TECHNICAL MEMORANDUM

DATE: October 11, 2012

TO: Mr. Steve Teel;
Washington Department of Ecology; SWRO

FROM: Aaron Galer
Northwest Pipeline GP

Eric Koltes, L.G.
Environmental Partners, Inc.

Alan Hopkins, P.G.
Portnoy Environmental, Inc.

RE: Response to Ecology Letter (July 30, 2012)
Re: Opinion on Proposed Cleanup of the following Site:
Name: Sumner Compressor Station
Address: 3104 166th Avenue East, Sumner, WA
Facility/Site No.: 59485745
Cleanup Site ID No.: 7302
UST No.: 7302
VCP No.: SW0717

INTRODUCTION

Northwest Pipeline GP (NWPL GP), and our consultants, Environmental Partners Inc. (EPI) and Portnoy Environmental Inc. (PEI), are pleased to present this response to the Washington Department of Ecology's (Ecology's) July 30, 2013 Letter Re: Opinion on Proposed Cleanup for the Sumner compressor station (C/S) facility (Opinion Letter).

The Opinion Letter was based upon a review of the following:

1. December 2005, Williams Gas Pipeline, Environmental Partners, Inc., and Portnoy Environmental. Site Condition Summary and Sampling Plan, Sumner Compressor Station, 3104 166th Avenue East, Sumner, Washington.

2. November 2008, Williams Gas Pipeline, Environmental Partners, Inc., and Portnoy Environmental. Deferred AOPC Sampling Plan, Sumner Compressor Station, 3104 166th Avenue East, Sumner, Washington.

3. April 30 2012, Williams Gas Pipeline, Environmental Partners, Inc., and Portnoy Environmental. Remedial Investigation and Cleanup Action Plan, Volumes I and II, Sumner Compressor Station, 3104 166th Avenue East, Sumner, Washington.

Based on a review of Ecology's Opinion Letter, it appears that many of the comments are centered on estimated or assumed subsurface conditions and the fact that samples were not collected at specific depths that were specified in the *Deferred AOPC Sampling Plan*. The site-specific geologic conditions are important site features to understand in establishing whether or not the site is adequately characterized.

As documented in the *Remedial Investigation and Cleanup Action Plan* (RI-CAP), the site was fully investigated and hollow-stem auger (HSA) borings consistently encountered refusal on bedrock at depths ranging from 5 to 16 feet below grade. No shallow ground water was encountered at the soil-bedrock interface in any of the borings advanced. As such, it was empirically demonstrated that such a shallow ground water table was not present at the site during the performance of the scope of work; it was unnecessary to install ground water monitoring wells, and it was not possible to collect deeper subsurface soil samples due to the presence of bedrock. Deviations to the procedures detailed in the *Deferred AOPC Sampling Plan* were detailed in Section 4.2.5 in the RI-CAP.

The remainder of this document focuses on addressing Ecology's specific comments to the proposed cleanup. There are numerous comments that NWPL GP requires additional information. These inquiries are presented in **bold** throughout the remainder of the document. Please provide NWPL GP with a response that addresses these inquiries.

For clarity, Ecology's original comments have been included herein in *italics*. NWPL GP's response follows each comment.

Comment 1: *Ecology has concluded that, upon completion of your proposed cleanup, further remedial action will likely be necessary to clean up contamination at the Site. That conclusion is based on the following analysis:*

1. Characterization of the Site.

Ecology has determined your characterization of the Site is not sufficient to establish cleanup standards and select a cleanup action.

The Sumner Compressor Station consists of one contiguous parcels totaling 16.5 acres on the west side of 166th Avenue East in Sumner, Washington. The compressor station was originally constructed and put into service in 1968. This facility is part of the Northwest Pipeline/Williams Gas Pipeline (natural gas) and consists of a compressor station within a fenced and locked enclosure. The area inside the fence is approximately 2.9 acres. Currently included within the fenced enclosure are a compressor building, various other support buildings (hazmat, auxiliary, generator, and communications), an oil/water separator, one above-ground storage tank (AST) containing used oil/pipeline liquids, two main pipelines and several connecting pipelines, fin fans, two in-line scrubbers, air storage tanks, exhaust stacks, air

intakes, lube oil coolers, and a vent stack. Features outside of the main fenced area include pipeline pig receivers, a drainage ditch adjacent to the south fence line, and a septic system leach field.

Historical facilities that were removed from the Site include a former compressor building (and associated sump); an earthen pit and associated used oil/pipeline liquids AST; lube oil run down, lube oil storage, and glycol ASTs; numerous above- and below-grade piping runs; scrubber; fin fan coolers; muffler tower; and a raw water storage tower.

Depth to groundwater is unknown. However, it is estimated that perched groundwater may be encountered within 30 feet below grade (fbg).

Response 1: The depth to ground water at the facility and the general geologic conditions are important site features for understanding and establishing whether or not the facility is adequately characterized. There is no evidence to suggest that groundwater is present within 30 feet below grade and does not have data that indicates the existence of such a perched ground water table present beneath the subject property. Since the preparation of the *Deferred AOPC Sampling Plan* it has been established that the Sumner CS is underlain by basalt bedrock at a depth of between 5 and 16 feet below ground surface and that water levels from nearby wells range from 151 to 360 feet below grade. It is likely that more than 100 feet of basalt bedrock is present beneath the Sumner C/S before a water table aquifer would be encountered. These findings were documented in the *Remedial Investigation and Cleanup Action Plan* for the Sumner C/S. These findings document the absence of a perched ground water layer or a local water table aquifer and no further investigation of ground water is appropriate for the Sumner C/S.

It should be noted that in an Opinion Letter dated January 2009, Ecology indicated that the Deferred AOPC Sampling Plan was likely to meet the substantive requirements of MTCA. That plan was implemented and has resulted in the currently available data.

If Ecology has additional information not available to NWPL GP relative to shallow ground water conditions at the Sumner C/S please provide those information at your earliest convenience.

Comment 2: *Previous reports have identified 14 Areas of Potential Concern (AOPC):*

- *AOPC 1 -Former Earthen Pit*
- *AOPC 2- Former Used Oil/Pipeline Liquids AST*
- *AOPC 3 -Septic System and Leach Field*
- *AOPC 4 -Former Fuel Gas Meter Building*
- *AOPC 5- Former Compressor Building*
- *AOPC 6- Former Compressor Building Sump*
- *AOPC 7- Former AST Area*
- *AOPC 8- Former Solvent Barrel Storage*
- *AOPCs 9 and 10-Former Fin Fan Coolers*
- *AOPC 11 -Former Gasoline Underground Storage Tank (UST)*
- *AOPC 12- Current Used Oil/Pipeline Liquids AST*

• AOPC 13 and 14- Pig Receivers

Based on a review of the available information, Ecology has the following comments on the Remedial Investigation and Cleanup Action Plan, Volumes I and II, Sumner Compressor Station:

General Comments

1. *The report is incomplete because it is lacking the following items:*

    a. *Well logs need to be included in an appendix.*

Response 2: The boring logs for each mechanically installed soil boring are included with this memorandum and will be included in the revised RI-CAP.

Comment 3:

> *Also, the geologic description is inconsistent and lacks detail. For example, Section 4.2.5 mentions the "soil-bedrock interface" and Section 7.0 refers to the presence of basalt but Section 5.2 simply describes site soils as "gravelly sand" with a thickness of 6 to 16 fbg.*

Response 3: Section 4.2 indicates that bedrock is encountered at depths ranging from 6 to 10 feet below grade. These limits are in error. Based on a review of the boring logs, the correct range is 5 to 16 feet below grade. Sections 4.2.5 and Section 5.2 will be modified to add clarity to the fact that bedrock exists beneath the site at depths ranging from 5 to 16 feet below grade and no ground water was encountered at the soil-bedrock interface. The gravelly sand refers to the unconsolidated soils above the soil bedrock interface and the bedrock is basalt, the common bedrock material in the Willapa Hills geologic region of Washington.

Comment 4:

> *The report also needs to describe the thickness and characteristics of any fill observed at the Site. The Deferred AOPC Sampling Plan (Work Plan) mentions that the Site underwent major renovation and reconstruction activities in the early 2000s and due to these activities, AOPCs 1, 2, 4, 5, 6, 7, 9, 10, and 11 are considered "disturbed." The Work Plan listed special considerations for sampling these AOPCs. However, the report does not describe in detail what was observed regarding disturbance at the AOPCs. The text needs to describe the depth of disturbance that was observed at each of the AOPCs.*

Response 4: No fill was placed during the reconstruction activities in the early 2000's. 'Disturbed' refers to soil at the site that was re-worked during reconstruction and impacts from historical site features may have been inadvertently spread during the reconstruction activities. All soil at the facility is consistent with native materials, and soil horizons indicative of construction disturbance were not observable.

Comment 5:

b. Section 5.5 states that it is anticipated that the report that summarizes the results of the Terrestrial Ecological Evaluation (TEE) for Compressor Station Facilities will be submitted to Ecology in the second quarter of 2012. As of the date of this letter, this TEE report has not been received. The TEE report is necessary for supporting the proposed cleanup levels in Table SNCS-1.

Response 5: Although a formal TEE data report addressing all C/S facilities in Western Washington has not been submitted, Section 5.5 of the RI-CAP includes a presentation of the TEE data and TEE CULs that pertain specifically to the Sumner C/S facility. This presentation is consistent with the requirements of WAC 173-340-7490 and has been developed in cooperation with Ecology (Mr. Dave Sternberg and Mr. Steve Teel). NWPL GP requests that a conditional approval of the TEE for the Sumner C/S be granted based on the TEE CULs presented in Section 5.5. The TEE data report addressing all C/S facilities in Western Washington is currently in progress and there are no data pending for the Sumner C/S. All TEE data and TEE CULs pertaining to Sumner C/S facility were reported in the RI-CAP.

Comment 6:

Also, the TEE cleanup levels for oil-range petroleum hydrocarbons (TPH-0) need to be added to the table. Please submit the TEE report prior to or concurrently with the submittal of the revised Cleanup Action Plan.

Response 6: Oil-range petroleum hydrocarbons (as "higher-range petroleum hydrocarbons"; HRPH) were eliminated as a contaminant of potential ecological concern (COPEC) for the Sumner C/S during the development of the *Terrestrial Ecological Evaluation; Northwest Pipeline GP I-5 Corridor Compressor Station Facilities* dated August 16, 2011. This document was reviewed by Ecology and approved via opinion letter dated August 30, 2011.

With the exception of AOPC 1, HRPH was detected in locations that are beneath the asphalted and concrete areas at the facility, which, in accordance with WAC 173-340-7491(1)(b), are subject to a primary TEE exclusion and do not require further TEE assessment. These areas are in compliance with the MTCA Method A Cleanup Level for Unrestricted Land Uses and do not require further sampling.

In accordance with WAC 173-340-7490(4)(a), a conditional point of compliance for potential terrestrial and ecological exposures of 6 feet below grade can be used if institutional controls (IC) are implemented. For AOPC 1, excavation is planned to a depth greater than 6 feet and NWPL GP has elected to use the conditional point of compliance with the required ICs to address terrestrial and ecological exposures.

Comment 7:

2. Ecology does not agree with the scoring used in Section 12.3.3.1, Protectiveness; Section 12.3.3.2, Permanence; Section 12.3.3.4, Effectiveness over the Long Term; and, Section 12.3.3.6, Technical and Administrative Implementability. The scoring assumes that there is not a complete soil to

groundwater pathway. Ecology does not agree with this assumption at this time.

Response 7: As mentioned in Response 1, it has been empirically demonstrated that a shallow ground water table is not present at the Sumner C/S and that the facility is underlain by a basalt bedrock. Therefore, the soil to ground water pathway cannot be complete. Furthermore, as documented in Section 5.4 of the RI-CAP:

> "Ground water was not encountered to the maximum depth explored of 16 feet bgs during investigation activities at the subject property. EPI conducted a well log search for the subject property and surrounding properties. The depth to water bearing zones in wells located on properties in the vicinity of the subject property ranged from 194 to 381 feet bgs. Static water levels ranged from 151 to 360 feet bgs, indicating that ground water beneath the subject property occurs under confined conditions. Based on the available information, the closest identified well appears to be located within one-eighth mile to the south of the facility along 166th Avenue East. This well had a depth to the water bearing zone of 248 feet bgs and a static water level of 225 feet bgs. The most likely direction of flow for ground water beneath the subject property is to the west and most likely point of ground water discharge is into the White River. The elevation of the White River is approximately 180 feet msl.
>
> According to the Pierce County Geographic Information System (GIS), the subject property is located within a Pierce County Aquifer Recharge Zone. There are some private water supply wells located on properties surrounding the subject property. The nearest down-gradient private water supply well is located approximately 2000 feet to the southwest. Water in that well (47290) was first encountered at 320 feet msl and has a static water level of approximately 337 feet msl."

This information, coupled with the on-site observations, indicates that there is no shallow ground water table in the vicinity of the facility and that ground water is deep (*i.e.*, greater than 150 feet below grade). Additionally, vertical delineation of soil impacts to concentrations below the applicable cleanup levels has been achieved throughout the facility in soil above the soil-bedrock interface.

Therefore, it is reasonable to conclude that the soil-to-ground water pathway at the Sumner C/S is not completed.

Given these findings, NWPL GP stands by its scoring approach. **If Ecology has additional data indicating that the soil-to-ground water pathway has the potential to be completed, please provide such information.**

Comment 8:

As indicated in the following comments, additional characterization at the Site is necessary.

Response 8: Ecology has provided several comments regarding the characterization of the Site throughout the opinion letter. NWPL GP has addressed each comment directly below and will rely upon those individual

responses to address Ecology's overarching comments.

Comment 9:

> *Also, the scoring cannot be evaluated because the TEE report has not yet been submitted. This report is the basis for the TEE cleanup levels for the Site.*

Response 9: As stated in Response 6, Section 5.5 of the RI-CAP includes a full presentation of the TEE for the Sumner C/S. All TEE data and TEE CULs pertaining to Sumner C/S facility were reported in the RI-CAP. NWPL GP requests that the scoring be evaluated based upon that property-specific TEE for the Sumner C/S.

Comment 10:

3. *Table SNCS-15. Please modify this table and the corresponding text to delete references to a MTCA Method B Cleanup Level. Ecology views this Site as appropriate for a Method A Cleanup Level for Unrestricted Land Use. Also, please delete the columns that refer to a remediation level.*

Response 10: It is unclear why Ecology is directing NWPL GP to eliminate the use of MTCA Method B Cleanup Levels. There is no requirement in MTCA for the use of MTCA Method A and the use of Method A is applicable only to simple sites. Potentially Liable Persons (PLPs) have the option, but not the obligation, to use MTCA Method A cleanup levels. MTCA Method B is applicable to all sites, and, in accordance with WAC 173-340-700(5)(b), MTCA Method B: Universal Method states that:

> "Method B is the universal method for determining cleanup levels for all media at all sites. Under Method B, cleanup levels for individual hazardous substances are established using applicable state and federal laws and the risk equations and other requirements specified in WAC 173-340-720 through 173-340-760."

NWPL GP requires additional information regarding why Ecology is determining that MTCA Method B cannot be used at the Sumner C/S. Please provide us with any such information at your earliest convenience as well as the regulatory citation and requirement for the use of MTCA Method A and/or the elimination of the use of Method B.

Similarly, NWPL GP requires additional clarification from Ecology regarding the deletion of the use of remediation levels (RELs) for the Sumner C/S and why their use has been excluded. It is NWPL GP's opinion that RELs are both applicable and appropriate for use at the Sumner C/S.

MTCA allows the development of cleanup actions that include RELs (WAC 173-340-355) provided that the cleanup action meets the specific requirements (WAC 173-340-360). RELs are, by definition, higher than cleanup levels and institutional controls (ICs) are used to insure protectiveness of exposures to concentrations between the cleanup level and the REL. This is the approach that has been used in the RI-CAP for the Sumner C/S. Remediation of the Sumner C/S uses a combination of actions to address remediation of the AOPCs and those actions have been evaluated as required by MTCA and comply with the

cleanup standard. Ecology has not provided any feedback indicating that it has an opinion that the selected cleanup actions do not meet the requirement of WAC 173-340-360 or why the use of RELs and ICs in conjunction with cleanup levels is not appropriate at the Sumner C/S.

For the facility, MTCA Method A residential cleanup levels are used for all areas outside of the fenced and secure enclosure. For impacts within the fenced and secure enclosure, RELs are used to identify areas for remedial action and ICs are used to insure that areas with concentrations between the cleanup levels and the RELs do not have a residential exposure.

NWPL GP acknowledges that the Sumner C/S is in an area that is zoned as Moderate Density Single Family (MSF; 'residential'). However, the Sumner C/S is covered by an IC that is highly restrictive and prevents the facility from being used as anything other than a natural gas compression facility for the foreseeable future. That IC is in the form of federal regulations.

The Federal Energy Regulation Committee (FERC) regulates the construction and decommissioning of natural gas facilities. Natural gas transmission facilities are considered by FERC and the federal government to be integral to the national infrastructure, national defense, and energy independence. Natural gas pipelines are not readily realigned and a change in land use at a natural gas compression facility such as the Sumner C/S is difficult. In accordance with CFR Title 18 Part 157, the decommissioning of a natural gas facility involves an application process, landowner and public notifications, and hearings. If a use of the property were to change, governmental agencies in addition to the public would be well informed. This type of IC is significantly more restrictive than other forms of ICs, such as Deed Restrictions or Environmental Covenants that are simply attached to a deed and have no enforceable requirements for public notification of a change in land use. Moreover, given the population growth in Western Washington and the need for natural gas, it is even more unlikely that the land use of the Sumner C/S will change.

Additionally, access to compressor station facilities is restricted for security purposes. These facilities are not accessible by the general public. Therefore, although the facility is located within residentially zoned areas, residential exposure pathways do not apply to these properties. As such the security fence should be allowed as a conditional point of compliance for contaminated media. MTCA allows the use of fencing and placarding as a component of ICs [WAC 173-340-400 (1)(a)]. It is common practice to fence and placard both Federal and State superfund sites at the property line or point of compliance as a component of the remedial action.

Therefore, it is reasonable to assume that for contaminated media located outside of the conditional point of compliance (*i.e.*, the facilities security fence) that a residential exposure would be applicable. That is the approach that has been taken in the RI-CAP. Similarly, given the constraints on changes in facility use and ownership, it is appropriate to base cleanup objectives within the facility's secure enclosure on a site-specific risk analysis for exposures to workers at the facility. This approach is consistent with MTCA.

The RI-CAP submitted for the Sumner C/S contains a complete conceptual site model (CSM) in Section 7.0 that evaluates routes of exposure applicable for the subject property. Using the facility boundary as a conditional point of compliance, NWPL GP developed a remedial strategy that protects against all relevant routes of exposure, thus protecting human health and the environment. The FERC requirements for the

Sumner C/S (and all other compressor stations) serve as an IC for redevelopment and severely limits the potential for future residential exposures at the facility.

The CSM presented in the RI-CAP defines appropriate routes of exposure and forms the basis for how remedial actions are planned for the Sumner C/S. It is NWPL GP's opinion that the use of the combination of active remediation through excavation and off-site disposal to attain RELs and ICs to protect potential exposures to concentrations above CUL are fully protective of all potentially competed exposure pathways.

Comment 11:

4. *Electronic data needs to be submitted to Ecology's Environmental Information Management (EIM) database. In accordance with Ecology Toxics Cleanup Program Policy 840 (Data Submittal Requirements), data generated shall be submitted in both a written and electronic format. Additional information regarding electronic format requirements, see the website http://www.ecy.wa.gov/eim. All laboratory analyses shall be performed by the State of Washington Certified Laboratory for each analytical method used.*

Response 11: Acknowledged. NWPL GP will submit the EIM data after resolution of inquiries presented herein.

Comment 12:

Comments on Specific AOPCs

5. *AOPC 1- Former Earthen Pit: The Work Plan indicated that this AOPC would be continuously logged and field screened to a minimum total depth of approximately 16 fbg. Also, the Work Plan (Section 3.3) stated that soil logs would be examined for determination of soil horizons, potential smear zones, and bottom of the pit. This information needs to be provided in the report. Additionally, the Work Plan (Section 4.0) called for the installation of four soil borings using standard direct-push techniques and one boring at the center of the former pit to be advanced to an approximate depth of 30 fbg by hollow-stem auger (HSA). It does not appear that the deep HSA boring was installed as stated in the work plan and it appears that the depth of investigation was only 8 fbg. Additional deep samples are needed from this AOPC.*

Response 12: Acknowledged. The boring logs for each mechanically installed soil boring are included with this memorandum and will be included in the revised RI-CAP.

Evidence of the pit was observed at depths ranging from 4 to 8 feet below grade and soil samples were selected for analysis based on these observations.

Hollow stem auger (HSA) refusal was encountered at the soil/bedrock contact in each boring at depths ranging from 7 to 10 feet below grade within this AOPC. Impacts to soil at this interface were in compliance

with MTCA Method A soil cleanup levels. Based upon this finding along with the non-existent primary porosity, and only limited secondary porosity, of the basalt bedrock, it is NWPL GP's opinion that no further vertical assessment of impacts is required in AOPC 1.

Comment 13:

6. *AOPC 3- Septic System and Leach Field:*

   a. Naphthalene was not analyzed from location SNSB3-1, adjacent to the septic tank. A sample needs to be obtained from this area and analyzed for naphthalene. The results of this sample are needed to assess whether the proposed remedial excavation is sufficient.

Response 13: Acknowledged. Upon resolution to the inquiries contained herein, NWPL GP will obtain a soil sample near the septic tank outlet in AOPC 3 for analysis of naphthalene.

Response 14:

b. Figure SNCS-10 and -11 indicate that excavation and replacement of the drain field will likely be required. However, the area of excavation shown in Figure SNCS-11 does not include the drain field. Please modify this figure to include the drain field and also modify Figure SNCS-10 accordingly.

Response 14: Figure SNCS-10 and -11 do not indicate that the excavation of the drain field will be required. Figure SNCS-10 shows the distribution of cadmium impacts to soil and Figure SNCS-11 shows the distribution of naphthalene impacts to soil. The only pathway of concern for cadmium impacts in AOPC 3 is the soil-to-ground water pathway of concern. In the absence of a shallow ground water table (see Response 1), it is not necessary to excavate these soils and institutional controls are sufficient. The area indicated on Figure SNCS-11 indicates a small area of naphthalene-impacted soil that will require excavation. However, it will not be necessary to excavate the entire drain field.

Response 15:

c. The proposed use of a deed restriction as a remedy for the cadmium contamination does not meet the substantive requirements of MTCA. As stated in WAC 173-340-440(5), cleanup actions shall not rely primarily on institutional controls where it is technically possible to implement a more permanent cleanup action for all or a portion of the site.

Response 15: NWPL GP disagrees. The proposed remedial actions at the Sumner C/S use more permanent solutions to address a range of COCs in a number of areas across the Site. Those more permanent solutions include excavation and off-site disposal of contaminated soils. In accordance with the CSM presented in the RI-CAP, excavation is not necessary for the impacts in AOPC 3. The cadmium impacts in AOPC 3 are most appropriately addressed through the use of ICs as presented in the RI-CAP.

Please provide NWPL GP with additional information regarding the reasoning for disallowing the use

of an REL and ICs for cadmium at AOPC 3.

Comment 16:

7. *AOPC 5- Former Compressor Building, AOPC 6- Former Compressor Building Sump: The characterization of these AOPCs is not adequate; additional sampling is needed. Samples from the 5 fbg depth need to be collected and analyzed from locations SNSB5-3 and -5 as specified in the Work Plan. In particular, SNSB5-3 showed TPH-O concentrations of 400 milligrams per kilogram (mg/kg) at a depth of 1 foot and no deeper samples were analyzed to determine the vertical extent of contamination. Also, it does not appear that the two deep HSA borings were installed at SNSB5-1 and SNSB6-1; this results in a depth of investigation of 5 fbg at AOPC 5 rather than 30 fbg as shown in the Work Plan. Ecology recommends that location SNSB5-3 be used for the deep boring location for AOPC 5 instead of SNSB5-1.*

Response 16: As noted above**,** HSA refusal was encountered at the soil/bedrock interface throughout the Site and in AOPC 5 that interface was located at 5 feet below grade. The observed TPH-O concentration is below the MTCA Method A or B cleanup levels for residential exposures. The TPH-O impacts are also located beneath an asphalt parking area and therefore, there is no TEE pathway of concern.

If Ecology does not concur with Response 16, please provide a technical rationale for the collection of deeper samples at AOPC 5.

Comment 17:

8. *AOPC 7- Former AST Area: The characterization of this AOPCs is not adequate; additional sampling is needed to define the extent of TPH-0 contamination. Locations SNSB7-4 and -5 detected TPH-0 at a depth of 3 fbg but no deeper samples were analyzed. Also, it does not appear that the deep HSA boring was installed as shown in the Work Plan; this results in a depth of investigation of 7 fbg rather than 30 fbg. Ecology recommends that either location SNSB7-4 or -5 be used for the deep boring location for this AOPC.*

Response 17: As noted above, HSA refusal was encountered at the soil/bedrock interface throughout the Site and in AOPC 7 that interface was encountered at between 3 and 9 feet below grade.. As such, it was not possible/nor necessary to investigate deeper than 9 feet in AOPC 7. The observed TPH-O concentration is below the MTCA Method A or B cleanup levels for residential exposures. The TPH-O impacts are also located beneath an asphalt parking area and therefore, there is no TEE pathway of concern.

If Ecology does not concur with Response 17, please provide a technical rationale for the collection of deeper samples at AOPC 7.

Comment 18:

9. *AOPC 8- Former Solvent Barrel Storage: The TEE report is needed before the proposed cleanup of this AOPC can be evaluated (see above comment 1b).*

Response 18: As stated in Response 5, Section 5.5 of the RI-CAP includes a full presentation of the TEE for the Sumner C/S. All TEE data and TEE CULs pertaining to Sumner C/S facility were reported in the RI-CAP. NWPL GP requests that the scoring be evaluated based upon that property-specific TEE for the Sumner C/S.

Comment 19:

10. *AOPCs 9 and 10-Former Fin Fan Coolers: The characterization of these AOPCs is not adequate; additional sampling is needed. The Work Plan showed three sample locations in an aerial spread. However, only two locations were sampled on one side of AOPC 10. Ecology understands that access limitations restrict sampling within the new compressor building. However, additional sampling could probably be performed within AOPC 9.*

Response 19: The lack of a third sampling location, due to access constraints, does not invalidate the conclusions drawn from the existing data. Those data indicate no impacts in the areas sampled. Moreover, there is no access for mechanical sampling equipment on the south side of AOPCs 9 and 10. It is not possible to collect samples within the building without compromising the secondary containment. It is NWPL GP's stance that an IC is appropriate to address any minor impacts that may be located beneath the building.

Comment 20:

11. *AOPC 11- Former Gasoline Underground Storage Tank (UST): The proposed use of a deed restriction as a remedy for the cadmium contamination does not meet the substantive requirements of MTCA. As stated in WAC 173-340-440(5), cleanup actions shall not rely primarily on institutional controls where it is technically possible to implement a more permanent cleanup action for all or a portion of the site.*

Response 20: Please see response 15 above. NWPL GP disagrees. The remediation of the Sumner C/S Site does not rely solely on ICs or deed restrictions. More aggressive remedial actions have been taken in other AOPCs at the Site and for other COCs. The use of an IC to address the cadmium impacts at AOPC 11 is consistent with the regulations.

Please provide a specific rationale why the use of an IC for a portion (AOPC 11) of the Sumner C/S Site is not allowed by the MTCA regulation.

Comment 21:

12. *AOPC 12- Current Used Oil/Pipeline Liquids AST: Locations SNSS12-1 and -2 show TPH-0 concentrations at 3 fbg of 360 and 750 mg/kg, respectively. No deeper samples were collected. These concentrations are likely not protective of the terrestrial ecological pathway. Therefore, accessible areas will likely require remediation. Additional sampling is also necessary to characterize the extent of contamination.*

Response 21: The impacts detected in AOPC 12 are beneath a concrete secondary containment structure, therefore, there is no TEE pathway of concern.

Comment 22:

13. AOPC 13 and 14- Pig Receivers:

a. The extent of cPAH contamination has not been fully defined at AOPC 13. Additional samples are needed north of SN13-CM19 and east of SN13-CG13.

Response 22: The RI-CAP indicates that additional samples are necessary to delineate impacts within AOPC 13. However, the data collected to date are sufficient to make decisions regarding a remedial direction at the property and additional data will be collected during remediation and to guide remedial excavation. Additional data are not needed at this time to plan and implement the proposed remedial action.

Comment 23:

b. Additional detail needs to be added to the report to explain the cause of the cPAH release from AOPC 13. Is there a potential for recontamination during continued use of this pig receiver? Are additional engineering controls necessary for either of these AOPCs? Will AOPC 14 be put into use or has it yet been used?

Response 23: Additional detail will be added to the revised RI/CAP.

Comment 24:

1. Establishment of cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site do not meet the substantive requirements of MTCA. The Site has yet to be fully defined. As such, cleanup standards cannot yet be fully established.

Response 24: With the exception of AOPC 13, all impacts at the Sumner C/S have been horizontally and vertically delineated. NWPL GP acknowledges that full delineation has not occurred within AOPC 13. However, the data collected to date represent the maximum concentrations likely present and to a high degree of certainty, the lateral and vertical extent of such impacts.

WAC 173-340-350 (1) and (7) state that the purpose of a remedial investigation is to collect, develop, and evaluation sufficient information regarding a site to select a cleanup action…" It is NWPL GP's opinion that this standard has been met. MTCA does not require a higher level of site characterization and does not require that a site be "…fully defined" as stated in Ecology's comment.

Please provide specific data gaps that preclude NWPL GP's ability to adequately plan and implement a remedial action at the Sumner C/S.

Comment 25:

Site soil and groundwater data should be compared against MTCA Method A cleanup levels for unrestricted land use.

Response 25: NWPL GP disagrees. Please see Response No. 10 above. **Please provide a specific rationale and regulatory citation for the exclusive use of MTCA Method A cleanup levels for the Sumner C/S.**

Comment 26:

Standard points of compliance are currently being used for the Site. The point of compliance for protection of groundwater is established in the soils throughout the Site. For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance is established in the soils throughout the Site from the ground surface to 15 fbg. In addition, the point of compliance for the groundwater is established throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the Site.

Response 26: The use of standard points of compliance are not appropriate to the subject property based on:

- The current and future use of the property;
- The currently applicable federal regulations and requirements for the facility;
- The presence of bedrock at depths ranging from 5 to 16 feet below grade; and
- The lack of a shallow ground water above the bedrock.

The CSM details the potential exposure pathways for the facility and the CULs and RELs developed are protective of all the potential pathways.

Please provide a technical rationale and/or regulatory citation regarding the requirement for the use of standard points of compliance or the exclusion of conditional points of compliance for the Sumner C/S.

Comment 27:

2. Selection of cleanup action.

Ecology has determined the cleanup action you proposed for the Site does not meet the substantive requirements of MTCA. The Cleanup Action Plan (CAP) that was submitted does not address the entire Site and it has not been demonstrated that the extent of contamination has been defined. Please refer to Section

1 for specific comments on the CAP.

Response 27: NWPL GP disagrees. Please see Responses No. 1, 10, 14, 15, 17, 20, 24, and 25. Please provide specific items which are not in compliance with the substantive requirements. Please provide specific comments regarding which portions of the Site are not addressed by the CAP. As noted in Response No. 24, MTCA does not require that a site by "defined", rather it requires a sufficient level of characterization to evaluate, plan, and implement a remedial action. Please provide specific comments regarding what additional data are needed to satisfy that level of characterization or which data are missing that would preclude the evaluation, planning and implementation of a remedial action.

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/6/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			24		0				FILL, brown with sand and gravel, no odor	1
2			6							2
3	Backfilled w/ bentonite chips		9		0		GW		GRAVEL, light gray, sandy	3
4			7							4
5			30						hard drilling	5
			>50						bedrock, refusal at 5'	
									Bottom of Boring @ 5 ft.	
6										6
7										7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB1-1	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB1-1**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/6/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			18		0		GW		GRAVEL, brown, sandy, slight odor	1
2			11							2
3			7		5		SW		SAND, gray, trace of gravel, odor	3
4	Backfilled w/ bentonite chips →		4							4
5			6							5
6			25		3					6
7			29							7
8			>50		2				no odor	8
9			>50		0				bedrock, refusal at 8'	9
10									Bottom of Boring @ 8 ft.	10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB1-2	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB1-2**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/5/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			16		0				FILL, brown with gravel, no odor, moist	1
2			17							2
3			10							3
4	Backfilled w/ bentonite chips		9		0					4
5			9							5
6			9							6
7			15		0		SW		SAND, brown-gray, with gravel	7
8			>50							8
9			49		0				hard drilling	9
10			>50						bedrock, refusal at 8'	10
11									Bottom of Boring @ 8 ft.	11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB1-3	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB1-3**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/5/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			12 16		0				FILL, brown, with gravel, no odor, moist	1
2										2
3			12 10		0					3
4	Backfilled w/ bentonite chips →									4
5			6 5		0		SW		SAND, brown, with gravel, very moist	5
6			4							6
7			>50		0				hard drilling	7
8			>50						bedrock, refusal at 8'	8
									Bottom of Boring @ 8 ft.	
9										9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 10/10/12

Figure: SNSB1-4	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB1-4**		CHECKED BY: **Alan Hopkins**	DATE: **10/10/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/4/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

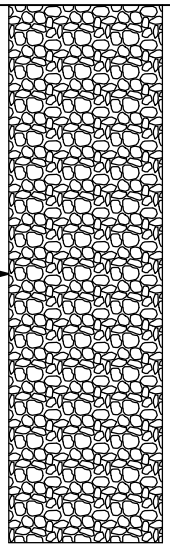
WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1									FILL, dark brown	1
2					0		SW		SAND, dark brown, gravel, no odor	2
3										3
4					0					4
5	Backfilled w/ bentonite chips								becoming rust brown, very moist	5
6					0					6
7					3.6				becoming gray, moist. slight odor	7
8					2.3 2.7					8
9					0		GW		GRAVEL, white, fractured	9
10			>50						bedrock, refusal at 10'	10
11									Bottom of Boring @ 10 ft.	11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 10/10/12

Figure: SNSB1-5	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB1-5**		CHECKED BY: **Alan Hopkins**	DATE: **10/10/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling**	Well Diam.:	Screen Length:
Drilling Method: **HSA**	GS Elev.:	Slot Size:
Date Drilled: **11/6/08**	TOC Elev.:	Top of Screen Elev.:
Geologist: **Mike Portnoy**	Depth to Water:	Groundwater Elev.:

WELL CONSTRUCTION



SOIL DESCRIPTION

Depth (ft)	Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1		>50		0				FILL, brown, with gravel, no odor, moist	1
2		>50							2
3		29				SW		SAND, brown, with gravel, very moist	3
4		>50		0					4
5		50							5
6		>50		0					6
7		>50		0				hard drilling	7
								bedrock, refusal at 7'	
								Bottom of Boring @ 7 ft.	
8									8
9									9
10									10
11									11
12									12
13									13
14									14
15									15

Figure: SNSB2-1	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB2-1**		CHECKED BY: **Alan Hopkins**	DATE: **10/10/12**	PROJECT NUMBER: **10178**

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 10/10/12

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/6/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			26						FILL, brown, with gravel, no odor, moist	1
2			>50							2
3			15				GW		GRAVEL, light brown, sand, no odor	3
4			21		0					4
5	Backfilled w/ bentonite chips →		50							5
6			>50		0					6
7										7
8			>50						hard drilling	8
9			>50						bedrock, refusal at 9'	9
10									Bottom of Boring @ 9 ft.	10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 10/10/12

Figure: SNSB2-3	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB2-3**		CHECKED BY: **Alan Hopkins**	DATE: **10/10/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/6/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			7		0				FILL, brown, with gravel, no odor, moist	1
2			9							2
3	Backfilled w/ bentonite chips		13				SW		SAND, brown, with gravel, very moist	3
4			6		0					4
5			26							5
6			39						bedrock, refusal at 6'	6
7			>50		0				Bottom of Boring @ 6 ft.	7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 10/10/12

Figure: SNSB2-4	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB2-4**		CHECKED BY: **Alan Hopkins**	DATE: **10/10/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/6/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			29						FILL, brown, with gravel, no odor, moist	1
2			>50 46		0		SW		SAND, brown, with gravel, no odor	2
3			3							3
4			4 3		0					4
5	Backfilled w/ bentonite chips →		4							5
6			7 9		0					6
7										7
8			34		0				hard drilling	8
9										9
10			>50		0				bedrock, refusal at 10'	10
11									Bottom of Boring @ 10 ft.	11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 10/10/12

Figure: SNSB4-3	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB4-3**		CHECKED BY: **Alan Hopkins**	DATE: **10/10/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/6/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			29						FILL, brown, with gravel, no odor, moist	1
2			37		0					2
3			46							3
4			>50		0					4
5	Backfilled w/ bentonite chips		21				SW		SAND, brown, with gravel, no odor	5
6			33		0					6
7			41							7
8			>50		0					8
9										9
10			>50		0				bedrock, refusal at 10'	10
11									Bottom of Boring @ 10 ft.	11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB4-4	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB4-4**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/4/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION | **SOIL DESCRIPTION**

Depth (ft)	Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1		35		0		GW		GRAVEL, brown-white, with sand, no odor	1
2		50							2
3		23		0					3
4		26							4
5		39							5
6		29		0					6
7		19				SW		SAND, brown and gray, with gravel, cemented	7
8		19							8
9		9		0					9
10		9							10
11		9							11
12		7		0				not logged	12
13		6							13
14		6							14
15		12		0					15
16		20							16
17		37						bedrock, refusal at 16'	17
18								Bottom of Boring @ 16 ft.	18
19		30		0					19
20		>50							20
		>50		0					

Backfilled w/ bentonite chips

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB4-5	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB4-5**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/4/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION							
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			>50		0		GW		GRAVEL, brown, with sand	1
2	Backfilled w/ bentonite chips									2
3			>50							3
4									ash flow tuff, refusal at 4'	4
5									Bottom of Boring @ 4 ft.	5
6										6
7										7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB5-1	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB5-1**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/4/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION							
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1	Backfilled w/ bentonite chips		>50		0		GW		GRAVEL, brown-gray, well cemented	1
2									refusal at 2'	2
3									Bottom of Boring @ 2 ft.	3
4										4
5										5
6										6
7										7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

Figure: SNSB5-3

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Soil Boring and Well Construction Log

SNSB5-3

Northwest Pipeline GP
Sumner CS
Sumner, WA

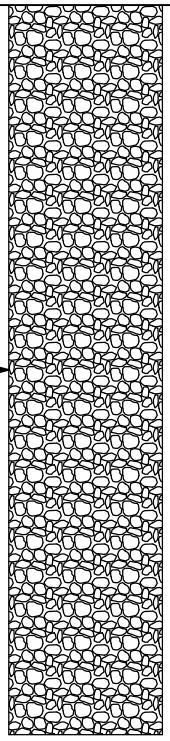
PEI

CHECKED BY:	DATE:	PROJECT NUMBER:
Alan Hopkins	**8/16/12**	**10178**

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Driller: **Cascade Drilling**	Well Diam.:	Screen Length:
Drilling Method: **HSA**	GS Elev.:	Slot Size:
Date Drilled: **11/4/08**	TOC Elev.:	Top of Screen Elev.:
Geologist: **Mike Portnoy**	Depth to Water:	Groundwater Elev.:

WELL CONSTRUCTION | **SOIL DESCRIPTION**



Depth (ft)	Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1		34						FILL, brown-white, with gravel and sand, no odor, moist	1
2		23		0					2
3		20							3
4		20							4
5		11		0					5
6		9							6
7		6							7
8		6		0					8
9		6						very moist	9
10		9							10
11		4		0					11
12		>50							12
13		>50		0					13
14		>50							14
15								bedrock, refusal at 9.5'	15
								Bottom of Boring @ 9.5 ft.	

Figure: SNSB6-1	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB6-1**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/4/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION								
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			31				GW		GRAVEL, white-brown, trace of sand, moist	1
2			30		0					2
3			22							3
4			21							4
5	Backfilled w/ bentonite chips		19		0					5
6			6				SW		SAND, brown, with gravel, very moist	6
7			23							7
8			50		0					8
9			25							9
10			21		0					10
11			28							11
12			>50		0				bedrock, refusal at 8.5'	12
13									Bottom of Boring @ 8.5 ft.	13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB7-1	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB7-1**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/6/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION							
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1	Backfilled w/ bentonite chips		35		0				Refusal Bottom of Boring @ 0.5 ft.	1
2										2
3										3
4										4
5										5
6										6
7										7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB7-2	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB7-2**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/5/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION							
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			46						FILL, brown, with gravel and sand, no odor, moist	1
2			25		0					2
3	Backfilled w/ bentonite chips		10							3
4			4							4
5			14		0					5
6			10						bedrock, refusal at 5.5'	6
7			45						Bottom of Boring @ 5.5 ft.	7
8			50		0					8
9			>50							9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB10-1	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB10-1**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/5/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION							
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1									FILL, brown, with gravel, no odor, moist	1
2										2
3	Backfilled w/ bentonite chips →		12		0					3
4			50							4
5			>50						bedrock, refusal at 5'	5
6									Bottom of Boring @ 5 ft.	6
7										7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB11-1	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB11-1**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/5/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION							
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1									FILL, brown, with gravel, no odor, moist	1
2										2
3	Backfilled w/ bentonite chips		26							3
4			50							4
5			50							5
6			50						bedrock, refusal at 5.5'	6
7									Bottom of Boring @ 5.5 ft.	7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB11-2	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB11-2**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**

Driller: **Cascade Drilling** | Well Diam.: | Screen Length:

Drilling Method: **HSA** | GS Elev.: | Slot Size:

Date Drilled: **11/5/08** | TOC Elev.: | Top of Screen Elev.:

Geologist: **Mike Portnoy** | Depth to Water: | Groundwater Elev.:

WELL CONSTRUCTION			SOIL DESCRIPTION							
Depth (ft)		Water Level	Blow Counts	PP (tsf)	OVA (ppm)	Sample Interval	USCS	Log	Ground Surface	Depth (ft)
1			29						FILL, brown, with gravel, no odor, moist	1
2			19		0					2
3	Backfilled w/ bentonite chips		10							3
4			5							4
5			5		0					5
6			5							6
7			15						bedrock, refusal at 6'	7
8			50		0				Bottom of Boring @ 6 ft.	8
9			50							9
10										10
11										11
12										12
13										13
14										14
15										15

SOIL BORING AND WELL CONSTRUCTION SUMNER CS.GPJ PORTNOY.GDT 8/16/12

Figure: SNSB11-3	**Soil Boring and Well Construction Log**	**Northwest Pipeline GP Sumner CS Sumner, WA**	PEI		
Page 1 of 1	**SNSB11-3**		CHECKED BY: **Alan Hopkins**	DATE: **8/16/12**	PROJECT NUMBER: **10178**