exchange of fresh water into the tank and at the location where the sample is collected. If the sample is collected from a tap or spigot located just before a storage tank, spigots located inside the building or structure should be turned on to prevent any backflow from the storage tank to the sample tap or spigot. It is generally advisable to open several taps during the purge to ensure a rapid and complete exchange of water in the tanks.

3.2 Stabilization for Potable Wells

During the purge period, obtain at least three sets of readings as follows: after purging for several minutes, measure the temperature, pH, specific conductivity and turbidity of the water. Continue to measure these parameters to assess for stabilization. After three sets of stabilized readings have been obtained, samples may be collected. If stabilization has not occurred after the 15-minute purge period, it is at the discretion of the project leader to collect the sample or continue purging and monitoring the parameters. This would depend on the condition of the system and the specific objectives of the investigation.

3.3 Potable Well Sample Collection

Samples should be collected following purging from a valve or cold water tap as near to the well as possible, preferably prior to any storage / pressure tanks or physical / chemical treatment system that might be present. Remove any hose that may be present before sample collection and reduce the flow to a low level to minimize sample disturbance, particularly with respect to volatile organic compounds. Samples should be collected directly into the appropriate containers. It may be necessary to use a secondary container, such as a clean 8 oz. (or similar size) sample jar or a stainless-steel scoop, to obtain and transfer samples from spigots with low ground clearance. All measurements for temperature, pH, specific conductance and turbidity should be recorded at the time of sample collection.

4.0 Public Water Supply Sampling

Samples should be collected directly into the appropriate containers. It may be necessary to use a secondary container, such as a clean 8 oz. (or similar size) sample jar or a stainless-steel scoop, to obtain and transfer samples from spigots with low ground clearance. All measurements for temperature, pH, specific conductance and turbidity should be recorded at the time of sample collection.

4.1 Potable Treatment Plant Sampling

Municipal water supply plants and wells that continuously operate require NO PURGE other than opening a valve and allowing it to flush for a few minutes. Remove any hoses on the sample taps. If a storage tank is present, a spigot, valve or other sampling point should be located between the pump and the storage tank. If not, sample from the valve closest to the tank. Measurements of temperature, pH, specific conductance and turbidity are recorded at the time of sampling when water quality parameters are required.

When sampling at a water treatment plant, samples are often collected from the raw water supply and from the treated or finished water after chlorination.

4.2 Potable Water Distribution Sampling

Occasionally, samples are collected to determine the contribution of system-related variables (e.g., transmission pipes, water coolers, water heaters, holding tanks, pressurization tanks, etc.) to the quality of potable water supplies. In these cases, it may be necessary to ensure that the water source has not been used for a specific time interval (e.g., six-hours or over a weekend). Sample collection may consist of collecting a sample of the initial flush, collecting a sample after flushing for several minutes, and collecting another sample after the system being investigated has been flushed until one or more of the water quality parameters stabilize.

When sampling drinking water from the interior of residential homes, it useful to record in the logbook both the interior plumbing and service line material (i.e. PVC, galvanized iron, copper and / or lead), and any filters which are in use. Also, photographs of the sample tap, and the underlying fixtures are recommended.

Additionally, federal and state regulations require monitoring water within the distribution system under three specific rules: Total Coliform Rule, Lead and Copper Rule, and Trihalomethane Rule. Consequently, when samples are being analyzed for one of these parameters, prescriptive sampling will need to be followed and approved drinking water methods will be required for the analyses.

4.2.1 Total Coliform Rule – controls the microbial water quality aspects by testing for coliform bacteria and chlorine residuals.

4.2.2 Lead and Copper Rule – deals with the corrosivity of water distributed to homes with lead and copper plumbing. Water is tested for lead and copper in the ends of water mains and from the drinking water taps of homes after a stagnant period. Other useful water quality measurements include pH, alkalinity and the residual of any corrosion inhibitor applied to the water.

4.2.3 Trihalomethane Rule – monitors for disinfection by-products such as Trihalomethanes and chlorine residuals.

5.0 References

SESD Operating Procedure for Potable Water Supply Sampling, SESDPROC-305-R3, May 30, 2013

US EPA. Laboratory Services Branch Laboratory Operations and Quality Assurance Manual. Region 4 SESD, Athens, GA, May 2019.

US EPA. 2001. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. Region 4 Science and Ecosystem Support Division (SESD), Athens, GA

US EPA. Region 8. Quick Guide to Drinking Water Sample Collection (2nd Edition). Region 8 Laboratory, 16194 W. 45th Dr., Golden, CO 80403, September 2016

US EPA. Office of Ground Water & Drinking Water. "Clarification of Recommended Tap Sampling Procedures for Purposes of the Lead and Copper Rule" memorandum, February 29, 2016

Water Distribution System Operation and Maintenance (6th Edition), California State University, Sacramento, California, College of Engineering and Computer Science, Office of Water Programs, 2012

6.0 Revision History

This table shows changes to this controlled document over time. The most recent version is presented in the top row of the table. Previous versions of the document are maintained by the LSASD Document Control Coordinator.

History	Effective Date
ASBPROC-305-R4, Potable Water Supply Sampling, replaces SESDPROC-305-R3	June 11, 2019
SESDPROC-305-R3, *Potable Water Supply Sampling*, replaces SESDPROC-305-R2	May 30, 2013
SESDPROC-305-R2, *Potable Water Supply Sampling*, replaces SESDPROC-305-R1	January 29, 2013
SESDPROC-305-R1, *Potable Water Supply Sampling*, replaces SESDPROC-305-R0	November 1, 2007
SESDPROC-305-R0, *Potable Water Supply Sampling*, Original Issue	February 05, 2007

APPENDIX C

National Primary Drinking Water Regulations

National Primary Drinking Water Regulations

EPA

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Acrylamide	TT[4]	Nervous system or blood problems; increased risk of cancer	Added to water during sewage/ wastewater treatment	zero
Alachlor	0.002	Eye, liver, kidney, or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops	zero
Alpha/photon emitters	15 picocuries per Liter (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation	zero
Antimony	0.006	Increase in blood cholesterol; decrease in blood sugar	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder	0.006
Arsenic	0.010	Skin damage or problems with circulatory systems, and may have increased risk of getting cancer	Erosion of natural deposits; runoff from orchards; runoff from glass & electronics production wastes	0
Asbestos (fibers >10 micrometers)	7 million fibers per Liter (MFL)	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits	7 MFL
Atrazine	0.003	Cardiovascular system or reproductive problems	Runoff from herbicide used on row crops	0.003
Barium	2	Increase in blood pressure	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	2
Benzene	0.005	Anemia; decrease in blood platelets; increased risk of cancer	Discharge from factories; leaching from gas storage tanks and landfills	zero
Benzo(a)pyrene (PAHs)	0.0002	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines	zero
Beryllium	0.004	Intestinal lesions	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries	0.004
Beta photon emitters	4 millirems per year	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation	zero
Bromate	0.010	Increased risk of cancer	Byproduct of drinking water disinfection	zero
Cadmium	0.005	Kidney damage	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints	0.005
Carbofuran	0.04	Problems with blood, nervous system, or reproductive system	Leaching of soil fumigant used on rice and alfalfa	0.04

LEGEND

DISINFECTANT | DISINFECTION BYPRODUCT | INORGANIC CHEMICAL | MICROORGANISM | ORGANIC CHEMICAL | RADIONUCLIDES

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Carbon tetrachloride	0.005	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities	zero
Chloramines (as Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort; anemia	Water additive used to control microbes	MRDLG=4[1]
Chlordane	0.002	Liver or nervous system problems; increased risk of cancer	Residue of banned termiticide	zero
Chlorine (as Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort	Water additive used to control microbes	MRDLG=4[1]
Chlorine dioxide (as ClO_2)	MRDL=0.8[1]	Anemia; infants, young children, and fetuses of pregnant women: nervous system effects	Water additive used to control microbes	MRDLG=0.8[1]
Chlorite	1.0	Anemia; infants, young children, and fetuses of pregnant women: nervous system effects	Byproduct of drinking water disinfection	0.8
Chlorobenzene	0.1	Liver or kidney problems	Discharge from chemical and agricultural chemical factories	0.1
Chromium (total)	0.1	Allergic dermatitis	Discharge from steel and pulp mills; erosion of natural deposits	0.1
Copper	TT[5]; Action Level=1.3	Short-term exposure: Gastrointestinal distress. Long-term exposure: Liver or kidney damage. People with Wilson's Disease should consult their personal doctor if the amount of copper in their water exceeds the action level	Corrosion of household plumbing systems; erosion of natural deposits	1.3
Cryptosporidium	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
Cyanide (as free cyanide)	0.2	Nerve damage or thyroid problems	Discharge from steel/metal factories; discharge from plastic and fertilizer factories	0.2
2,4-D	0.07	Kidney, liver, or adrenal gland problems	Runoff from herbicide used on row crops	0.07
Dalapon	0.2	Minor kidney changes	Runoff from herbicide used on rights of way	0.2
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	Reproductive difficulties; increased risk of cancer	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards	zero
o-Dichlorobenzene	0.6	Liver, kidney, or circulatory system problems	Discharge from industrial chemical factories	0.6
p-Dichlorobenzene	0.075	Anemia; liver, kidney, or spleen damage; changes in blood	Discharge from industrial chemical factories	0.075
1,2-Dichloroethane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
1,1-Dichloroethylene	0.007	Liver problems	Discharge from industrial chemical factories	0.007
cis-1,2-Dichloroethylene	0.07	Liver problems	Discharge from industrial chemical factories	0.07
trans-1,2, Dichloroethylene	0.1	Liver problems	Discharge from industrial chemical factories	0.1
Dichloromethane	0.005	Liver problems; increased risk of cancer	Discharge from industrial chemical factories	zero
1,2-Dichloropropane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero
Di(2-ethylhexyl) adipate	0.4	Weight loss, liver problems, or possible reproductive difficulties	Discharge from chemical factories	0.4
Di(2-ethylhexyl) phthalate	0.006	Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories	zero
Dinoseb	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables	0.007
Dioxin (2,3,7,8-TCDD)	0.00000003	Reproductive difficulties; increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories	zero
Diquat	0.02	Cataracts	Runoff from herbicide use	0.02
Endothall	0.1	Stomach and intestinal problems	Runoff from herbicide use	0.1
Endrin	0.002	Liver problems	Residue of banned insecticide	0.002
Epichlorohydrin	TT[4]	Increased cancer risk; stomach problems	Discharge from industrial chemical factories; an impurity of some water treatment chemicals	zero
Ethylbenzene	0.7	Liver or kidney problems	Discharge from petroleum refineries	0.7
Ethylene dibromide	0.00005	Problems with liver, stomach, reproductive system, or kidneys; increased risk of cancer	Discharge from petroleum refineries	zero
Fecal coliform and *E. coli*	MCL[6]	Fecal coliforms and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes may cause short term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.	Human and animal fecal waste	zero[6]

LEGEND

DISINFECTANT | DISINFECTION BYPRODUCT | INORGANIC CHEMICAL | MICROORGANISM | ORGANIC CHEMICAL | RADIONUCLIDES

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Fluoride	4.0	Bone disease (pain and tenderness of the bones); children may get mottled teeth	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories	4.0
Giardia lamblia	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
Glyphosate	0.7	Kidney problems; reproductive difficulties	Runoff from herbicide use	0.7
Haloacetic acids (HAA5)	0.060	Increased risk of cancer	Byproduct of drinking water disinfection	n/a[9]
Heptachlor	0.0004	Liver damage; increased risk of cancer	Residue of banned termiticide	zero
Heptachlor epoxide	0.0002	Liver damage; increased risk of cancer	Breakdown of heptachlor	zero
Heterotrophic plate count (HPC)	TT[7]	HPC has no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.	HPC measures a range of bacteria that are naturally present in the environment	n/a
Hexachlorobenzene	0.001	Liver or kidney problems; reproductive difficulties; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories	zero
Hexachloro-cyclopentadiene	0.05	Kidney or stomach problems	Discharge from chemical factories	0.05
Lead	TT[5]; Action Level=0.015	Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities; Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits	zero
Legionella	TT[7]	Legionnaire's Disease, a type of pneumonia	Found naturally in water; multiplies in heating systems	zero
Lindane	0.0002	Liver or kidney problems	Runoff/leaching from insecticide used on cattle, lumber, and gardens	0.0002
Mercury (inorganic)	0.002	Kidney damage	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and croplands	0.002
Methoxychlor	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, and livestock	0.04
Nitrate (measured as Nitrogen)	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	10

LEGEND DISINFECTANT | DISINFECTION BYPRODUCT | INORGANIC CHEMICAL | MICROORGANISM | ORGANIC CHEMICAL | RADIONUCLIDES

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[1] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Nitrite (measured as Nitrogen)	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	1
Oxamyl (Vydate)	0.2	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, and tomatoes	0.2
Pentachlorophenol	0.001	Liver or kidney problems; increased cancer risk	Discharge from wood-preserving factories	zero
Picloram	0.5	Liver problems	Herbicide runoff	0.5
Polychlorinated biphenyls (PCBs)	0.0005	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemicals	zero
Radium 226 and Radium 228 (combined)	5 pCi/L	Increased risk of cancer	Erosion of natural deposits	zero
Selenium	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum and metal refineries; erosion of natural deposits; discharge from mines	0.05
Simazine	0.004	Problems with blood	Herbicide runoff	0.004
Styrene	0.1	Liver, kidney, or circulatory system problems	Discharge from rubber and plastic factories; leaching from landfills	0.1
Tetrachloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from factories and dry cleaners	zero
Thallium	0.002	Hair loss; changes in blood; kidney, intestine, or liver problems	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories	0.0005
Toluene	1	Nervous system, kidney, or liver problems	Discharge from petroleum factories	1
Total Coliforms	5.0 percent[8]	Coliforms are bacteria that indicate that other, potentially harmful bacteria may be present. See fecal coliforms and *E. coli*	Naturally present in the environment	zero
Total Trihalomethanes (TTHMs)	0.080	Liver, kidney, or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection	n/a[9]
Toxaphene	0.003	Kidney, liver, or thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle	zero
2,4,5-TP (Silvex)	0.05	Liver problems	Residue of banned herbicide	0.05
1,2,4-Trichlorobenzene	0.07	Changes in adrenal glands	Discharge from textile finishing factories	0.07

LEGEND DISINFECTANT | DISINFECTION BYPRODUCT | INORGANIC CHEMICAL | MICROORGANISM | ORGANIC CHEMICAL | RADIONUCLIDES

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
1,1,1-Trichloroethane	0.2	Liver, nervous system, or circulatory problems	Discharge from metal degreasing sites and other factories	0.2
1,1,2-Trichloroethane	0.005	Liver, kidney, or immune system problems	Discharge from industrial chemical factories	0.003
Trichloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from metal degreasing sites and other factories	zero
Turbidity	TT[7]	Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (e.g., whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites, and some bacteria. These organisms can cause short term symptoms such as nausea, cramps, diarrhea, and associated headaches.	Soil runoff	n/a
Uranium	30µg/L	Increased risk of cancer, kidney toxicity	Erosion of natural deposits	zero
Vinyl chloride	0.002	Increased risk of cancer	Leaching from PVC pipes; discharge from plastic factories	zero
Viruses (enteric)	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
Xylenes (total)	10	Nervous system damage	Discharge from petroleum factories; discharge from chemical factories	10

LEGEND


DISINFECTANT


DISINFECTION BYPRODUCT


INORGANIC CHEMICAL


MICROORGANISM


ORGANIC CHEMICAL


RADIONUCLIDES

NOTES

1 Definitions
- **Maximum Contaminant Level Goal (MCLG):** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.
- **Maximum Contaminant Level (MCL):** The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
- **Maximum Residual Disinfectant Level Goal (MRDLG):** The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- **Maximum Residual Disinfectant Level (MRDL):** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- **Treatment Technique (TT):** A required process intended to reduce the level of a contaminant in drinking water.

2 Units are in milligrams per liter (mg/L) unless otherwise noted. Milligrams per liter are equivalent to parts per million (ppm).

3 Health effects are from long-term exposure unless specified as short-term exposure.

4 Each water system must certify annually, in writing, to the state (using third-party or manufacturers certification) that when it uses acrylamide and/or epichlorohydrin to treat water, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows: Acrylamide = 0.05 percent dosed at 1 mg/L (or equivalent); Epichlorohydrin = 0.01 percent dosed at 20 mg/L (or equivalent).

5 Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10 percent of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L.

6 A routine sample that is fecal coliform-positive or E. coli-positive triggers repeat samples--if any repeat sample is total coliform-positive, the system has an acute MCL violation. A routine sample that is total coliform-positive and fecal coliform-negative or E. coli-negative triggers repeat samples--if any repeat sample is fecal coliform-positive or E. coli-positive, the system has an acute MCL violation. See also Total Coliforms.

7 EPA's surface water treatment rules require systems using surface water or ground water under the direct influence of surface water to (1) disinfect their water, and (2) filter their water or meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels:
- ***Cryptosporidium*:** 99 percent removal for systems that filter. Unfiltered systems are required to include Cryptosporidium in their existing watershed control provisions.
- **Giardia lamblia:** 99.9 percent removal/inactivation
- **Viruses:** 99.9 percent removal/inactivation
- ***Legionella*:** No limit, but EPA believes that if *Giardia* and viruses are removed/inactivated, according to the treatment techniques in the surface water treatment rule, *Legionella* will also be controlled.
- **Turbidity:** For systems that use conventional or direct filtration, at no time can turbidity (cloudiness of water) go higher than 1 nephelometric turbidity unit (NTU), and samples for turbidity must be less than or equal to 0.3 NTU in at least 95 percent of the samples in any month. Systems that use filtration other than the conventional or direct filtration must follow state limits, which must include turbidity at no time exceeding 5 NTU.
- **HPC:** No more than 500 bacterial colonies per milliliter
- **Long Term 1 Enhanced Surface Water Treatment:** Surface water systems or ground water systems under the direct influence of surface water serving fewer than 10,000 people must comply with the applicable Long Term 1 Enhanced Surface Water Treatment Rule provisions (e.g. turbidity standards, individual filter monitoring, *Cryptosporidium* removal requirements, updated watershed control requirements for unfiltered systems).
- **Long Term 2 Enhanced Surface Water Treatment:** This rule applies to all surface water systems or ground water systems under the direct influence of surface water. The rule targets additional *Cryptosporidium* treatment requirements for higher risk systems and includes provisions to reduce risks from uncovered finished water storages facilities and to ensure that the systems maintain microbial protection as they take steps to reduce the formation of disinfection byproducts. (Monitoring start dates are staggered by system size. The largest systems (serving at least 100,000 people) will begin monitoring in October 2006 and the smallest systems (serving fewer than 10,000 people) will not begin monitoring until October 2008. After completing monitoring and determining their treatment bin, systems generally have three years to comply with any additional treatment requirements.)
- **Filter Backwash Recycling:** The Filter Backwash Recycling Rule requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the state.

8 No more than 5.0 percent samples total coliform-positive in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Every sample that has total coliform must be analyzed for either fecal coliforms or E. coli. If two consecutive TC-positive samples, and one is also positive for E. coli or fecal coliforms, system has an acute MCL violation.

9 Although there is no collective MCLG for this contaminant group, there are individual MCLGs for some of the individual contaminants:
- **Haloacetic acids:** dichloroacetic acid (zero); trichloroacetic acid (0.3 mg/L)
- **Trihalomethanes:** bromodichloromethane (zero); bromoform (zero); dibromochloromethane (0.06 mg/L)

NATIONAL SECONDARY DRINKING WATER REGULATION

National Secondary Drinking Water Regulations are non-enforceable guidelines regarding contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, some states may choose to adopt them as enforceable standards.

Contaminant	Secondary Maximum Contaminant Level
Aluminum	0.05 to 0.2 mg/L
Chloride	250 mg/L
Color	15 (color units)
Copper	1.0 mg/L
Corrosivity	Noncorrosive
Fluoride	2.0 mg/L
Foaming Agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Silver	0.10 mg/L
Sulfate	250 mg/L
Total Dissolved Solids	500 mg/L
Zinc	5 mg/L

FOR MORE INFORMATION ON EPA'S SAFE DRINKING WATER:

visit: **epa.gov/safewater**

call: **(800) 426-4791**

ADDITIONAL INFORMATION:

To order additional posters or other ground water and drinking water publications, please contact the National Service Center for Environmental Publications at: **(800) 490-9198**, or email: **nscep@bps-lmit.com**.

OFFICE OF GROUND WATER AND DRINKING WATER

Appendix F-2

Well Water Sampling Locations Map

CTEH®

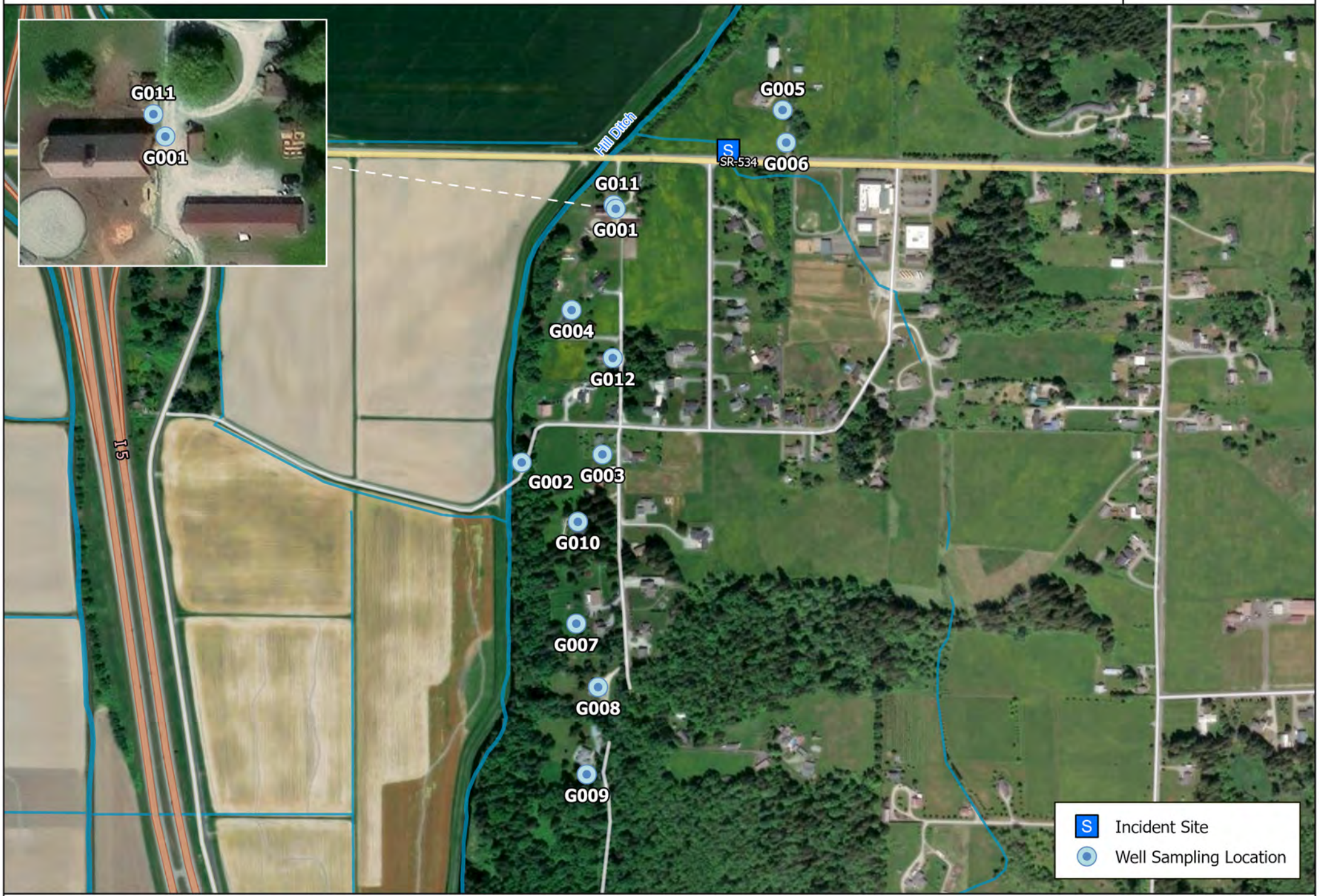
Well Water Sampling Locations

Olympic Pipeline Gasoline Spill - Conway, WA

0 250 500 1,000 Feet

N

Project: PROJ-032692
Client: BP
City: Mt. Vernon, WA
County: Skagit



Projection: NAD 1983 2011 UTM Zone 10N Datum: NAD 1983 2011

Updated At: 7/22/2024 1:48 PM

Appendix F-3

Well Water Sampling Results Summaries

Laboratory Results | Well Water

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			G001			G002				G003			
			19510 SR-534: NE corner of red barn near pig pen			19356 Conway Hill Rd: Artesian spring outfall approximately 50 yards N of bridge				19356 Conway Hill Rd: Holding tank on the SW corner of the house			
			12/17/2023	2/9/2024	3/26/2024	12/17/2023	1/10/2024	2/9/2024	3/26/2024	12/17/2023	1/10/2024	2/9/2024	3/26/2024
Analytical Method	**Analyte**	**Screening Value (µg/L)**	MTWA1217G001	MTWA0209G001	MTWA0326G001	MTWA1217G002	MTWA0110G002	MTWA0209G002	MTWA0326G002	MTWA1217G003	MTWA0110G003	MTWA0209G003	MTWA0326G003
8260D	Benzene	5[1]	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L
	Ethylbenzene	700[1]	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L
	Toluene	1000[1]	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L
	Total Xylenes	10000[1]	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L
NWTPHGX	Gasoline Range Organics-NWTPH	800[2]	< 44.2 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 36.8 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 34.4 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L

[1] USEPA National Primary Drinking Water Regulations - Maximum Contaminant Levels (MCLs)
[2] WAC 173-340-720 - Method A cleanup levels for potable ground water (Table 720-1)
Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).
Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:
B: The same analyte is found in the associated blank.
J: Result is estimated between the laboratory method detection limit and reporting limit.

Non-detection

Laboratory Results | Well Water

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			G004				G005				G006			
			21190 Locken Hill Ln: Spigot on the S side of the house				19651 SR-534: Spigot at pumphouse 40 yards E of the house				19651 SR-534: Spigot on the N side of the house			
			12/18/2023	1/8/2024	2/9/2024	3/26/2024	12/18/2023	1/8/2024	2/10/2024	3/26/2024	12/18/2023	1/8/2024	2/10/2024	3/26/2024
Analytical Method	Analyte	Screening Value (µg/L)	MTWA1218G004	MTWA0108G004	MTWA0209G004	MTWA0326G004	MTWA1218G005	MTWA0108G005	MTWA0210G005	MTWA0326G005	MTWA1218G006	MTWA0108G006	MTWA0210G006	MTWA0326G006
8260D	Benzene	5[1]	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L
	Ethylbenzene	700[1]	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L
	Toluene	1000[1]	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L
	Total Xylenes	10000[1]	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L
NWTPHGX	Gasoline Range Organics-NWTPH	800[2]	< 50.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 52 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L

[1] USEPA National Primary Drinking Water Regulations - Maximum Contaminant Levels (MCLs)
[2] WAC 173-340-720 - Method A cleanup levels for potable ground water (Table 720-1)
Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).
Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:
B: The same analyte is found in the associated blank.
J: Result is estimated between the laboratory method detection limit and reporting limit.

Non-detection

Laboratory Results | Well Water

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			G007	G008						G009					
			21462 Conway Hill Ln: Spigot in the backyard	21498 Conway Hill Ln: Spigot on front of the house						21596 Snowden Ln: Spigot on the S side of the house					
			12/19/2023	12/20/2023	1/19/2024		2/9/2024	3/26/2024		12/22/2023		1/19/2024		2/10/2024	3/27/2024
Analytical Method	**Analyte**	**Screening Value (µg/L)**	MTWA1219G007	MTWA1220G008	MTWA0119G008	MTWA0119H008	MTWA0209G008	MTWA0326G008	MTWA0326H008	MTWA1222G009	MTWA1222H009	MTWA0119G009	MTWA0119H009	MTWA0210G009	MTWA0327G009
8260D	Benzene	5[1]	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L
	Ethylbenzene	700[1]	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L
	Toluene	1000[1]	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L
	Total Xylenes	10000[1]	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L
NWTPHGX	Gasoline Range Organics-NWTPH	800[2]	< 31.6 µg/L	< 31.6 µg/L	39.4 µg/L (J)	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 32 µg/L	< 31.6 µg/L	< 31.6 µg/L

[1] USEPA National Primary Drinking Water Regulations - Maximum Contaminant Levels (MCLs)
[2] WAC 173-340-720 - Method A cleanup levels for potable ground water (Table 720-1)
Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).
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J: Result is estimated between the laboratory method detection limit and reporting limit.

Detection
Non-detection

Laboratory Results | Well Water

PROJ-032692 | Olympic Pipeline Gasoline Spill - Conway, WA

			G010			G011			G012		
			21340 Conway Hill Rd: Spigot on N side of house			19510 SR-534: NE corner of red barn near pig pen			21214 Locken Ln: Spigot in basement		
			12/28/2023	1/10/2024	2/9/2024	1/5/2024	2/9/2024	3/26/2024	1/8/2024	2/11/2024	
Analytical Method	Analyte	Screening Value (µg/L)	MTWA1228G010	MTWA0110G010	MTWA0209G010	MTWA0105G011	MTWA0209G011	MTWA0326G011	MTWA0108G012	MTWA0211G012	MTWA0211H012
8260D	Benzene	5[1]	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L	< 0.0941 µg/L
	Ethylbenzene	700[1]	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L	< 0.137 µg/L
	Toluene	1000[1]	< 0.278 µg/L	< 0.278 µg/L	1.65 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L	< 0.278 µg/L
	Total Xylenes	10000[1]	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L	< 0.174 µg/L
NWTPHGX	Gasoline Range Organics-NWTPH	800[2]	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L	< 31.6 µg/L

[1] USEPA National Primary Drinking Water Regulations - Maximum Contaminant Levels (MCLs)

[2] WAC 173-340-720 - Method A cleanup levels for potable ground water (Table 720-1)

Laboratory non-detections are reported as less than ("<") the laboratory method detection limit (MDL).

Laboratory result qualifiers are reported to the right of corresponding detections (in parentheses). Definitions of reported qualifiers are below:

B: The same analyte is found in the associated blank.

J: Result is estimated between the laboratory method detection limit and reporting limit.

Detection

Non-detection

Appendix F-4

Well Water Sampling Results Maps

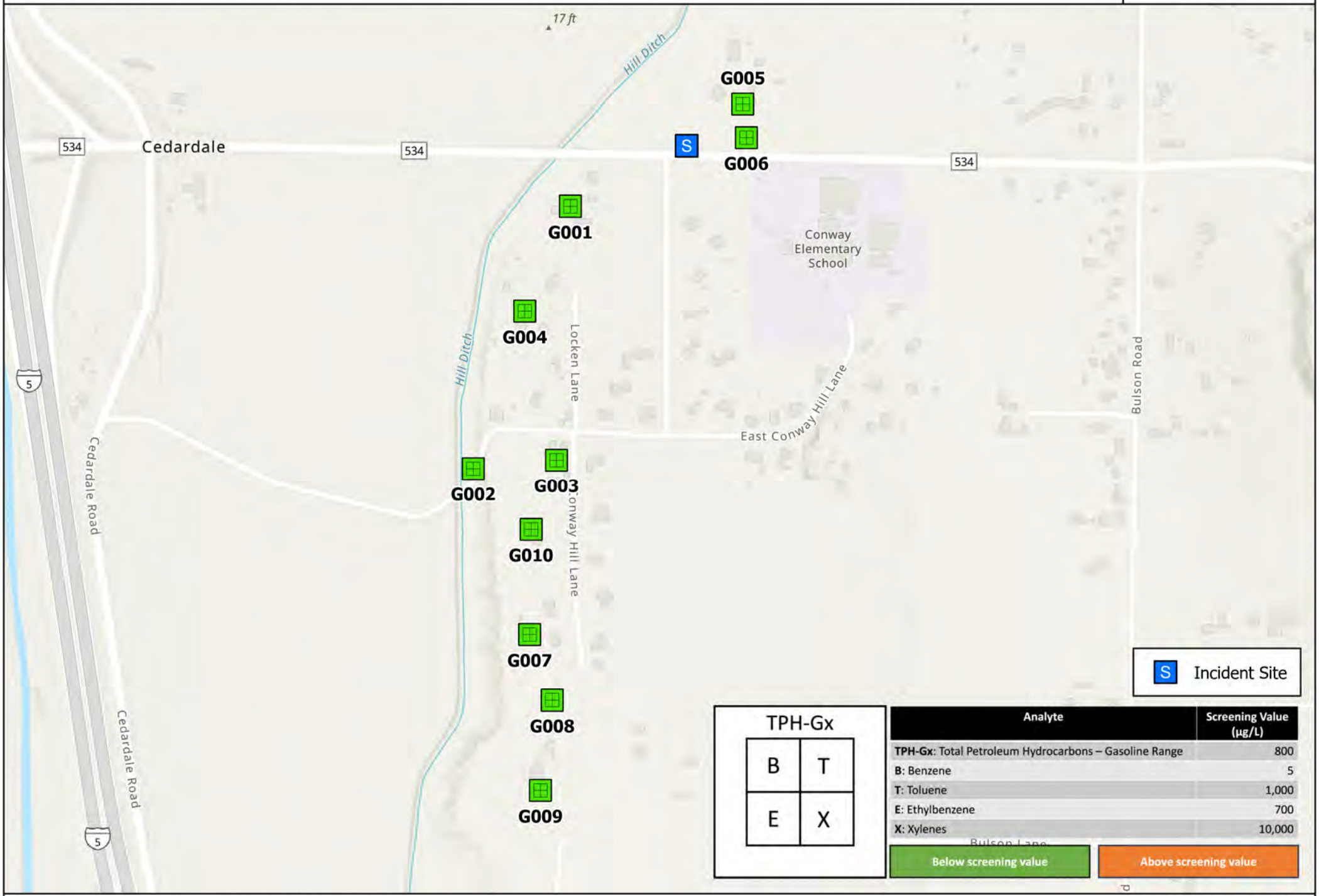
Well Water Sampling Results

Olympic Pipeline Gasoline Spill

0 500 1,000 Feet

N

Project: PROJ-032692
Client: BP
City: Mt. Vernon, WA
County: Skagit



Analyte	Screening Value (µg/L)
TPH-Gx: Total Petroleum Hydrocarbons – Gasoline Range	800
B: Benzene	5
T: Toluene	1,000
E: Ethylbenzene	700
X: Xylenes	10,000

Below screening value | Above screening value

Projection: NAD 1983 2011 UTM Zone 10N Datum: NAD 1983 2011

Updated At: 1/2/2024 5:12 PM

Appendix G-1

Sampling and Analysis Plan for Delineation and Remediation of Impacted Soils

DOCUMENTATION – COVER SHEET

MP 46 Olympic Pipeline Spill Conway South of Allen Station

Date: 13 December 2023

Document Control Name: Soil Delination

Prepared by: Robyn Whiteford

Preparer Role: Documentation Lead

Approvals

Responsible Party / Incident Commander	Terry Zimmerman		12-13-2023	1322
	Print Name above	*Sign Above*	*Date*	*Time*
Federal On-Scene Coordinator	Monica Tonel	Monica Tonel	12/13/2023	1257
	Print Name above	*Sign Above*	*Date*	*Time*
Washington State On-Scene Coordinator	Madeline Fritzen		12/13/2023	1307
	Print Name above	*Sign Above*	*Date*	*Time*
Local On-Scene Coordinator	Julie DeLosada / Joan Cromley	Joan Cromley	12/13/23	12:30
	Print Name above	*Sign Above*	*Date*	*Time*
Tribal Coordinator	Shaun Beasley		12.13.2023	1249
	Jeff Solomon		12-13-23	1244
	Print Name above	*Sign Above*	*Date*	*Time*
Section Chief	Tony Hout	Tony Hout	12/13/23	12:50
	Print Name above	*Sign Above*	*Date*	*Time*
Unit Leader	Laura Hayes	Laura Hayes	12/13/23	1153
	Print Name above	*Sign Above*	*Date*	*Time*

	Revision Record		
Change Date	Remove Insert Page Number(s)		Description of Change(s)
			This is revision 0. Describe subsequent revisions in this table.

CTEH®

Olympic Pipeline Gasoline Spill

Conway, WA 12/10/2023

Environmental Sampling and Analysis Plan (SAP) for Delineation and Remediation of Impacted Soils

Version 1.0

Prepared on Behalf of:

Olympic Pipeline

Prepared By:

CTEH, LLC

5120 Northshore Drive

Little Rock, AR 72118

501-801-8500

December 13, 2023

	Name/Organization	Signature	Date Signed
Prepared by:			
Reviewed by:			
Approved by:			
Approved by:			
Approved by:			

1.0 Introduction and Purpose

This Sampling and Analysis Plan (SAP) was prepared by CTEH®, LLC. on behalf of Olympic Pipeline Company (Olympic) to provide environmental sampling work plans related to the Olympic Pipeline Gasoline Spill in Conway, WA . The incident occurred on December 10, 2023. The coordinates for the approximate location of the release site is 19651 SR 534, Conway, WA. The location of the incident is depicted on the Site Location Map in Appendix A.

The objectives of the environmental investigation and proposed sampling for defining both emergency response and remediation sampling include:

For the purpose of initial soil removal:

1. The collection of soil samples to delineate extent and nature of potential impact related to the incident;

2. The preliminary screening of surface (surface to approximately 12" bgs*) soil samples using a photoionization detector (PID) to establish the estimated lateral extent of gasoline impacts for determination of inclusion in the initial surface soil removal effort. Discreet readings will be taken from surface soil as well as within the clay layer known to exists approximately 6" to 12" below grade.

For the purpose of Soil Remediation:

3. The collection of background samples to determine a baseline and develop the range of potential background concentrations for comparative purposes and to distinguish between target analytes related to this incident and non-related target analytes;
4. The collection of confirmatory soil samples in heavily impacted areas following the response actions performed by the Oil Spill Response Organization (OSRO) to mitigate free product;
5. The development of a grid-based sampling scheme to delineate the horizontal and vertical extent of impacted soil and determine the areas of the site which require removal or further mitigation;
6. Defining the extent of impacted soil for attaining remedial endpoints

2.0 Health and Safety

CTEH sampling personnel will review and adhere to the site-specific Health and Safety Plan. Sampling and documentation activities will be conducted only under weather and other environmental conditions that do not create an unsafe working environment.

* acronym for:

3.0 Data Quality Objectives

The data collected during field activities will be used to assess potential exposures to human health and the environment to constituents potentially related to the release.

A strategic planning approach based on scientific method will be employed for data collection activities providing a systematic procedure to ensure the type, quantity and quality of data used in decision-making will be appropriate for the intended application. All samples will be submitted to the analytical laboratory for a Level II data quality package.

4.0 Soil Sampling

4.1 Soil Screening for Spill Delineation/Emergency Response

The objective of this soil screening effort is to delineate heavily impacted soils which will be removed during an initial contaminated soil remediation effort and to gain a better understanding of soil and contaminant conditions within the soils of the tree line adjacent Hill Ditch. The purpose of the initial soil removal effort is to move the project from the emergency response phase to a soil remediation phase. The criteria of 500 ppm PID detection will be used to designate soil for inclusion in the initial soil removal effort.

An aliquot of soil shall be taken from a sample location, and immediately placed into a clean 1-quart sized re-sealable zipper storage bag and sealed. The sample will be allowed to volatilize in the bag for 15 minutes prior to measuring VOCs using the PID.

If PID readings at a given location exceed 500 ppm the location will be marked with a red pin flag and additional screening with occur laterally at 10-foot intervals to define the extent of contamination. PID readings less than 500 ppm will be marked with a green pin flag to designate boundaries for the proposed initial remedial excavation. All soil screening readings will be entered into the GIS database. A map showing results of the soil screening effort will be prepared to assist in decision-making of next steps.

In addition, a walking survey for Benzene will be conducted. A benzene reading of non-detect is required for emergency response removal to be considered complete as well as no observation of free product.

The initial screening/assessment of the tree line will include hand-auguring boreholes to determine soil type and the presence of a clay layer. Free product, if encountered will be noted. Boreholes will be logged as possible to assist in developing a remedial strategy emphasizing the protection of the trees currently present along Hill Ditch. Following visual delineation of the impacted area [and subsequent removal operations], soil screening of volatile organic compounds (VOCs) will be conducted in the field using a properly calibrated photo-ionization detector (PID). No soil removal is planned for the tree line area during the initial emergency response phase remedial efforts. All data associated with the delineation and tree line assessment will be geo-referenced and incorporated into the project GIS database.

4.2 Soil Sampling Methodology and Analysis

Soil samples from each location will be collected by stainless steel spoons or hand trowels. For samples submitted in the laboratory supplied soil jars, the sample containers will be completely filled to minimize headspace. Samples will be collected after vegetation, rocks, litter, and other non-native soil material which may bias the sample are carefully removed. The depth below ground surface at which each sample is collected will be recorded in a log book and SIERA. Additionally, the final report will clearly state the depth at which each sample was collected.

Background samples will be collected from areas near the site that have not been impacted by any of the activities associated with onsite operations or the incident.

All samples will be submitted under strict chain-of-custody to Pace Analytical, a NELAP accredited laboratory, for laboratory analysis. The planned analysis for soil samples are listed below in Table 1.

Table 1 Soil Sampling Summary

Analysis	Method	Sample Container	Preservative	Hold Time
Total Petroleum Hydrocarbons (TPH)	NWTPH-Gx	Terracore; 2 x 40 mL VOA	Ice, maintained at 0-6°C	14 days
Volatile Organic Compounds (VOCs) including BTEX	US EPA 8260	Terracore; 2 x 40 mL VOA	Methanol; Ice, maintained at 0-6°C	14 days
Semi Volatile Organic Compounds (SVOCs) – PAHS only	US EPA 8270	1 x 4oz. Glass	Ice, maintained at 0-6°C	14 days

4.3 Location and Frequency

Soil samples will be collected to determine whether gasoline released from this incident have impacted nearby soils.

Initially proposed soil sample locations may include the following:

- immediately adjacent to the Site;
- downwind and/or down gradient of the Site;
- upwind and/or up gradient of the Site (Background)
- At Public Access Areas such as boat launches, recreational areas, etc.

Soil samples will be collected one time initially at each location. Subsequent samples may be collected, as required for statistical representativeness. Additional sampling locations may be added as appendices based on a review of the preliminary results and/or a change in operational areas and activities.

5.0 Quality Assurance

Sampling will be carried out in conjunction with a well-defined quality assurance (QA) program. The goal of the field QA program is to document that samples are collected without the effects of accidental cross- or systematic contamination and refers to the sampling, analysis, and data validation procedures for generating valid and defensible data. To provide QA for the proposed sampling event, the following sampling, analysis, and data validation procedures will be performed:

5.1 Field Calibration

Instruments used in the field as part of this sampling event are anticipated to consist of GPS units, digital cameras, and handheld data collection devices such as tablets/smart phones. Other equipment is not ~~are not~~ anticipated to require field calibration. Operators of each piece of equipment are responsible for maintaining (including proper battery charge) and operating this equipment such that it conforms to each respective manufacturer's specifications.

5.2 Field Duplicate Sample

For approximately every ten samples collected in the field, one field duplicate will be collected and submitted for laboratory analyses to verify the reproducibility of the sampling methods. Field duplicates will be prepared by separately submitting an aliquot from the same sample location to the laboratory for analysis consistent with the proscribed analyses. The submitted duplicate will be submitted such that the laboratory is not aware that it is a duplicate (i.e., the sample ID will not identify it as a "duplicate" for any specific sample location). At least one field duplicate will be collected each day that samples are collected.

5.3 Field Split Samples

Field split samples refer to samples collected by the regulatory agency or its designee from the same sampling location and independently submitted to a different laboratory for analysis. Field split samples may be collected at the discretion of representatives of the regulatory agency or Incident Command.

5.4 Laboratory QA

Laboratory quality control procedures will be conducted in a manner consistent with relevant State and federal regulatory guidance. Deliverables will contain the supporting documentation necessary for data validation. Internal laboratory quality control checks will include method blanks, matrix spikes (and matrix spike duplicates), surrogate samples, calibration standards, and laboratory control standards (LCSs).

5.5 Matrix Spike/Matrix Spike Duplicate Sample

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples refer to field samples spiked with the analytes of interest prior to being analyzed at the laboratory to gauge the quality of analysis. Approximately one in twenty samples will be analyzed as MS/MSD samples.

5.6 Data Validation

Validation of the data generated by the laboratory performing the analyses will include at a minimum sample holding times, accuracy, precision, contamination of field generated or laboratory method blanks,

and surrogate compound recovery. Accuracy will be determined by evaluating LCS and MS recovery. Precision will be determined by evaluating laboratory and field duplicate samples. Level II data verification will be performed on 100% of the samples.

6.0 Decontamination Procedures

Decontamination procedures refer to the steps undertaken to minimize the potential for offsite contamination and cross-contamination between individual sampling locations. Prior to collecting any sample for this release the following decontamination procedures will be undertaken: non-disposable sampling equipment such as stainless-steel hand trowels which come into contact with sampling media will be decontaminated using a bristled brush and a solution comprised of a laboratory grade, non-phosphate detergent (e.g., Alconox or Liquinox) and deionized water. Depending on ancillary activities being conducted for the response to this release, the decontamination of sampling equipment will be conducted over poly sheeting at the sample location or in a nearby designated area. The sampling equipment to be decontaminated will first be placed in a bucket containing the detergent solution and thoroughly washed using a bristled brush. The items will then be transferred to the second 5-gallon bucket containing deionized water for rinsing. Following the initial rinsing, the item will be held over the third 5-gallon bucket while deionized water is carefully decanted over each item. Decontaminated items will be wrapped in clean aluminum foil for transit to the next sampling location.

Nitrile gloves will be worn by sampling personnel and changed between activities at each discrete sample collection location. Previously worn nitrile gloves will be discarded in appropriate waste receptacles with other PPE.

7.0 Sampling Waste Disposal

Decontamination fluids and contaminated Personal Protective Equipment (PPE) will be containerized and collected at the designated onsite waste staging area as needed.

All produced waste onsite will be managed and disposed of in a manner consistent with all regulatory guidelines and requirements.

8.0 Data Analysis

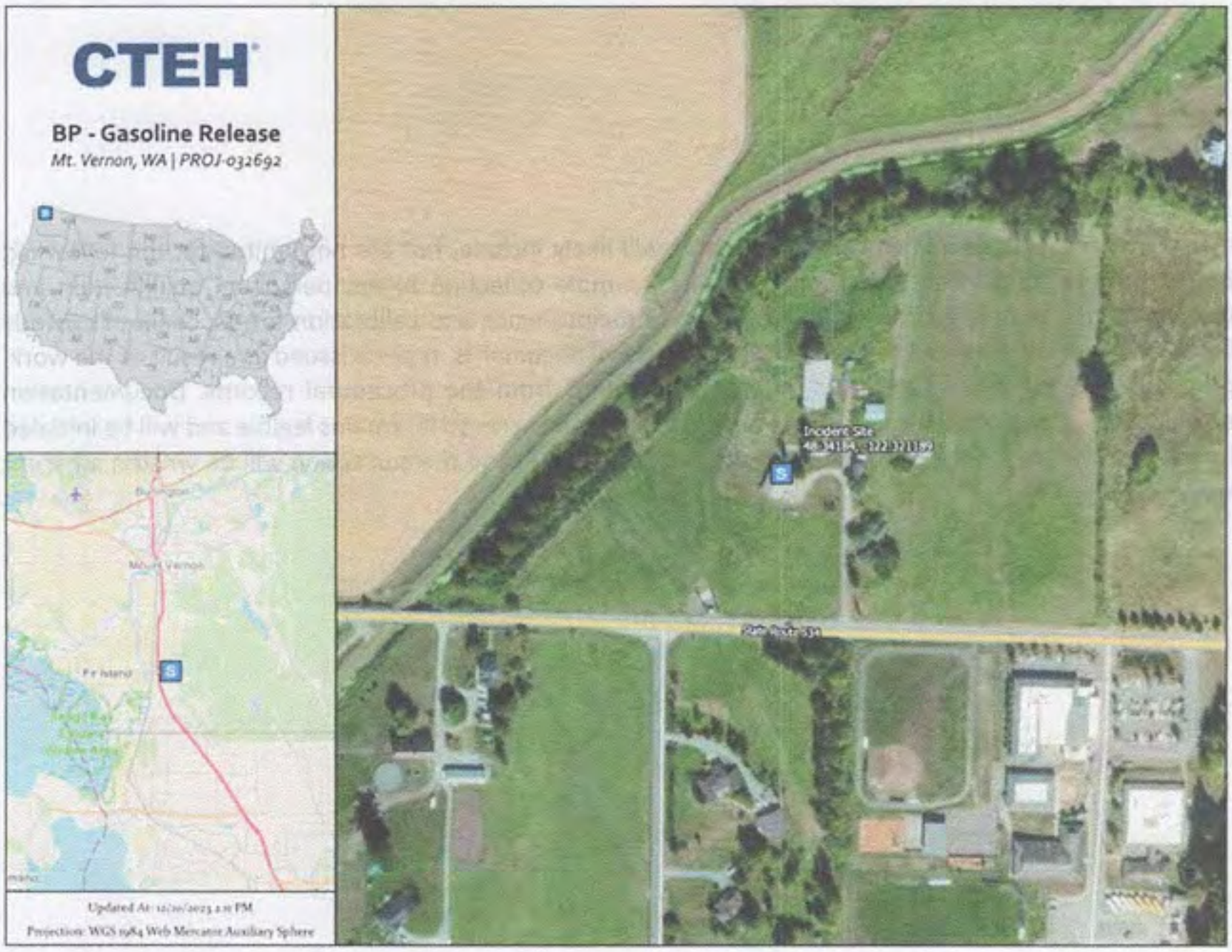
To assess the potential impact from the incident, the results of sampling will be reviewed for the presence/absence of these compounds, and should they be found, the concentrations of these parameters relative to appropriate regulatory standards. The results of laboratory analyses will be provided to the Olympic Pipeline Company.

9.0 Records Management

Records management refers to the procedures for generating, controlling, and archiving project-specific records and records of field activities. Project records, particularly those that are anticipated to be used as evidentiary data, directly support current or ongoing technical studies and activities, and provide historical evidence needed for later reviews and analyses, will be legible, identifiable, retrievable and protected against damage, deterioration, or loss on a centralized electronic database. Handwritten

records will be written in indelible ink. Records will likely include, but are not limited to, the following: bound field notebooks on pre-numbered pages, sample collection forms, personnel qualification and training forms, sample location maps, equipment maintenance and calibration forms, chain-of custody forms, maps and drawings, transportation and disposal documents, reports issued as a result of the work, procedures used, correspondences, and any deviations from the procedural records. Documentation errors will be corrected by drawing a single line through the error so it remains legible and will be initialed by the responsible individual, along with the date of change, and the correction will be written adjacent to the error.

Appendix A: Site Location Map



Appendix G-2

Soil Delineation Plan A2-A3 Excavation Addendum

Cover Sheet

Document Name: A2-A3 Excavation Addendum with Revisions

Incident Name: Olympic Pipeline Gasoline Spill Conway 12/10/23

Printed: 01/25/2024 09:32 PST UTC-8

Approved By

Name/Position	*Comments*	*Status*	*Date/Time*
Beasley, Shaun Swinomish Tribal OSC		Approved	01/24/2024 14:20
Tonel, Monica Federal OSC		Approved	01/23/2024 08:42
Cromley, Joan Local Government OSC		Approved	01/23/2024 07:52
Fritzen, Madeline State OSC		Approved	01/24/2024 12:59
Neuhauser, Scott RP Incident Commander		Approved	01/23/2024 06:32

Soil Delineation Plan – Division A-2 and A3 Addendum

This document has been prepared as an addendum to the approved Environmental Sampling and Analysis Plan (SAP) for Delineation and Remediation of Impacted Soils generated in response to the Olympic Pipeline gasoline spill which occurred on December 10, 2023.

Gasoline and gasoline constituents are known to exist in subsurface soils in Division A-2 and A-3 (Attachment 1: Division A Map). Sections of Division A-2 received free product as gasoline during the initial discharge of oil (gasoline). This area, which is riparian in nature, contains more permeable soil/cobble lens which increased the potential lateral migration of contaminants. A delineation effort was conducted to identify areas of free product, contaminated soil and groundwater. A polygon of impacted soils was developed to guide remedial excavation efforts. During the delineation work, an area of diesel-contaminated soil was discovered. This diesel contamination was determined to be residual from a pipeline release that occurred in 1985, however, delineating and remediating the historical diesel contamination is beyond the scope of this emergency response. The Riparian zone (formerly A-2) is now divided into three subdivisions: A-2 (the eastern segment of the former A-2) a 75'-wide zone extending from the pipeline corridor 200' parallel to Hill Ditch; A-3, an approximately 25-foot wide zone directly adjacent to both Hill Ditch and A-2, and A-4, the western portion of the former A-2 that has been determined to contain no or little gasoline contamination based on soil sampling data and has a thick clay layer extending from near the surface to depths greater than 10-feet below ground surface (bgs). A map of the new divisions is attached to this addendum.

Excavation at Division A-2 is planned to begin the week of January 15, 2024. The goal is to remove the vast majority of contaminated soil in this division and prepare the area for staging of a crane capable of installing sheet piling near the shore of Hill Ditch in the area designated as A-3. In addition, a product/groundwater extraction trench approximately 4 feet wide and approximately 3.75 feet deep will be installed along the boundary of Division A-2 and Division A-3. The trench will be designed to intercept groundwater flowing from the upgradient portions of the site and potentially reversing the gradient for Hill Ditch to minimize transport of residual product in Division A-3 into the water/Hill Ditch. The excavation effort will begin on the eastern side of Division A-2 and continue west until it reaches the trench but may be adjusted based on field observations of the operations team. Soil sampling and field screening will be conducted to guide the excavation and determine where soils presumed clean are present. Details of the sampling and analytical procedures are described below.

Following the excavation at Division A-2 and placement of the cofferdam, excavation of contaminated soils will occur in Division A-3. Division A-3 is defined as the area within the cofferdam that extends approximately 215 feet from north to south along Hill Ditch and east to within 25 feet of the shoreline. The cofferdam will extend approximately 3 feet into the waterway/Hill Ditch. The Fish Exclusion Plan details activities to be conducted to ensure protection and removal of any fish and amphibians, should they be present on the shoreline side of the cofferdam.

Health and Safety

Safety is the primary consideration in all field work and given the large amount of activity scheduled at the spill site, communication and coordination is critical. Travelling to and entering the site is subject to restrictions to prevent interference with school traffic and other on-site response activities. Particular attention should be paid to the presence and activity of backhoes and other excavators. A worker safety

technician will be attached to each excavator/sampling group to test for potentially hazardous vapors and recognize unsafe situations.

Soil Sample Collection Guidance

Soil samples will be collected at the discretion of the field sampling technician with the goal of identifying and removing all soil that may exceed Model Toxics Control Act (MTCA) Method A clean-up levels. Samples will be collected as either a grab from the base or sidewall of the excavation or as a composite (for TPH analysis) from a sidewall of the excavation. Field screening using a photo ionization detector (PID) will be used in an effort to distinguish clean (below MTCA Method A) and contaminated soil. A PID reading of 100 ppm will be the threshold concentration in making the determination and may be supplemented with a benzene screening analysis. Any samples collected from an excavation deeper than 4-feet and not having adequate slope for safe entry will be collected from the excavator bucket or other non-entry method. It is understood that this sampling is not the final compliance sampling effort so a precise grid will not be used to drive sample locations. Sufficient samples will be collected to determine that contaminated soil is removed to its lateral and vertical boundaries if possible. Should contaminated soil need to be temporarily left in place efforts will be made to define the area of residual impacts. Sample collection will be done as described in the SAP. In some cases, at the discretion of the sampling technician or environmental branch sampling supervisor, composite samples may be collected to assess larger areas of excavated soil. Composite sampling will consist of collecting up five aliquots of soil from an area larger than the 20' x 20' grid used for compliance sampling. This type of sampling is designed to guide the remedial excavation and define boundaries prior to actual compliance sampling. Due to the presence of diesel range hydrocarbons in the northern portion of Division A-2, analytical method NWTPH-Dx has been added to the analytical list. Diesel-range hydrocarbons appear to be limited in extent, and therefore sample collection to better understand its extent will be conducted post-excavation. Sample locations requiring NWTPH-Dx analysis will be designated based on field screening and proximity to the pipeline corridor, which is the suspected source area for the diesel plume. This sampling addendum is designed to be dynamic and allow for flexibility in the field based on findings during the excavation effort. It is envisioned that a single grab sample will be collected near the center of each 20-foot grid. A map showing the grid layout can be found in Attachment 1. All samples will be analyzed for TPHg and BTEX as per the analytical table below. Should areas of contamination be identified that are unable to be excavated at this time, additional samples will collected from that area and the area will be geo-referenced for future remedial efforts.

Hand auger boring samples were collected to further delineate the extent of gasoline-impacted soils in the northeast portion of Division A-2. Ten borings were completed to a depth of approximately four feet. Samples were collected at approximately 2 feet and 4 feet depths. The samples were screened using PID and benzene meters. The locations of the borings are depicted in Attachment 2: Soil Sampling and Boring Map. A summary report documenting the boring completion and analytical results will be prepared pending receipt of analytical results.

Division A-3 Excavation Guidance

Excavation activities in Division A-3 will be done in a similar fashion to the guidance for Division A-2 above. The screening level will be more conservative to ensure that impacted soils are removed and will not be a continued source of gasoline contamination to Hill Ditch. A screening level of 25 ppm will be used in the field to delineate soils potentially exceeding MTCA Method A clean-up levels and may be supplemented with a benzene screening analysis. Sample collection for MTCA compliance will be

collected based on a 20 foot x 20 foot grid along the base and on 20 foot centers along the sidewalls. Sample locations may be modified as per the findings in the field and at the discretion of the sampling team to ensure representative samples and that samples are collected in a safe manner.

Analytical Protocols:

All samples will be submitted under strict chain-of-custody to Pace Analytical, a TNI-accredited laboratory, for laboratory analysis. The planned analysis for soil samples are listed below in Table 1.

Table 1 Soil Sampling Summary

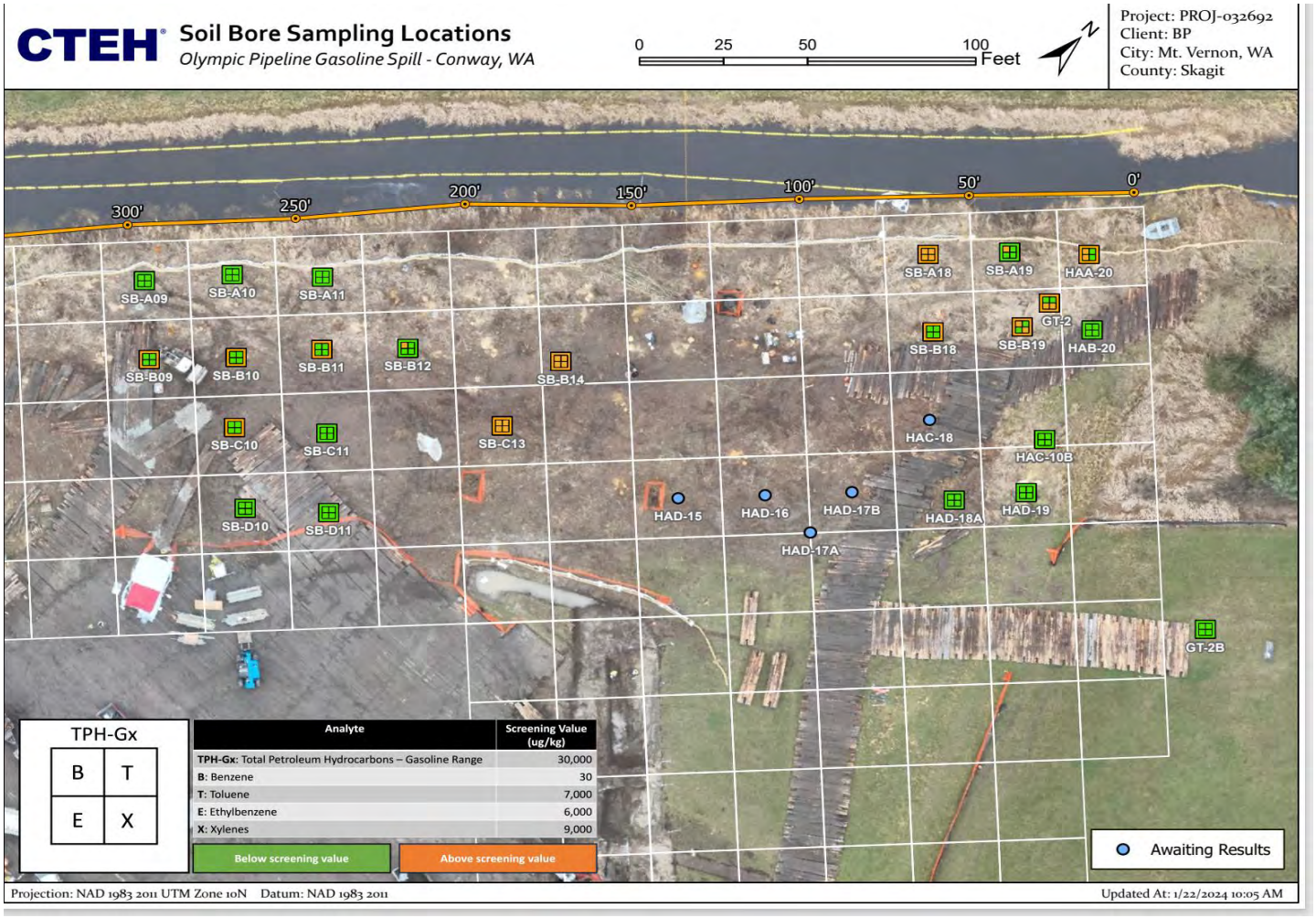
Analysis	Method	Sample Container	Preservative	Hold Time
Total Petroleum Hydrocarbons (TPH)	NWTPH-Gx	Terracore; 2 x 40 mL VOA	Ice, maintained at 0-6°C	14 days
Total Petroleum Hydrocarbons (TPH)	NWTPH-Dx	Terracore; 2 x 40 mL VOA	Ice, maintained at 0-6°C	14 days
Volatile Organic Compounds (VOCs)	US EPA 8260	Terracore; 2 x 40 mL VOA	Methanol; Ice, maintained at 0-6°C	14 days

Reporting

At the conclusion of field work, a report will be generated to document the amount of contaminated soil removed and analytical results for soils that remain in Division A-2. A description of the excavation activity will be included and also contain descriptions of any anomalies, variances to this Plan or unexpected findings. A map of excavated soils will be developed to assist in the design of a final compliance sampling plan.

Attachment 1: Division A Map

Attachment 2: Hand Auger Boring Map



Appendix G-3

Division A4 Addendum

Cover Sheet

Document Name: Sampling and Analysis Plan: Div A-4 Soil SAP Addendum

Incident Name: Olympic Pipeline Gasoline Spill Conway 12/10/23

Printed: 01/29/2024 09:51 PST UTC-8

Approved By

Name/Position	*Comments*	*Status*	*Date/Time*
Tonel, Monica Federal OSC		Approved	01/27/2024 14:08
Cromley, Joan Local Government OSC		Approved	01/27/2024 19:58
Mallick, Kevin Planning Section Chief		Approved	01/27/2024 13:31
Neuhauser, Scott RP Incident Commander		Approved	01/27/2024 13:32
Fritzen, Madeline State OSC		Approved	01/28/2024 06:38
Cleary, Keri Swinomish Tribal OSC		Approved	01/29/2024 06:29

Environmental Sampling and Analysis Plan (SAP) for Delineation and Remediation of Impacted Soils - Division A-4 Addendum

This document has been prepared as an addendum to the approved Environmental Sampling and Analysis Plan (SAP) for Delineation and Remediation of Impacted Soils ("Plan") generated in response to the Olympic Pipeline Gasoline Spill which occurred on December 10, 2023.

The Riparian zone adjacent to the release site has been divided into three subdivisions:

- A-2 (the eastern segment of the former A-2) a 75'-wide zone extending from the pipeline corridor 200' parallel to Hill Ditch;
- A-3, an approximately 25-foot-wide zone directly adjacent to both Hill Ditch and A-2; and
- A-4, the western portion of the riparian zone that has been determined to contain no or little gasoline contamination based on soil sampling data and has a thick clay layer extending from near the surface to depths greater than 10-feet below ground surface (bgs).

This addendum is specific to the delineation of hydrocarbons in Division A-4. See Division A Map in **Attachment 1.**

Health and Safety

Safety is the primary consideration in all fieldwork and given the large amount of activity scheduled at the spill site, communication and coordination is critical. Travelling to and entering the site is subject to restrictions to prevent interference with school traffic and other on-site response activities. Particular attention should be paid to the presence and activity of backhoes and other excavators. A worker safety technician will be attached to each excavator/sampling group to test for potentially hazardous vapors and recognize unsafe situations.

Soil Sampling Methodology

Proposed A-4 soil sample locations and identification numbers are provided in **Attachment 2**. Soil samples shall be collected at the surface of each location. A hand auger will be used to collect samples at depths of 2 feet and 4 feet. Soil samples shall be screened via PID headspace analysis and collected in accordance with the Plan.

Soil Analysis

All samples will be submitted under strict chain-of-custody to Pace Analytical, a TNI-accredited laboratory, for analysis. The planned analyses for soil samples are listed below in Table 1.

Table 1 A-4 Soil Sampling Summary

Analysis	Method	Sample Container	Preservative	Hold Time
Total Petroleum Hydrocarbons (TPH)	NWTPH-Gx	Terracore; 2 x 40mL VOA	Ice, maintained at 0-6°C	14 days
Volatile Organic Compounds (VOCs), including benzene and Total VOCs	US EPA Method 8260	Terracore; 2 x 40mL VOA	Methanol; Ice, maintained at 0-6°C	14 days
Metals (RCRA-8 + copper, nickel and zinc)	EPA 6010/6020, and 7471	1 x 8oz glass jar	Ice, maintained at 0-6°C	180 days; except Hg: 28 days

Attachment A: Division A Map

Attachment B: Proposed Soil Sampling Locations (Div A-4)