COMPLIANCE MONITORING PLAN

Cleanup of Pulp and Tissue Mill
Remedial Action Unit
Georgia-Pacific West Site, Bellingham, Washington

Volume 1: Soil Removal from Bunker C Subarea

Prepared for: Port of Bellingham

Project No. 140298-001-09 • July 24, 2015 Final

Aspect CONSULTING

earth + water

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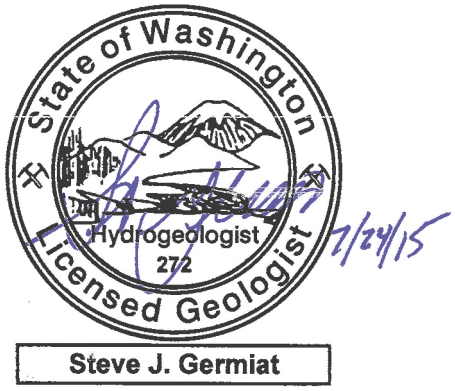

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1 Introduction

This Compliance Monitoring Plan (CMP) Volume 1 describes construction preparation and oversight, compliance monitoring, and reporting requirements for soil removal from the Bunker C subarea, which is a portion of the final cleanup action selected by the Washington State Department of Ecology (Ecology) for the Pulp and Tissue Mill Remedial Action Unit (RAU) of the Georgia-Pacific West Site (Site) shown on Figure 1. The Pulp and Tissue Mill RAU is being cleaned up by the Port of Bellingham (Port) in accordance with the terms of Consent Decree No. 14207008 (Decree) between the Port and Ecology.

Based on the evaluation of RAU remedial alternatives relative to Model Toxics Control Act (MTCA) criteria in the Feasibility Study (FS; Aspect, 2014), Ecology's Cleanup Action Plan (CAP; Ecology, 2014) for the RAU selected a final cleanup action consisting of four elements. The first element is soil removal from the Bunker C Subarea, which is addressed in this volume of the CMP. Volume 1 of the Engineering Design Report (EDR; Aspect, 2015) describes the engineering concepts and design criteria for the Bunker C soil removal.

The Port's Construction Plans and Specifications for the Bunker C soil removal provide requirements for the Port's selected construction contractor (Contractor) to complete this portion of the final cleanup action. This volume of the CMP references the Specifications (concurrently submitted to Ecology), and focuses on construction-related activities which are the responsibility of Aspect Consulting, LLC (Aspect) as the Port's authorized on-Site representative, referred to in the Specifications as "the Engineer."

2 Goal of Bunker C Soil Removal

The selected cleanup action for the Pulp and Tissue Mill RAU will remediate the Pulp and Tissue Mill RAU to meet soil cleanup levels for unrestricted use and groundwater cleanup levels for protection of discharge to the Whatcom Waterway. Protection for direct soil direct contact is achieved by the RAU-wide capping component of the cleanup action, which is addressed in separate cleanup documentation. Groundwater cleanup levels will be achieved through monitored natural attenuation (MNA), which is also addressed in separate cleanup documentation.

The Bunker C soil removal will permanently remove remaining petroleum-contaminated soils that are a potential source of groundwater contamination.

2.1 Soil Remediation Level

The CAP defines 10,000 milligrams per kilogram (mg/kg) total petroleum hydrocarbons (TPH) as the RAU-specific soil remediation level based on Bunker C oil residual

saturation. The soil remediation level is protective of groundwater quality in terms of both accumulation of non-aqueous phase liquid petroleum (NAPL) and leaching to groundwater.

2.2 Excavation Adjacent to Shoreline Bulkhead

Mill-north of the planned excavation area there is a shoreline bulkhead that reportedly is comprised of rip-rap armoring and sheet piles stabilized by tieback anchors. The shoreline bulkhead is located beneath the pile-supported floor slab mill-north of the excavation area. While contaminated soil is not expected to extend in the mill-north direction much beyond the estimated excavation bottom outline shown on Figure 2, its actual extent is not known. The Specifications require that excavation activities not damage the existing shoreline bulkhead, and the excavation will be conducted so as to not damage tiebacks if encountered. The Contractor will monitor conditions during excavation and shall be responsible for determining and notifying Aspect when excavation should stop in order to not compromise the structural stability of the shoreline bulkhead. If excavation is stopped for this reason, the Port, Aspect, and Ecology will consult to determine an appropriate path forward.

If excavation closer to the bulkhead is deemed necessary, measures that may be implemented to excavate and protect the bulkhead include one or more of the following strategies: shallow tied-back shoring or sheet piles, trench boxes, gravity walls, and/or caissons. Each of the strategies is subject to constraints that would be considered before the final option is specified. Even with these measures, removal of all soil exceeding the remediation level may not be practicable due to inaccessibility. An *in situ* solidification/stabilization contingency action can be performed to address inaccessible soil and is described further in the Feasibility Study (Aspect, 2014), CAP (Ecology, 2014), and EDR Volume 1 (Aspect, 2015) for the final cleanup action.

3 Construction Preparation

3.1 Remedial Action Management Plan

The Contractor has been given flexibility in planning and executing this portion of the final action to meet the defined goals. The Specifications are largely “performance-based,” in that they specify required outcomes but rely on the Contractor to propose the most efficient means and methods (within specified constraints) of achieving those outcomes. This approach generally works well for “dig-and-haul” cleanups of this magnitude, provided that an experienced environmental cleanup contractor performs the work. It takes advantage of the Contractor’s previous experience with similar dig-and-haul projects, and places the contractor in more of an “ownership” role with respect to the construction means and methods to be employed. Supplemental bidder criteria are established in the Specifications, and the Port can eliminate from consideration a Contractor that does not meet the minimum requirements.

As described in the Specifications, prior to mobilization, the Contractor will prepare and submit for approval a Remedial Action Management Plan (RAMP) that proposes detailed construction means and methods for completing this portion of the final action in compliance with the Construction Plans and Specifications. The RAMP will include the following:

- A Temporary Erosion and Sedimentation Control (TESC) Plan addressing erosion, sedimentation, and stormwater controls during construction;
- A Contingency Plan addressing environmental protection (e.g., controlling and preventing spills of hazardous materials);
- An Excavation and Backfilling Work Plan detailing the excavation and backfilling approach, including stockpiling of overburden soil for chemical testing, and excavation dewatering with water treatment and disposal; and
- A Waste Management Plan addressing the procedures to load, transport, and dispose of waste materials.

Aspect will review and provide comments on the RAMP. No work at the Project Site, with the exception of site inspections and surveys, shall be performed until the RAMP is approved.

3.2 Monitoring Well Decommissioning

Prior to the start of interim action construction, groundwater monitoring well BC-MW101, located within the expected soil excavation area (Figure 2), will be decommissioned in accordance with the requirements of Chapter 173-160 WAC.

4 Construction Oversight and Monitoring

During the Bunker C Subarea soil removal, Aspect will conduct the following construction oversight and monitoring activities in the role of Engineer:

- Oversight of mobilization and site preparation, including temporary removal/relocation of utilities as needed, monitoring well decommissioning, and establishment of temporary erosion and sediment controls;
- Oversight of soil excavation and stockpiling, including direction of soil and debris segregation;
- Soil sampling and analysis to designate overburden soils as contaminated soil or not;
- Soil sampling and analysis within the excavation to verify that the soil remediation level is achieved (cleanup goal achieved);
- Oversight of excavation dewatering and treatment/disposal of the water;

- Oversight of loading and off-Site disposal of contaminated soils and debris, including compilation of certificates of disposal as documentation;
- Oversight of crushing and on-Site placement of usable concrete; and
- Oversight of excavation backfill and compaction, and replacement of utilities as needed.

These activities are briefly described in this section. Refer to the Construction Plans and Specifications for additional detail on the required construction activities.

4.1 Mobilization and Site Preparation

Aspect will monitor the following Contractor mobilization and site preparation activities for compliance with the Specifications:

- Mobilize construction equipment, materials, and utilities (e.g., electrical generators).
- Mobilize, install, and test a dewatering and water treatment system. The dewatering system will dewater the saturated contaminated soil to facilitate effective soil removal and handling and verification soil sampling. The treatment systems will remove settleable solids and separate-phase oil from excavation dewatering water and water accumulating in the soil stockpile areas. The water treatment system will include conveyance piping from the source areas to the treatment system inlet and from the treatment system outlet to the point of discharge to the Port's pump station to the Aeration Stabilization Basin (ASB).
- Construct bermed and lined soil stockpile area(s) for contaminated soil and debris, as determined by field screening during excavation, and separate stockpile areas for overburden and for uncontaminated debris. Water collecting within stockpile areas will be treated and disposed of using the water treatment system described above.
- Construct erosion and sedimentation controls in accordance with the TESC Plan.
- Remove or reroute active utilities (e.g., stormwater infrastructure, overhead power lines and poles) that may be impacted by the cleanup activities. At the end of the cleanup action, utilities that were modified will be restored to their preconstruction function.
- The Contractor will propose in the RAMP where to locate various activities such as soil stockpiling and water storage/treatment, so as to not interfere with other construction and/or demolition projects occurring concurrently on site.
- Prior to start of construction, Aspect will oversee decommissioning of existing monitoring well BC-MW101, located within the northern central edge of the planned excavation area (Figure 2). Decommissioning will be performed in accordance with the provisions of Chapter 173-160 WAC.

4.2 Soil Excavation, Stockpiling, and Monitoring

4.2.1 Soil Excavation and Segregation

Figure 2 shows the anticipated soil excavation area bottom, based on the current understanding of subsurface conditions. The data that are the basis for defining the excavation area (extent of soil exceeding remediation level) are also shown (data are described in Aspect [2015]). Excavation sidewalls will extend laterally beyond the excavation bottom as needed to maintain a stable excavation.

Aspect is responsible for directing soil segregation activities. During excavation, visual and olfactory field screening techniques will be used to distinguish between excavated soil that is inferred to be above the remediation level of 10,000 mg/kg TPH ("contaminated soil") and that inferred to be below the remediation level ("overburden soil"). Contaminated soil is expected to be encountered at depths between about 7 and 15 feet below grade. The two soil streams will be segregated and managed separately.

Soils that are judged by Aspect to be contaminated based on field screening do not require sampling/analysis prior to load-out for off-Site treatment/disposal. However, if the Contractor chooses to stockpile contaminated soil prior to loading for off-Site disposal, the ground surface in that stockpile area will be lined/sealed to prevent contaminated soil from contacting underlying materials.

The overburden soil will likewise be stockpiled in a bermed, lined/sealed stockpile area in the event that a stockpile needs to be managed as contaminated soil based on sampling results.

All stockpiles will be covered with a geomembrane when not in use. Water accumulating in the bermed stockpile areas will be pumped to the Contractor's on-Site water treatment system and then discharged to the ASB pump station.

4.2.2 Overburden Stockpile Sampling and Disposition

The overburden soil will be stockpiled on site pending completion of TPH analysis by an Ecology-accredited laboratory (Section 4.2.5) to confirm its designation as contaminated soil or not. Stockpiles of overburden soil will not exceed 100 cubic yards in size for the purpose of designation testing for disposition, and each stockpile will have one representative five-point composite sample to determine its compliance with the remedial level and thus its disposition.

Overburden stockpiles containing a detected TPH concentration (sum of diesel- and oil-range concentrations) above the 10,000 mg/kg TPH soil remediation level will be properly disposed of off-Site as contaminated soil. Stockpiles of overburden with a detected TPH concentration below the remediation level will be retained for backfilling the excavation, irrespective of geotechnical character. Because overburden soil meeting the remediation level (thus used as backfill) is assumed to exceed the more stringent soil cleanup levels for one or more contaminants, it will be capped in accordance with the CAP requirements for capping all RAU soil, as described in Section 4.5.

4.2.3 Debris

During excavation to remove soil, abundant subsurface structural elements will be encountered, such as concrete floor slabs, concrete grade beams, concrete pile caps, vertical wood piles, and pipes of various sizes and materials. The structural materials will be removed only as needed to access contaminated soil, and will be broken or cut as needed so that they can be removed from the excavation, and stockpiled. Soil stockpiles cannot contain any materials whose largest dimension exceeds 1 foot. Materials with any dimension exceeding 1 foot will be segregated and stockpiled separately as inert debris, contaminated debris, or usable concrete as directed by the Aspect Engineer, in accordance with the Specifications.

If visual and olfactory screening indicates that the removed debris is contaminated, it will be managed for off-Site disposal consistent with the contaminated soil. If the removed debris does not appear to be contaminated, it will be designated either as "inert debris[1]" or "usable concrete." Inert debris may be reused as excavation backfill above the water table (if dimensions less than 1 foot) or properly disposed of offsite. Concrete not visually contaminated with petroleum is usable concrete and will be managed in accordance with the Specifications. The Specifications require that, unless otherwise proposed by the Contractor and approved by Aspect, usable concrete will be crushed to a 3-inch minus size and transported to a usable concrete stockpile area on-Site as directed by Aspect.

If contaminated fluids (such as petroleum product) are encountered in piping or other structural elements, the Specifications require the Contractor to collect and properly dispose of the fluids.

The ground surface in the contaminated debris stockpile area (can be same as contaminated soil stockpile area) will be sealed, and the stockpiles of contaminated debris will be covered when not in use. Water accumulating in the contaminated debris stockpile area will be pumped to the Contractor's on-Site water treatment system and then discharged to the ASB pump station. The ground surface in the inert debris stockpile area need not be sealed, and the inert debris stockpiles need not be covered unless needed to control dust.

4.2.4 Performance Monitoring and Over-Excavation

When field screening indicates that contaminated soils have been removed from a portion of the excavation to meet the remediation level, excavation sidewall and bottom verification soil samples will be collected for laboratory analysis to confirm compliance with the 10,000 mg/kg TPH soil remediation level. The soil samples will be collected from within the excavation using the excavator bucket, or by hand if safely accessible to a worker.

Excavation bottom samples will be collected on a systematic 20-foot grid (one sample per 20-foot by 20-foot square), with a minimum of four bottom samples, to document that

[1] Meets the WAC 173-350-990 criteria for inert waste.

the 10,000 mg/kg TPH remediation level is met at depth—i.e., vertically bounded. Excavation sidewall sampling will be conducted to document that the lateral extent of soil exceeding the 10,000 mg/kg remediation level has been removed. Sidewall samples will be collected at a horizontal spacing of approximately 20 feet and at 4-foot depth intervals (e.g., 0 to 4 feet, 4 to 8 feet, 8 to 12 feet, etc.), or zones of visual contamination/staining, across the full extent of excavation sidewalls. A minimum of two samples will be collected from each sidewall (potentially less than 40 feet in length) at each depth interval.

Where the concentration of TPH in an excavation sidewall sample exceeds the remediation level, the length of sidewall represented by the sample will be over-excavated at least 1 foot laterally, if practicable, subject to the requirement to protect the bulkhead structure (see Section 2.2). If field screening at the new sidewall location indicates the remediation level is met, then a new sidewall verification sample will be collected at that location and submitted for analysis. Where the concentration of TPH in an excavation bottom sample exceeds the remediation level, the excavation will be deepened in the area represented by the sample by at least 1 foot, if practicable, followed by collection of a new bottom verification sample.

4.2.5 Soil Sampling and Laboratory Analyses

The soil sampling and chemical analysis described above will be conducted in accordance with the Sampling and Analysis Plan and Quality Assurance Project Plan included in Appendix A.

As noted in Appendix A, Aspect will submit overburden and excavation verification soil samples to Onsite Environmental, Inc., of Redmond, Washington, for TPH analysis in the diesel and heavy oil ranges (Method NWTPH-Dx with silica gel cleanup). OnSite Environmental's lab is accredited by Ecology to conduct the NWTPH-Dx analysis. Typically, 24-hour turnaround will be requested for the lab analyses, so as to not delay the cleanup progress.

For purposes of compliance determination, the lab-reported diesel-range and oil-range hydrocarbon concentrations will be summed, in accordance with Ecology policy, to determine the soil TPH concentration compared against the TPH soil remediation level.

4.3 Excavation Dewatering and Management of Water

Construction dewatering will be conducted during the excavation to facilitate soil removal and handling and excavation verification soil sampling. Means and methods for dewatering will be determined by the construction Contractor, and may include temporary sumps within the open excavation, well points outside the excavation, and/or groundwater cutoff technologies. Methods such as temporary shoring, trench boxes, etc. can also be employed to reduce water inflow and/or stabilize the excavations.

Groundwater pumped during dewatering will be conveyed to the Contractor's water treatment system where it will be pre-treated to reduce settleable solids and remove NAPL, then discharged to the ASB pump station in accordance with the Port's NPDES permit (Permit No. WA-000109-1) for the facility. Aspect will regularly monitor water discharged from the Contractor's water treatment system to confirm compliance with the

project water quality performance standards, as per the Specifications (total settleable solids below 100 ml/L and no visible NAPL).

4.4 Off-Site Disposal of Excavated Material

The Contractor is responsible for selecting the permitted off-Site soil disposal facility, completing upfront waste profiling paperwork, and obtaining the disposal permit. Analytical data to support the Contractor's waste profiling is provided in Aspect (2015) and as an appendix to the Specifications.

The Contractor will provide Aspect with copies of the treatment/disposal permit (pre-approval) and certificates of disposal for material disposed of off site, and Aspect will include them in the as-built report documenting the soil removal action (refer to Section 5).

4.5 Excavation Backfill

The excavation will be backfilled to the approximate pre-construction grade using a combination of stockpiled reusable overburden soil and gravel borrow imported from a known source of uncontaminated fill. Stockpiled reusable overburden soil that meets the remediation level will be used preferentially over imported gravel borrow. Depending upon the condition of the subgrade material prior to backfill, quarry spalls may be required as a base for the backfilled materials. The backfill soil will be placed in lifts and compacted as called for in the Specifications.

Because overburden soil used as backfill is assumed to exceed cleanup levels, it will not be placed at depths less than 2 feet below existing grade. Rather, the uppermost 2 feet of compacted backfill will be uncontaminated imported gravel borrow, which will be underlain by the separation geotextile to distinguish the capping material from the underlying soil, in accordance with the CAP and the Specifications.

5 Reporting

In accordance with the CAP (Ecology, 2014), an As-Built Report will be prepared after the Bunker C Subarea soil removal is completed to provide documentation of the activities for Ecology review in accordance with the Consent Decree. At a minimum, the report will include the following:

- Description of cleanup activities conducted, including deviations from the construction specifications;
- Maps illustrating the as-built excavation area and other pertinent information;
- Detailed performance monitoring information, including sample locations, analytical methods, data quality review, and results;

- If the soil remediation level was not achieved everywhere (e.g., due to soil inaccessibility), discussion of why it was not, and how it was addressed in consultation with Ecology;
- Documentation of water management during construction;
- Documentation of overburden soil segregation, sampling results, and disposition;
- Documentation of contaminated soil disposal, including quantities of soil removed and disposed, and landfill certificates of disposal; and
- Documentation of excavation backfill quantities by source.

The As-Built Report for the Bunker C Subarea Soil Removal will be submitted to Ecology as a draft for review. Ecology comments will be incorporated and a final Report prepared. The data collected during the cleanup will be uploaded to Ecology's Environmental Information Management (EIM) database in accordance with the Consent Decree.

6 References

Aspect Consulting (Aspect), 2014, Feasibility Study, Pulp/Tissue Mill Remedial Action Unit, Vol. 2a of RI/FS, Georgia-Pacific West Site, Bellingham, Washington, October 27, 2014.

Aspect Consulting (Aspect), 2015, Engineering Design Report, Cleanup of the Pulp and Tissue Mill Remedial Action Unit, Georgia-Pacific West Site, Bellingham, Washington, Volume 1: Soil Removal from Bunker C Subarea, May 14, 2015.

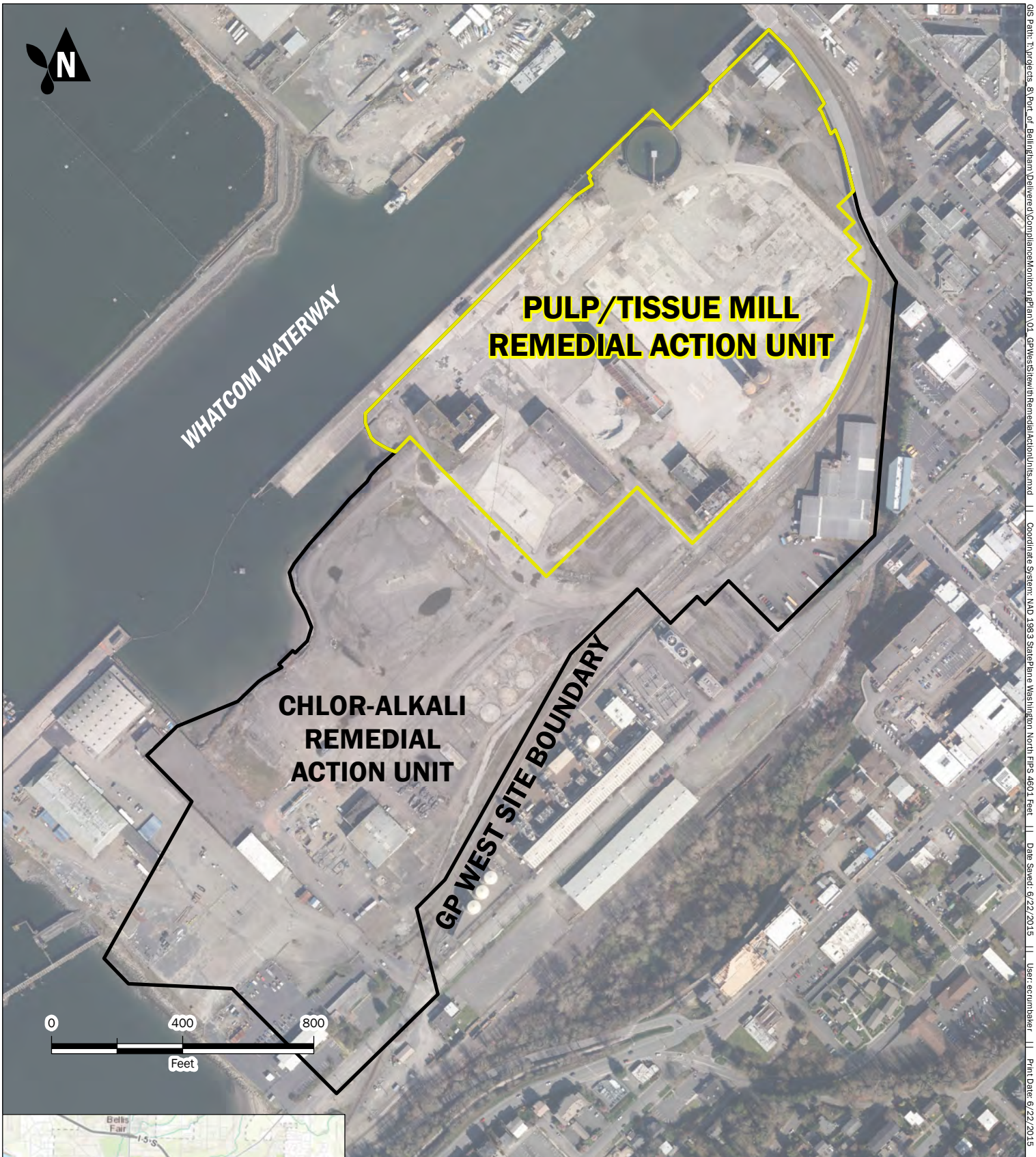
Washington State Department of Ecology (Ecology), 2014, Cleanup Action Plan, Pulp/Tissue Mill Remedial Action Unit, Georgia-Pacific West Site, Bellingham, Washington, Exhibit B to Consent Decree No. 14207008, October 30, 2014.

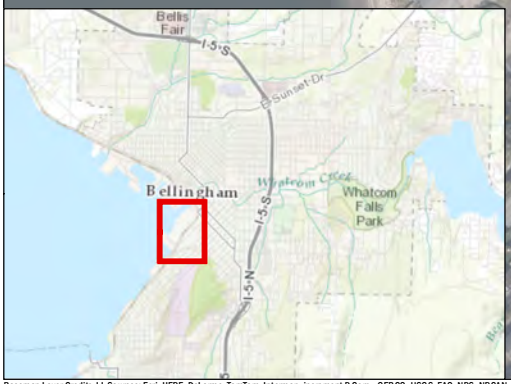
7 Limitations

Work for this project was performed for the Port of Bellingham (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

FIGURES





GP West Site with Remedial Action Units

Compliance Monitoring Plan
Pulp/Tissue Mill RAU
GP West Site, Bellingham, WA

Aspect CONSULTING	JUN-2015	BY: MAV / EAC	FIGURE NO. 1
	PROJECT NO. 140298	REVISED BY: ---	

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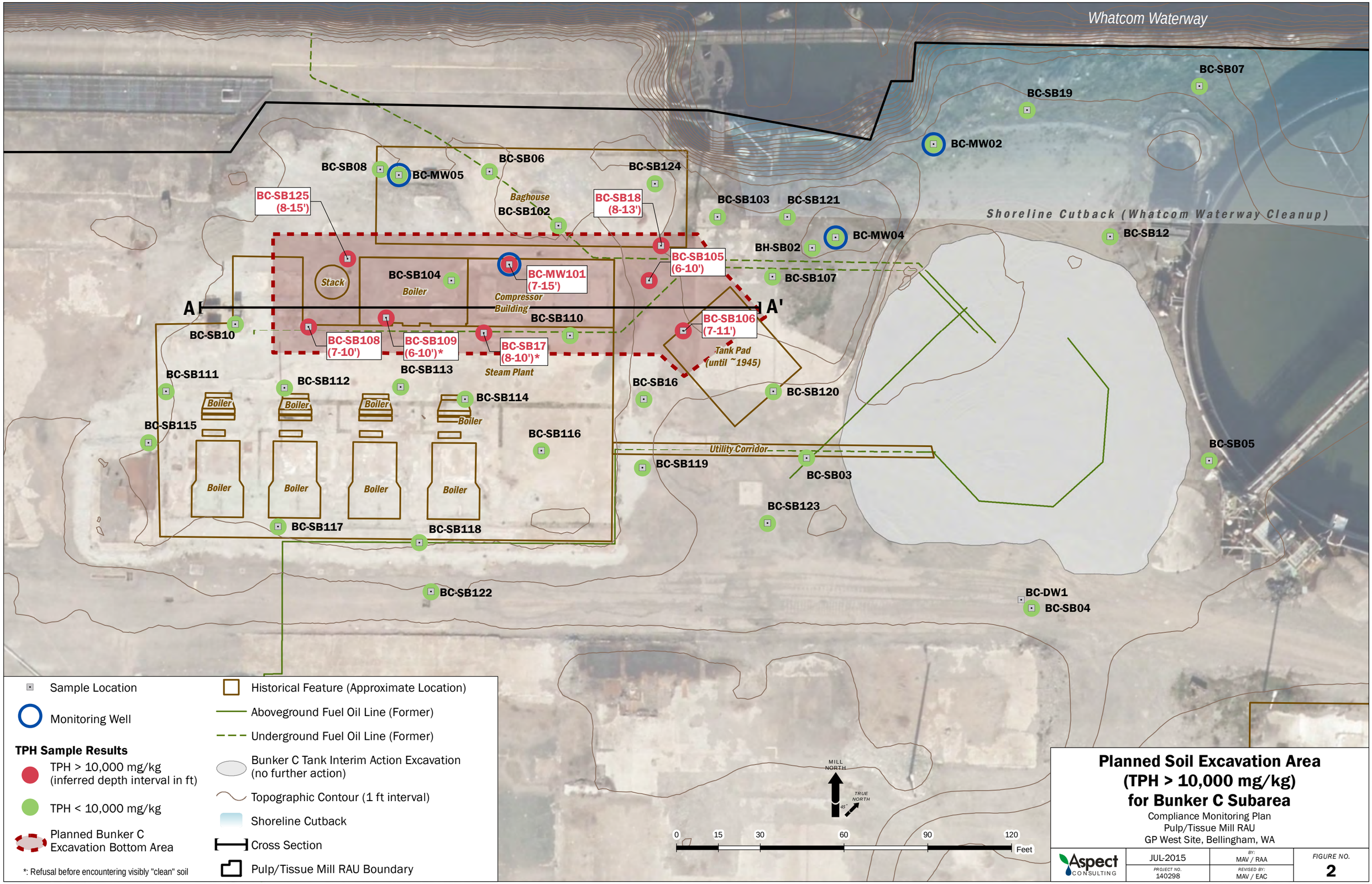

- Sample Location
- Monitoring Well

TPH Sample Results

- TPH > 10,000 mg/kg (inferred depth interval in ft)
- TPH < 10,000 mg/kg
- Planned Bunker C Excavation Bottom Area

*: Refusal before encountering visibly "clean" soil

- Historical Feature (Approximate Location)
- Aboveground Fuel Oil Line (Former)
- Underground Fuel Oil Line (Former)
- Bunker C Tank Interim Action Excavation (no further action)
- Topographic Contour (1 ft interval)
- Shoreline Cutback
- Cross Section
- Pulp/Tissue Mill RAU Boundary

Planned Soil Excavation Area (TPH > 10,000 mg/kg) for Bunker C Subarea

Compliance Monitoring Plan
Pulp/Tissue Mill RAU
GP West Site, Bellingham, WA

Aspect CONSULTING

JUL-2015	BY: MAV / RAA	FIGURE NO. 2
PROJECT NO. 140298	REVISED BY: MAV / EAC	

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APPENDIX A

Sampling and Analysis Plan for Compliance Monitoring of Bunker C Soil Removal

A. Sampling and Analysis Plan for Compliance Monitoring of Bunker C Soil Removal

The purpose of this Sampling and Analysis Plan (SAP) is to ensure that field sample collection, handling, and laboratory analysis conducted during compliance monitoring for the Bunker C soil removal within the Pulp/Tissue Mill Remedial Action Unit (RAU) will generate data to meet project-specific data quality objectives in accordance with Model Toxics Control Act (MTCA) requirements (WAC 173-340-350).

This SAP is comprised of two major components: a Field Sampling Plan (FSP; Section 1) defining field sampling protocols and a Quality Assurance Project Plan (QAPP; Section 2) defining analytical protocols. It is the responsibility of the Aspect Consulting, LLC (Aspect) personnel and subcontracted analytical laboratory personnel performing the compliance monitoring activities to adhere to the requirements of the FSP and QAPP.

A.1. Field Sampling Plan

A.1.1. Soil Sampling Procedures

As described in Section 4 of the Compliance Monitoring Plan (CMP), Aspect will collect both overburden and excavation verification soil samples that will be submitted to the analytical laboratory for total petroleum hydrocarbon (TPH) analysis in the diesel and heavy oil ranges (Method NWTPH-Dx with silica gel cleanup). The QAPP (Section 2) provides additional information regarding the laboratory analyses.

Overburden Samples. Stockpiles of overburden soil will not exceed 100 cubic yards in size for the purpose of designation testing for disposition. Each stockpile will have one representative five-point composite sample collected by hand using a decontaminated stainless-steel spoon or disposable spoon to determine its compliance with the 10,000-milligram per kilogram (mg/kg) TPH remediation level, and thus, its ultimate disposition as contaminated (off-Site disposal) versus usable as backfill beneath a cap. The five subsamples being composited will be collected from a minimum of 6 inches below the outer surface of the stockpile at each location. The subsample volumes will be homogenized in a decontaminated stainless steel bowl prior to placement of the representative composite sample into laboratory-supplied containers.

Excavation Verification Samples. Excavation sidewall and bottom verification soil samples will be collected for laboratory analysis to confirm compliance with the 10,000 mg/kg TPH soil remediation level. The verification samples will be discrete grab samples of soil collected from within the excavation using the excavator bucket, or, if safely accessible to a worker, by hand using a decontaminated stainless steel spoon or disposable spoon.

- The excavation bottom verification samples will be collected on a systematic 20-foot grid (one sample per 20-foot by 20-foot square), with a minimum of four bottom samples, to document that the remediation level is met at depth.
- The excavation sidewall verification samples will be collected at a horizontal spacing of approximately 20 feet and at 4-foot depth intervals (e.g., 0 to 4 feet, 4 to 8 feet, 8 to 12 feet, etc.), or zones of visual contamination/staining, across the full extent of the excavation sidewalls. A minimum of two samples will be collected from each sidewall (potentially less than 40 feet in length) at each depth interval.

A.1.2.Investigation-Derived Waste

Rinsate from decontamination of sampling equipment will be collected and discharged to the Contractor's water treatment system, which discharges to the Aeration Stabilization Basin (ASB). Disposable personal protective equipment for personnel conducting the construction oversight and monitoring will be disposed of with the contaminated soil or debris.

A.1.3.Sampling Documentation Procedures

A.1.3.1. Field Documentation

While conducting field work, the field representative will document pertinent observations and events on field forms specific to each activity in a field notebook, and, when warranted, provide photographic documentation of specific sampling efforts. Field notes will include a description of each field activity, sample descriptions, and associated details such as the date, time, and field conditions.

A.1.3.2. Sample Labeling and Nomenclature

Sample labels will clearly indicate the soil sample identification (which will include the soil sample number and sample date), sampler's initials, and any pertinent comments.

A.1.3.3. Sample Handling and Custody

Upon collection, each soil sample will be placed in a laboratory-provided sample container and placed upright in a cooler. Ice or Blue Ice will be placed in each cooler to meet sample preservation requirements. Inert cushioning material will be placed in the remaining space of the cooler as needed to limit movement of the sample containers. Once the samples and completed chain-of-custody form (described below) are in the cooler, it will be taped shut prior to transport to the laboratory.

After collection, samples will be maintained in the consultant's custody until formally transferred to the analytical laboratory. For purposes of this work, custody of the samples will be defined as follows:

- In plain view of the field representatives;
- Inside a cooler that is in plain view of the field representative; or
- Inside any locked space such as a cooler, locker, car, or truck to which the field representative has the only immediately available key(s).

A chain-of-custody record provided by the laboratory will prepared for all samples collected, and it will be signed by the field representative and others who subsequently take custody of the sample. Couriers or other professional shipping representatives are not required to sign the chain-of-custody form; however, shipping receipts will be collected and maintained as a part of custody documentation in project files. The analytical laboratory's data report will include a copy of the fully executed chain-of-custody form for the samples in the report.

Upon sample receipt, the laboratory will fill out a cooler receipt form to document sample delivery conditions. A designated sample custodian will accept custody of the shipped samples and will verify that the chain-of-custody form matches the samples received. The laboratory will notify the consultant project manager of any issues noted with the sample shipment or custody as soon as possible.

A.2. Quality Assurance Project Plan

The purpose of the QAPP is to define, in specific terms, the quality assurance (QA) and quality control (QC) objectives, organization, and functional activities associated with the sampling and analysis of soil samples collected for compliance monitoring of the soil removal for the Bunker C Subarea.

OnSite Environmental of Redmond, Washington, is the Washington Department of Ecology (Ecology)-accredited analytical laboratory that will conduct the analyses of soil samples under the compliance monitoring plan. The Port of Bellingham (Port) can propose for Ecology approval a change to analytical laboratory, assuming the new laboratory can meet the QC requirements of this QAPP. No change in laboratory will occur without Ecology approval.

A.2.1. Analytical Procedures and Target Reporting Limits

Laboratory analytical methods and target reporting limits for soil analyses to be performed during this monitoring program are as follow:

Constituent	Analytical Method	Target Reporting Limit (mg/kg)
TPH analysis in the diesel and heavy oil ranges	NWTPH-Dx with silica gel cleanup	100 (for diesel and heavy oil ranges)

The above-listed reporting limit (RL) for the method defined is well below the 10,000 mg/kg TPH remediation level defined in Ecology's Cleanup Action Plan (CAP). The RL is equivalent to the practical quantitation limit (PQL) and is defined as the lowest concentration at which a chemical can be accurately and reproducibly quantified, within specified limits of precision and accuracy, for a given environmental sample. The RL can vary from sample to sample depending on sample size, sample dilution, matrix interferences, and other sample-specific conditions.

A.2.2. Data Quality Objective and Indicators

The data quality objective for this project is to reliably document the TPH concentrations in soil samples collected as part of the soil removal from the Bunker C Subarea in order to determine compliance with the CAP's soil remediation level for the cleanup action.

Data quality indicators (DQIs), including precision, accuracy, representativeness, comparability, and completeness (PARCC parameters), and data RLs are dictated by the data quality objectives, project requirements, and intended uses of the data. An assessment of data quality is based upon quantitative (precision, accuracy, and completeness) and qualitative (representativeness and comparability) indicators. Definitions of these parameters and the applicable QC procedures are presented below.

A.2.2.1. Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared with their average values. For the NWTPH-Dx analysis, analytical precision is quantitatively expressed as the relative percent difference (RPD) between lab duplicate pairs. Analytical precision measurements will be carried out at a minimum frequency of 1 per 20 samples or one per laboratory analysis group. Laboratory precision will be evaluated against laboratory quantitative RPD performance criteria provided with the lab's analytical data report.

A.2.2.2. Accuracy

Accuracy measures the closeness of the measured value to the true value. For the NWTPH-Dx analysis, the accuracy of chemical test results is assessed by "spiking" samples with known surrogates and establishing the recovery. Surrogate recoveries will be determined for each sample analyzed. Laboratory accuracy will be evaluated against the lab's quantitative surrogate recovery performance criteria as provided with the lab's analytical data report.

A.2.2.3. Representativeness

Representativeness measures how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the matrix sampled. The sampling plan design, sampling techniques, and sample handling protocols (e.g., homogenizing, storage, and preservation) have been developed to ensure representative samples.

A.2.2.4. Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard techniques for both sample collection and laboratory analysis should make data collected comparable to internal data generated for this project as well as preexisting analytical data that may exist.

A.2.2.5. Completeness

Completeness is defined as the percentage of measurements made that are judged to be valid measurements. Results will be considered valid if all the precision, accuracy, and representativeness objectives are met and if RLs are sufficient for the intended uses of the data. The target completeness goal for this project is 95 percent.

Laboratory internal QC checks, preventive maintenance, and corrective action, as described in other sections of this document, will be implemented to help meet the QA objectives established for these analyses.

A.2.3. Quality Control Procedures

Field and laboratory QC procedures are outlined below.

A.2.3.1. Field Quality Control

The use of standardized field sampling protocols is defined in Section 1, no additional field QC procedures are planned for this project.

A.2.3.2. Laboratory Quality Control

The laboratory's QA officers are responsible for ensuring that the laboratory implements all routine internal QC and QA procedures. The laboratory QC procedures used for this project will consist of the following at a minimum:

- Instrument calibration and standards as defined in the laboratory standard operating procedures (SOPs);
- Laboratory blank measurements at a minimum frequency of 5 percent or one per twenty samples; and
- Accuracy and precision measurements as defined above, at a minimum frequency of 5 percent or one per twenty samples per matrix.

A.2.4. Corrective Actions

If routine QC audits by the laboratory detect unacceptable conditions or data, actions specified in the laboratory SOPs will be taken. Specific corrective actions are outlined in each SOP used and can include the following:

- Identifying the source of the violation;
- Reanalyzing samples if holding time criteria permit;
- Resampling and analyzing;
- Evaluating and amending sampling and analytical procedures; and/or
- Accepting, but qualifying data to indicate the level of uncertainty.

If unacceptable conditions occur, the laboratory will contact the consultant's project manager to discuss the issues and determine the appropriate corrective action. All corrective actions taken by the laboratory during analysis of samples for this project will

be documented by the laboratory in the case narrative associated with the affected samples.

A.2.5. Data Quality Review and Reporting

All data will undergo two levels of QA/QC evaluation: one at the laboratory and one by a validator independent of the laboratory. Initial data QC evaluation and reporting at the laboratory will be carried out as described in the appropriate analytical protocols. Quality control data resulting from methods and procedures described in this document will also be reported.

A.2.5.1. Minimum Data Reporting Requirements

The following sections describe the minimum data reporting requirements necessary to allow proper QA/QC reporting.

Sample Receipt. Cooler receipt forms will be filled out for all sample shipments to document problems in sample packaging, chain of custody, and sample preservation.

Reporting. For each analytical method run, analytes for each sample will be reported as a detected concentration or as less than the specific RL. The laboratory will report dilution factors for each sample as well as date of extraction (if applicable), date of analysis, extraction method, additional sample preparation methods performed if any, and confirmation results where required.

Internal Quality Control Reporting. Internal quality control samples will be analyzed at the rates specified in the NWTPH-Dx method.

- *Laboratory Method Blanks.* Analytes will be reported for each laboratory blank. Nonblank sample results will be designated as corresponding to a particular laboratory blank in terms of analytical batch processing.
- *Surrogate Spike Samples.* Surrogate spike recoveries will be reported for each sample analyzed by the NWTPH-Dx method. The report shall also specify the control limits for surrogate spike results as well as the spiking concentration. Spike recoveries outside of specified control limits (as defined in the laboratory SOP) will result in the sample being rerun.
- *Laboratory Duplicate Pairs*. Relative percent differences will be reported for duplicate pairs relative to analyte/matrix-specific control limits defined in the laboratory SOP.

A.2.5.2. Data Quality Review

Reported analytical results will be qualified by the laboratory to identify QC concerns in accordance with the specifications of the analytical methods and the laboratory's SOPs. Additional laboratory data qualifiers may be defined and reported by the laboratory to more completely explain QC concerns regarding a particular sample result. All additional data qualifiers will be defined in the laboratory's narrative reports associated with each case.

Aspect will prepare an independent Stage 2A data quality review for all analytical data generated for this project. The data quality review will be performed in accordance with U.S. Environmental Protection Agency (EPA) National Functional Guidelines for organic analyses (EPA, 2004), Ecology's NWPTH methodology (Ecology, 1997), and laboratory-defined QC limits, with regard to the following, as appropriate to the particular analysis:

- Sample documentation/custody;
- Holding times;
- Method blanks (representativeness);
- Reporting limits;
- Surrogate percent recoveries (accuracy);
- Laboratory duplicate pair RPDs (precision);
- Comparability; and
- Completeness.

A.2.6. Preventative Maintenance Procedures and Schedules

Preventative maintenance in the laboratory will be the responsibility of the laboratory personnel and analysts. This maintenance includes routine care and cleaning of instruments, and inspection and monitoring of carrier gases, solvents, and glassware used in analyses. Details of the maintenance procedures are addressed in the respective laboratory SOPs.

Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to change as indicated by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the method-specific QC criteria.

A.2.7. Performance and Systems Audits

The consultant's project manager has responsibility for performance of the laboratory QA program. This will be achieved through regular contact with the analytical laboratory's project manager. To ensure comparable data, all samples of a given matrix to be analyzed by each specified analytical method will be processed consistently by the same analytical laboratory.

A.3. References for Appendix A

U.S. Environmental Protection Agency (USEPA), 2004, Contract Laboratory Program National Functional Guidelines for Organic Methods Data Review, Office of Superfund Remediation and Technology Innovation (OSRTI), USEPA Publication No. 540-R-04-004, October.

Washington State Department of Ecology (Ecology), 1997, Analytical Methods for Petroleum Hydrocarbons, Ecology publication no. 97-602, June.

Washington State Department of Ecology (Ecology), 2014, Cleanup Action Plan, Pulp/Tissue Mill Remedial Action Unit, Georgia-Pacific West Site, Bellingham, Washington, Exhibit B to Consent Decree No. 14207008, October 30, 2014.