U.S. Environmental Protection Agency's 29 April 2015 letter		
EPA General Comments		**Northwest Pipe Company Response**
Comment 1:	*As stated in comments on the January 2014 Draft Final RI/SCE Report, additional groundwater monitoring data is needed to evaluate the groundwater pathway at the site. The data presentation in the RI/SCE indicates a southwest trending tetrachloroethene (PCE) plume extending from Southeast Area monitoring well MW5 to the Port of Portland Terminal 4 monitoring well T-4-MW-03S. In 2005, the PCE and vinyl chloride concentrations at monitoring well T-4-MW-03S were 14 and 5.4 µg/L, respectively, exceeding the February 2015 Preliminary Remediation Goals (PRGs) that have been established for the Portland Harbor site (0.24 and 2 µg/L for PCE and vinyl chloride, respectively) by up to 58 times. Monitoring well T-4-MW-03 S is located less than 100 feet from the edge of Slip 1 and the PCE and vinyl chloride concentrations in surface water at Slip 1 have not been determined.*	Additional groundwater sampling has been conducted and will be added to the RI and SCE sections addressing groundwater and COCs in groundwater. As requested in a subsequent comment, a map with COC concentrations measured in the investigation wells will be presented as part of the report. This map illustrates that neither PCE nor vinyl chloride have exceeded PRGs in the samples taken from wells closest to T4 Slip 1 since May 2005 (T4S1MW-03S and T4S1MW-09). The updated information will also note the fact that T4S1MW-03S is located 160 feet from T4 Slip 1 and T4S1MW-09 is located 145 feet from T4 Slip 1. The accurate distances are relevant because greater distances result in increased transport time during which attenuation processes would be expected to occur, thereby increasing the protectiveness to the river.
EPA General Comment 1 (continued):	*The RI/SCE concludes that the potential for groundwater to exceed protective standards is very low because groundwater data indicates that PCE and trichloroethene (TCE) concentrations are decreasing at the site. A new Figure 6-6 was added to the RI/SCE to present time versus PCE and TCE concentrations, which demonstrate trends in groundwater at the site. The time versus PCE and TCE concentration plots presented in Figure 6-6 incorrectly plot the last data point in the time series (i.e., August 2007) as 0 µg/L for PCE and TCE concentrations at all monitoring wells. This is misleading and the trend plots should be corrected. The actual concentrations, based on data presented in Tables 5-2 and 5-12, show an increasing PCE trend at MW-05, with PCE concentrations increasing from 52 µg/L in 2004 to 1,400 µg/L in 2007. Concentrations at monitoring wells MW-03 and MW-04 also increased between 2005 and 2007. Data collected at the Terminal 4 monitoring well T4-MW-03S from April 2004 through May 2005 does not show a stable trend in PCE and vinyl chloride concentrations. Given the increasing trend at some of the monitoring wells in the Southeast Area, unstable concentration trends at monitoring well T4-MW-03S, and the lack of data more recent than 2007, additional groundwater monitoring should be performed to evaluate PCE and related VOC concentration trends and plume stability. Until contaminant concentration trends in groundwater are determined, the evaluation of the risk due to contaminated groundwater discharging to surface water is inconclusive.*	Figure 6-6 was in error due to a unit conversion issue with one set of the included data. Instead of correcting Figure 6-6, it will be replaced. The text will be updated with findings from the supplemental Southeast Area groundwater sampling. Data collected indicates principal VOC concentrations are confirmed to be reduced below ROD concentrations in monitoring wells 140 feet from the Willamette River at Slip 1, as shown by concentrations measured in all events at both Port wells closest to the Slip. In addition, the trend analysis including current and historical data show evidence of reductive dechlorination in the Southeast Area, with consistent decreasing trends in all VOCs downgradient of the Northwest Pipe site. Molar concentration comparisons along the centerline of the plume show strong evidence of degradation of parent VOCs (PCE) to daughter products (TCE, cis-1,2-DCE and VC). To maintain continued protection of the groundwater discharge to surface water pathway, the appropriate remedy for VOC concentrations in the southeast area is monitored natural attenuation (MNA). An MNA workplan is under discussion with DEQ and in progress. It will be completed separately from the submittal of the final RI/SCE.
EPA General Comment 2:	*The stormwater collection and treatment system at this site is critical for prevention of discharging stormwater with unacceptable levels of polyaromatic hydrocarbons (PAHs), polycyclic biphenyls (PCBs), and metals to Outfall 18/WR-123 and the Willamette River. To be protective, the system must have sufficient flow capacity and volume to handle significant storm events that are defined in Section 2.4.3 as a storm event of 0.83 inches of rainfall within 24-hours (criteria encompasses all storm events contributing 90 percent of the total annual runoff). Based on the information presented in Section 2.4.3 and Appendix D, the maximum capacity of the storm water treatment system is 630 gallons per minute (gpm) and the total detention volume is 46,547 gallons. There is insufficient information presented to evaluate whether or not this capacity is adequate to handle stormwater runoff during the 0.83 inches of rainfall over a 24-hour storm event. The estimated runoff rate during the 0.83 inches rainfall event should be stated in the report and the runoff rate should be compared to the maximum capacity of the treatment system.*	The system has a capacity to treat 907,200 gallons per day (gpd), based on 630 gallons per minute (gpm) (210 gpm per unit for each of three units) total treatment capacity. The design rain event is 0.83 inch per day, which over the 28-acre area of the facility, totals 631,066 gpd of runoff. This means that the total treatment capacity is approximately 44 percent greater than the runoff produced during the rain event specified in the City of Portland's Stormwater Management Manual. This information will be added to the text.
EPA General Comment 3:	*The Hydrologic and Hydraulic Model presented in Appendix D does not provide sufficient information to evaluate the performance of the collection system and piping. While the modeled hydraulic grade line for baseline conditions during 2-, 10-, and 25-year storm events and the location of collection components and pipe are provided, the hydraulic grade line for the regraded scenario is not provided. In addition, the runoff rates for the 2-, 10-, and 25-year storm events during the baseline and regraded scenarios are not provided. The report states that a 10-year storm event total flow rate equates to a flow rate of 43 cubic feet per second (19,200 gpm); however, this seems too high given rainfall rates in Portland and would exceed the capacity of the stormwater treatment system (630 gpm). Documentation of the modeling results presented in Appendix D is required for EPA to assess the regraded scenario model.*	The Appendix D model was not related to stormwater treatment system operation or water quality but was instead a predictive hydraulic evaluation of the stormwater conveyance system. The predictive hydraulic evaluation model was intended to evaluate the conveyance system's ability to handle anticipated runoff associated with regrading, additional site paving, and outfall modifications. This model was used in a predictive capacity prior to completing the grading and paving work and is now no longer relevant. Since work was completed, the conveyance system has performed through a range of severe runoff conditions and has handled stormwater without interfering with facility production or site stormwater management. This information will be added to the text.

EPA General Comment 4:	*The hydraulic evaluation for the treatment system used the 0.83 inches of rainfall over 24-hour (i.e., 90 percent of annual runoff) to estimate stormwater runoff and the hydraulic modeling for the collection and piping system used 2-, 10-, and 25-year storm events to estimate stormwater runoff. The report should explain why these different scenarios were used to estimate runoff to the collection and piping system and to the treatment system.*	Different precipitation scenarios were used because the objectives of the two projects differed. The hydraulic evaluation of the stormwater treatment system was performed to assess whether the system could manage flows generated by the storm event required for design cited in Appendix E of the City of Portland's Stormwater Management Manual. The predictive hydraulic evaluation modeling related to the site grading, paving, and redistribution of stormwater flow from three to two outfalls, was intended to evaluate whether the site's stormwater conveyance system capacity was capable of handling anticipated flows under different storm events. Both evaluations determined that the presented scenarios meet or exceed capacity and flow. The text will be clarified to indicate the different objectives of the two projects.
EPA General Comment 5:	*The effluent from the stormwater treatment system should be monitored for PAHs, PCBs, and arsenic in addition to other NPDES 1200-Z parameters to ensure that the system is operating properly and confirm that stormwater discharging from the site is not adding contaminants to the Willamette River at concentrations that may pose a risk to human health or the environment. If ongoing stormwater monitoring data indicates exceedances of NPDES 1200-Z or other Portland Harbor specific benchmarks, then additional stormwater source control measures/best management practices may need to be implemented.*	Site stormwater is monitored pursuant to the facility's 1200-Z stormwater permit. This permit requires monitoring for copper, lead, zinc, pH, total suspended solids, oil and grease, iron, aluminum, cadmium, nickel, mercury, aldrin, chlordane, cyanide, dieldrin, hexachlorobenzene, DDT, DDE, pentachlorophenol, PCBs, and PAHs (acenaphthene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene and pyrene). The response to monitoring results is stipulated in Schedule A of the permit. Northwest Pipe received monitoring waivers from the City of Portland in both 2014 and 2018 for the 1200-Z general stormwater discharge permit. In September 2014, a monitoring waiver was granted for all parameters at both monitoring points for the remainder of the permit term. In September 2018, a monitoring waiver was approved for both sample points for pH, total suspended solids, oil and grease, copper, lead, zinc, iron, and aluminum for the remainder of the permit term. This additional detail will be added to the text.
EPA Specific Comments		**Northwest Pipe Company Response**
EPA Specific Comment 1:	*Section 2.3, Page 2.4.3 -- The detention volumes for the Outfall 3 and Outfall 4 stormwater treatment systems are listed as 29,462 and 17,085 gallons, respectively, in Section 2.4.3; however, the Stormwater Operations & Maintenance Plan lists the storage as 4,730 and 3,740 cubic feet (35,383 and 27,977 gallons), respectively. It is recommended that this discrepancy in detention volumes be addressed.*	The text will be revised to match the Stormwater O&M Plan to accurately describe the storage capacities of the treatment systems. The northwest treatment system (formerly Outfall 3, now designated Outfall 1 in response to BES requirement) has a total storage capacity of 35,383 gallons. The northeast treatment system (formerly Outfall 4, now designated Outfall 2 in response to BES requirement) has a total storage capacity of 27,977 gallons.
EPA Specific Comment 2:	*Section 5.2.2.1, Page 5-7 - The assumption that the observed groundwater concentrations of chlorinated solvents in monitoring well MW-5 indicates a potential offsite source with the plume migrating onto the site is not supported by the lower concentrations of PCE detected in groundwater at the boring between monitoring well MW-5 and the rail spur (i.e., geoprobes GW-11, GP-108, GP-109, GP-110, and GP-111).* *The lower concentrations at these locations need to be addressed in the context of the hypothesis that an off-site plume is migrating onsite; otherwise, the hypothesis should be dismissed or modified. It is recommended that this concern be addressed.*	Identifying and discussing possible sources is standard element of both an RI (through development of a conceptual site model [EPA, 1988]) and an SCE (through identification of potential sources and contaminants of interest [DEQ, 2010]). Since NWP interprets the data to suggest a potential off-site contributing source, this information will be retained in the discussion of potential sources to the Southeast groundwater VOC plume. In its March 13, 2018 letter to NW Pipe, DEQ offered the following: "To the extent the meeting summary includes NWP's conclusions regarding offsite sources of contamination that were based on the discussion at the meeting, DEQ is not a position to affirm or deny such conclusions…. No available data exists to support a conclusion that there is or was an offsite source, or that substantiates a need to undertake any further investigation, though a contributing offsite source is a theoretical possibility. DEQ and EPA have sufficient, conclusive information about the site to proceed to review of a final source control decision." NWP is following the DEQ guidance for the RI and SCE evaluation reports by including discussion of the potential sources, when this issue is mentioned. Additional explanation of the geoprobe data in relation to an offsite, upgradient source will be added to the text for clarification. Additional MNA investigation work is ongoing and being managed in a separate effort.

EPA Specific Comment 3:	*Section 6.2.9, Page 6-5 --As stated in Specific Comment 2, PCE concentrations in groundwater collected from the geoprobe borings between monitoring well MW-5 and the rail spur do not support the idea of an offsite upgradient source. While the PCE concentration at monitoring well MW-5 is not the maximum concentration observed at the Southeast Area, the data presented in Tables 5-2 and 5-12 indicated an increasing trend at this monitoring well. As stated in General Comment 1, additional monitoring at monitoring well MW-5 and other monitoring wells at the Southeast Area and Port of Portland Terminal 4 is need to evaluate the stability of the groundwater plume. It is recommended that this data gap be addressed.*	NW Pipe addressed this issue through the implementation of supplemental Southeast Area groundwater sampling, results of which will be integrated into the groundwater sections of the text.
EPA Specific Comment 4:	*Table 6-5 - The footnote to the table states that values exceeding the 2004 NRWQC 175 g/day consumption rate are in bold; however, many of the groundwater results in the table exceeding this criteria are not indicated as bold (e.g., monitoring wells MW-4, MW-5, and MW-6). It is recommended that the table be modified so that all results exceeding the NRWQC criteria are in bold.*	The footnote did not apply to this table and was a copy-and-paste error. This table, and other similar comparison tables in the document, will be revised consistent with the most recent guidance from Jim Orr of DEQ, provided in a telephone conversation with NW Pipe on May 1, 2019 (hereinafter referred to as the "May 1, 2019 DEQ guidance"), which was as follows: • The SCE portion of the document should prioritize and use the ROD clean up values for comparisons. If a ROD value does not exist for a particular constituent, NW Pipe should use the JSCS numbers for comparison. • The NFA/RI portion of the document should use the values presented in Oregon DEQ's Risk Based Concentration table contained in the most recent version of the Department's Risk-Based Decision-Making guidance.
EPA Specific Comment 5:	*Appendix B, Operations Manual for Stormwater Filtration System -- Aside from the minimum once a year removal of sediment from storm drain basins and lines, there is no criteria for when sediment must be removed. The manual should include criteria for what depth of accumulated sediment measured during the monthly inspection will trigger removal of sediment from the catch basin or storm drain line. It is recommended that this omission be addressed.*	The 2010 Operations Manual for Filter System that EPA is referring to has been updated by StormwateRx. Sediment removal in catch basins and lines is done on an as-needed basis to protect the life expectancy of the stormwater filtration media. The updated manual will replace the 2010 manual in the text.

DEQ's 31 August 2015 letter		**Northwest Pipe Company Response**
DEQ General Comments		
DEQ General Comment 1:	*DEQ requests that NWP address the screening of all constituents of interest and issues discussed in our letter and the EPA Letter. DEQ concurs with all the concerns identified in the EPA Letter. Please consider them to be DEQ's comments* *Clarification provided in conference call conducted 17 September 2015 and follow-up letter dated 1 October 2015 (summarized from NWP meeting notes included in 1 October 2015 DEQ letter):* *All COIs were included, but screening should use most recently published screening levels (July 29, 2015 PRGs).*	Based on further discussion of this comment in the conference call between Northwest Pipe and DEQ on September 17, 2015, Northwest Pipe understands that all constituents of DEQ's interest were screened in the March 2015 RI/SCE report, but DEQ wants constituents screened against the recently-revised (July 29, 2015) preliminary remediation goals (PRGs) prepared by EPA as screening levels. Based on later clarification (comment b, from DEQ's 20 October 2017 letter on the Supplemental Groundwater Data Report), NW Pipe intends to screen constituents against the ROD concentrations, rather than the PRGs as agreed previously. Relevant tables and discussion will be revised to reflect these updated screening levels.
DEQ General Comment 2:	*The SCE presents a conclusion that there is not a risk from chemicals in groundwater. Groundwater concentrations near the IT slip exceed ambient water quality criteria for PCE and vinyl chloride, indicating a potential risk from consumption of water and organisms exposed to water in the Slip 1 of Terminal 4 and a potential impairment of the beneficial use of groundwater.* *Clarification provided in conference call conducted 17 September 2015 and follow-up letter dated 1 October 2015 (summarized from NWP meeting notes included in 1 October 2015 DEQ letter):* *Source Control screening evaluation should evaluate groundwater discharge to surface water pathway. Groundwater should be compared to surface water AWQC values to evaluate surface water risk, and groundwater which exceeds values is considered a Hot Spot.*	Data collected during the supplemental Southeast Area groundwater sampling indicates principal VOC concentrations are confirmed to be reduced below ROD concentrations in monitoring wells over 140 feet from the Willamette River at Slip 1, as shown by concentrations measured in all events at both Port wells closest to the Slip. This data will be used to update the SCE. The SCE will be updated to evaluate the groundwater discharge to surface water pathway. NW Pipe will include screening consistent with the May 1, 2019 DEQ guidance described earlier in this document in the response to EPA Specific Comment 4, for data collected from wells closest to the slip.

DEQ General Comment 3:	*The report combines screening and reporting elements for both SCE and upland risk which results in a confusing narrative. DEQ requests that these issues be separated in future reports. The specific details of this and other concerns are presented below and in the EPA Letter.* *Additional clarification provided via email August 14, 2017:* *DEQ requests that COIs for the site be screened and discussed as two separate pathway evaluations. Portland Harbor SCE shall screen with the Portland Harbor ROD Cleanup values (Table 17 in the ROD) or most recent screening Portland Harbor screening levels if not covered by ROD Cleanup values. The SCE section should conform to Portland Harbor JSCS guidance.* *Please use DEQ RBCs and guidance for upland exposure evaluations in the report for the NFA screening.* *Current and historic groundwater data, groundwater modeling, pump tests, conceptual site models, and all investigation data should be used for both evaluations in a comprehensive SCE.* *For clarity, it may be useful to provide two separate reports (SCE and NFA) but the SCE and NFA evaluations could be separate sections of a single report.*	NW Pipe intends to restructure the report into two separate sections addressing the Remedial Investigation NFA decision and the Source Control decision separately. This will create some repetitiveness but appears to be the best method for providing DEQ and EPA with all the required screening and reporting elements for both evaluations. A preliminary outline of our proposed separation of the information was provided to EPA and DEQ in November 2017, upon which no comments were received. Data used to support the RI NFA determination will be screened using DEQ RBCs. Data used to support the SCE decision (MNA for Southeast Area groundwater) will be screened against the ROD cleanup values and JSCS screening values, when no ROD cleanup value is available.

DEQ Specific Comments		**Northwest Pipe Company Response**
DEQ Specific Comment 1:	*<u>Page ES-3, Expanded Risk Assessment for Chlorinated Solvents in Groundwater</u>* *The conclusion presented in the Executive Summary is that there is no risk from chemicals in groundwater. Groundwater concentrations near the IT slip exceed ambient water quality criteria for PCE and vinyl chloride, indicating a potential risk from consumption of water and organisms exposed to water in the slip. This observation is repeated in the EPA letter. Please address this concern.*	Data collected during the supplemental Southeast Area groundwater sampling indicate principal VOC concentrations are confirmed to be reduced below ROD concentrations in monitoring wells over 100 feet from the Willamette River at Slip 1, as shown by concentrations measured in all events at both Port wells closest to the Slip. This data will be used to update the SCE. NW Pipe will revise this section consistent with the May 1, 2019 DEQ guidance, described earlier in this document in the response to EPA Specific Comment 4, to address the groundwater discharge to surface water pathway in the RI as part of the risk assessment.
DEQ Specific Comment 2:	*<u>Section 6.2.10 Ecology</u>* *The statement that in the IT Slip, "ecological habitat is neither fostered nor encouraged" may be correct, but it is misleading. The slip is favored by fish species such as small mouth bass and crappie, regardless of whether the slip was intended to be habitat. Please clarify by adding the following statements: "Some fish, such as smallmouth bass, are attracted to in-water structures, and are therefore likely to be attracted to the slip. Also, fish may use slips as refuges and resting areas away from the main channel of the river."*	Northwest Pipe disagrees that the statement was misleading, but to avoid uncertainty, the report will be revised to include the following statement: Some resident piscivorous fish, such as smallmouth bass, are affiliated with certain in-water structures, and therefore may be found in the slip. Also, native anadromous fish may use the slip as a temporary refuge and resting area away from the main channel of the river.
DEQ Specific Comment 3:	*Section 6.3.1.3 Offsite Recreational User Scenario* *The statement that the T4 and IT slips "are not intended to be used, nor are they much used, for fishing" is not factual. The intent may be to not have fishing in the slips, but DEQ has frequently observed fishing in these areas. In addition, a local fishing club indicated that because the slips are attractive to some species and they are good areas to fish. Please remove the statement.*	The sentence will be revised to delete the phrase “nor are they much used.”
DEQ Specific Comment 4, part 1:	*<u>Section 6.2.1.4 Offsite Drinking Water Scenario</u>* *The report presents a line of evidence that use of water from the Willamette River is a "remote possibility". While, DEQ may agree with NW Pipe on the likely future use of this portion of the Willamette River for drinking water, EPA considers water from the Willamette as a potential drinking water source.* *Clarification provided in conference call conducted 17 September 2015 and follow-up letter dated 1 October 2015:* *Section reference corrected to <u>Section 6.2.12.4 Offsite Drinking Water Scenario</u>* *Clarification provided via email 7 October 2015:*	Although this comment was withdrawn for the SCE, Northwest Pipe believes the issue raised in this comment will be addressed in the RI NFA section. The RI NFA portion of the document will be revised to include the following information. DEQ reports that EPA considers the Willamette River as a potential drinking water source. In the unlikely event of its use, the various natural processes that act to attenuate constituents along the groundwater flow path and reduce concentrations both within the aquifer and after discharging and mixing with river water would reduce concentrations below levels of concern. In addition, EPA drinking water quality standards require surface water to be treated prior to distribution in a water distribution system. Consequently, the weight of evidence related to the groundwater pathway indicates that site-related constituents in groundwater would not pose a risk above DEQ selected levels.

	Please consider our original Comment 4 to be withdrawn from the DEQ SCE comments. No action relative to the SCE process is required at this time. The proposed NFA comment schedule and process is discussed at the beginning of this email.	
DEQ Specific Comment 4, part 2:	*<u>Section 6.3.1.4 Conclusions for Human Health Risk Screening</u>* *Conclusions regarding risks from human exposure to zinc cannot be used as the basis for drawing ecological risk conclusions. Aquatic ecological screening levels for zinc are considerably lower than human health screening levels. Screening should be conducted for both human health and ecological receptors using the appropriate screening values.* *Clarification provided in conference call conducted 17 September 2015 and follow-up letter dated 1 October 2015:* *Section reference corrected to <u>6.3.1.3 Conclusions for Human Health Risk Screening</u>* *The site maximum concentration should be compared with background UPL. This comment will also be addressed in pending No Further Action DEQ comments.* *Clarification provided via email 7 October 2015:* *Please consider our original Comment 4 to be withdrawn from the DEQ SCE comments. No action relative to the SCE process is required at this time. The proposed NFA comment schedule and process is discussed at the beginning of this email.*	Although this comment was withdrawn for the SCE, Northwest Pipe believes the issue raised in this comment will be addressed in the RI NFA section. The Human Health Screening Methodology will be updated as follows: Groundwater data will be screened against comparison values consistent with the May 1, 2019 DEQ guidance described earlier in this document in the response to EPA Specific Comment 4. In addition, the Site maximum concentrations for metals in soil will be compared with Regional 95% UPL Default Background Concentrations for Metals in Soil for the Portland Basin (DEQ, 2013).
DEQ Specific Comment 5, part 1:	*<u>Section 6.4.1.3 Exposure</u>* *Aquatic Water Quality Criteria are established using standard approaches that DEQ considers reasonable. The approach includes bioaccumulation into fish by consumption of benthic organisms that are more likely to be exposed to chemical concentrations in groundwater that have not been substantially diluted. It is not appropriate to consider this process as "uncertain". This section requires significant rewriting to reflect the SCE screening process.*	The referenced section is within the Uncertainty Evaluation, which is a standard element in risk assessment documentation (Sections 6.8 and 8.4, EPA, 1989). The risk assessment will be included in the RI NFA portion of the document as it is not a required element of an SCE. The Uncertainty Evaluation does not specifically address AWQC comparisons. It outlines some of the uncertainties underlying a comparison of screening levels based on surface water exposure to groundwater concentrations observed a considerable distance upgradient of the point of discharge to surface water. The report will be modified to present comparisons, where needed, to the May 1, 2019 DEQ guidance described earlier in this document in the response to EPA Specific Comment 4.
DEQ Specific Comment 5, part 2:	*Chemical concentrations in the main channel of the river are not an issue to evaluate for SCE. Aquatic organisms will be exposed to concentrations in the slip because slips are good habitat for many species, and fish find refuge in the slips from the main flow of the river and also feed closer to shore. EPA and DEQ do not conduct risk assessments assuming contact with water in the main channel of the river, and instead focus on areas where exposure is likely. Please remove the discussion of the main channel.*	The reference to the main channel of the Willamette River will be revised to refer to the slip
DEQ Specific Comment 6:	*<u>Section 7 Groundwater Pathway</u>* *The SCE determination that the groundwater pathway is incomplete is not supported by the investigation. Final DEQ source control decisions are based on a DEQ accepted SCE report and subject to EPA review/comment as required by the Portland Harbor Memorandum of Understanding. Please modify this section to reconsider the current SCE of the groundwater pathway.*	An evaluation of this pathway will be added to the SCE.
DEQ Specific Comment 7:	*<u>Section 5-6 Stormwater System Investigation</u>* *Line abandonments were proposed but DEQ has not received information to support that the work occurred. Completion or documentation of the abandonments is needed to assure that recontamination is not likely and to support a source control decision. Please submit current information regarding line abandonments.*	The text will be modified to include the following discussion: The location of the catch basins and associated lengths of pipe proposed to be abandoned was the leased property south of the Northwest Pipe Company facility. Northwest Pipe Company contacted the property owner at the time of the recommendations, but the property owner declined to allow Northwest Pipe Company to perform infrastructure upgrades. Since the catch basins and tributary lines have been confirmed as non-functional, no migration of stormwater offsite can occur through them. Instead, stormwater runoff in this portion of the site is directed to a trench drain and ultimately enters the onsite stormwater treatment system. Therefore, any potential source is effectively controlled. In addition, conditions have changed since the time of the video inspection. The area including the non-functional catch

		basins is now part of an ongoing stormwater investigation by the property owner. Results from this investigation will continue to be monitored by Northwest Pipe and the need for action, if any, will be reassessed as needed.
DEQ Specific Comment 8:	*Section 8 Final Source Control Sampling and Evaluation* *The statement that "stormwater is the only potentially complete pathway for constituents to reach the Willamette River from the Site" should be modified to include groundwater. Please correct this statement in this section and the rest of the SCE to reflect that the groundwater pathway is complete.*	The report will be revised to note that the only potentially complete pathways for constituents to reach the river from the site are groundwater and stormwater.
DEQ Specific Comment 9:	*Table 5-2 Historical Groundwater Results* *The historical groundwater sample results from 2001 through 2005 are tabulated but the data points are not included on site maps. Analytical results are presented in various units. All tabulated analytical data should be presented as the same units in screening values. Please correct table analytical units and missing data points on the maps and figures.*	Regulatory comparison criteria for water commonly are reported in either milligrams per liter (for example, maximum contaminant levels) or micrograms per liter (for example, DEQ ecological screening level values). Groundwater and stormwater results will be standardized using mg/L for conventional parameters and µg/L for low level COCs, such as VOCs, SVOCs, PCBs, and similar. Text and tables will be revised to this proposed approach. Northwest Pipe will use updated maps with more recent groundwater data in the report.
DEQ Specific Comment 10:	*Tables 6-9 and 6-10* *Laboratory qualifiers should be explained. For example "=" is not defined.* *The analytical values shown for PCE are not correct for well T4S1MW-10. Please correct.* *Clarification provided in conference call conducted 17 September 2015 and follow-up letter dated 1 October 2015:* *Section reference corrected to All Report Tables* *DEQ withdraws the comment regarding well T4S1MW-10 values.*	The tables will be revised to define each of the symbols and qualifiers used.
DEQ Specific Comment 11:	*Figure 5-7 Southeast Area Geoprobe and Monitoring Well Locations with PCE Concentrations* *PCE and associated constituents should be presented in additional figures and screened against all SCE parameters.*	A figure with VOC concentrations will be provided in the report.
DEQ Specific Comment 12:	*Figure 6-6* *The graphs presented in Figure 6-6 contained substantial errors. For instance, the data plots assumed an end point of zero in place of the detection limit for a specific sample. The EPA letter addressed several other issues that require correction. Please reconstruct the graphs considering DEQ and EPA comments.*	Figure 6-6 was affected by a unit conversion error. Figure 6-6 will be substituted with figures including data from the recent supplemental Southeast Area groundwater sampling.

EPA's 26 September 2017 letter on the *Supplemental Groundwater Data Report*		
EPA Primary Comments		**Northwest Pipe Company Response**
Comment 1:	*EPA agrees with the conclusions that tetrachloroethene (PCE) and associated degradation product concentrations in groundwater at Slip 1 are currently below the Portland Harbor Superfund Site (PHSS) cleanup levels listed in Table 17 of the Record of Decision (ROD [EPA 2017]) for the Selected Remedy and that natural attenuation of the plume appears to be occurring. However, based on increasing VOC concentrations observed at onsite monitoring wells MW-05 and MW-03 (Figures 10 and 11), long-term groundwater monitoring and documentation of the natural attenuation process is needed. An objective of the long-term groundwater monitoring should include verification that the PCE plume and associated degradation products in groundwater do not discharge to the Willamette River at concentrations above the cleanup levels listed in Table 17 of the ROD (EPA 2017). A groundwater monitoring work plan should be prepared to describe future groundwater monitoring objectives, and activities that will be conducted to verify that natural attenuation prevents the discharge of PCE and associated degradation products to the Willamette River. Future work plans, groundwater monitoring reports, and evaluations should be provided for EPA's review.*	An MNA work plan will be provided for EPA review separately from the submittal of the final RI NFA/SCE.
Comment 2:	*Averaging the PCE, trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride concentrations at MW-03 and MW-04 to estimate the concentration for the purpose of BIOCHLOR modeling underestimates the concentrations of these contaminants in groundwater leaving the site. The groundwater elevation contour maps in Figure 4 through 8 indicate that MW-03 is on the flow path from MW-05 and MW-06 to the river. However, MW-04 is located cross gradient with respect to the flow path from MW-05 and MW-06 to the river. Therefore, it is not appropriate to use the average concentrations at MW-03 and MW-04 as the source concentration. Because MW-*	Following discussion during the 6 November 2017 meeting with EPA and DEQ, EPA agreed that the BIOCHLOR model does not need to be rerun. In lieu of rerunning the model, NWP will provide actual monitoring data compared to ROD concentrations, in accordance with an MNA work plan which will be submitted to EPA and DEQ separately from the submittal of the final RI NFA/SCE.

	03 is located on the flow path and has the highest concentration at the downgradient property boundary, concentrations at this well should be used for the BIOCHLOR modeling. The BIOCHLOR model should be rerun using MW-03 concentrations and the report discussion revised as needed.	
Comment 3:	*Section 4.1, Plume Stability, page 6, second paragraph. The conclusion that the plume extent is stable or decreasing is not supported by the graphs included on Figure 10. Figure 10 shows an increase of PCE and TCE between 2004 and 2016 at MW-05 and MW-03. Additionally, this paragraph describes the maximum concentration of PCE in MW-05 as less than half the maximum concentration previously detected in groundwater at the site. Additional explanation of the maximum concentration of PCE should be provided in the report to support this observation. The location, date, and other relevant historical data for PCE should be added to the technical memorandum to better explain how this observation supports plume stability in the Southeast Area.*	NWP acknowledges that there are different approaches to assessing plume stability. In our opinion, the available data shows that the plume is stable and decreasing near the most downgradient monitoring point prior to Slip 1 and not affecting the river. Maximum concentrations observed in recent monitoring events are within the range of historically observed concentrations. While concentrations within any plume may rise or fall over time depending on the spatial distribution of concentrations within the plume and plume migration past a particular monitoring point, such normal variations do not indicate an unstable plume. Data from the supplemental Southeast Area groundwater sampling will be used to update the relevant sections regarding groundwater and will be discussed in context of historical groundwater concentrations of VOCs.
Comment 4:	*Section 4.1, Plume Stability, page 7, first bullet. The statement that there is an upgradient offsite VOC plume migrating onsite is not supported by the current data. It is not possible to evaluate potential offsite contributions to the VOC plume at the NW Pipe property without data collected from groundwater monitoring wells between MW-05 and the east-northeast end of the property.*	NW Pipe recognizes that the agencies do not agree that available data support a contributing source to the Southeast Area groundwater plume from offsite. However, identifying and discussing possible sources is a standard element of both an RI and an SCE. Since NWP interprets the data to suggest a *potential* off-site contributing source, this information will be retained in the discussion of *potential* sources to the Southeast groundwater VOC plume. For the purposes of this report, NWP is following the DEQ guidance for the RI NFA and SCE evaluation reports by including discussion of the potential sources, when this issue is mentioned.

EPA To Be Considered Comments		**Northwest Pipe Company Response**
Comment 1:	*Section 4.2, Natural Attenuation Analysis. As EPA previously commented on the work plan for this evaluation, ferrous iron is the parameter that should be used for natural attenuation analysis and not dissolved iron. Because ferrous iron was not analyzed for in the groundwater samples and the concentration is not known, ferrous iron scoring in Table 7 should be changed to 'not determined' and the discussion revised. Future groundwater sampling should include analysis of ferrous iron to assess redox conditions and the natural attenuation analysis. This recommendation is consistent with EPA guidance (EPA 1998) followed for the natural attenuation analysis.*	NWP inadvertently analyzed dissolved iron instead of ferrous iron. However, dissolved iron concentrations provide a reasonable estimate of ferrous iron concentrations at the conditions of the Northwest Pipe Site. Under the observed redox conditions, iron would exist in the reduced (ferrous) state, which is relatively soluble, compared to iron in the oxidized (ferric) state, which has extremely low aqueous solubility (less than 0.01 mg/L above a pH of 4.8, as reported in U.S. Geological Survey Water Supply Paper 1473 entitled *Study and Interpretation of the Chemical Characteristics of Natural Water*). Consequently, iron dissolved in solution would exist overwhelmingly in the reduced, ferrous iron valence state. The natural attenuation analysis performed with the data from the 2017 *Supplemental Groundwater Investigation* will be updated to replace the iron result with "not determined", with additional explanation. The MNA work plan, to be submitted separately from the revised RI NFA/SCE, will specify ferrous iron for the determination of redox conditions.
Comment 2:	*Section 3.1, Hydraulic Conductivity Estimates from Aquifer Tests, page 5, third paragraph. The paragraph describes that monitoring wells were installed with the direct-push drilling methods, but boring logs for monitoring wells MW-1 through MW-6 list hollow stem auger as the drilling method. This section should be revised to correct the discrepancy.*	This discussion of hydraulic conductivity will be merged into the report and the drilling method will be revised for accuracy and consistency with drilling logs.
EPA Matters of Style Comments		**Northwest Pipe Company Response**
Comment 1:	*Table 4. The average hydraulic conductivities in Table 4 should be checked. For example, the repetitions for slug testing for MW-05 were 131, 139, and 132 feet per day (ft/day), but the average hydraulic conductivity value is listed as 130 ft/day.*	The apparent discrepancy is due to rounding to two significant digits. Clarification will be provided in the text.
Comment 2:	*Including a figure with PCE isoconcentrations (and degradation products) and/or the numerical results of the supplemental groundwater monitoring would make it easier to visualize the distribution of PCE (and degradation products) at the site.*	NWP will provide numeric results of the PCE concentrations (and degradation products) in the Southeast Area posted on a new figure included in the report.

DEQ's 20 October 2017 letter on the *Supplemental Groundwater Data Report*	
DEQ Specific Comments on the Supplemental Groundwater Data Report	**Northwest Pipe Company Response**

Comment 1:	*Page 6, 4.0 Data Analysis* *The conclusion of an offsite source of Volatile Organic Compounds (VOC) is not supported by the current analytic results. While the most recent work addressed potential migration of groundwater contamination to the river, information regarding offsite sources of contamination was not provided. In contrast to the conclusion, a reversal of the site typical gradient was observed at monitoring wells MW-5 and MW-6, which supports onsite transport of contamination.*	See previous responses regarding the offsite, upgradient source. NWP believes a discussion of the potential off-site sources to groundwater contamination (a standard element of an RI evaluation per EPA, 1988) is not complete without the discussion of this issue.
Comment 2:	*Page 6, 4.1 Plume Stability* *The molar concentrations of VOCs from Figure 11 for MWs-5, -6, and -3 seem to indicate similar or increasing trends compared to the January 2005 data. The analysis of plume stability considers variability or stable concentrations as decreasing trends, which seems inaccurate. In contrast to the analysis, DEQ considers the onsite source area to demonstrate a constant source of VOCs.*	In the meeting held on 6 November 2017, DEQ clarified terminology from "constant source" to "source area." The available data shows that the plume is stable and decreasing near the most downgradient monitoring points at T4S1MW-03S and T4S1MW-09 prior to Slip 1 and not affecting the river. This analysis of the supplemental Southeast Area groundwater sampling data will be added to the report.
Comment 3:	*Page 8, Fate and Transport* *There is no discussion of the source of VOCs detected on the NWP site. Please ensure a VOCs source discussion is included in the revised SCE report.*	The discussion of the source of VOCs is currently present in the report and will be revised to be described twice, in both the RI NFA and SCE sections.
Comment 4:	*Page 8, Fate and Transport* *There is no explanation of the rationale for the selection of hydraulic conductivity and VOC concentrations used in modeling. Please include this discussion in the revised SCE report*	Because groundwater monitoring has restarted, that provides us quantified results to evaluate site conditions, and in light of the discussion during the 6 November 2017 meeting with EPA and DEQ, Northwest Pipe anticipates relying on groundwater monitoring results documenting site conditions rather than predictive work involving BIOCHLOR modeling. The MNA work plan currently under development will describe this approach in more detail and will be submitted to EPA and DEQ separately from the submittal of the final RI NFA/SCE.
Comment 5:	*Figures 10, 11, and 12* *The scales of the figures make it difficult to perceive the trends discussed in the text. Similar figures should be presented in the revised SCE report. Please adjust the scales to more clearly illustrate the trends.*	Figures 10, 11, and 12 will be revised or duplicated with differing scales and/or different page formatting in the report to improve clarity and readability.
Comment 6:	*Because of the elevated VOCs concentrations in groundwater on the NWP site, DEQ requests a work plan for monitored natural attention confirmation groundwater sampling. Please be prepared to discuss this request at our meeting on November 6th.*	An MNA work plan will be prepared and submitted separately from the submittal of the RI NFA/SCE report.
Supplemental Comment:	An evaluation of Port of Portland wells for anaerobic biodegradation, as shown for the NWP wells would be useful.	NWP will add this evaluation to the report.
DEQ guidance for completion of the revised SCE and NFA report		**Northwest Pipe Company Response**
a:	*The 2015 SCE Report presented combined screening and reporting of elements in the remedial investigation and source control evaluations, which resulted in a confusing narrative. Please ensure that the revised report presents pathway and risk evaluations for source control and upland risk assessment in separate sections;*	Noted. A draft outline was provided to the agencies during the 6 November 2017 meeting. We plan to provide one report, with two separate sections, one to meet the RI NFA Determination, one to meet the Source Control Decision.
b:	*Please ensure that the revised SCE includes all historic analytical data collected in data screening tables; compared to cleanup levels in Table 17 of the January 2017 EPA Portland Harbor Record of Decision or, for contaminants without Table 17 values, use screening level values in Table 3-1 of the 2005 EPA/DEQ Joint Source Control Strategy; and an evaluation of the magnitude of exceedances (i.e. less than 10, 10, 100, or 1,000 times screening value);*	Noted. Some historical data is no longer relevant, as it was related to removed soil. The data will be included, but data related to removed soil will be noted.
c:	*Please ensure that the revised report follows the template found in Appendix C of DEQ's Guidance for Evaluating the Stormwater Pathway at Upland Sites and the Joint Source Control Strategy, to support a SCD;*	Noted. A draft outline following the template for the SCE was provided to the agencies during the 6 November 2017 meeting.
d:	*The revised upland remedial investigation report NFA section should evaluate all current and potential future risk pathways using DEQ risk based screening level concentrations (RBC); and*	The revised upland RI NFA section will include the risk assessment.
e:	*If any current or potential future uses are found to exceed risk RBCs, then determine the extent of impact and propose potential actions, such as a deed restriction and contaminated media management plans.*	Commented noted. NW Pipe will provide the determination of extent of impact and propose potential actions (i.e., update the 2011 Contaminated Media Management Plan).

DEQ's 13 March 2018 letter on the *November 6, 2017 Meeting Notes and Development of Source Control Evaluation and No Further Action Determination*		
DEQ General Comments		**Northwest Pipe Company Response**
Comment 1:	*The Department of Environmental Quality reviewed the NWP Supplemental Groundwater Data Report. DEQ concurs with the comments on the report provided by EPA in a letter dated September 26, 2017 and DEQ provided comments in our October 20, 2017 letter.* *In addition, DEQ and EPA previously provided comments on NWP's March 2015 Remedial Investigation and Source Control Evaluation (SCE) report. Please ensure that all comments from both agencies are addressed in the submittal of the revised SCE/NFA report. DEQ offers the following additional guidance on preparing the revised SCE/NFA report and comments for the November 6,2017 meeting notes submitted by NWP.*	Comment noted. This table should address all comments since NWP's most recent RI/SCE Report March 2015.
DEQ Specific Comments on the NWP November 6, 2017 Meeting Notes		**Northwest Pipe Company Response**
Comment 1:	*To the extent the meeting summary includes NWP's conclusions regarding offsite sources of contamination that were based on the discussion at the meeting, DEQ is not in position to affirm or deny such conclusions. Available site data supports the conclusion that there were significant onsite sources of contamination. No available data exists to support a conclusion that there is or was an offsite source, or that substantiates a need to undertake any further investigation, though a contributing offsite source is a theoretical possibility. DEQ and EPA have sufficient, conclusive information about the site to proceed to review of a final source control decision.*	Comment noted.
Comment 2:	*DEQ has the following comments for the Draft Southeast Area Groundwater Flow Analysis presented at the meeting:* • *The number of time steps and length of each step was arbitrary and limited;* • *The length of the steps is an artifact of the timing and total number of samples collected;* • *There is significant uncertainty in the estimates of travel distances associated with the data that was collected;* • *No comparison of groundwater conditions was considered for previous years to determine if conditions were typical for the site;* • *The choice of well pairs used for analysis will change estimates of transport rates;* • *The source area coincides with a seasonal groundwater divide that results in a flow reversal and the contamination in the vicinity of MW-5 is not unexpected; and* • *The groundwater flow analysis does not support an offsite source of contamination.* *The Southeast Area Flow Analysis has significant uncertainty due to the assumptions presented in the analysis. It is not necessary to revise the analysis.*	Comment noted.
DEQ Specific Comments for the SCE/NFA Report		**Northwest Pipe Company Response**
Comment 1:	*Include the southeast groundwater supplemental investigation data in the SCE/NFA report;*	Comment noted. The data will be discussed in the body of the report, as well as attached in the Appendixes.
Comment 2:	*Address all previous DEQ and EPA comments*	Comment noted. This table should address all comments since NWP's most recent RI/SCE Report March 2015.
Comment 3:	*Modify the site Conceptual Site Model (CSM) to include risk screening elements presented below;*	NWP submitted preliminary responses and requests for clarification to the sub-bullets included in comment 3, shown below. DEQ clarification received 8 June 2018 is included in the comment column, and the proposed responses shown below have been revised based on DEQ feedback, as needed.
Comment 3a:	*Update the current and future use of industrial water onsite and offsite for risk evaluation;* *8 June 2018 clarification:* *Recommended revisions will be sufficient to address DEQ's comments.*	The current use of production well water at Northwest Pipe has changed – it is no longer used for applying shotcrete to steel pipe. In addition, nearby property owners have not changed their use of industrial water (deep groundwater). The most recent data for the production well (2001) were screened in the risk assessment against vapor intrusion RBCs, outdoor air RBCs, and groundwater in excavations. Text updates:

		Update the current and future use to eliminate use of industrial water in applying shotcrete. Expand discussion of the results of the production well screening (no exceedances) in the text.
Comment 3b:	*Future excavation workers should be characterized as construction/excavation workers* *8 June 2018 clarification:* *DEQ prefers that relevant receptors be explicitly evaluated. However, it is acceptable to use an evaluation for a more protective scenario. In this case, the conclusion that occupational risk is unacceptable also applies to construction/excavation workers. A remedial action such as a cap to prevent occupational exposure must also apply to construction/excavation workers, which will likely involve a deed restriction.*	The cap was constructed in 2011 and is protective of human health for both the occupational and construction worker/excavation scenarios.
Comment 3c:	*Construction/excavation worker exposure to volatiles in an excavation should be considered a complete pathway and evaluated* *8 June 2018 clarification:* *RBCs for occupational exposure to volatiles in soil considers VOCs in ambient air, not in a confined area such as a trench for excavation workers. However, DEQ will not require a separate evaluation for airborne exposure to trench workers. Instead, the risk assessment should acknowledge that trench worker exposure to VOCs may be underestimated.*	RBCs used to evaluate risk to excavation workers account for incidental soil ingestion and dermal contact, but evaluate inhalation of VOCs consistent with any outdoor exposure rather than calculating the somewhat enhanced inhalation exposure that might be experienced by an excavation worker. As you are aware, no current regulatory screening levels have been established by which we can evaluate that scenario. While the RBCs published by DEQ are both conservative and protective, we will acknowledge in the risk assessment that the specific scenario of exposure to VOCs volatilizing from soil to air in the partially confined environment of a trench are not fully accounted for in the RBCs used for this evaluation, which may lead the calculated risk to be somewhat under or over estimated. The limited duration of such exposure, based on actual site history as well as current and reasonably anticipated future practices, limits the practical adverse effect, if any, of an underestimation.
Comment 3d:	*Ecological fish consumption was designated as not significant in the previous CSM but it should be evaluated by comparison with screening values for fish, birds, and mammals* *8 June 2018 clarification:* *EPA's evaluation of in water risk in Portland Harbor included bioaccumulation of VOCs into fish tissue and subsequent consumption of fish. AWQC include this pathway. To be consistent with the Portland Harbor assessment, bioaccumulation should be considered.*	The risk assessment included evaluation of human health risk to recreational anglers as a complete pathway. The risk assessment also included a Level II screening assessment of ecological risk with screening values for fish, birds, and mammals. The risk of bioaccumulation was discussed in the risk assessment qualitatively, but not evaluated quantitatively since the COCs are not expected to bioaccumulate. The report will be revised to provide comparison of groundwater data consistent with the May 1, 2019 DEQ guidance, which was described earlier in this document in the response to EPA Specific Comment 4.
Comment 3e:	*The risk assessment should not consider soil beneath the capped areas to be residual risk but should be evaluated as baseline risk* *8 June 2018 clarification:* *DEQ's concern regarding the use of the term "residual" can be resolved by small changes to text.* *Regarding the bullet in Section 6.3.1.4, the appropriate conclusions are 1) COCs were identified because baseline risks exceed acceptable risk levels, 2) unacceptable risks are addressed by the cap, and 3) given that a well maintained cap is an adequate and reliable means of preventing exposure and therefore mitigating risk, residual risk evaluated once a final remedy is selected should show that risk is acceptable in areas protected by the cap.*	The risk assessment did evaluate soil beneath capped areas as baseline risk in Sections 6.1, 6.2, and 6.3, however, Section 6.3.1.4 will be revised as recommended.
Comment 3f:	*Using exposure point concentrations is appropriate for evaluating occupational exposure to most soil and groundwater concentrations but vapor intrusion screening should be conducted on a point by point basis.* *8 June 2018 clarification:* *DEQ was acknowledging the evaluation performed in the SCE/NFA report, and the comment was meant to convey the expectation that a similar evaluation would be performed with the new data. It appears that we are in agreement on this issue.*	Data from the supplemental Southeast Area groundwater sampling will be integrated into the evaluation.