

# Supplemental Groundwater Data Report

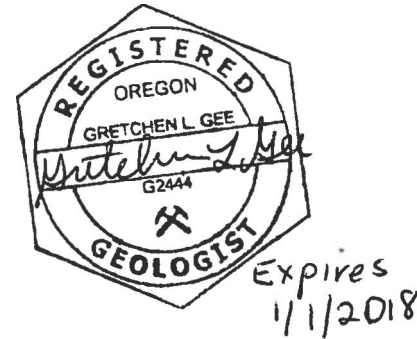
## Northwest Pipe Company, Portland, Oregon ECSI #138

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### Executive Summary

A supplemental groundwater investigation was completed to provide the Oregon Department of Environmental Quality (DEQ) and Region 10 of the Environmental Protection Agency (EPA) with the requested additional data on volatile organic compound (VOC) concentrations in, and downgradient of, the Southeast Area of the Northwest Pipe Company site. Samples were collected as required by DEQ consistent with the approved work plan. The key findings of this investigation are as follows:

- Groundwater characterization and VOC concentrations are fundamentally consistent with those previously characterized in past reports.
- Analysis of principal VOCs with ultra-low detection limits confirm that concentrations drop below the concentrations identified in Table 17 of Appendix II of the Portland Harbor Record of Decision (ROD) (hereafter referred to as ROD concentrations) over 100 feet from the nearest surface water.
- Groundwater containing VOCs is controlled by ongoing natural attenuation processes.

The results of this investigation provide the basis for DEQ to issue a No Further Action determination for source control for the groundwater pathway.

### 1.0 Introduction

This technical memorandum presents an evaluation of the additional groundwater characterization work completed to address the comments provided to Northwest Pipe Company by the DEQ and EPA on the Remedial Investigation and Source Control Evaluation (RI/SCE) report. The intent of this data collection and analysis is to provide DEQ and EPA with the supplemental data requested to complete a source control decision consistent with the Portland Harbor ROD (EPA, 2017). The overall strategy for achieving this decision was outlined in the RI/SCE report (CH2M, 2015) and the *Final Supplemental Groundwater Sampling and Data Evaluation (Work Plan)* (CH2M, 2016). Sampling data from this investigation is used to update groundwater quality information and supplement the existing data set to help inform the source control decision for groundwater at the site.

The focus of this work is shallow groundwater at and downgradient of the Southeast Area of the Northwest Pipe Company site in Portland, Oregon (Figure 1).

## 1.1 Background

Past sampling work for soil and groundwater in the Southeast Area was completed from 2001 through 2007 (CH2M, 2015). VOCs were detected, principally the chlorinated solvents tetrachloroethene (PCE) and its breakdown products trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC). In addition to being a breakdown product of PCE, TCE also is a historic commercially available solvent and its presence may be attributable to use of products containing TCE. Elevated VOC concentrations were determined to be limited to the shallow unconfined aquifer. The shallow aquifer is located within hydraulic fill (dredged river sediment) placed in the late 1930s and early 1940s over the mudflats that formerly occurred in the site vicinity. The hydraulic fill is characterized by fine sand and silty sand extending from the ground surface to approximately 28 feet below ground surface (bgs), saturated in its lower half under unconfined conditions, and underlain by a thick, low-permeability confining layer. The confining layer consists of low-permeability silt with interbedded sand from approximately 28 feet to 161 feet bgs. The top of this confining layer represents the historical ground surface prior to site filling and development.

Prior to 2003, groundwater in the Southeast Area was characterized using direct-push sampling technology. In 2003 and 2004, six monitoring wells were installed in the shallow aquifer and comprise the groundwater monitoring network in the Southeast Area sampled from 2003 to 2007 and again in this investigation (Table 1 and Figure 2). This supplemental investigation also focused on selected shallow aquifer wells downgradient of the Southeast Area on the Port of Portland (Port) Terminal 4 property (Table 1 and Figure 2). Prior to the work described in this memorandum, the most recent groundwater sampling had occurred in 2007 for Southeast Area and 2005 for the Port wells (CH2M, 2015 and Ash Creek Associates, Inc., 2007). No additional investigation of this area was requested by DEQ until August 2015, in response to EPA's comments.

## 1.2 Objective

The objective of this work was to provide supplemental data to help inform the source control determination for the Northwest Pipe Company Portland site. The work consisted of the following elements:

1. **Hydrologic Characterization.** Data were collected to confirm groundwater flow conditions on and downgradient of the Northwest Pipe site including flow direction, horizontal hydraulic conductivity, and horizontal hydraulic gradient. The results of this analysis were used in evaluating the fate and transport of the principal VOCs.
2. **Update VOC Concentrations.** A primary EPA objective was to obtain more recent concentration data for the principal VOCs and screen concentrations against the Portland Harbor ROD concentrations.
3. **Plume Stability Analysis.** Quarterly groundwater monitoring was conducted to demonstrate plume stability. The current results were compared to the historical record to determine concentrations trends over time. Plume stability was assessed through decreasing trends in concentrations of principal VOCs, as well as trends in breakdown (daughter) products indicative of natural attenuation of the principal VOCs. The monitoring wells selected to achieve this objective included monitoring wells at, and downgradient of, the Southeast Area.
4. **Natural Attenuation Analysis.** The monitoring further included the analysis of natural attenuation parameters to assess whether geochemical conditions at the site were consistent with conditions that favor natural reductive dechlorination of VOCs in groundwater.
5. **Fate and Transport Analysis.** Current VOC concentration data were evaluated in comparison to Portland Harbor ROD concentrations. In addition, the data were used to conduct predictive modeling using the reductive dechlorination model, BIOCHLOR, to assess the degradation of current

VOC concentrations along the pathway from the Northwest Pipe site to Terminal 4 Slip 1 (Slip 1). Predicted future concentrations were then compared to the Portland Harbor ROD concentrations.

## 2.0 Field Investigation Summary

The scope of work for this data collection effort consisted of the following elements: monitoring well survey, well redevelopment, aquifer testing, and groundwater sampling in the Southeast Area and at selected Port wells offsite and downgradient of the Northwest Pipe site (Figure 2).

### 2.1 Well Survey and Re-development

Prior to aquifer testing and sampling, wells were re-surveyed, as required by DEQ, due to concerns over potential settlement and measurement point elevation change over the years for all wells used in the evaluation of groundwater flow. The wells selected for groundwater monitoring were also re-developed to confirm that wells were not plugged, silted in, or otherwise unable to yield representative groundwater samples. The well survey was performed on October 3, 2016, and the well re-development was conducted from October 5 through 7, 2016. The well survey and re-development data were submitted to DEQ and EPA in the technical memorandum *Northwest Pipe Groundwater Investigation, Well Redevelopment Data* (CH2M, 2016b), also included as Attachment A. Well re-development data was used to evaluate specific capacity and validate the selection of wells for aquifer testing.

### 2.2 Aquifer Testing

Aquifer testing was intended to provide additional site-specific information on aquifer hydraulic characteristics to expand the understanding of the groundwater flow velocity at the site. Single-well rising head tests, commonly referred to as slug-withdrawal tests, were performed November 7, 2016, on three of the six monitoring wells on the Northwest Pipe site (MW-05, MW-06, and MW-03) and two Port wells (T4S1MW-22 and T4S1MW-03s). A trial run was conducted on MW-04 to confirm the equipment would perform as expected prior to the remaining aquifer tests, and results from that well were also evaluated and are included in the reporting.

### 2.3 Groundwater Sampling

Four quarters of groundwater monitoring were performed from October 2016 to July 2017. The groundwater monitoring wells are displayed on Figure 2. Groundwater elevations, calculated from the depth to water measured at the beginning of each groundwater sampling event, were used to confirm groundwater flow conditions. An additional set of groundwater depth to water measurements was made during the first quarter of 2017. The sampling event scheduled for the week of January 10, 2017, was preempted by an unexpected snowstorm. Samples collected in the day leading up to the storm were discarded since the event could not be completed in a timely manner, but the depth to groundwater had already been measured and these values were analyzed to provide greater temporal coverage of groundwater flow conditions.

Groundwater laboratory analysis was performed for selected VOCs (PCE, TCE, cis-1,2-DCE, and VC) to provide the agency-requested updated information on plume stability and to evaluate fate and transport. Analysis for geochemical indicators of natural attenuation was conducted to provide further evidence of site conditions favorable for natural enhanced reductive dechlorination. All parameters were measured for each of the four quarters. Well sampling order was revised and approved by DEQ on January 31 from that stated in the Work Plan prior to the second sampling event. The well order was revised based on the first round (October 2016) of sampling results and site-specific considerations to increase sampling efficiency and reduce potential for cross-contamination between wells. The revised sampling order, from first to last, was T4S1MW-09, T4S1MW-03s, MW-02, MW-04, T4S1MW-23, T4S1MW-22, MW-01, MW-06, MW-03, and MW-05. Field sampling documentation is included in

Attachment B, analytical laboratory reports in Attachment C, and data validation reports in Attachment D.

### 3.0 Data Summary

The first two objectives of the supplemental groundwater investigation were to evaluate the site for changed conditions in groundwater characteristics and VOC concentrations since the last data collection effort. This included evaluating the groundwater flow conditions and obtaining up-to-date concentration data for principal VOCs; a primary concern for agency consideration of the source control decision for the site.

#### 3.1 Hydrologic Characterization

From October 2016 to July 2017, the depth to groundwater ranged from 6.66 feet to 12.96 feet bgs on the Northwest Pipe site and from 5.65 feet to 19.33 feet bgs on the Port site. These depths are similar to the historical range for the Northwest Pipe site of 6 to 14 feet bgs (CH2M, 2015). Groundwater in the Southeast Area flows toward Slip 1 to the south of the site (Figure 1). Groundwater levels in the shallow aquifer are influenced by the Willamette River stage. Groundwater depth measurements and water quality sampling captured both wet and dry season conditions over a range of river stage conditions (Figure 3).

Water levels measured during the groundwater investigation are summarized in Table 2. Groundwater elevation contour maps were prepared for the five measurement events (Figures 4 through 8). Groundwater flow direction is consistently south to southwest toward the Slip 1 on the Port site downgradient of the Southeast Area. The hydraulic gradient increases approaching Slip 1, from an average of 0.005 foot per foot (ft/ft), from the boundary of the Northwest Pipe site through the middle of the Port site, then transitioning to an average of 0.01 ft/ft near the slip. On the Northwest Pipe site, the groundwater flow direction appears to be nearly flat and more variable than further south, but flow is predominantly southerly as well. The observed variability appears to be due to a gradual gradient and aquifer response to changes in river stage or precipitation events. The water level at MW-04 to the east of the high concentration area appears to drive westerly and sometimes northerly flow directions. However, the significant decrease in hydraulic gradient (an average of 0.0006 ft/ft) across the Southeast Area compared to the Port site slows groundwater flow and response to changes in river stage. Actual groundwater movement during short duration periods of hydraulic gradient reversal would be minimal because of the combination of low hydraulic gradient, low hydraulic conductivity, and brief duration of apparent gradient reversal. The strongest gradient across the Southeast Area (0.0013 ft/ft) was measured during a period of south to southwest flow from MW-05 to MW-06 to MW-03 in July 2017.

#### **Hydraulic Conductivity Estimates from Aquifer Tests**

The hydraulic conductivity of the shallow aquifer was estimated based on interpretation of slug-withdrawal tests, performed on three of the six monitoring wells on the Northwest Pipe site (MW-05, MW-06, and MW-03) and two of the offsite Port wells (T4S1MW-22 and T4S1MW-03s). As noted above, a trial run was performed on MW-04 and results are included from a single repetition of testing. Well selection was confirmed and approved by DEQ based on analysis of well re-development data to estimate specific capacities as presented in CH2M (2016b). Wells selected for testing are located along the flow path from the highest concentration wells in the Southeast Area to the wells closest to Slip 1. Well re-development data also indicated the selected wells represented a range of typical hydraulic conductivities in the shallow aquifer (CH2M, 2016b).

Water level drawdown and recovery data during the tests were monitored using pressure transducers installed in each well being tested. Water level response data for the aquifer tests are provided in

electronic format on the CD included as Attachment E. Water level response as displacement versus time were analyzed using the industry-standard software, AQTESOLV (version 4.5 - software used for design and analysis of aquifer tests), to estimate the hydraulic conductivity of the shallow aquifer. Based on the site's hydrogeologic conditions and the well responses, the Bouwer and Rice (1976) equation for single-well tests in an unconfined aquifer was selected as the analytical solution for all wells selected for aquifer testing, but MW-05. This is a derived solution for steady flow to a fully or partially-penetrating, finite diameter well with no wellbore skin effects in a homogeneous, isotropic, unconfined aquifer. The recovery data for MW-05 showed minimal drawdown and an underdamped response (oscillation in the water level during equilibration). Therefore, the solution Springer-Gelhar (1991), intended for higher conductivity, unconfined aquifers with potentially underdamped response to slug-tests, was used for MW-05 analysis. AQTESOLV output for the aquifer test analysis is provided as Attachment F. Table 3 summarizes the results from the analysis for each aquifer test, with hydraulic property estimates for each test well. Three repetitions from each well were evaluated and results were averaged.

Table 3 also presents a comparison of the hydraulic conductivity values from the supplemental investigation with those calculated from the January 2005 monitoring event using the ASTM Method D 5472-93 and presented in the RI/SCE Work Plan (CH2M HILL, 2005), and those values from the 2016 redevelopment data calculated using the same method. Hydraulic conductivities calculated using the different data collection events and methods show good agreement between the wells (Table 3 and Figure 9). The typical hydraulic conductivity for the shallow aquifer along the flow path ranges from approximately 2 to 25 feet per day (ft/day). The hydraulic conductivity of MW-05 was calculated to be higher than the typical range (130 ft/day) indicating that this well is screened in a zone of higher conductivity. The higher hydraulic conductivity at this well is consistent with observations of minimal drawdown during sampling. However, this zone of higher hydraulic conductivity is bounded by lower conductivity in the downgradient direction and that lower conductivity will ultimately determine the rate of flow through this area.

As requested by DEQ, the aquifer test data were examined for evidence of wellbore skin effects. A low-permeability "skin" in the wellbore may occur in some geologic settings due to plastic silt smeared during drilling; a phenomenon most associated with the rotational action of hollow-stem auger drilling rigs. However, the wells used in this evaluation were installed using direct-push drilling methods, and unlikely to exhibit wellbore skin effects., CH2M identified no evidence of skin effects on well response during aquifer testing, with the exception of Port well T4S1MW-03s, which showed a slightly curved response in the early stage data during the transition period between the initial segment of the time-recovery plot. While this response could potentially be attributed to wellbore skin effects, it is also a characteristic of filter pack response and the second segment characteristic of aquifer response (Bouwer, 1989). The straight-line fit and calculation of aquifer hydraulic conductivity focused on the second segment of the recovery curve that reflects aquifer response (Attachment F). Other wells showed either no filter pack response or the expected straight-line filter pack response preceding the straight-line aquifer response.

In general, the hydrologic characterization work completed under this investigation confirmed the existing understanding of groundwater at the site, namely:

- Hydraulic conductivity estimates determined from earlier specific capacity calculations are generally similar to those determined from aquifer testing in this investigation
- A higher hydraulic conductivity exists at MW-05, but is bounded by lower hydraulic conductivity downgradient
- The hydraulic gradient in the Southeast Area is relatively flat, but downgradient a more distinct southerly gradient is observed.

This information was used to evaluate the observed concentrations of VOCs as described later in this memorandum.

### 3.2 VOC Concentrations

VOC concentrations were compared against ROD concentrations identified for remedial action objectives 4 and 8 associated with migration of contaminated groundwater (EPA, 2017). A key finding of this supplemental sampling is that concentrations of chlorinated solvents in groundwater in wells nearest to the Willamette River (T4S1MW-03s and T4S1MW-09) were consistently below the ROD concentrations for chlorinated solvents in each quarter monitored. These results indicate that the groundwater pathway is effectively controlled via ongoing natural attenuation processes.

As expected, VOC concentrations at selected wells approximately 1,000 feet or more upgradient to surface water in the Southeast Area, while generally lower than concentrations observed in the 2005 era, were observed to be above ROD concentrations. The groundwater analytical data for the four quarters of monitoring for the selected VOCs (PCE, TCE, cis-1,2-DCE, and VC) are presented in Table 4. On the Port property, the two wells closest to the Southeast Area, well T4S1MW-22 and T4S1MW-23, located approximately 1,000 feet and 700 feet, respectively, from Slip 1, had concentrations for certain VOCs above the ROD concentrations. T4S1MW-22 exceeded the ROD concentrations for PCE, TCE, and VC for all four quarters of monitoring. As noted above, the wells closest to the slip, T4S1MW-03s and T4S1MW-09, did not exceed the ROD concentrations for the VOCs evaluated in this study.

## 4.0 Data analysis

Groundwater flow data and analytical data were collected for the key objectives of evaluating plume stability, geochemical conditions favorable to natural attenuation, and fate and transport of the principal VOCs. Each of these analyses provides an additional line of evidence to support the conclusion that VOCs present in groundwater are controlled and do not represent a source of constituents to the Willamette River above ROD concentrations.

### 4.1 Plume Stability

The data collected during this study, in combination with data reported previously, indicate the plume of VOCs in groundwater is stable or possibly shrinking. Evidence of plume stability is provided by the relative distribution of VOCs in various wells and the areal extent of VOCs in groundwater.

Regarding the distribution of VOCs, the wells with higher VOC concentrations a decade ago in the mid-2000s (MW-05 and MW-06) are the same wells exhibiting higher VOC concentrations in recent data. Similarly, wells with previously moderate concentrations (MW-01, MW-03, and MW-04) are the same in recent data, as are wells with lower concentrations (MW-02 and wells on the Port property). Although the recent data shown in Table 4 exhibit temporal variability in concentration, the maximum value of the most highly concentrated VOC identified in this study (PCE in MW-05) is less than half the maximum concentration previously detected in groundwater at the site. Based on the stability in the relative distribution of VOCs within the plume, and the consistently low to non-detectable results for VOCs detected in Port wells, with concentrations lower than reported previously, the plume extent is stable and possibly shrinking. These characteristics are consistent with a stable or decreasing plume that is effectively controlled by natural attenuation processes.

The concentration trends in the Southeast Area are more complex than the consistently decreasing concentrations on the Port property. This trend observation is as expected with chlorinated solvents actively undergoing reductive dechlorination. Concentrations for all constituents in MW-01 and MW-02 have decreased since the last measurement events in 2003 to 2007. Concentrations in MW-04 are stable to decreasing for all constituents. Concentrations in MW-05, MW-06, and MW-03 are more variable. In

particular, concentrations in MW-05, which has been confirmed to be along the upgradient edge of the Northwest Pipe site, reflect possible onsite migration of an upgradient, offsite VOC plume.

To remove the effect of different molecular weights for different constituents, the VOCs were converted from micrograms per liter to micromoles per liter (molarity) by dividing concentrations by molecular weight for the three wells along the assumed centerline, or highest concentration zone, of the plume (MW-05, MW-06, and MW-03). These data are plotted in Figure 11. The figure also shows the predominant groundwater flow direction for the Southeast Area for the most recent sampling event. The three plots have different axes to allow for the detail of the concentration trends to be observed. PCE is a definitive parent compound, while TCE may be a parent compound or a breakdown or daughter product of PCE. The variability of the trends in these three wells probably is due to the following factors:

- Continued onsite migration of an upgradient, offsite VOC plume (reflected in rising PCE concentrations in the most upgradient well at the site, MW-05)
- Robust degradation of parent compounds to daughter products (rising concentrations of degradation products in certain wells)

Additional evidence of significant degradation beyond the Southeast Area is observed when average molar concentrations for principal VOCs are compared between wells in the Southeast Area and wells on Port property. Average molar concentrations are presented for the three highest-concentration in the Southeast Area (MW-05, MW-06, and MW-03), along with Port wells T4S1MW-22 (cross-gradient, from the plume, but higher concentrations than T4S1MW-23), T4S1MW-03s, and T4S1MW-09 closest to Slip 1 (Figure 12). Molar concentrations of PCE are reduced from an average of 18.5  $\mu\text{mol/L}$  at MW-05 to 3.5  $\mu\text{mol/L}$  at MW-03. Degradation product cis-1,2-DCE peaks in concentration at MW-06 and is further degraded by the time groundwater reaches MW-03. Downgradient on the Port site, all average VOC molar concentrations are less than 0.05  $\mu\text{mol/L}$ , confirming VOC concentrations are highly degraded on the Northwest Pipe site before even reaching the Port site.

#### 4.2 Natural Attenuation Analysis

Reductive dechlorination is an important fate process for natural attenuation of chlorinated solvents, including PCE, TCE, cis-1,2-DCE, and VC. In reductive dechlorination, chlorine atoms are successively removed from the chlorinated hydrocarbon and are replaced by hydrogen atoms. The removal of the chlorine atoms occurs as anaerobic microorganisms obtain energy by transferring electrons from electron donors (such as naturally occurring organic matter) to electron acceptors, such as dissolved oxygen (DO), nitrate, ferric iron ( $\text{Fe}^{3+}$ ), sulfate, carbon dioxide, and chlorinated aliphatic hydrocarbons such as PCE, TCE, DCE, and VC.

After DO is consumed, the anaerobic microorganisms preferentially use additional electron acceptors in the following order of preference: nitrate,  $\text{Fe}^{3+}$ , sulfate, and, finally, carbon dioxide. Reductive dechlorination is most effective in the range corresponding to sulfate reduction and methanogenesis (which occurs through the reduction of carbon dioxide). Groundwater chemistry indicative of sulfate-reducing or methanogenic conditions includes the following (EPA, 1998):

- Low DO concentrations, typically less than 0.5 milligrams per Liter (mg/L)
- Low ORP, typically less than 50 millivolts (mV) and preferable below -100 mV
- Low concentrations of nitrate, typically less than 1 mg/L
- The presence of ferrous iron ( $\text{Fe}^{2+}$ ), which results from the reduction of  $\text{Fe}^{3+}$ , at concentrations greater than 1 mg/L

Table 5 presents field parameters measured during collection of groundwater samples. DO and ORP levels measured at Southeast Area monitoring wells (typically below 0.20 mg/L and -50 mV,

respectively) demonstrate that reducing conditions are present throughout the Southeast Area. Additionally, the pH (which ranged from 6.3 to 7.1) is within the range amenable to microorganism survival.

Table 6 presents the remaining natural attenuation parameters analyzed during the investigation: nitrate, iron, sulfate, carbon dioxide, methane, chloride, and TOC. Combining these data with the field parameter data described above and the record of chlorinated solvent data from monitoring well samples (Table 4), it is possible to evaluate whether site conditions are consistent with reductive dechlorination of chlorinated solvents. EPA developed a screening worksheet for evaluating the potential for reductive dechlorination based on geochemical conditions (EPA, 1998). Table 7 contains the worksheet, along with scores assigned to the Northwest Pipe site based on available monitoring well data. The total score of 23 for data collected in this investigation, consistent with data from 2005, falls within the "strong evidence" category (greater than 20 points) identified by EPA for chlorinated solvent degradation via reductive dechlorination (EPA, 1998), indicating that geochemical conditions in the Southeast Area are conducive to reductive dechlorination and consistent with the observed limited migration of chlorinated solvents.

Additional evidence that demonstrates that reductive dechlorination is occurring is found in the presence of PCE and TCE daughter products, such as cis-1,2-DCE and VC in the shallow groundwater, as discussed previously. The presence of cis-1,2-DCE has been shown to indicate reductive dechlorination through biodegradation (EPA, 1998). Moreover, the elevated chloride concentrations in MW-03, MW-04, MW-05, and MW-06 compared to cross-gradient background conditions in MW-02 are consistent with chloride ion production from reductive dechlorination.

#### 4.3 Fate and Transport

Considering the observed flow direction, the nearest location where groundwater may reach surface water would be at Slip 1, which is located approximately 1,000 feet downgradient of the Southeast Area.

To further evaluate whether VOCs in groundwater leaving the Northwest Pipe site may migrate downgradient at sufficient concentrations to pose a risk to potential receptors in surface water, the transport of PCE and its biodegradation products were evaluated using EPA's BIOCHLOR model (EPA, 2000; EPA, 2002a). BIOCHLOR simulates the reductive dechlorination process (the dominant biotransformation process for chlorinated organic compounds at most sites), and was developed for and distributed by the EPA to assist in assessing the potential for downgradient migration of dissolved chlorinated solvents in groundwater.

Reductive dechlorination occurs under anaerobic conditions. Field monitoring data collected during groundwater monitoring at Northwest Pipe confirm that anaerobic conditions are present in shallow groundwater beneath the site, and the presence of chlorinated solvent degradation products is consistent with reductive dechlorination as an active process reducing the concentration and migration potential for chlorinated solvents in shallow groundwater.

BIOCHLOR is based on the Domenico analytical solute transport model, which assumes a uniform groundwater flow field. In addition to biotransformation, BIOCHLOR includes the ability to simulate three-dimensional dispersion and adsorption onto aquifer organic carbon. A literature value for the organic carbon partition coefficient was used in the BIOCHLOR evaluation. Other parameters used by the model were based on site specific data (gradient, hydraulic conductivity, fractional organic carbon content, and VOC concentrations), and assumed values (porosity, dispersivity, source area width). The input parameters used in the BIOCHLOR evaluation are summarized in Table 8.

Within BIOCHLOR, the source area is represented as a cross-sectional area (with a specified width and depth) that is oriented perpendicular to the flow field, and through which groundwater enters the

model at the assigned source area concentration. For this evaluation, it was assumed that the width of the source zone was 400 feet, based on the assumed width of the plume leaving the Northwest Pipe site (the distance between wells MW-03 and MW-04, plus approximately 40 feet on each side). As a conservative assumption, the vertical distribution of VOCs in the source area was assumed to equal the full saturated thickness of the shallow aquifer (14 feet). Source area concentrations for PCE and breakdown products assigned to the model are the average concentrations as measured in groundwater samples collected from MW-03 and MW-04, which reflect the concentrations of VOCs migrating off the Northwest Pipe site. The simulations assumed that VOC concentrations in this area remained constant for the full duration of the simulation. The simulation was then run for 1,000 years, which was found by iteration to be well beyond the time-frame for steady-state conditions. Applying unchanging VOC concentrations to the model for this duration is a highly conservative assumption because concentrations in the area would decrease over the 1,000-year modeling period as mass is depleted by advection, volatilization, and degradation.

Site data from the Port site (time-averaged concentrations from T4S1MW-22, T4S1MW-03s, and T4S1MW-09) were used as targets and the first order degradation rate for each VOC was determined by calibrating the model to these observed concentrations. The model was found to be sensitive to the degradation constants which emphasizes the need for using site-specific data where available. In this case, concentrations near Slip 1 are an indicator of the degradation occurring downgradient of the Southeast Area. The resulting degradation constants are within the range of values cited in literature reviewed for this study (Aronson and Howard, 1997; EPA, 2002b; and USGS, 2002). The output and input screens from BIOCHLOR simulations for PCE, TCE, cis-1,2-DCE, and VC are included as Attachment G. These present the simulated concentrations with increasing distance from the source area along the centerline axis of the simulated plume - the location where concentrations would be highest. At any given distance downgradient, concentrations decrease with increasing distance from the Northwest Pipe site.

Using the calibrated first order biodegradation rate constants, BIOCHLOR predicts that VOCs would not reach surface water at concentrations above the Portland Harbor ROD concentrations. Furthermore, it is important to note that the inputs to the BIOCHLOR model are highly conservative for the following reasons:

- The source is assumed to be continuous at the concentrations measured in the current investigation for the length of the simulation (1,000 years). A much more likely scenario is that concentrations will diminish over time.
- Groundwater flow conditions were averaged along the flow path. The actual VOC concentration data and geochemical data indicate biodegradation is occurring most rapidly near the Southeast Area, where the rate of groundwater flow is the lowest. Variation in groundwater flow direction may also slow plume migration toward Slip 1.
- Model findings agree with actual concentration data measured for the site, which both indicate that VOCs will not reach Slip 1 above ROD concentrations.

## 5.0 Conclusions

The supplemental investigation has shown groundwater flow conditions, VOC concentrations, and geochemical conditions remain largely unchanged since data were last collected and evaluated for the Southeast Area and the area downgradient of it. Following are the key conclusions of the investigation:

- **Hydrologic Characterization.** Groundwater flow direction determined from measurements collected in this investigation confirm flow is southerly, toward the Willamette River at Slip 1. The gradient and groundwater flow velocity across the Southeast Area is much flatter than that

on the Port site, allowing for reductive dechlorination to reduce VOC concentrations significantly before groundwater migrates to the Port site.

- **Updated VOC Concentrations.** 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 four events at both Port wells closest to the Slip.
- **Plume Stability Analysis.** Trend analysis including current and historic data show evidence of reductive dechlorination in the Southeast Area, with consistent decreasing trends in all VOCs downgradient of the site. Molar concentration comparisons along the centerline of the plume show strong evidence of degradation of parent VOCs (PCE and possibly TCE) to daughter products (cis-1,2-DCE and VC).
- **Natural Attenuation Analysis.** Geochemical data collected for the site confirms the 2005 conclusion that site conditions are favorable for reductive dechlorination processes. Data from both 2005 and this investigation fall into the “strong evidence” category identified by EPA for chlorinated solvent degradation via reductive dechlorination (EPA, 1998).
- **Fate and Transport Analysis.** Since the last VOC data was collected to now, VOC concentrations downgradient of the site have decreased. VOCs measured in wells nearest Slip 1 are below ROD concentrations. BIOCHLOR modeling using site-specific and highly conservative assumptions confirms VOCs will not reach Slip 1 in the future even with a continuous, ongoing source.

The supplemental groundwater investigation of the Southeast Area has provided DEQ and EPA with the data necessary to complete a Joint Source Control Decision that complies with the Portland Harbor ROD.

## 6.0 References

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# Tables

**Table 1**

Investigation Well Construction Details  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant

Well ID	Construction Date	Total Depth (ft bgs)	Casing Diameter (inches)	Borehole Diameter (inches)	Screen Length (ft)	Screened Interval (ft bgs)	Screened Material
<i>Northwest Pipe Company Wells</i>							
MW-01	7/23/2003	25	2-inch	6	10	14 to 24	Medium to fine sand
MW-02	7/23/2003	22	2-inch	6	10	10.5 to 20.5	Medium to fine sand
MW-03	7/24/2003	26	2-inch	6	10	14.5 to 24.5	Medium to fine sand
MW-04	8/6/2004	27	2-inch	6	10	16.5 to 26.5	Sand w/ silt. Medium to fine sand
MW-05	8/6/2004	28	2-inch	6	10	17.5 to 27.5	Sand w/ silt
MW-06	12/20/2004	29	2-inch	6	10	18.5 to 28.5	Medium to fine sand
<i>Port of Portland Wells</i>							
T4S1MW-03S	4/6/2004	30	2-inch	4	10	20 to 30	Medium sand
T4S1MW-09	4/7/2004	30	2-inch	4	10	20 to 30	Medium sand
T4S1MW-22	8/24/2004	30	2-inch	4	10	13 to 23	Medium sand
T4S1MW-23	8/24/2004	30	2-inch	4	10	15 to 25	Medium sand

Notes:

ft = feet

bgs = below ground surface

**Table 2**

Groundwater Elevation Measurements  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant

Well ID	Measurement Point Elevation (NGVD 29, ft)	Ground Surface Elevation (NGVD 29, ft)	Measurement Date	Depth to Water (ft bgs)	Elevation (NGVD 29, ft)
MW-01	30.64	30.99	10/25/2016	12.96	17.68
			1/10/2017	11.60	19.04
			1/30/2017	11.23	19.41
			4/25/2017	9.64	21.35
			7/24/2017	11.05	19.94
MW-02	27.66	27.97	10/25/2016	10.04	17.62
			1/10/2017	8.70	18.96
			1/30/2017	8.22	19.44
			4/25/2017	6.66	21.31
			7/24/2017	8.16	19.81
MW-03	29.15	29.38	10/25/2016	11.63	17.52
			1/10/2017	10.20	18.95
			1/30/2017	9.69	19.46
			4/25/2017	8.09	21.29
			7/24/2017	9.82	19.56
MW-04	30.12	30.77	10/25/2016	12.50	17.62
			1/10/2017	11.07	19.05
			1/30/2017	10.62	19.50
			4/25/2017	9.00	21.77
			7/24/2017	10.64	20.13
MW-05	30.38	30.74	10/25/2016	12.70	17.68
			1/10/2017	11.38	19.00
			1/30/2017	10.98	19.40
			4/25/2017	9.44	21.30
			7/24/2017	10.82	19.92
MW-06	29.82	30.06	10/25/2016	12.16	17.66
			1/10/2017	10.80	19.02
			1/30/2017	10.38	19.44
			4/25/2017	8.79	21.27
			7/24/2017	10.27	19.79
T4S1MW-02S	35.27	35.59	10/25/2016	18.35	16.92
			1/10/2017	16.52	18.75
			1/30/2017	16.10	19.17
			4/25/2017	14.15	21.44
			7/24/2017	16.39	19.20
T4S1MW-03S	32.91	33.36	10/25/2016	19.04	13.87
			1/10/2017	18.04	14.87
			1/30/2017	17.61	15.30
			4/25/2017	15.65	17.71
			7/24/2017	18.09	15.27
T4S1MW-09	33.47	33.75	10/25/2016	19.33	14.14
			1/10/2017	18.47	15.00
			1/30/2017	18.10	15.37
			4/25/2017	16.46	17.29
			7/24/2017	18.51	15.24

**Table 2**

Groundwater Elevation Measurements  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant

Well ID	Measurement Point Elevation (NGVD 29, ft)	Ground Surface Elevation (NGVD 29, ft)	Measurement Date	Depth to Water (ft bgs)	Elevation (NGVD 29, ft)
T4S1MW-10	22.22	22.53	10/25/2016	8.16	14.06
			1/10/2017	7.44	14.78
			1/30/2017	7.20	15.02
			4/25/2017	5.65	16.88
			7/24/2017	7.57	14.96
T4S1MW-17	31.06	31.34	10/25/2016	14.89	16.17
			1/10/2017	13.43	17.63
			1/30/2017	12.87	18.19
			4/25/2017	11.31	20.03
			7/24/2017	13.75	17.59
T4S1MW-22	32.95	33.30	10/25/2016	15.46	17.49
			1/10/2017	13.95	19.00
			1/30/2017	13.44	19.51
			4/25/2017	11.78	21.52
			7/24/2017	13.63	19.67
T4S1MW-23	31.21	31.45	10/25/2016	13.72	17.49
			1/10/2017	12.44	18.77
			1/30/2017	11.82	19.39
			4/25/2017	10.45	21.00
			7/24/2017	12.34	19.11
T4S1MW-25	30.95	31.38	10/25/2016	15.11	15.84
			1/10/2017	13.46	17.49
			1/30/2017	12.95	18.00
			4/25/2017	11.16	20.22
			7/24/2017	13.54	17.84
Willamette River			10/25/2016		5.03
			1/10/2017		6.82
			1/30/2017		6.07
			4/25/2017		14.88
			7/24/2017		4.00

Notes:

ft bgs = feet below ground surface

NGVD 29 = National Geodetic Vertical Datum of 1929

**Table 3**

Hydraulic Conductivity Estimates from 2005 Compared to 2016

*Supplemental Groundwater Investigation**Northwest Pipe Company Portland Plant*

	Estimated Hydraulic Conductivity (ft/day)					
	2005 Monitoring Purge Data	2016 Redevelopment Data	2016 Aquifer Test			
			Repetition A	Repetition B	Repetition C	Average
<i>Northwest Pipe Company Wells</i>						
MW-01	28	82	--	--	--	--
MW-02	2.6	1.3	--	--	--	--
MW-03	3.1	3.2	2.3	2.4	2.3	2.3
MW-04	5.6	20	17	--	--	17
MW-05	-	124	131	139	132	130
MW-06	19	48	21	28	25	25
<i>Port of Portland Wells</i>						
T4S1MW-03s	-	4.7	3.8	3.0	2.8	3.2
T4S1MW-22	-	24	16	11	16	15
T4S1MW-23	-	11	--	--	--	--

**Notes:**

Purge data from the January 2005 monitoring event was evaluated using ASTM Method D 5472-93 and presented in the RI/SCE Work Plan (CH2M HILL, 2005).

Well redevelopment data from October 2016 was evaluated using ASTM Method D 5472-93 and used to select wells for slug testing in November 2016.

MW-01, MW-02, MW-04, T4S1MW-09, and T4S1MW-23 were not selected for 2016 aquifer testing. A proof of concept aquifer test was performed on MW-04 on October 26, 2016 and analyzed data is included here. Repetitions of the MW-04 test were not performed.

**Table 4**  
Groundwater Quality Analytical Data for Volatile Organic Compounds  
Supplemental Groundwater Investigation  
Northwest Pipe Company Portland Plant

		Volatile Organic Compounds (µg/L)			
		PCE	TCE	cis-1,2-DCE	VC
Portland Harbor ROD Concentrations (µg/L) <sup>1</sup>		0.24	0.6	9.9	0.022
<b>Northwest Pipe Company Wells</b>					
MW-01	10/26/2016	<b>158</b>	<b>22.8</b>	<b>113</b>	<b>16.7</b>
(1,280 feet to river)	2/1/2017	<b>71.1</b>	<b>14.9</b>	<b>107</b>	<b>29.9</b>
	5/1/2017	<b>61.7</b>	<b>13.0</b>	<b>220</b>	<b>51.6</b>
	7/26/2017	<b>197</b>	<b>26.7</b>	<b>174</b>	<b>8.51</b>
MW-02	10/26/2016	<b>0.0598</b>	0.15 U	0.15 U	<b>0.0652</b>
(1,140 feet to river)	2/1/2017	<b>0.169</b>	0.15 U	<b>0.20 J</b>	<b>0.0370</b>
	4/27/2017	<b>0.224</b>	0.15 U	<b>0.21 J</b>	<b>0.0115 J</b>
	7/25/2017	<b>0.451</b>	0.15 U	<b>0.41 J</b>	<b>0.0190 J</b>
MW-03	10/26/2016	<b>630</b>	<b>221</b>	<b>428</b>	<b>22.8</b>
(975 feet to river)	2/1/2017	<b>483</b>	<b>178</b>	<b>502</b>	<b>20.8</b>
	5/1/2017	<b>657</b>	<b>283</b>	<b>847</b>	<b>26.1</b>
	7/27/2017	<b>550</b>	<b>209</b>	<b>670</b>	<b>29.9</b>
MW-04	10/26/2016	<b>28.2</b>	<b>38.4</b>	<b>111</b>	<b>4.45</b>
(1,130 feet to river)	2/1/2017	<b>12.4</b>	<b>20.3</b>	<b>119</b>	<b>9.73</b>
	4/27/2017	<b>14.4</b>	<b>29.7</b>	<b>116</b>	<b>16.6</b>
	7/26/2017	<b>18.5</b>	<b>35.4</b>	<b>137</b>	<b>9.43</b>
MW-05	10/26/2016	<b>3,510</b>	<b>195</b>	<b>1,160</b>	<b>40.4</b>
(1,370 feet to river)	2/1/2017	<b>4,150</b>	<b>208</b>	<b>1,240</b>	<b>39.5</b>
	5/1/2017	<b>949</b>	<b>92</b>	<b>634</b>	<b>70.7</b>
	7/27/2017	<b>3,640</b>	<b>170</b>	<b>1,730</b>	<b>7.58 J</b>
MW-06	10/26/2016	<b>287</b>	<b>60.4</b>	<b>1,160</b>	<b>170</b>
(1,200 feet to river)	2/1/2017	<b>805</b>	<b>147</b>	<b>1,590</b>	<b>51</b>
	5/1/2017	<b>1,280</b>	<b>225</b>	<b>1,530</b>	<b>21.9</b>
	7/27/2017	<b>810</b>	<b>128</b>	<b>1,080</b>	<b>18.3</b>
MW-06	10/26/2016	<b>299</b>	<b>70.9</b>	<b>1,130</b>	<b>177</b>
Duplicate	2/1/2017	<b>760</b>	<b>145</b>	<b>1,600</b>	<b>53.9</b>
(1,200 feet to river)	5/1/2017	<b>1,280</b>	<b>228</b>	<b>1,550</b>	<b>20.7</b>
	7/27/2017	<b>728</b>	<b>123</b>	<b>1,080</b>	<b>22.5</b>
<b>Port of Portland Wells (Upgradient to Downgradient)</b>					
T4S1MW-22	10/25/2016	<b>1.46 J</b>	<b>4.6 J</b>	<b>2.77 J</b>	<b>0.0499 J</b>
(1,010 feet to river)	2/1/2017	<b>1.28</b>	<b>4.29</b>	<b>5.36</b>	<b>0.106</b>
	4/27/2017	<b>1.43</b>	<b>3.56</b>	<b>2.11</b>	<b>0.022</b>
	7/26/2017	<b>1.71</b>	<b>3.00</b>	<b>3.78</b>	<b>0.0638</b>
T4S1MW-23	10/25/2016	<b>1.59 J</b>	0.15 UJ	<b>0.70 J</b>	0.008 UJ
(710 feet to river)	2/1/2017	<b>0.937</b>	<b>0.41 J</b>	<b>0.65</b>	<b>0.0188 J</b>
	4/27/2017	<b>1.07</b>	<b>0.39 J</b>	<b>0.42 J</b>	0.008 U
	7/26/2017	<b>1.21</b>	<b>0.29 J</b>	0.15 U	0.008 U
T4S1MW-03S	10/25/2016	<b>0.112 J</b>	0.15 UJ	0.15 UJ	0.008 UJ
(160 feet to river)	2/1/2017	<b>0.23</b>	0.15 U	0.15 U	0.008 U
	4/26/2017	<b>0.117</b>	0.15 U	0.15 U	0.008 U
	7/25/2017	<b>0.0508</b>	0.15 U	0.15 U	0.008 U
T4S1MW-09	10/25/2016	<b>0.0191 J</b>	0.15 UJ	0.15 UJ	<b>0.0197 J</b>
(145 feet to river)	2/1/2017	<b>0.0177 J</b>	0.15 U	0.15 U	<b>0.0113 J</b>
	4/26/2017	0.005 U	0.15 U	0.15 U	0.008 U
	7/25/2017	<b>0.0139 J</b>	0.15 U	0.15 U	0.008 U

Notes:

µg/L = micrograms per Liter

Results shown in **bold** denote detected concentrations.

Shaded values exceed identified ROD concentrations.

<sup>1</sup>ROD concentrations are selected from Table 17 of the Portland Harbor Record of Decision (U.S. Environmental Protection Agency Region 10, 2017). Values were selected from remedial action objectives (RAOs) 4 and 8 associated with migration of contaminated groundwater.

Qualifiers

U - the analyte was analyzed for but was not detected above the detection limit.

J - the analyte was detected, but the associated numerical value is considered an estimated quantity.

UJ - the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**Table 5**

Groundwater Quality Field Parameters  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant

Well	Date Sampled	Temperature (°C)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
<i>Northwest Pipe Company Wells</i>							
MW-01	10/26/2016	15.9	6.42	352	0.26	6	6.8
	2/2/2017	16.0	6.64	385	0.01	-36	3.1
	5/1/2017	15.5	6.56	423	0.12	36	3.0
	7/26/2017	17.2	6.46	513	0.08	66	1.0
MW-02	10/26/2016	16.8	6.90	197	0.24	-138	0.7
	2/1/2017	15.4	6.97	202	0.09	-136	8.2
	4/27/2017	15.0	7.11	240	0.20	-142	8.1
	7/25/2017	20.1	6.74	244	0.07	-141	1.0
MW-03	10/26/2016	16.4	6.61	281	0.32	-88	2.6
	2/2/2017	15.9	6.76	321	0.26	-68	3.2
	5/1/2017	15.5	6.56	334	0.07	-43	3.5
	7/27/2017	17.0	6.55	360	0.08	-69	2.6
MW-04	10/26/2016	14.8	6.34	323	0.28	-59	4.1
	2/1/2017	14.3	6.39	440	0.32	-45	1.3
	4/27/2017	13.0	6.60	337	0.22	-59	5.0
	7/26/2017	15.1	6.42	374	0.13	-66	8.1
MW-05	10/26/2016	15.5	6.50	375	0.17	-52	1.2
	2/2/2017	15.7	6.59	426	0.33	77	1.8
	5/1/2017	15.4	6.60	360	0.11	-40	0.5
	7/27/2017	18.0	6.46	390	0.11	19	2.2
MW-06	10/26/2016	15.9	6.47	266	0.15	-76	2.7
	2/2/2017	15.5	6.54	299	0.20	-47	2.8
	5/1/2017	15.7	6.35	310	0.13	20	4.4
	7/27/2017	16.6	6.27	322	0.07	-9	10.7
<i>Port of Portland Wells</i>							
T4S1MW-03S	10/25/2016	14.2	6.42	245	0.86	72	0.5
	2/1/2017	14.3	6.65	111	5.19	145	0.8
	4/26/2017	13.2	6.62	87	8.96	167	1.6
	7/25/2017	16.0	6.46	164	4.46	115	0.3
T4S1MW-09	10/25/2016	14.9	6.51	278	3.27	-53	1.6
	2/1/2017	14.9	6.67	234	2.87	-41	0.9
	4/26/2017	14.3	6.51	200	0.98	-20	4.2
	7/25/2017	16.0	6.45	216	1.77	96	1.8
T4S1MW-22	10/25/2016	15.7	6.35	217	0.33	97	4.0
	2/1/2017	14.4	6.40	255	0.30	132	1.2
	4/27/2017	15.0	6.36	232	1.20	169	1.4
	7/26/2017	16.0	6.25	242	0.88	117	0.7
T4S1MW-23	10/25/2016	15.1	6.49	165	0.90	39	1.2
	2/1/2017	14.2	6.54	177	1.31	51	1.4
	4/27/2017	14.9	6.53	161	1.12	92	1.9
	7/26/2017	18.0	6.57	165	1.47	61	0.6

**Notes:**

°C = degrees Celsius

mg/L = milligrams per liter

mV = millivolts

uS/cm = microsiemens per centimeter

NTU = Nephelometric Turbidity Units

**Table 6**

Groundwater Quality Analytical Data for Natural Attenuation Parameters  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant

Natural Attenuation Parameters (mg/L)								
Sample ID	Sample Date	Chloride	Nitrate-N	Sulfate	TOC	Iron, dissolved	Carbon Dioxide	Methane
<i>Northwest Pipe Company Wells</i>								
MW-01	10/26/2016	2.46	0.37 J	10.1	1.00	1.59	81.0	1.25
	2/1/2017	3.69	0.061	4.71	0.84	3.01	68.2	1.74
	5/1/2017	4.00	0.029	3.57	1.34	1.53	82.6	3.12
	7/26/2017	5.29	4.22	29.3	1.28	0.01	10.3	0.177
MW-02	10/26/2016	1.98	0.023 J	4.15	1.48	5.45	29.6	3.68
	2/1/2017	2.50	0.39	8.09	1.23	5.39	17.6	3.30
	4/27/2017	2.47	0.31	5.37	1.6	1.34	15.6	3.42
	7/25/2017	3.14	0.27	5.88	1.52	5.91	19.3	5.33
MW-03	10/26/2016	3.61	0.018 J	10.2	1.27	6.14	53.6	1.48
	2/1/2017	3.92	0.018	10.4	0.93	4.46	44.1	0.734
	5/1/2017	5.47	0.0028 U	12.1	1.27	3.32	53.9	0.748
	7/27/2017	5.19	0.011	9.48	1.33	6.31	57.6	2.67
MW-04	10/26/2016	3.00	0.043 J	5.7	1.21	12.9	104	1.46
	2/1/2017	4.90	0.0028 U	4.42	1.09	9.75	98.4	1.86
	4/27/2017	4.52	0.011	2.35	1.40	9.83	82.0	1.21
	7/26/2017	4.10	0.023	2.55	0.72	10.0	82.9	1.78
MW-05	10/26/2016	5.36	0.34 J	20.5	1.67	4.46	75.1	1.16
	2/1/2017	7.03	0.57	29.7	1.50	0.0137 U	74.9	0.887
	5/1/2017	4.87	0.0028 U	11.9	1.33	4.17	50.5	2.31
	7/27/2017	6.53	1.05	20.9	1.28	2.14	63.8	1.19
MW-06	10/26/2016	5.07	0.016 J	5.17	1.25	7.29	57.1	2.28
	2/1/2017	6.12	0.0028 U	9.27	1.15	6.1	60.5	0.623
	5/1/2017	6.2	0.0028 U	13.9	1.27	3.53	81.8	0.206
	7/27/2017	5.18	0.0084 J	13.7	1.05	3.24	78.6	0.214 J
MW-06	10/26/2016	5.05	0.017 J	5.36	1.15	7.4	59.5	2.04
Duplicate	2/1/2017	5.95	0.003 J	9.09	1.12	6.09	62.3	0.666
	5/1/2017	6.21	0.0028 U	14.0	1.40	3.6	82.3	0.265
	7/27/2017	5.21	0.01	13.6	1.16	3.22	80.0	0.382 J
<i>Port of Portland Wells</i>								
T4S1MW-03S	10/25/2016	5.1 J	5.19 J	24.7 J	0.85 J	0.0304 J	26.2 J	0.0291 J
	2/1/2017	0.86	1.23	4.54	0.39 J	0.01 U	13.9	0.0101 J
	4/26/2017	0.71	0.44	2.56	0.50	0.01 U	9.60	0.00515 U
	7/25/2017	1.9	3.79	12.4	0.56	0.01 U	18.1	0.00495 U
T4S1MW-09	10/25/2016	2.76 J	1.23 J	5.97 J	1.09 J	7.62	49.1 J	2.64 J
	2/1/2017	1.70	2.94	5.66	0.61	4.41	29.0	1.22
	4/26/2017	1.65	1.87	5.95	0.70	2.00	27.3	0.0225 J
	7/25/2017	2.34	1.94	7.16	0.69	0.0321 J	30.8	0.0225 J
T4S1MW-22	10/25/2016	2.8 J	0.095 J	5.49 J	1.19 J	0.01 U	48.4 J	0.0159 J
	2/1/2017	4.56	0.039	8.90	1.09	0.01 U	84.5	0.0334
	4/27/2017	3.38	0.92	10.0	1.18	0.01 U	49.1	0.00605 U
	7/26/2017	4.78	0.36	7.90	1.15	0.01 U	60.0	0.0154 J
T4S1MW-23	10/25/2016	3.92 J	0.27 J	7.67 J	0.65 J	0.221	52.9 J	0.00507 J
	2/1/2017	4.24	0.58	8.74	0.68	0.185	26.9	0.0379
	4/27/2017	3.36	0.42	7.76	0.78	0.0545 J	20.4	0.00712 J
	7/26/2017	4.07	0.36	4.83	1.18	0.110	27.5	0.0196 J

**Notes:**

mg/L = milligrams per Liter

TOC = Total Organic Carbon

Qualifiers

U - the analyte was analyzed for but was not detected above the detection limit.

J - the analyte was detected, but the associated numerical value is considered an estimated quantity.

**Table 7**

Analytical Parameters and Weighting for Preliminary Screening for Anaerobic Biodegradation Processes  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant

Analysis	Concentration in Most Contaminated Zone <sup>a</sup>	Interpretation	Value	Northwest Pipe Score	
				2005	2017
Dissolved Oxygen	< 0.5 mg/L	Tolerated; suppresses the reductive pathway at higher concentrations	3	3	3
Nitrate	< 1 mg/L	At higher concentrations, may compete with reductive pathway	2	2	2
Iron II	> 1 mg/L	Reductive pathway possible	3	3	3
Sulfate	< 20 mg/L	At higher concentrations, may compete with reductive pathway	2	2	2
Sulfide	> 1 mg/L	Reductive pathway possible	3	ND <sup>b</sup>	ND <sup>b</sup>
Methane	> 0.5 mg/L	Ultimate reductive daughter product	3	3	3
Oxidation reduction potential	< 50 millivolts	Reductive pathway likely	2	1	1
pH	5 <pH< 9	Optimal range for reductive pathway	0	0	0
TOC	> 20 mg/L	Carbon and energy source; drives dechlorination; can be natural or anthropogenic	2	0	0
Temperature	>20°C	At T > 20°C, biochemical process is accelerated	1	0	0
Carbon dioxide	> 2x background <sup>a</sup>	Ultimate oxidative daughter product	1	1	1
Alkalinity	> 2x background <sup>a</sup>	Results from interaction between CO2 and aquifer minerals	1	0	ND <sup>b</sup>
Chloride	> 2x background <sup>a</sup>	Daughter product of organic chlorine	2	2	2
Hydrogen	> 1 nM	Reductive pathway possible	3	ND <sup>b</sup>	ND <sup>b</sup>
TCE		Daughter product of PCE	2 <sup>c</sup>	2	2
DCE		Daughter product of TCE	2 <sup>c</sup>	2	2
VC		Daughter product of DCE	2 <sup>c</sup>	2	2
<b>Total Score for Northwest Pipe Facility</b>				<b>23</b>	<b>23</b>

<sup>a</sup> Data from MW-02 was considered indicative of background conditions and MW-01, MW-04, and MW-06 as representative of the most contaminated zone for 2005 and MW-05 and MW-06 for 2017.

<sup>b</sup> ND = Not determined. Assigned a value of zero although the actual value, if data were available, may be higher.

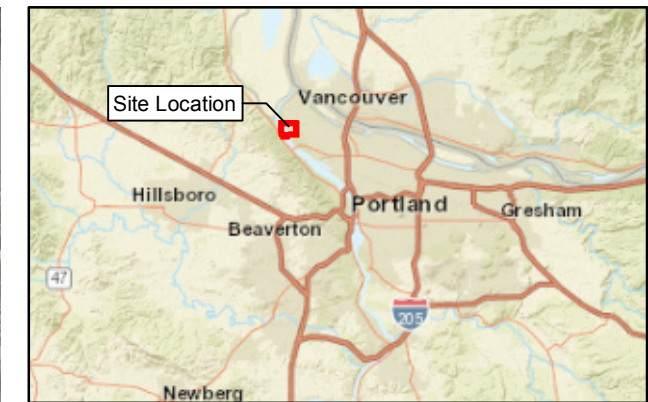
<sup>c</sup> Points awarded only if it can be shown that the compound is a daughter product (i.e., not a constituent of the source material). The presence of TCE and further breakdown products, combined with the limited migration distance away from the area of highest concentration, indicate that TCE, DCE, and VC are breakdown products.

**Table 8**

BIOCHLOR Input Parameters  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant

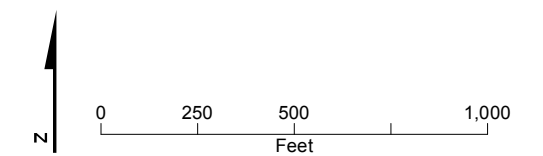
<b>Input Parameter</b>	<b>Values</b>	<b>Units</b>	<b>Comments</b>
<i>Hydrogeologic Data</i>			
Hydraulic conductivity	0.0031	cm/sec	Average of hydraulic conductivities estimated at downgradient Port wells (8.8 ft/day).
Hydraulic gradient	0.005	unitless	Average gradient across majority of Port site downgradient of Southeast Area.
Effective porosity	0.2	unitless	Typical default value
Seepage velocity	80	feet/year	Calculated from above values
Longitudinal dispersivity	100	feet	Assumed to be 10% of distance to discharge location.
Transverse dispersivity	10	feet	Assumed to be 10% of longitudinal dispersivity.
Aquifer bulk density	1.7	kg/L	Typical default value
Organic carbon partition coefficient (Koc)	1.93	mg/kg	Estimated from reported values for chlorinated solvents (EPA, 2000)
Fraction organic carbon	0.000843	unitless	Average of three soil samples collected in boring MW-06
<i>Biotransformation Data</i>			
PCE to TCE	1.2	per year	Calibrated model to field data downgradient of Southeast Area.
TCE to DCE	0.95	per year	Calibrated model to field data downgradient of Southeast Area.
DCE to vinyl chloride	1.7	per year	Calibrated model to field data downgradient of Southeast Area.
Vinyl chloride to ethene	7	per year	Calibrated model to field data downgradient of Southeast Area.
<i>Source Data</i>			
PCE concentration in source zone	299	µg/L	Average concentration of samples collected at MW-03 and MW-04.
TCE concentration in source zone	127	µg/L	Average concentration of samples collected at MW-03 and MW-04.
DCE concentration in source zone	366	µg/L	Average concentration of samples collected at MW-03 and MW-04.
Vinyl chloride concentration in source zone	17.5	µg/L	Average concentration of samples collected at MW-03 and MW-04.
Ethene concentration in source zone	0	µg/L	Not analyzed.
Source area width	400	feet	Estimated based on field observations.
Source area depth	14	feet	Assumed to extend over full saturated thickness of aquifer.

# Figures



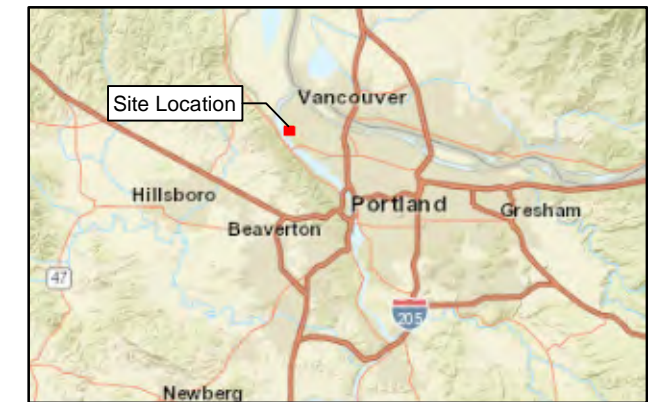
**LEGEND**

 Northwest Pipe Site Boundary

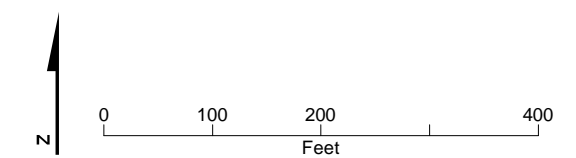


**FIGURE 1**  
**Vicinity Map**  
 Supplemental Groundwater Sampling and Data Evaluation  
 Northwest Pipe Company, Portland, Oregon

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



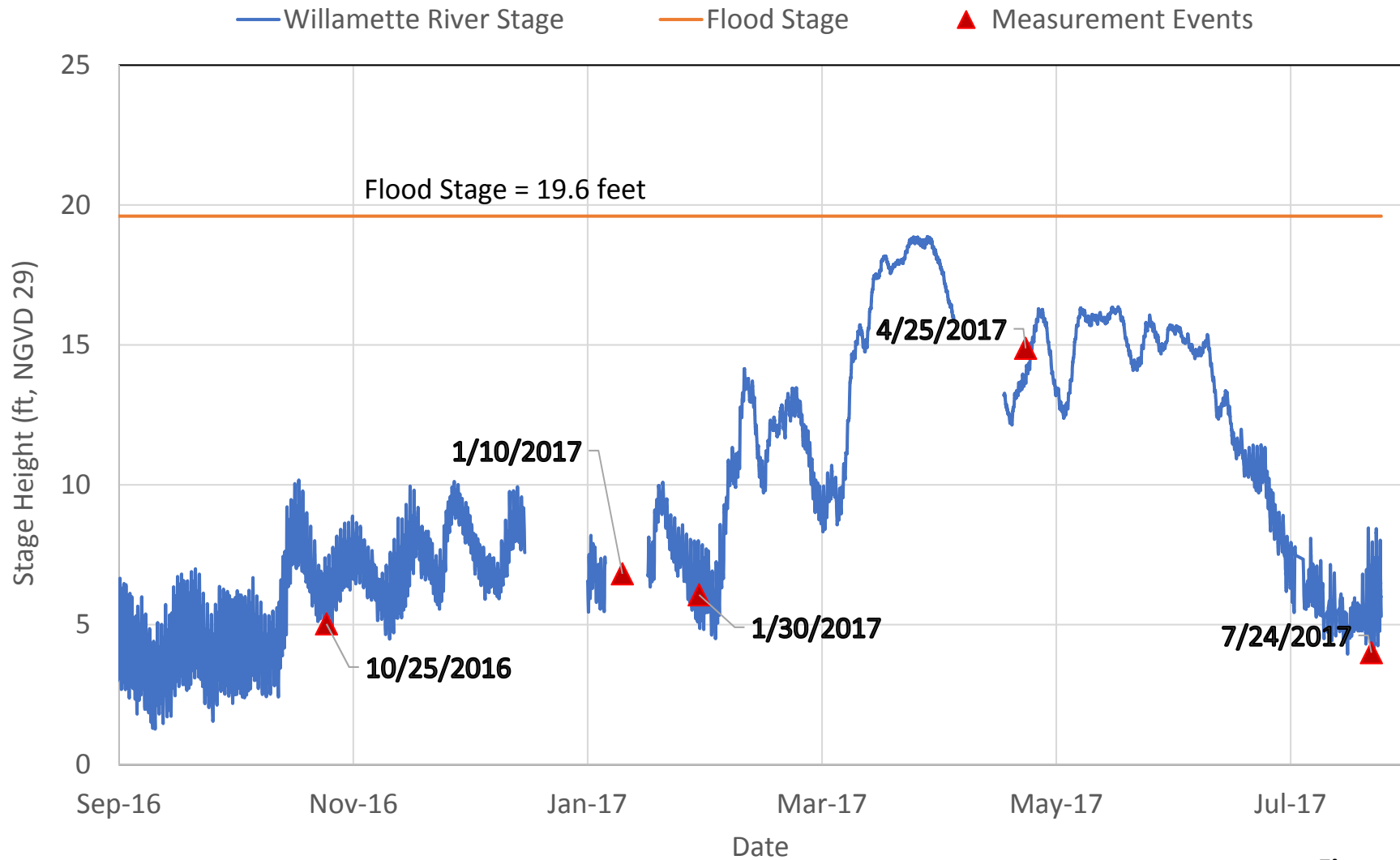
- LEGEND**
- Investigation Wells**
- Groundwater Quality Monitoring
  - Water Level Only
  - Northwest Pipe Site Boundary



**FIGURE 2**  
**Groundwater Investigation Wells**  
 Supplemental Groundwater Sampling and Data Evaluation  
 Northwest Pipe Company, Portland, Oregon

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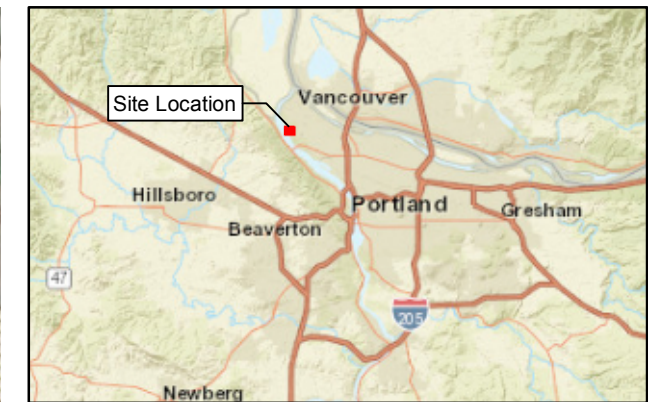
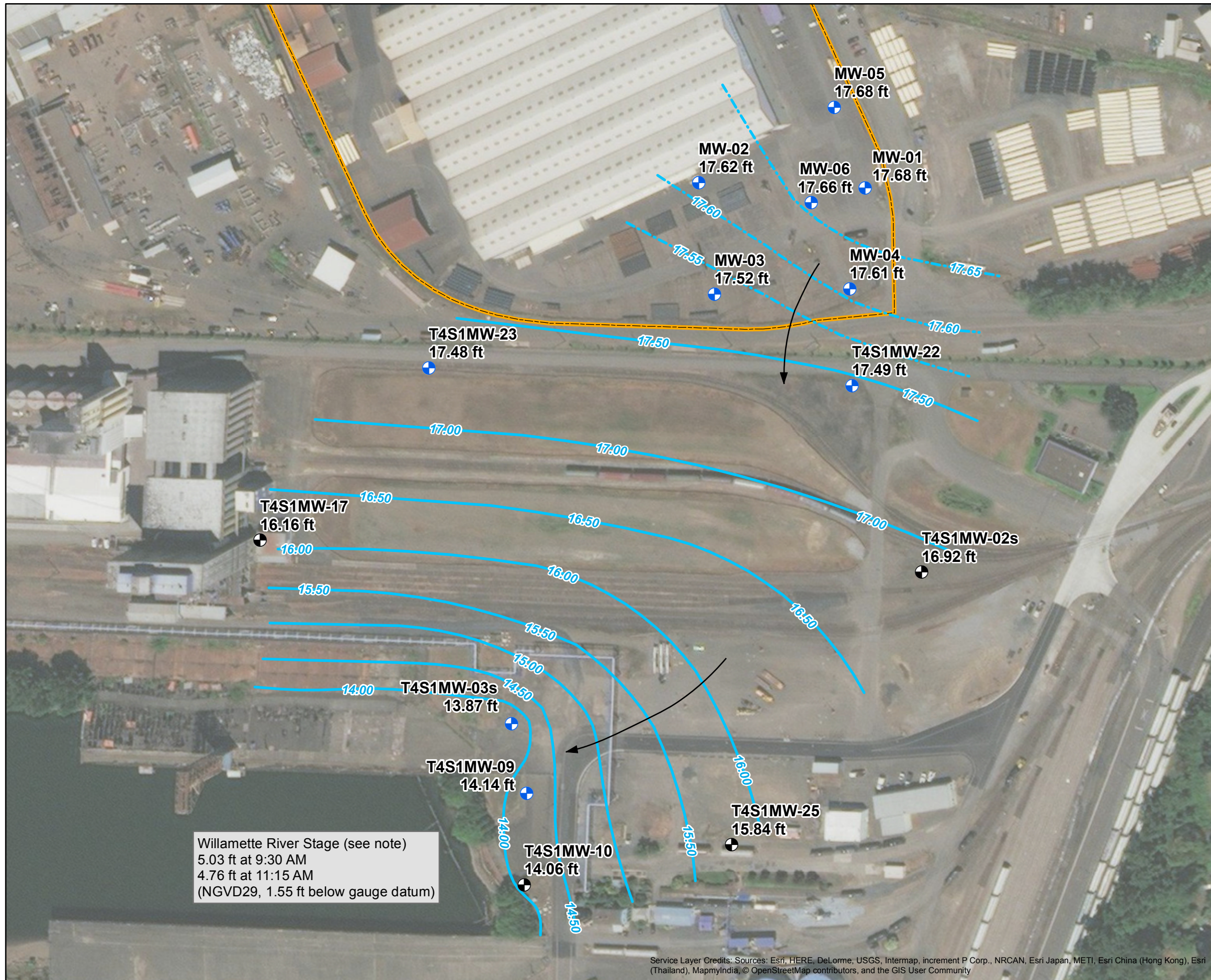




Notes:

Gage Zero: +1.6 NGVD 29/MSL (Data corrected to NGVD 29 elevation)  
 Latitude: 45° 31' 12" N Longitude: 122° 40' 12" W  
 Gaps in stage data represent equipment malfunction.  
 NGVD 29 = National Geodetic Vertical Datum of 1929  
 ft = feet  
 MSL = mean sea level

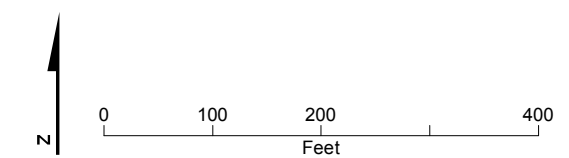
**Figure 3**  
 Willamette River Stage Height (USGS Gage 14211720)  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant



**LEGEND**

- Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29)
- Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
- Groundwater Flow Direction
- Investigation Wells**
- Groundwater Quality Monitoring
- Water Level Only
- Northwest Pipe Site Boundary

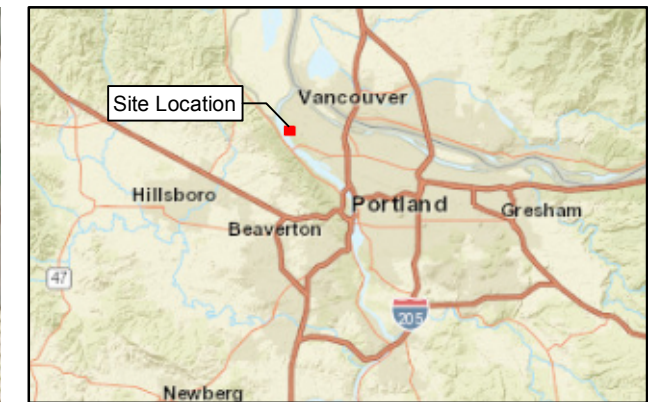
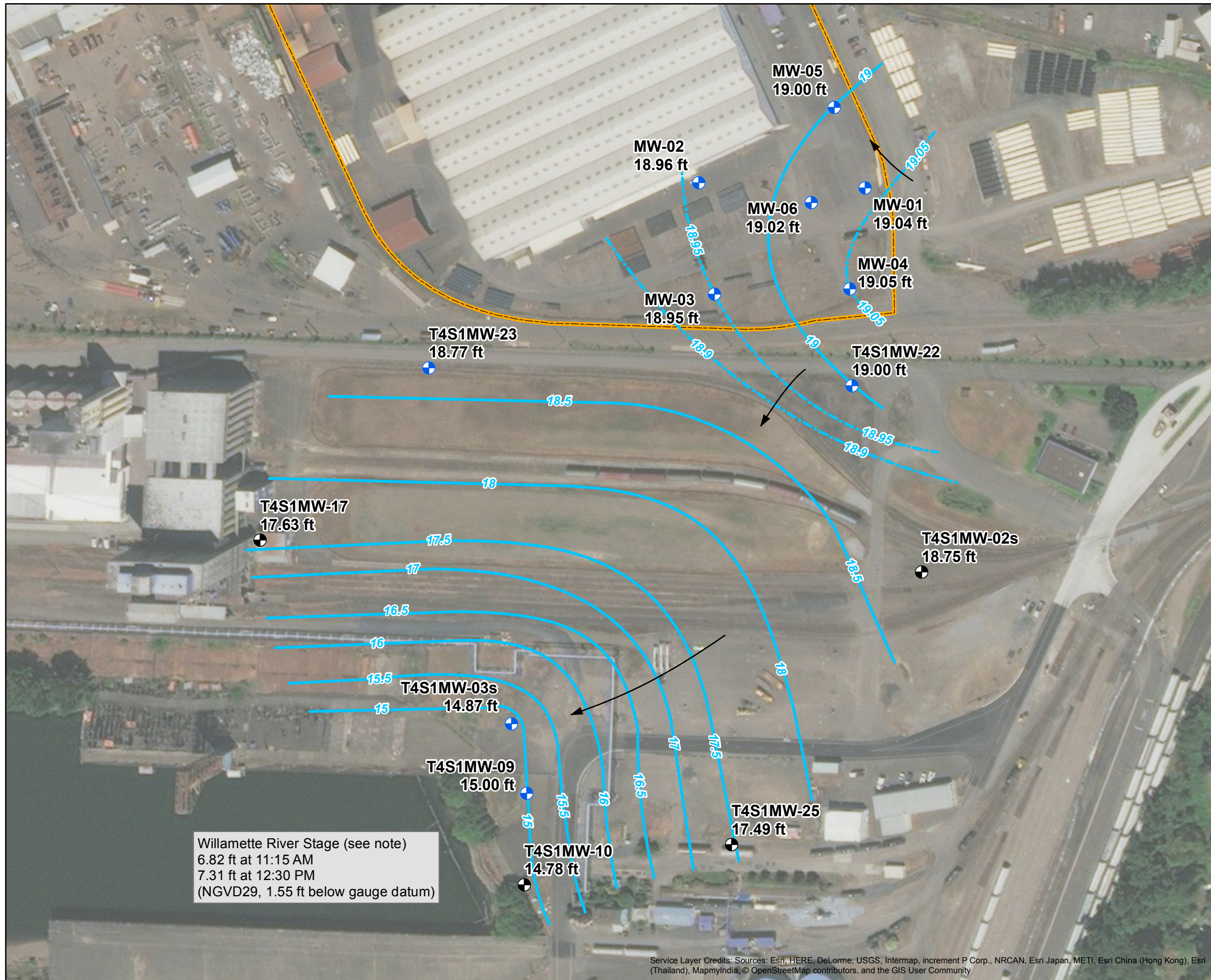
Note: Groundwater levels measured between 9:30 AM and 11:10 AM on October 25, 2016. During this period, the Willamette River stage decreased by 0.27 foot, as measured at the Broadway Bridge river gauge (USGS 14211720).



**FIGURE 4**  
**Groundwater Elevation Contour Map**  
**October 25, 2016**

Supplemental Groundwater Sampling and Data Evaluation  
 Northwest Pipe Company, Portland, Oregon

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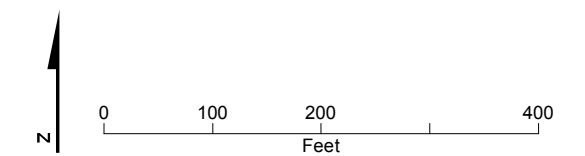
**LEGEND**

- Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29)
- Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
- Groundwater Flow Direction

**Investigation Wells**

- Groundwater Quality Monitoring
- Water Level Only
- Northwest Pipe Site Boundary

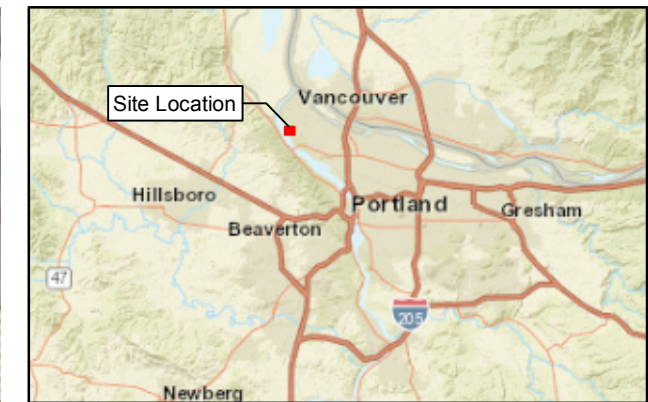
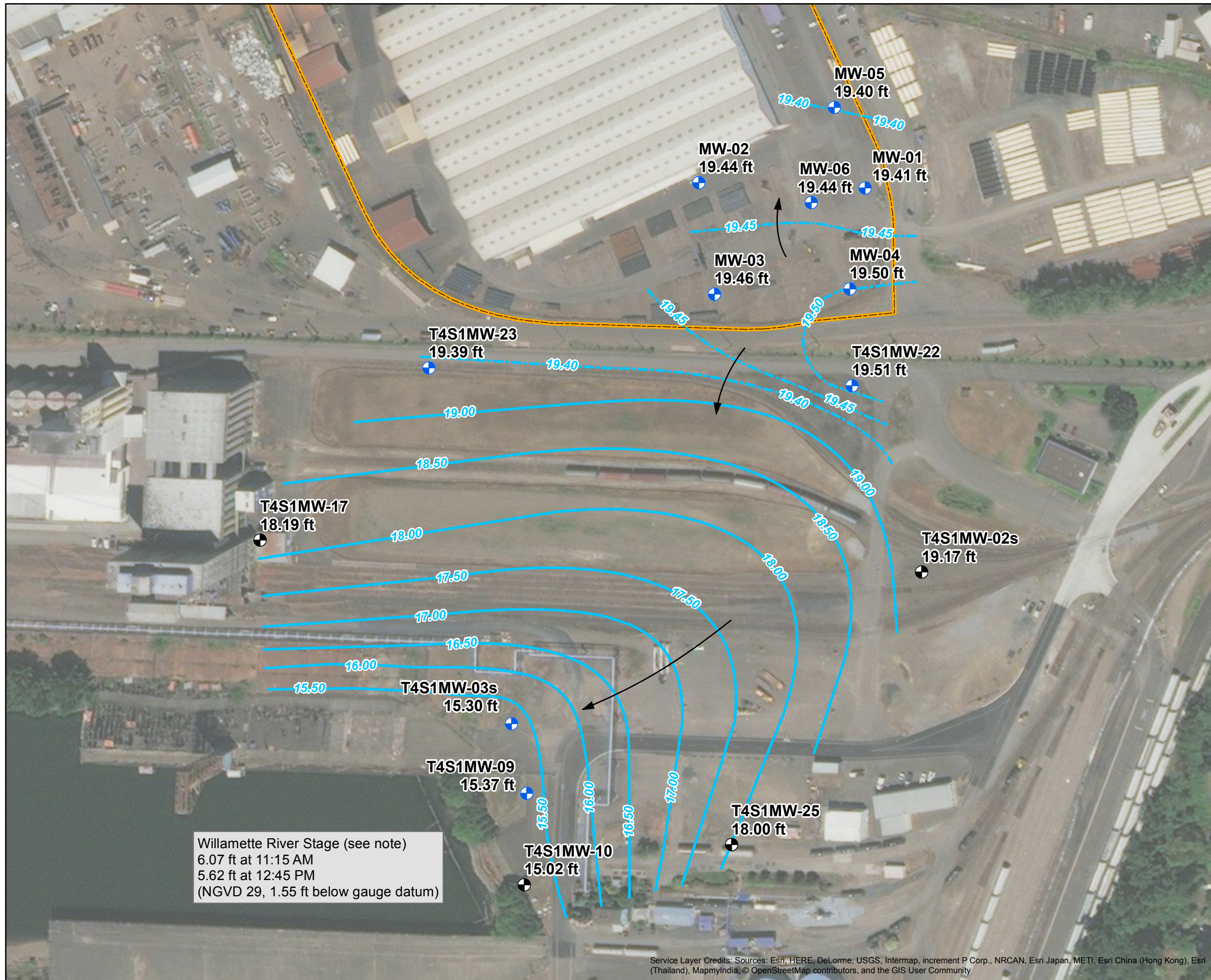
Note: Groundwater levels measured between 11:23 AM and 12:35 PM on January 10, 2017. During this period, the Willamette River stage increased by 0.49 foot, as measured at the Broadway Bridge river gauge (USGS 14211720).



**FIGURE 5**  
**Groundwater Elevation Contour Map**  
**January 10, 2017**

Supplemental Groundwater Sampling and Data Evaluation  
 Northwest Pipe Company, Portland, Oregon

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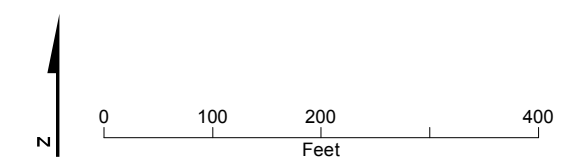
**LEGEND**

- Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29)
- Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
- Groundwater Flow Direction

**Investigation Wells**

- Groundwater Quality Monitoring
- Water Level Only
- Northwest Pipe Site Boundary

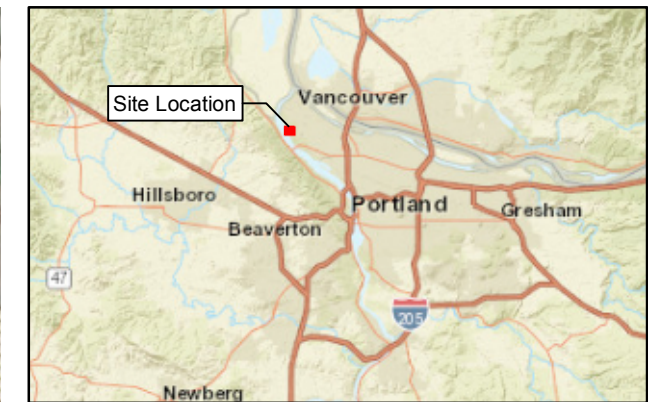
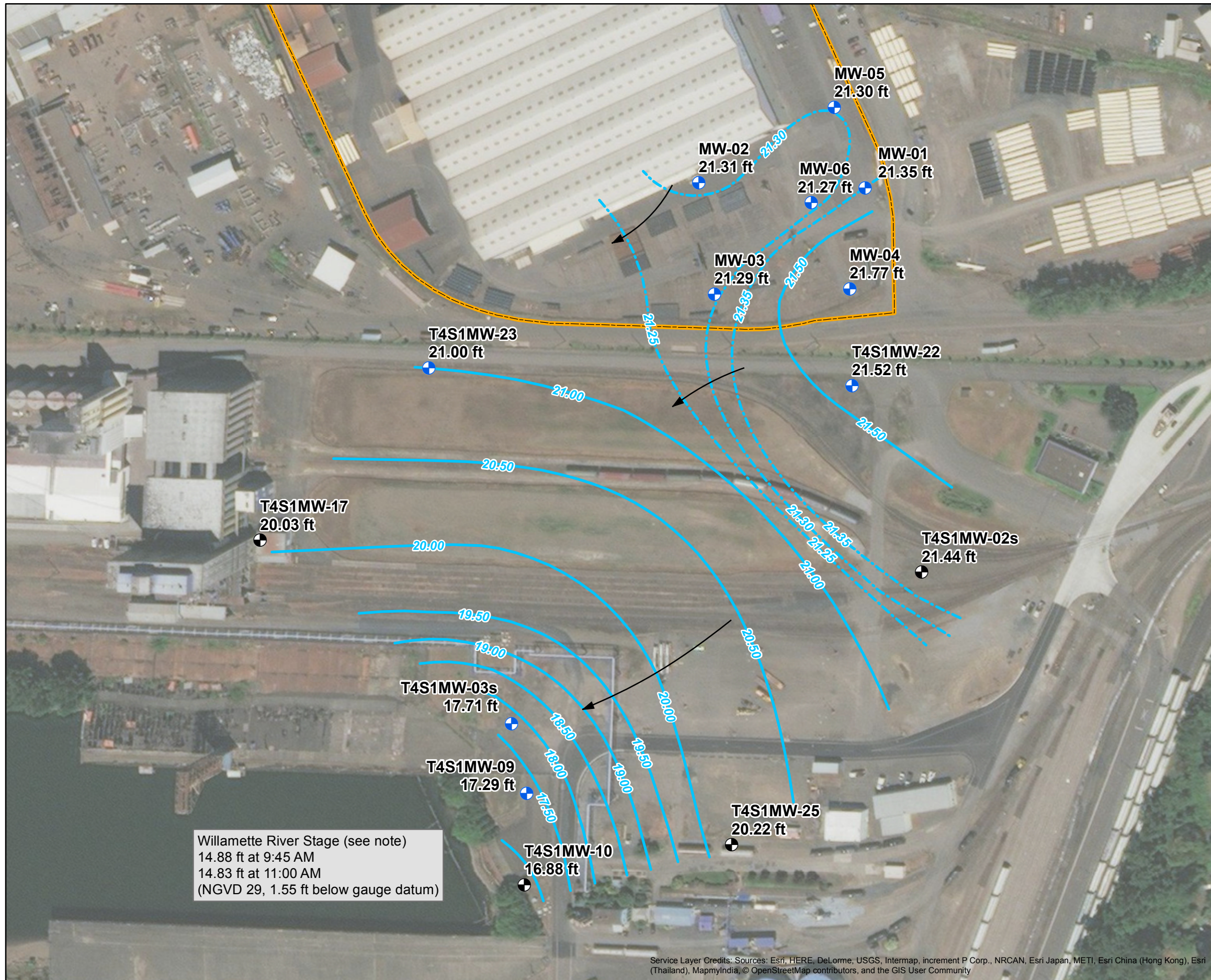
Note: Groundwater levels measured between 11:20 AM and 12:40 PM on January 30, 2017. During this period, the Willamette River stage decreased by 0.45 foot, as measured at the Broadway Bridge river gauge (USGS 14211720).



**FIGURE 6**  
**Groundwater Elevation Contour Map**  
**January 30, 2017**

Supplemental Groundwater Sampling and Data Evaluation  
 Northwest Pipe Company, Portland, Oregon

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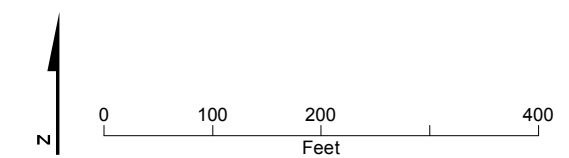
**LEGEND**

- Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29)
- Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
- Groundwater Flow Direction

**Investigation Wells**

- Groundwater Quality Monitoring
- Water Level Only
- Northwest Pipe Site Boundary

Note: Groundwater levels measured between 9:48 AM and 10:51 AM on April 26, 2017. During this period, the Willamette River stage decreased by 0.05 foot, as measured at the Broadway Bridge river gauge (USGS 14211720).

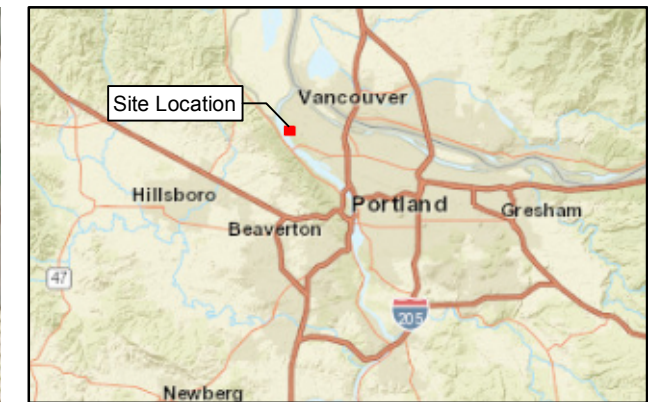
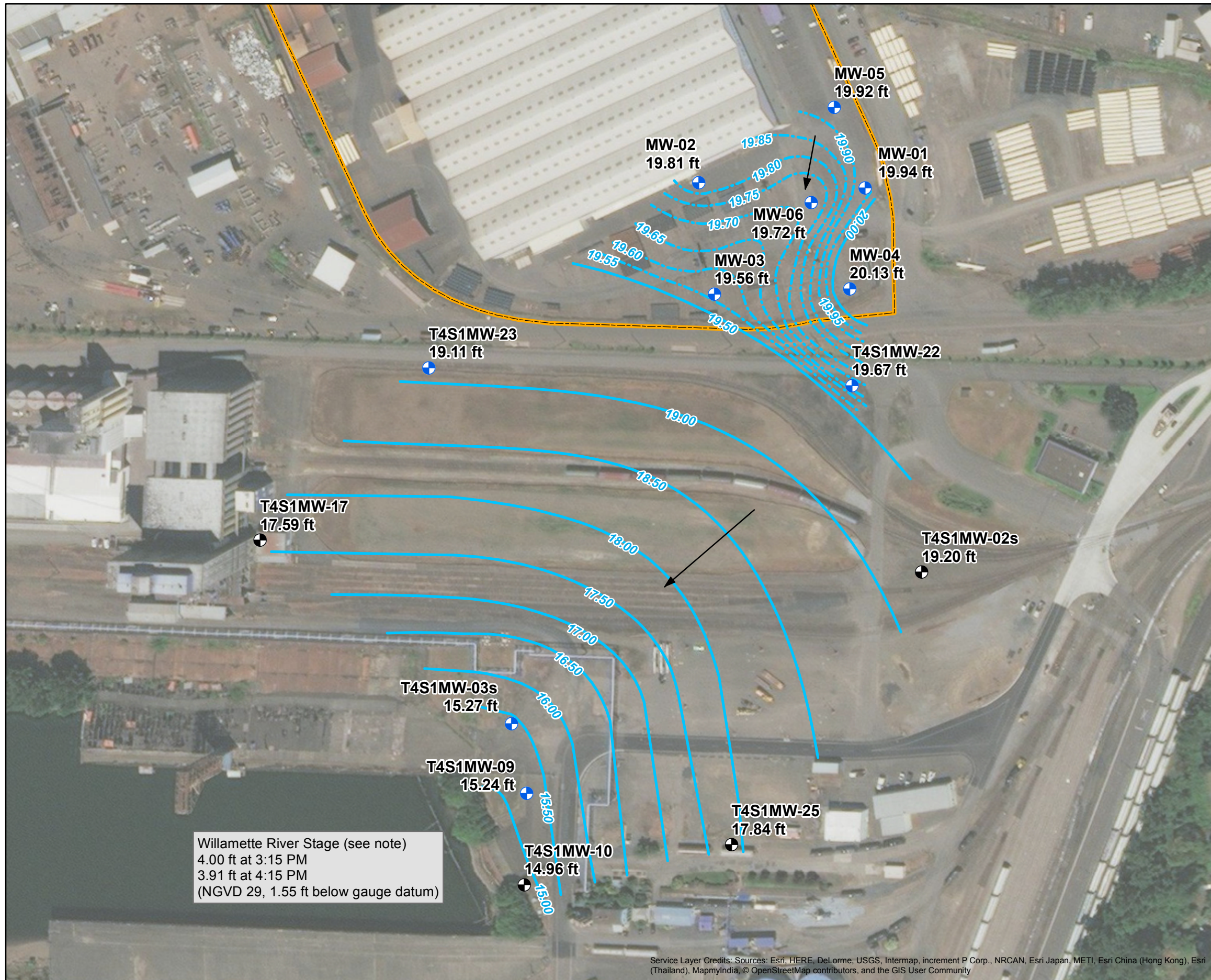


**FIGURE 7**  
**Groundwater Elevation Contour Map**  
**April 26, 2017**

Supplemental Groundwater Sampling and Data Evaluation  
 Northwest Pipe Company, Portland, Oregon

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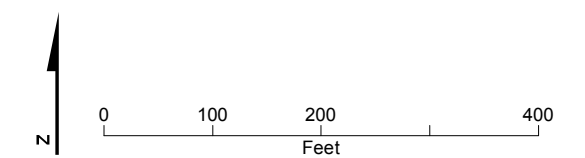
**LEGEND**

- Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29)
- Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
- Groundwater Flow Direction

**Investigation Wells**

- Groundwater Quality Monitoring
- Water Level Only
- Northwest Pipe Site Boundary

Note: Groundwater levels measured between 3:20 PM and 4:11 PM on July 24, 2017. During this period, the Willamette River stage decreased by 0.09 foot, as measured at the Broadway Bridge river gauge (USGS 14211720).

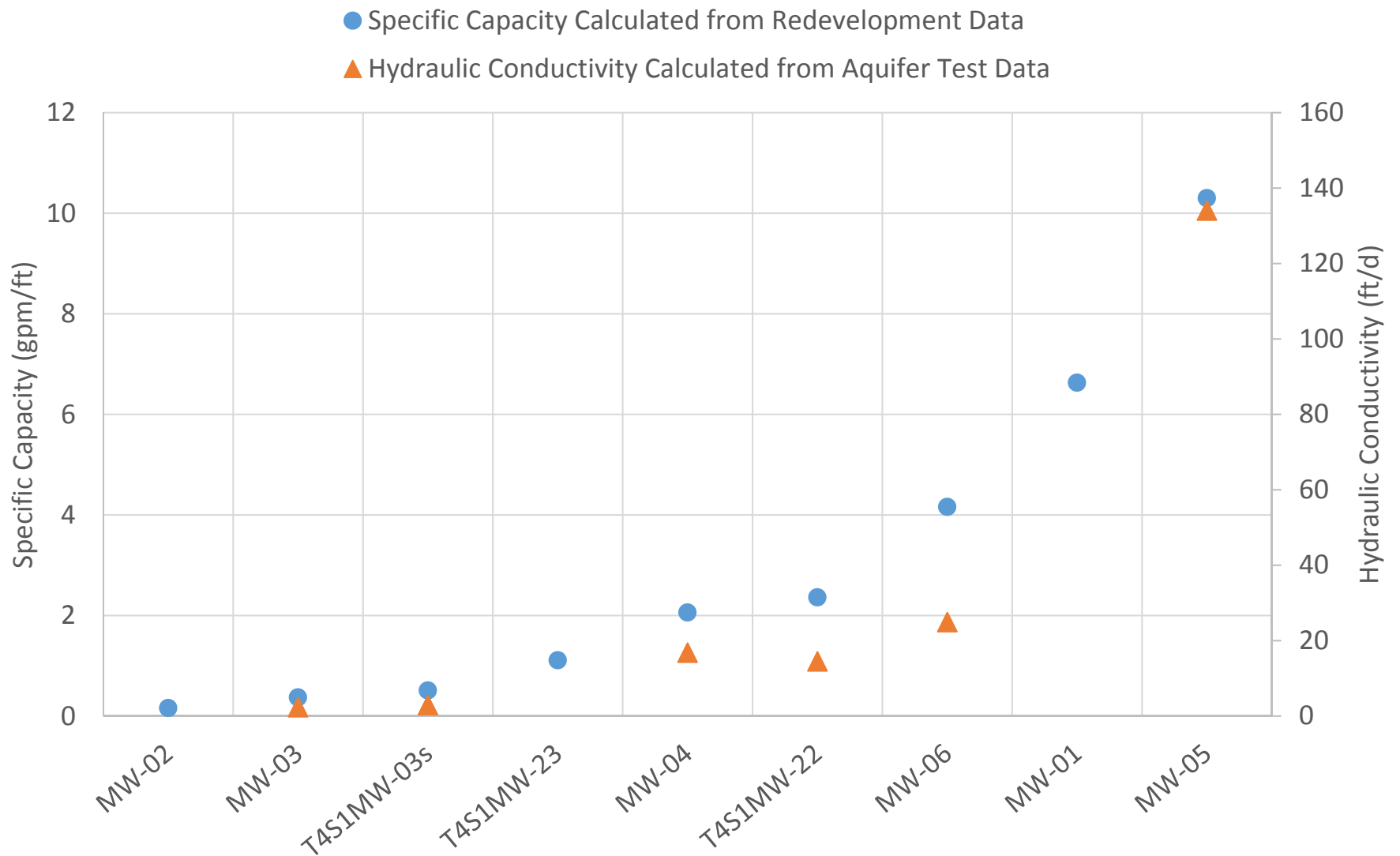


**FIGURE 8**  
**Groundwater Elevation Contour Map**  
**July 24, 2017**

Supplemental Groundwater Sampling and Data Evaluation  
 Northwest Pipe Company, Portland, Oregon

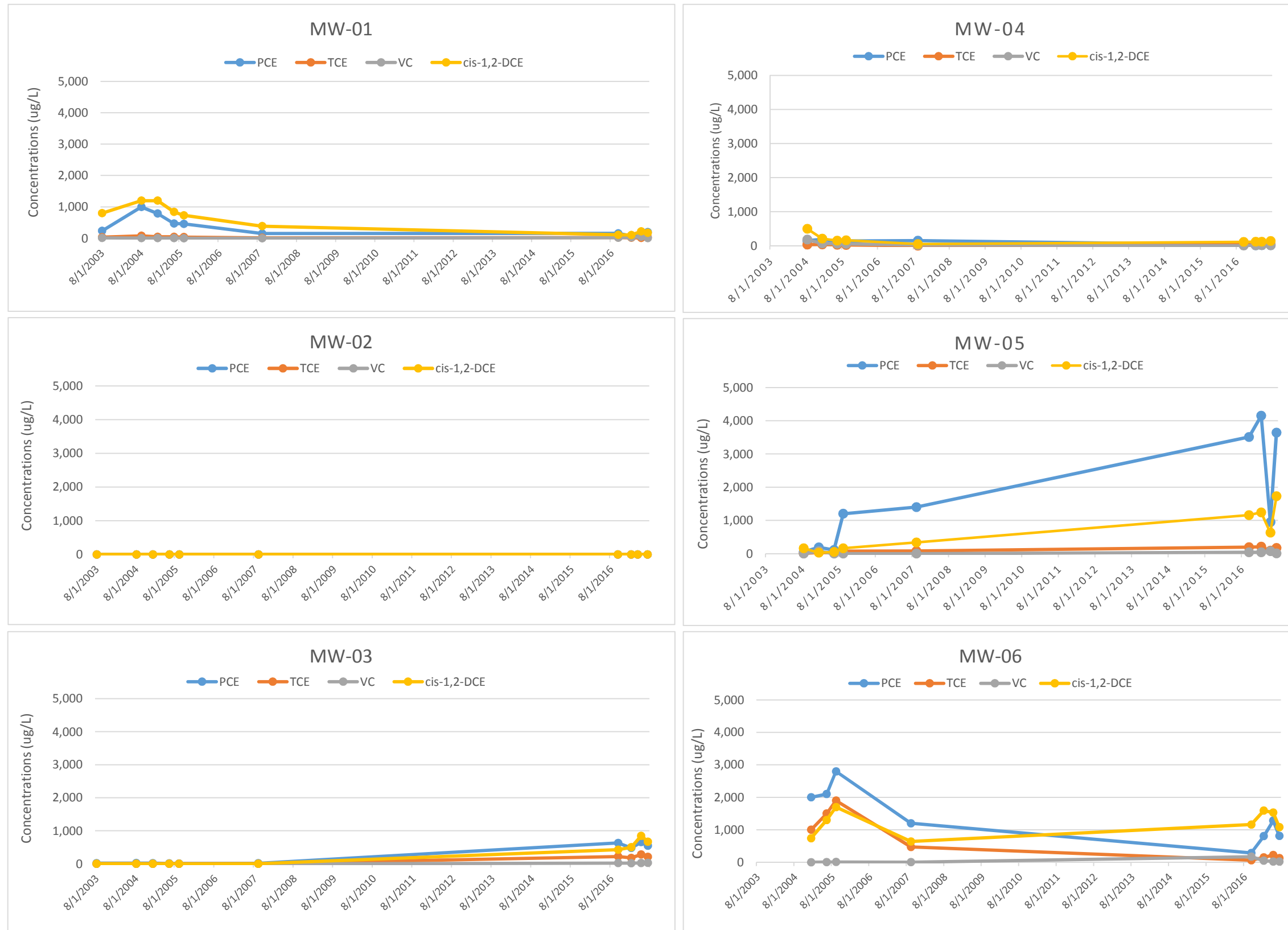


Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

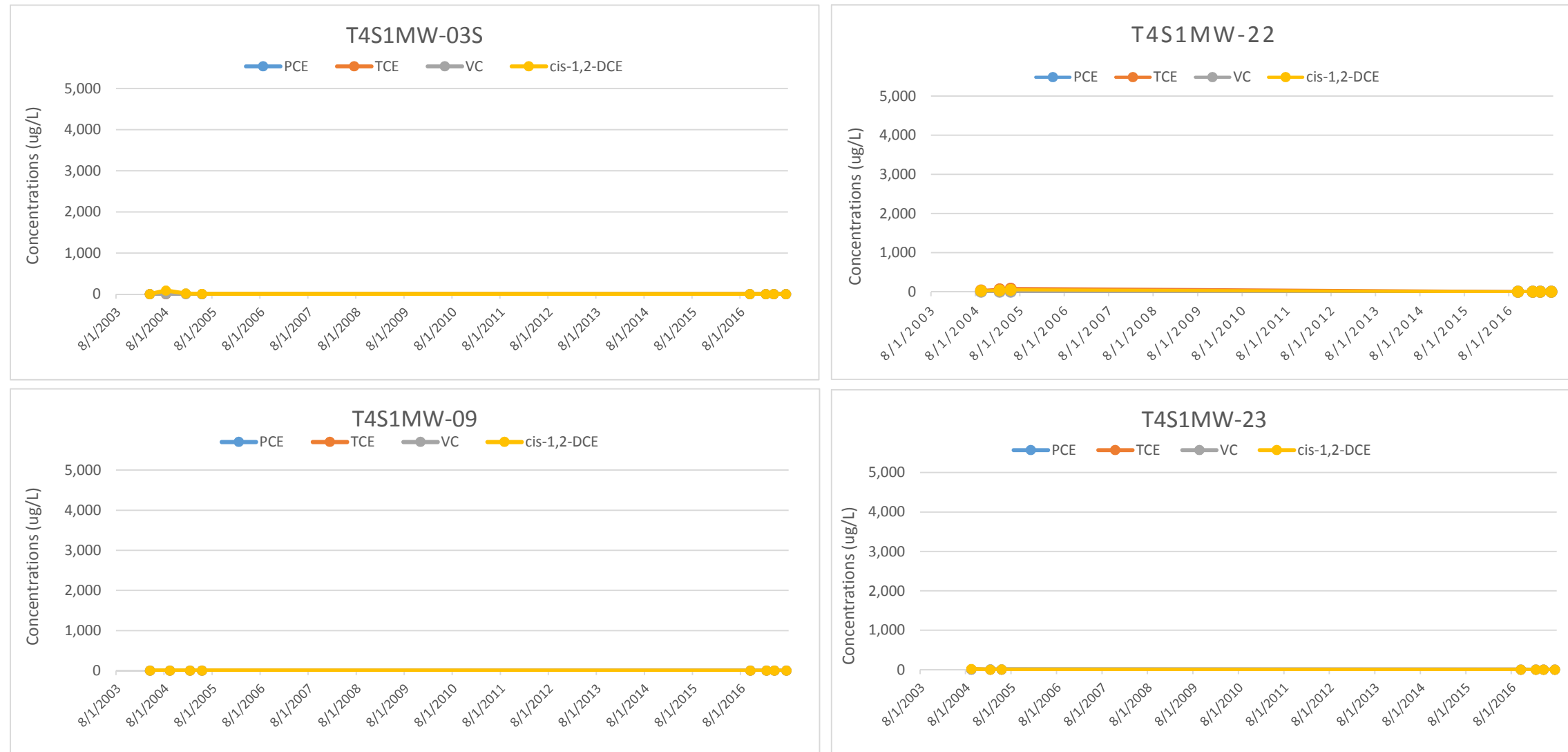


Notes:  
 gpm = gallons per minute  
 ft/d = feet per day

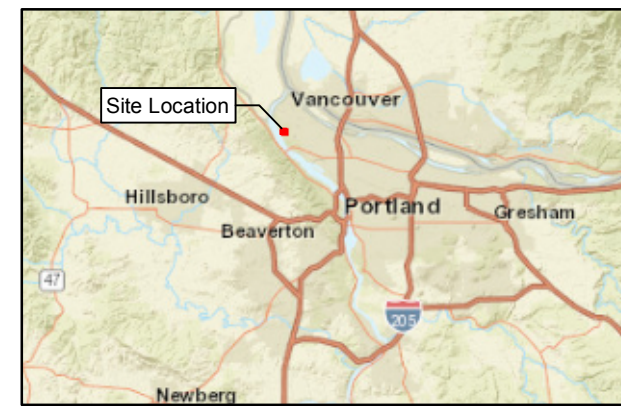
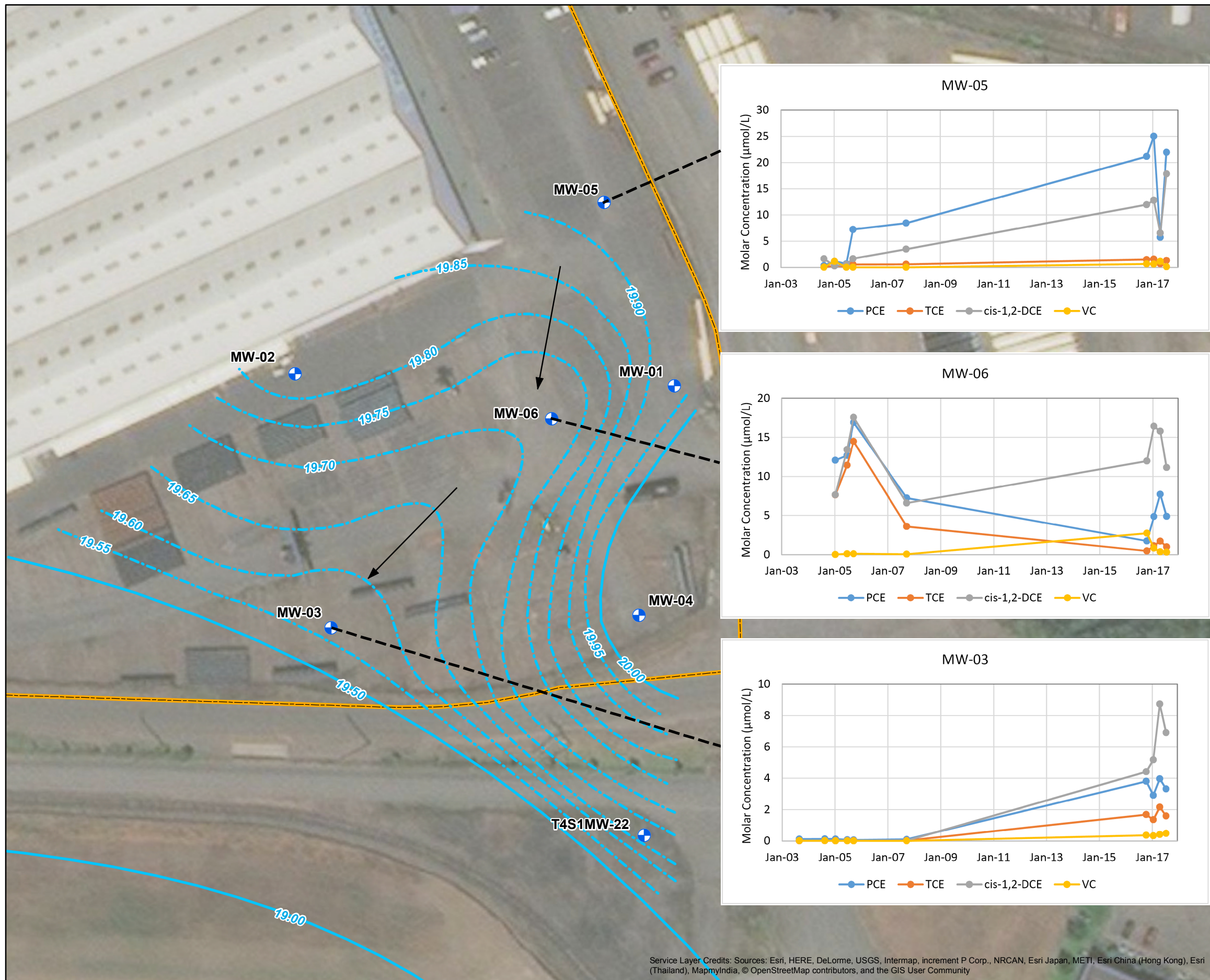
**Figure 9**  
 Relative Comparison of Aquifer Properties from Redevelopment versus Slug Testing  
*Supplemental Groundwater Investigation*  
*Northwest Pipe Company Portland Plant*



**Figure 10**  
**CVOC Trend Plots (2003 - 2017)**  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant



**Figure 10**  
**CVOC Trend Plots (2003 - 2017)**  
 Supplemental Groundwater Investigation  
 Northwest Pipe Company Portland Plant



**LEGEND**

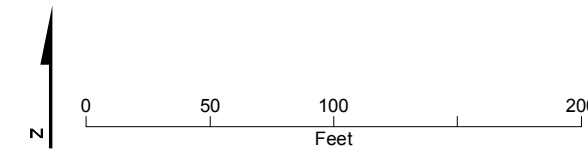
Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29, Measured July 24, 2017)

Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29, Measured July 24, 2017)

Groundwater Flow Direction

**Investigation Wells**

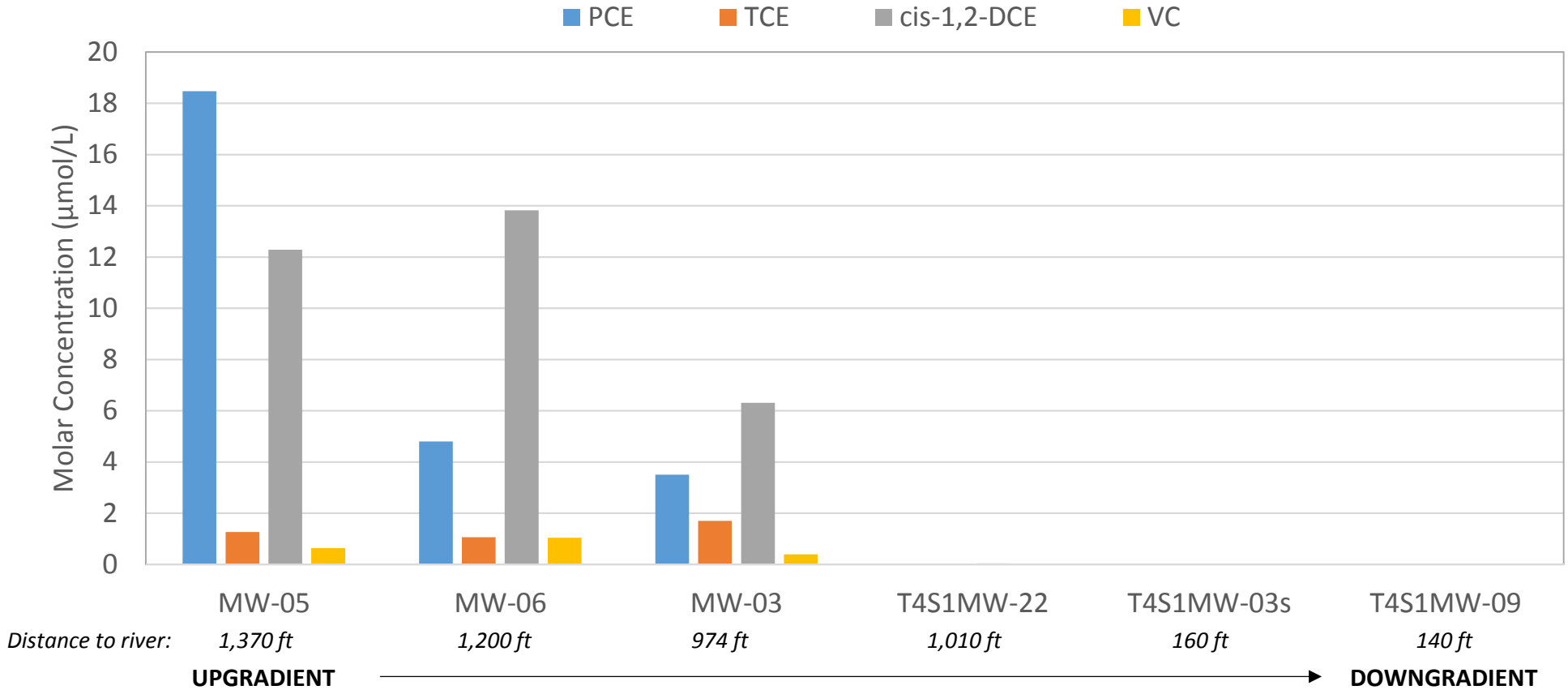
- Groundwater Quality Monitoring
- Water Level Only
- Northwest Pipe Site Boundary



**FIGURE 11**  
**Molar Concentration Plots for Selected Wells**  
 Supplemental Groundwater Sampling and Data Evaluation  
 Northwest Pipe Company, Portland, Oregon



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Data displayed:

	Average Molar Concentration (µmol/L)			
	PCE	TCE	cis-1,2-DCE	VC
MW-05	18.5	1.3	12.3	0.6
MW-06	4.8	1.1	13.8	1.0
MW-03	3.5	1.7	6.3	0.4
T4S1MW-22	0.009	0.03	0.04	0.001
T4S1MW-03s	0.0008	0.001	0.002	0.0001
T4S1MW-09	0.0001	0.001	0.002	0.0002

**Figure 12**  
Average Molar CVOC Concentrations for Selected Wells (2016 - 2017)

Supplemental Groundwater Investigation  
Northwest Pipe Company Portland Plant

# Attachment A

## Well Redevelopment Memo

# Northwest Pipe Groundwater Investigation

## Well Redevelopment Data

PREPARED FOR: Stephanie Heldt-Sheller/Northwest Pipe Company  
David Bennett/Northwest Pipe Company

COPY TO: Tim Whitson/Northwest Pipe Company  
Claudia Powers/Ater Wynne LLP  
Mike Merchant/Black Helterline LLP

PREPARED BY: Gretchen Gee/CH2M  
Ken Shump/CH2M

DATE: October 13, 2016

This memorandum documents the first field activities completed pursuant to the DEQ-approved Final Supplemental Groundwater Sampling and Data Evaluation work plan (CH2M 2016) (Work Plan). The well redevelopment was completed during the week of October 5 through 7, 2016, at Northwest Pipe's Portland facility and at the Port of Portland's (Port's) Terminal 4. In its February 18, 2016 letter, DEQ requested well redevelopment data be provided to DEQ for review and confirmation prior to conducting slug tests. This memorandum provides an assessment of the well redevelopment data to evaluate the suitability of the wells selected in the Work Plan for slug testing.

### Well Redevelopment

The wells planned for sampling were redeveloped to confirm they are in hydraulic communication with the aquifer and capable of yielding representative groundwater samples. Six Northwest Pipe Company monitoring wells in the Southeast Area, MW-01 through MW-06, and four Port of Portland monitoring wells (T4S1MW-23, T4S1MW-22, T4S1MW-09, and T4S1MW-03s) were redeveloped between October 5 and 7, 2016 (Figure 1). The wells were redeveloped using a combination of surging with dedicated, disposable surge blocks (manufactured by Qwater Well Developer of Tallahassee, Florida) and pumping with a high-flow peristaltic pump using new tubing for each well to reduce the potential for cross-contamination. Each well was surged for approximately 10 to 15 minutes and then pumped until the discharge water visibly cleared. Once visual clarity was established, a multi-parameter meter was used to measure pH, specific conductance, and turbidity until three successive measurements met the stabilization criteria noted in the work plan. Purge water was containerized and is stored temporarily at Northwest Pipe Company with disposal pending receipt of analytical results. Field notes and documentation are attached.

### Data Assessment

One of the objectives of the groundwater investigation is to confirm groundwater flow conditions in the area of interest, including flow direction, horizontal hydraulic conductivity, and horizontal hydraulic gradient. Therefore, aquifer testing (slug tests) will be conducted on a subset of wells selected for sampling. The wells proposed in the Work Plan for testing are MW-05, MW-06, and MW-03 on the Northwest Pipe facility, and T4S1MW-22 and T4S1MW-03s on the Port's property. To confirm the wells selected for slug testing represent the range of aquifer conditions in the area, the water level responses to pumping that were observed during well development were evaluated.

Using the water level and pumping data collected during well redevelopment, the specific capacity of each well was calculated. Specific capacity is an indicator of transmissivity (USGS 1991, Driscoll 1986). A summary of the data used to calculate the specific capacities of the wells is presented in Table 1. The specific capacities calculated for the redeveloped wells ranges from 0.16 gallon per minute per foot (gpm/ft) at MW-02 to 10.3 gpm/ft at MW-05 (Figure 2). The wells selected for slug testing, fall along this range including wells at the lower end of the spectrum (MW-03 and T4S1MW-03s), wells in the middle of the range (T4S1MW-22 and MW-06), and one well at the high end (MW-05). This evaluation indicates that the wells selected for aquifer testing represent the range of flow conditions that occur along the flow path. No changes to the selected wells are recommended based on this assessment.

**Table 1. Well Development Specific Capacity Summary**  
*Northwest Pipe Company Supplemental Groundwater Monitoring*

Well	Pumping time (min)	Volume pumped (gal)	Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/ft)
<i>Northwest Pipe Wells</i>					
MW-01	65	34.5	0.53	0.08	6.63
MW-02	57	29.8	0.52	3.18	0.16
MW-03	40	19	0.48	1.27	0.37
MW-04	25	16	0.64	0.31	2.06
MW-05	35	18	0.51	0.05	10.3
MW-06	46	32.5	0.71	0.17	4.16
<i>Port of Portland Wells</i>					
T4S1MW-03s	70	7.8	0.11	0.22	0.51
T4S1MW-09*	115	13.9	0.12	none	
T4S1MW-22	35	19	0.54	0.23	2.36
T4S1MW-23	45	12	0.27	0.24	1.11

Notes:

min = minutes

gal = gallons

ft = feet

gpm = gallons per minute

\* The water level in T4S1MW-09 appeared to rise compared to the initial measurement. Currently, it is assumed the initial measurement was incorrectly read or recorded in the field. Therefore, no specific capacity is possible for this well.

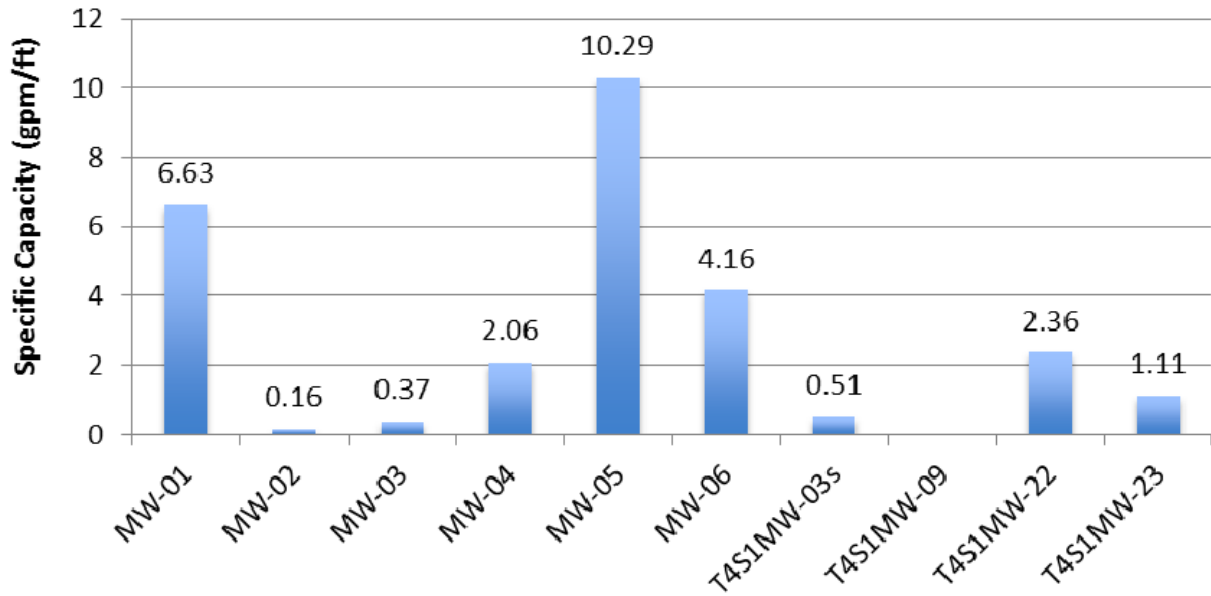


Figure 2. Specific Capacity of Redeveloped Wells on Northwest Pipe Company and Port of Portland Properties  
*Northwest Pipe Company Supplemental Groundwater Monitoring*

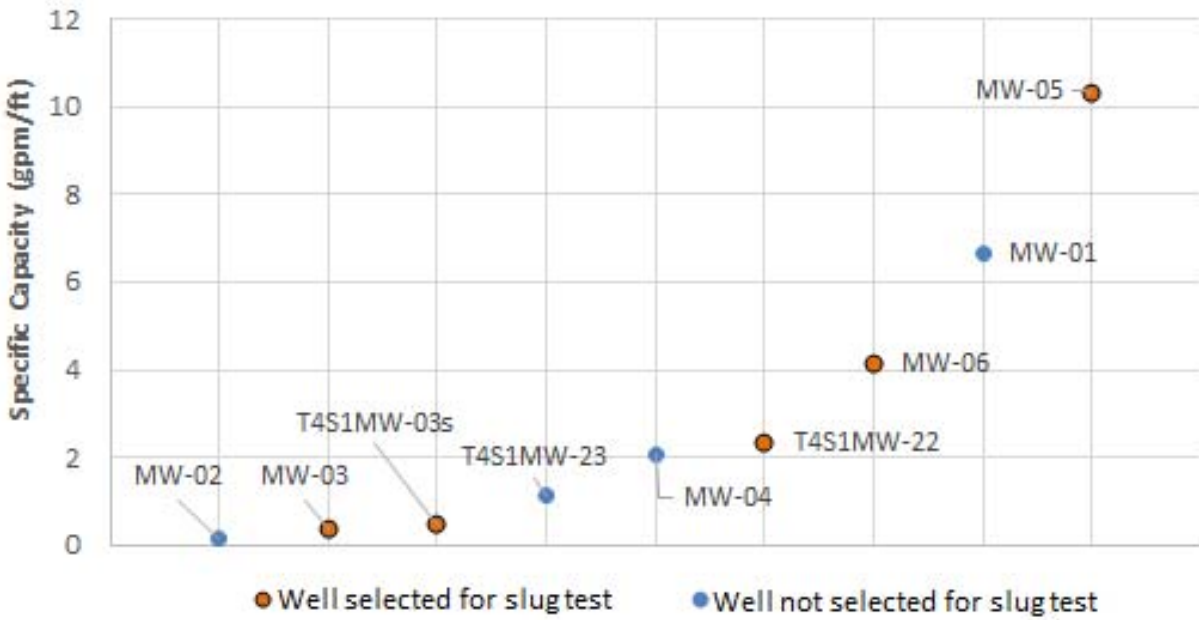


Figure 3. Specific Capacity Comparison of Wells Selected for Aquifer Testing  
*Northwest Pipe Company Supplemental Groundwater Monitoring*

## References




CH2M. 2016. *Final Supplemental Groundwater Sampling and Data Evaluation*. Unpublished consultant's report prepared for Northwest Pipe Company, Portland, Oregon, for submittal to Oregon DEQ.

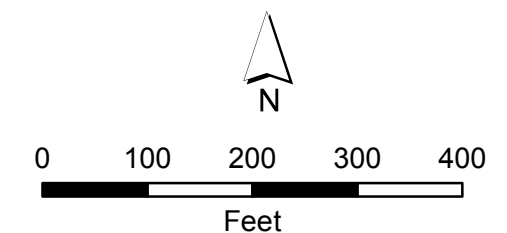
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U.S. Geological Survey. 1991. *Estimates of Hydraulic Conductivity from Aquifer-Test Analysis and Specific-Capacity Data, Gulf Coast Regional Aquifer Systems, South-Central United States*. USGS Water-Resources Investigations Report 90-4121, Austin, Texas. 43 p.

**Figure 1**  
**Groundwater**  
**Investigation Locations**  
 Northwest Pipe Company  
 Portland, Oregon

**LEGEND**

-  Existing Monitoring Well Selected for Sampling/Redevelopment
-  Additional Well Selected for Survey/Elevation Monitoring
-  Northwest Pipe Property Boundary



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Attachment  
Well Redevelopment Field  
Documentation



10/06/16

PROJECT NUMBER	WELL NUMBER MW-01	SHEET 1 OF 1
<b>WELL DEVELOPMENT LOG</b>		

PROJECT: NWP LOCATION: NWP Property  
 DEVELOPMENT CONTRACTOR: CH2M  
 DEVELOPMENT METHOD AND EQUIPMENT USED: Surge/Purge  
 START WATER LEVELS: 13.30 START: 1350 END: 1500 LOGGER: J. Ulrich Frame

MAXIMUM DRAWDOWN DURING PUMPING: 0.14'  
 RANGE AND AVERAGE DISCHARGE RATE: ~ 0.16 gpm  
 TOTAL QUANTITY OF WATER DISCHARGED: 37 GALLONS  
 DISPOSITION OF DISCHARGE WATER: TRANSFER TO PUMP STAGED AT NWP FAB SHOP

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	mS/cm Conductivity (µmhos/cm)	Remarks (color, odor, sheen, sediment, etc.)
1350	initial	13.30	>1000	-	-	-	*Surged for ~15 mins
1355	2.5	13.44	>1000	-	-	-	• water highly turbid
1400	3.75	13.40	>1000	-	-	-	*Surge ~ 5 mins
1405	6.00	13.38	>1000	-	-	-	
1410	9.00	13.38	851	-	-	-	
1415	10.0	13.38	168	-	-	-	
1420	13.5	13.38	149	-	-	-	
1430	19.5	13.38	90.8	-	-	-	water clears. connect YSI
1435	22	13.38	68.4	-	-	-	
1440	25	13.38	72.1	16.5	6.65	0.381	
1445	28	13.38	44.9	16.5	6.62	0.379	
1450	31.5	13.38	21.3	16.5	6.62	0.380	
1455	34.5	13.38	13.7	16.5	6.61	0.377	
1500	37	13.38	11.2	16.5	6.61	0.381	- STABILIZED -

ins  
 id. wait  
 to clear  
 before  
 connecting  
 to YSI  
 connect YSI



10/06/16

PROJECT NUMBER	WELL NUMBER NW-02	SHEET 1 OF 1
<b>WELL DEVELOPMENT LOG</b>		

PROJECT: NWP LOCATION: NWP property  
 DEVELOPMENT CONTRACTOR: CH2M  
 DEVELOPMENT METHOD AND EQUIPMENT USED: Surge/Purge  
 START WATER LEVELS: 10.40 START: 0930 END: LOGGER: J. (Ulrich) Frame  
 MAXIMUM DRAWDOWN DURING PUMPING: 4.98'  
 RANGE AND AVERAGE DISCHARGE RATE: ~ 0.5 GPM  
 TOTAL QUANTITY OF WATER DISCHARGED: 33 GALLONS  
 DISPOSITION OF DISCHARGE WATER: TRANSFER TO PAVM STORAGE AT NWP FAB SHOP

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	ms/cm Conductivity (µmhos/cm)	Remarks (color, odor, sheen, sediment, etc.)
0930	initial	10.40	>1000	-	-	-	* Surged for ~15 min
0938	43.2	10.98	>1000	-	-	-	* Water begins to clear
0945	6.4	11.71	>1000	-	-	-	* surge again ~ 5 min
0950	109.6	12.50	380	-	-	-	* Water turbid. Wait to connect to YSE
0955	123.5	13.4	130	-	-	-	
1000	1715	14.9	71.4	-	-	-	* mid screen clear
1005	18.5	15.29	39.2	-	-	-	* top of screen clear
1010	20.0	15.32	>1000	-	-	-	* Dwp to bottom. High turbid
1015	23.0	15.16	428	-	-	-	wait to clear
1020	26.5	15.21	21.4	-	-	-	* Bottom screen clear
1028	29.5	14.83	25.3	17.4	6.89	0.220	* set @ mid screen
1030	30	14.57	26.9	17.4	6.97	0.214	
1035	33	14.16	26.3	17.4	6.94	0.210	- STABILIZE -

water 40 & 100  
 highly turbid;  
 water to clear before connecting to YSE  
 highly turbid wait to clear  
 connect to YSE

10/06/16



PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
	MW-03	
<b>WELL DEVELOPMENT LOG</b>		

PROJECT: NWP LOCATION: MW-03 (NWP) NWP Property  
 DEVELOPMENT CONTRACTOR: CH2M  
 DEVELOPMENT METHOD AND EQUIPMENT USED: Surge Purge  
 START WATER LEVELS: 12.08 START: 1125 END: 1210 LOGGER: J. (Ulrich) Frame  
 MAXIMUM DRAWDOWN DURING PUMPING: 2.0'  
 RANGE AND AVERAGE DISCHARGE RATE: ~ 0.5 bpm  
 TOTAL QUANTITY OF WATER DISCHARGED: 22 GALLONS  
 DISPOSITION OF DISCHARGE WATER: TRANSFER TO PLUM STAGED AT NWP TAG SHOP

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	ms/cm Conductivity (µmhos/cm)	Remarks (color, odor, sheen, sediment, etc.)
1125	initial	12.08	>1000	-	-	-	Surge 15 mins (full screen)
1130	3	14.02	>1000	-	-	-	Water highly turbid. Wait to clear before connecting YSI
1135	5.5	14.00	814	-	-	-	Surge bottom ~ 5 mins
1140	8.5	14.08	224	-	-	-	
1145	10.5	14.06	28.9	17.6	6.65	0.312	Connect to YSI
1150	12.5	14.05	21.8	17.6	6.66	0.310	
1155	15	14.01	12.2	17.6	6.66	0.310	
1200	17.5	13.45	8.02	17.6	6.67	0.309	
1205	19.5	13.20	6.29	17.6	6.66	0.311	
1210	22	13.35	5.24	17.6	6.67	0.312	- STABILIZE -

screen)  
 id. Wait to clear before connecting YSI









10/05/16

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
	THS1MW-03S	
<b>WELL DEVELOPMENT LOG</b>		

PROJECT: NWP LOCATION: Port Property  
 DEVELOPMENT CONTRACTOR: CH2M  
 DEVELOPMENT METHOD AND EQUIPMENT USED: Peristaltic pump & surge  
 START WATER LEVELS: 19.52 START: 1545 END: 1705 LOGGER: J. Ulrich Frame

MAXIMUM DRAWDOWN DURING PUMPING: 0.22  
 RANGE AND AVERAGE DISCHARGE RATE: 0.17 gpm - 0.10 gpm  
 TOTAL QUANTITY OF WATER DISCHARGED: 9.3 gallons  
 DISPOSITION OF DISCHARGE WATER: Transfer to drums staged at NWP Fab Shop

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	ms/cm Conductivity (µmhos/cm)	Remarks (color, odor, sheen, sediment, etc.)
1545	—	19.52	>1000	—	—	—	• SURGE ~ 10 mins
1555	1.5	19.94	>1000	—	—	—	• highly turbid. Wait for visual clearance
1605	2.5	19.74	>1000	—	—	—	
1620	3.8	19.74	376	—	—	—	* Water begins to clear up
4.5 ↗ 1625	<del>5.15</del> 2.2	19.74	941	—	—	—	• SURGE AGAIN MID-SCREEN ~ 5 min
5.2 ↗ 1630	<del>6.00</del>	19.74	560	—	—	—	• Highly turbid, wait for water to clear before connecting to YSI
6.0 ↗ 1635	<del>7.00</del>	19.74	305	—	—	—	
6.7 ↗ 1640	<del>8.00</del>	19.74	67.3	15.2	6.86	0.210	* connect to YSI
7.80 ↗ 1645	<del>7.80</del>	19.74	41.2	15.2	6.58	0.202	
1650	8.00	19.74	26.7	15.2	6.58	0.201	
1655	8.50	19.74	18.9	15.3	6.58	0.202	
1700	9.00	19.74	15.3	15.2	6.58	0.205	
1705	9.3	19.74	16.2	15.2	6.58	0.205	STABILIZED —

→ highly turbid  
 for visual clearance  
 up  
 ~ 5 min  
 water to clear before connecting to YSI



10/05/16

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
	T451MW-09	
<b>WELL DEVELOPMENT LOG</b>		

PROJECT: NWP LOCATION: Port Property  
 DEVELOPMENT CONTRACTOR: CH2M  
 DEVELOPMENT METHOD AND EQUIPMENT USED: Surge + Pump  
 START WATER LEVELS: 20.72 START: 1100 END: 1345 LOGGER: J. Ulrich  
 MAXIMUM DRAWDOWN DURING PUMPING: 0.98  
 RANGE AND AVERAGE DISCHARGE RATE: ~1 gpm ~0.1 gpm  
 TOTAL QUANTITY OF WATER DISCHARGED: 17.6  
 DISPOSITION OF DISCHARGE WATER: Transfer to 55 gal drum staged @ NWP Fab Shop

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	ms/cm Conductivity (µmhos/cm)	Remarks (color, odor, sheen, sediment, etc.)
1100	—	20.72	—	—	—	—	ID = 31.5' * Highly Turbid
1150	3.7	19.8	913	—	—	—	Begin to clear. Collect NTUs, wait to connect YSI
1155	4.0	19.8	—	—	—	—	
1200	4.5	19.8	—	—	—	—	
1205	5.0	19.8	—	—	—	—	
1210	5.5	19.8	—	—	—	—	* Change to smaller diameter tubing
1215	6.0	19.8	338	—	—	—	* Begin surging again for ~5 mins
1230	8.0	19.8	>1000	—	—	—	Water highly turbid wait for visual clarity to connect to YSI
1255	11.5	19.78	605	—	—	—	
1310	14	19.79	583	—	—	—	
1330	16	19.79	52.3	—	—	—	* connect to flow through cell
1335	15	19.79	18.6	16.6	6.62	0.259	
1338	15.8	19.79	10.7	16.8	6.64	0.259	
1342	17.3	19.79	8.99	16.7	6.64	0.259	
1345	17.6	19.79	8.06	16.8	6.64	0.259	- STABILIZED -

~10 min. Surge for Turbid, purge until visual clarity

\* Change to smaller diameter tubing  
\* Begin surging again for ~5 mins  
Water highly turbid wait for visual clarity to connect to YSI

\* connect to flow through cell





10/05/16

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
	T4S1MW-23	

### WELL DEVELOPMENT LOG

PROJECT: NWP LOCATION: Port Property  
 DEVELOPMENT CONTRACTOR: CH2M  
 DEVELOPMENT METHOD AND EQUIPMENT USED: SURGE/PURGE  
 START WATER LEVELS: 14.41 START: 1825 END: 1915 LOGGER: J. (ULRICH) FRAME  
 MAXIMUM DRAWDOWN DURING PUMPING: 0.26'  
 RANGE AND AVERAGE DISCHARGE RATE: - 0.12 GPM  
 TOTAL QUANTITY OF WATER DISCHARGED: 16 GALLONS  
 DISPOSITION OF DISCHARGE WATER: TRANSFER TO PUMP STAGED AT NWP FAB SHOP

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Remarks (color, odor, sheen, sediment, etc.)
1825	initial	14.41	-	-	-	-	* SURGE for ~ 15mins
1830	4	14.65	-	-	-	-	* Highly turbid. wait
1835	8	14.65	-	-	-	-	* STOP PUMP for 10mins
1845	12	14.65	-	-	-	-	* water clears up
1855	13.5	14.65	62.3	15.5	6.75	0.153	* connect to YSE
1900	14.5	14.65	22.5	15.5	6.74	0.153	
1905	1500	14.67	10.2	15.5	6.71	0.153	
1910	<del>1500</del> 15.5	14.65	9.3	15.5	6.72	0.153	
1915	160	14.65	9.1	15.5	6.72	0.153	STABILIZE

for visual clarity

# NWP - Well development

10/19/16

OBJECTIVE: Redevelop MWs ~~ISSUE~~ T4S1MW-09, T4S1MW-03S, T4S1MW-23, T4S1MW-23 on Port Property. Attempt to complete wells on Port of Portland property today. Move to remaining 6 wells on NWP property tomorrow/Friday.

Personnel: CH2M: Brandon Jones-Stanley (BJS) & Jennifer (Ulrich) Frame (JUF)

Weather: overcast, Rain, wind, 55°F

0800 - BJS onsite main PDX office (drove from CVO w/ fleet vehicle). Begin packing van for days effort. JUF picking up poly drums from vendor

0835 - JUF onsite. Pickup supplies from office. Team heads out to NWP.

0915 - JUF contacts Tim Whitson for access/training. Inform will be onsite shortly. Call Bill McCormack (Port of Portland) - no answer.

0930 - onsite NWP property checkin w/ Tim. Go over H&S requirements. Review well locations & drum staging area. Drums will be staged in ~~primary~~ <sup>JUF secondary</sup> containment area in Fab shop. Tim indicates NWP property access is limited to hours of operation, typically 0500 ~ 1500. Team will wait for Tim's confirmation of today's hour limitations (will vary by day).

1000 - Contact Bill McCormack. Discuss access for today. Team plans to start @ ~~the~~ location T4S1MW-09 first. Well is located w/in fenced area on Port property. BJS has TWIC Card, JUF does not. Team will need H&S briefing & Port Badge w/ escort ~~from~~ <sup>to</sup> before working on main part of Port. Team will ~~be~~ <sup>be</sup> escorted from main gate ~~entrance~~ <sup>entrance</sup> to location & will receive training after T4S1MW-09 has been developed.

1020 - onsite Port of Portland. Escorted to T4S1MW-09. Setup on well <sup>DTW: 20.72 TD: 31.5</sup> <sub>FDC FDC</sub>

1100 - begin purging - see well development log. Calibrate field equipment.

\* LATE ENTRY \* 1030 - conduct H&S briefing. Topics include:

- Proper PPE (level D)
- access restrictions
- slips, trips, falls, ~~heavy~~ <sup>JUF</sup>
- heavy lifting
- Rain
- Bees, hornets - nest observed near location T4S1MW-03S.

1345 - well stabilized. Pack up. call Bill to confirm training time. Port employees have all-hands call from 2-3 pm. CH2M team will be escorted to main gate & will have to wait for training until 3 pm.

- 1410 - CH2M wait for training
- 1500 - complete Port training - BJS receives port Badge w/ Escort Privilege
- 1535 - onsite T4S1MW-03S DTW: 19.52 TD: 30.32 (FTDC)
- 1545 - begin purge/surge development - see 'well development log'  
PID @ BZ: 0.0 ppm WH: 0.0 ppm
- 1705 - parameters stabilize. Demobe from well
- 1720 - onsite T4S1MW-22 DTW: 15.97 FTDC TD: 22.73 FTDC PID: BZ 0.0 ppm
- ~~1710~~ 1730 - begin purge/surge development - see 'well development log'
- 1815 - parameters stabilize Demobe from well
- 1822 - onsite T4S1MW-23 DTW: 14.41 FTDC TD: 24.83 FTDC  
 \* well located w/in 10 ft. of RR tracks  
 Appears to be lightly used track & team is on outside of operating hours, but will need to consider for future sampling/field efforts.  
 Call Security to discuss. Security indicates that though main ~~train~~ operations are done @ 5pm, Train & track traffic plus during off hours. Security does not have train schedule.  
 Team discusses & sets up 1 look out, Both members will watch for movement.
- 1825 - begin surge/purge - see "well development log" PID: BZ 0.0 ppm
- 1835 - train begins heading our direction. Team turns off pump & removes ourselves equipment from track area. Talk w/ train personnel. This is the only movement planned on this portion of the track for next hour or so
- 1845 - train gone. Team continues development.
- 1915 - parameters stabilize Demobe for day. Call Port Security to inform of departure
- 1945 - back to main PDX office. drop Van.
- 2015 - End of day

Jennifer Leuch 10/5/16

# NWP Well Redevelopment

10/6/16

OBJECTIVE: continue redevelopment effort (on NWP property to day) of remaining wells (MW-02, MW-03, MW-01, MW-04, MW-05, MW-06)

PERSONNEL: Jennifer (Ulrich) Frame (JUF) + Brad Ostapkowicz (BO)

WEATHER: overcast 59°F

- 0630 - BO onsite PDX office. Packs van w/ remaining supplies for day (JUF picking up rental sump pump to transfer IDW water) to ~~S~~ JUF
- 0640 - JUF onsite crew heads to yield site. Need 1 addtl 55 gal drum for IDW.
- 0715 - onsite Myers Containers to purchase/pickup drum
- 0752 - Contact Tim Whitson w/ NWP to inform of team heading to site. Confirm work hours to 1600 today.
- 0815 - Transfer IDW purge water
- 0910 - onsite MW-02 DTW: 10.40 FTOC TD: 20.94 FTOC  
PID @ WH: 0.0 ppm PID @ BZ: 0.0 ppm
- 0930 - Begin purge/surge redevelopment see 'Well Development Log'
- 1035 - parameters stabilize. Demobe from well
- 1105 - onsite MW-03 DTW: 12.08 FTOC TD: (ETOC) 25.04  
PID @ WH: 13.7 (max) 6.2 (ave) ppm PID @ BZ: 0.0 ppm
- 1125 - begin purge/surge. see 'Well development log'
- 1210 - parameters stabilize demobe from well
- 1224 - onsite staging area to transfer IDW
- 1329 - onsite MW-01 DTW: 13.30 FTOC TD: 24.48 FTOC  
PID @ WH: 0.0 ppm PID @ BZ: 0.0 ppm
- 1350 - Begin surge/purge. See 'Well Development log'
- 1500 - parameters stabilize. Demobe from well
- 1510 - onsite MW-4 DTW: 12.93 FTOC TD: 27.28 FTOC  
PID @ WH: 0.0 ppm PID @ BZ: 0.0 ppm
- 1530 - begin surge/purge. See 'Well Development log'
- 1600 - parameters stabilize. Demobe from well
- 1605 - transfer purge water to staging area
- 1630 - onsite NWP. Return to PDX office
- 1710 - Return to PDX.
- 1730 - ~~OFF~~ ~~JUF~~ END OF DAY

Jennifer Ulrich 10/6/16

# NWP Well Redevelopment

10/7/16

Objective: Complete well redevelopment on NWP property. MW-5 + MW-6 only remaining wells to complete.

Personnel: Brandon Jones-Stanley/CVO + Jake Pannally/CVO

Weather: Overcast ~55°F

0530 - Depart CVO

0700 - Arrive @ PDX, swap vehicles. Stop for gas.

0730 - Mob to site.

0800 - Arrive on-site. Meet w/Tim + Discuss plan

0815 - Onsite @ MW-5 DTW=13.06, TD=27.75.

Max PID @ well head = 16 ppm

0825 - Begin purge/surge development see "well development log"

0910 - Parameters stable demob from well.

Transfer IDW to segregated drum, labelled MW-5

0945 - Mob to MW-6 DTW=12.55, TD=28.99

PID = 8 ppm @ well head, DO in BZ


0955 - Begin purge/surge development

1056 - Parameters stable, demob from well.

1100 - Transfer IDW to drums. Use 2nd drum that had ~20 gal from other wells. Decon tubing, drums + buckets

Total of 5 IDW drums (2 from MW-5 + MW-6).

1200 - Demob from site. Return to office + drop equipment + paperwork.



10/7/16

# Attachment B

## Field Documentation

# Event 1: 2016, Quarter 4

## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/26/16

Project #: 682722.GW.RP

Well I.D.: MW-01

Field Team: BSS / BD

Total Depth (ft) 24.57 (-) DTW (ft) 12.93 (X0.17 gal/ft) = Well Casing Volume (gal.) = 2.0

Field Conditions: Raining

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION Teflon

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with <input checked="" type="checkbox"/> new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method :	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 20' Purge water disposal: Drum

Comments/Exceptions to SAP: Pump On: 10:37

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
10:37	0.1	403	15.86	6.43	42.6	1.21	58.9		12.94	C, Colorless, 70%
10:55	2.0	362	15.89	6.40	18.4	0.34	5.01		12.95	CC, Colorless, 70%
11:00	2.6	353	15.86	6.41	10.4	0.36	6.83		12.93	CC
11:05	3.25	354	15.87	6.41	7.4	0.25	6.23		12.93	CC
11:10	3.70	352	15.87	6.42	6.4	0.26	6.82		12.95	CC, colorless, 70%
:										
:										
:										
:										
:										
11:13	Start Sampling									
11:20	End Sampling									

\* VC = Very cloudy    CI = Cloudy    SC = Slightly Cloudy    VSC = Very Slightly Cloudy    AC = Almost Clear    C = Clear    CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/26/16

Time: 11:13

Well ID: MW-01

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

MW01-102516-0	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
1	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
--	---	---	---	--------	------	------	---------------------------------

**Natural Attenuation Monitoring Constituents**

1	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/26/16

Project #: 682722.GW.RP

Well I.D.: MW-2

Field Team: BJS / BP

Total Depth (ft) 21.02 (-) DTW (ft) 10 (X0.17 gal/ft) = Well Casing Volume (gal.) = 1.9

Field Conditions: Raining

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

*Teflon*

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with <input checked="" type="checkbox"/> new or     dedicated <del>polyethylene</del> tubing
<input type="checkbox"/>	Purge Method :	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~15'

Purge water disposal: Drum

Comments/Exceptions to SAP: Pump On - 8:33

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
8:35	0.1	191	17.52	6.76	-85.4	0.63	3.23		10.32	CC, colorless
8:38	2	197	16.86	6.91	-134	0.27	0.69		10.36	CC, colorless
9:03	2.3	196	16.87	6.90	-135.9	0.25	0.47		10.36	
9:08	2.5	197	16.81	6.90	-137.8	0.24	0.66		10.36	
:										
:										
:										
:										
:										
9:10	Start Sampling									
9:23	End Sampling									

\* VC = Very cloudy    CI = Cloudy    SC = Slightly Cloudy    VSC = Very Slightly Cloudy    AC = Almost Clear    C = Clear    CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/26/16

Time: 9:10

Well ID: MW-2

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

MW02-102616-0	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
1	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

1	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

1	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
1	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
1	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/26/16

Project #: 682722.GW.RP

Well I.D.: MW-03

Field Team: BSS/BP

Total Depth (ft) 25.10 (-) DTW (ft) 11.6 (X0.17 gal/ft) = Well Casing Volume (gal.) = 2.3

Field Conditions: Raining

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

*Teflon*

X	Purge Method:	Transient peristaltic pump with <input checked="" type="checkbox"/> new or <input type="checkbox"/> dedicated polyethylene tubing
	Purge Method:	Dedicated submersible pump with <input type="checkbox"/> new or <input type="checkbox"/> dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with <input type="checkbox"/> new or <input type="checkbox"/> dedicated polyethylene tubing

Pump Suction Depth (ft): ~20'

Purge water disposal: *Drum*

Comments/Exceptions to SAP:

*Pump On: 9:31*

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
9:33	0.1	307	15.75	6.63	-109.6	2.85	69.3		11.79	AC, colorless
10:03	2.25	285	16.34	6.62	-90.3	0.34	5.18		11.79	CC, colorless, 55
10:08	2.6	282	16.40	6.60	-88.7	0.31	2.91		11.79	CC, colorless
10:13	3.0	281	16.40	6.61	-87.6	0.32	2.60		11.79	''
:										
:										
:										
:										
:										
:										
10:15	Start Sampling									
10:28	End Sampling									

\* VC = Very cloudy    CI = Cloudy    SC = Slightly Cloudy    VSC = Very Slightly Cloudy    AC = Almost Clear    C = Clear    CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/26/16 Time: 10:15

Well ID: MW-03

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

MW03-102616-D	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
1	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

1	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

1	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
1	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
1	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

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## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/26/16

Project #: 682722.GW.RP

Well I.D.: MW-04

Field Team: BSS / BP

Total Depth (ft) 27.39 (-) DTW (ft) 12.47 (X0.17 gal/ft) = Well Casing Volume (gal.) = 2.5

Field Conditions: Overcast

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

Teflon

Purge Method: Transient peristaltic pump with  new or  dedicated polyethylene tubing

Purge Method: Dedicated submersible pump with  new or  dedicated polyethylene tubing

Purge Method: Dedicated Hydrostar pump with  new or  dedicated polyethylene tubing

Pump Suction Depth (ft): ~21'

Purge water disposal: Drain

Comments/Exceptions to SAP: Pump On = 11:31

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
11:33	0.1	382	14.57	6.49	-64.8	1.49	154		12.51	VSC,
11:52	2.5	316	14.72	6.27	-39.7	0.40	16.4		12.52	C, colorless
11:57	3.3	321	14.74	6.32	-50.5	0.29	9.35		12.56	<sup>BSS</sup> 52CC, colorless
12:02	3.75	315	14.75	6.33	-54.3	0.30	4.87		12.52	cc, colorless
12:07	4.5	323	14.75	6.34	-59.2	0.28	4.07		12.52	cc, colorless
:										
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:										
12:10	Start Sampling									
12:19	End Sampling									

\* VC = Very cloudy   CI = Cloudy   SC = Slightly Cloudy   VSC = Very Slightly Cloudy   AC = Almost Clear   C = Clear   CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/26/16

Time: 12:10

Well ID: MW-04

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

MW04-102616-0	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

**Field Filtered using 0.45 micron filter**

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/26/16

Project #: 682722.GW.RP

Well I.D.: MW-05

Field Team: BSS / BDP

Total Depth (ft) 22.84 (-) DTW (ft) 12.66 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.6

Field Conditions: Overcast, ~60°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION Teflon

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with <input checked="" type="checkbox"/> new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~22'

Purge water disposal: Drain

Comments/Exceptions to SAP: Pump On - 1232  
PID ~ 2.3 c wellhead

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
12:33	0.1	371	15.49	6.52	30.6	1.48	17.7		12.68	C, colorless, 65% C
12:53	2.6	366	15.55	6.44	-14.3	0.25	3.53		12.68	CC, colorless
12:58	3.3	366	15.51	6.46	-27.4	0.18	2.23		12.68	"
13:03	3.8	373	15.54	6.47	-34.9	0.22	1.69		12.68	"
13:08	4.4	373	15.52	6.48	-43.3	0.21	1.59		12.68	CC, colorless
13:13	5.0	373	15.52	6.49	-47.9	0.14	1.33		12.68	"
13:18	5.7	375	15.5	6.50	-52.4	0.17	1.15		12.68	CC, colorless
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:										
:										
13:20	Start Sampling									
13:29	End Sampling									

\* VC = Very cloudy    CI = Cloudy    SC = Slightly Cloudy    VSC = Very Slightly Cloudy    AC = Almost Clear    C = Clear    CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/26/16 Time: 13:20

Well ID: MW-05

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample				

**Organic Constituent Wells**

MW05-102616-0	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/26/16

Project #: 682722.GW.RP

Well I.D.: MW-06

Field Team: BSS/BP

Total Depth (ft) 29.03 (-) DTW (ft) 12.13 (X0.17 gal/ft) = Well Casing Volume (gal.) = 2.9

Field Conditions: Overcast, ~60°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

*Teflon*

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with <input checked="" type="checkbox"/> new or     dedicated polyethylene tubing
	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~23'

Purge water disposal: *Down*

Comments/Exceptions to SAP: Pump On = 12:36  
PID = 0.3 @ wellhead

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
13:38	0.1	262	15.99	6.57	-61.4	<sup>35</sup> 0.140	32.0		12.16	CC, colorless
14:01	2.9	262	15.92	6.48	-76.3	0.17	15.3		12.18	CC, colorless
14:07	3.7	265	15.91	6.47	-76.3	0.16	6.47		12.16	"
14:12	4.25	265	15.92	6.47	-75.7	0.15	3.81		12.16	CC, colorless
14:17	4.8	266	15.93	6.47	-75.7	0.15	2.73		12.16	CC, colorless
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14:20	Start Sampling									
14:35	End Sampling									

\* VC = Very cloudy    CI = Cloudy    SC = Slightly Cloudy    VSC = Very Slightly Cloudy    AC = Almost Clear    C = Clear    CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/26/16 Time: 14:20

Well ID: MW-06

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

MW06-102616-0	3	(3)	(3)	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
1	3	(3)	(3)	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

1	1	(1)	(1)	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

1	1	(1)	(1)	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
1	1	(1)	(1)	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
3	3	(3)	(3)	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID MW06-102616-1 Time: 14:25

**Comments:**

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## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/25/16

Project #: 682722.GW.RP

Well I.D.: T451MWOSS

Field Team: BSS/BP

Total Depth (ft) 30 (-) DTW (ft) 19.04 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.9

Field Conditions: Overcast, ~60°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with <input checked="" type="checkbox"/> new or     dedicated <sup>Teflon</sup> polyethylene tubing
<input type="checkbox"/>	Purge Method :	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~25 ft Purge water disposal:

Comments/Exceptions to SAP: PID = 0.0 @ Wellhead

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
12:26	0.1	265	13.98	6.67	39.5	3.01	2.97		19.39	CC, colorless, 75%
12:45	2.0	248	14.12	6.40	66.1	0.91	0.86		19.30	Backed off pump CC, colorless, 65%
12:50	2.6	248	14.11	6.40	68.8	0.89	0.97		19.26	CC, colorless, 65%
12:55	3.1	248	14.21	6.38	71.8	0.89	0.76		19.20	"
13:00	3.5	245	14.24	6.42	71.9	0.86	0.46		19.18	
:										
:										
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:										
13:02	Start Sampling									
13:23	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/25/16

Time: 13:02

Well ID: T4S1MW-03s

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

T4S1MW03S-102516-03 1	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

1	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

1	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
1	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
1	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

## CH2M HILL WELL SAMPLING FIELD LOG

Date: <sup>25</sup>10/24/16 <sup>BSS</sup>

Project #: 682722.GW.RP

Well I.D.: T4SIM6-09

Field Team: BSS / BP

Total Depth (ft) 31.5 (-) DTW (ft) 19.33 (X0.17 gal/ft) = Well Casing Volume (gal.) = 2.1

Field Conditions: Overcast ~60°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with <input checked="" type="checkbox"/> new or <input type="checkbox"/> dedicated <del>polyethylene</del> <sup>Teflon</sup> tubing
<input type="checkbox"/>	Purge Method:	Dedicated submersible pump with <input type="checkbox"/> new or <input type="checkbox"/> dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with <input type="checkbox"/> new or <input type="checkbox"/> dedicated polyethylene tubing

Pump Suction Depth (ft): ~25' Purge water disposal:

Comments/Exceptions to SAP: pump on ~ 11:15, speed ~ 75%

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
11:14	0.1	240	15.13	6.95	118	6.15	4.80		19.36	CC, colorless, ~75%
11:25	2.1	241	14.88	6.45	12.1	4.19	1.77		19.37	CC, colorless, ~85%
11:29	2.9	258	14.87	6.44	-17.2	3.82	1.34		19.37	"
11:34	3.75	344	14.51	6.51	-102.9	2.56	2.47		19.37	CC, colorless, ~75%
11:39	4.5	280	14.76	6.55	-68.1	2.07	1.86		19.37	CC, colorless, ~75%
11:44	5.25	277	14.90	6.53	-52.3	2.48	1.15		19.37	CC, colorless, ~75%
11:49	6.25	277	14.91	6.51	-50.3	3.12	1.10		19.37	CC, colorless, 75%
11:54	7.0	276	14.91	6.52	-54.2	3.05	1.57		19.37	CC, colorless, 75%
11:59	7.6	278	14.90	6.51	-52.6	3.27			19.37	CC, colorless
:										
12:02	Start Sampling									
12:10	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/25/16

Time: 12:02

Well ID: T451MW-09

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample				

**Organic Constituent Wells**

T451MW-102516-0	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/25/16

Project #: 682722.GW.RP

Well I.D.: T451M2-22

Field Team: BSS/BP

Total Depth (ft) 23 (-) DTW (ft) 15.43 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.3

Field Conditions: Overcast, ~60°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with <input checked="" type="checkbox"/> new or <input checked="" type="checkbox"/> dedicated polyethylene tubing <span style="float: right; margin-right: 20px;">Teflon</span>
<input type="checkbox"/>	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~18'

Purge water disposal:

Comments/Exceptions to SAP: PID = 0.0 @ wellhead

pump on - 13:38

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
13:39	0.1	208	15.81	6.54	94.2	2.47	13.1		15.46	CC, colorless, 60%
13:55	1.3	213	15.67	6.37	95.1	0.37	6.01		15.46	"
14:00	1.75	214	15.66	6.36	96.1	0.36	4.49		15.46	CC, colorless, 60%
14:05	2.25	217	15.66	6.35	96.8	0.33	4.04		15.46	CC, colorless, 60%
:										
:										
:										
:										
:										
14:07	Start Sampling									
14:20	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/25/16

Time: 14:07

Well ID: T451 MW-22

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

T451 MW22-102516-0	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
1	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

)	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

↓	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

## CH2M HILL WELL SAMPLING FIELD LOG

Date: 10/25/16

Project #: 682722.GW.RP

Well I.D.: T451M10-23

Field Team: BSS/BP

Total Depth (ft) 25 (-) DTW (ft) 13.71 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.9

Field Conditions: Overcast, ~60°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

*Teflon*

X Purge Method: Transient peristaltic pump with  new or | | dedicated polyethylene tubing  
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~20'

Purge water disposal:

Comments/Exceptions to SAP: Pump On - 14:30

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
14:32	0.1	202	14.88	6.83	99.5	6.24	95.8		13.71	VC, colorless, 60
14:50	2.2	174	15.04	6.48	75.5	2.69	5.80		13.74	CC, colorless, 65
14:55	3.0	170	15.05	6.46	61.5	2.09	3.32		13.74	"
15:00	3.5	167	15.06	6.46	50.8	1.71	2.38		13.74	"
15:05	4.1	166	15.06	6.45	46.3	1.34	1.94		13.74	"
15:10	5.0	166	15.06	6.45	44.5	1.10	1.77		13.74	CC, colorless, 65
15:15	5.5	166	15.07	6.47	40.8	0.97	1.20		13.74	CC, colorless
15:20	6.0	165	15.06	6.49	38.8	0.90	1.23		13.74	CC, colorless
:										
:										
15:23	Start Sampling									
15:30	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 10/25/16

Time: 15:23

Well ID: T4SIMW-23

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

T4SIMW23-102516-0 1	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

1	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

1	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
1	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
3	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

# Event 2: 2017, Quarter 1

# CH2M HILL WELL SAMPLING FIELD LOG

Date: 02/02/17

Project #: 682722.GW.RP<sup>05</sup>

Well I.D.: MW-01

Field Team: BPO + SB

Total Depth (ft) 24.57 (-) DTW (ft) 11.22 (X 0.07 gal/ft) = Well Casing Volume (gal.) = 2.27

Field Conditions: 35°F, P. CLOUDY

Decontamination: Alconox wash, DI wash

## PURGE INFORMATION

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with		new or	<input checked="" type="checkbox"/>	dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated submersible pump with		new or	<input type="checkbox"/>	dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with		new or	<input type="checkbox"/>	dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 20' Purge water disposal: DRUM

Comments/Exceptions to SAP: ~ 4' OF TUBING OUT OF WELL TO GET 20' SUCTION

Time	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
9:06	PUMP	ms/cm ON								
9:08	0.2	0.382	15.6	6.68	243.7	0.90	6.89	0.1	11.22	clear/colorless
9:30	2.3	0.387	15.6	6.64	0.3	0.17	4.99	0.09	11.23	" "
9:35	3.2	0.389	15.8	6.64	-19.0	0.15	4.8	0.18	11.22	" "
9:40	3.5	0.389	15.6	6.65	-29.9	0.14	6.83		11.22	" "
9:45	3.9	0.386	15.8	6.66	-34.4	0.12	4.22	0.08	11.22	" "
9:50	4.4	0.385	16.0	6.64	-35.5	0.12	3.08	0.1	11.22	" "
:										
:										
:										
9:55	Start Sampling									
:	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

+/- 3% +/- 0.1 +/- 10 +/- 0.3 +/- 10%

NOTES: ONLY 1 BOLT.  
GET NEW GASKET

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>of</sup>**

DATE: 02/02/17

Time: 09:55

Well ID: MW-01

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample				

**Organic Constituent Wells**

	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2S04	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

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# CH2M HILL WELL SAMPLING FIELD LOG

Project #: 682722.GW.RP<sup>05</sup>

Date: 02/01/17  
Well I.D.: MW-02

Field Team: BRB + SB

Total Depth (ft) 21.02 (-) DTW (ft) 8.22 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.18

Field Conditions: 35°F, P. CLOUDY

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

X	Purge Method:	Transient peristaltic pump with     new or <input checked="" type="checkbox"/> dedicated <u>polyethylene</u> tubing
	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~15' Purge water disposal: DRUM

Comments/Exceptions to SAP: ~~1.5~~ 2' OF TUBING OUT OF WELL

Time	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
12:23	PUMP	ms/cm 6N								
12:26	0.2	0.190	15.4	6.91	17.4	0.70	68.2		8.63	SLIGHTLY CLOUDY/ LIGHT YELLOW TINT
12:43	2.2	0.200	15.7	6.93	-114.9	0.12	32.3		8.65	SMALL SPECS/ LIGHT YELLOW TINT
12:49	2.9	0.196	15.5	6.94	-116.9	0.11	17.0	0.1	8.60	SMALL WHITE SPECS/ COLORLESS
12:54	3.4	0.197	15.6	6.94	-119.0	0.10	12.4	0.1	8.60	SMALL WHITE SPECS/ COLORLESS
12:59	3.9	0.200	15.7	6.96	-128.8	0.10	8.97	0.1	8.60	SMALL WHITE SPECS/ COLORLESS
13:04	4.4	0.202	15.4	6.99	-130.6	0.11	9.57	0.1	8.54	SMALL WHITE SPECS/ COLORLESS
13:10	4.9	0.203	15.5	6.96	-135.0	0.09	10.8	0.1	8.54	CLEAR / COLORLESS
13:15	5.4	0.202	15.4	6.97	-135.6	0.09	8.17	0.1	8.54	CLEAR / COLORLESS
:										
13:20	Start Sampling									
:	End Sampling									

PUMP SPECS  
75%

VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>05</sup>**

DATE: 02/01/17

Time: 13 : 20

Well ID: MW-02

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				
<b>Organic Constituent Wells</b>							
	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)
<b>Metals</b>							
<u>Field Filtered using 0.45 micron filter</u>							
	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
<b>Natural Attenuation Monitoring Constituents</b>							
	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

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## CH2M HILL WELL SAMPLING FIELD LOG

Date: 02/02/17

Project #: 682722.GW.RP<sup>01</sup>

Well I.D.: MW-03

Field Team: BAO + SB

Total Depth (ft) 25.10 (-) DTW (ft) 9.72 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.6

Field Conditions: 35°F, SUNNY

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

TEFLON

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with     new or <input checked="" type="checkbox"/> dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~20' Purge water disposal: DRUM

Comments/Exceptions to SAP: ~4' OF TUBING OUT OF WELL FOR 20' SUCTION

12:46 WENT HEAD PFD = 1.7 ppm 0.0 BZ

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
12:22	PUMP	ON								
12:24	0.2	0.338	15.9	6.85	-80.7	0.98	41.2	0.1	10.02	VSC, COLORLESS
12:46	2.8	0.326	15.9	6.76	-64.4	0.19	9.11	0.12	9.83	CLEAR, COLORLESS
12:51	3.2	0.326	15.4	6.75	-66.1	0.26	4.20	0.08	9.84	CLEAR, COLORLESS
12:56	3.5	0.321	15.9	6.76	-67.9	0.26	3.15	0.06	9.97	CLEAR, COLORLESS
:										
:										
:										
:										
:										
13:00	Start Sampling									
:	End Sampling									

\* VC = Very cloudy Cl = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 02/02/17 Time: 13:00 Well ID: MW-03

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID Time:

Comments:

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# CH2M HILL WELL SAMPLING FIELD LOG

Date: 02/01/17  
Well I.D.: MW-04

Project #: 682722.GW.RP<sup>05</sup>

Field Team: BPO + SB

Total Depth (ft) 27.39 (-) DTW (ft) 10.61 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.8

Field Conditions: 35° cloudy

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with     new or   <input checked="" type="checkbox"/> dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~21' Purge water disposal:

Comments/Exceptions to SAP: 4' OF TUBING OUT OF WELL FOR 21' SUCTION DEPTH

Time	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
13:52	Pump	ms/cm ON								
13:54	0.2	0.309 (COND.)	14.5	6.38	-1.1	0.81	8.87		10.65	CLEAR/COLORLESS
14:24	2.9	0.438	13.8	6.43	-41.2	<del>0.57</del> 0.78	6.11	0.1	10.64	CLEAR/COLORLESS
14:30	3.2	0.436	13.8	6.43	-42.9	0.94	2.85	<0.1	10.64	- PUMP SLOWED DOWN, BATTERY LOW. USE W/ BATTERY = CLEAR/COLORLESS
14:35	3.6	0.429	13.8	6.41	-39.2	0.46	1.93	<0.1	10.65	- CLEAR/COLORLESS
14:40	3.9	0.434	14.3	6.41	-43.5	0.35	1.83	<0.1	10.65	- CLEAR/COLORLESS
14:45	4.4	0.440	14.3	6.39	-44.8	0.32	1.32	0.1	10.65	CLEAR/COLORLESS
:										
:										
:										
14:50	Start Sampling									
:	End Sampling									

vC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>05</sup>**

DATE: 02/01/17 Time: 11 : 50

Well ID: MW-04

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID \_\_\_\_\_ Time: \_\_\_\_\_

**Comments:**

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## CH2M HILL WELL SAMPLING FIELD LOG

Date: 02/02/17  
Well I.D.: MW-05

Project #: 682722.GW.RP<sup>01</sup>

Field Team: BPO & SB

Total Depth (ft) 27.84 (-) DTW (ft) 10.94 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.9

Field Conditions: 40°F CLOUDY

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

TEFLON

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with     new or <input checked="" type="checkbox"/> dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~22' Purge water disposal: DRUM

Comments/Exceptions to SAP: ~2' OF TUBING OUT OF WELL FOR 22' SUCTION  
1340 WEL HEAD PIP = ~~6.6~~ <sup>8.0</sup> 6.6 ppm, 0.0 ppm BZ

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
13:40	pump	ms/cm on								
13:43	0.3	0.435	15.8	6.59	58.2	1.06	6.33	0.1	10.94	CLEAR, COLORLESS
14:10	2.9	0.429	15.7	6.59	69.5	0.37	3.66	0.1	10.94	CLEAR, COLORLESS
14:15	3.25	0.430	15.7	6.58	70.5	0.36	2.67	0.1	10.95	CLEAR, COLORLESS
14:20	3.75	0.426	15.7	6.59	77.0	0.33	1.76	0.1	10.95	CLEAR, COLORLESS
:										
:										
:										
:										
:										
14:25	Start Sampling									
:	End Sampling									

\* VC = Very cloudy    CI = Cloudy    SC = Slightly Cloudy    VSC = Very Slightly Cloudy    AC = Almost Clear    C = Clear    CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>05</sup>**

DATE: 02/02/17 Time: 14:25

Well ID: MW-05

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample				

**Organic Constituent Wells**

	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID Time:

Comments:

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# CH2M HILL WELL SAMPLING FIELD LOG

Date: 02/02/17  
Well I.D.: MW-06

Project #: 682722.GW.RP<sup>105</sup>

Field Team: BLO + SB

Total Depth (ft) 29.03 (-) DTW (ft) 10.37 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 3.17

Field Conditions: 35°F, P. CLOUDY

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

TEFLON

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with		new or	<input checked="" type="checkbox"/>	dedicated polyethylene tubing
	Purge Method:	Dedicated submersible pump with		new or		dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with		new or		dedicated polyethylene tubing

Pump Suction Depth (ft): ~23' Purge water disposal: DRUM

Comments/Exceptions to SAP: 1-2' OF NBSM OUT OF WELL TO GET 23' SOLUTION  
0.2 ppm @ WELLHEAD

Time	Purge Volume (gallons)	Specific Conduct. (US/cm <sup>2</sup> ) <small>mS/cm</small>	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
10:42										
10:44	0.1	0.288	16.0	6.59	-19.1	0.89	5.62		10.41	CLEAR, COLORLESS
11:07	3.25	0.297	16.1	6.56	-44.6	0.15	2.47		10.40	CLEAR, COLORLESS
11:12	3.8	0.297	15.7	6.55	-49.3	0.13	2.23		10.39	CLEAR, COLORLESS
11:17	4.1	0.305	14.3	6.54	-39.4	0.19	2.78		10.38	CLEAR, COLORLESS
11:22	4.3	0.299	15.5	6.54	-47.1	0.20	2.79		10.39	CLEAR, COLORLESS
:										
:										
:										
:										
11:25	Start Sampling									
:	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>05</sup>**

DATE: 02/02/17 Time: 11 : 25

Well ID: Mw-06

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample				
<b>Organic Constituent Wells</b>							
	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)
<b>Metals</b>							
<u>Field Filtered using 0.45 micron filter</u>							
	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
<b>Natural Attenuation Monitoring Constituents</b>							
	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2S04	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID Time:

Comments: DUPLICATE

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# CH2M HILL WELL SAMPLING FIELD LOG

Date: 02/01/17  
Well I.D.: 143/MW-055

Project #: 682722.GW.RP<sup>05</sup>

Field Team: BPO + SB  
Total Depth (ft) 30 (-) DTW (ft) 17.69 (X) gal/ft = Well Casing Volume (gal.) = 2.1

Field Conditions: 30°F, P. CLOUDY

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

Purge Method: Transient peristaltic pump with | | new or |  dedicated polyethylene tubing  
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~25' Purge water disposal: DRUM

Comments/Exceptions to SAP: tubing ~ 3' from well to pump  
5 to 4'

Time	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
10:51	PUMP	ON								
10:53	0.2	0.114	13.7	6.98	82.0	4.11	2.27	0.1	17.83	CLAR / COLORLESS
11:24	2.2	0.111	14.5	6.65	140.8	5.38	1.59	0.1	17.85	CLAR / COLORLESS
11:29	2.8	0.111	14.3	6.66	143.4	5.33	0.86	0.11	17.81	CLAR / COLORLESS
11:34	3.3	0.111	14.3	6.65	145.3	5.19	0.76	0.1	17.82	
:										
:										
:										
:										
:										
11:40	Start Sampling									
:	End Sampling									

VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear  
 +/- 3% +/- 0.1 +/- 10 +/- 0.3 +/- 10%

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>05</sup>**

DATE: 02/01/17 Time: 11:40

Well ID: TY51MW-03s

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample				
<b>Organic Constituent Wells</b>							
	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)
<b>Metals</b>							
<u>Field Filtered using 0.45 micron filter</u>							
	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
<b>Natural Attenuation Monitoring Constituents</b>							
	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID \_\_\_\_\_ Time: \_\_\_\_\_

Comments:

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## CH2M HILL WELL SAMPLING FIELD LOG

Date: 02/16/17

Project #: 682722.GW.RP<sup>05</sup>

Well I.D.: 7451 MW - 09

Field Team: DPO + SB

Total Depth (ft) 31.5 (-) DTW (ft) 18.15 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.27

Field Conditions: 30°F, P. CLOUDY

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

TEFLON

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with     new or <input checked="" type="checkbox"/> dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
<input type="checkbox"/>	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 25'

Purge water disposal: DRUM

Comments/Exceptions to SAP:

Time	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
9:21	PUMP	ON								
9:26	0.4	0.222	15.0	6.74	23.4	3.03	2.1		18.18	CLEAR/COLORLESS
9:46	2.2	0.229	14.9	6.67	-42.2	2.92	1.41	0.1	18.16	CLEAR/COLORLESS
9:51	2.7	0.234	14.9	6.66	-40.9	2.96	0.91	0.1	18.16	CLEAR/COLORLESS
9:56	3.3	0.234	14.9	6.67	-40.8	2.87	0.91	0.1	18.16	" "
:										
:										
:										
:										
:										
10:00	Start Sampling									
:	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>05</sup>**

DATE: 02/01/17

Time: 10:00

Well ID: TYS/MW-09

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				
<b>Organic Constituent Wells</b>							
	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)
<b>Metals</b>							
<u>Field Filtered using 0.45 micron filter</u>							
	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
<b>Natural Attenuation Monitoring Constituents</b>							
	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

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## CH2M HILL WELL SAMPLING FIELD LOG

Date: 02/01/17  
Well I.D.: 148 MW-22

Project #: 682722.GW.RP<sup>05</sup>

Field Team: BPO + SB

Total Depth (ft) 23 (-) DTW (ft) 13.47 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.62

Field Conditions: 35°F, CLOUDY

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

Purge Method: Transient peristaltic pump with | | new or |  dedicated polyethylene tubing TEFLON  
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 18' Purge water disposal: DRUM

Comments/Exceptions to SAP: 1' OF TUBING OUT OF WELL FOR 18' SUCTION

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
16:57	<u>PUMP</u>	<u>ms/cm ON</u>								
16:59	<u>0.2</u>	<u>0.247</u>	<u>15.0</u>	<u>6.46</u>	<u>95.2</u>	<u>1.89</u>	<u>2.02</u>	<u>0.1</u>	<u>13.50</u>	<u>CLEAR, COLORLESS</u>
17:13	<u>1.7</u>	<u>0.255</u>	<u>14.7</u>	<u>6.40</u>	<u>119.1</u>	<u>0.36</u>	<u>2.35</u>	<u>0.1</u>	<u>13.48</u>	<u>CLEAR, COLORLESS</u>
17:18	<u>2.1</u>	<u>0.254</u>	<u>14.4</u>	<u>6.40</u>	<u>125.0</u>	<u>0.35</u>	<u>1.66</u>	<u>&lt;0.1</u>	<u>13.49</u>	<u>CLEAR, COLORLESS</u>
17:23	<u>2.4</u>	<u>0.256</u>	<u>14.1</u>	<u>6.40</u>	<u>127.9</u>	<u>0.32</u>	<u>1.35</u>	<u>&lt;0.1</u>	<u>13.49</u>	<u>CLEAR, COLORLESS</u>
17:28	<u>2.7</u>	<u>0.255</u>	<u>14.4</u>	<u>6.40</u>	<u>131.9</u>	<u>0.30</u>	<u>1.17</u>	<u>&lt;0.1</u>	<u>13.49</u>	
:										
:										
:										
:										
17:30	<u>Start Sampling</u>									
:	<u>End Sampling</u>									

\* VC = Very cloudy    CI = Cloudy    SC = Slightly Cloudy    VSC = Very Slightly Cloudy    AC = Almost Clear    C = Clear    CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP** of

DATE: 02/01/17 Time: : Well ID: TYB1 MW-22

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample				

**Organic Constituent Wells**

	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID \_\_\_\_\_ Time: \_\_\_\_\_

Comments:  
 \_\_\_\_\_  
 \_\_\_\_\_  
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 \_\_\_\_\_  
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## CH2M HILL WELL SAMPLING FIELD LOG

Date: 2/1/17

Project #: 682722.GW.RP<sup>05</sup>

Well I.D.: TYSIMW-23

Field Team: BO + SB

Total Depth (ft) 25 (-) DTW (ft) 11.90 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.2

Field Conditions: 35°F, cloudy

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

TEFLON

Purge Method: Transient peristaltic pump with  new or  dedicated polyethylene tubing

Purge Method: Dedicated submersible pump with  new or  dedicated polyethylene tubing

Purge Method: Dedicated Hydrostar pump with  new or  dedicated polyethylene tubing

Pump Suction Depth (ft): ~20'

Purge water disposal: DRUM

Comments/Exceptions to SAP: 3 to 4' of tubing out of well to be  
AT Suction Depth 20'

Time	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
15:55	PUMP	ON								
15:57	0.3	0.158	15.1	6.62	43.5	4.35	7.08		11.95	- SMALL BLACK SPECS - CLEAR, COLORLESS
16:10	2.2	0.178	15.0	6.55	61.0	2.25	3.72		11.94	- SMALL BLACK SPECS, - CLEAR, COLORLESS
16:15	2.8	0.173	14.7	6.56	56.3	1.77	2.42		11.93	- VERY SMALL AMOUNT OF BLACK SPECS - CLEAR, COLORLESS
16:20	3.3	0.173	14.1	6.56	52.7	1.58	2.18		11.93	- CLEAR, COLORLESS
16:25	3.6	0.173	14.3	6.53	49.8	1.30	1.74		11.93	- CLEAR, COLORLESS
16:30	4.0	0.177	14.2	6.54	50.6	1.31	1.37		11.93	- CLEAR, COLORLESS
:										
:										
16:46										
:	Start Sampling									
:	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>05</sup>**

DATE: 02/01/17 Time: 16:40

Well ID: TYS1 MW-23

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				
<b>Organic Constituent Wells</b>							
	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)
<b>Metals</b>							
<u>Field Filtered using 0.45 micron filter</u>							
	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
<b>Natural Attenuation Monitoring Constituents</b>							
	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2S04	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)
<b>Duplicate ID</b>		<b>Time:</b>					
<b>Comments:</b>							

# Event 3: 2017, Quarter 2

## CH2M WELL SAMPLING FIELD LOG

Date: 5/1/12

Project #: **682722.GW.05**

Well I.D.: MW-01

Field Team: S. Battow, B. Ostapko

Total Depth (ft) 24.57 (-) DTW (ft) 9.73 (X0.17 gal/ft) = Well Casing Volume (gal.) = 2.52

Field Conditions: 44°F, cloudy

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION *reflon*

Purge Method: Transient peristaltic pump with | | new or  dedicated ~~polyethylene~~ tubing  
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~20' Purge water disposal: Drum

Comments/Exceptions to SAP: ~4' of tubing out of well to get 20' suction depth  
PSD @ WELL HEAD = 0.0 ppm

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria Time	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
09:58	initial	351.3	15.2	6.43	229.8	0.50	12.7		9.73	
09:28	2.6	373.3	15.2	6.54	136.0	0.65	9.50		9.73	CLEAR, COLORLESS
09:33	3.0	418.6 SPC	15.7	6.53	122.5	0.40	3.15		9.73	CLEAR, COLORLESS
9:38	3.4	419.1	15.5	6.53	113.8	0.33	2.72		9.73	CLEAR, COLORLESS
9:43	3.8	417.7	15.4	6.56	92.5	0.28	1.79		9.73	CLEAR, COLORLESS
9:48	4.1	418.6	15.4	6.58	85.5	0.15	2.71		9.73	CLEAR, COLORLESS
9:53	4.3	421.8	15.4	6.58	71.8	0.15	1.57		9.73	CLEAR, COLORLESS
9:58	4.6	420.0	15.5	6.57	63.8	0.14	2.96		9.73	CLEAR, COLORLESS
10:03	4.8	421.0	15.6	6.58	52.7	0.28	4.25		9.73	CLEAR, COLORLESS
10:08	5.2	421.7	15.6	6.59	41.9	0.14	1.62		9.73	CLEAR, COLORLESS
10:13	5.5	421.3	15.5	6.58	40.9	0.12	1.91		9.73	CLEAR, COLORLESS
10:18	5.8	423.3	15.5	6.56	35.5	0.12	2.97		9.73	CLEAR, COLORLESS
10:20	Start Sampling									
:	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 05/01/17      Time: 10 : 20      Well ID: MW-01

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl	5/1/17	EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl	↓	EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2S04		SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None	↓	RSK 175, no headspace
Duplicate ID      Time:								
Comments:								

## CH2M HILL WELL SAMPLING FIELD LOG

Project #: 682722.GW.RP<sup>05</sup>

Date: 4/27/17

Well I.D.: MW-02

Field Team: J. Ulrich/PDX + S. Bartow/PDX

Total Depth (ft) 21.00 (-) DTW (ft) 6.68 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.43

Field Conditions: Overcast, 50°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION TEFLON LINED

✓	Purge Method:	Transient peristaltic pump with     new or   <span style="border: 1px solid black; border-radius: 15px; padding: 2px;">dedicated polyethylene tubing</span>
	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 15' BTDC

Purge water disposal: DRUM

Comments/Exceptions to SAP: —

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
09:06	0.02 initial	256.1	14.9	6.78	-101.9	0.33 <del>0.6</del>	15.6	0.1	6.68	Slight sulfur odor clear, odorless (up)
09:34	2.5	237.8	15.1	7.07	-111.3	1.08	3.42	0.08	6.95	"
09:39	3	236.4	15.1	7.17	-110.9	0.27	7.20	0.1	6.95	"
09:44	3.4	239.9	15.1	7.14	-134.3	0.22	5.42	0.08	6.95	"
09:49	3.9	239.1	15.1	7.13	-139.7	0.21	9.02	0.1 <del>0.08</del>	6.96	"
09:54	4.3	239.7	15.0	7.11	-142.3	0.20	8.12	0.08	6.95	"
:										
:										
:										
:										
16:00	Start Sampling									
18:20	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP**

DATE: 4/27/17 Time: 10 : 00

Well ID: MW-02

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Analytical Method
	Equip- ment	Dupli- cate	Parent Sample				

**Organic Constituent Wells**

	3	3	3	40 mL	Glass	HCl	TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl	PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3	Dissolved Ferrous Iron (E200.7)
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**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None	Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4	Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None	Methane and Carbon Dioxide (RSK 175)

Duplicate ID

Time:

Comments:

## CH2M WELL SAMPLING FIELD LOG

Date: 05/01/17

Project #: 682722.GW.05

Well I.D.: MW-03

Field Team: SB + BPO

Total Depth (ft) 25.10 (-) DTW (ft) 8.14 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.88

Field Conditions: 50°F Cloudy

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

X	Purge Method:	Transient peristaltic pump with     new or <input checked="" type="checkbox"/> dedicated polyethylene tubing
	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~20' Purge water disposal:

Comments/Exceptions to SAP: ~ 4' OF RUBBER OUT OF WELL FOR 20' SULFONATE WELL HEAD PFD = 0.0 ppm

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria Time	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
12:33	PUMP ON									
12:36	0.3	330.4	15.6	6.60	21.3	0.47	117		8.52	CLOUDY, ORANGE TAN
13:04	2.9	332.3	15.5	6.54	1.3	0.37	22.9		8.34	VSC, CLOUDINESS
13:10	3.4	333.1	15.3	6.53	0.7	0.22	19.7		8.32	AC, CLOUDINESS
13:15	3.8	329.9	15.5	6.56	5.5	0.20	17.8	0.08	8.47	AC, CLOUDINESS
13:21	4.3	334.7	15.5	6.57	-19.1	0.09	20.5	0.1	8.43	AC, CLOUDINESS
13:26	4.7	333.2	15.5	6.57	-23.6	0.08	9.61	0.08	8.44	C, CLOUDINESS
13:31	5.2	333.2	15.5	6.57	-32.6	0.07	8.24	0.1	8.44	C, CLOUDINESS
13:36	5.75	333.3	15.5	6.57	-37.2	0.17	4.81	0.1	8.41	CLEAR, CLOUDINESS
13:41	6.5	334.1	15.5	6.58	-45.0	0.08			8.43	CLEAR, CLOUDINESS
13:46	7.0	333.5	15.5	6.56	-42.7	0.07	3.95		8.43	CLEAR, CLOUDINESS
13:46	6.0						3.46			
13:50	Start Sampling									
:	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 05/01/17

Time: 13:50

Well ID: MW-03

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-licate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2S04		SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID _____ Time: _____								
Comments:								

## CH2M WELL SAMPLING FIELD LOG

Date: 4/27/17

Project #: 682722.GW.05

Well I.D.: MW-04

Field Team: J. Ulrich / PDX + S. Bartow / PDX

Total Depth (ft) 27.39 (-) DTW (ft) 9.04 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 3.12

Field Conditions: Partly cloudy, 51°F, light wind

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION TEFLON LINED

✓	Purge Method:	Transient peristaltic pump with     new or     <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">dedicated polyethylene tubing</span>
	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 21 ft BTDC

Purge water disposal: DRUM

Comments/Exceptions to SAP: -

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
<b>Target Stabilization Criteria</b>	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
<b>Time</b>										
10:37	initial	329.1	13.4	6.51	88.2	3.71	16.8	~0.1	9.04	clear, odorless turn pump down
10:15	3.2	334.6	14.0	6.59	-58.2	0.42	5.95	0.08	9.09	"
11:20	3.6	337.1	13.9	6.60	-58.7	0.31	5.88	0.08	9.08	"
11:25	3.9	337.1	13	6.60	-58.9	0.22	5.02	0.08	9.08	"
11:40										
:										
:										
:										
:										
:										
11:30	Start Sampling									
11:40	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 4/27/17

Time: 11 : 30

Well ID: MW-04

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl	4/27/17	EPA 8260C, no headspace
PCE, VC	3	3	(3)	40 mL	Glass	HCl	"	EPA 8260SIM, no headspace
<b>Metals</b> <span style="margin-left: 100px;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	1	(1)	250 mL	Poly	HNO3	"	E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None	"	Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	(1)	250 mL	Poly	H2SO4	"	SM5310
Methane and Carbon Dioxide	3	3	(3)	40 mL	Glass	None	"	RSK 175, no headspace
Duplicate ID	—			Time:	—			
Comments:	—							

## CH2M WELL SAMPLING FIELD LOG

Date: 5/1/17

Project #: **682722.GW.05**

Well I.D.: MW-05

Field Team: SS + BPO

Total Depth (ft) 27.84 (-) DTW (ft) 9.51 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 3.11

Field Conditions: 51° F Cloudy

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

teflon

Purge Method: Transient peristaltic pump with | | new or  dedicated polyethylene tubing

Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing

Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~22'

Purge water disposal: Drum

Comments/Exceptions to SAP: - 2 ft tubing out of well for 22' suction

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
14:22	initial	315.1	15.3	6.55	94.0	1.25	1.74		9.51	AC, colorless
14:58	3.1	353.1	15.4	6.57	-22.2	0.30	0.73		9.50	C, colorless
15:03	3.6	357.5	15.3	6.61	-31.2	0.15	1.78		9.50	" "
15:08	4.0	358.9	15.4	6.57	-35.7	0.11	0.93		9.50	" "
15:13	4.5	359.7	15.4	6.60	-39.9	0.11	0.49		9.50	" "
:										
:										
:										
:										
:										
15:20	Start Sampling									
:	End Sampling									

VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 05/01/17 Time: 15:20 Well ID: MW-05

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <span style="margin-left: 100px;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID <span style="margin-left: 150px;">Time:</span>								
Comments:								

## CH2M WELL SAMPLING FIELD LOG

Date: 05/01/17  
Well I.D.: MW-06

Project #: 682722.GW.05

Field Team: SB + BPO

Total Depth (ft) 29.03 (-) DTW (ft) 8.86 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 3.7

Field Conditions: 45°F, LL0.05

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

*TEFLON*

Purge Method: Transient peristaltic pump with | | new or |  dedicated polyethylene tubing  
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 23' Purge water disposal:

Comments/Exceptions to SAP: 1-2' OF TUBING OUT OF WELL TO GET 23' SUCTION

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
<b>Target Stabilization Criteria</b>	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
<b>Time</b>										
10:55	- Pump ON									
10:58	0.2	315.1	15.7	6.45	16.8	0.75	33.1	0.07	8.96	SMALL, PPD FLECKS CLOUDY
11:30	3.4	310.7	15.8	6.39	15.8	0.48	6.32	0.1	8.89	CLEAR, CLOUDY
11:35	3.9	311.3	15.8	6.36	12.2	0.22	7.22	0.1	8.89	CLEAR, CLOUDY
11:40	4.2	309.9	15.7	6.34	14.5	0.14	3.79	0.06	8.89	CLEAR, CLOUDY
11:45	4.5	310.1	15.7	6.35	19.8	0.13	4.37		8.89	CLEAR, CLOUDY
:										
:										
:										
:										
11:50	Start Sampling									
:	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 05/01/17 Time: 11:50 Well ID: MW-06

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl	05/01/17	EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2S04		SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID	Time:							
Comments:	DUPLICATE MW-100-050117-0							

## CH2M HILL WELL SAMPLING FIELD LOG

Date: 4/26/17

Project #: 682722.GW.RP05

Well I.D.: T4S1MW-03 S

Field Team: J. Ulrich / PDX + B. Ostapkowicz / PDX

Total Depth (ft) 30 (-) DTW (ft) 15.61 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.45

Field Conditions: Partly cloudy

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION TEFLON LINED

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with     new or   <u>dedicated polyethylene tubing</u>
	Purge Method:	Dedicated submersible pump with     new or     dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~25 ft BTDC

Purge water disposal: DRUM

Comments/Exceptions to SAP: -

+/- 39.4 uS/cm

+/- 0.3 mg/L

Time	Purge Volume (gallons)	Specific Conduct. (uS/cm)	Temp. (oC)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
13:59	initial	-	-	-	-	-	-	-	15.61	Allow line to clear prior to clear/odorless connect.
14:04	0.14	90.4	13.4	6.79	126.0	9.67	8.3	0.1	15.73	"
14:28	2.5	86.9	13.1	6.57	151.2	9.15	3.32	0.1	15.79	"
14:33	3.8	86.1	13.2	6.52	157.9	8.91	2.19	0.14	15.79	turned down pump
14:38	3.5	88.0	13.1	6.60	165.3	9.07	2.12	0.06	15.75	"
14:43	4.0	86.6	13.2	6.62	146.8	8.96	1.55	0.1	15.74	"
:										
:										
:										
:										
14:45	Start Sampling									
15:20	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical  
Groundwater Monitoring  
Project #: 682722.GW.RP<sup>01</sup>**

DATE: 4/26/17      Time: 14:45      Well ID: T4S1MW-03S

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.		Analytical Method
	Equip- ment	Dupli- cate	Parent Sample					

**Organic Constituent Wells**

	3	3	3	40 mL	Glass	HCl		TCE, cis-1,2-DCE (EPA 8260C)
	3	3	3	40 mL	Glass	HCl		PCE, VC (EPA 8260SIM)

**Metals**

Field Filtered using 0.45 micron filter

	1	1	1	250 mL	Poly	HNO3		Dissolved Ferrous Iron (E200.7)
--	---	---	---	--------	------	------	--	---------------------------------

**Natural Attenuation Monitoring Constituents**

	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate (E300.0), & Chloride (E300.0)
	1	1	1	250 mL	Poly	H2SO4		Total Organic Carbon (SM5310)
	3	3	3	40 mL	Glass	None		Methane and Carbon Dioxide (RSK 175)

Duplicate ID \_\_\_\_\_ Time: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## CH2M WELL SAMPLING FIELD LOG

Date: 4/26/17

Project #: 682722.GW.05

Well I.D.: T4S1MW-09

Field Team: Jennifer Ulrich / PDX & Brad Ostapkowicz / PDX

Total Depth (ft) 31.5 (-) DTW (ft) 16.44 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.56

Field Conditions: partly cloudy, 53°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

TEFLON LINED

Purge Method: Transient peristaltic pump with | new or | dedicated polyethylene tubing

Purge Method: Dedicated submersible pump with | new or | dedicated polyethylene tubing

Purge Method: Dedicated Hydrostar pump with | new or | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 25' BTOC

Purge water disposal: DRUM

Comments/Exceptions to SAP: -

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
<b>Target Stabilization Criteria</b>	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
<b>Time</b>										
12:17	initial	212.2	13.9	6.26	-13.5	0.70	14.6	0.1	16.44	clear, odorless
12:48	2.6	198.9	14.3	6.46	-23.9	1.15	6.21	0.06	16.45	"
12:53	2.9	200.1	14.4	6.48	-29.9	0.99	4.64	0.06	16.45	"
12:58	3.2	200.2	14.3	6.51	-20.4	0.98	4.22	0.06	16.45	"
:										
:										
:										
:										
:										
13:00	Start Sampling									
13:35	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 4/26/17

Time: 13 :00

Well ID: T4S1MW-09

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl	4/26/17	EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl	"	EPA 8260SIM, no headspace
<b>Metals</b> <span style="margin-left: 100px;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3	"	E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None	"	Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2SO4	"	SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None	"	RSK 175, no headspace
Duplicate ID <span style="margin-left: 150px;">Time:</span>								
Comments: —								

## CH2M WELL SAMPLING FIELD LOG

Date: 4/27/17

Project #: 682722.GW.05

Well I.D.: T4S/MW-22

Field Team: J. Ulrich / PDX + S. Bartow / PDX

Total Depth (ft) 23 (-) DTW (ft) 11.81 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.9

Field Conditions: Partly cloudy, 54°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

TEFLON LINED

✓ Purge Method: Transient peristaltic pump with | | new or | (~~dedicated polyethylene tubing~~)

Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing

Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~19' BTOC

Purge water disposal: DRUM

Comments/Exceptions to SAP: -

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
<b>Target Stabilization Criteria Time</b>	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
13:58	initial	236.3	15.3	6.55	149.6	3.08	13.2	0.07	11.81	clear, odorless
14:26	2	228.1	15.1	6.30	174.2	1.24	2.15	0.07	11.80	"
14:31	2.3	230.2	15.1	6.36	173.6	1.07	1.53	0.06	11.80	"
14:36	2.6	232.2	15.0	6.36	148.9	1.20	1.39	0.06	11.80	"
:										
:										
:										
:										
:										
14:40	Start Sampling									
15:03	End Sampling									

\* VC = Very cloudy Ci = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 4/27/17

Time: 14 : 40

Well ID: T451MW-22

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl	4/27/17	EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl	"	EPA 8260SIM, no headspace
<b>Metals</b> <span style="margin-left: 100px;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3	"	E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None	"	Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2SO4	"	SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None	"	RSK 175, no headspace
Duplicate ID	Time:							
Comments:								

## CH2M WELL SAMPLING FIELD LOG

Date: 4/27/17

Project #: 682722.GW.05

Well I.D.: T4SIMW-23

Field Team: J. Ulrich / PDX + S. Bartow / PDX

Total Depth (ft) 25 (-) DTW (ft) 10.46 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.47

Field Conditions: Partly cloudy, 54°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION TEFLON LINED

✓	Purge Method:	Transient peristaltic pump with     new or     dedicated polyethylene tubing
	Purge Method :	Dedicated submersible pump with     new or     dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with     new or     dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 20 ft BTDC

Purge water disposal: DRUM

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
12:23	initial	191.1	15.0	6.76	112.6	3.30	8.77	0.07	10.46	clear, odorless
12:56	2.5	162.9	15.0	6.53	94.3	2.31	4.90	0.09	10.48	"
13:01	2.9	160.4	14.9	6.55	90.2	1.24	2.65	0.08	10.48	"
13:06	3.6	160.7	14.9	6.54	91.6	1.15	1.94	0.14	10.48	TURN DOWN PUMP
13:11	<del>3.8</del> 4.0	161.2	14.9	6.53	91.6	1.12	1.87	0.08	10.48	
:										
:										
:										
:										
:										
13:15	Start Sampling									
13:40	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 4/27/17

Time: 13:15

Well ID: T4SIMW-23

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl	4/27/17	EPA 8260C, no headspace
PCE, VC	3	3	(3)	40 mL	Glass	HCl	"	EPA 8260SIM, no headspace
<b>Metals</b> <span style="float: right;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	1	(1)	250 mL	Poly	HNO3	"	E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None	"	Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	(1)	250 mL	Poly	H2SO4	"	SM5310
Methane and Carbon Dioxide	3	3	(3)	40 mL	Glass	None	"	RSK 175, no headspace
Duplicate ID: — Time: —								
Comments: —								

# Event 4: 2017, Quarter 3

## CH2M WELL SAMPLING FIELD LOG

Date: 7/24/17

Well I.D.: MW-01

Project #: 682722.GW.05

Field Team: JUF & SB

Total Depth (ft) 24.57 (-) DTW (ft) 11.13 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.28

Field Conditions: Clear, lite breeze, 74°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

Purge Method:  Transient peristaltic pump with | new or |  dedicated polyethylene tubing *Teflon lined*

Purge Method:  Dedicated submersible pump with | new or | dedicated polyethylene tubing

Purge Method:  Dedicated Hydrostar pump with | new or | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 20 ft BTDC

Purge water disposal: DRUM

Comments/Exceptions to SAP:

Target Stabilization Criteria	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PID @ well head = 0.0 ppm (VOCs)
Time										
11:54	initial	525.8	17.5	6.50	115.0	0.41	4.01	0.07	11.13	clear, no odor
12:28	2.25	517.2	17.1	6.42	72.8	0.08	3.15	0.07	11.14	purge 1x casing vol
12:33	2.65	513.3	17.2	6.43	67.4	0.08	1.21	0.08	11.14	
12:38	3.0	513.2	17.2	6.46	65.6	0.08	1.01	0.08	11.14	
:										
:										
:										
:										
:										
12:40	Start Sampling									
13:00	End Sampling									

\* VC = Very cloudy Ci = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/26/17

Time: 12:40

Well ID: MW-01

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	(3)	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	(1)	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	(1)	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	(3)	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID	_____			Time:	_____			
Comments:	_____							
	_____							
	_____							
	_____							
	_____							
	_____							

## CH2M WELL SAMPLING FIELD LOG

Date: 7/25/17

Well I.D.: MW-02

Project #: 682722.GW.05

Field Team: JUF + SB

Total Depth (ft) 21.00 (-) DTW (ft) 8.19 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.18

Field Conditions: Clear, lite breeze, 90°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

Purge Method: Transient peristaltic pump with | new or | dedicated polyethylene tubing → Teflon lined  
 Purge Method: Dedicated submersible pump with | new or | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | new or | dedicated polyethylene tubing

Pump Suction Depth (ft): ~15 <sup>(JUF)</sup> BTIC

Purge water disposal: DRUM

Comments/Exceptions to SAP:

Target Stabilization Criteria Time	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PID @ well head = 0.0 ppm (VOCs)
13:25	initial	242.8	18.6	6.88	-123.7	0.11	1.67	0.08	8.19	clear, no odor
13:50	2.2	243.1	20.6	6.79	-150.1	0.04	1.24	0.08	8.41	purge 1x casing vol * reduce purge rate
13:55	3.0	243.8	19.8	6.81	-145.2	0.07	0.71	0.12	8.41	reduce purge rate
14:00	3.4	244.3	20.1	6.74	-140.5	0.07	1.01	0.08	8.40	
:										
:										
:										
:										
:										
14:05	Start Sampling									
14:30	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/25/17

Time: 14:05

Well ID: MW-02

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	(3)	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	(1)	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	(1)	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	(3)	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID _____ Time: _____								
Comments:								

## CH2M WELL SAMPLING FIELD LOG

Date: 7/27/17

Project #: 682722.GW.05

Well I.D.: MW-03

Field Team: SB & JUF

Total Depth (ft) 25.10 (-) DTW (ft) 9.89 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.59

Field Conditions: Overcast, 67°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

✓	Purge Method:	Transient peristaltic pump with	new or	dedicated polyethylene tubing	Teflon lined
	Purge Method:	Dedicated submersible pump with	new or	dedicated polyethylene tubing	
	Purge Method:	Dedicated Hydrostar pump with	new or	dedicated polyethylene tubing	

Pump Suction Depth (ft): ~20 ft BTOC

Purge water disposal: Drum

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria Time	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PIP @ well head = 0.0 ppm (VOCs)
11:41	0.25	371.8	16.4	6.60	-70.1	1.24	85.6	0.06	9.89	SC, yellowish tinge, Fe fouling present
12:11	3.00	363.8	16.9	6.53	-65.1	0.09	3.05	0.08	10.10	start up, slight Fe odor. PURGE 1X
12:16	3.01	363.0	17.0	6.55	-65.7	0.09	2.62	0.08	10.10	CASING VOL → reduce purge rate
12:21	3.8	360.4	17.0	6.55	-68.7	0.08	2.55	0.08	10.10	
12:41										
:										
:										
:										
:										
12:25	Start Sampling									
12:41	End Sampling									

VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/27/17

Time: 12:25

Well ID: MW-03

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2S04		SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID	Time:							
Comments:								

# CH2M WELL SAMPLING FIELD LOG

Date: 7/26/17

Project #: 682722.GW.05

Well I.D.: MW-04

Field Team: JUF + SB

Total Depth (ft) 27.39 (-) DTW (ft) 10.70 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.84

Field Conditions: Clear, calm, 86°F 68°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

✓	Purge Method:	<del>Transient peristaltic pump with</del>   new or   <del>Dedicated polyethylene tubing</del>	<i>teflon lined</i>
	Purge Method:	Dedicated submersible pump with   new or   dedicated polyethylene tubing	
	Purge Method:	Dedicated Hydrostar pump with   new or   dedicated polyethylene tubing	

Pump Suction Depth (ft): ~ 21 ft BTC

Purge water disposal: DRUM

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PID @ well head = 0.0 ppm (VOCs)
Time										
7:25	0.25	246.4	14.8	7.10	59.0	0.22	17.2	0.08	10.75	AC, yellowish tinge, slight (red) color
7:59	2.8	374.4	15.2	6.40	-61.6	0.13	8.11	0.08	10.75	Purge 1x casing volume
8:04	3.25	372.3	15.1	6.40	-62.8	0.13	7.77	0.09	10.75	Turn down flow rate slightly
8:09	3.60	373.9	15.1	6.42	-65.8	0.13	8.11	0.08	10.75	
:										
:										
:										
:										
:										
8:10	Start Sampling									
8:30	End Sampling									

\* VC = Very cloudy Ci = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/26/17

Time: 8:10

Well ID: MW-04

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <span style="float: right;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID	Time:							
Comments:								

# CH2M WELL SAMPLING FIELD LOG

Date: 7/27/17

Project #: 682722.GW.05

Well I.D.: MW-05

Field Team: JMF + SB

Total Depth (ft) 27.84 (-) DTW (ft) 10.91 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.88

Field Conditions: Overcast, 77°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

✓ Purge Method: Transient peristaltic pump with | new or | dedicated polyethylene tubing - Teflon lined

Purge Method: Dedicated submersible pump with | new or | dedicated polyethylene tubing

Purge Method: Dedicated Hydrostar pump with | new or | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 22 ft BTDC Purge water disposal: DRUM

Comments/Exceptions to SAP: Purge water separated. Combined w/ MW-06

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	4	P10 @ well head = 0.0 ppm WDCs
Time										
13:06	initial	387.0	16.8	6.75	98.1	1.08	2.97	0.06	10.91	Clear, no odor
13:51	2.9	382.2	18.8	6.43	60.2	0.15	1.32	0.06	10.91	Purge 1x casing vol
13:56	3.3	389.1	18.0	6.46	25.6	0.17	1.42	0.06	10.91	
14:01	3.6	388.9	18.0	6.43	21.4	0.12	2.80	0.06	10.91	
14:06	3.9	390	18.0	6.46	19.3	0.11	2.22	0.06	10.91	
:										
:										
:										
:										
14:10	Start Sampling									
14:30	End Sampling									

\* VC = Very cloudy Ci = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/27/17 <sup>27 (UE)</sup>

Time: 14:10

Well ID: MW-05

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	(3)	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	(1)	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	(1)	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	(3)	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID	Time:							
Comments:								

## CH2M WELL SAMPLING FIELD LOG

Date: 7/27/17

Project #: 682722.GW.05

Well I.D.: MW-06

Field Team: SB + JUF

Total Depth (ft) 29.03 (-) DTW (ft) 10.37 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 3.17

Field Conditions: overcast, 58°F, lite breeze

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

✓	Purge Method:	Transient peristaltic pump with	new or	dedicated polyethylene tubing - teflon lined
	Purge Method:	Dedicated submersible pump with	new or	dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with	new or	dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 23 ft BTDC

Purge water disposal: DRUM

Comments/Exceptions to SAP: Purge water drummed separately - combined w/ MW-05  
Collect ED here: MW-100-072717-0 @ 1030

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
<b>Target Stabilization Criteria</b>	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PID @ well head = 0.0 ppm WOCs
<b>Time</b>										
9:00	initial	327.1	16.5	6.03	21.1	0.39	28.6	0.07	10.37	At slightly turbid, VSC no odor, yellow
9:46	3.25	322.3	16.5	6.25	-4.9	0.07	27.7	0.07	10.40	Purge 1x casing tinge
9:51	3.6	320.9	16.6	6.28	-3.9	0.08	24.9	0.08	10.40	
9:56	4.0	323.9	16.5	6.28	-4.7	0.08	14.4	0.08	10.40	
10:01	4.4	322.2	16.5	6.25	-5.3	0.07	13.2	0.08	10.40	
10:04	4.75	322.2	16.6	6.27	-8.6	0.07	10.7	0.07	10.40	
:										
:										
:										
:										
10:15	Start Sampling									
10:40	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/27/17

Time: 10:15

Well ID: MW-06

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	(3)	(3)	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	(3)	(3)	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <span style="margin-left: 100px;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	(1)	(1)	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	(1)	(1)	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	(1)	(1)	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	(3)	(3)	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID MW-100-072717-0 Time: 10:30								
Comments: —								

*ell*

## CH2M WELL SAMPLING FIELD LOG

Date: 7/25/17

Well I.D.: T4S1MW-038

Project #: 682722.GW.05

Field Team: JWF + SB

Total Depth (ft) 30 (-) DTW (ft) 18.09 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.02

Field Conditions: Clear, light breeze, 90°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

Purge Method: Transient peristaltic pump with | new or | dedicated polyethylene tubing ← Teflon lined  
 Purge Method: Dedicated submersible pump with | new or | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | new or | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 25 BTDC

Purge water disposal: DRUM

Comments/Exceptions to SAP: —

Target Stabilization Criteria	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PID @ well head = 0.0 ppm (VOCs)
Time										
11:54	initial	173.9	13.6	6.70	106.3	4.70	0.44	0.06	18.09	Initial;
12:26	2.1	167.8	16.7	6.46	112.6	4.45	1.99	0.06	18.14	let purge 1x casing vol before continued param
12:31	2.30	164.8	16.1	6.47	113.1	4.43	0.41	0.04	18.15	collection rate * turn up purge slightly
12:36	2.75	164.4	16.0	6.46	114.9	4.46	0.32	0.07	18.15	
13:05										
12:40	Start Sampling									
13:05	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/25/17

Time: 12:40

Well ID: T4S1MW-03S

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	(3)	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	(1)	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	(1)	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	(3)	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID _____ Time: _____								
Comments:								

# CH2M WELL SAMPLING FIELD LOG

Date: 7/25/17

Well I.D.: T491MW-09

Project #: 682722.GW.05

Field Team: JAF + SB

Total Depth (ft) 31.50 (-) DTW (ft) 18.52 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.21

Field Conditions: Clear, 5-9 mph winds, 90°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

Purge Method: Transient peristaltic pump with | new or | dedicated polyethylene tubing → Teflon lined  
 Purge Method: Dedicated submersible pump with | new or | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | new or | dedicated polyethylene tubing

Pump Suction Depth (ft): ~18 ft b7c

Purge water disposal: DRUM

Comments/Exceptions to SAP: —

Target Stabilization Criteria Time	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PIDE wellhead = 0.0 ppm VOCs
9:58	0.02	221.7	16.1	6.82	170.1	1.58	5.1	0.06	18.52	initial purge
10:34	2.5	215.4	15.7	6.45	99.8	1.83	0.86	0.06	18.56	* Allow 1 well casing to purge clear, no odor
10:39	2.85	214.9	15.8	6.43	99.6	1.81	0.59	0.7	18.55	—
10:44	3.10	215.7	16.0	6.45	95.5	1.77	1.76	0.7	18.55	—
:										
:										
:										
:										
:										
10:45	Start Sampling									
11:15	End Sampling									

\* VC = Very cloudy, Cl = Cloudy, SC = Slightly Cloudy, VSC = Very Slightly Cloudy, AC = Almost Clear, C = Clear, CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/25/17

Time: 10:45

Well ID: T4S1MN-09

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	(3)	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <span style="margin-left: 100px;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	1	(1)	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	(1)	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	(3)	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID _____ Time: _____								
Comments:								

## CH2M WELL SAMPLING FIELD LOG

Date: 7/26/17

Project #: 682722.GW.05

Well I.D.: TS41MW-22

Field Team: JUF + SB

Total Depth (ft) 23 (-) DTW (ft) 13.70 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.58

Field Conditions: Clear, calm, 84°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

✓	Purge Method:	Transient peristaltic pump with	new or	dedicated polyethylene tubing	Teflon lined
	Purge Method:	Dedicated submersible pump with	new or	dedicated polyethylene tubing	
	Purge Method:	Dedicated Hydrostar pump with	new or	dedicated polyethylene tubing	

Pump Suction Depth (ft): ~ 18 ft. BTOC

Purge water disposal: Drum

Comments/Exceptions to SAP: -

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PID @ well head = 0.0 ppm (VOCs)
Time										
10:38	initial	242.0	15.7	6.51	127.7	2.98	2.36	0.08	13.70	clear, no odor
11:03	1.50	242.9	16.3	6.24	124.0	1.13	1.52	0.06	13.72	Purge 1x casing vol
11:08	1.90	241.4	16.0	6.25	120.3	0.97	0.71	0.08	13.72	
11:13	2.30	241.5	16.0	6.25	117.3	0.88	0.70	0.08	13.72	
:										
:										
:										
:										
:										
11:15	Start Sampling									
11:35	End Sampling									

\* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/26/17

Time: 11:15

Well ID: TS41MW-22

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <span style="margin-left: 20px;"><u>0.45 µm field filtered</u></span>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID	Time:							
Comments:								

## CH2M WELL SAMPLING FIELD LOG

Date: 7/26/17

Well I.D.: T541MW-23

Project #: 682722.GW.05

Field Team: JUF + SB

Total Depth (ft) 25 (-) DTW (ft) 12.41 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.14

Field Conditions: Clear, calm, 75°F

Decontamination: Alconox wash, DI wash

### PURGE INFORMATION

Purge Method: Transient peristaltic pump with | new or | dedicated polyethylene tubing - teflon lined  
 Purge Method: Dedicated submersible pump with | new or | dedicated polyethylene tubing  
 Purge Method: Dedicated Hydrostar pump with | new or | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 20 ft BTDC

Purge water disposal: DRUM

Comments/Exceptions to SAP:

Target Stabilization Criteria	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	PIDE well head = 0.0 ppm (VOCs)
Time										
9:13	0.15 <del>0.05</del> <del>0.10</del>	186.2	18.4	6.43	120.4	4.18	3.54	0.08	12.44	clear, no odor
9:35	2.25	166.1	18.3	6.43	73.8	2.10	2.17	0.09	12.44	Purge 1x casing volume
9:40	2.65	164.9	18.8	6.45	68.7	1.98	0.72	0.08	12.44	Turn down flow rate slightly
9:45	3.10	165.4	18.1	6.48	67.0	1.57	0.72	0.09	12.42	Turn down flow rate slightly
9:50	3.50 <del>3.10</del> <del>3.00</del>	165.9	18.4	6.56	64.2	1.42	0.66	0.08	12.42	
9:55	3.90	165.4 <del>169.0</del>	18.0	6.57	61.4	1.47	0.59	0.08	12.42	
:										
:										
:										
:										
10:00	Start Sampling									
10:20	End Sampling									

\* VC = Very cloudy Ci = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

**Laboratory Analytical Program - Quarterly Sampling**  
**Groundwater Sampling**  
**Project #: 682722.GW.05**

DATE: 7/26/17

Time: 10 : 00

Well ID: TS41 MW-23

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
<b>Organic Constituents</b>								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
<b>Metals</b> <u>0.45 µm field filtered</u>								
Dissolved Ferrous Iron	1	1	1	250 mL	Poly	HNO3		E200.7
<b>Natural Attenuation Monitoring Constituents</b>								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (E353.2), Sulfate & Chloride (E300.0)
TOC	1	1	1	250 mL	Poly	H2SO4		SM5310
Methane and Carbon Dioxide	3	3	3	40 mL	Glass	None		RSK 175, no headspace
Duplicate ID _____ Time: _____								
Comments:								

# Attachment C

## Laboratory Analytical Reports

# Event 1: 2016, Quarter 4



# Analytical Report for Northwest Pipe

ASL Report #: Q3331

Project ID: 682722.GW.SB

**Attn: Gretchen Gee**

cc:

Beckett, Jamie/RDD

Authorized and Released By:

Laboratory Project Manager

Kathy McKinley

(541) 758-0235 ext.23144

November 09, 2016

All analyses performed by CH2M HILL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)  
Louisiana (05031)

CH2M - Applied Sciences Laboratory  
1100 NE Circle Boulevard, Suite 300  
Corvallis, Oregon 97330  
[www.ch2m.com](http://www.ch2m.com)



ASL Report #: Q3331

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

ASL Sample ID	Client Sample ID	Date/Time Collected	Date Received
Q333101	TRIPBLANK_102516	10/25/16 08:00	10/26/16
Q333102	T4S1MW09-102516-0	10/25/16 12:02	10/26/16
Q333103	T4S1MW03S-102516-0	10/25/16 13:02	10/26/16
Q333104	T4S1MW22-102516-0	10/25/16 14:07	10/26/16
Q333105	T4S1MW23-102516-0	10/25/16 15:23	10/26/16

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3331

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260C: SW5030

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: TRIPBLANK_102516				Lab Sample ID: Q333101			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	113	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	90	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW09-102516-0</b>				<b>Lab Sample ID: Q333102</b>			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 12:02				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	87	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW03S-102516-0</b>				<b>Lab Sample ID: Q333103</b>			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 13:02				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	113	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	88	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW22-102516-0</b>				<b>Lab Sample ID: Q333104</b>			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 14:07				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	2.77		ug/L	SW8260C	10/27/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	4.60		ug/L	SW8260C	10/27/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	117	70-130	
1,2-Dichloroethane-d4	120	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	90	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW23-102516-0				Lab Sample ID: Q333105			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 15:23				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.70		ug/L	SW8260C	10/27/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	85	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-1027</b>				<b>Lab Sample ID: WB1-1027</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/27/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W1027	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	17.2	ug/L	86	SW8260C	10/27/16
Trichloroethene (TCE)	79-01-6	20.0	18.5	ug/L	93	SW8260C	10/27/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	101	70-130	
1,2-Dichloroethane-d4	99	70-130	
Toluene-d8	94	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3331

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

SW8260C-SIM: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK_102516</b>				<b>Lab Sample ID: Q333101</b>			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	130	70-130	
1,2-Dichloroethane-d4	126	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	105	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW09-102516-0				Lab Sample ID: Q333102			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 12:02				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	19.7	J	ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	19.1	J	ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	120	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	87	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW03S-102516-0</b>				<b>Lab Sample ID: Q333103</b>			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 13:02				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	112		ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	119	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	86	70-130	
4-Bromofluorobenzene	94	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW22-102516-0</b>				<b>Lab Sample ID: Q333104</b>			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 14:07				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	49.9		ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	1460		ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	122	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	86	70-130	
4-Bromofluorobenzene	94	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW23-102516-0				Lab Sample ID: Q333105			
Project Name: Northwest Pipe				Date Received: 10/26/16			
Sample Date: 10/25/16				Dilution Factor: 1			
Sample Time: 15:23				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	1590		ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	124	70-130	
1,2-Dichloroethane-d4	119	70-130	
Toluene-d8	89	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-1103</b>				<b>Lab Sample ID: WB1-1103</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	125	70-130	
1,2-Dichloroethane-d4	123	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W1103	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	500	575	ng/L	115	SW8260C-SIM	11/03/16
Tetrachloroethene (PCE)	127-18-4	500	437	ng/L	87	SW8260C-SIM	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	115	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	91	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE HEADSPACE ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3331

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
RSK-175

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW09-102516-0	Lab Sample ID: Q333102
Project Name: Northwest Pipe	Date Received: 10/26/16
Sample Date: 10/25/16	Report Revision No: 0
Sample Time: 12:02	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.70	37.7	2640		ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	35.9	217	49100		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW03S-102516-0	Lab Sample ID: Q333103
Project Name: Northwest Pipe	Date Received: 10/26/16
Sample Date: 10/25/16	Report Revision No: 0
Sample Time: 13:02	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.25	34.1	29.1	J	ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	34.9	211	26200		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW22-102516-0	Lab Sample ID: Q333104
Project Name: Northwest Pipe	Date Received: 10/26/16
Sample Date: 10/25/16	Report Revision No: 0
Sample Time: 14:07	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.44	35.6	15.9	J	ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	35.3	214	48400		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW23-102516-0	Lab Sample ID: Q333105
Project Name: Northwest Pipe	Date Received: 10/26/16
Sample Date: 10/25/16	Report Revision No: 0
Sample Time: 15:23	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.31	34.6	5.07	J	ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	35.1	212	52900		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-1031				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe Type: QC Matrix: Water		LCS ID: BS1X1031 Report Revision No.: 0 Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	589	ug/L	99	RSK-175	10/31/16
Carbon dioxide	124-38-9	3180	3120	ug/L	98	RSK-175	10/31/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE METALS ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3331

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E200.7: FLDFLT

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: Q3331			
Date Received: 10/26/16				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<i>Dissolved Metals</i>								
T4S1MW09-102516-0	Q333102F	1	10.0	100	7620		ug/L	11/04/16
T4S1MW03S-102516-0	Q333103F	1	10.0	100	30.4	J	ug/L	11/04/16
T4S1MW22-102516-0	Q333104F	1	10.0	100	10.0	U	ug/L	11/04/16
T4S1MW23-102516-0	Q333105F	1	10.0	100	221		ug/L	11/04/16
<i>Total Metals</i>								
WB10-1102	WB10-1102	1	10.0	100	10.0	U	ug/L	11/04/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS10W1102 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	1000	1090	ug/L	109	E200.7	E200.2	11/04/16

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3331

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E300.0A

# CH2M ASL

Client Information		Lab Information	
<b>Project Name: Northwest Pipe</b>		<b>Lab Batch ID: Q3331</b>	
Date Received: 10/26/16		Analysis Method: E300.0A	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW09-102516-0	Q333102	1	0.020	0.20	2.76		10/30/16
T4S1MW03S-102516-0	Q333103	1	0.020	0.20	5.10		10/30/16
T4S1MW22-102516-0	Q333104	1	0.020	0.20	2.80		10/31/16
T4S1MW23-102516-0	Q333105	1	0.020	0.20	3.92		10/31/16
WB1-1030	WB1-1030	1	0.020	0.20	0.020	U	10/30/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: Q3331</b>			
Date Received: 10/26/16				Analysis Method: E300.0A			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW09-102516-0	Q333102	1	0.023	0.20	5.97		10/30/16
T4S1MW03S-102516-0	Q333103	2	0.045	0.40	24.7		11/03/16
T4S1MW22-102516-0	Q333104	1	0.023	0.20	5.49		10/31/16
T4S1MW23-102516-0	Q333105	1	0.023	0.20	7.67		10/31/16
WB1-1030	WB1-1030	1	0.023	0.20	0.023	U	10/30/16
WB1-1103	WB1-1103	1	0.023	0.20	0.042	J	11/03/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe Type: QC Matrix: Water		Lab Batch ID: Q3331 Report Revision No.: 0	

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W1030	Chloride	5.00	5.14	mg/L	103	E300.0A	10/30/16
BS1W1030	Sulfate	5.00	5.22	mg/L	104	E300.0A	10/30/16
BS1W1103	Sulfate	5.00	4.88	mg/L	98	E300.0A	11/03/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3331

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**

E353.2

# CH2M ASL

Client Information			Lab Information		
Project Name: Northwest Pipe			Lab Batch ID: Q3331		
Date Received: 10/26/16			Analysis Method: E353.2		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW09-102516-0	Q333102	10	0.028	0.10	1.23		10/26/16 17:28
T4S1MW03S-102516-0	Q333103	10	0.028	0.10	5.19		10/26/16 17:29
T4S1MW22-102516-0	Q333104	1	0.0028	0.010	0.095		10/26/16 17:30
T4S1MW23-102516-0	Q333105	1	0.0028	0.010	0.27		10/26/16 17:34
WB1-102616	WB1-102616	1	0.0028	0.010	0.0028	U	10/26/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3331

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
SM5310B

# CH2M ASL

Client Information			Lab Information			
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: Q3331</b>			
Date Received: 10/26/16			Analysis Method: SM5310B			
Type: See C.O.C.			Units: mg/L			
Matrix: Water			Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW09-102516-0	Q333102	1	0.20	0.50	1.09		10/31/16
T4S1MW03S-102516-0	Q333103	1	0.20	0.50	0.85		10/31/16
T4S1MW22-102516-0	Q333104	1	0.20	0.50	1.19		10/31/16
T4S1MW23-102516-0	Q333105	1	0.20	0.50	0.65		10/31/16
WB1-1031	WB1-1031	1	0.20	0.50	0.20	U	10/31/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: Q3331 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W1031	Total Organic Carbon	5.00	4.88	mg/L	98	SM5310B	10/31/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative



## Sample Receipt Record

SDG ID: Q3331

Date Received: 10/26/2016

Client/Project: Northwest Pipe

Received by: TW

Were custody seals intact and on the outside of the cooler?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Shipping Record:	<input checked="" type="checkbox"/> Hand Delivered	<input type="checkbox"/> On File	<input type="checkbox"/> COC
Radiological Screening for DoD	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Packing Material:	<input checked="" type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice <input type="checkbox"/> Box
Temp OK? (<6C) Therm ID: TH173 Exp. 1/17	7.8 °C	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Was a Chain of Custody (CoC) Provided?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was the CoC correctly filled out (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did sample labels agree with COC? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Were the sample containers in good condition (not broken or leaking)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was enough sample volume provided for analysis? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Containers supplied by ASL?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Any sample with < 1/2 holding time remaining? If so contact LPM and document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Samples have multi-phase? If yes, document on SRER	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
All water VOCs free of air bubbles? No, document on SRER	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
pH of all samples met criteria on receipt? If "No", preserve and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals filtered in the field?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals have sediment in bottom of container? If so document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A

### Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

### Sample Exception Report (The following exceptions were noted)

1) COC requests MEE, CO2. Work plan requests CO2/Methane  
 2) COC requests Fe. Work plan requests Fe and Mn

Client was notified on: 10/27/16 Client contact: Gretchen Gee, Jamie Becket

Resolution to Exception:  
 1) log in for CO2/Methane only  
 2) Per Jamie only report Fe.

### Amended Report

Date:	11/14/16	Client:	NW Pipe
SDG No.:	Q3342	Project/Task:	
Revision No.:	1	Completed by:	MB
Affected Method(s):	VOC	Approved by:	KJM

**Amendment(s) Completed and Reason(s):**

Sample 1 and 2 missing TCE and cis-1,2-DCE in final report.

**Amendment(s) Justification:**

- Reporting error
- Calculation error
- Missing information/data
- Wrong information/data
- Analytical problem/correction
- Client change/request
- Subcontracted laboratory error
- Other (define) \_\_\_\_\_

**Edata Required:**

- Yes
- No



# Analytical Report for Northwest Pipe

ASL Report #: Q3342

Project ID: 682722.GW.SB

**Attn: Gretchen Gee**

cc:

Beckett, Jamie/RDD

Authorized and Released By:

Laboratory Project Manager

Kathy McKinley

(541) 758-0235 ext.23144

November 14, 2016

All analyses performed by CH2M HILL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)  
Louisiana (05031)



ASL Report #: Q3342

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

<b>ASL Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
Q334201	TRIPBLANK_102616	10/26/16 07:30	10/27/16
Q334202	MW02-102616-0	10/26/16 09:10	10/27/16
Q334203	MW03-102616-0	10/26/16 10:15	10/27/16
Q334204	MW01-102616-0	10/26/16 11:13	10/27/16
Q334205	MW04-102616-0	10/26/16 12:10	10/27/16
Q334206	MW05-102616-0	10/26/16 13:20	10/27/16
Q334207	MW06-102616-0	10/26/16 14:20	10/27/16
Q334208	MW06-102616-1	10/26/16 14:25	10/27/16

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3342

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

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**Method(s):**  
SW8260C: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW03-102616-0</b>				<b>Lab Sample ID: Q334203</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 10:15				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	22.8		ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	424	E	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	218	E	ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	572	E	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	107	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	94	70-130	
4-Bromofluorobenzene	81	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW03-102616-ODL				Lab Sample ID: Q334203DL			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 20			
Sample Time: 10:15				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	3.00	10.0	25.4		ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	3.00	10.0	428		ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	3.00	10.0	221		ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	3.00	10.0	630		ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	111	70-130	
1,2-Dichloroethane-d4	113	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	84	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW01-102616-0</b>				<b>Lab Sample ID: Q334204</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 11:13				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	16.7		ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	116	E	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	22.8		ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	158	E	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	94	70-130	
4-Bromofluorobenzene	82	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW01-102616-ODL				Lab Sample ID: Q334204DL			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 10			
Sample Time: 11:13				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	20.1		ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	113		ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	1.50	5.00	22.8		ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	158		ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	118	70-130	
1,2-Dichloroethane-d4	120	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	83	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW04-102616-0</b>				<b>Lab Sample ID: Q334205</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 12:10				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	4.45		ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	117	E	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	38.4		ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	28.2		ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	113	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	84	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW04-102616-ODL</b>				<b>Lab Sample ID: Q334205DL</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 10			
Sample Time: 12:10				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	3.97	J	ug/L	SW8260C	11/01/16
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	111		ug/L	SW8260C	11/01/16
Trichloroethene (TCE)	79-01-6	1.50	5.00	38.1		ug/L	SW8260C	11/01/16
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	31.3		ug/L	SW8260C	11/01/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	100	70-130	
1,2-Dichloroethane-d4	97	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	92	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW05-102616-0</b>				<b>Lab Sample ID: Q334206</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 13:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	40.4		ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	998	E	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	192	E	ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	1810	E	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	110	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	83	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW05-102616-ODL</b>				<b>Lab Sample ID: Q334206DL</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 100			
Sample Time: 13:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	35.0	J	ug/L	SW8260C	11/01/16
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	1160		ug/L	SW8260C	11/01/16
Trichloroethene (TCE)	79-01-6	15.0	50.0	195		ug/L	SW8260C	11/01/16
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	3510		ug/L	SW8260C	11/01/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	100	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW06-102616-0</b>				<b>Lab Sample ID: Q334207</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 14:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	180	E	ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	1010	E	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	60.4		ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	267	E	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	111	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	79	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW06-102616-ODL</b>				<b>Lab Sample ID: Q334207DL</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 100			
Sample Time: 14:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	170		ug/L	SW8260C	11/01/16
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	1160		ug/L	SW8260C	11/01/16
Trichloroethene (TCE)	79-01-6	15.0	50.0	66.6		ug/L	SW8260C	11/01/16
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	287		ug/L	SW8260C	11/01/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	101	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	89	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW06-102616-1</b>				<b>Lab Sample ID: Q334208</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 14:25				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	178	E	ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	1020	E	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	70.9		ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	319	E	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	84	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW06-102616-1DL</b>				<b>Lab Sample ID: Q334208DL</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 100			
Sample Time: 14:25				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	177		ug/L	SW8260C	11/01/16
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	1130		ug/L	SW8260C	11/01/16
Trichloroethene (TCE)	79-01-6	15.0	50.0	65.1		ug/L	SW8260C	11/01/16
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	299		ug/L	SW8260C	11/01/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	104	70-130	
1,2-Dichloroethane-d4	103	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-1031</b>				<b>Lab Sample ID: WB1-1031</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	114	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-1101</b>				<b>Lab Sample ID: WB1-1101</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	11/01/16
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	11/01/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	11/01/16
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	11/01/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	104	70-130	
1,2-Dichloroethane-d4	99	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	100	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W1031	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	20.3	ug/L	101	SW8260C	10/31/16
cis-1,2-Dichloroethene	156-59-2	20.0	17.9	ug/L	89	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	20.0	18.8	ug/L	94	SW8260C	10/31/16
Tetrachloroethene (PCE)	127-18-4	20.0	18.3	ug/L	91	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	100	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W1101	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	18.0	ug/L	90	SW8260C	11/01/16
cis-1,2-Dichloroethene	156-59-2	20.0	16.7	ug/L	83	SW8260C	11/01/16
Trichloroethene (TCE)	79-01-6	20.0	19.8	ug/L	99	SW8260C	11/01/16
Tetrachloroethene (PCE)	127-18-4	20.0	19.7	ug/L	98	SW8260C	11/01/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	100	70-130	
1,2-Dichloroethane-d4	91	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	100	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3342

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

SW8260C-SIM: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK_102616</b>				<b>Lab Sample ID: Q334201</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 07:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	128	70-130	
1,2-Dichloroethane-d4	124	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW02-102616-0</b>				<b>Lab Sample ID: Q334202</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 09:10				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	65.2		ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	59.8		ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	121	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	86	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-1103</b>				<b>Lab Sample ID: WB1-1103</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	11/03/16
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	125	70-130	
1,2-Dichloroethane-d4	123	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W1103	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	500	575	ng/L	115	SW8260C-SIM	11/03/16
Tetrachloroethene (PCE)	127-18-4	500	437	ng/L	87	SW8260C-SIM	11/03/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	115	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	91	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3342

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260C: SW5030

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: TRIPBLANK_102616				Lab Sample ID: Q334201			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 07:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	107	70-130	
1,2-Dichloroethane-d4	114	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	83	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW02-102616-0</b>				<b>Lab Sample ID: Q334202</b>			
Project Name: Northwest Pipe				Date Received: 10/27/16			
Sample Date: 10/26/16				Dilution Factor: 1			
Sample Time: 09:10				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	83	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-1031</b>				<b>Lab Sample ID: WB1-1031</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	114	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	LCS ID: BS1W1031 Report Revision No.: 0 Dilution Factor: 1

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	17.9	ug/L	89	SW8260C	10/31/16
Trichloroethene (TCE)	79-01-6	20.0	18.8	ug/L	94	SW8260C	10/31/16

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	100	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE HEADSPACE ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3342

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

RSK-175

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW02-102616-0					Lab Sample ID: Q334202				
Project Name: Northwest Pipe					Date Received: 10/27/16				
Sample Date: 10/26/16					Report Revision No: 0				
Sample Time: 09:10									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.27	34.3	3680		ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	35.0	211	29600		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW03-102616-0					Lab Sample ID: Q334203				
Project Name: Northwest Pipe					Date Received: 10/27/16				
Sample Date: 10/26/16					Report Revision No: 0				
Sample Time: 10:15									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.23	33.9	1480		ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	34.9	211	53600		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information	Lab Information
Client Sample ID: MW01-102616-0	Lab Sample ID: Q334204
Project Name: Northwest Pipe	Date Received: 10/27/16
Sample Date: 10/26/16	Report Revision No: 0
Sample Time: 11:13	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.20	33.7	1250		ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	34.8	211	81000		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW04-102616-0					Lab Sample ID: Q334205				
Project Name: Northwest Pipe					Date Received: 10/27/16				
Sample Date: 10/26/16					Report Revision No: 0				
Sample Time: 12:10									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.17	33.4	1460		ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	34.8	210	104000		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW05-102616-0					Lab Sample ID: Q334206				
Project Name: Northwest Pipe					Date Received: 10/27/16				
Sample Date: 10/26/16					Report Revision No: 0				
Sample Time: 13:20									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.23	33.9	1160		ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	34.9	211	75100		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW06-102616-0					Lab Sample ID: Q334207				
Project Name: Northwest Pipe					Date Received: 10/27/16				
Sample Date: 10/26/16					Report Revision No: 0				
Sample Time: 14:20									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.45	35.7	2280		ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	35.4	214	57100		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW06-102616-1					Lab Sample ID: Q334208				
Project Name: Northwest Pipe					Date Received: 10/27/16				
Sample Date: 10/26/16					Report Revision No: 0				
Sample Time: 14:25									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.14	33.2	2040		ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	34.7	210	59500		ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# CH2M ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-1031				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	10/31/16
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	10/31/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				LCS ID: BS1X1031 Report Revision No.: 0 Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	589	ug/L	99	RSK-175	10/31/16
Carbon dioxide	124-38-9	3180	3120	ug/L	98	RSK-175	10/31/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE METALS ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3342

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

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**Method(s):**

E200.7: FLDFLT

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: Q3342			
Date Received: 10/27/16				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<i>Dissolved Metals</i>								
MW02-102616-0	Q334202F	1	10.0	100	5450		ug/L	11/04/16
MW03-102616-0	Q334203F	1	10.0	100	6140		ug/L	11/04/16
MW01-102616-0	Q334204F	1	10.0	100	1590		ug/L	11/04/16
MW04-102616-0	Q334205F	1	10.0	100	12900		ug/L	11/04/16
MW05-102616-0	Q334206F	1	10.0	100	4460		ug/L	11/04/16
MW06-102616-0	Q334207F	1	10.0	100	7290		ug/L	11/04/16
MW06-102616-1	Q334208F	1	10.0	100	7400		ug/L	11/04/16
<i>Total Metals</i>								
WB10-1102	WB10-1102	1	10.0	100	10.0	U	ug/L	11/04/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS10W1102 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	1000	1090	ug/L	109	E200.7	E200.2	11/04/16

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3342

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E300.0A

# CH2M ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> Q3342	
Date Received: 10/27/16		Analysis Method: E300.0A	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW02-102616-0	Q334202	1	0.020	0.20	1.98		11/03/16
MW03-102616-0	Q334203	1	0.020	0.20	3.61		11/03/16
MW01-102616-0	Q334204	1	0.020	0.20	2.46		11/03/16
MW04-102616-0	Q334205	1	0.020	0.20	3.00		11/03/16
MW05-102616-0	Q334206	1	0.020	0.20	5.36		11/03/16
MW06-102616-0	Q334207	1	0.020	0.20	5.07		11/03/16
MW06-102616-1	Q334208	1	0.020	0.20	5.05		11/03/16
WB1-1103	WB1-1103	1	0.020	0.20	0.020	U	11/03/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: Q3342</b>		
Date Received: 10/27/16			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW02-102616-0	Q334202	1	0.023	0.20	4.15		11/03/16
MW03-102616-0	Q334203	1	0.023	0.20	10.2		11/03/16
MW01-102616-0	Q334204	1	0.023	0.20	10.1		11/03/16
MW04-102616-0	Q334205	1	0.023	0.20	5.70		11/03/16
MW05-102616-0	Q334206	2	0.045	0.40	20.5		11/04/16
MW06-102616-0	Q334207	1	0.023	0.20	5.17		11/03/16
MW06-102616-1	Q334208	1	0.023	0.20	5.36		11/03/16
WB1-1103	WB1-1103	1	0.023	0.20	0.042	J	11/03/16
WB1-1104	WB1-1104	1	0.023	0.20	0.023	U	11/04/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe Type: QC Matrix: Water		Lab Batch ID: Q3342 Report Revision No.: 0	

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W1103	Chloride	5.00	4.79	mg/L	96	E300.0A	11/03/16
BS1W1103	Sulfate	5.00	4.88	mg/L	98	E300.0A	11/03/16
BS1W1104	Sulfate	5.00	4.85	mg/L	97	E300.0A	11/04/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3342

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E353.2

# CH2M ASL

Client Information			Lab Information		
Project Name: Northwest Pipe			Lab Batch ID: Q3342		
Date Received: 10/27/16			Analysis Method: E353.2		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW02-102616-0	Q334202	1	0.0028	0.010	0.023		10/27/16 15:26
MW03-102616-0	Q334203	1	0.0028	0.010	0.018		10/27/16 15:27
MW01-102616-0	Q334204	1	0.0028	0.010	0.37		10/27/16 15:29
MW04-102616-0	Q334205	1	0.0028	0.010	0.043		10/27/16 15:30
MW05-102616-0	Q334206	1	0.0028	0.010	0.34		10/27/16 15:31
MW06-102616-0	Q334207	1	0.0028	0.010	0.016		10/27/16 15:32
MW06-102616-1	Q334208	1	0.0028	0.010	0.017		10/27/16 15:33
WB1-102716	WB1-102716	1	0.0028	0.010	0.0028	J	10/27/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** Q3342

**Project:** Northwest Pipe

**Project #:** 682722.GW.SB

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SM5310B

# CH2M ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> Q3342	
Date Received: 10/27/16		Analysis Method: SM5310B	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW02-102616-0	Q334202	1	0.20	0.50	1.48		10/31/16
MW03-102616-0	Q334203	1	0.20	0.50	1.27		10/31/16
MW01-102616-0	Q334204	1	0.20	0.50	1.00		10/31/16
MW04-102616-0	Q334205	1	0.20	0.50	1.21		10/31/16
MW05-102616-0	Q334206	1	0.20	0.50	1.67		10/31/16
MW06-102616-0	Q334207	1	0.20	0.50	1.25		10/31/16
MW06-102616-1	Q334208	1	0.20	0.50	1.15		11/01/16
WB1-1031	WB1-1031	1	0.20	0.50	0.20	U	10/31/16
WB2-1031	WB2-1031	1	0.20	0.50	0.20	U	10/31/16

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: Q3342 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W1031	Total Organic Carbon	5.00	4.88	mg/L	98	SM5310B	10/31/16
BS2W1031	Total Organic Carbon	5.00	4.79	mg/L	96	SM5310B	11/01/16

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# Chain of Custody Record

1100 NE Circle Blvd. Suite 300  
 Corvallis, OR 97330  
 (541) 768-3120

Client Contact		Analysis Turnaround Time				Preservation Used						For Lab Use Only:		
Project Name: <u>Northwest Pipe</u> Project # or PO #: <u>682722, GWS, RP</u> Company Name: <u>CH2M</u> Address: <u>2020 SW 4th Ave. Suite 300</u> City/State/Zip: <u>Portland, OR 97201</u> Project Manager: <u>Gretehen Gies</u> Phone #: <u>503-736</u> Report to email: <u>Gretehen.Gies@ADX</u>		TAT is Calendar days TAT if different from below <input type="checkbox"/> 21 days (STD) <input type="checkbox"/> 14 days * <input type="checkbox"/> 7 days * <input type="checkbox"/> 5 days * <input type="checkbox"/> 3 day ** <input type="checkbox"/> 2 days ** <input type="checkbox"/> 1 day * * (Surcharges will apply)				Analysis Requested VOCs 8260C VOCs 8260SIM Metcne, CA RST-175 TOC Phate, nitrite, chloride Dissolved Iron						SDG: <u>03342</u> Custody Seals Intact? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Hand delivered? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp <u>19</u> °C <u>1.6</u> C corrected Therm ID No. <u>173</u> Therm Exp. <u>117</u> Packing Material: Circle Below <input checked="" type="checkbox"/> Blue Ice Box <input type="checkbox"/> Bubble Wrap Radiological Screen? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Sample Identification (Limit of 20 characters)	Sample Date	Sample Time	Sample Type (G=Comp, G=Grab)	Matrix (Water, Soil, Air)	Total # of Cont.	VOCs 8260C	VOCs 8260SIM	Metcne, CA	RST-175	TOC	Phate, nitrite, chloride	Dissolved Iron	Sample Specific Notes:	Lab ID:
TRIP BLANK - 102616	10/26	0730	G	W	6	X	X							1
MW02 - 102616-0	10/26	910	G	W	12	X	X	X	X	X	X	X		2
MW03 - 102616-0	10/26	1015	G	W	12	X	X	X	X	X	X	X		3
MW01 - 102616-0	10/26	1113	G	W	12	X	X	X	X	X	X	X		4
MW04 - 102616-0	10/26	1210	G	W	12	X	X	X	X	X	X	X		5
MW05 - 102616-0	10/26	1320	G	W	12	X	X	X	X	X	X	X		6
MW06 - 102616-0	10/26	1410	G	W	12	X	X	X	X	X	X	X		7
MW06 - 102616-1	10/26	1425	G	W	12	X	X	X	X	X	X	X		8

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other

Possible Hazard Identification:  
 Are samples hazardous?  Yes  No  
 If yes, select hazard(s):  Used  Ignitable  Corrosive  Reactive  Toxic  
 If YES or NO is not checked above, samples will be assumed hazardous and hazardous disposal fees will be applied.

Sampled By: [Signature] Date/Time: 10/26/16 1500  
 Received by: [Signature] Date/Time: 10/27/16 0940

Sample Disposal (A fee may be added if samples are retained longer than 30 day per client request, samples are returned to client, or classified as hazardous.)  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ months

Relinquished by: [Signature] Date/Time: 10/26/16 1820  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Shipped Via:  UPS  Fed-Ex  USPS  Other Tracking #: \_\_\_\_\_

Received in Laboratory by: [Signature] Date/Time: 10/27/16 0940  
 Special Instructions/QC Requirements

## Sample Receipt Record

SDG ID: Q3342

Date Received: 10/27/2016

Client/Project: Northwest Pipe

Received by: TW

Were custody seals intact and on the outside of the cooler?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Shipping Record:	<input checked="" type="checkbox"/> Hand Delivered	<input type="checkbox"/> On File	<input type="checkbox"/> COC
Radiological Screening for DoD	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Packing Material:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice <input type="checkbox"/> Box
Temp OK? (<6C) Therm ID: TH173 Exp. 1/17	1.6°C	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Was a Chain of Custody (CoC) Provided?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was the CoC correctly filled out (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did sample labels agree with COC? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Were the sample containers in good condition (not broken or leaking)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was enough sample volume provided for analysis? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Containers supplied by ASL?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Any sample with < 1/2 holding time remaining? If so contact LPM and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Samples have multi-phase? If yes, document on SRER	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
All water VOCs free of air bubbles? No, document on SRER	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
pH of all samples met criteria on receipt? If "No", preserve and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals filtered in the field?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals have sediment in bottom of container? If so document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A

### Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

### Sample Exception Report (The following exceptions were noted)

1) Sample Q334202 Nitrate has less than half holding time remaining.

Client was notified on: \_\_\_\_\_ Client contact: \_\_\_\_\_

Resolution to Exception:

# Event 2: 2017, Quarter 1



# Analytical Report for Northwest Pipe

ASL Report #: R1204

Project ID: 682722.GW.05

**Attn: Gretchen Gee**

cc:

Beckett, Jamie/RDD

Authorized and Released By:

Laboratory Project Manager  
Kathy McKinley  
(541) 758-0235 ext.23144  
February 16, 2017

All analyses performed by CH2M HILL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)  
Louisiana (05031)



ASL Report #: R1204

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

<b>ASL Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
R120401	T4S1MW-09-020117-0	02/01/17 10:00	02/02/17
R120402	T4S1MW-03S-020117-0	02/01/17 11:40	02/02/17
R120403	TRIPBLANK-020117-01	02/01/17 08:00	02/02/17
R120404	MW-02-020117-0	02/01/17 13:20	02/02/17
R120405	MW-04-020117-0	02/01/17 14:50	02/02/17
R120406	T4S1MW-23-020117-0	02/01/17 16:40	02/02/17
R120407	T4S1MW-22-020117-0	02/01/17 17:30	02/02/17

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1204

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

SW8260C-SIM: SW5030

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-09-020117-0				Lab Sample ID: R120401			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 10:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	11.3	J	ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	17.7	J	ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	113	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	104	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW-03S-020117-0</b>				<b>Lab Sample ID: R120402</b>			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 11:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	230		ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	116	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	107	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-020117-01</b>				<b>Lab Sample ID: R120403</b>			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	113	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	105	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-02-020117-0</b>				<b>Lab Sample ID: R120404</b>			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 13:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	37.0		ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	169		ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	114	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	104	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW-23-020117-0</b>				<b>Lab Sample ID: R120406</b>			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 16:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	18.8	J	ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	937		ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	118	70-130	
1,2-Dichloroethane-d4	118	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	107	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-22-020117-0				Lab Sample ID: R120407			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 17:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	106		ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	1280		ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	115	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	108	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0208</b>				<b>Lab Sample ID: WB1-0208</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	110	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	108	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0208	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	500	535	ng/L	107	SW8260C-SIM	02/08/17
Tetrachloroethene (PCE)	127-18-4	500	514	ng/L	103	SW8260C-SIM	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1204

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260C: SW5030

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-09-020117-0				Lab Sample ID: R120401			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 10:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	89	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-03S-020117-0				Lab Sample ID: R120402			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 11:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	90	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-020117-01</b>				<b>Lab Sample ID: R120403</b>			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	108	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-02-020117-0</b>				<b>Lab Sample ID: R120404</b>			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 13:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.20	J	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	105	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-23-020117-0				Lab Sample ID: R120406			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 16:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.65		ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.41	J	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	117	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	89	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-22-020117-0				Lab Sample ID: R120407			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 17:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	5.36		ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	4.29		ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	111	70-130	
1,2-Dichloroethane-d4	117	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	88	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0203</b>				<b>Lab Sample ID: WB1-0203</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	92	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				LCS ID: BS1W0203			
Type: QC				Report Revision No.: 0			
Matrix: Water				Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	17.8	ug/L	89	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	20.0	20.1	ug/L	100	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	101	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1204

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260C: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-04-020117-0</b>				<b>Lab Sample ID: R120405</b>			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 1			
Sample Time: 14:50				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	9.73		ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	123	E	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	20.3		ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	12.4		ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	113	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	90	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-04-020117-0DL				Lab Sample ID: R120405DL			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Dilution Factor: 10			
Sample Time: 14:50				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	8.85		ug/L	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	119		ug/L	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	1.50	5.00	21.6		ug/L	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	14.3		ug/L	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	107	70-130	
1,2-Dichloroethane-d4	112	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	90	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0203</b>				<b>Lab Sample ID: WB1-0203</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	92	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0206</b>				<b>Lab Sample ID: WB1-0206</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0203	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	17.2	ug/L	86	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	20.0	17.8	ug/L	89	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	20.0	20.1	ug/L	100	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	20.0	19.3	ug/L	97	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	101	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0206	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	17.3	ug/L	86	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	20.0	17.8	ug/L	89	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	20.0	19.2	ug/L	96	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	20.0	19.3	ug/L	97	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	104	70-130	
1,2-Dichloroethane-d4	103	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE HEADSPACE ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1204

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
RSK-175

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: T4S1MW-09-020117-0					Lab Sample ID: R120401				
Project Name: Northwest Pipe					Date Received: 02/02/17				
Sample Date: 02/01/17					Report Revision No: 0				
Sample Time: 10:00									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.30	26.5	1220		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	32.9	199	29000		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW-03S-020117-0	Lab Sample ID: R120402
Project Name: Northwest Pipe	Date Received: 02/02/17
Sample Date: 02/01/17	Report Revision No: 0
Sample Time: 11:40	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.19	25.6	10.1	J	ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	32.6	197	13900		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-02-020117-0					Lab Sample ID: R120404				
Project Name: Northwest Pipe					Date Received: 02/02/17				
Sample Date: 02/01/17					Report Revision No: 0				
Sample Time: 13:20									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.67	29.4	3300		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	33.7	204	17600		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-04-020117-0				Lab Sample ID: R120405			
Project Name: Northwest Pipe				Date Received: 02/02/17			
Sample Date: 02/01/17				Report Revision No: 0			
Sample Time: 14:50							
Type: Grab							
Matrix: Water							

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.91	31.4	1860		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	34.2	207	98400		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW-23-020117-0	Lab Sample ID: R120406
Project Name: Northwest Pipe	Date Received: 02/02/17
Sample Date: 02/01/17	Report Revision No: 0
Sample Time: 16:40	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.97	31.8	37.9		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	34.3	207	26900		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW-22-020117-0	Lab Sample ID: R120407
Project Name: Northwest Pipe	Date Received: 02/02/17
Sample Date: 02/01/17	Report Revision No: 0
Sample Time: 17:30	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.72	29.8	33.4		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	33.8	204	84500		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Sample Date: N/A Sample Time: N/A Type: QC Matrix: Water	Method Blank ID: XB1-0203  Date Received: N/A Report Revision No: 0

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				LCS ID: BS1X0203 Report Revision No.: 0 Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	614	ug/L	103	RSK-175	02/03/17
Carbon dioxide	124-38-9	3180	3300	ug/L	104	RSK-175	02/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE METALS ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1204

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E200.7: FLDFLT

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: R1204			
Date Received: 02/02/17				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<b>Dissolved Metals</b>								
T4S1MW-09-020117-0	R120401F	1	10.0	100	4410		ug/L	02/14/17
T4S1MW-03S-020117-0	R120402F	1	10.0	100	10.0	U	ug/L	02/14/17
MW-02-020117-0	R120404F	1	10.0	100	5390		ug/L	02/14/17
MW-04-020117-0	R120405F	1	10.0	100	9750		ug/L	02/14/17
T4S1MW-23-020117-0	R120406F	1	10.0	100	185		ug/L	02/14/17
T4S1MW-22-020117-0	R120407F	1	10.0	100	10.0	U	ug/L	02/14/17
<b>Total Metals</b>								
WB10-0214	WB10-0214	1	10.0	100	10.0	U	ug/L	02/14/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS10W0214 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	50000	50300	ug/L	101	E200.7	E200.2	02/14/17

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1204

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E300.0A

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1204</b>		
Date Received: 02/02/17			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-020117-0	R120401	1	0.020	0.20	1.70		02/02/17
T4S1MW-03S-020117-0	R120402	1	0.020	0.20	0.86		02/02/17
MW-02-020117-0	R120404	1	0.020	0.20	2.50		02/02/17
MW-04-020117-0	R120405	1	0.020	0.20	4.90		02/02/17
T4S1MW-23-020117-0	R120406	1	0.020	0.20	4.24		02/02/17
T4S1MW-22-020117-0	R120407	1	0.020	0.20	4.56		02/02/17
WB1-0202	WB1-0202	1	0.020	0.20	0.020	U	02/02/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1204</b>		
Date Received: 02/02/17			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-020117-0	R120401	1	0.023	0.20	5.66		02/02/17
T4S1MW-03S-020117-0	R120402	1	0.023	0.20	4.54		02/02/17
MW-02-020117-0	R120404	1	0.023	0.20	8.09		02/02/17
MW-04-020117-0	R120405	1	0.023	0.20	4.42		02/02/17
T4S1MW-23-020117-0	R120406	1	0.023	0.20	8.74		02/02/17
T4S1MW-22-020117-0	R120407	1	0.023	0.20	8.90		02/02/17
WB1-0202	WB1-0202	1	0.023	0.20	0.023	U	02/02/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1204 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0202	Chloride	5.00	5.02	mg/L	100	E300.0A	02/02/17
BS1W0202	Sulfate	5.00	4.99	mg/L	100	E300.0A	02/02/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1204

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E353.2

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1204</b>		
Date Received: 02/02/17			Analysis Method: E353.2		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-020117-0	R120401	4	0.011	0.040	2.94		02/02/17 18:21
T4S1MW-03S-020117-0	R120402	4	0.011	0.040	1.23		02/02/17 18:23
MW-02-020117-0	R120404	1	0.0028	0.010	0.39		02/02/17 18:03
MW-04-020117-0	R120405	1	0.0028	0.010	0.0028	U	02/02/17 18:04
T4S1MW-23-020117-0	R120406	1	0.0028	0.010	0.58		02/02/17 18:05
T4S1MW-22-020117-0	R120407	1	0.0028	0.010	0.039		02/02/17 18:06
WB1-020217	WB1-020217	1	0.0028	0.010	0.0028	U	02/02/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1204

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SM5310B

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1204</b>		
Date Received: 02/02/17			Analysis Method: SM5310B		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-020117-0	R120401	1	0.20	0.50	0.61		02/04/17
T4S1MW-03S-020117-0	R120402	1	0.20	0.50	0.39	J	02/04/17
MW-02-020117-0	R120404	1	0.20	0.50	1.23		02/04/17
MW-04-020117-0	R120405	1	0.20	0.50	1.09		02/04/17
T4S1MW-23-020117-0	R120406	1	0.20	0.50	0.68		02/04/17
T4S1MW-22-020117-0	R120407	1	0.20	0.50	1.09		02/04/17
WB1-0204	WB1-0204	1	0.20	0.50	0.20	U	02/04/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1204 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0204	Total Organic Carbon	5.00	4.64	mg/L	93	SM5310B	02/04/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# Chain of Custody Record

Client Contact		Analysis Turnaround Time					Preservation Used						For Lab Use Only:		
Project Name: <u>NOOTHWEST PIPE</u>		TAT is Calander days					HCL HCL - HNO <sub>3</sub>						SDG: <u>R1204</u>		
Project # or PO #:		TAT if different from below					Analysis Requested						Custody Seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Company Name: <u>CH2M</u>		<input checked="" type="checkbox"/> 21 days (STD)					VOCs - 8260C VOCs - 8260STM Methane, CO <sub>2</sub> PSE-ITS TOL Nitrate Sulfate, chloride Dissolved Ferrrous Iron (PSECO REJECTED)						Hand delivered? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Address: <u>2020 SW POWELL AVE, STE 300</u>		<input type="checkbox"/> 14 days * <input type="checkbox"/> 3 day * <input type="checkbox"/> 7 days * <input type="checkbox"/> 2 days * <input type="checkbox"/> 5 days * <input type="checkbox"/> 1 day *											Cooler Temp: <u>3.6°C</u>		
City/State/Zip: <u>POMPAD, OR 97201</u>		* (Surcharges will apply)											Therm ID No.: <u>193</u> Therm Exp: <u>4/17/17</u>		
Project Manager: <u>GAVELIN GEE</u>													Packing Material: Circle Below <input checked="" type="radio"/> Blue Ice Box <input type="radio"/> Bubble Wrap		
Phone #:		Sample Date		Sample Time		Sample Type (CeComp, G=Grab)		Matrix (Water, Soil, Air)		Total # of Cont.		Sample Specific Notes:		Lab ID:	
Report to email: <u>GAVELIN GEE/POX</u>															
T451MW-09-020117-0		02/01/17		1000		G		W		12		X		1	
T451MW-035-020117-0		02/01/17		1140		G		W		12		X		2	
TRIP BLANK -020117-01		02/01/17		0800		G		W		2		X		3	
MW-02-020117-0		02/01/17		1320		G		W		12		X		4	
MW-04-020117-0		02/01/17		1450		G		W		12		X		5	
T451MW-23-020117-0		02/01/17		1640		G		W		12		X		6	
T451MW-22-020117-0		02/01/17		1730		G		W		12		X		7	
Preservation Used: (1=Ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6= Other)															
Possible Hazard Identification: Are samples hazardous? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, select hazard(s): <input type="checkbox"/> Listed <input type="checkbox"/> Ignitable <input type="checkbox"/> Corrosive <input type="checkbox"/> Reactive <input type="checkbox"/> Toxic If YES or NO is not checked above, samples will be assumed hazardous and hazardous disposal fees will be applied.															
Sample Disposal (A fee may be added if samples are retained longer than 30 day per client request, samples are returned to client, or classified as hazardous.) <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ months															
Sampled By: <u>BRAD OSTAPKO WWS B.M.</u> Date/Time: <u>02/01/17 1800</u>				Relinquished by: <u>BRAD OSTAPKO WWS B.M.</u> Date/Time: <u>02/01/17 1800</u>											
Received by: _____ Date/Time: _____				Relinquished by: _____ Date/Time: _____											
Received in Laboratory by: <u>Public Center</u> Date/Time: <u>02/17 1045</u>				Shipped Via: <input type="checkbox"/> UPS <input checked="" type="checkbox"/> Fed-Ex <input type="checkbox"/> USPS <input type="checkbox"/> Other				Tracking #: _____							
Special Instructions/QC Requirements															

## Sample Receipt Record

SDG ID: R1204

Date Received: 2/2/2017

Client/Project: Northwest Pipe

Received by: PC

Were custody seals intact and on the outside of the cooler?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Shipping Record:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> On File	<input type="checkbox"/> COC
Radiological Screening for DoD	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Packing Material:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice <input type="checkbox"/> Box
Temp OK? (<6C) Therm ID: TH173 Exp. 4/17/17	3.6 °C	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Was a Chain of Custody (CoC) Provided?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was the CoC correctly filled out (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did sample labels agree with COC? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Were the sample containers in good condition (not broken or leaking)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was enough sample volume provided for analysis? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Containers supplied by ASL?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Any sample with < 1/2 holding time remaining? If so contact LPM and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Samples have multi-phase? If yes, document on SRER	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
All water VOCs free of air bubbles? No, document on SRER	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
pH of all samples met criteria on receipt? If "No", preserve and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals filtered in the field?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals have sediment in bottom of container? If so document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A

### Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

### Sample Exception Report (The following exceptions were noted)

1. Nitrate sample T4S1MW-09-020117-0 (R120401) received with less than half holding time remaining.

Client was notified on: \_\_\_\_\_ Client contact: \_\_\_\_\_

Resolution to Exception:



# Analytical Report for Northwest Pipe

ASL Report #: R1213  
Project ID: 682722.GW.05

**Attn: Gretchen Gee**

cc:  
Beckett, Jamie/RDD

Authorized and Released By:

Laboratory Project Manager  
Kathy McKinley  
(541) 758-0235 ext.23144  
February 17, 2017

All analyses performed by CH2M HILL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)  
Louisiana (05031)



ASL Report #: R1213

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

<b>ASL Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
R121301	MW-01-020217-0	02/02/17 09:55	02/03/17
R121302	MW-06-020217-0	02/02/17 11:25	02/03/17
R121303	MW-06-020217-1	02/02/17 11:30	02/03/17
R121304	MW-03-020217-0	02/02/17 13:00	02/03/17
R121305	TRIP BLANK-020217-1	02/02/17 08:00	02/03/17
R121306	MW-05-020217-0	02/02/17 14:25	02/03/17

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1213

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**

SW8260C-SIM: SW5030

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: TRIP BLANK-020217-1				Lab Sample ID: R121305			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	115	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	108	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0208</b>				<b>Lab Sample ID: WB1-0208</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	02/08/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	110	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	108	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0208	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	500	535	ng/L	107	SW8260C-SIM	02/08/17
Tetrachloroethene (PCE)	127-18-4	500	514	ng/L	103	SW8260C-SIM	02/08/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1213

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
SW8260C: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-01-020217-0</b>				<b>Lab Sample ID: R121301</b>			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 1			
Sample Time: 09:55				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	29.9		ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	106	E	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	14.9		ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	71.7		ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	117	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	88	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-01-020217-0DL				Lab Sample ID: R121301DL			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 10			
Sample Time: 09:55				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	27.4		ug/L	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	107		ug/L	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	1.50	5.00	16.4		ug/L	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	88.7		ug/L	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	117	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	92	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-06-020217-0</b>				<b>Lab Sample ID: R121302</b>			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 1			
Sample Time: 11:25				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	51.0		ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	1100	E	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	147	E	ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	656	E	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	114	70-130	
1,2-Dichloroethane-d4	119	70-130	
Toluene-d8	104	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-06-020217-0DL				Lab Sample ID: R121302DL			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 50			
Sample Time: 11:25				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	7.50	25.0	55.8		ug/L	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	7.50	25.0	1590		ug/L	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	7.50	25.0	147		ug/L	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	7.50	25.0	805		ug/L	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	108	70-130	
1,2-Dichloroethane-d4	113	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	88	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-06-020217-1</b>				<b>Lab Sample ID: R121303</b>			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 1			
Sample Time: 11:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	53.9		ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	1100	E	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	132	E	ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	593	E	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	118	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	90	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-06-020217-1DL				Lab Sample ID: R121303DL			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 50			
Sample Time: 11:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	7.50	25.0	55.2		ug/L	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	7.50	25.0	1600		ug/L	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	7.50	25.0	145		ug/L	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	7.50	25.0	760		ug/L	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	118	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-03-020217-0</b>				<b>Lab Sample ID: R121304</b>			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 1			
Sample Time: 13:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	20.8		ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	408	E	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	183	E	ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	460	E	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	117	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	88	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-03-020217-0DL				Lab Sample ID: R121304DL			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 10			
Sample Time: 13:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	26.3		ug/L	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	502		ug/L	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	1.50	5.00	178		ug/L	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	483		ug/L	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	115	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	89	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIP BLANK-020217-1</b>				<b>Lab Sample ID: R121305</b>			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	114	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-05-020217-0</b>				<b>Lab Sample ID: R121306</b>			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 1			
Sample Time: 14:25				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	39.5		ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	941	E	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	205	E	ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	1810	E	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	105	70-130	
4-Bromofluorobenzene	90	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-05-020217-0DL				Lab Sample ID: R121306DL			
Project Name: Northwest Pipe				Date Received: 02/03/17			
Sample Date: 02/02/17				Dilution Factor: 100			
Sample Time: 14:25				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	34.2	J	ug/L	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	1240		ug/L	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	15.0	50.0	208		ug/L	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	4150		ug/L	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	114	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	88	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0203</b>				<b>Lab Sample ID: WB1-0203</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	92	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0206</b>				<b>Lab Sample ID: WB1-0206</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0203	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	17.2	ug/L	86	SW8260C	02/03/17
cis-1,2-Dichloroethene	156-59-2	20.0	17.8	ug/L	89	SW8260C	02/03/17
Trichloroethene (TCE)	79-01-6	20.0	20.1	ug/L	100	SW8260C	02/03/17
Tetrachloroethene (PCE)	127-18-4	20.0	19.3	ug/L	97	SW8260C	02/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	101	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0206	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	17.3	ug/L	86	SW8260C	02/06/17
cis-1,2-Dichloroethene	156-59-2	20.0	17.8	ug/L	89	SW8260C	02/06/17
Trichloroethene (TCE)	79-01-6	20.0	19.2	ug/L	96	SW8260C	02/06/17
Tetrachloroethene (PCE)	127-18-4	20.0	19.3	ug/L	97	SW8260C	02/06/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	104	70-130	
1,2-Dichloroethane-d4	103	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE HEADSPACE ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1213

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
RSK-175

# CH2M ASL

Client Information	Lab Information
Client Sample ID: MW-01-020217-0	Lab Sample ID: R121301
Project Name: Northwest Pipe	Date Received: 02/03/17
Sample Date: 02/02/17	Report Revision No: 0
Sample Time: 09:55	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.49	28.0	1740		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	33.3	201	68200		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-06-020217-0					Lab Sample ID: R121302				
Project Name: Northwest Pipe					Date Received: 02/03/17				
Sample Date: 02/02/17					Report Revision No: 0				
Sample Time: 11:25									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.80	30.5	623		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	34.0	205	60500		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-06-020217-1					Lab Sample ID: R121303				
Project Name: Northwest Pipe					Date Received: 02/03/17				
Sample Date: 02/02/17					Report Revision No: 0				
Sample Time: 11:30									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.72	29.9	666		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	33.8	204	62300		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-03-020217-0					Lab Sample ID: R121304				
Project Name: Northwest Pipe					Date Received: 02/03/17				
Sample Date: 02/02/17					Report Revision No: 0				
Sample Time: 13:00									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.85	30.9	734		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	34.1	206	44100		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-05-020217-0					Lab Sample ID: R121306				
Project Name: Northwest Pipe					Date Received: 02/03/17				
Sample Date: 02/02/17					Report Revision No: 0				
Sample Time: 14:25									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	3.48	27.9	887		ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	33.3	201	74900		ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-0203				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	02/03/17
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				LCS ID: BS1X0203 Report Revision No.: 0 Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	614	ug/L	103	RSK-175	02/03/17
Carbon dioxide	124-38-9	3180	3300	ug/L	104	RSK-175	02/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE METALS ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1213

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E200.7: FLDFLT

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: R1213			
Date Received: 02/03/2017				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<i>Dissolved Metals</i>								
MW-01-020217-0	R121301F	1	10.0	100	3010		ug/L	02/08/2017
MW-06-020217-0	R121302F	1	10.0	100	6100		ug/L	02/08/2017
MW-06-020217-1	R121303F	1	10.0	100	6090		ug/L	02/08/2017
MW-03-020217-0	R121304F	1	10.0	100	4460		ug/L	02/08/2017
MW-05-020217-0	R121306F	1	10.0	100	13.7	J	ug/L	02/08/2017
<i>Total Metals</i>								
WB11-0208	WB11-0208	1	10.0	100	19.8	J	ug/L	02/08/2017

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS11W0208 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	50000	49300	ug/L	99	E200.7	E200.2	02/08/2017

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1213

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E300.0A

# CH2M ASL

Client Information			Lab Information		
Project Name: Northwest Pipe			Lab Batch ID: R1213		
Date Received: 02/03/17			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-01-020217-0	R121301	1	0.020	0.20	3.69		02/08/17
MW-06-020217-0	R121302	1	0.020	0.20	6.12		02/08/17
MW-06-020217-1	R121303	1	0.020	0.20	5.95		02/08/17
MW-03-020217-0	R121304	1	0.020	0.20	3.92		02/08/17
MW-05-020217-0	R121306	1	0.020	0.20	7.03		02/08/17
WB1-0208	WB1-0208	1	0.020	0.20	0.020	U	02/08/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1213</b>		
Date Received: 02/03/17			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-01-020217-0	R121301	1	0.023	0.20	4.71		02/08/17
MW-06-020217-0	R121302	1	0.023	0.20	9.27		02/08/17
MW-06-020217-1	R121303	1	0.023	0.20	9.09		02/08/17
MW-03-020217-0	R121304	1	0.023	0.20	10.4		02/08/17
MW-05-020217-0	R121306	5	0.11	1.00	29.7		02/13/17
WB1-0208	WB1-0208	1	0.023	0.20	0.023	U	02/08/17
WB1-0213	WB1-0213	1	0.023	0.20	0.023	U	02/13/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1213 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0208	Chloride	5.00	4.79	mg/L	96	E300.0A	02/08/17
BS1W0208	Sulfate	5.00	4.78	mg/L	96	E300.0A	02/08/17
BS1W0213	Sulfate	5.00	4.87	mg/L	97	E300.0A	02/13/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1213

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
E353.2

# CH2M ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: R1213</b>			
Date Received: 02/03/17				Analysis Method: E353.2			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-01-020217-0	R121301	1	0.0028	0.010	0.061		02/03/17 16:58
MW-06-020217-0	R121302	1	0.0028	0.010	0.0028	U	02/03/17 17:00
MW-06-020217-1	R121303	1	0.0028	0.010	0.0030	J	02/03/17 17:01
MW-03-020217-0	R121304	1	0.0028	0.010	0.018		02/03/17 17:02
MW-05-020217-0	R121306	1	0.0028	0.010	0.57		02/03/17 17:03
WB1-020317	WB1-020317	1	0.0028	0.010	0.0028	U	02/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1213

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
SM5310B

# CH2M ASL

Client Information			Lab Information			
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1213</b>			
Date Received: 02/03/17			Analysis Method: SM5310B			
Type: See C.O.C.			Units: mg/L			
Matrix: Water			Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-01-020217-0	R121301	1	0.20	0.50	0.84		02/09/17
MW-06-020217-0	R121302	1	0.20	0.50	1.15		02/09/17
MW-06-020217-1	R121303	1	0.20	0.50	1.12		02/09/17
MW-03-020217-0	R121304	1	0.20	0.50	0.93		02/09/17
MW-05-020217-0	R121306	1	0.20	0.50	1.50		02/09/17
WB1-0209	WB1-0209	1	0.20	0.50	0.20	U	02/09/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1213 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0209	Total Organic Carbon	5.00	4.64	mg/L	93	SM5310B	02/09/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative



## Sample Receipt Record

SDG ID: R1213

Date Received: 2/3/2017

Client/Project: Northwest Pipe

Received by: PC

Were custody seals intact and on the outside of the cooler?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Shipping Record:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> On File	<input type="checkbox"/> COC
Radiological Screening for DoD	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Packing Material:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice <input type="checkbox"/> Box
Temp OK? (<6C) Therm ID: TH173 Exp. 4/17/17	0.3 °C	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Was a Chain of Custody (CoC) Provided?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was the CoC correctly filled out (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did sample labels agree with COC? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Were the sample containers in good condition (not broken or leaking)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was enough sample volume provided for analysis? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Containers supplied by ASL?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Any sample with < 1/2 holding time remaining? If so contact LPM and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Samples have multi-phase? If yes, document on SRER	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
All water VOCs free of air bubbles? No, document on SRER	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
pH of all samples met criteria on receipt? If "No", preserve and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals filtered in the field?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals have sediment in bottom of container? If so document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A

### Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

### Sample Exception Report (The following exceptions were noted)

1. Nitrate sample MW-01-020217-0 (R121301) received with less than half holding time remaining.

Client was notified on: \_\_\_\_\_ Client contact: \_\_\_\_\_

Resolution to Exception:

# Event 3: 2017, Quarter 2



# Analytical Report for Northwest Pipe

ASL Report #: R1871

Project ID: 682722.GW.05

**Attn: Gretchen Gee**

cc:

Beckett, Jamie/RDD

Authorized and Released By:

Laboratory Project Manager  
Kathy McKinley  
(541) 758-0235 ext.23144  
May 12, 2017

All analyses performed by CH2M HILL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)  
Louisiana (05031)



ASL Report #: R1871

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

<b>ASL Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
R187101	TRIP BLANK-042617-01	04/26/17 08:00	04/27/17
R187102	T4S1MW-09-042617-0	04/26/17 13:00	04/27/17
R187103	T4S1MW-03S-042617-0	04/26/17 14:45	04/27/17

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1871

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
SW8260C: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIP BLANK-042617-01</b>				<b>Lab Sample ID: R187101</b>			
Project Name: Northwest Pipe				Date Received: 04/27/17			
Sample Date: 04/26/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	04/27/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	04/27/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	100	70-130	
1,2-Dichloroethane-d4	95	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-09-042617-0				Lab Sample ID: R187102			
Project Name: Northwest Pipe				Date Received: 04/27/17			
Sample Date: 04/26/17				Dilution Factor: 1			
Sample Time: 13:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	04/27/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	04/27/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	100	70-130	
1,2-Dichloroethane-d4	95	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW-03S-042617-0</b>				<b>Lab Sample ID: R187103</b>			
Project Name: Northwest Pipe				Date Received: 04/27/17			
Sample Date: 04/26/17				Dilution Factor: 1			
Sample Time: 14:45				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	04/27/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	04/27/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	101	70-130	
1,2-Dichloroethane-d4	94	70-130	
Toluene-d8	94	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0427</b>				<b>Lab Sample ID: WB1-0427</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	04/27/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	04/27/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	96	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	97	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	LCS ID: BS1W0427 Report Revision No.: 0 Dilution Factor: 1

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	18.0	ug/L	90	SW8260C	04/27/17
Trichloroethene (TCE)	79-01-6	20.0	19.6	ug/L	98	SW8260C	04/27/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	99	70-130	
1,2-Dichloroethane-d4	92	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1871

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**

SW8260C-SIM: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIP BLANK-042617-01</b>				<b>Lab Sample ID: R187101</b>			
Project Name: Northwest Pipe				Date Received: 04/27/17			
Sample Date: 04/26/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	104	70-130	
1,2-Dichloroethane-d4	103	70-130	
Toluene-d8	94	70-130	
4-Bromofluorobenzene	111	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-09-042617-0				Lab Sample ID: R187102			
Project Name: Northwest Pipe				Date Received: 04/27/17			
Sample Date: 04/26/17				Dilution Factor: 1			
Sample Time: 13:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	107	70-130	
1,2-Dichloroethane-d4	105	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-03S-042617-0				Lab Sample ID: R187103			
Project Name: Northwest Pipe				Date Received: 04/27/17			
Sample Date: 04/26/17				Dilution Factor: 1			
Sample Time: 14:45				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	117		ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	107	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0509</b>				<b>Lab Sample ID: WB1-0509</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	103	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0509	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	500	503	ng/L	101	SW8260C-SIM	05/09/17
Tetrachloroethene (PCE)	127-18-4	500	485	ng/L	97	SW8260C-SIM	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	101	70-130	
1,2-Dichloroethane-d4	101	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	111	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

## CASE NARRATIVE HEADSPACE ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1871

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
RSK-175

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW-09-042617-0	Lab Sample ID: R187102
Project Name: Northwest Pipe	Date Received: 04/27/17
Sample Date: 04/26/17	Report Revision No: 0
Sample Time: 13:00	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.31	42.6	22.5	J	ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	37.2	225	27300		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: T4S1MW-03S-042617-0					Lab Sample ID: R187103				
Project Name: Northwest Pipe					Date Received: 04/27/17				
Sample Date: 04/26/17					Report Revision No: 0				
Sample Time: 14:45									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.15	41.3	5.15	U	ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	36.9	223	9600		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-0503				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				LCS ID: BS1X0503 Report Revision No.: 0 Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	594	ug/L	100	RSK-175	05/03/17
Carbon dioxide	124-38-9	3180	3140	ug/L	99	RSK-175	05/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE METALS ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1871

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E200.7: FLDFLT

# CH2M ASL

Client Information		Lab Information	
Client Sample ID: T4S1MW-09-042617-0		Lab Sample ID: R187102F	
Project Name: Northwest Pipe		Date Received: 04/27/17	
Sample Date: 04/26/17		Report Revision No: 0	
Sample Time: 13:00			
Type: Grab			
Matrix: Water			

Analyte	Dilution Factor	DL	RL	Result	Qual	Units	Analysis Method	Prep Method	Date Analyzed
<b>Dissolved Metals</b>									
Iron	1	10.0	100	2000		ug/L	E200.7	FLDFLT	04/28/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-03S-042617-0				Lab Sample ID: R187103F			
Project Name: Northwest Pipe				Date Received: 04/27/17			
Sample Date: 04/26/17				Report Revision No: 0			
Sample Time: 14:45							
Type: Grab							
Matrix: Water							

Analyte	Dilution Factor	DL	RL	Result	Qual	Units	Analysis Method	Prep Method	Date Analyzed
<b>Dissolved Metals</b>									
Iron	1	10.0	100	10.0	U	ug/L	E200.7	FLDFLT	04/28/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Method Blank ID: WB10-0428			
Sample Date: N/A				Date Received: N/A			
Sample Time: N/A				Report Revision No: 0			
Type: QC							
Matrix: Water							

Analyte	Dilution Factor	DL	RL	Result	Qual	Units	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>									
Iron	1	10.0	100	10.0	U	ug/L	E200.7	E200.2	04/28/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS10W0428 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	50000	52700	ug/L	105	E200.7	E200.2	04/28/17

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1871

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E300.0A

# CH2M ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> R1871	
Date Received: 04/27/17		Analysis Method: E300.0A	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-042617-0	R187102	1	0.020	0.20	1.65		05/08/17
T4S1MW-03S-042617-0	R187103	1	0.020	0.20	0.71		05/08/17
WB1-0508	WB1-0508	1	0.020	0.20	0.020	U	05/08/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information			Lab Information		
Project Name: Northwest Pipe			Lab Batch ID: R1871		
Date Received: 04/27/17			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-042617-0	R187102	1	0.020	0.20	5.95		05/08/17
T4S1MW-03S-042617-0	R187103	1	0.020	0.20	2.56		05/08/17
WB1-0508	WB1-0508	1	0.020	0.20	0.020	U	05/08/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1871 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0508	Chloride	5.00	5.08	mg/L	102	E300.0A	05/08/17
BS1W0508	Sulfate	5.00	4.89	mg/L	98	E300.0A	05/08/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1871

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E353.2

# CH2M ASL

Client Information		Lab Information	
<b>Project Name: Northwest Pipe</b>		<b>Lab Batch ID: R1871</b>	
Date Received: 04/27/17		Analysis Method: E353.2	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-042617-0	R187102	4	0.011	0.040	1.87		04/28/17 10:11
T4S1MW-03S-042617-0	R187103	1	0.0028	0.010	0.44		04/28/17 09:57
WB1-042817	WB1-042817	1	0.0028	0.010	0.0028	U	04/28/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1871

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SM5310B

# CH2M ASL

Client Information			Lab Information			
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1871</b>			
Date Received: 04/27/2017			Analysis Method: SM5310B			
Type: See C.O.C.			Units: mg/L			
Matrix: Water			Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-042617-0	R187102	1	0.20	0.50	0.70		05/08/2017
T4S1MW-03S-042617-0	R187103	1	0.20	0.50	0.50		05/08/2017
WB1-0508	WB1-0508	1	0.20	0.50	0.20	U	05/08/2017

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1871 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0508	Total Organic Carbon	5.00	4.87	mg/L	97	SM5310B	05/08/2017

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# Chain of Custody Record

Client Contact		Analysis Turnaround Time					Preservation Used							For Lab Use Only:																			
Project Name: <b>NWP</b>		TAT is Calendar days TAT: If different from below _____ <input checked="" type="checkbox"/> 21 days (STD) <input type="checkbox"/> 14 days * <input type="checkbox"/> 3 day * <input type="checkbox"/> 7 days * <input type="checkbox"/> 2 days * <input type="checkbox"/> 5 days * <input type="checkbox"/> 1 day * * (Surcharges will apply)					Analysis Requested							SDG: <b>R1871</b>																			
Project # or PO #: <b>682722</b>							<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">4</td> <td style="width: 10%;">1</td> <td style="width: 10%;">1</td> <td style="width: 10%;">3</td> <td style="width: 10%;">2</td> <td style="width: 10%;">2</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">E200.7F</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">E300.0 E353.2</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">RSK175</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">GM5310</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">SW8260C</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">SW8260SIM</td> <td></td> <td></td> <td></td> </tr> </table>							4	1	1	3	2	2				E200.7F	E300.0 E353.2	RSK175	GM5310	SW8260C	SW8260SIM				Custody Seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
4	1													1	3	2	2																
E200.7F	E300.0 E353.2													RSK175	GM5310	SW8260C	SW8260SIM																
Company Name: <b>CH2M HILL</b>		Hand delivered? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																															
Address: <b>2020 SW 4th Ave Ste 300</b>		Cooler Temp <b>0.6 °C</b>																															
City/State/Zip: <b>Portland, OR 97201</b>		Therm ID No. <b>193</b> Therm Exp. <b>7/17/17</b>																															
Project Manager: <b>Gretchen Gee</b>		Packing Material: Circle Below																															
Phone #: <b>503 736 4349</b>		<input checked="" type="radio"/> Ice <input type="checkbox"/> Blue Ice <input type="checkbox"/> Box <input type="checkbox"/> Bubble Wrap																															
Report to email: <b>Gretchen.gee@CH2M.com</b>		Radiological Screen? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																															
Sample Identification (Limit of 20 characters)	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix (Water, Soil, Air)	Total # of Cont.								Sample Specific Notes:	Lab ID:																			
TRIPBLANK-042617-01	4/26/17	0800	G	W	2												1																
T4SIMW-09-042617-0	4/26/17	1300	G	W	12	1	1	3	1	3	3						2																
T4SIMW-03S-042617-0	4/26/17	1445	G	W	12	1	1	3	1	3	3						3																
<b>Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other</b>																																	
<b>Possible Hazard Identification:</b> Are samples hazardous? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, select hazard(s): <input type="checkbox"/> Listed <input type="checkbox"/> Ignitable <input type="checkbox"/> Corrosive <input type="checkbox"/> Reactive <input type="checkbox"/> Toxic If YES or NO is not checked above, samples will be assumed hazardous and hazardous disposal fees will be applied.						<b>Sample Disposal (A fee may be added if samples are retained longer than 30 day per client request, samples are returned to client, or classified as hazardous.)</b> <input type="checkbox"/> Return to Client <input type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ months																											
Sampled By: <b>Jennifer Ulrich</b>		Date/Time: <b>4/26/17</b>				Relinquished by: <b>Jennifer Ulrich</b>		Date/Time: <b>4/26/17 1645</b>																									
Received by:		Date/Time:				Relinquished by:		Date/Time:																									
Received in Laboratory by: <b>Tina Williams</b>		Date/Time: <b>4/27/17 1035</b>				Shipped Via: <input type="checkbox"/> UPS <input type="checkbox"/> Fed-Ex <input type="checkbox"/> USPS <input type="checkbox"/> Other		Tracking #:																									
<b>Special Instructions/OC Requirements</b> • E200.7F Field Filtered • E353.2 48 hr. hold time																																	

## Sample Receipt Record

SDG ID: R1871

Date Received: 4/27/2017

Client/Project: Northwest Pipe

Received by: TW

Were custody seals intact and on the outside of the cooler?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Shipping Record:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> On File	<input type="checkbox"/> COC
Radiological Screening for DoD	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Packing Material:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice <input type="checkbox"/> Box
Temp OK? (<6C) Therm ID: TH173 Exp. 7/17/17	0.8°C	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Was a Chain of Custody (CoC) Provided?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was the CoC correctly filled out (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did sample labels agree with COC? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Were the sample containers in good condition (not broken or leaking)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was enough sample volume provided for analysis? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Containers supplied by ASL?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Any sample with < 1/2 holding time remaining? If so contact LPM and document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Samples have multi-phase? If yes, document on SRER	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
All water VOCs free of air bubbles? No, document on SRER	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
pH of all samples met criteria on receipt? If "No", preserve and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals filtered in the field?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals have sediment in bottom of container? If so document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A

### Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

### Sample Exception Report (The following exceptions were noted)

Client was notified on: _____ Client contact: _____
Resolution to Exception: _____



# Analytical Report for Northwest Pipe

ASL Report #: R1877

Project ID: 682722.GW.05

**Attn: Gretchen Gee**

cc:

Beckett, Jamie/RDD

Authorized and Released By:

Laboratory Project Manager  
Kathy McKinley  
(541) 758-0235 ext.23144  
May 12, 2017

All analyses performed by CH2M HILL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)  
Louisiana (05031)



ASL Report #: R1877

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

<b>ASL Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
R187701	TRIP BLANK-042717-02	04/27/17 08:00	04/28/17
R187702	MW-02-042717-0	04/27/17 10:00	04/28/17
R187703	MW-04-042717-0	04/27/17 11:30	04/28/17
R187704	T4S1MW-23-042717-0	04/27/17 13:15	04/28/17
R187705	T4S1MW-22-042717	04/27/17 14:40	04/28/17

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1877

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260B: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIP BLANK-042717-02</b>				<b>Lab Sample ID: R187701</b>			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	97	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-02-042717-0</b>				<b>Lab Sample ID: R187702</b>			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 10:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.21	J	ug/L	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	107	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	101	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW-23-042717-0</b>				<b>Lab Sample ID: R187704</b>			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 13:15				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.42	J	ug/L	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.39	J	ug/L	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	108	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	100	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-22-042717				Lab Sample ID: R187705			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 14:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	2.11		ug/L	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	3.56		ug/L	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	113	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0428</b>				<b>Lab Sample ID: WB1-0428</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information			Lab Information		
Project Name: Northwest Pipe			LCS ID: BS1W0428		
Type: QC			Report Revision No.: 0		
Matrix: Water			Dilution Factor: 1		

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	18.8	ug/L	94	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	20.0	19.9	ug/L	100	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	96	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	103	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1877

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260B: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-04-042717-0</b>				<b>Lab Sample ID: R187703</b>			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 11:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	16.6		ug/L	SW8260B	04/28/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	111	E	ug/L	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	29.7		ug/L	SW8260B	04/28/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	14.4		ug/L	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	105	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-04-042717-0DL				Lab Sample ID: R187703DL			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 10			
Sample Time: 11:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	16.4		ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	116		ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	1.50	5.00	31.3		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	14.7		ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	99	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0428</b>				<b>Lab Sample ID: WB1-0428</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0503</b>				<b>Lab Sample ID: WB1-0503</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0428	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	21.2	ug/L	106	SW8260B	04/28/17
cis-1,2-Dichloroethene	156-59-2	20.0	18.8	ug/L	94	SW8260B	04/28/17
Trichloroethene (TCE)	79-01-6	20.0	19.9	ug/L	100	SW8260B	04/28/17
Tetrachloroethene (PCE)	127-18-4	20.0	20.2	ug/L	101	SW8260B	04/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	96	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	103	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0503	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	20.1	ug/L	101	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	20.0	17.4	ug/L	87	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	20.0	18.5	ug/L	93	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	20.0	18.3	ug/L	92	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	104	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1877

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

SW8260C-SIM: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIP BLANK-042717-02</b>				<b>Lab Sample ID: R187701</b>			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	105	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	111	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-02-042717-0</b>				<b>Lab Sample ID: R187702</b>			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 10:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	11.5	J	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	224		ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	107	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	94	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-23-042717-0				Lab Sample ID: R187704			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 13:15				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	1070		ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	110	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	111	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-22-042717				Lab Sample ID: R187705			
Project Name: Northwest Pipe				Date Received: 04/28/17			
Sample Date: 04/27/17				Dilution Factor: 1			
Sample Time: 14:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	22.0		ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	1430		ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	107	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	93	70-130	
4-Bromofluorobenzene	110	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0509</b>				<b>Lab Sample ID: WB1-0509</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	103	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0509	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	500	503	ng/L	101	SW8260C-SIM	05/09/17
Tetrachloroethene (PCE)	127-18-4	500	485	ng/L	97	SW8260C-SIM	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	101	70-130	
1,2-Dichloroethane-d4	101	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	111	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE HEADSPACE ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1877

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
RSK-175

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-02-042717-0					Lab Sample ID: R187702				
Project Name: Northwest Pipe					Date Received: 04/28/17				
Sample Date: 04/27/17					Report Revision No: 0				
Sample Time: 10:00									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.31	42.6	3420		ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	37.2	225	15600		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-04-042717-0					Lab Sample ID: R187703				
Project Name: Northwest Pipe					Date Received: 04/28/17				
Sample Date: 04/27/17					Report Revision No: 0				
Sample Time: 11:30									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.67	37.5	1210		ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	35.8	217	82000		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Client Sample ID: T4S1MW-23-042717-0	Lab Sample ID: R187704
Project Name: Northwest Pipe	Date Received: 04/28/17
Sample Date: 04/27/17	Report Revision No: 0
Sample Time: 13:15	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.86	47.0	7.12	J	ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	38.4	232	20400		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: T4S1MW-22-042717					Lab Sample ID: R187705				
Project Name: Northwest Pipe					Date Received: 04/28/17				
Sample Date: 04/27/17					Report Revision No: 0				
Sample Time: 14:40									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	6.05	48.6	6.05	U	ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	38.8	235	49100		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-0503				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				LCS ID: BS1X0503 Report Revision No.: 0 Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	594	ug/L	100	RSK-175	05/03/17
Carbon dioxide	124-38-9	3180	3140	ug/L	99	RSK-175	05/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE METALS ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1877

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

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**Method(s):**

E200.7: FLDFLT

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: R1877			
Date Received: 04/28/17				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<i>Dissolved Metals</i>								
MW-02-042717-0	R187702F	1	10.0	100	1340		ug/L	05/05/17
MW-04-042717-0	R187703F	1	10.0	100	9830		ug/L	05/05/17
T4S1MW-23-042717-0	R187704F	1	10.0	100	54.5	J	ug/L	05/05/17
T4S1MW-22-042717	R187705F	1	10.0	100	10.0	U	ug/L	05/05/17
<i>Total Metals</i>								
WB10-0505	WB10-0505	1	10.0	100	10.0	U	ug/L	05/05/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS10W0505 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	50000	52700	ug/L	105	E200.7	E200.2	05/05/17

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1877

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E300.0A

# CH2M ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: R1877</b>			
Date Received: 04/28/2017				Analysis Method: E300.0A			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-02-042717-0	R187702	1	0.020	0.20	2.47		05/04/2017
MW-04-042717-0	R187703	1	0.020	0.20	4.52		05/04/2017
T4S1MW-23-042717-0	R187704	1	0.020	0.20	3.36		05/04/2017
T4S1MW-22-042717	R187705	1	0.020	0.20	3.38		05/04/2017
WB1-0504	WB1-0504	1	0.020	0.20	0.020	U	05/04/2017

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1877</b>		
Date Received: 04/28/2017			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-02-042717-0	R187702	1	0.020	0.20	5.37		05/04/2017
MW-04-042717-0	R187703	1	0.020	0.20	2.35		05/04/2017
T4S1MW-23-042717-0	R187704	1	0.020	0.20	7.76		05/04/2017
T4S1MW-22-042717	R187705	1	0.020	0.20	10.0		05/04/2017
WB1-0504	WB1-0504	1	0.020	0.20	0.020	U	05/04/2017

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1877 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0504	Chloride	5.00	4.99	mg/L	100	E300.0A	05/04/2017
BS1W0504	Sulfate	5.00	4.85	mg/L	97	E300.0A	05/04/2017

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1877

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

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**Method(s):**

E353.2

# CH2M ASL

Client Information			Lab Information		
Project Name: Northwest Pipe			Lab Batch ID: R1877		
Date Received: 04/28/17			Analysis Method: E353.2		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-02-042717-0	R187702	1	0.0028	0.010	0.31		04/28/17 14:17
MW-04-042717-0	R187703	1	0.0028	0.010	0.011		04/28/17 14:18
T4S1MW-23-042717-0	R187704	1	0.0028	0.010	0.42		04/28/17 14:20
T4S1MW-22-042717	R187705	1	0.0028	0.010	0.92		04/28/17 14:21
WB1-042817	WB1-042817	1	0.0028	0.010	0.0028	U	04/28/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1877

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

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**Method(s):**  
SM5310B

# CH2M ASL

Client Information		Lab Information	
<b>Project Name: Northwest Pipe</b>		<b>Lab Batch ID: R1877</b>	
Date Received: 04/28/2017		Analysis Method: SM5310B	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-02-042717-0	R187702	1	0.20	0.50	1.60		05/08/2017
MW-04-042717-0	R187703	1	0.20	0.50	1.40		05/08/2017
T4S1MW-23-042717-0	R187704	1	0.20	0.50	0.78		05/08/2017
T4S1MW-22-042717	R187705	1	0.20	0.50	1.18		05/08/2017
WB1-0508	WB1-0508	1	0.20	0.50	0.20	U	05/08/2017

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1877 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0508	Total Organic Carbon	5.00	4.87	mg/L	97	SM5310B	05/08/2017

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# Chain of Custody Record

<b>Client Contact</b>	<b>Analysis Turnaround Time</b>	<b>Preservation Used</b>	<b>For Lab Use Only:</b>
Project Name: <u>NWP</u>	TAT is Calander days	4   1   1   3   4   4   1   4	SDG: <u>R1877</u>
Project # or PO #: <u>602722</u>	TAT if different from below _____	<b>Analysis Requested</b>	Custody Seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Company Name: <u>CH2M HILL</u>	<input checked="" type="checkbox"/> 21 days (STD)	E200.7 F E300.0, E353.2 RSK-175 SM 5310 SW02600C SW02600JM E300.0, E353.2 E200.7*	Hand delivered? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Address: <u>2020 SW 4th Ave Ste 300</u>	<input type="checkbox"/> 14 days * <input type="checkbox"/> 3 day *		Cooler Temp: <u>3.5</u> °C
City/State/Zip: <u>Portland, OR 97201</u>	<input type="checkbox"/> 7 days * <input type="checkbox"/> 2 days *		Therm ID No. <u>173</u> Therm Exp. <u>7/17/17</u>
Project Manager: <u>Gretchen Gee</u>	<input type="checkbox"/> 5 days * <input type="checkbox"/> 1 day *		Packing Material: Circle Below
Phone #: <u>503 736 4349</u>	* (Surcharges will apply)		<input checked="" type="radio"/> Blue Ice Box <input type="radio"/> Bubble Wrap
Report to email: <u>Gretchen.Gee@ch2m.com</u>			Radiological Screen? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Sample Identification (Limit of 20 characters)	Sample Date	Sample Time	Sample Type (CuComp, G=Grab)	Matrix (Water, Soil, Air)	Total # of Cont.													Sample Specific Notes:	Lab ID:
TRIPBLANK-042717-02	4/27/17	0800	G	W	4														1
MW-02-042717-0	4/27/17	1000	G	W	12				3	1	3	3	1						2
MW-04-042717-0	4/27/17	1130	G	W	12				3	1	3	3	1						3
T4S1MW-23-042717-0	4/27/17	1315	G	W	12				3	1	3	3	1						4
T4S1MW-22-042717-0	4/27/17	1440	G	W	12	1	1		3	1	3	3	1						5

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

<b>Possible Hazard Identification:</b>	<b>Sample Disposal</b> (A fee may be added if samples are retained longer than 30 day per client request, samples are returned to client, or classified as hazardous.)
Are samples hazardous? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If yes, select hazard(s): <input type="checkbox"/> Listed <input type="checkbox"/> Ignitable <input type="checkbox"/> Corrosive <input type="checkbox"/> Reactive <input type="checkbox"/> Toxic	
If YES or NO is not checked above, samples will be assumed hazardous and hazardous disposal fees will be applied.	<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ months

Sampled by: <u>Jennifer Ulrich</u>	Date/Time: <u>4/27/17</u>	Relinquished by: <u>Jennifer Ulrich</u>	Date/Time: <u>4/27/17/1615</u>
Received by:	Date/Time:	Relinquished by:	Date/Time:
Received in Laboratory by: <u>Tina Williams</u>	Date/Time: <u>4/28/17 1015</u>	Shipped Via: <input type="checkbox"/> UPS <input checked="" type="checkbox"/> Fed-Ex <input type="checkbox"/> USPS <input type="checkbox"/> Other	Tracking #:

Special Instructions/QC Requirements

• E200.7 F = field filtered; filter E200.7 from un-preserved group E300.0, E353.2, E200.7

## Sample Receipt Record

SDG ID: R1877

Date Received: 4/28/2017

Client/Project: Northwest Pipe

Received by: TW

Were custody seals intact and on the outside of the cooler?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Shipping Record:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> On File	<input type="checkbox"/> COC
Radiological Screening for DoD	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Packing Material:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice <input type="checkbox"/> Box
Temp OK? (<6C) Therm ID: TH173 Exp. 7/17/17	3.5 °C	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Was a Chain of Custody (CoC) Provided?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was the CoC correctly filled out (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did sample labels agree with COC? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Were the sample containers in good condition (not broken or leaking)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was enough sample volume provided for analysis? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Containers supplied by ASL?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Any sample with < 1/2 holding time remaining? If so contact LPM and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Samples have multi-phase? If yes, document on SRER	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
All water VOCs free of air bubbles? No, document on SRER	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
pH of all samples met criteria on receipt? If "No", preserve and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals filtered in the field?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals have sediment in bottom of container? If so document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A

### Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

### Sample Exception Report (The following exceptions were noted)

- 1) MW-02-42717-0 (R187702) Nitrate sample has less than half holding time remaining.
- 2) Samples MW-02-042717-0, MW-04-042717-0, and T4S1MW-23-042717-0 (R1877-02, -03, and -04) were filtered into 8oz poly bottles preserved with HNO3 (Lot #937) using 0.45um Sterivex filters (Lot #1616/00279).
- 3) Compound list not included on COC. Logged in according to quote and past SDGs.

Client was notified on: 4/28/17 Client contact: Jamie Beckett/RDD

Resolution to Exception:



# Analytical Report for Northwest Pipe

ASL Report #: R1893

Project ID: 682722.GW.05

**Attn: Gretchen Gee**

cc:

Beckett, Jamie/RDD

Authorized and Released By:

Laboratory Project Manager  
Kathy McKinley  
(541) 758-0235 ext.23144  
May 17, 2017

All analyses performed by CH2M HILL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)  
Louisiana (05031)



ASL Report #: R1893

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

<b>ASL Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
R189301	TRIPBLANK-050117-03	05/01/17 08:00	05/02/17
R189302	MW-01-050117-0	05/01/17 10:20	05/02/17
R189303	MW-100-050117-0	05/01/17 12:00	05/02/17
R189304	MW-06-050117-0	05/01/17 11:50	05/02/17
R189305	MW-03-050117-0	05/01/17 13:50	05/02/17
R189306	MW-05-050117-0	05/01/17 15:20	05/02/17

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1893

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

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**Method(s):**

SW8260B: SW5030

**Analytical Exception(s):**

Due to instrumental contamination concerns, some samples in this SDG could not be analyzed at a 1x-concentration.

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-01-050117-0</b>				<b>Lab Sample ID: R189302</b>			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 1			
Sample Time: 10:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	51.6		ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	220	E	ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	13.0		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	61.7		ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	119	70-130	
1,2-Dichloroethane-d4	119	70-130	
Toluene-d8	108	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-01-050117-0DL				Lab Sample ID: R189302DL			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 10			
Sample Time: 10:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	49.3		ug/L	SW8260B	05/04/17
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	220		ug/L	SW8260B	05/04/17
Trichloroethene (TCE)	79-01-6	1.50	5.00	11.3		ug/L	SW8260B	05/04/17
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	54.6		ug/L	SW8260B	05/04/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	105	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	103	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-100-050117-0</b>				<b>Lab Sample ID: R189303</b>			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 10			
Sample Time: 12:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	20.7		ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	1590	E	ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	1.50	5.00	228		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	1250	E	ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	115	70-130	
1,2-Dichloroethane-d4	114	70-130	
Toluene-d8	106	70-130	
4-Bromofluorobenzene	106	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-100-050117-0DL				Lab Sample ID: R189303DL			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 100			
Sample Time: 12:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	24.4	J	ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	1550		ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	15.0	50.0	224		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	1280		ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	115	70-130	
1,2-Dichloroethane-d4	116	70-130	
Toluene-d8	106	70-130	
4-Bromofluorobenzene	107	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-06-050117-0</b>				<b>Lab Sample ID: R189304</b>			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 10			
Sample Time: 11:50				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	21.9		ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	1600	E	ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	1.50	5.00	225		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	1280	E	ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	115	70-130	
1,2-Dichloroethane-d4	113	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	103	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-06-050117-0DL				Lab Sample ID: R189304DL			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 50			
Sample Time: 11:50				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	7.50	25.0	20.9	J	ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	7.50	25.0	1530		ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	7.50	25.0	220		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	7.50	25.0	1280		ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	111	70-130	
1,2-Dichloroethane-d4	112	70-130	
Toluene-d8	105	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-03-050117-0</b>				<b>Lab Sample ID: R189305</b>			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 10			
Sample Time: 13:50				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	26.1		ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	847		ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	1.50	5.00	283		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	657		ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	111	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	101	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-05-050117-0</b>				<b>Lab Sample ID: R189306</b>			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 1			
Sample Time: 15:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	70.7		ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	608	E	ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	92.0		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	770	E	ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	106	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	103	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Client Sample ID: MW-05-050117-0DL				Lab Sample ID: R189306DL			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 100			
Sample Time: 15:20				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	79.9		ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	634		ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	15.0	50.0	98.1		ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	949		ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	104	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	94	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0503</b>				<b>Lab Sample ID: WB1-0503</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0504</b>				<b>Lab Sample ID: WB1-0504</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260B	05/04/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260B	05/04/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	05/04/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260B	05/04/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	99	70-130	
1,2-Dichloroethane-d4	93	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0503	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	20.1	ug/L	101	SW8260B	05/03/17
cis-1,2-Dichloroethene	156-59-2	20.0	17.4	ug/L	87	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	20.0	18.5	ug/L	93	SW8260B	05/03/17
Tetrachloroethene (PCE)	127-18-4	20.0	18.3	ug/L	92	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	104	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0504	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	21.3	ug/L	106	SW8260B	05/04/17
cis-1,2-Dichloroethene	156-59-2	20.0	18.6	ug/L	93	SW8260B	05/04/17
Trichloroethene (TCE)	79-01-6	20.0	20.4	ug/L	102	SW8260B	05/04/17
Tetrachloroethene (PCE)	127-18-4	20.0	20.9	ug/L	104	SW8260B	05/04/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	94	70-130	
1,2-Dichloroethane-d4	88	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	100	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1893

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260B: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-050117-03</b>				<b>Lab Sample ID: R189301</b>			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	111	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	97	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0503</b>				<b>Lab Sample ID: WB1-0503</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	103	70-130	
4-Bromofluorobenzene	102	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0503	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	17.4	ug/L	87	SW8260B	05/03/17
Trichloroethene (TCE)	79-01-6	20.0	18.5	ug/L	93	SW8260B	05/03/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	104	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

## CASE NARRATIVE GC/MS VOLATILES ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1893

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

SW8260C-SIM: SW5030

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-050117-03</b>				<b>Lab Sample ID: R189301</b>			
Project Name: Northwest Pipe				Date Received: 05/02/17			
Sample Date: 05/01/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	109	70-130	
1,2-Dichloroethane-d4	106	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	108	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0509</b>				<b>Lab Sample ID: WB1-0509</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	05/09/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	103	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	95	70-130	
4-Bromofluorobenzene	109	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# CH2M ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0509	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	500	503	ng/L	101	SW8260C-SIM	05/09/17
Tetrachloroethene (PCE)	127-18-4	500	485	ng/L	97	SW8260C-SIM	05/09/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	101	70-130	
1,2-Dichloroethane-d4	101	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	111	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

## CASE NARRATIVE HEADSPACE ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1893

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
RSK-175

# CH2M ASL

Client Information	Lab Information
Client Sample ID: MW-01-050117-0	Lab Sample ID: R189302
Project Name: Northwest Pipe	Date Received: 05/02/17
Sample Date: 05/01/17	Report Revision No: 0
Sample Time: 10:20	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.23	41.9	3120		ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	37.0	224	82600		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-100-050117-0					Lab Sample ID: R189303				
Project Name: Northwest Pipe					Date Received: 05/02/17				
Sample Date: 05/01/17					Report Revision No: 0				
Sample Time: 12:00									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	6.26	50.2	265		ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	39.3	237	82300		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Client Sample ID: MW-06-050117-0	Lab Sample ID: R189304
Project Name: Northwest Pipe	Date Received: 05/02/17
Sample Date: 05/01/17	Report Revision No: 0
Sample Time: 11:50	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.25	42.1	206		ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	37.1	224	81800		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Client Sample ID: MW-03-050117-0					Lab Sample ID: R189305				
Project Name: Northwest Pipe					Date Received: 05/02/17				
Sample Date: 05/01/17					Report Revision No: 0				
Sample Time: 13:50									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.99	40.0	748		ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	36.5	221	53900		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information	Lab Information
Client Sample ID: MW-05-050117-0	Lab Sample ID: R189306
Project Name: Northwest Pipe	Date Received: 05/02/17
Sample Date: 05/01/17	Report Revision No: 0
Sample Time: 15:20	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.97	39.9	2310		ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	36.5	221	50500		ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-0503				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	05/03/17
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	05/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				LCS ID: BS1X0503 Report Revision No.: 0 Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	594	ug/L	100	RSK-175	05/03/17
Carbon dioxide	124-38-9	3180	3140	ug/L	99	RSK-175	05/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE METALS ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1893

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

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**Method(s):**

E200.7: FLDFLT

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: R1893			
Date Received: 05/02/17				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<i>Dissolved Metals</i>								
MW-01-050117-0	R189302F	1	10.0	100	1530		ug/L	05/05/17
MW-100-050117-0	R189303F	1	10.0	100	3600		ug/L	05/05/17
MW-06-050117-0	R189304F	1	10.0	100	3530		ug/L	05/05/17
MW-03-050117-0	R189305F	1	10.0	100	3320		ug/L	05/05/17
MW-05-050117-0	R189306F	1	10.0	100	4170		ug/L	05/05/17
<i>Total Metals</i>								
WB10-0505	WB10-0505	1	10.0	100	10.0	U	ug/L	05/05/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Blank Spike ID: BS10W0505 Report Revision No: 0 Dilution Factor: 1			

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	50000	52700	ug/L	105	E200.7	E200.2	05/05/17

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1893

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
E300.0A

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1893</b>		
Date Received: 05/02/2017			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-01-050117-0	R189302	1	0.020	0.20	4.00		05/05/2017
MW-100-050117-0	R189303	1	0.020	0.20	6.21		05/05/2017
MW-06-050117-0	R189304	1	0.020	0.20	6.20		05/05/2017
MW-03-050117-0	R189305	1	0.020	0.20	5.47		05/05/2017
MW-05-050117-0	R189306	1	0.020	0.20	4.87		05/05/2017
WB1-0504	WB1-0504	1	0.020	0.20	0.020	U	05/04/2017

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information			Lab Information		
<b>Project Name: Northwest Pipe</b>			<b>Lab Batch ID: R1893</b>		
Date Received: 05/02/2017			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-01-050117-0	R189302	1	0.020	0.20	3.57		05/05/2017
MW-100-050117-0	R189303	1	0.020	0.20	14.0		05/05/2017
MW-06-050117-0	R189304	1	0.020	0.20	13.9		05/05/2017
MW-03-050117-0	R189305	1	0.020	0.20	12.1		05/05/2017
MW-05-050117-0	R189306	1	0.020	0.20	11.9		05/05/2017
WB1-0504	WB1-0504	1	0.020	0.20	0.020	U	05/04/2017

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1893 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0504	Chloride	5.00	4.99	mg/L	100	E300.0A	05/04/2017
BS1W0504	Sulfate	5.00	4.85	mg/L	97	E300.0A	05/04/2017

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1893

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E353.2

# CH2M ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: R1893</b>			
Date Received: 05/02/17				Analysis Method: E353.2			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-01-050117-0	R189302	1	0.0028	0.010	0.029		05/02/17 14:52
MW-100-050117-0	R189303	1	0.0028	0.010	0.0028	U	05/02/17 14:53
MW-06-050117-0	R189304	1	0.0028	0.010	0.0028	U	05/02/17 14:54
MW-03-050117-0	R189305	1	0.0028	0.010	0.0028	U	05/02/17 14:56
MW-05-050117-0	R189306	1	0.0028	0.010	0.0028	U	05/02/17 14:57
WB1-050217	WB1-050217	1	0.0028	0.010	0.0028	U	05/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

## CASE NARRATIVE GENERAL CHEMISTRY ANALYSIS

**Lab Name:** CH2M ASL

**ASL SDG#:** R1893

**Project:** Northwest Pipe

**Project #:** 682722.GW.05

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
SM5310B

# CH2M ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> R1893	
Date Received: 05/02/2017		Analysis Method: SM5310B	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-01-050117-0	R189302	1	0.20	0.50	1.34		05/08/2017
MW-100-050117-0	R189303	1	0.20	0.50	1.40		05/08/2017
MW-06-050117-0	R189304	1	0.20	0.50	1.27		05/08/2017
MW-03-050117-0	R189305	1	0.20	0.50	1.27		05/08/2017
MW-05-050117-0	R189306	1	0.20	0.50	1.33		05/08/2017
WB1-0508	WB1-0508	1	0.20	0.50	0.20	U	05/08/2017

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# CH2M ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R1893 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0508	Total Organic Carbon	5.00	4.87	mg/L	97	SM5310B	05/08/2017

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# Chain of Custody Record

1100 NE Circle Blvd. Suite 300  
 Corvallis, OR 97330  
 (541) 768-3120

Client Contact		Analysis Turnaround Time		Preservation Used						For Lab Use Only:				
Project Name:	NMP	TAT is Calendar days		HU	HU	1	4	1	3	SDG: R1893	Custody Seals Intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Project # or PO #:	682702	TAT if different from below		Analysis Requested						Hand delivered?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		
Company Name:	CH2M	<input checked="" type="checkbox"/> 21 days (STD)	<input type="checkbox"/> 14 days *	SW8260C	SW8260SIM	RSK-175	E20017F	E300.01E353.2	SM5310	Cooler Temp	29°C	Therm ID No.	11717	
Address:	2020 SW 4th Ave Ste 300	<input type="checkbox"/> 7 days *	<input type="checkbox"/> 3 day *							Packing Material:	Circle Below	Blue Ice Box	Bubble Wrap	
City/State/Zip:	Portland, OR 97201	<input type="checkbox"/> 5 days *	<input type="checkbox"/> 2 days *							Ice	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Project Manager:	Gretchen Greer	<input type="checkbox"/> 1 day *	<input type="checkbox"/> 1 day *							Radiological Screen?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Lab ID:	
Phone #:	503-736-4349	* (Surcharges will apply)		Sample Date	Sample Time	Sample Type (Co-Comp, Gas Grab)	Matrix (Water, Soil, Air)	Total # of Cont.	Sample Specific Notes:					
Report to email:	Gretchen.Greer@ch2m.com			5/1/17	0900	G	W	4						
Sample Identification (Limit of 20 characters)	TRIPBLANK-050117-03	5/1/17	1020	G	W	12	3	3	1	1	1	1	1	
	MW-01-050117-0	5/1/17	1200	G	W	12	3	3	1	1	1	1	1	
	MW-100-050117-0	5/1/17	1150	G	W	12	3	3	1	1	1	1	1	
	MW-06-050117-0	5/1/17	1350	G	W	12	3	3	1	1	1	1	1	
	MW-03-050117-0	5/1/17	1520	G	W	12	3	3	1	1	1	1	1	
	MW-05-050117-0													

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other

Possible Hazard Identification:  
 Are samples hazardous?  Yes  No  
 If YES, select hazard(s):  Listed  Ignitable  Corrosive  Reactive  Toxic  
 If YES or NO is not checked above, samples will be assumed hazardous and hazardous disposal fees will be applied.

Sampled By: *[Signature]* Date/Time: 5/1/17 1720  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Shipped Via:  UPS  Fed-Ex  USPS  Other  
 Tracking #: \_\_\_\_\_  
 Special Instructions/QC Requirements

## Sample Receipt Record

SDG ID: R1893

Date Received: 5/2/2017

Client/Project: Northwest Pipe

Received by: TW

Were custody seals intact and on the outside of the cooler?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Shipping Record:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> On File	<input type="checkbox"/> COC
Radiological Screening for DoD	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Packing Material:	<input type="checkbox"/> Hand Delivered	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice <input type="checkbox"/> Box
Temp OK? (<6C) Therm ID: TH173 Exp. 7/17/17	2.9 °C	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Was a Chain of Custody (CoC) Provided?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was the CoC correctly filled out (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did sample labels agree with COC? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Were the sample containers in good condition (not broken or leaking)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Was enough sample volume provided for analysis? (If No, document below)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Containers supplied by ASL?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Any sample with < 1/2 holding time remaining? If so contact LPM and document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Samples have multi-phase? If yes, document on SRER	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
All water VOCs free of air bubbles? No, document on SRER	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
pH of all samples met criteria on receipt? If "No", preserve and document below.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals filtered in the field?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Dissolved/Soluble metals have sediment in bottom of container? If so document below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A

### Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

### Sample Exception Report (The following exceptions were noted)

Client was notified on: \_\_\_\_\_ Client contact: \_\_\_\_\_

Resolution to Exception:

# Event 4: 2017, Quarter 3

# Analytical Report for Northwest Pipe

ASL Report #: R2485

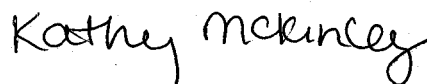
Project ID: 682722.GW.05

**Attn: Gretchen Gee**

cc:

Jamie.beckett@ch2m.com

Authorized and Released By:



Laboratory Project Manager

Kathy McKinley

541.243.0974

August 08, 2017

All analyses performed by TestAmerica ASL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)

TestAmerica ASL Report #: R2485

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

<b>Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
R248501	TRIPBLANK-072517-01	07/25/17 08:00	07/26/17
R248502	T4S1MW-09-072517-0	07/25/17 10:45	07/26/17
R248503	T4S1MW-03S-072517-0	07/25/17 12:40	07/26/17
R248504	MW-02-072517-0	07/25/17 14:05	07/26/17

**CASE NARRATIVE  
GC/MS VOLATILES ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2485

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260C: SW5030

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-072517-01</b>				<b>Lab Sample ID: R248501</b>			
Project Name: Northwest Pipe				Date Received: 07/26/2017			
Sample Date: 07/25/2017				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	101	70-130	
1,2-Dichloroethane-d4	104	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-09-072517-0				Lab Sample ID: R248502			
Project Name: Northwest Pipe				Date Received: 07/26/2017			
Sample Date: 07/25/2017				Dilution Factor: 1			
Sample Time: 10:45				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	96	70-130	
1,2-Dichloroethane-d4	104	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	92	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW-03S-072517-0</b>				<b>Lab Sample ID: R248503</b>			
Project Name: Northwest Pipe				Date Received: 07/26/2017			
Sample Date: 07/25/2017				Dilution Factor: 1			
Sample Time: 12:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	100	70-130	
1,2-Dichloroethane-d4	106	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	95	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-02-072517-0</b>				<b>Lab Sample ID: R248504</b>			
Project Name: Northwest Pipe				Date Received: 07/26/2017			
Sample Date: 07/25/2017				Dilution Factor: 1			
Sample Time: 14:05				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.41	J	ug/L	SW8260C	07/26/2017
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	108	70-130	
Toluene-d8	102	70-130	
4-Bromofluorobenzene	94	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0726</b>				<b>Lab Sample ID: WB1-0726</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/26/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	98	70-130	
1,2-Dichloroethane-d4	105	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				LCS ID: BS1W0726			
Type: QC				Report Revision No.: 0			
Matrix: Water				Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	19.4	ug/L	97	SW8260C	07/26/2017
Trichloroethene (TCE)	79-01-6	20.0	18.2	ug/L	91	SW8260C	07/26/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	100	70-130	
1,2-Dichloroethane-d4	103	70-130	
Toluene-d8	104	70-130	
4-Bromofluorobenzene	100	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

**CASE NARRATIVE  
GC/MS VOLATILES ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2485

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

SW8260C-SIM: SW5030

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: TRIPBLANK-072517-01				Lab Sample ID: R248501			
Project Name: Northwest Pipe				Date Received: 07/26/17			
Sample Date: 07/25/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	115	70-130	
1,2-Dichloroethane-d4	113	70-130	
Toluene-d8	91	70-130	
4-Bromofluorobenzene	124	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: T4S1MW-09-072517-0				Lab Sample ID: R248502			
Project Name: Northwest Pipe				Date Received: 07/26/17			
Sample Date: 07/25/17				Dilution Factor: 1			
Sample Time: 10:45				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	13.9	J	ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	120	70-130	
1,2-Dichloroethane-d4	118	70-130	
Toluene-d8	92	70-130	
4-Bromofluorobenzene	124	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: T4S1MW-03S-072517-0</b>				<b>Lab Sample ID: R248503</b>			
Project Name: Northwest Pipe				Date Received: 07/26/17			
Sample Date: 07/25/17				Dilution Factor: 1			
Sample Time: 12:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	50.8		ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	120	70-130	
1,2-Dichloroethane-d4	118	70-130	
Toluene-d8	91	70-130	
4-Bromofluorobenzene	122	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-02-072517-0</b>				<b>Lab Sample ID: R248504</b>			
Project Name: Northwest Pipe				Date Received: 07/26/17			
Sample Date: 07/25/17				Dilution Factor: 1			
Sample Time: 14:05				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	19.0	J	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	451		ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	123	70-130	
1,2-Dichloroethane-d4	120	70-130	
Toluene-d8	91	70-130	
4-Bromofluorobenzene	124	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0731</b>				<b>Lab Sample ID: WB1-0731</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	89	70-130	
4-Bromofluorobenzene	122	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0731	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	250	213	ng/L	85	SW8260C-SIM	07/31/17
Tetrachloroethene (PCE)	127-18-4	250	223	ng/L	89	SW8260C-SIM	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	93	70-130	
4-Bromofluorobenzene	125	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

**CASE NARRATIVE  
HEADSPACE ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2485

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All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
RSK-175

# TestAmerica ASL

Client Information					Lab Information				
Client Sample ID: T4S1MW-09-072517-0					Lab Sample ID: R248502				
Project Name: Northwest Pipe					Date Received: 07/26/17				
Sample Date: 07/25/17					Report Revision No: 0				
Sample Time: 10:45									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.99	48.0	22.5	J	ug/L	RSK-175	07/27/17
Carbon dioxide	124-38-9	1	38.7	234	30800		ug/L	RSK-175	07/27/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: T4S1MW-03S-072517-0	Lab Sample ID: R248503
Project Name: Northwest Pipe	Date Received: 07/26/17
Sample Date: 07/25/17	Report Revision No: 0
Sample Time: 12:40	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	4.95	39.7	4.95	U	ug/L	RSK-175	07/27/17
Carbon dioxide	124-38-9	1	36.4	220	18100		ug/L	RSK-175	07/27/17

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E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information					Lab Information				
Client Sample ID: MW-02-072517-0					Lab Sample ID: R248504				
Project Name: Northwest Pipe					Date Received: 07/26/17				
Sample Date: 07/25/17					Report Revision No: 0				
Sample Time: 14:05									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	6.29	50.5	5330		ug/L	RSK-175	07/27/17
Carbon dioxide	124-38-9	1	39.3	238	19300		ug/L	RSK-175	07/27/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-0727				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	07/27/17
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	07/27/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	LCS ID: BS1X0727 Report Revision No.: 0 Dilution Factor: 1

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	596	ug/L	100	RSK-175	07/27/17
Carbon dioxide	124-38-9	3180	3080	ug/L	97	RSK-175	07/27/17

U=Not detected and reported as less than detection limit  
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E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
METALS ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2485

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**Method(s):**

E200.7: FLDFLT

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: R2485			
Date Received: 07/26/17				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<i>Dissolved Metals</i>								
T4S1MW-09-072517-0	R248502F	1	10.0	100	32.1	J	ug/L	08/02/17
T4S1MW-03S-072517-0	R248503F	1	10.0	100	10.0	U	ug/L	08/02/17
MW-02-072517-0	R248504F	1	10.0	100	5910		ug/L	08/02/17
<i>Total Metals</i>								
WB10-0802	WB10-0802	1	10.0	100	10.0	U	ug/L	08/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS10W0802 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	50000	51300	ug/L	103	E200.7	E200.2	08/02/17

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2485

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**Method(s):**  
E300.0A

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> R2485	
Date Received: 07/26/17		Analysis Method: E300.0A	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-072517-0	R248502	1	0.020	0.20	2.34		08/03/17
T4S1MW-03S-072517-0	R248503	1	0.020	0.20	1.90		08/03/17
MW-02-072517-0	R248504	1	0.020	0.20	3.14		08/03/17
WB1-0803	WB1-0803	1	0.020	0.20	0.096	J	08/03/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> R2485	
Date Received: 07/26/17		Analysis Method: E300.0A	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-072517-0	R248502	1	0.040	0.20	7.16		08/03/17
T4S1MW-03S-072517-0	R248503	1	0.040	0.20	12.4		08/03/17
MW-02-072517-0	R248504	1	0.040	0.20	5.88		08/03/17
WB1-0803	WB1-0803	1	0.040	0.20	0.040	U	08/03/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2485 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0803	Chloride	5.00	5.11	mg/L	102	E300.0A	08/03/17
BS1W0803	Sulfate	5.00	4.87	mg/L	97	E300.0A	08/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# TestAmerica ASL

Client Information	Lab Information
<b>Client Sample ID:</b> MW-02-072517-0	
Project Name: Northwest Pipe	Report Revision No.: 0
Type: QC	
Matrix: Water	

Analyte	CAS#	MS %Recovery	MSD %Recovery	RPD	QC Limits	RPD Limits	Analysis Method
<b>General Chemistry</b>							
Sulfate	14808-79-8	104	110	3	85-115	15	E300.0A
Chloride	16887-00-6	104	106	1	85-115	15	E300.0A

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2485

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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**Method(s):**  
E353.2

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> R2485	
Date Received: 07/26/17		Analysis Method: E353.2	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-072517-0	R248502	4	0.011	0.040	1.94		07/26/17 16:43
T4S1MW-03S-072517-0	R248503	4	0.011	0.040	3.79		07/26/17 16:45
MW-02-072517-0	R248504	1	0.0028	0.010	0.27		07/26/17 16:18
WB1-072617	WB1-072617	1	0.0028	0.010	0.0028	U	07/26/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: R2485</b>			
Date Received: 07/26/17				Analysis Method: E353.2			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Nitrite-N Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-072517-0	R248502	1	0.0030	0.010	0.0030	U	07/26/17 15:29
T4S1MW-03S-072517-0	R248503	1	0.0030	0.010	0.0030	U	07/26/17 15:30
MW-02-072517-0	R248504	1	0.0030	0.010	0.0030	U	07/26/17 15:30
WB1-072617	WB1-072617	1	0.0030	0.010	0.0030	U	07/26/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2485 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0726	Nitrite-N	0.76	0.82	mg/L	108	E353.2	07/26/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-02-072517-0				Report Revision No.: 0			
Project Name: Northwest Pipe							
Type: QC							
Matrix: Water							

Analyte	CAS#	MS %Recovery	MSD %Recovery	RPD	QC Limits	RPD Limits	Analysis Method
<b>General Chemistry</b>							
Nitrite-N	14797-65-0	102	102	0.1	90-110	15	E353.2

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2485

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

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**Method(s):**  
SM5310B

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> R2485	
Date Received: 07/26/17		Analysis Method: SM5310B	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
T4S1MW-09-072517-0	R248502	1	0.20	0.50	0.69		08/03/17
T4S1MW-03S-072517-0	R248503	1	0.20	0.50	0.56		08/03/17
MW-02-072517-0	R248504	1	0.20	0.50	1.52		08/03/17
WB2-0802	WB2-0802	1	0.20	0.50	0.20	U	08/02/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2485 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS2W0802	Total Organic Carbon	5.00	4.76	mg/L	95	SM5310B	08/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# Chain of Custody Record

Client Contact		Analysis Turnaround Time			Preservation Used					For Lab Use Only:	
Project Name: <u>NWP</u> Project # or PO #: <u>082729.GW.05</u> Company Name: <u>EXAM HILL</u> Address: <u>2020 SW 4th Ave, STE 300</u> City/State/Zip: <u>Portland, OR 97201</u> Project Manager: <u>Gretchen Gave</u> Phone #: _____ Report to email: <u>gretchen.gave@ch2m.com</u>		TAT is Calendar days TAT if different from below <input checked="" type="checkbox"/> 21 days (STD) <input type="checkbox"/> 14 days * <input type="checkbox"/> 3 day * <input type="checkbox"/> 7 days * <input type="checkbox"/> 2 days * <input type="checkbox"/> 5 days * <input type="checkbox"/> 1 day * * (Surcharges will apply)			2 2 3 4 1 1 Analysis Requested (VOCs - SIM)    (VOCs) (VOCs - SIM)    (VOCs) (VOCs - SIM)    (VOCs) (VOCs - SIM)    (VOCs) (VOCs - SIM)    (VOCs) (VOCs - SIM)    (VOCs) (VOCs - SIM)    (VOCs)					Custody Seals Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Hand delivered? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Cooler Temp <u>0.8°C</u> Therm ID No. <u>123</u> Therm Exp. <u>10/14/17</u> Packing Material: Circle Below <input checked="" type="checkbox"/> Blue Ice Box <input type="checkbox"/> Bubble Wrap Radiological Screen? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Sample Identification (Limit of 20 characters)	Sample Date	Sample Time	Sample Type (G=Grab, G=Comp, W=Water, S=Soil, Ab)	Matrix	Total # of Cont.	Analysis Requested	Sample Specific Notes:	Lab ID:			
T RIPBLANK-072517-01	7/25/17	0800	G	W	4	(Disc Metals) E 300.0 & F RSK-175		1			
T4SIMW-09-072517-0	7/25/17	1045	G	W	12			2			
T4SIMW-09-072517-0	7/25/17	1240	G	W	12			3			
MW-02-072517-0	7/25/17	1405	G	W	12			4			

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:  
 Are samples hazardous?  Yes  No  
 If yes, select hazard(s):  Listed  Ignitable  Corrosive  Reactive  Toxic  
 If YES or NO is not checked above, samples will be assumed hazardous and hazardous disposal fees will be applied.

Sampled By: Jennifer Ulrich Date/Time: 7/25/2017 1400  
 Relinquished by: Jennifer Ulrich Date/Time: 7/25/17 1600  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Shipped Via:  UPS  Fed-Ex  USPS  Other  
 Tracking #: \_\_\_\_\_

Received in Laboratory by: [Signature] Date/Time: 7/20/17 1030  
 Special Instructions/OC Requirements: \_\_\_\_\_

Sample Receipt Record

SDG ID: R2485

Date Received: 7/26/2017

Client/Project: NWP

Received by: PC

Were custody seals intact and on the outside of the cooler?  Yes  No  N/A

Shipping Record:  Hand Delivered  On File  COC

Radiological Screening for DoD  Yes  No  N/A

Packing Material:  Hand Delivered  Ice  Blue Ice  Box

Temp OK? (<6C) Therm ID: TH173 Exp. 10/14/17 0.8°C  Yes  No  N/A

Was a Chain of Custody (CoC) Provided?  Yes  No  N/A

Was the CoC correctly filled out (If No, document below)  Yes  No  N/A

Did sample labels agree with COC? (If No, document below)  Yes  No  N/A

Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)  Yes  No  N/A

Were the sample containers in good condition (not broken or leaking)?  Yes  No  N/A

Was enough sample volume provided for analysis? (If No, document below)  Yes  No  N/A

Containers supplied by ASL?  Yes  No  N/A

Any sample with < 1/2 holding time remaining? If so contact LPM and document below.  Yes  No  N/A

Samples have multi-phase? If yes, document on SRER  Yes  No  N/A

All water VOCs free of air bubbles? No, document on SRER  Yes  No  N/A

pH of all samples met criteria on receipt? If "No", preserve and document below.  Yes  No  N/A

Dissolved/Soluble metals filtered in the field?  Yes  No  N/A

Dissolved/Soluble metals have sediment in bottom of container? If so document below.  Yes  No  N/A

Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

Sample Exception Report (The following exceptions were noted)

1. One number missing from R2485-03 ID on COC. Logged in per bottle labels of T4S1MW-03S-072517-0
2. RSK on COC does not identify parameters
3. Metals on COC does not identify parameters

Client was notified on: 7/26/17 Client contact: Gretchen Gee

Resolution to Exception:  
Table of required parameters were submitted.

# Analytical Report for Northwest Pipe

ASL Report #: R2499

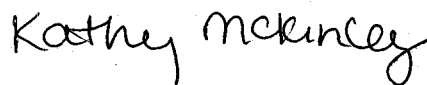
Project ID: 682722.GW.05

**Attn: Gretchen Gee**

cc:

Jamie.beckett@ch2m.com

Authorized and Released By:



Laboratory Project Manager  
Kathy McKinley  
541.243.0974  
August 08, 2017

All analyses performed by TestAmerica ASL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)

**Sample Receipt Comments**

We certify that the test results meet all NELAP requirements.

**Sample Cross-Reference**

<b>Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
R249901	TRIPBLANK-072617-02	07/26/17 08:00	07/27/17
R249902	MW-04-072617-0	07/26/17 08:10	07/27/17
R249903	TS41MW-23-072617-0	07/26/17 10:00	07/27/17
R249904	TS41MW-22-072617-0	07/26/17 11:15	07/27/17
R249905	MW-01-072617-0	07/26/17 12:40	07/27/17

**CASE NARRATIVE  
GC/MS VOLATILES ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2499

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All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

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**Method(s):**  
SW8260C: SW5030

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-04-072617-0				Lab Sample ID: R249902			
Project Name: Northwest Pipe				Date Received: 07/27/2017			
Sample Date: 07/26/2017				Dilution Factor: 10			
Sample Time: 08:10				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	9.43		ug/L	SW8260C	07/28/2017
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	137		ug/L	SW8260C	07/28/2017
Trichloroethene (TCE)	79-01-6	1.50	5.00	35.4		ug/L	SW8260C	07/28/2017
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	18.5		ug/L	SW8260C	07/28/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: MW-01-072617-0</b>				<b>Lab Sample ID: R249905</b>			
Project Name: Northwest Pipe				Date Received: 07/27/2017			
Sample Date: 07/26/2017				Dilution Factor: 10			
Sample Time: 12:40				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	1.50	5.00	8.51		ug/L	SW8260C	07/28/2017
cis-1,2-Dichloroethene	156-59-2	1.50	5.00	174		ug/L	SW8260C	07/28/2017
Trichloroethene (TCE)	79-01-6	1.50	5.00	26.7		ug/L	SW8260C	07/28/2017
Tetrachloroethene (PCE)	127-18-4	1.50	5.00	197		ug/L	SW8260C	07/28/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	101	70-130	
1,2-Dichloroethane-d4	108	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	95	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0728</b>				<b>Lab Sample ID: WB1-0728</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/2017
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/2017
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/2017
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	112	70-130	
Toluene-d8	105	70-130	
4-Bromofluorobenzene	97	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0728	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	19.8	ug/L	99	SW8260C	07/28/2017
cis-1,2-Dichloroethene	156-59-2	20.0	19.5	ug/L	98	SW8260C	07/28/2017
Trichloroethene (TCE)	79-01-6	20.0	18.2	ug/L	91	SW8260C	07/28/2017
Tetrachloroethene (PCE)	127-18-4	20.0	18.3	ug/L	92	SW8260C	07/28/2017

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	99	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

**CASE NARRATIVE  
GC/MS VOLATILES ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2499

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**Method(s):**

SW8260C-SIM: SW5030

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-072617-02</b>				<b>Lab Sample ID: R249901</b>			
Project Name: Northwest Pipe				Date Received: 07/27/17			
Sample Date: 07/26/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	114	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	91	70-130	
4-Bromofluorobenzene	123	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: TS41MW-23-072617-0				Lab Sample ID: R249903			
Project Name: Northwest Pipe				Date Received: 07/27/17			
Sample Date: 07/26/17				Dilution Factor: 1			
Sample Time: 10:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	1210		ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	126	70-130	
1,2-Dichloroethane-d4	123	70-130	
Toluene-d8	94	70-130	
4-Bromofluorobenzene	127	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: TS41MW-22-072617-0				Lab Sample ID: R249904			
Project Name: Northwest Pipe				Date Received: 07/27/17			
Sample Date: 07/26/17				Dilution Factor: 1			
Sample Time: 11:15				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	63.8		ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	1710		ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	120	70-130	
1,2-Dichloroethane-d4	119	70-130	
Toluene-d8	90	70-130	
4-Bromofluorobenzene	122	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0731</b>				<b>Lab Sample ID: WB1-0731</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	89	70-130	
4-Bromofluorobenzene	122	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0731	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	250	213	ng/L	85	SW8260C-SIM	07/31/17
Tetrachloroethene (PCE)	127-18-4	250	223	ng/L	89	SW8260C-SIM	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	93	70-130	
4-Bromofluorobenzene	125	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

**CASE NARRATIVE  
GC/MS VOLATILES ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2499

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SW8260C: SW5030

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-072617-02</b>				<b>Lab Sample ID: R249901</b>			
Project Name: Northwest Pipe				Date Received: 07/27/17			
Sample Date: 07/26/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	100	70-130	
1,2-Dichloroethane-d4	106	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	90	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: TS41MW-23-072617-0				Lab Sample ID: R249903			
Project Name: Northwest Pipe				Date Received: 07/27/17			
Sample Date: 07/26/17				Dilution Factor: 1			
Sample Time: 10:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.29	J	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	89	70-130	
1,2-Dichloroethane-d4	96	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	100	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: TS41MW-22-072617-0				Lab Sample ID: R249904			
Project Name: Northwest Pipe				Date Received: 07/27/17			
Sample Date: 07/26/17				Dilution Factor: 1			
Sample Time: 11:15				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	3.78		ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	3.00		ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	97	70-130	
1,2-Dichloroethane-d4	104	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0728</b>				<b>Lab Sample ID: WB1-0728</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	112	70-130	
Toluene-d8	105	70-130	
4-Bromofluorobenzene	97	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0728	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	19.5	ug/L	98	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	20.0	18.2	ug/L	91	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	99	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

**CASE NARRATIVE  
HEADSPACE ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2499

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
RSK-175

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: MW-04-072617-0	Lab Sample ID: R249902
Project Name: Northwest Pipe	Date Received: 07/27/17
Sample Date: 07/26/17	Report Revision No: 0
Sample Time: 08:10	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.49	44.0	1780		ug/L	RSK-175	07/28/17
Carbon dioxide	124-38-9	1	37.6	227	82900		ug/L	RSK-175	07/28/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: TS41MW-23-072617-0	Lab Sample ID: R249903
Project Name: Northwest Pipe	Date Received: 07/27/17
Sample Date: 07/26/17	Report Revision No: 0
Sample Time: 10:00	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.98	48.0	19.6	J	ug/L	RSK-175	07/28/17
Carbon dioxide	124-38-9	1	38.7	234	27500		ug/L	RSK-175	07/28/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: TS41MW-22-072617-0	Lab Sample ID: R249904
Project Name: Northwest Pipe	Date Received: 07/27/17
Sample Date: 07/26/17	Report Revision No: 0
Sample Time: 11:15	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.26	42.2	15.4	J	ug/L	RSK-175	07/28/17
Carbon dioxide	124-38-9	1	37.1	224	60000		ug/L	RSK-175	07/28/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: MW-01-072617-0	Lab Sample ID: R249905
Project Name: Northwest Pipe	Date Received: 07/27/17
Sample Date: 07/26/17	Report Revision No: 0
Sample Time: 12:40	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.08	40.7	177		ug/L	RSK-175	07/28/17
Carbon dioxide	124-38-9	1	36.7	222	103000		ug/L	RSK-175	07/28/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-0728				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	07/28/17
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	07/28/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	LCS ID: BS1X0728 Report Revision No.: 0 Dilution Factor: 1

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	605	ug/L	102	RSK-175	07/28/17
Carbon dioxide	124-38-9	3180	3210	ug/L	101	RSK-175	07/28/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
METALS ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2499

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E200.7: FLDFLT

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: R2499			
Date Received: 07/27/17				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<i>Dissolved Metals</i>								
MW-04-072617-0	R249902F	1	10.0	100	10000		ug/L	08/02/17
TS41MW-23-072617-0	R249903F	1	10.0	100	110		ug/L	08/02/17
TS41MW-22-072617-0	R249904F	1	10.0	100	10.0	U	ug/L	08/02/17
MW-01-072617-0	R249905F	1	10.0	100	10.0	U	ug/L	08/02/17
<i>Total Metals</i>								
WB10-0802	WB10-0802	1	10.0	100	10.0	U	ug/L	08/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS10W0802 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	50000	51300	ug/L	103	E200.7	E200.2	08/02/17

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2499

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E300.0A

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name: Northwest Pipe</b>		<b>Lab Batch ID: R2499</b>	
Date Received: 07/27/17		Analysis Method: E300.0A	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-04-072617-0	R249902	1	0.020	0.20	4.10		08/03/17
TS41MW-23-072617-0	R249903	1	0.020	0.20	4.07		08/03/17
TS41MW-22-072617-0	R249904	1	0.020	0.20	4.78		08/03/17
MW-01-072617-0	R249905	5	0.10	1.00	5.29		08/03/17
WB1-0803	WB1-0803	1	0.020	0.20	0.096	J	08/03/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information			Lab Information		
Project Name: Northwest Pipe			Lab Batch ID: R2499		
Date Received: 07/27/17			Analysis Method: E300.0A		
Type: See C.O.C.			Units: mg/L		
Matrix: Water			Report Revision No.: 0		

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-04-072617-0	R249902	1	0.040	0.20	2.55		08/03/17
TS41MW-23-072617-0	R249903	1	0.040	0.20	4.83		08/03/17
TS41MW-22-072617-0	R249904	1	0.040	0.20	7.90		08/03/17
MW-01-072617-0	R249905	5	0.20	1.00	29.3		08/03/17
WB1-0803	WB1-0803	1	0.040	0.20	0.040	U	08/03/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2499 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0803	Chloride	5.00	5.11	mg/L	102	E300.0A	08/03/17
BS1W0803	Sulfate	5.00	4.87	mg/L	97	E300.0A	08/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2499

---

With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

E353.2

**Matrix Spike/Matrix Spike Duplicate(s):**

E353.2: The matrix spike/matrix spike duplicate recoveries for Nitrate/Nitrite-N were outside acceptance criteria because the analyte concentration in sample MW-01-072617-0 was significantly higher than the added spike concentrations.

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> R2499	
Date Received: 07/27/17		Analysis Method: E353.2	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-04-072617-0	R249902	1	0.0028	0.010	0.023		07/27/17 16:35
TS41MW-23-072617-0	R249903	1	0.0028	0.010	0.36		07/27/17 16:37
TS41MW-22-072617-0	R249904	1	0.0028	0.010	0.36		07/27/17 16:38
MW-01-072617-0	R249905	31	0.085	0.31	4.22		07/27/17 17:09
WB1-072717	WB1-072717	1	0.0028	0.010	0.0028	U	07/27/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: R2499</b>			
Date Received: 07/27/17				Analysis Method: E353.2			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrite-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-04-072617-0	R249902	1	0.0030	0.010	0.0087	J	07/27/17 16:12
TS41MW-23-072617-0	R249903	1	0.0030	0.010	0.0030	U	07/27/17 16:13
TS41MW-22-072617-0	R249904	1	0.0030	0.010	0.0030	U	07/27/17 16:13
MW-01-072617-0	R249905	1	0.0030	0.010	0.0030	U	07/27/17 16:14
WB1-072717	WB1-072717	1	0.0030	0.010	0.0030	U	07/27/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2499 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0727	Nitrite-N	0.76	0.81	mg/L	106	E353.2	07/27/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-01-072617-0				Report Revision No.: 0			
Project Name: Northwest Pipe							
Type: QC							
Matrix: Water							

Analyte	CAS#	MS %Recovery	MSD %Recovery	RPD	QC Limits	RPD Limits	Analysis Method
<b>General Chemistry</b>							
Nitrite-N	14797-65-0	102	100	2	90-110	15	E353.2

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2499

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SM5310B

**Matrix Spike/Matrix Spike Duplicate(s):**  
SM5310B: R2499-04: Matrix spike recovery (98%) was within the acceptance limits (80-120%).

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name: Northwest Pipe</b>		<b>Lab Batch ID: R2499</b>	
Date Received: 07/27/17		Analysis Method: SM5310B	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-04-072617-0	R249902	1	0.20	0.50	0.72		08/03/17
TS41MW-23-072617-0	R249903	1	0.20	0.50	1.18		08/03/17
TS41MW-22-072617-0	R249904	1	0.20	0.50	1.15		08/03/17
MW-01-072617-0	R249905	1	0.20	0.50	1.28		08/03/17
WB2-0802	WB2-0802	1	0.20	0.50	0.20	U	08/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2499 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS2W0802	Total Organic Carbon	5.00	4.76	mg/L	95	SM5310B	08/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative



Sample Receipt Record

SDG ID: R2499

Date Received: 7/27/2017

Client/Project: Northwest Pipe

Received by: PC

Were custody seals intact and on the outside of the cooler?  Yes  No  N/A

Shipping Record:  Hand Delivered  On File  COC

Radiological Screening for DoD  Yes  No  N/A

Packing Material:  Hand Delivered  Ice  Blue Ice  Box

Temp OK? (<6C) Therm ID: TH173 Exp. 10/14/17 0.1 °C  Yes  No  N/A

Was a Chain of Custody (CoC) Provided?  Yes  No  N/A

Was the CoC correctly filled out (If No, document below)  Yes  No  N/A

Did sample labels agree with COC? (If No, document below)  Yes  No  N/A

Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)  Yes  No  N/A

Were the sample containers in good condition (not broken or leaking)?  Yes  No  N/A

Was enough sample volume provided for analysis? (If No, document below)  Yes  No  N/A

Containers supplied by ASL?  Yes  No  N/A

Any sample with < 1/2 holding time remaining? If so contact LPM and document below.  Yes  No  N/A

Samples have multi-phase? If yes, document on SRER  Yes  No  N/A

All water VOCs free of air bubbles? No, document on SRER  Yes  No  N/A

pH of all samples met criteria on receipt? If "No", preserve and document below.  Yes  No  N/A

Dissolved/Soluble metals filtered in the field?  Yes  No  N/A

Dissolved/Soluble metals have sediment in bottom of container? If so document below.  Yes  No  N/A

Preservation Adjustment

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

Sample Exception Report (The following exceptions were noted)

1. MW-04-072617-0 (R249902) received with less than half holding time remaining for nitrate analysis.

Client was notified on: Client contact:

Resolution to Exception:

# Analytical Report for Northwest Pipe

ASL Report #: R2508

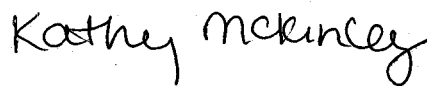
Project ID: 682722.GW.05

**Attn: Gretchen Gee**

cc:

Jamie.beckett@ch2m.com

Authorized and Released By:



Laboratory Project Manager

Kathy McKinley

541.243.0974

August 08, 2017

All analyses performed by TestAmerica ASL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.



Accredited in accordance with NELAP:  
Oregon (100022)

TestAmerica ASL Report #: R2508

### Sample Receipt Comments

We certify that the test results meet all NELAP requirements.

### Sample Cross-Reference

<b>Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date Received</b>
R250801	TRIPBLANK-072717-03	07/27/17 08:00	07/28/17
R250802	MW-06-072717-0	07/27/17 10:15	07/28/17
R250803	MW-100-072717-0	07/27/17 10:30	07/28/17
R250804	MW-03-072717-0	07/27/17 12:25	07/28/17
R250805	MW-05-072717-0	07/27/17 14:10	07/28/17

**CASE NARRATIVE  
GC/MS VOLATILES ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2508

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**Method(s):**  
SW8260C: SW5030

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-072717-03</b>				<b>Lab Sample ID: R250801</b>			
Project Name: Northwest Pipe				Date Received: 07/28/17			
Sample Date: 07/27/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	94	70-130	
1,2-Dichloroethane-d4	100	70-130	
Toluene-d8	96	70-130	
4-Bromofluorobenzene	95	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0728</b>				<b>Lab Sample ID: WB1-0728</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	112	70-130	
Toluene-d8	105	70-130	
4-Bromofluorobenzene	97	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0728	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
cis-1,2-Dichloroethene	156-59-2	20.0	19.5	ug/L	98	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	20.0	18.2	ug/L	91	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	99	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	98	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

**CASE NARRATIVE  
GC/MS VOLATILES ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2508

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

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**Method(s):**  
SW8260C: SW5030

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-06-072717-0				Lab Sample ID: R250802			
Project Name: Northwest Pipe				Date Received: 07/28/17			
Sample Date: 07/27/17				Dilution Factor: 5			
Sample Time: 10:15				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.75	2.50	18.3		ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	0.75	2.50	1230	E	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.75	2.50	128		ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	0.75	2.50	853	E	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	99	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	95	70-130	

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative  
 B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: MW-06-072717-0DL	Lab Sample ID: R250802DL
Project Name: Northwest Pipe	Date Received: 07/28/17
Sample Date: 07/27/17	Dilution Factor: 100
Sample Time: 10:15	Report Revision No.: 0
Type: Grab	
Matrix: Water	

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	17.7	J	ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	1080		ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	15.0	50.0	130		ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	810		ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	100	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	95	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-100-072717-0				Lab Sample ID: R250803			
Project Name: Northwest Pipe				Date Received: 07/28/17			
Sample Date: 07/27/17				Dilution Factor: 5			
Sample Time: 10:30				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.75	2.50	22.5		ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	0.75	2.50	1280	E	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.75	2.50	123		ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	0.75	2.50	790	E	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	104	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	100	70-130	
4-Bromofluorobenzene	96	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: MW-100-072717-0DL	Lab Sample ID: R250803DL
Project Name: Northwest Pipe	Date Received: 07/28/17
Sample Date: 07/27/17	Dilution Factor: 100
Sample Time: 10:30	Report Revision No.: 0
Type: Grab	
Matrix: Water	

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	20.4	J	ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	1080		ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	15.0	50.0	120		ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	728		ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	98	70-130	
1,2-Dichloroethane-d4	104	70-130	
Toluene-d8	97	70-130	
4-Bromofluorobenzene	93	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-03-072717-0				Lab Sample ID: R250804			
Project Name: Northwest Pipe				Date Received: 07/28/17			
Sample Date: 07/27/17				Dilution Factor: 5			
Sample Time: 12:25				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.75	2.50	29.9		ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	0.75	2.50	764	E	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.75	2.50	209		ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	0.75	2.50	581	E	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	101	70-130	
1,2-Dichloroethane-d4	107	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	91	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-03-072717-0DL				Lab Sample ID: R250804DL			
Project Name: Northwest Pipe				Date Received: 07/28/17			
Sample Date: 07/27/17				Dilution Factor: 100			
Sample Time: 12:25				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	32.6	J	ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	670		ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	15.0	50.0	199		ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	550		ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	111	70-130	
Toluene-d8	99	70-130	
4-Bromofluorobenzene	94	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-05-072717-0				Lab Sample ID: R250805			
Project Name: Northwest Pipe				Date Received: 07/28/17			
Sample Date: 07/27/17				Dilution Factor: 20			
Sample Time: 14:10				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	3.00	10.0	7.58	J	ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	3.00	10.0	1730		ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	3.00	10.0	170		ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	3.00	10.0	4130	E	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	106	70-130	
1,2-Dichloroethane-d4	112	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	94	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Client Sample ID: MW-05-072717-0DL				Lab Sample ID: R250805DL			
Project Name: Northwest Pipe				Date Received: 07/28/17			
Sample Date: 07/27/17				Dilution Factor: 100			
Sample Time: 14:10				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	15.0	50.0	15.0	U	ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	15.0	50.0	1420		ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	15.0	50.0	161		ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	15.0	50.0	3640		ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	102	70-130	
1,2-Dichloroethane-d4	112	70-130	
Toluene-d8	98	70-130	
4-Bromofluorobenzene	95	70-130	

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# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0728</b>				<b>Lab Sample ID: WB1-0728</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	0.15	0.50	0.15	U	ug/L	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	105	70-130	
1,2-Dichloroethane-d4	112	70-130	
Toluene-d8	105	70-130	
4-Bromofluorobenzene	97	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0728	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	20.0	19.8	ug/L	99	SW8260C	07/28/17
cis-1,2-Dichloroethene	156-59-2	20.0	19.5	ug/L	98	SW8260C	07/28/17
Trichloroethene (TCE)	79-01-6	20.0	18.2	ug/L	91	SW8260C	07/28/17
Tetrachloroethene (PCE)	127-18-4	20.0	18.3	ug/L	92	SW8260C	07/28/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	99	70-130	
1,2-Dichloroethane-d4	102	70-130	
Toluene-d8	101	70-130	
4-Bromofluorobenzene	98	70-130	

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 E=Estimated value above calibration range  
 \*=See case narrative

**CASE NARRATIVE  
GC/MS VOLATILES ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2508

---

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All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**

SW8260C-SIM: SW5030

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: TRIPBLANK-072717-03</b>				<b>Lab Sample ID: R250801</b>			
Project Name: Northwest Pipe				Date Received: 07/28/17			
Sample Date: 07/27/17				Dilution Factor: 1			
Sample Time: 08:00				Report Revision No.: 0			
Type: Grab							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	116	70-130	
1,2-Dichloroethane-d4	114	70-130	
Toluene-d8	90	70-130	
4-Bromofluorobenzene	122	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Client Sample ID: WB1-0731</b>				<b>Lab Sample ID: WB1-0731</b>			
Project Name: Northwest Pipe				Date Received: N/A			
Sample Date: N/A				Dilution Factor: 1			
Sample Time: N/A				Report Revision No.: 0			
Type: QC							
Matrix: Water							

Analyte	CAS#	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>								
Vinyl Chloride	75-01-4	8.00	20.0	8.00	U	ng/L	SW8260C-SI	07/31/17
Tetrachloroethene (PCE)	127-18-4	5.00	20.0	5.00	U	ng/L	SW8260C-SI	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	112	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	89	70-130	
4-Bromofluorobenzene	122	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information		Lab Information	
Project Name: Northwest Pipe		LCS ID: BS1W0731	
Type: QC		Report Revision No.: 0	
Matrix: Water		Dilution Factor: 1	

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC/MS Volatiles</b>							
Vinyl Chloride	75-01-4	250	213	ng/L	85	SW8260C-SIM	07/31/17
Tetrachloroethene (PCE)	127-18-4	250	223	ng/L	89	SW8260C-SIM	07/31/17

Surrogate	% Recovery	Control Limits	Qualifier
Dibromofluoromethane	110	70-130	
1,2-Dichloroethane-d4	109	70-130	
Toluene-d8	93	70-130	
4-Bromofluorobenzene	125	70-130	

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

**CASE NARRATIVE  
HEADSPACE ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2508

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
RSK-175

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: MW-06-072717-0	Lab Sample ID: R250802
Project Name: Northwest Pipe	Date Received: 07/28/17
Sample Date: 07/27/17	Report Revision No: 0
Sample Time: 10:15	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.11	41.0	214		ug/L	RSK-175	08/02/17
Carbon dioxide	124-38-9	1	36.8	222	78600		ug/L	RSK-175	08/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information					Lab Information				
Client Sample ID: MW-100-072717-0					Lab Sample ID: R250803				
Project Name: Northwest Pipe					Date Received: 07/28/17				
Sample Date: 07/27/17					Report Revision No: 0				
Sample Time: 10:30									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.11	41.0	382		ug/L	RSK-175	08/02/17
Carbon dioxide	124-38-9	1	36.8	222	80000		ug/L	RSK-175	08/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Client Sample ID: MW-03-072717-0	Lab Sample ID: R250804
Project Name: Northwest Pipe	Date Received: 07/28/17
Sample Date: 07/27/17	Report Revision No: 0
Sample Time: 12:25	
Type: Grab	
Matrix: Water	

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.09	40.8	2670		ug/L	RSK-175	08/02/17
Carbon dioxide	124-38-9	1	36.7	222	57600		ug/L	RSK-175	08/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information					Lab Information				
Client Sample ID: MW-05-072717-0					Lab Sample ID: R250805				
Project Name: Northwest Pipe					Date Received: 07/28/17				
Sample Date: 07/27/17					Report Revision No: 0				
Sample Time: 14:10									
Type: Grab									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	5.07	40.7	1190		ug/L	RSK-175	08/02/17
Carbon dioxide	124-38-9	1	36.7	222	63800		ug/L	RSK-175	08/02/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information					Lab Information				
Project Name: Northwest Pipe					Method Blank ID: XB1-0802				
Sample Date: N/A					Date Received: N/A				
Sample Time: N/A					Report Revision No: 0				
Type: QC									
Matrix: Water									

Analyte	CAS#	Dilution Factor	DL	RL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
<b>GC Volatiles</b>									
Methane	74-82-8	1	14.3	114	14.3	U	ug/L	RSK-175	08/02/17
Carbon dioxide	124-38-9	1	56.6	342	56.6	U	ug/L	RSK-175	08/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				LCS ID: BS1X0802 Report Revision No.: 0 Dilution Factor: 1			

Analyte	CAS#	Spike Amount	Sample Result	Units	%Recovery	Analysis Method	Date Analyzed
<b>GC Volatiles</b>							
Methane	74-82-8	593	588	ug/L	99	RSK-175	08/02/17
Carbon dioxide	124-38-9	3180	3070	ug/L	96	RSK-175	08/02/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
METALS ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2508

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

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**Method(s):**

E200.7: FLDFLT

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe				Lab Batch ID: R2508			
Date Received: 07/28/17				Report Revision No.: 0			
Type: See C.O.C.							
Matrix: Water							

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Result	Qual	Units	Date Analyzed
<b>Iron: E200.7</b>								
<i>Dissolved Metals</i>								
MW-06-072717-0	R250802F	1	10.0	100	3240		ug/L	08/02/17
MW-100-072717-0	R250803F	1	10.0	100	3220		ug/L	08/02/17
MW-03-072717-0	R250804F	1	10.0	100	6310		ug/L	08/02/17
MW-05-072717-0	R250805F	1	10.0	100	2140		ug/L	08/02/17
<i>Total Metals</i>								
WB10-0802	WB10-0802	1	10.0	100	10.0	U	ug/L	08/02/17

U=Not detected and reported as less than detection limit

J=Estimated value below reporting limit

E=Estimated value above calibration range

\*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information	Lab Information
Project Name: Northwest Pipe Type: QC Matrix: Water	Blank Spike ID: BS10W0802 Report Revision No: 0 Dilution Factor: 1

Analyte	Spike Amount	Result	Units	%Recovery	Analysis Method	Prep Method	Date Analyzed
<b>Metals</b>							
Iron	50000	51300	ug/L	103	E200.7	E200.2	08/02/17

U=Not detected and report as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2508

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

Calculations are performed before rounding to minimize errors in calculated values.

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**Method(s):**  
E300.0A

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name:</b> Northwest Pipe		<b>Lab Batch ID:</b> R2508	
Date Received: 07/28/17		Analysis Method: E300.0A	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Chloride RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-06-072717-0	R250802	1	0.020	0.20	5.18		08/03/17
MW-100-072717-0	R250803	1	0.020	0.20	5.21		08/03/17
MW-03-072717-0	R250804	1	0.020	0.20	5.19		08/03/17
MW-05-072717-0	R250805	2	0.040	0.40	6.53		08/03/17
WB1-0803	WB1-0803	1	0.020	0.20	0.096	J	08/03/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: R2508</b>			
Date Received: 07/28/17				Analysis Method: E300.0A			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Sulfate Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-06-072717-0	R250802	1	0.040	0.20	13.7		08/03/17
MW-100-072717-0	R250803	1	0.040	0.20	13.6		08/03/17
MW-03-072717-0	R250804	1	0.040	0.20	9.48		08/03/17
MW-05-072717-0	R250805	2	0.080	0.40	20.9		08/03/17
WB1-0803	WB1-0803	1	0.040	0.20	0.040	U	08/03/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2508 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0803	Chloride	5.00	5.11	mg/L	102	E300.0A	08/03/17
BS1W0803	Sulfate	5.00	4.87	mg/L	97	E300.0A	08/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2508

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. For diluted samples, the reporting limits are adjusted for the dilution required.

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All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
E353.2

# TestAmerica ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: R2508</b>			
Date Received: 07/28/17				Analysis Method: E353.2			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Nitrate-N RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-06-072717-0	R250802	1	0.0028	0.010	0.0084	J	07/28/17 13:23
MW-100-072717-0	R250803	1	0.0028	0.010	0.010		07/28/17 13:24
MW-03-072717-0	R250804	1	0.0028	0.010	0.011		07/28/17 13:25
MW-05-072717-0	R250805	4	0.011	0.040	1.05		07/28/17 13:40
WB1-072817	WB1-072817	1	0.0028	0.010	0.0028	U	07/28/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
<b>Project Name: Northwest Pipe</b>				<b>Lab Batch ID: R2508</b>			
Date Received: 07/28/17				Analysis Method: E353.2			
Type: See C.O.C.				Units: mg/L			
Matrix: Water				Report Revision No.: 0			

Client Sample ID	Lab Sample ID	Dilution Factor	DL	RL	Nitrite-N Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-06-072717-0	R250802	1	0.0030	0.010	0.0030	U	07/28/17 12:59
MW-100-072717-0	R250803	1	0.0030	0.010	0.0036	J	07/28/17 13:00
MW-03-072717-0	R250804	1	0.0030	0.010	0.0067	J	07/28/17 13:01
MW-05-072717-0	R250805	1	0.0030	0.010	0.0086	J	07/28/17 13:01
WB1-072817	WB1-072817	1	0.0030	0.010	0.0030	U	07/28/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2508 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS1W0728	Nitrite-N	0.76	0.81	mg/L	107	E353.2	07/28/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# TestAmerica ASL

Client Information	Lab Information
<b>Client Sample ID: MW-05-072717-0</b>	
Project Name: Northwest Pipe	Report Revision No.: 0
Type: QC	
Matrix: Water	

Analyte	CAS#	MS %Recovery	MSD %Recovery	RPD	QC Limits	RPD Limits	Analysis Method
<b>General Chemistry</b>							
Nitrite-N	14797-65-0	104	102	1	90-110	15	E353.2

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

**CASE NARRATIVE  
GENERAL CHEMISTRY ANALYSIS**

**Project:** Northwest Pipe

**ASL SDG#:** R2508

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With the exceptions noted as flags, footnotes, or detailed in the section below; standard operating procedures were followed in the analysis of the samples and no problems were encountered or anomalies observed.

All laboratory quality control samples were within established control limits, with any exceptions noted below, or in the associated QC summary forms.

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Calculations are performed before rounding to minimize errors in calculated values.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the section below, or in the sample receipt documentation.

**Method(s):**  
SM5310B

# TestAmerica ASL

Client Information		Lab Information	
<b>Project Name: Northwest Pipe</b>		<b>Lab Batch ID: R2508</b>	
Date Received: 07/28/17		Analysis Method: SM5310B	
Type: See C.O.C.		Units: mg/L	
Matrix: Water		Report Revision No.: 0	

Client Sample ID	Lab Sample ID	Dilution Factor	DL	Total Organic Carbon RL	Result	Qualifier	Date Analyzed
<b>General Chemistry</b>							
MW-06-072717-0	R250802	1	0.20	0.50	1.05		08/03/17
MW-100-072717-0	R250803	1	0.20	0.50	1.16		08/03/17
MW-03-072717-0	R250804	1	0.20	0.50	1.33		08/03/17
MW-05-072717-0	R250805	1	0.20	0.50	1.28		08/03/17
WB2-0802	WB2-0802	1	0.20	0.50	0.20	U	08/02/17

U=Not detected and reported as less than detection limit  
 J=Estimated value below reporting limit  
 E=Estimated value above calibration range  
 \*=See case narrative

B=Analyte detected in blank

# TestAmerica ASL

Client Information				Lab Information			
Project Name: Northwest Pipe Type: QC Matrix: Water				Lab Batch ID: R2508 Report Revision No.: 0			

LCS ID	Analyte	Spike Amount	Sample Result	Units	% Recovery	Analysis Method	Date Analyzed
<b>General Chemistry</b>							
BS2W0802	Total Organic Carbon	5.00	4.76	mg/L	95	SM5310B	08/03/17

U=Not detected and reported as less than detection limit  
J=Estimated value below reporting limit  
E=Estimated value above calibration range  
\*=See case narrative

# Chain of Custody Record

Client Contact		Analysis Turnaround Time				Preservation Used					For Lab Use Only:				
		Sample Date	Sample Time	Sample Type (Co-Comp, G, Gmb)	Matrix (Wet, Soil, Air)	Total # of Cont.	2	2	3	4	1	1	SDG: 23508	Custody Seals Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Project Name: NWP		TAT is Calendar days									Hand delivered? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
Project # or PO #: 682722 GW.05		TAT if different from below									Cooler Temp: 1.16 °C				
Company Name: CH2M Hill		<input type="checkbox"/> 14 days * <input type="checkbox"/> 7 days * <input type="checkbox"/> 5 days * <input checked="" type="checkbox"/> 21 days (STD) <input type="checkbox"/> 3 day * <input type="checkbox"/> 2 days * <input type="checkbox"/> 1 day *									Therm ID No.: P3 Therm Exp. 10/14/17				
Address: 2020 SW 4th Ave Ste. 300		* (Surcharges will apply)									Packing Material: Circle Below (See Blue Ice Box Bubble Wrap)				
City/State/Zip: Portland, OR 97201											Radiological Screen? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
Project Manager: Gretchen Gee											Sample Specific Notes:				
Phone #: _____											Lab ID:				
Report to email: gretchen.gee@ch2m.com															
Sample Identification (Limit of 20 characters)		Sample Date	Sample Time	Sample Type	Matrix	Total # of Cont.	SW260C (WOC)	SW260SIM (WOC)	SM5310 (Gen Chem H2S)	E200.7 (Metals)	(Cd, Cr, Ni, Pb, Cu, Zn, Fe, Mn, Al, Ag, As, Ba, Be, Bi, Br, Ca, Co, Cs, D, H, Hg, K, Li, Mg, Mo, Ni, O, P, Se, Si, Sr, Tl, U, V, W, Y, Zn)	E300.0 (E303.2)	RSK 175	1	
TRIP BLANK-072717-03		7/27/17	0800	G	W	4								2	
MW-06-072717-0		7/27/17	1015	G	W	12								3	
MW-100-072717-0		7/27/17	1030	G	W	12								3	
MW-03-072717-0		7/27/17	1225	G	W	12								3	
MW-05-072717-0		7/27/17	1410	G	W	12								3	
-NAW-JUP														5	
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other															
Possible Hazard Identification:															
Are samples hazardous? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No															
If YES, select hazard(s): <input type="checkbox"/> Listed <input type="checkbox"/> Ignitable <input type="checkbox"/> Corrosive <input type="checkbox"/> Reactive <input type="checkbox"/> Toxic															
If YES or NO is not checked above, samples will be assumed hazardous and hazardous disposal fees will be applied.															
Sampled By: Jennifer Ulrich		Date/Time: 7/27/17	1410											Date/Time: 7/27/17	1545
Received by: _____		Date/Time: _____	_____											Date/Time: _____	_____
Received in Laboratory by: _____		Date/Time: 7/28/17	1030											Date/Time: _____	_____
Special Instructions/CC Requirements		Relinquished by: Jennifer Ulrich Relinquished by: _____ Shipped Via: <input type="checkbox"/> UPS <input checked="" type="checkbox"/> Fed-Ex <input type="checkbox"/> USPS <input type="checkbox"/> Other Tracking #: _____ 'E200.7 Field Filtered for all shipments from 7/25-7/27/17													

SDG ID: R2508

Date Received: 7/28/2017

Client/Project: Northwest Pipe

Received by: PC

Were custody seals intact and on the outside of the cooler?  Yes  No  N/A

Shipping Record:  Hand Delivered  On File  COC

Radiological Screening for DoD  Yes  No  N/A

Packing Material:  Hand Delivered  Ice  Blue Ice  Box

Temp OK? (<6C) Therm ID: TH173 Exp. 10/14/17 1.6°C  Yes  No  N/A

Was a Chain of Custody (CoC) Provided?  Yes  No  N/A

Was the CoC correctly filled out (If No, document below)  Yes  No  N/A

Did sample labels agree with COC? (If No, document below)  Yes  No  N/A

Did the CoC list a correct bottle count and the preservative types (No=Correct on CoC)  Yes  No  N/A

Were the sample containers in good condition (not broken or leaking)?  Yes  No  N/A

Was enough sample volume provided for analysis? (If No, document below)  Yes  No  N/A

Containers supplied by ASL?  Yes  No  N/A

Any sample with < 1/2 holding time remaining? If so contact LPM and document below.  Yes  No  N/A

Samples have multi-phase? If yes, document on SRER  Yes  No  N/A

All water VOCs free of air bubbles? No, document on SRER  Yes  No  N/A

pH of all samples met criteria on receipt? If "No", preserve and document below.  Yes  No  N/A

Dissolved/Soluble metals filtered in the field?  Yes  No  N/A

Dissolved/Soluble metals have sediment in bottom of container? If so document below.  Yes  No  N/A

**Preservation Adjustment**

Sample ID	Reagent	Reagent Lot Number	Volume Added	Initials/Date-Time	24 hour pH check Initials/Time

Did pH of all metals samples preserved upon receipt meet criteria 24 hours after preservation?  Yes  No

**Sample Exception Report** (The following exceptions were noted)

1. Nitrate sample for MW-06-072717-0 (R250802) received with less than half holding time remaining.

Client was notified on: Client contact:

Resolution to Exception:

# Attachment D Data Validation Reports

# Event 1: 2016, Quarter 4

# Groundwater Data Quality Evaluation for Northwest Pipe Company, Portland, Oregon

PREPARED FOR: Stephanie Heldt-Sheller/Northwest Pipe Company  
Dave Bennett/Northwest Pipe Company

PREPARED BY: Jamie Beckett/CH2M

REVIEWED BY: Bernice Kidd/CH2M

REFERENCE: Northwest Pipe Company GWM 4Q Event – October 25, 2016 and  
October 26, 2016

DATE: December 6, 2016

## Introduction

The objective of this data quality evaluation (DQE) is to assess the representativeness and usability of data quality for groundwater quality samples collected to monitor the Groundwater at the Northwest Pipe Company. The rationale for monitoring, the data quality objectives (DQOs), and the method for performing this DQE is provided in the *Final Supplemental Groundwater Sampling and Data Quality Evaluation*, Northwest Pipe Company, Oregon, August 2016 (hereafter referred to as the *NWP SAP*).

This DQE report includes evaluation of groundwater quality data from 10 groundwater samples collected in accordance with the *NWP SAP* on October 25 and October 26, 2016. This DQE report is intended as a general data quality assessment designed to summarize data issues, and written in accordance with *National Functional Guidelines (NFGs) for Superfund Organic Methods Data Review* (EPA, 2016) and *National Functional Guidelines (NFGs) for Inorganic Superfund Methods Data Review* (EPA, 2016).

## Findings

The overall summaries of the data validation findings are contained in Tables 1 through 6 and summarized in the method sections that follow:

- **Table 1:** Sample Summary by Chain of Custody – Data Summary. Presents the sample identifiers, sampling dates, and SDG sorted by chain-of-custody (COC) number.
- **Table 2:** Sample Chronology – Data Summary. Presents the sample identifiers, methods, sampling dates, received dates, extraction dates, and analysis dates sorted by SDG number.
- **Table 3:** Overall Flagging Summary. Presents the number of occurrences for each data validation reason by method.
- **Table 4:** Temperature – Qualified Data. Presents the data qualified because of temperature exceedances.

- **Table 5:** Field Duplicate Precision – Results. Presents the relative percent differences (RPDs) for all data with FD pair detects above the RL.
- **Table 6:** Site Completeness by Analyte – Qualified Data. Presents the percent completeness by method, analyte, and matrix.

## Analytical Data

This DQE report includes 10 normal groundwater samples and one FD collected on October 25 and October 26, 2016. These samples were reported under two sample delivery groups: Q3331 and Q3342. A list of samples included in this DQE are presented in Table 1. Seven methods were used to analyze the groundwater samples and are provided in Table 2. The analyses were performed by Applied Sciences Laboratory, Corvallis, Oregon. Samples were collected and delivered by overnight carrier to the laboratory.

The data were assessed according to the requirements of the *NWP SAP* and included a review of:

1. chain of custody documentation;
2. holding-time compliance;
3. required quality control (QC) samples at the specified frequencies;
4. flagging for method blanks;
5. laboratory control sample/laboratory control sample duplicates (LCS/LCSD);
6. matrix spike/matrix spike duplicate (MS/MSD) recoveries;

and other method-specific criteria as defined by the *NWP SAP*.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included the review of a FD.

Data flags were assigned according to the *NFGs*. These flags, as well as the reason for each flag, are entered into the electronic database and can be found in Table 3. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will be only one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are defined below:

- J = the analyte was detected, but the associated numerical value is considered an estimated quantity.
- R = the sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified. No associated value is reported.
- U = the analyte was analyzed for but was not detected above the detection limit.
- UJ = the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

## Overall Flagging Summary

The overall summaries of the data validation findings are summarized in the following sections. Table 3 provides a flagging summary of overall occurrences for each data validation reason by method.

### Temperature

Temperature requirements were generally met. See Table 4 for the following exceptions:

Four samples for chloride and sulfate were received outside of temperature for Method E300.0A. Eight associated detected results were qualified as estimated and flagged "J".

Four samples for nitrate-N were received outside of temperature for Method E353.2. Four associated detected results were qualified as estimated and flagged "J".

Four samples for carbon dioxide and methane were received outside of temperature for Method RSK-175. Eight associated detected results were qualified as estimated and flagged "J".

Four samples for total organic carbon were received outside of temperature for Method SM5310B. Four associated detected results were qualified as estimated and flagged "J".

Four samples for cis-1,2-dichloroethene and trichloroethene were received outside of temperature for Method SW8260C. Three associated detected results were qualified as estimated and flagged "J". Five associated non-detected results were qualified as estimated and flagged "UJ".

Four samples for tetrachloroethene and vinyl chloride were received outside of temperature for Method SW8260C-SIM. Six associated detected results were qualified as estimated and flagged "J". Two associated non-detected results were qualified as estimated and flagged "UJ".

### Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination.

### Field Duplicates

In accordance with the *NWP SAP*, one field duplicate (FD) was collected from well MW06, and all precision criteria were met.

Table 5 shows the RPD between the primary (P) sample and FD, and was calculated for detected results above the RL using the following equation:

$$RPD = 100 * [ (P1 - FD1) / (P1 + FD1) / 2 ]$$

### Laboratory Control Samples

LCS were analyzed at the required frequency and the accuracy and precision criteria were met.

### Holding Times

All holding-time criteria were met.

### Chain of Custody

There were no discrepancies.

## Overall Assessment

The final activity in the DQE is an assessment of whether the data meets the data quality objectives. The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The precision, accuracy, representativeness, completeness and comparability are addressed in the *NWP SAP*. The following summary highlights the data evaluation findings for the above defined events:

1. No data were rejected and completeness was 100 percent for all method/matrix/analyte combinations as shown in Table 6.
2. Temperature exceedances were observed for Methods E300.0A, E353.2, RSK-175, SM5310B, SW8260C and SW8260C-SIM; 40 results were qualified as estimated.
3. The precision and accuracy of the data, as measured by field and laboratory QC indicators, suggests that the *NWP SAP* goals for project use were met.
4. The field crew followed the *NWP SAP* and project documents.

## Works Cited

CH2M Hill, Inc. 2016. *Final Supplemental Groundwater Sampling and Data Evaluation (referenced herein as the NWP SAP)*, Northwest Pipe Company, Oregon. August.

EPA, 2016. *National Functional Guidelines for Superfund Organic Methods Data Review*. September.

EPA, 2016. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. September.

**TABLE 1****Sample Summary by COC - Data Summary**

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
Q3331	25-Oct-16	WATER	T4S1MW03S-102516-0 / N	Q3331	CHMC
			T4S1MW09-102516-0 / N	Q3331	CHMC
			T4S1MW22-102516-0 / N	Q3331	CHMC
			T4S1MW23-102516-0 / N	Q3331	CHMC
			TRIPBLANK_102516 / TB	Q3331	CHMC
Q3342	26-Oct-16	WATER	MW01-102616-0 / N	Q3342	CHMC
			MW02-102616-0 / N	Q3342	CHMC
			MW03-102616-0 / N	Q3342	CHMC
			MW04-102616-0 / N	Q3342	CHMC
			MW05-102616-0 / N	Q3342	CHMC
			MW06-102616-0 / N	Q3342	CHMC
			MW06-102616-1 / FD	Q3342	CHMC
TRIPBLANK_102616 / TB	Q3342	CHMC			

**QAQC Type**

N = normal environmental sample

FD = field duplicate

TB = trip blank

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	Q3331	T4S1MW03S-102516-0	E200.7F	10/25/2016	10/26/2016	11/2/2016	11/4/2016
		T4S1MW03S-102516-0	E300.0A	10/25/2016	10/26/2016		10/30/2016
		T4S1MW03S-102516-0	E300.0A	10/25/2016	10/26/2016		11/3/2016
		T4S1MW03S-102516-0	E353.2	10/25/2016	10/26/2016		10/26/2016
		T4S1MW03S-102516-0	RSK-175	10/25/2016	10/26/2016	10/31/2016	10/31/2016
		T4S1MW03S-102516-0	SM5310B	10/25/2016	10/26/2016		10/31/2016
		T4S1MW03S-102516-0	SW8260C	10/25/2016	10/26/2016	10/27/2016	10/27/2016
		T4S1MW03S-102516-0	SW8260C-SIM	10/25/2016	10/26/2016	11/3/2016	11/3/2016
		T4S1MW09-102516-0	E200.7F	10/25/2016	10/26/2016	11/2/2016	11/4/2016
		T4S1MW09-102516-0	E300.0A	10/25/2016	10/26/2016		10/30/2016
		T4S1MW09-102516-0	E353.2	10/25/2016	10/26/2016		10/26/2016
		T4S1MW09-102516-0	RSK-175	10/25/2016	10/26/2016	10/31/2016	10/31/2016
		T4S1MW09-102516-0	SM5310B	10/25/2016	10/26/2016		10/31/2016
		T4S1MW09-102516-0	SW8260C	10/25/2016	10/26/2016	10/27/2016	10/27/2016
		T4S1MW09-102516-0	SW8260C-SIM	10/25/2016	10/26/2016	11/3/2016	11/3/2016
		T4S1MW22-102516-0	E200.7F	10/25/2016	10/26/2016	11/2/2016	11/4/2016
		T4S1MW22-102516-0	E300.0A	10/25/2016	10/26/2016		10/31/2016
		T4S1MW22-102516-0	E353.2	10/25/2016	10/26/2016		10/26/2016
		T4S1MW22-102516-0	RSK-175	10/25/2016	10/26/2016	10/31/2016	10/31/2016
		T4S1MW22-102516-0	SM5310B	10/25/2016	10/26/2016		10/31/2016
		T4S1MW22-102516-0	SW8260C	10/25/2016	10/26/2016	10/27/2016	10/27/2016
		T4S1MW22-102516-0	SW8260C-SIM	10/25/2016	10/26/2016	11/3/2016	11/3/2016
		T4S1MW23-102516-0	E200.7F	10/25/2016	10/26/2016	11/2/2016	11/4/2016
		T4S1MW23-102516-0	E300.0A	10/25/2016	10/26/2016		10/31/2016
		T4S1MW23-102516-0	E353.2	10/25/2016	10/26/2016		10/26/2016
		T4S1MW23-102516-0	RSK-175	10/25/2016	10/26/2016	10/31/2016	10/31/2016
		T4S1MW23-102516-0	SM5310B	10/25/2016	10/26/2016		10/31/2016
	T4S1MW23-102516-0	SW8260C	10/25/2016	10/26/2016	10/27/2016	10/27/2016	
	T4S1MW23-102516-0	SW8260C-SIM	10/25/2016	10/26/2016	11/3/2016	11/3/2016	
	TRIPBLANK_102516	SW8260C	10/25/2016	10/26/2016	10/27/2016	10/27/2016	
	TRIPBLANK_102516	SW8260C-SIM	10/25/2016	10/26/2016	11/3/2016	11/3/2016	
	Q3342	MW01-102616-0	E200.7F	10/26/2016	10/27/2016	11/2/2016	11/4/2016
		MW01-102616-0	E300.0A	10/26/2016	10/27/2016		11/3/2016
MW01-102616-0		E353.2	10/26/2016	10/27/2016		10/27/2016	
MW01-102616-0		RSK-175	10/26/2016	10/27/2016	10/31/2016	10/31/2016	

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	Q3342	MW01-102616-0	SM5310B	10/26/2016	10/27/2016		10/31/2016
		MW01-102616-0	SW8260C	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW02-102616-0	E200.7F	10/26/2016	10/27/2016	11/2/2016	11/4/2016
		MW02-102616-0	E300.0A	10/26/2016	10/27/2016		11/3/2016
		MW02-102616-0	E353.2	10/26/2016	10/27/2016		10/27/2016
		MW02-102616-0	RSK-175	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW02-102616-0	SM5310B	10/26/2016	10/27/2016		10/31/2016
		MW02-102616-0	SW8260C	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW02-102616-0	SW8260C-SIM	10/26/2016	10/27/2016	11/3/2016	11/3/2016
		MW03-102616-0	E200.7F	10/26/2016	10/27/2016	11/2/2016	11/4/2016
		MW03-102616-0	E300.0A	10/26/2016	10/27/2016		11/3/2016
		MW03-102616-0	E353.2	10/26/2016	10/27/2016		10/27/2016
		MW03-102616-0	RSK-175	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW03-102616-0	SM5310B	10/26/2016	10/27/2016		10/31/2016
		MW03-102616-0	SW8260C	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW04-102616-0	E200.7F	10/26/2016	10/27/2016	11/2/2016	11/4/2016
		MW04-102616-0	E300.0A	10/26/2016	10/27/2016		11/3/2016
		MW04-102616-0	E353.2	10/26/2016	10/27/2016		10/27/2016
		MW04-102616-0	RSK-175	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW04-102616-0	SM5310B	10/26/2016	10/27/2016		10/31/2016
		MW04-102616-0	SW8260C	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW04-102616-0	SW8260C	10/26/2016	10/27/2016	11/1/2016	11/1/2016
		MW05-102616-0	E200.7F	10/26/2016	10/27/2016	11/2/2016	11/4/2016
		MW05-102616-0	E300.0A	10/26/2016	10/27/2016		11/3/2016
		MW05-102616-0	E300.0A	10/26/2016	10/27/2016		11/4/2016
		MW05-102616-0	E353.2	10/26/2016	10/27/2016		10/27/2016
		MW05-102616-0	RSK-175	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW05-102616-0	SM5310B	10/26/2016	10/27/2016		10/31/2016
		MW05-102616-0	SW8260C	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW05-102616-0	SW8260C	10/26/2016	10/27/2016	11/1/2016	11/1/2016
		MW06-102616-0	E200.7F	10/26/2016	10/27/2016	11/2/2016	11/4/2016
		MW06-102616-0	E300.0A	10/26/2016	10/27/2016		11/3/2016
		MW06-102616-0	E353.2	10/26/2016	10/27/2016		10/27/2016
		MW06-102616-0	RSK-175	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW06-102616-0	SM5310B	10/26/2016	10/27/2016		10/31/2016

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	Q3342	MW06-102616-0	SW8260C	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW06-102616-0	SW8260C	10/26/2016	10/27/2016	11/1/2016	11/1/2016
		MW06-102616-1	E200.7F	10/26/2016	10/27/2016	11/2/2016	11/4/2016
		MW06-102616-1	E300.0A	10/26/2016	10/27/2016		11/3/2016
		MW06-102616-1	E353.2	10/26/2016	10/27/2016		10/27/2016
		MW06-102616-1	RSK-175	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW06-102616-1	SM5310B	10/26/2016	10/27/2016		11/1/2016
		MW06-102616-1	SW8260C	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		MW06-102616-1	SW8260C	10/26/2016	10/27/2016	11/1/2016	11/1/2016
		TRIPBLANK_102616	SW8260C	10/26/2016	10/27/2016	10/31/2016	10/31/2016
		TRIPBLANK_102616	SW8260C-SIM	10/26/2016	10/27/2016	11/3/2016	11/3/2016

**TABLE 3****Overall Flagging Summary**

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
E300.0A	WATER				
	Category = Temperature	Temperature blank > 6 degrees C	J	Other	8
E353.2	WATER				
	Category = Temperature	Temperature blank > 6 degrees C	J	Other	4
RSK-175	WATER				
	Category = Temperature	Temperature blank > 6 degrees C	J	Other	8
SM5310B	WATER				
	Category = Temperature	Temperature blank > 6 degrees C	J	Other	4
SW8260C	WATER				
	Category = Temperature	Temperature blank > 6 degrees C	UJ	Other	5
			J	Other	3
SW8260C-SIM	WATER				
	Category = Temperature	Temperature blank > 6 degrees C	UJ	Other	2
			J	Other	6

**TABLE 3**

**Overall Flagging Summary**

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<b>Method</b>	<b>Matrix</b>	<b>Validation Reason</b>	<b>Qualifier*</b>	<b>Qualifier Type</b>	<b>Number of Affected Analytes</b>
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\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

J = The analyte was positively identified, and the quantitation is an estimation because of discrepancies in meeting certain analyte-specific quality control criteria.

UJ = The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

**Qualifier Type:**

Protocol = Flagging due to contractor/laboratory protocol violations.

Other = Flagging due to sample, matrix, or field issues not related to Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan (SAP) protocol.



**TABLE 4**  
**Temperature Exceedance - Qualified Data**

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments	
SW8260C	WATER	T4S1MW22-102516-0	2.77 UG/L	J	TEMP>6C	Temp = 7.8C	
		T4S1MW23-102516-0	0.7 UG/L	J	TEMP>6C	Temp = 7.8C	
		<b>Trichloroethene (TCE)</b>					
		T4S1MW03S-102516-0	0.15 UG/L	UJ	TEMP>6C	Temp = 7.8C	
		T4S1MW09-102516-0	0.15 UG/L	UJ	TEMP>6C	Temp = 7.8C	
SW8260C-SIM	WATER	T4S1MW22-102516-0	4.6 UG/L	J	TEMP>6C	Temp = 7.8C	
		T4S1MW23-102516-0	0.15 UG/L	UJ	TEMP>6C	Temp = 7.8C	
		<b>Tetrachloroethene (PCE)</b>					
		T4S1MW03S-102516-0	112 NG/L	J	TEMP>6C	Temp = 7.8C	
		T4S1MW09-102516-0	19.1 NG/L	J	TEMP>6C	Temp = 7.8C	
SW8260C-SIM	WATER	T4S1MW22-102516-0	1460 NG/L	J	TEMP>6C	Temp = 7.8C	
		T4S1MW23-102516-0	1590 NG/L	J	TEMP>6C	Temp = 7.8C	
		<b>Vinyl Chloride</b>					
		T4S1MW03S-102516-0	8 NG/L	UJ	TEMP>6C	Temp = 7.8C	
		T4S1MW09-102516-0	19.7 NG/L	J	TEMP>6C	Temp = 7.8C	
		T4S1MW22-102516-0	49.9 NG/L	J	TEMP>6C	Temp = 7.8C	
		T4S1MW23-102516-0	8 NG/L	UJ	TEMP>6C	Temp = 7.8C	

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

J = The analyte was positively identified, and the quantitation is an estimation because of discrepancies in meeting certain analyte-specific quality control criteria.

UJ = The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

**Criteria:**

TEMP>6C = Temperature blank > 6 degrees C

**TABLE 5**  
**Field Duplicate Precision**

*Sorted by Method and Normal Sample ID*

Method	Normal Sample ID	Matrix	Analyte	SDG	Result	Field Duplicate	Result	Calculated RPD	Criteria
<b>E200.7F</b>									
	MW06-102616-0	WATER	Iron, dissolved	Q3342	7290	MW06-102616-1	7400	1.5	50
<b>E300.0A</b>									
	MW06-102616-0	WATER	Chloride	Q3342	5.07	MW06-102616-1	5.05	0.4	30
	MW06-102616-0	WATER	Sulfate	Q3342	5.17	MW06-102616-1	5.36	3.61	30
<b>E353.2</b>									
	MW06-102616-0	WATER	Nitrate-N	Q3342	0.016	MW06-102616-1	0.017	6.06	30
<b>RSK-175</b>									
	MW06-102616-0	WATER	Carbon dioxide	Q3342	57100	MW06-102616-1	59500	4.12	30
	MW06-102616-0	WATER	Methane	Q3342	2280	MW06-102616-1	2040	11.11	30
<b>SM5310B</b>									
	MW06-102616-0	WATER	Total Organic Carbon	Q3342	1.25	MW06-102616-1	1.15	8.33	30
<b>SW8260C</b>									
	MW06-102616-0	WATER	Trichloroethene (TCE)	Q3342	60.4	MW06-102616-1	70.9	15.99	30

RPDs for actual validation may be calculated differently.

**TABLE 6**  
**Site Completeness by Analyte - Qualified Data**

Method	Analyte	Units	Number of Occurrences					Contractor R-Flags	Total Contractor Completeness (%)	Overall Completeness (%)
			Analyses	Detects	Non- detects	Blank Flags	J-Flags			
E200.7F	Iron, dissolved	UG/L	11	10	1		1		100	100
E300.0A	Chloride	MG/L	11	11			4		100	100
E300.0A	Sulfate	MG/L	11	11			4		100	100
E353.2	Nitrate-N	MG/L	11	11			4		100	100
RSK-175	Carbon dioxide	UG/L	11	11			4		100	100
RSK-175	Methane	UG/L	11	11			4		100	100
SM5310B	Total Organic Carbon	MG/L	11	11			4		100	100
SW8260C	cis-1,2-Dichloroethene	UG/L	11	8	3		4		100	100
SW8260C	Tetrachloroethene (PCE)	UG/L	6	6					100	100
SW8260C	Trichloroethene (TCE)	UG/L	11	7	4		4		100	100
SW8260C	Vinyl Chloride	UG/L	6	6					100	100
SW8260C-SIM	Tetrachloroethene (PCE)	NG/L	5	5			4		100	100
SW8260C-SIM	Vinyl Chloride	NG/L	5	3	2		4		100	100

# Event 2: 2017, Quarter 1

# Groundwater Data Quality Evaluation for Northwest Pipe Company, Portland, Oregon

PREPARED FOR: Stephanie Heldt-Sheller/Northwest Pipe Company  
Dave Bennett/Northwest Pipe Company

PREPARED BY: Jamie Beckett/CH2M

REVIEWED BY: Bernice Kidd/CH2M

REFERENCE: Northwest Pipe Company GWM 1Q Event – February 1 and February 2, 2017

DATE: March 2, 2017

## Introduction

The objective of this data quality evaluation (DQE) is to assess the representativeness and usability of data quality for groundwater quality samples collected to monitor the groundwater at the Northwest Pipe Company. The rationale for monitoring, the data quality objectives (DQOs), and the method for performing this DQE is provided in the *Final Supplemental Groundwater Sampling and Data Evaluation*, Northwest Pipe Company, Oregon, August 2016 (hereafter referred to as the *NWP SAP*).

This DQE report includes evaluation of groundwater quality data from 10 groundwater samples collected in accordance with the *NWP SAP* on February 1 and February 2, 2016. This DQE report is intended as a general data quality assessment designed to summarize data issues, and written in accordance with *National Functional Guidelines (NFGs) for Superfund Organic Methods Data Review* (EPA, 2016) and *National Functional Guidelines (NFGs) for Inorganic Superfund Methods Data Review* (EPA, 2016).

## Findings

The overall summaries of the data validation findings are contained in Tables 1 through 6 and summarized in the method sections that follow:

- **Table 1:** Sample Summary by Chain of Custody – Data Summary. Presents the sample identifiers, sampling dates, and SDG sorted by chain-of-custody (COC) number.
- **Table 2:** Sample Chronology – Data Summary. Presents the sample identifiers, methods, sampling dates, received dates, extraction dates, and analysis dates sorted by SDG number.
- **Table 3:** Overall Flagging Summary. Presents the number of occurrences for each data validation reason by method.
- **Table 4:** Blank Contamination – Qualified Data.
- **Table 5:** Field Duplicate Precision – Results. Presents the relative percent differences (RPDs) for all data with FD pair detects above the RL.

- **Table 6:** Site Completeness by Analyte – Qualified Data. Presents the percent completeness by method, analyte, and matrix.

## Analytical Data

This DQE report includes 10 normal groundwater samples and one FD collected on February 1 and February 2, 2017. These samples were reported under two sample delivery groups: R1204 and R1213. A list of samples included in this DQE are presented in Table 1. Seven methods were used to analyze the groundwater samples and are provided in Table 2. The analyses were performed by Applied Sciences Laboratory, Corvallis, Oregon. Samples were collected and delivered by overnight carrier to the laboratory.

The data were assessed according to the requirements of the *NWP SAP* and included a review of:

1. chain of custody documentation;
2. holding-time compliance;
3. required quality control (QC) samples at the specified frequencies;
4. flagging for method blanks;
5. laboratory control sample/laboratory control sample duplicates (LCS/LCSD);
6. matrix spike/matrix spike duplicate (MS/MSD) recoveries;

and other method-specific criteria as defined by the *NWP SAP*.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included the review of a FD.

Data flags were assigned according to the *NFGs*. These flags, as well as the reason for each flag, are entered into the electronic database and can be found in Table 3. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will be only one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are defined below:

- J = the analyte was detected, but the associated numerical value is considered an estimated quantity.
- R = the sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified. No associated value is reported.
- U = the analyte was analyzed for but was not detected above the detection limit.
- UJ = the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

## Overall Flagging Summary

The overall summaries of the data validation findings are summarized in the following sections. Table 3 provides a flagging summary of overall occurrences for each data validation reason by method.

### Temperature

Temperature requirements were met.

### Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination that affected the sample results with Table 4 listing the following exception:

Iron, dissolved was detected below the RL in the method blank for Method E200.7F. One associated sample result was detected less than five times the blank concentration. The result was qualified as not detected and flagged "U".

### Field Duplicates

In accordance with the *NWP SAP*, one field duplicate (FD) was collected from well MW06, and all precision criteria were met.

Table 5 shows the RPD between the primary (P) sample and FD, and was calculated for detected results above the RL using the following equation:

$$RPD = 100 * [ (P1 - FD1) / (P1 + FD1) / 2 ]$$

### Laboratory Control Samples

LCS were analyzed at the required frequency and the accuracy and precision criteria were met.

### Results

Analysis for tetrachloroethene and vinyl chloride were analyzed by SW8260C in lieu of SW8260C-SIM in several samples due to the high target analyte results.

### Holding Times

All holding-time criteria were met.

### Chain of Custody

There were no discrepancies.

### Overall Assessment

The final activity in the DQE is an assessment of whether the data meets the data quality objectives. The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The precision, accuracy, representativeness, completeness and comparability are addressed in the *NWP SAP*. The following summary highlights the data evaluation findings for the above defined events:

1. No data were rejected and completeness was 100 percent for all method/matrix/analyte combinations as shown in Table 6.
2. Laboratory blank contamination observed for Method E200.7F; one result was qualified as estimated.

3. The precision and accuracy of the data, as measured by field and laboratory QC indicators, suggests that the *NWP SAP* goals for project use were met.
4. The field crew followed the *NWP SAP* and project documents.

## Works Cited

CH2M Hill, Inc. 2016. *Final Supplemental Groundwater Sampling and Data Evaluation (referenced herein as the NWP SAP)*, Northwest Pipe Company, Oregon. August.

EPA, 2016. *National Functional Guidelines for Superfund Organic Methods Data Review*. September.

EPA, 2016. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. September.

**TABLE 1**

**Sample Summary by COC - Data Summary**

CoC Number	Sample Date	Matrix	QAQC Type	Sample Identification	SDG	Laboratory
R1204	01-Feb-17	WATER	N	MW-02-020117-0	R1204	CHMC
			N	MW-04-020117-0	R1204	CHMC
			N	T4S1MW-03S-020117-0	R1204	CHMC
			N	T4S1MW-09-020117-0	R1204	CHMC
			N	T4S1MW-22-020117-0	R1204	CHMC
			N	T4S1MW-23-020117-0	R1204	CHMC
			TB	TRIPBLANK-020117-01	R1204	CHMC
R1213	02-Feb-17	WATER	N	MW-01-020217-0	R1213	CHMC
			N	MW-03-020217-0	R1213	CHMC
			N	MW-05-020217-0	R1213	CHMC
			N	MW-06-020217-0	R1213	CHMC
			FD	MW-06-020217-1	R1213	CHMC
			TB	TRIP BLANK-020217-1	R1213	CHMC

SDG = Sample delivery group  
 CHMC = Applied Sciences Laboratory  
**QAQC Type**  
 FD = Field Duplicate  
 N = Normal  
 TB = Trip Blank

**TABLE 2**

**Sample Chronology - Data Summary**

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	R1204	MW-02-020117-0	E200.7F	2/1/2017	2/2/2017	2/14/2017	2/14/2017
		MW-02-020117-0	E300.0A	2/1/2017	2/2/2017		2/2/2017
		MW-02-020117-0	E353.2	2/1/2017	2/2/2017		2/2/2017
		MW-02-020117-0	RSK-175	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		MW-02-020117-0	SM5310B	2/1/2017	2/2/2017		2/4/2017
		MW-02-020117-0	SW8260C	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		MW-02-020117-0	SW8260C-SIM	2/1/2017	2/2/2017	2/8/2017	2/8/2017
		MW-04-020117-0	E200.7F	2/1/2017	2/2/2017	2/14/2017	2/14/2017
		MW-04-020117-0	E300.0A	2/1/2017	2/2/2017		2/2/2017
		MW-04-020117-0	E353.2	2/1/2017	2/2/2017		2/2/2017
		MW-04-020117-0	RSK-175	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		MW-04-020117-0	SM5310B	2/1/2017	2/2/2017		2/4/2017
		MW-04-020117-0	SW8260C	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		MW-04-020117-0	SW8260C	2/1/2017	2/2/2017	2/6/2017	2/6/2017
		T4S1MW-03S-020117-0	E200.7F	2/1/2017	2/2/2017	2/14/2017	2/14/2017
		T4S1MW-03S-020117-0	E300.0A	2/1/2017	2/2/2017		2/2/2017
		T4S1MW-03S-020117-0	E353.2	2/1/2017	2/2/2017		2/2/2017
		T4S1MW-03S-020117-0	RSK-175	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		T4S1MW-03S-020117-0	SM5310B	2/1/2017	2/2/2017		2/4/2017
		T4S1MW-03S-020117-0	SW8260C	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		T4S1MW-03S-020117-0	SW8260C-SIM	2/1/2017	2/2/2017	2/8/2017	2/8/2017
		T4S1MW-09-020117-0	E200.7F	2/1/2017	2/2/2017	2/14/2017	2/14/2017
		T4S1MW-09-020117-0	E300.0A	2/1/2017	2/2/2017		2/2/2017
		T4S1MW-09-020117-0	E353.2	2/1/2017	2/2/2017		2/2/2017
		T4S1MW-09-020117-0	RSK-175	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		T4S1MW-09-020117-0	SM5310B	2/1/2017	2/2/2017		2/4/2017
		T4S1MW-09-020117-0	SW8260C	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		T4S1MW-09-020117-0	SW8260C-SIM	2/1/2017	2/2/2017	2/8/2017	2/8/2017
		T4S1MW-22-020117-0	E200.7F	2/1/2017	2/2/2017	2/14/2017	2/14/2017
		T4S1MW-22-020117-0	E300.0A	2/1/2017	2/2/2017		2/2/2017
		T4S1MW-22-020117-0	E353.2	2/1/2017	2/2/2017		2/2/2017
		T4S1MW-22-020117-0	RSK-175	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		T4S1MW-22-020117-0	SM5310B	2/1/2017	2/2/2017		2/4/2017
T4S1MW-22-020117-0	SW8260C	2/1/2017	2/2/2017	2/3/2017	2/3/2017		
T4S1MW-22-020117-0	SW8260C-SIM	2/1/2017	2/2/2017	2/8/2017	2/8/2017		
T4S1MW-23-020117-0	E200.7F	2/1/2017	2/2/2017	2/14/2017	2/14/2017		

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	R1204	T4S1MW-23-020117-0	E300.0A	2/1/2017	2/2/2017		2/2/2017
		T4S1MW-23-020117-0	E353.2	2/1/2017	2/2/2017		2/2/2017
		T4S1MW-23-020117-0	RSK-175	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		T4S1MW-23-020117-0	SM5310B	2/1/2017	2/2/2017		2/4/2017
		T4S1MW-23-020117-0	SW8260C	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		T4S1MW-23-020117-0	SW8260C-SIM	2/1/2017	2/2/2017	2/8/2017	2/8/2017
		TRIPBLANK-020117-01	SW8260C	2/1/2017	2/2/2017	2/3/2017	2/3/2017
		TRIPBLANK-020117-01	SW8260C-SIM	2/1/2017	2/2/2017	2/8/2017	2/8/2017
	R1213	MW-01-020217-0	E200.7F	2/2/2017	2/3/2017	2/8/2017	2/8/2017
		MW-01-020217-0	E300.0A	2/2/2017	2/3/2017		2/8/2017
		MW-01-020217-0	E353.2	2/2/2017	2/3/2017		2/3/2017
		MW-01-020217-0	RSK-175	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		MW-01-020217-0	SM5310B	2/2/2017	2/3/2017		2/9/2017
		MW-01-020217-0	SW8260C	2/2/2017	2/3/2017	2/6/2017	2/6/2017
		MW-01-020217-0	SW8260C	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		MW-03-020217-0	E200.7F	2/2/2017	2/3/2017	2/8/2017	2/8/2017
		MW-03-020217-0	E300.0A	2/2/2017	2/3/2017		2/8/2017
		MW-03-020217-0	E353.2	2/2/2017	2/3/2017		2/3/2017
		MW-03-020217-0	RSK-175	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		MW-03-020217-0	SM5310B	2/2/2017	2/3/2017		2/9/2017
		MW-03-020217-0	SW8260C	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		MW-03-020217-0	SW8260C	2/2/2017	2/3/2017	2/6/2017	2/6/2017
		MW-05-020217-0	E200.7F	2/2/2017	2/3/2017	2/8/2017	2/8/2017
		MW-05-020217-0	E300.0A	2/2/2017	2/3/2017		2/13/2017
		MW-05-020217-0	E300.0A	2/2/2017	2/3/2017		2/8/2017
		MW-05-020217-0	E353.2	2/2/2017	2/3/2017		2/3/2017
		MW-05-020217-0	RSK-175	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		MW-05-020217-0	SM5310B	2/2/2017	2/3/2017		2/9/2017
		MW-05-020217-0	SW8260C	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		MW-05-020217-0	SW8260C	2/2/2017	2/3/2017	2/6/2017	2/6/2017
		MW-06-020217-0	E200.7F	2/2/2017	2/3/2017	2/8/2017	2/8/2017
		MW-06-020217-0	E300.0A	2/2/2017	2/3/2017		2/8/2017
		MW-06-020217-0	E353.2	2/2/2017	2/3/2017		2/3/2017
MW-06-020217-0	RSK-175	2/2/2017	2/3/2017	2/3/2017	2/3/2017		
MW-06-020217-0	SM5310B	2/2/2017	2/3/2017		2/9/2017		
MW-06-020217-0	SW8260C	2/2/2017	2/3/2017	2/3/2017	2/3/2017		

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	R1213	MW-06-020217-0	SW8260C	2/2/2017	2/3/2017	2/6/2017	2/6/2017
		MW-06-020217-1	E200.7F	2/2/2017	2/3/2017	2/8/2017	2/8/2017
		MW-06-020217-1	E300.0A	2/2/2017	2/3/2017		2/8/2017
		MW-06-020217-1	E353.2	2/2/2017	2/3/2017		2/3/2017
		MW-06-020217-1	RSK-175	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		MW-06-020217-1	SM5310B	2/2/2017	2/3/2017		2/9/2017
		MW-06-020217-1	SW8260C	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		MW-06-020217-1	SW8260C	2/2/2017	2/3/2017	2/6/2017	2/6/2017
		TRIP BLANK-020217-1	SW8260C	2/2/2017	2/3/2017	2/3/2017	2/3/2017
		TRIP BLANK-020217-1	SW8260C-SIM	2/2/2017	2/3/2017	2/8/2017	2/8/2017

SDG = sample delivery group

CHMC = Applied Sciences Laboratory

**TABLE 3**

**Overall Flagging Summary**

<b>Method</b>	<b>Matrix</b>	<b>Validation Reason</b>	<b>Qualifier*</b>	<b>Qualifier Type</b>	<b>Number of Affected Analytes</b>
E200.7F	WATER				
Category = Blank		Laboratory blank contamination less than the reporting limit	U	Protocol	1

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

U = The analyte was analyzed for, but not detected.

**Qualifier Type:**

Protocol = Flagging due to contractor/laboratory protocol violations.

**TABLE 4**

**Blank Contamination - Qualified Data**

Analyte	Sample Identification	Result	Blank Contamination Qualifier*	Criteria	Comments
<b>Method (Matrix):</b> E200.7F (WATER)					
<b>Iron, dissolved</b>	MW-05-020217-0	13.7 UG/L	U	LB<RL	blank target = 19.8UG/L

UG/L = micrograms per liter

Blank target = concentration of field or laboratory blank.

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

U = The analyte was analyzed for, but not detected.

**Criteria:**

LB<RL = Laboratory blank contamination less than the reporting limit

**TABLE 5**  
**Field Duplicate Precision**

*Sorted by Method and Normal Sample ID*

Method	Normal Sample ID	Matrix	Analyte	SDG	Result	Field Duplicate	Result	Calculated RPD	Criteria
<b>E200.7F</b>									
	MW-06-020217-0	WATER	Iron, dissolved	R1213	6100	MW-06-020217-1	6090	0.16	50
<b>E300.0A</b>									
	MW-06-020217-0	WATER	Chloride	R1213	6.12	MW-06-020217-1	5.95	2.82	30
	MW-06-020217-0	WATER	Sulfate	R1213	9.27	MW-06-020217-1	9.09	1.96	30
<b>RSK-175</b>									
	MW-06-020217-0	WATER	Carbon dioxide	R1213	60500	MW-06-020217-1	62300	2.93	30
	MW-06-020217-0	WATER	Methane	R1213	623	MW-06-020217-1	666	6.67	30
<b>SM5310B</b>									
	MW-06-020217-0	WATER	Total Organic Carbon	R1213	1.15	MW-06-020217-1	1.12	2.64	30
<b>SW8260C</b>									
	MW-06-020217-0	WATER	Vinyl Chloride	R1213	51	MW-06-020217-1	53.9	5.53	30

'NC' = Not Calculated. RPD is calculated if both the normal and duplicate results are greater than the reporting limit. RPDs for actual validation may be calculated differently.

**TABLE 6**  
**Site Completeness by Analyte - Qualified Data**

Method	Analyte	Units	Number of Occurrences					Contractor R-Flags	Total Contractor Completeness (%)	Overall Completeness (%)
			Analyses	Detects	Non- detects	Blank Flags	J-Flags			
E200.7F	Iron, dissolved	UG/L	11	8	3				100	100
E300.0A	Chloride	MG/L	11	11					100	100
	Sulfate	MG/L	11	11					100	100
E353.2	Nitrate-N	MG/L	11	9	2		1		100	100
RSK-175	Carbon dioxide	UG/L	11	11					100	100
	Methane	UG/L	11	11			1		100	100
SM5310B	Total Organic Carbon	MG/L	11	11			1		100	100
SW8260C	cis-1,2-Dichloroethene	UG/L	11	9	2		1		100	100
	Tetrachloroethene (PCE)	UG/L	6	6					100	100
	Trichloroethene (TCE)	UG/L	11	8	3		1		100	100
	Vinyl Chloride	UG/L	6	6					100	100
SW8260C-SIM	Tetrachloroethene (PCE)	NG/L	5	5			1		100	100
	Vinyl Chloride	NG/L	5	4	1		2		100	100

% = Percent  
 J-Flags = Estimated results  
 R-Flags = Rejected results  
 MG/L = milligrams per liter  
 NG/L = nanogram per liter  
 UG/L = micrograms per liter

# Event 3: 2017, Quarter 2

# Groundwater Data Quality Evaluation for Northwest Pipe Company, Portland, Oregon

PREPARED FOR: Stephanie Heldt-Sheller/Northwest Pipe Company  
Dave Bennett/Northwest Pipe Company

PREPARED BY: Jamie Beckett/CH2M

REVIEWED BY: Bernice Kidd/CH2M

REFERENCE: Northwest Pipe Company GWM 2Q Event – April 26 through May 1, 2017

DATE: August 9, 2017

## Introduction

The objective of this data quality evaluation (DQE) is to assess the representativeness and usability of data quality for groundwater quality samples collected to monitor the groundwater at the Northwest Pipe Company. The rationale for monitoring, the data quality objectives (DQOs), and the method for performing this DQE is provided in the *Final Supplemental Groundwater Sampling and Data Evaluation*, Northwest Pipe Company, Oregon, August 2016 (hereafter referred to as the *NWP SAP*).

This DQE report includes evaluation of groundwater quality data from 10 groundwater samples collected in accordance with the *NWP SAP* from April 26 through May 1, 2017. This DQE report is intended as a general data quality assessment designed to summarize data issues, and written in accordance with *National Functional Guidelines (NFGs) for Superfund Organic Methods Data Review* (EPA, 2016) and *National Functional Guidelines (NFGs) for Inorganic Superfund Methods Data Review* (EPA, 2016).

## Findings

The overall summaries of the data validation findings are contained in Tables 1 through 6 and summarized in the method sections that follow:

- **Table 1:** Sample Summary by Chain of Custody – Data Summary. Presents the sample identifiers, sampling dates, and SDG sorted by chain-of-custody (COC) number.
- **Table 2:** Sample Chronology – Data Summary. Presents the sample identifiers, methods, sampling dates, received dates, extraction dates, and analysis dates sorted by SDG number.
- **Table 3:** Overall Flagging Summary. Presents the number of occurrences for each data validation reason by method.
- **Table 4:** Field Duplicate Precision – Results. Presents the relative percent differences (RPDs) for all data with FD pair detects above the RL.
- **Table 5:** Site Completeness by Analyte – Qualified Data. Presents the percent completeness by method, analyte, and matrix.

## Analytical Data

This DQE report includes 10 normal groundwater samples and one FD collected from April 26 through May 1, 2017. These samples were reported under three sample delivery groups: R1871, R1877 and R1893. A list of samples included in this DQE are presented in Table 1. Seven methods were used to analyze the groundwater samples and are provided in Table 2. The analyses were performed by Applied Sciences Laboratory, Corvallis, Oregon. Samples were collected and delivered by overnight carrier to the laboratory.

The data were assessed according to the requirements of the *NWP SAP* and included a review of:

1. chain of custody documentation;
2. holding-time compliance;
3. required quality control (QC) samples at the specified frequencies;
4. flagging for method blanks;
5. laboratory control sample/laboratory control sample duplicates (LCS/LCSD);
6. matrix spike/matrix spike duplicate (MS/MSD) recoveries;

and other method-specific criteria as defined by the *NWP SAP*.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included the review of a FD.

Data flags were assigned according to the *NFGs*. These flags, as well as the reason for each flag, are entered into the electronic database and can be found in Table 3. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will be only one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed in the *NWP SAP* and are defined below:

- J = the analyte was detected, but the associated numerical value is considered an estimated quantity.
- R = the sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified. No associated value is reported.
- U = the analyte was analyzed for but was not detected above the detection limit.
- UJ = the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

## Overall Flagging Summary

The overall summaries of the data validation findings are summarized in the following sections. Table 3 provides a flagging summary of overall occurrences for each data validation reason by method.

## Temperature

Temperature requirements were met.

## Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination that affected the sample results.

## Field Duplicates

In accordance with the *NWP SAP*, one field duplicate (FD) was collected from well MW-06, and all precision criteria were met.

Table 4 shows the RPD between the primary (P) sample and FD, and was calculated for detected results above the RL using the following equation:

$$RPD = 100 * [ (P1 - FD1) / (P1 + FD1) / 2 ]$$

## Laboratory Control Samples

LCS were analyzed at the required frequency and the accuracy and precision criteria were met.

## Results

Analysis for tetrachloroethene and vinyl chloride were analyzed by SW8260C in lieu of SW8260C-SIM in several samples due to the high target analyte results.

## Holding Times

All holding-time criteria were met.

## Chain of Custody

There were no discrepancies.

## Overall Assessment

The final activity in the DQE is an assessment of whether the data meets the data quality objectives. The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The precision, accuracy, representativeness, completeness and comparability are addressed in the *NWP SAP*. The following summary highlights the data evaluation findings for the above defined events:

1. No data were rejected and completeness was 100 percent for all method/matrix/analyte combinations as shown in Table 5.
2. The precision and accuracy of the data, as measured by field and laboratory QC indicators, suggests that the *NWP SAP* goals for project use were met.
3. The field crew followed the *NWP SAP* and project documents.

## Works Cited

CH2M Hill, Inc. 2016. *Final Supplemental Groundwater Sampling and Data Evaluation (referenced herein as the NWP SAP)*, Northwest Pipe Company, Oregon. August.

EPA, 2016. *National Functional Guidelines for Superfund Organic Methods Data Review*. September.

EPA, 2016. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. September.

**TABLE 1****Sample Summary by COC - Data Summary**

CoC Number	Sample Date	Matrix	QAQC Type	Sample Identification	SDG	Laboratory
R1871	26-Apr-17	WATER	N	T4S1MW-03S-042617-0	R1871	CHMC
			N	T4S1MW-09-042617-0	R1871	CHMC
			TB	TRIPBLANK-042617-01	R1871	CHMC
R1877	27-Apr-17	WATER	N	MW-02-042717-0	R1877	CHMC
			N	MW-04-042717-0	R1877	CHMC
			N	T4S1MW-22-042717-0	R1877	CHMC
			N	T4S1MW-23-042717-0	R1877	CHMC
			TB	TRIPBLANK-042717-02	R1877	CHMC
R1893	01-May-17	WATER	N	MW-01-050117-0	R1893	CHMC
			N	MW-03-050117-0	R1893	CHMC
			N	MW-05-050117-0	R1893	CHMC
			N	MW-06-050117-0	R1893	CHMC
			FD	MW-100-050117-0	R1893	CHMC
			TB	TRIPBLANK-050117-03	R1893	CHMC

SDG = Sample delivery group

CHMC = Applied Sciences Laboratory

**QAQC Type**

FD = Field Duplicate

N = Normal

TB = Trip Blank

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	R1871	T4S1MW-03S-042617-0	E200.7F	4/26/2017	4/27/2017	4/28/2017	4/28/2017
		T4S1MW-03S-042617-0	E300.0A	4/26/2017	4/27/2017		5/8/2017
		T4S1MW-03S-042617-0	E353.2	4/26/2017	4/27/2017		4/28/2017
		T4S1MW-03S-042617-0	RSK-175	4/26/2017	4/27/2017	5/3/2017	5/3/2017
		T4S1MW-03S-042617-0	SM5310B	4/26/2017	4/27/2017		5/8/2017
		T4S1MW-03S-042617-0	SW8260C	4/26/2017	4/27/2017	4/27/2017	4/27/2017
		T4S1MW-03S-042617-0	SW8260C-SIM	4/26/2017	4/27/2017	5/9/2017	5/9/2017
		T4S1MW-09-042617-0	E200.7F	4/26/2017	4/27/2017	4/28/2017	4/28/2017
		T4S1MW-09-042617-0	E300.0A	4/26/2017	4/27/2017		5/8/2017
		T4S1MW-09-042617-0	E353.2	4/26/2017	4/27/2017		4/28/2017
		T4S1MW-09-042617-0	RSK-175	4/26/2017	4/27/2017	5/3/2017	5/3/2017
		T4S1MW-09-042617-0	SM5310B	4/26/2017	4/27/2017		5/8/2017
		T4S1MW-09-042617-0	SW8260C	4/26/2017	4/27/2017	4/27/2017	4/27/2017
		T4S1MW-09-042617-0	SW8260C-SIM	4/26/2017	4/27/2017	5/9/2017	5/9/2017
	TRIPBLANK-042617-01	SW8260C	4/26/2017	4/27/2017	4/27/2017	4/27/2017	
	TRIPBLANK-042617-01	SW8260C-SIM	4/26/2017	4/27/2017	5/9/2017	5/9/2017	
	R1877	MW-02-042717-0	E200.7F	4/27/2017	4/28/2017	5/5/2017	5/5/2017
		MW-02-042717-0	E300.0A	4/27/2017	4/28/2017		5/4/2017
		MW-02-042717-0	E353.2	4/27/2017	4/28/2017		4/28/2017
		MW-02-042717-0	RSK-175	4/27/2017	4/28/2017	5/3/2017	5/3/2017
		MW-02-042717-0	SM5310B	4/27/2017	4/28/2017		5/8/2017
		MW-02-042717-0	SW8260C	4/27/2017	4/28/2017	4/28/2017	4/28/2017
		MW-02-042717-0	SW8260C-SIM	4/27/2017	4/28/2017	5/9/2017	5/9/2017
		MW-04-042717-0	E200.7F	4/27/2017	4/28/2017	5/5/2017	5/5/2017
		MW-04-042717-0	E300.0A	4/27/2017	4/28/2017		5/4/2017
		MW-04-042717-0	E353.2	4/27/2017	4/28/2017		4/28/2017
		MW-04-042717-0	RSK-175	4/27/2017	4/28/2017	5/3/2017	5/3/2017
		MW-04-042717-0	SM5310B	4/27/2017	4/28/2017		5/8/2017
MW-04-042717-0		SW8260C	4/27/2017	4/28/2017	4/28/2017	4/28/2017	
MW-04-042717-0		SW8260C	4/27/2017	4/28/2017	4/28/2017	5/3/2017	
T4S1MW-22-042717-0	E200.7F	4/27/2017	4/28/2017	5/5/2017	5/5/2017		
T4S1MW-22-042717-0	E300.0A	4/27/2017	4/28/2017		5/4/2017		
T4S1MW-22-042717-0	E353.2	4/27/2017	4/28/2017		4/28/2017		
T4S1MW-22-042717-0	RSK-175	4/27/2017	4/28/2017	5/3/2017	5/3/2017		
T4S1MW-22-042717-0	SM5310B	4/27/2017	4/28/2017		5/8/2017		
T4S1MW-22-042717-0	SW8260C	4/27/2017	4/28/2017	4/28/2017	4/28/2017		

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	R1877	T4S1MW-22-042717-0	SW8260C-SIM	4/27/2017	4/28/2017	5/9/2017	5/9/2017
		T4S1MW-23-042717-0	E200.7F	4/27/2017	4/28/2017	5/5/2017	5/5/2017
		T4S1MW-23-042717-0	E300.OA	4/27/2017	4/28/2017		5/4/2017
		T4S1MW-23-042717-0	E353.2	4/27/2017	4/28/2017		4/28/2017
		T4S1MW-23-042717-0	RSK-175	4/27/2017	4/28/2017	5/3/2017	5/3/2017
		T4S1MW-23-042717-0	SM5310B	4/27/2017	4/28/2017		5/8/2017
		T4S1MW-23-042717-0	SW8260C	4/27/2017	4/28/2017	4/28/2017	4/28/2017
		T4S1MW-23-042717-0	SW8260C-SIM	4/27/2017	4/28/2017	5/9/2017	5/9/2017
		TRIPBLANK-042717-02	SW8260C	4/27/2017	4/28/2017	4/28/2017	4/28/2017
		TRIPBLANK-042717-02	SW8260C-SIM	4/27/2017	4/28/2017	5/9/2017	5/9/2017
	R1893	MW-01-050117-0	E200.7F	5/1/2017	5/2/2017	5/5/2017	5/5/2017
		MW-01-050117-0	E300.OA	5/1/2017	5/2/2017		5/5/2017
		MW-01-050117-0	E353.2	5/1/2017	5/2/2017		5/2/2017
		MW-01-050117-0	RSK-175	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		MW-01-050117-0	SM5310B	5/1/2017	5/2/2017		5/8/2017
		MW-01-050117-0	SW8260C	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		MW-01-050117-0	SW8260C	5/1/2017	5/2/2017	5/4/2017	5/4/2017
		MW-03-050117-0	E200.7F	5/1/2017	5/2/2017	5/5/2017	5/5/2017
		MW-03-050117-0	E300.OA	5/1/2017	5/2/2017		5/5/2017
		MW-03-050117-0	E353.2	5/1/2017	5/2/2017		5/2/2017
		MW-03-050117-0	RSK-175	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		MW-03-050117-0	SM5310B	5/1/2017	5/2/2017		5/8/2017
		MW-03-050117-0	SW8260C	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		MW-05-050117-0	E200.7F	5/1/2017	5/2/2017	5/5/2017	5/5/2017
		MW-05-050117-0	E300.OA	5/1/2017	5/2/2017		5/5/2017
		MW-05-050117-0	E353.2	5/1/2017	5/2/2017		5/2/2017
		MW-05-050117-0	RSK-175	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		MW-05-050117-0	SM5310B	5/1/2017	5/2/2017		5/8/2017
		MW-05-050117-0	SW8260C	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		MW-06-050117-0	E200.7F	5/1/2017	5/2/2017	5/5/2017	5/5/2017
		MW-06-050117-0	E300.OA	5/1/2017	5/2/2017		5/5/2017
		MW-06-050117-0	E353.2	5/1/2017	5/2/2017		5/2/2017
		MW-06-050117-0	RSK-175	5/1/2017	5/2/2017	5/3/2017	5/3/2017
MW-06-050117-0	SM5310B	5/1/2017	5/2/2017		5/8/2017		
MW-06-050117-0	SW8260C	5/1/2017	5/2/2017	5/3/2017	5/3/2017		
MW-100-050117-0	E200.7F	5/1/2017	5/2/2017	5/5/2017	5/5/2017		

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
CHMC	R1893	MW-100-050117-0	E300.0A	5/1/2017	5/2/2017		5/5/2017
		MW-100-050117-0	E353.2	5/1/2017	5/2/2017		5/2/2017
		MW-100-050117-0	RSK-175	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		MW-100-050117-0	SM5310B	5/1/2017	5/2/2017		5/8/2017
		MW-100-050117-0	SW8260C	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		TRIPBLANK-050117-03	SW8260C	5/1/2017	5/2/2017	5/3/2017	5/3/2017
		TRIPBLANK-050117-03	SW8260C-SIM	5/1/2017	5/2/2017	5/9/2017	5/9/2017

SDG = sample delivery group

CHMC = Applied Sciences Laboratory

**TABLE 3**  
**Overall Flagging Summary**

<b>Method</b>	<b>Matrix</b>	<b>Validation Reason</b>	<b>Qualifier*</b>	<b>Qualifier Type</b>	<b>Number of Affected Analytes</b>
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**No data qualified**

**TABLE 4**  
**Field Duplicate Precision**

*Sorted by Method and Normal Sample ID*

Method	Normal Sample ID	Matrix	Analyte	SDG	Result	Field Duplicate	Result	Calculated RPD	Criteria
<b>E200.7F</b>									
	MW-06-050117-0	WATER	Iron, dissolved	R1893	3530	MW-100-050117-0	3600	1.96	50
<b>E300.0A</b>									
	MW-06-050117-0	WATER	Chloride	R1893	6.2	MW-100-050117-0	6.21	0.16	30
	MW-06-050117-0	WATER	Sulfate	R1893	13.9	MW-100-050117-0	14	0.72	30
<b>RSK-175</b>									
	MW-06-050117-0	WATER	Carbon dioxide	R1893	81800	MW-100-050117-0	82300	0.61	30
	MW-06-050117-0	WATER	Methane	R1893	206	MW-100-050117-0	265	25.05	30
<b>SM5310B</b>									
	MW-06-050117-0	WATER	Total Organic Carbon	R1893	1.27	MW-100-050117-0	1.4	9.74	30
<b>SW8260C</b>									
	MW-06-050117-0	WATER	Trichloroethene (TCE)	R1893	225	MW-100-050117-0	228	1.32	30
	MW-06-050117-0	WATER	Vinyl Chloride	R1893	21.9	MW-100-050117-0	20.7	5.63	30

'NC' = Not Calculated. RPD is calculated if both the normal and duplicate results are greater than the reporting limit. RPDs for actual validation may be calculated differently.

**TABLE 5**  
**Site Completeness by Analyte - Qualified Data**

Method	Analyte	Units	Number of Occurrences					Contractor R-Flags	Total Contractor Completeness (%)	Overall Completeness (%)
			Analyses	Detects	Non- detects	Blank Flags	J-Flags			
E200.7F	Iron, dissolved	UG/L	11	9	2		1		100	100
E300.0A	Chloride	MG/L	11	11					100	100
	Sulfate	MG/L	11	11					100	100
E353.2	Nitrate-N	MG/L	11	7	4				100	100
RSK-175	Carbon dioxide	UG/L	11	11					100	100
	Methane	UG/L	11	9	2		2		100	100
SM5310B	Total Organic Carbon	MG/L	11	11					100	100
SW8260C	cis-1,2-Dichloroethene	UG/L	11	9	2		2		100	100
	Tetrachloroethene (PCE)	UG/L	6	6					100	100
	Trichloroethene (TCE)	UG/L	11	8	3		1		100	100
	Vinyl Chloride	UG/L	6	6					100	100
SW8260C-SIM	Tetrachloroethene (PCE)	NG/L	5	4	1				100	100
	Vinyl Chloride	NG/L	5	2	3		1		100	100

% = Percent  
 J-Flags = Estimated results  
 R-Flags = Rejected results  
 MG/L = milligrams per liter  
 NG/L = nanogram per liter  
 UG/L = micrograms per liter

# Event 4: 2017, Quarter 3

# Groundwater Data Quality Evaluation for Northwest Pipe Company, Portland, Oregon

PREPARED FOR: Stephanie Heldt-Sheller/Northwest Pipe Company  
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PREPARED BY: Jamie Beckett/CH2M

REVIEWED BY: Bernice Kidd/CH2M

REFERENCE: Northwest Pipe Company GWM 3Q Event – July 25 through July 27, 2017

DATE: August 16, 2017

## Introduction

The objective of this data quality evaluation (DQE) is to assess the representativeness and usability of data quality for groundwater quality samples collected to monitor the groundwater at the Northwest Pipe Company. The rationale for monitoring, the data quality objectives (DQOs), and the method for performing this DQE is provided in the *Final Supplemental Groundwater Sampling and Data Evaluation*, Northwest Pipe Company, Oregon, August 2016 (hereafter referred to as the *NWP SAP*).

This DQE report includes evaluation of groundwater quality data from 10 groundwater samples collected in accordance with the *NWP SAP* on July 25 through July 27, 2017. This DQE report is intended as a general data quality assessment designed to summarize data issues, and written in accordance with *National Functional Guidelines (NFGs) for Superfund Organic Methods Data Review* (EPA, 2016) and *National Functional Guidelines (NFGs) for Inorganic Superfund Methods Data Review* (EPA, 2016).

## Findings

The overall summaries of the data validation findings are contained in Tables 1 through 6 and summarized in the method sections that follow:

- **Table 1:** Sample Summary by Chain of Custody – Data Summary. Presents the sample identifiers, sampling dates, and SDG sorted by chain-of-custody (COC) number.
- **Table 2:** Sample Chronology – Data Summary. Presents the sample identifiers, methods, sampling dates, received dates, extraction dates, and analysis dates sorted by SDG number.
- **Table 3:** Overall Flagging Summary. Presents the number of occurrences for each data validation reason by method.
- **Table 4:** Field Duplicate Precision – Qualified Data. Presents the results that are qualified because of field duplicate exceedances.
- **Table 5:** Field Duplicate Precision – Results. Presents the relative percent differences (RPDs) for all data with FD pair detects above the RL.

- **Table 6:** Site Completeness by Analyte – Qualified Data. Presents the percent completeness by method, analyte, and matrix.

## Analytical Data

This DQE report includes 10 normal groundwater samples and one FD collected from July 25 through July 27, 2017. These samples were reported under three sample delivery groups: R2485, R2499, and R2508. A list of samples included in this DQE are presented in Table 1. Seven methods were used to analyze the groundwater samples and are provided in Table 2. The analyses were performed by Test America Applied Sciences Laboratory, Corvallis, Oregon. Samples were collected and delivered by overnight carrier to the laboratory.

The data were assessed according to the requirements of the *NWP SAP* and included a review of:

1. chain of custody documentation;
2. holding-time compliance;
3. required quality control (QC) samples at the specified frequencies;
4. flagging for method blanks;
5. laboratory control sample/laboratory control sample duplicates (LCS/LCSD);
6. matrix spike/matrix spike duplicate (MS/MSD) recoveries;

and other method-specific criteria as defined by the *NWP SAP*.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included the review of a FD.

Data flags were assigned according to the *NFGs*. These flags, as well as the reason for each flag, are entered into the electronic database and can be found in Table 3. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will be only one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed in the *WPCF SAP* and are defined below:

- J = the analyte was detected, but the associated numerical value is considered an estimated quantity.
- R = the sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified. No associated value is reported.
- U = the analyte was analyzed for but was not detected above the detection limit.
- UJ = the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

## Overall Flagging Summary

The overall summaries of the data validation findings are summarized in the following sections. Table 3 provides a flagging summary of overall occurrences for each data validation reason by method.

### Temperature

Temperature requirements were met.

### Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination that affected the sample results.

### Field Duplicates

In accordance with the *NWP SAP*, one field duplicate (FD) was collected from well MW06, and all precision criteria were met with the following exception listed in Table 4:

The RPD for methane exceeded acceptance criteria in the FD pair [MW-06-072717-0/ MW-100-072717-1] for EPA Method RSK-175; indicating the associated sample results are possibly biased. Two associated detected results were qualified as estimated and flagged "J".

Table 5 shows the RPD between the primary (P) sample and FD, and was calculated for detected results above the RL using the following equation:

$$RPD = 100 * [ (P1 - FD1) / (P1 + FD1) / 2 ]$$

### Laboratory Control Samples

LCS were analyzed at the required frequency and the accuracy and precision criteria were met.

### Results

Analysis for tetrachloroethene and vinyl chloride were analyzed by SW8260C in lieu of SW8260C-SIM in several samples due to the high target analyte results.

### Holding Times

All holding-time criteria were met.

### Chain of Custody

There were no discrepancies.

### Overall Assessment

The final activity in the DQE is an assessment of whether the data meets the data quality objectives. The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The precision, accuracy, representativeness, completeness and comparability are addressed in the *NWP SAP*. The following summary highlights the data evaluation findings for the above defined events:

1. No data were rejected and completeness was 100 percent for all method/matrix/analyte combinations as shown in Table 6.
2. FD RPD exceedances were observed for Method RSK-175; two results were qualified as estimated.

3. The precision and accuracy of the data, as measured by field and laboratory QC indicators, suggests that the *NWP SAP* goals for project use were met.
4. The field crew followed the *NWP SAP* and project documents.

## Works Cited

CH2M Hill, Inc. 2016. *Final Supplemental Groundwater Sampling and Data Evaluation (referenced herein as the NWP SAP)*, Northwest Pipe Company, Oregon. August.

EPA, 2016. *National Functional Guidelines for Superfund Organic Methods Data Review*. September.

EPA, 2016. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. September.

**TABLE 1**  
**Sample Summary by COC - Data Summary**

CoC Number	Sample Date	Matrix	QAQC Type	Sample Identification	SDG	Laboratory
R2485	25-Jul-17	WATER	N	MW-02-072517-0	R2485	TAIC
			N	T4S1MW-03S-072517-0	R2485	TAIC
			N	T4S1MW-09-072517-0	R2485	TAIC
			TB	TRIPBLANK-072517-01	R2485	TAIC
R2499	26-Jul-17	WATER	N	MW-01-072617-0	R2499	TAIC
			N	MW-04-072617-0	R2499	TAIC
			N	T4S1MW-22-072617-0	R2499	TAIC
			N	T4S1MW-23-072617-0	R2499	TAIC
			TB	TRIPBLANK-072617-02	R2499	TAIC
R2508	27-Jul-17	WATER	N	MW-03-072717-0	R2508	TAIC
			N	MW-05-072717-0	R2508	TAIC
			N	MW-06-072717-0	R2508	TAIC
			FD	MW-100-072717-1	R2508	TAIC
			TB	TRIPBLANK-072717-03	R2508	TAIC

SDG = Sample delivery group

TAIC = Test America Applied Sciences Laboratory, Corvallis, Oregon

**QAQC Type**

FD = Field Duplicate

N = Normal

TB = Trip Blank

**TABLE 2**

**Sample Chronology - Data Summary**

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date	
TAIC	R2485	MW-02-072517-0	E200.7F	7/25/2017	7/26/2017	8/2/2017	8/2/2017	
		MW-02-072517-0	E300.OA	7/25/2017	7/26/2017		8/3/2017	
		MW-02-072517-0	E353.2	7/25/2017	7/26/2017		7/26/2017	
		MW-02-072517-0	RSK-175	7/25/2017	7/26/2017	7/27/2017	7/27/2017	
		MW-02-072517-0	SM5310B	7/25/2017	7/26/2017		8/3/2017	
		MW-02-072517-0	SW8260C	7/25/2017	7/26/2017	7/26/2017	7/26/2017	
		MW-02-072517-0	SW8260C-SIM	7/25/2017	7/26/2017	7/31/2017	7/31/2017	
		T4S1MW-03S-072517-0	E200.7F	7/25/2017	7/26/2017	8/2/2017	8/2/2017	
		T4S1MW-03S-072517-0	E300.OA	7/25/2017	7/26/2017		8/3/2017	
		T4S1MW-03S-072517-0	E353.2	7/25/2017	7/26/2017		7/26/2017	
		T4S1MW-03S-072517-0	RSK-175	7/25/2017	7/26/2017	7/27/2017	7/27/2017	
		T4S1MW-03S-072517-0	SM5310B	7/25/2017	7/26/2017		8/3/2017	
		T4S1MW-03S-072517-0	SW8260C	7/25/2017	7/26/2017	7/26/2017	7/26/2017	
		T4S1MW-03S-072517-0	SW8260C-SIM	7/25/2017	7/26/2017	7/31/2017	7/31/2017	
		T4S1MW-09-072517-0	E200.7F	7/25/2017	7/26/2017	8/2/2017	8/2/2017	
		T4S1MW-09-072517-0	E300.OA	7/25/2017	7/26/2017		8/3/2017	
	T4S1MW-09-072517-0	E353.2	7/25/2017	7/26/2017		7/26/2017		
	T4S1MW-09-072517-0	RSK-175	7/25/2017	7/26/2017	7/27/2017	7/27/2017		
	T4S1MW-09-072517-0	SM5310B	7/25/2017	7/26/2017		8/3/2017		
	T4S1MW-09-072517-0	SW8260C	7/25/2017	7/26/2017	7/26/2017	7/26/2017		
	T4S1MW-09-072517-0	SW8260C-SIM	7/25/2017	7/26/2017	7/31/2017	7/31/2017		
	TRIPBLANK-072517-01	SW8260C	7/25/2017	7/26/2017	7/26/2017	7/26/2017		
	TRIPBLANK-072517-01	SW8260C-SIM	7/25/2017	7/26/2017	7/31/2017	7/31/2017		
	R2499	MW-01-072617-0	E200.7F	7/26/2017	7/27/2017	8/2/2017	8/2/2017	
			E300.OA	7/26/2017	7/27/2017		8/3/2017	
			E353.2	7/26/2017	7/27/2017		7/27/2017	
			RSK-175	7/26/2017	7/27/2017	7/28/2017	7/28/2017	
			SM5310B	7/26/2017	7/27/2017		8/3/2017	
			SW8260C	7/26/2017	7/27/2017	7/28/2017	7/28/2017	
			MW-04-072617-0	E200.7F	7/26/2017	7/27/2017	8/2/2017	8/2/2017
			E300.OA	7/26/2017	7/27/2017		8/3/2017	
		MW-04-072617-0	E353.2	7/26/2017	7/27/2017		7/27/2017	
RSK-175			7/26/2017	7/27/2017	7/28/2017	7/28/2017		
SM5310B			7/26/2017	7/27/2017		8/3/2017		
SW8260C			7/26/2017	7/27/2017	7/28/2017	7/28/2017		
T4S1MW-22-072617-0			E200.7F	7/26/2017	7/27/2017	8/2/2017	8/2/2017	

**TABLE 2**  
**Sample Chronology - Data Summary**

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
TAIC	R2499	T4S1MW-22-072617-0	E300.OA	7/26/2017	7/27/2017		8/3/2017
		T4S1MW-22-072617-0	E353.2	7/26/2017	7/27/2017		7/27/2017
		T4S1MW-22-072617-0	RSK-175	7/26/2017	7/27/2017	7/28/2017	7/28/2017
		T4S1MW-22-072617-0	SM5310B	7/26/2017	7/27/2017		8/3/2017
		T4S1MW-22-072617-0	SW8260C	7/26/2017	7/27/2017	7/28/2017	7/28/2017
		T4S1MW-22-072617-0	SW8260C-SIM	7/26/2017	7/27/2017	7/31/2017	7/31/2017
		T4S1MW-23-072617-0	E200.7F	7/26/2017	7/27/2017	8/2/2017	8/2/2017
		T4S1MW-23-072617-0	E300.OA	7/26/2017	7/27/2017		8/3/2017
		T4S1MW-23-072617-0	E353.2	7/26/2017	7/27/2017		7/27/2017
		T4S1MW-23-072617-0	RSK-175	7/26/2017	7/27/2017	7/28/2017	7/28/2017
		T4S1MW-23-072617-0	SM5310B	7/26/2017	7/27/2017		8/3/2017
		T4S1MW-23-072617-0	SW8260C	7/26/2017	7/27/2017	7/28/2017	7/28/2017
		T4S1MW-23-072617-0	SW8260C-SIM	7/26/2017	7/27/2017	7/31/2017	7/31/2017
		TRIPBLANK-072617-02	SW8260C	7/26/2017	7/27/2017	7/28/2017	7/28/2017
	TRIPBLANK-072617-02	SW8260C-SIM	7/26/2017	7/27/2017	7/31/2017	7/31/2017	
	R2508	MW-03-072717-0	E200.7F	7/27/2017	7/28/2017	8/2/2017	8/2/2017
		MW-03-072717-0	E300.OA	7/27/2017	7/28/2017		8/3/2017
		MW-03-072717-0	E353.2	7/27/2017	7/28/2017		7/28/2017
		MW-03-072717-0	RSK-175	7/27/2017	7/28/2017	8/2/2017	8/2/2017
		MW-03-072717-0	SM5310B	7/27/2017	7/28/2017		8/3/2017
		MW-03-072717-0	SW8260C	7/27/2017	7/28/2017	7/28/2017	7/28/2017
		MW-05-072717-0	E200.7F	7/27/2017	7/28/2017	8/2/2017	8/2/2017
		MW-05-072717-0	E300.OA	7/27/2017	7/28/2017		8/3/2017
		MW-05-072717-0	E353.2	7/27/2017	7/28/2017		7/28/2017
		MW-05-072717-0	RSK-175	7/27/2017	7/28/2017	8/2/2017	8/2/2017
		MW-05-072717-0	SM5310B	7/27/2017	7/28/2017		8/3/2017
MW-05-072717-0		SW8260C	7/27/2017	7/28/2017	7/28/2017	7/28/2017	
MW-06-072717-0	E200.7F	7/27/2017	7/28/2017	8/2/2017	8/2/2017		
MW-06-072717-0	E300.OA	7/27/2017	7/28/2017		8/3/2017		
MW-06-072717-0	E353.2	7/27/2017	7/28/2017		7/28/2017		
MW-06-072717-0	RSK-175	7/27/2017	7/28/2017	8/2/2017	8/2/2017		
MW-06-072717-0	SM5310B	7/27/2017	7/28/2017		8/3/2017		
MW-06-072717-0	SW8260C	7/27/2017	7/28/2017	7/28/2017	7/28/2017		
MW-100-072717-1	E200.7F	7/27/2017	7/28/2017	8/2/2017	8/2/2017		
MW-100-072717-1	E300.OA	7/27/2017	7/28/2017		8/3/2017		
MW-100-072717-1	E353.2	7/27/2017	7/28/2017		7/28/2017		

**TABLE 2**  
**Sample Chronology - Data Summary**

<b>Laboratory</b>	<b>SDG</b>	<b>Sample Identification</b>	<b>Method</b>	<b>Sample Date</b>	<b>Receive Date</b>	<b>Extract Date</b>	<b>Analysis Date</b>
TAIC	R2508	MW-100-072717-1	RSK-175	7/27/2017	7/28/2017	8/2/2017	8/2/2017
		MW-100-072717-1	SM5310B	7/27/2017	7/28/2017		8/3/2017
		MW-100-072717-1	SW8260C	7/27/2017	7/28/2017	7/28/2017	7/28/2017
		TRIPBLANK-072717-03	SW8260C	7/27/2017	7/28/2017	7/28/2017	7/28/2017
		TRIPBLANK-072717-03	SW8260C-SIM	7/27/2017	7/28/2017	7/31/2017	7/31/2017

SDG = sample delivery group

TAIC = Test America Applied Sciences Laboratory, Corvallis, Oregon

**TABLE 3****Overall Flagging Summary**

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
RSK-175	WATER				
Category =	FieldDuplicate	Field duplicate RPD criteria exceeded	J	Other	2

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

J = The analyte was positively identified, and the quantitation is an estimation because of discrepancies in meeting certain analyte-specific quality control criteria.

**Qualifier Type:**

Protocol = Flagging due to contractor/laboratory protocol violations.

Other = Flagging due to sample, matrix, or field issues not related to Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan (SAP) protocol.

**TABLE 4**  
**Field Duplicate Precision - Qualified Data**

Analyte	Sample Identification	Result	Field Duplicate Qualifier*	Criteria	Validation Comments
<b>Method (Matrix):</b> RSK-175 (WATER)					
<b>Methane</b>	MW-06-072717-0	214 UG/L	J	FD>RPD	56.38 vs 30
	MW-100-072717-1	382 UG/L	J	FD>RPD	56.38 vs 30

RPD = relative percent difference

UG/L = micrograms per liter

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

J = The analyte was positively identified, and the quantitation is an estimation because of discrepancies in meeting certain analyte-specific quality control criteria.

**Criteria:**

FD>RPD = Field duplicate RPD criteria exceeded

**TABLE 5**  
**Field Duplicate Precision**

*Sorted by Method and Normal Sample ID*

Method	Normal Sample ID	Matrix	Analyte	SDG	Result	Field Duplicate	Result	Calculated RPD	Criteria
<b>E200.7F</b>									
	MW-06-072717-0	WATER	Iron, dissolved	R2508	3240	MW-100-072717-1	3220	0.62	50
<b>RSK-175</b>									
	MW-06-072717-0	WATER	Methane	R2508	214	MW-100-072717-1	382	56.38	30

RPD is calculated if both the normal and duplicate results are greater than the reporting limit.  
 RPDs for actual validation may be calculated differently.

**TABLE 6**  
**Site Completeness by Analyte - Qualified Data**

Method	Analyte	Units	Number of Occurrences					Contractor R-Flags	Total R-Flags	Contractor Completeness (%)	Overall Completeness (%)
			Analyses	Detects	Non- detects	Blank Flags	J-Flags				
E200.7F	Iron, dissolved	UG/L	11	8	3		1		100	100	
E300.0A	Chloride	MG/L	11	11					100	100	
	Sulfate	MG/L	11	11					100	100	
E353.2	Nitrate-N	MG/L	11	11			1		100	100	
	Nitrite-N	MG/L	11	4	7		4		100	100	
RSK-175	Carbon dioxide	UG/L	11	11					100	100	
	Methane	UG/L	11	10	1		5		100	100	
SM5310B	Total Organic Carbon	MG/L	11	11					100	100	
SW8260C	cis-1,2-Dichloroethene	UG/L	11	8	3		1		100	100	
	Tetrachloroethene (PCE)	UG/L	6	6					100	100	
	Trichloroethene (TCE)	UG/L	11	8	3		1		100	100	
	Vinyl Chloride	UG/L	6	6			1		100	100	
SW8260C-SIM	Tetrachloroethene (PCE)	NG/L	5	5			1		100	100	
	Vinyl Chloride	NG/L	5	2	3		1		100	100	

% = Percent  
 J-Flags = Estimated results  
 R-Flags = Rejected results  
 MG/L = milligrams per liter  
 NG/L = nanogram per liter  
 UG/L = micrograms per liter

# Attachment E

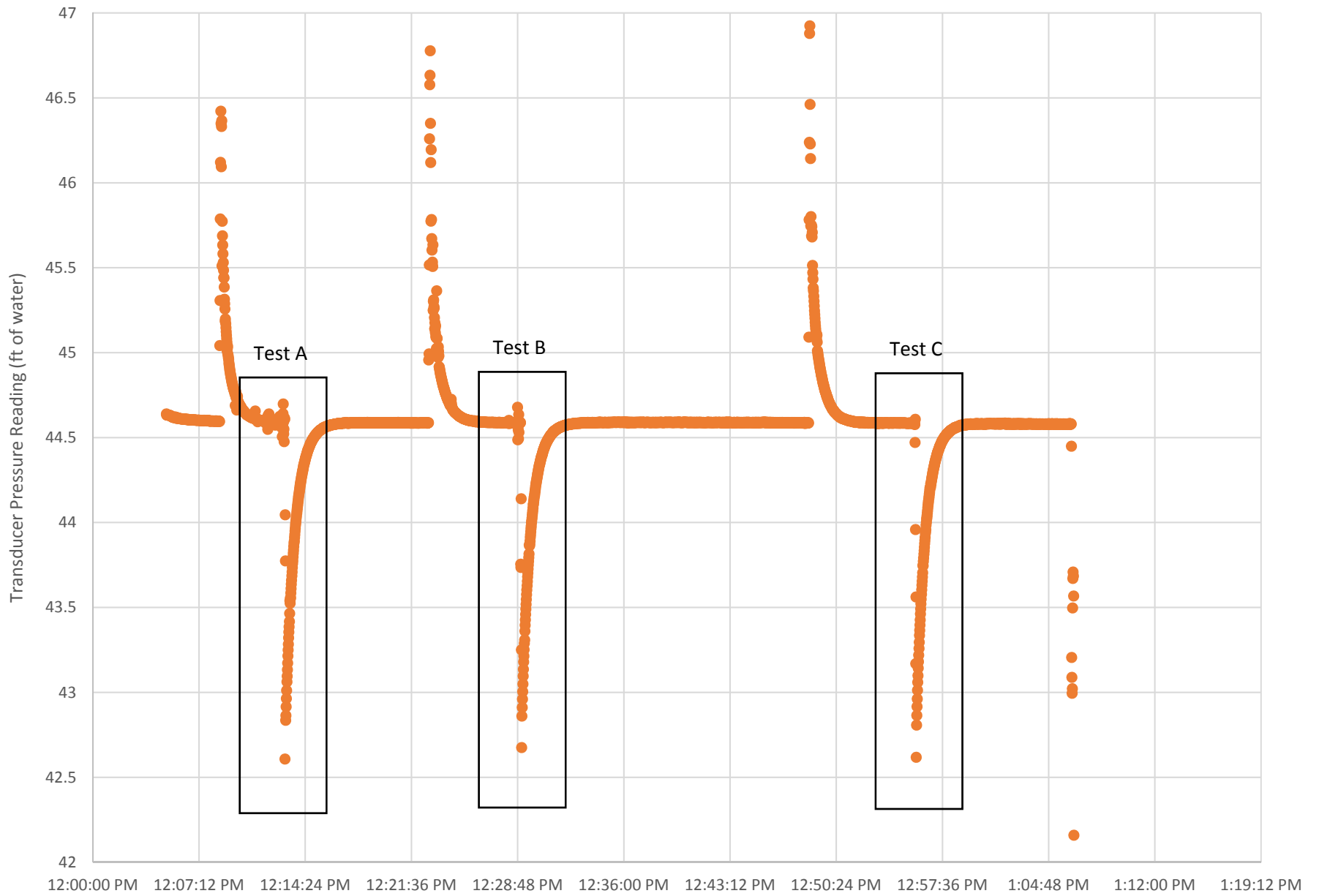
## AQTESOLV Inputs

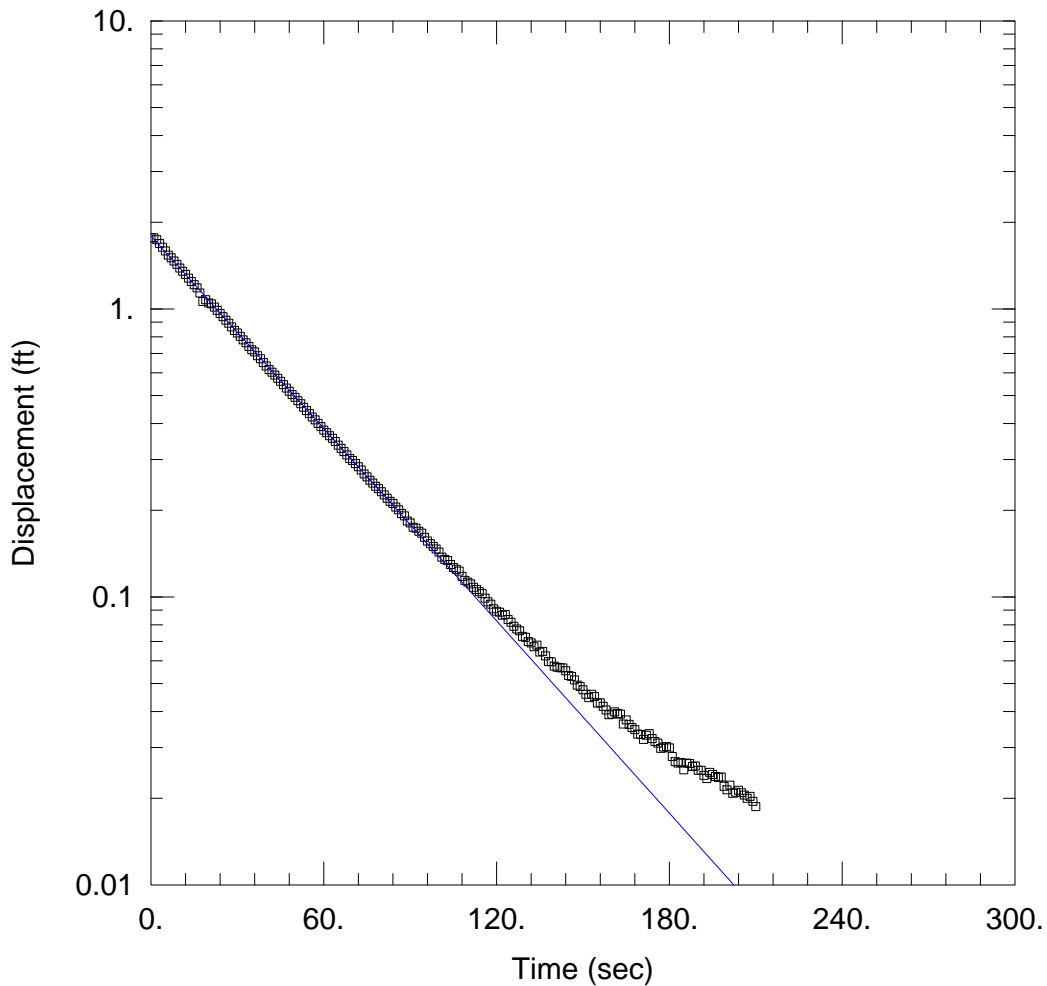
*Provided electronically*

# Attachment F

## AQTESOLV Outputs

# MW-03





### WELL TEST ANALYSIS

Data Set: \...\MW-3\_a.aqt  
 Date: 08/09/17

Time: 11:46:07

### PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: MW-03  
 Test Date: 11/07/2016

### AQUIFER DATA

Saturated Thickness: 14.56 ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

### WELL DATA (MW-03)

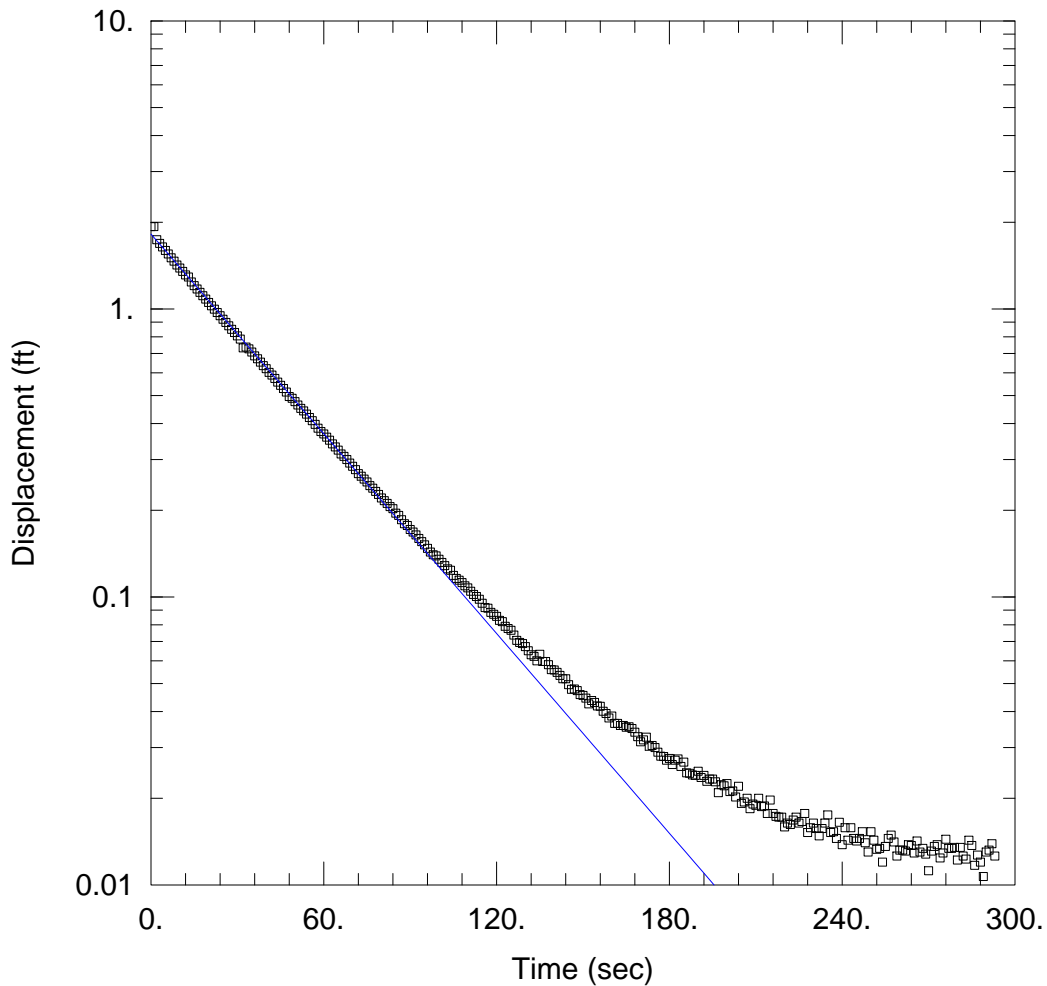
Initial Displacement: 1.765 ft  
 Total Well Penetration Depth: 13.06 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 14.56 ft  
 Screen Length: 10. ft  
 Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Unconfined  
 K = 2.268 ft/day

Solution Method: Bower-Rice  
 $y_0 =$  1.791 ft



### WELL TEST ANALYSIS

Data Set: \...\MW-3\_b.aqt  
Date: 08/09/17

Time: 11:45:38

### PROJECT INFORMATION

Company: Northwest Pipe Company  
Client: Northwest Pipe Company  
Location: Portland, OR  
Test Well: MW-03  
Test Date: 11/07/2016

### AQUIFER DATA

Saturated Thickness: 14.56 ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

### WELL DATA (MW-03)

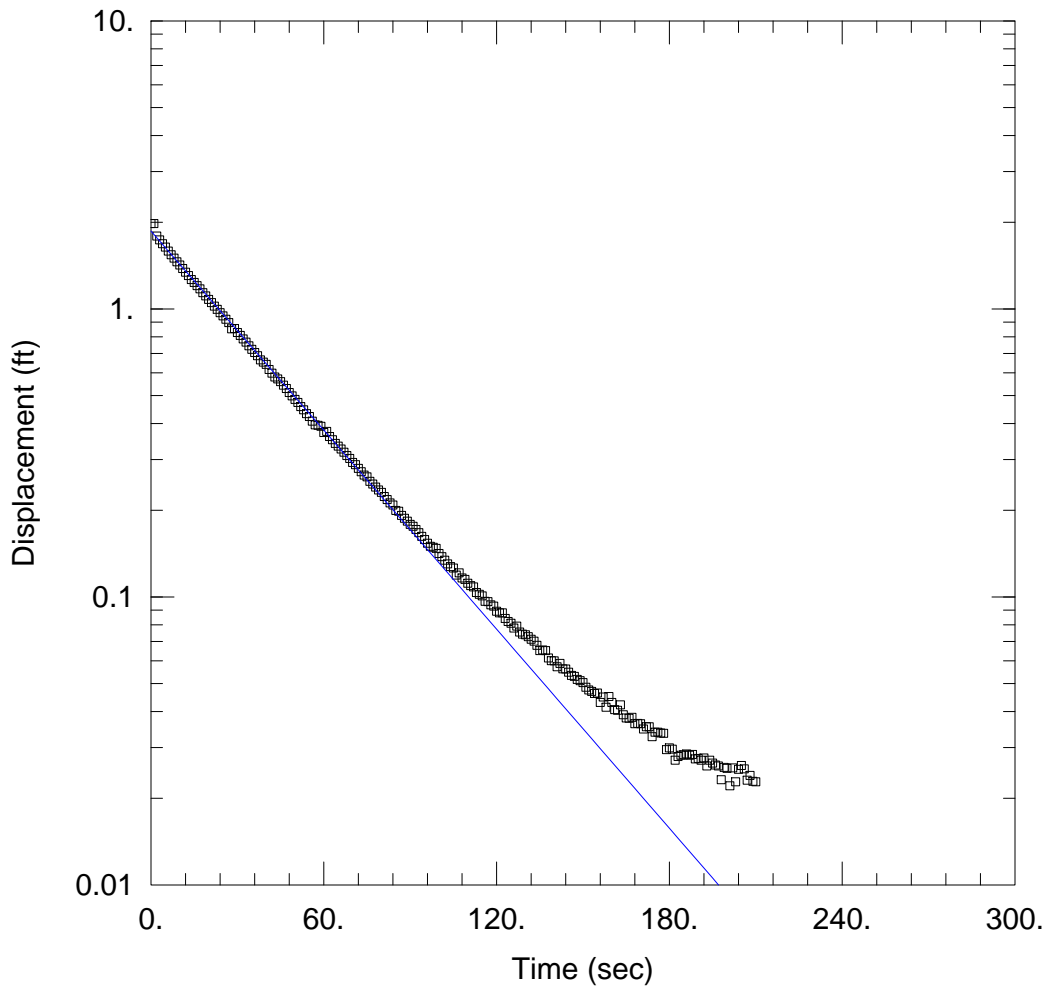
Initial Displacement: 1.93 ft  
Total Well Penetration Depth: 13.06 ft  
Casing Radius: 0.08333 ft

Static Water Column Height: 14.56 ft  
Screen Length: 10. ft  
Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Unconfined  
K = 2.354 ft/day

Solution Method: Bower-Rice  
 $y_0$  = 1.819 ft



### WELL TEST ANALYSIS

Data Set: \...\MW-3\_c.aqt  
Date: 08/09/17

Time: 11:44:50

### PROJECT INFORMATION

Company: Northwest Pipe Company  
Client: Northwest Pipe Company  
Location: Portland, OR  
Test Well: MW-03  
Test Date: 11/07/2016

### AQUIFER DATA

Saturated Thickness: 14.56 ft

Anisotropy Ratio (Kz/Kr): 0.1

### WELL DATA (MW-03)

Initial Displacement: 1.98 ft  
Total Well Penetration Depth: 13.06 ft  
Casing Radius: 0.08333 ft

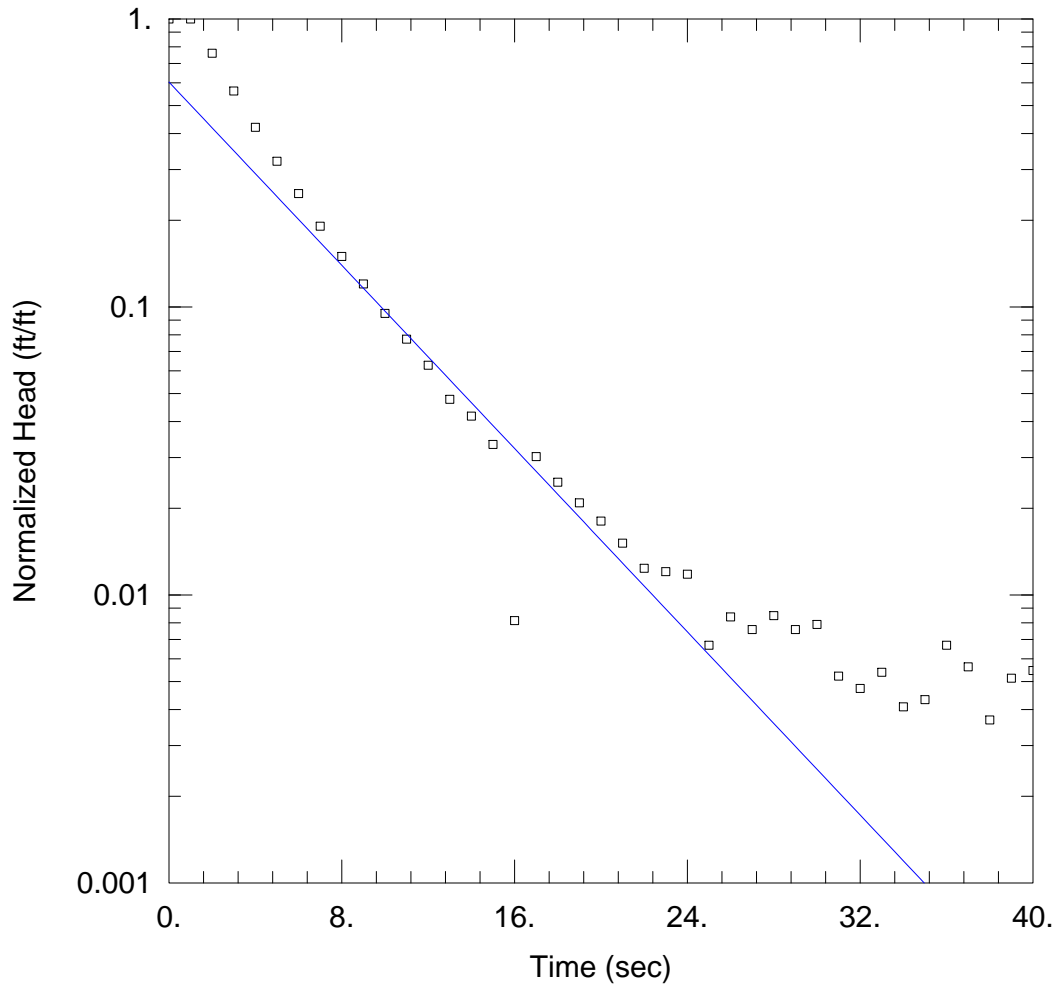
Static Water Column Height: 14.56 ft  
Screen Length: 10. ft  
Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Unconfined  
K = 2.346 ft/day

Solution Method: Bower-Rice  
y0 = 1.863 ft





### WELL TEST ANALYSIS

Data Set: \...\MW-4\_TrialRun.aqt  
 Date: 01/31/17

Time: 13:09:51

### PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: MW-4  
 Test Date: 10/26/16

### AQUIFER DATA

Saturated Thickness: 14.53 ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

### WELL DATA (MW-4)

Initial Displacement: 1.232 ft  
 Total Well Penetration Depth: 14.03 ft  
 Casing Radius: 0.08333 ft

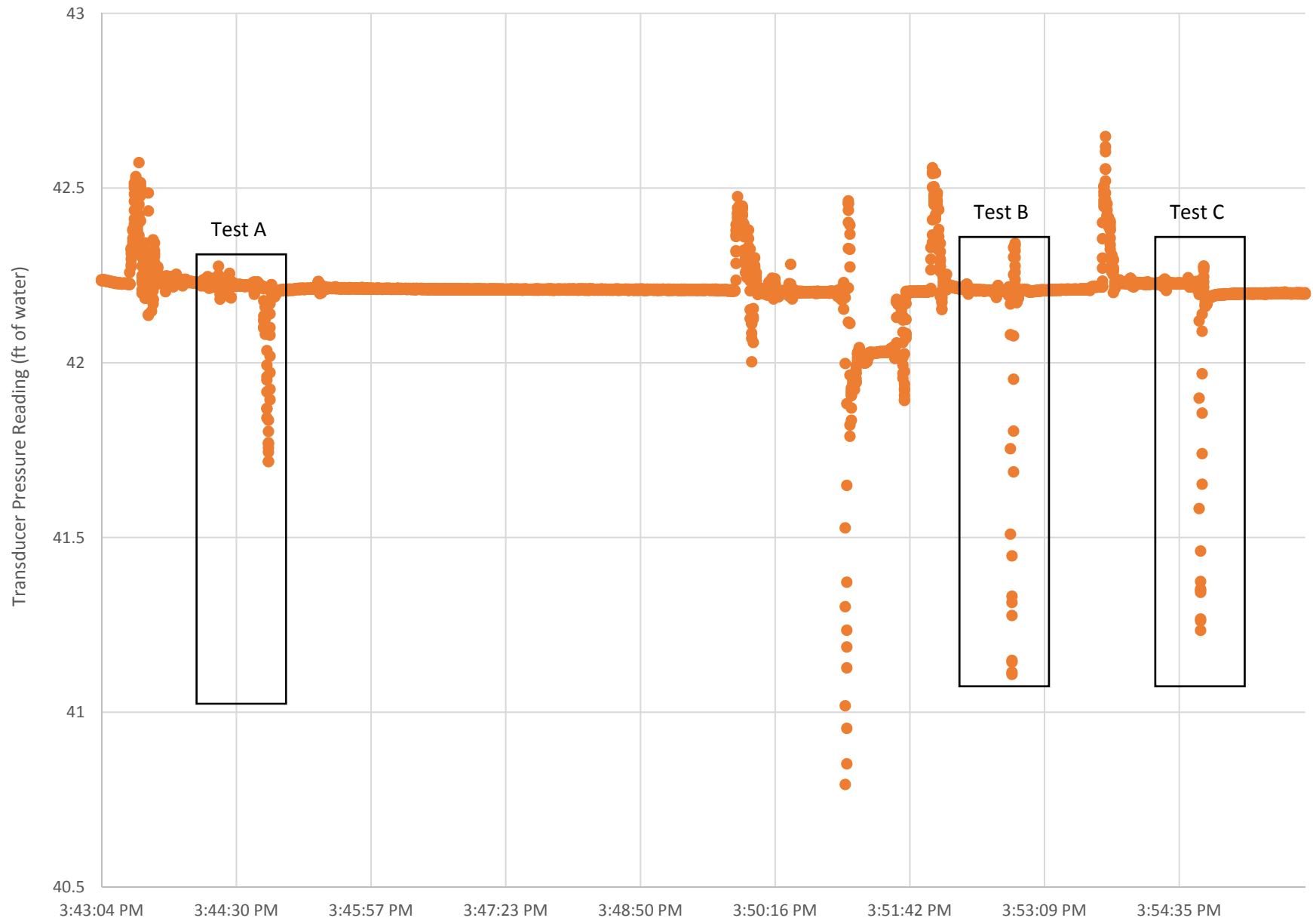
Static Water Column Height: 14.53 ft  
 Screen Length: 10. ft  
 Well Radius: 0.25 ft

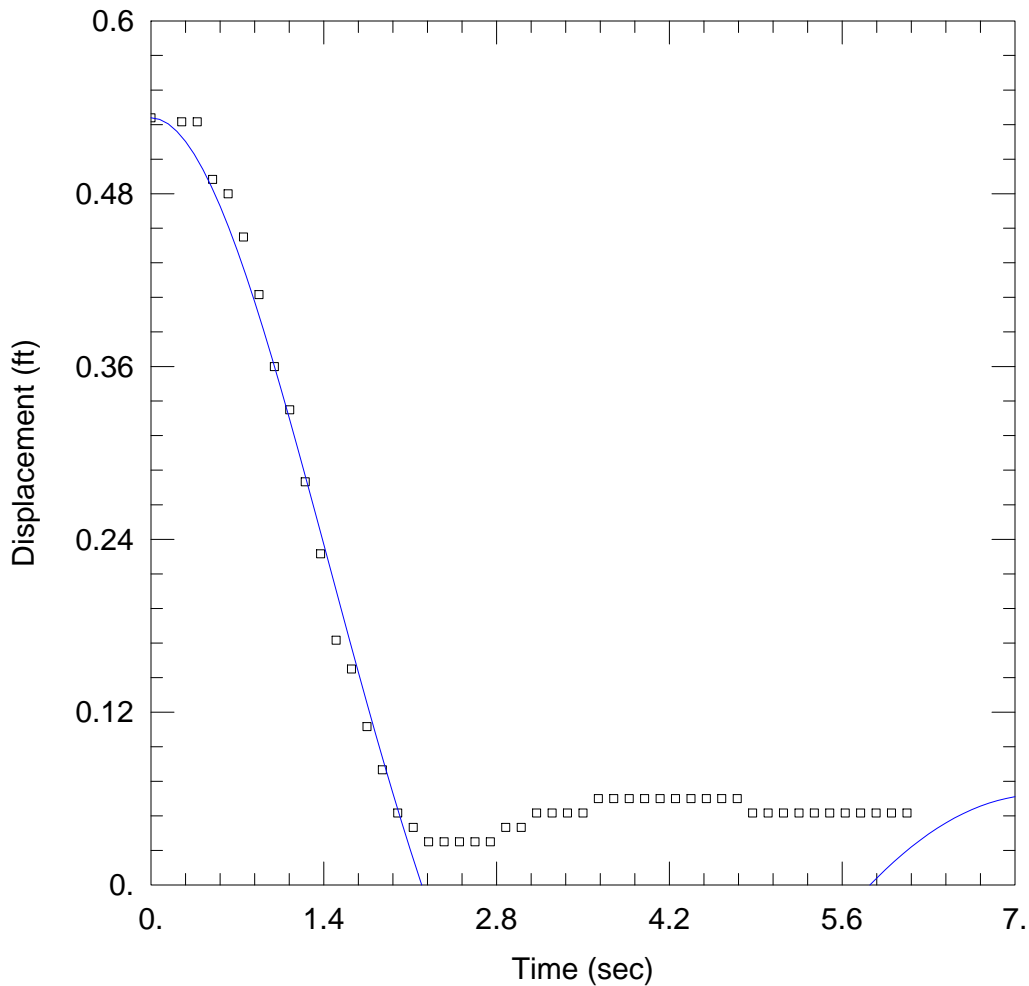
### SOLUTION

Aquifer Model: Unconfined  
 K = 16.83 ft/day

Solution Method: Bower-Rice  
 $y_0$  = 0.7433 ft

# MW-05





WELL TEST ANALYSIS

Data Set: \\...\MW-5\_a.aqt  
 Date: 01/31/17

Time: 12:43:54

PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: MW-5  
 Test Date: 11/07/2016

AQUIFER DATA

Saturated Thickness: 15.45 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-5)

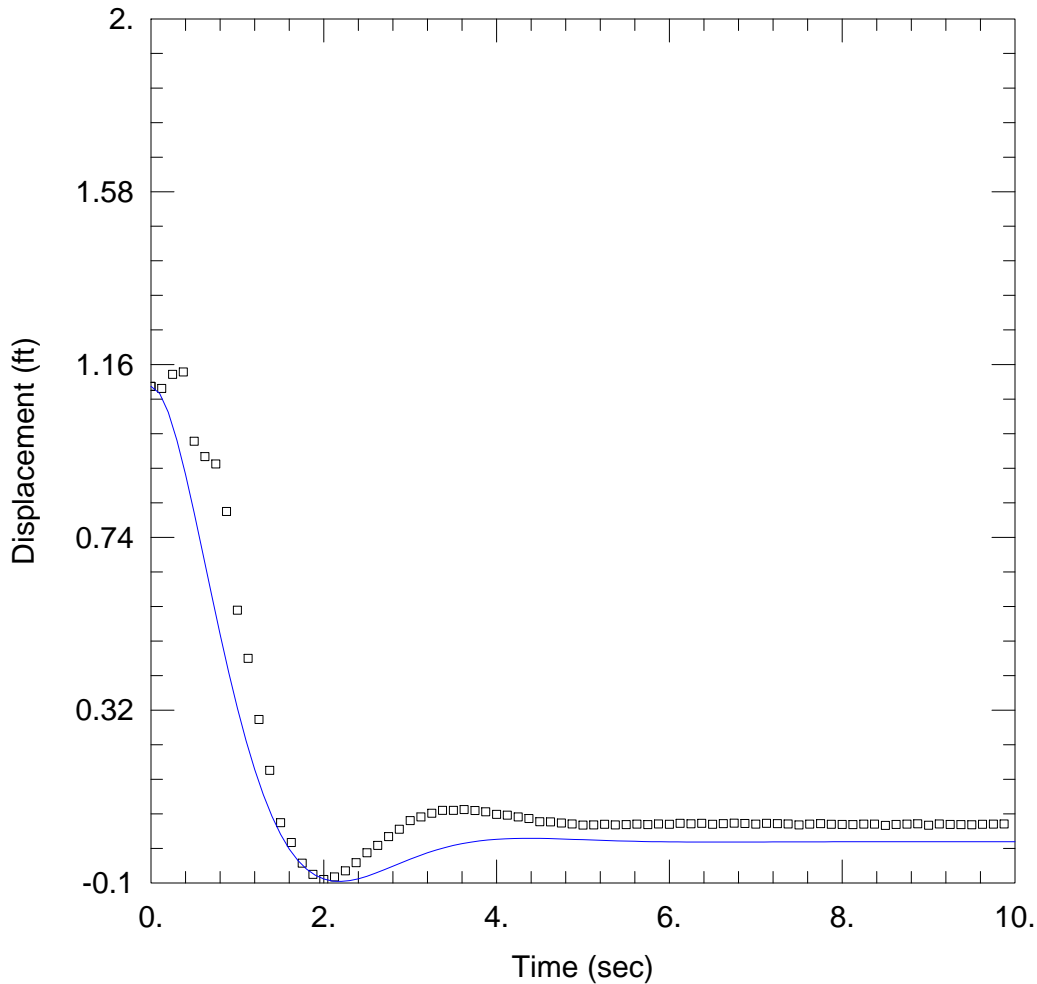
Initial Displacement: 0.5327 ft  
 Total Well Penetration Depth: 15. ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 15.45 ft  
 Screen Length: 10. ft  
 Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined  
 K = 132.3 ft/day

Solution Method: Springer-Gelhar  
 Le = 38.55 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-5\_b.aqt  
 Date: 01/31/17

Time: 12:42:08

### PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: MW-5  
 Test Date: 11/07/2016

### AQUIFER DATA

Saturated Thickness: 15.45 ft

Anisotropy Ratio (Kz/Kr): 0.1

### WELL DATA (MW-5)

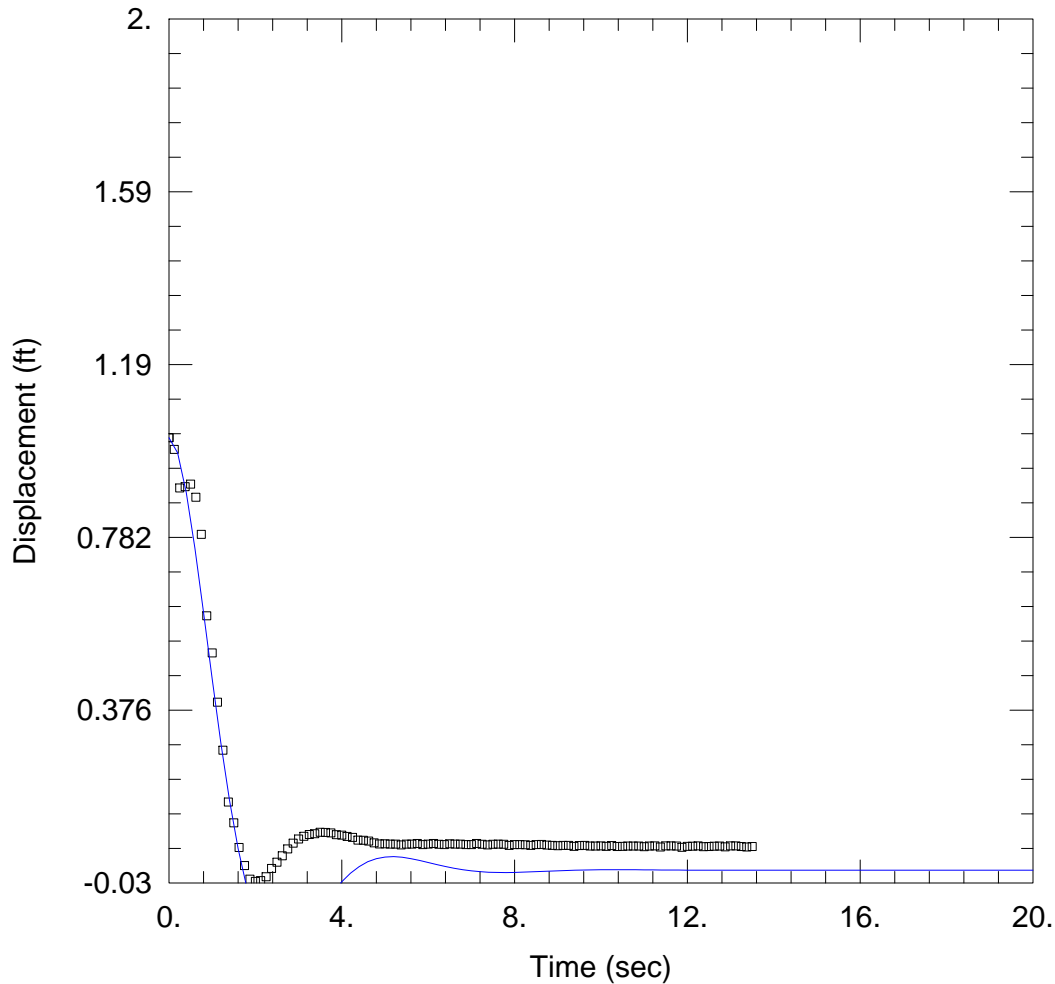
Initial Displacement: 1.107 ft  
 Total Well Penetration Depth: 15. ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 15.45 ft  
 Screen Length: 10. ft  
 Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Unconfined  
 K = 138.5 ft/day

Solution Method: Springer-Gelhar  
 Le = 9.66 ft



### WELL TEST ANALYSIS

Data Set: \...\MW-5\_c.aqt  
 Date: 01/31/17

Time: 12:41:30

### PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: MW-5  
 Test Date: 11/07/2016

### AQUIFER DATA

Saturated Thickness: 15.45 ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

### WELL DATA (MW-5)

Initial Displacement: 1.016 ft  
 Total Well Penetration Depth: 15. ft  
 Casing Radius: 0.08333 ft

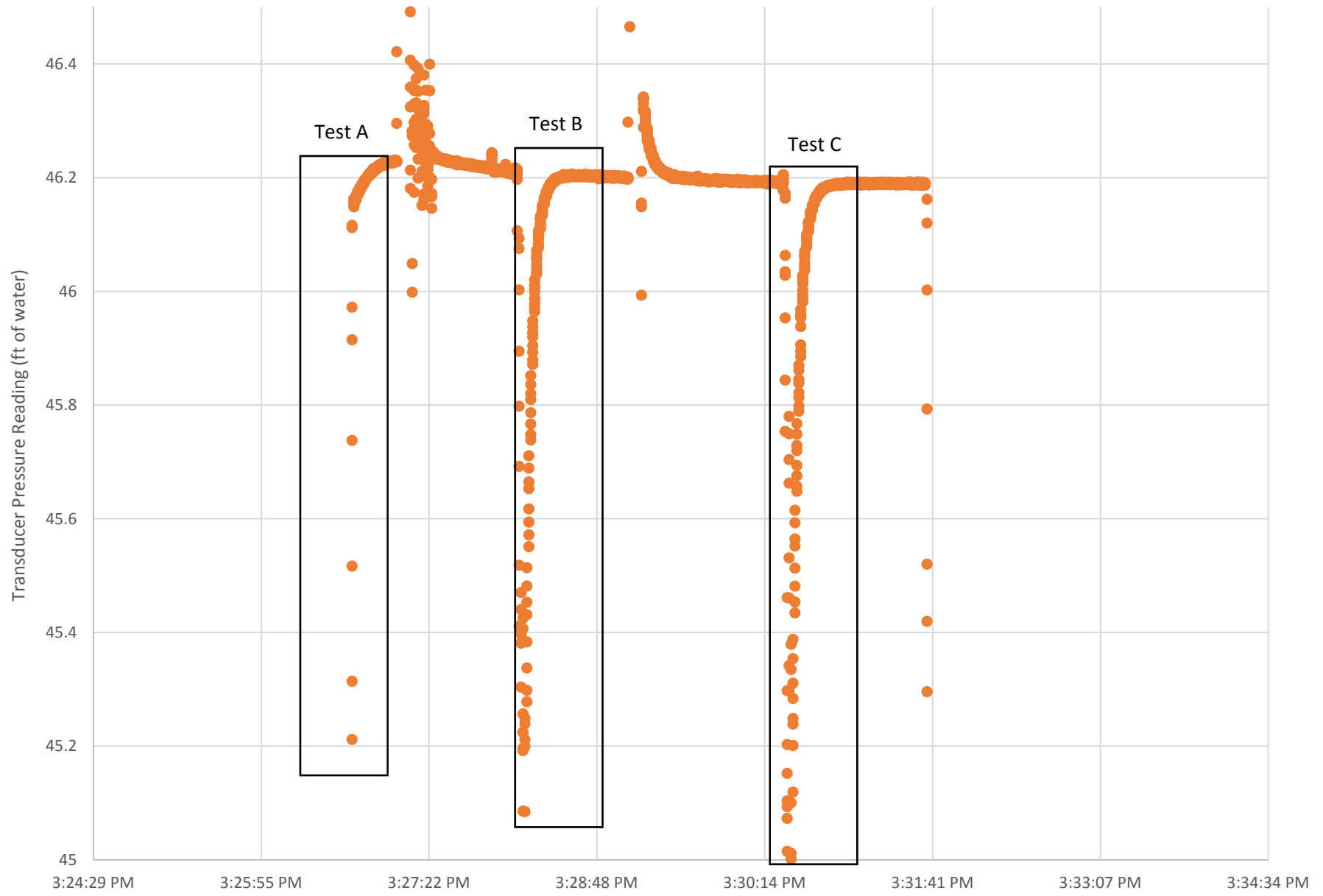
Static Water Column Height: 15.45 ft  
 Screen Length: 10. ft  
 Well Radius: 0.25 ft

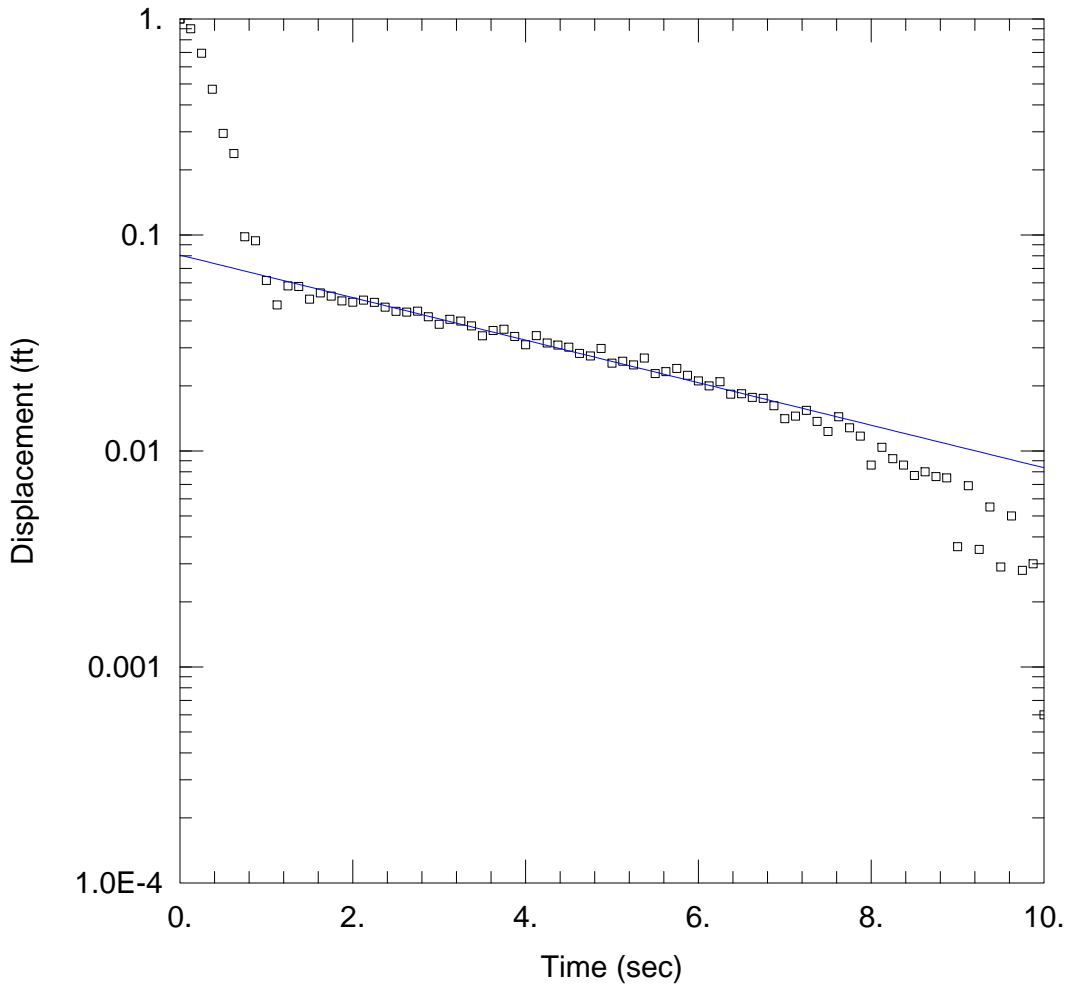
### SOLUTION

Aquifer Model: Unconfined  
 K = 133.9 ft/day

Solution Method: Springer-Gelhar  
 Le = 16.67 ft

MW-06





WELL TEST ANALYSIS

Data Set: \...\MW-6\_a.aqt  
 Date: 01/31/17

Time: 12:38:49

PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: MW-06  
 Test Date: 11/07/2016

AQUIFER DATA

Saturated Thickness: 17. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-06)

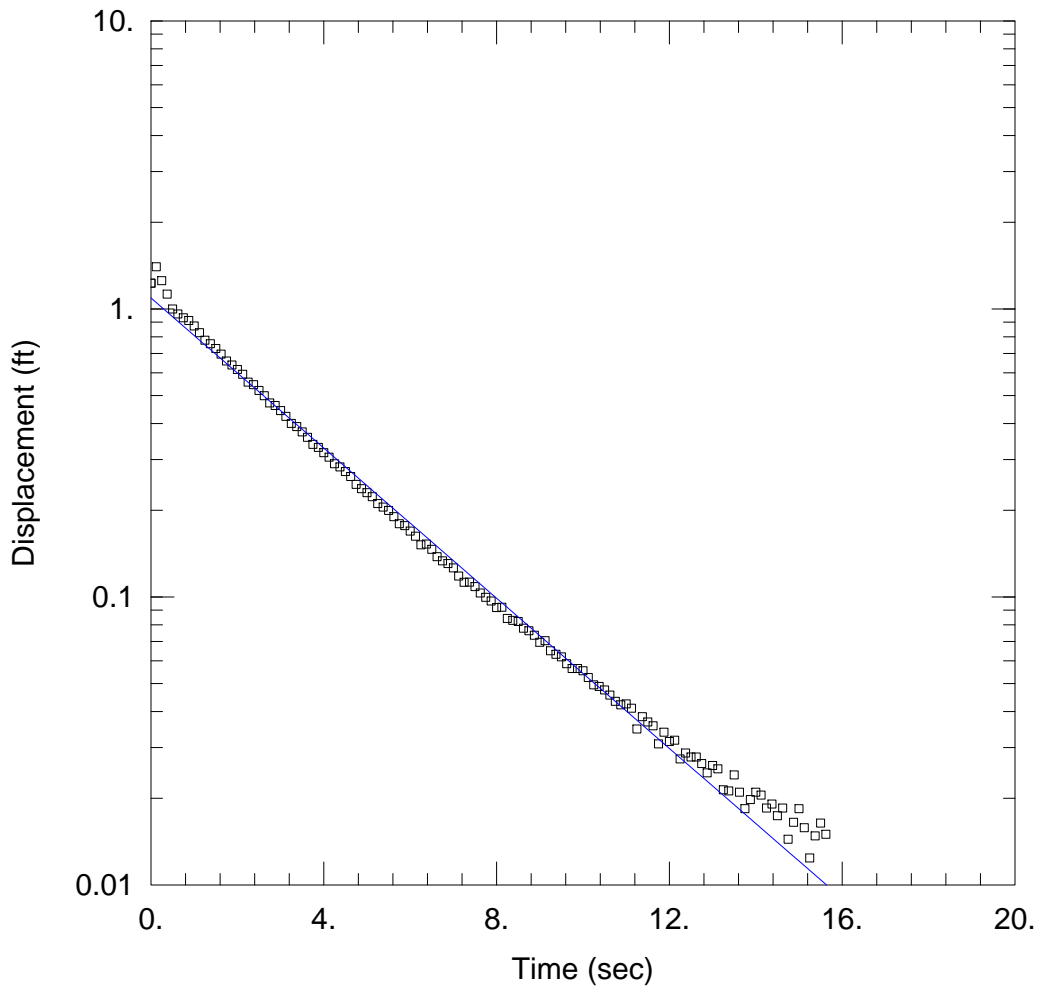
Initial Displacement: 1. ft  
 Total Well Penetration Depth: 16.5 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 17. ft  
 Screen Length: 10. ft  
 Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined  
 K = 21.35 ft/day

Solution Method: Bower-Rice  
 y0 = 0.08064 ft



### WELL TEST ANALYSIS

Data Set: \...\MW-6\_b.aqt  
 Date: 01/31/17

Time: 12:37:49

### PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: MW-06  
 Test Date: 11/07/2016

### AQUIFER DATA

Saturated Thickness: 17. ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

### WELL DATA (MW-06)

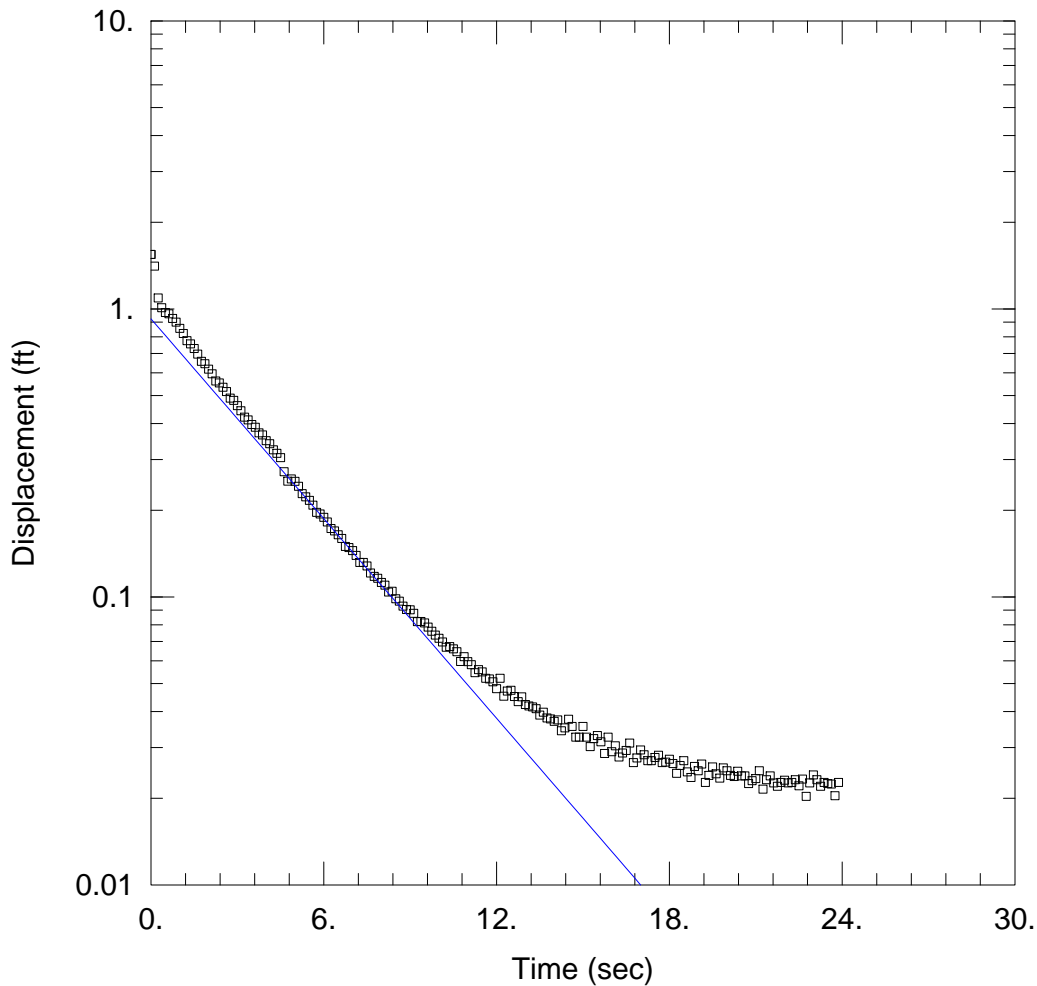
Initial Displacement: 1.228 ft  
 Total Well Penetration Depth: 16.5 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 17. ft  
 Screen Length: 10. ft  
 Well Radius: 0.25 ft

### SOLUTION

Aquifer Model: Unconfined  
 K = 28.27 ft/day

Solution Method: Bower-Rice  
 $y_0 =$  1.091 ft



### WELL TEST ANALYSIS

Data Set: \...\MW-6\_c.aqt  
 Date: 08/09/17

Time: 11:53:16

### PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: MW-06  
 Test Date: 11/07/2016

### AQUIFER DATA

Saturated Thickness: 17. ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

### WELL DATA (MW-06)

Initial Displacement: 1.546 ft  
 Total Well Penetration Depth: 16.5 ft  
 Casing Radius: 0.08333 ft

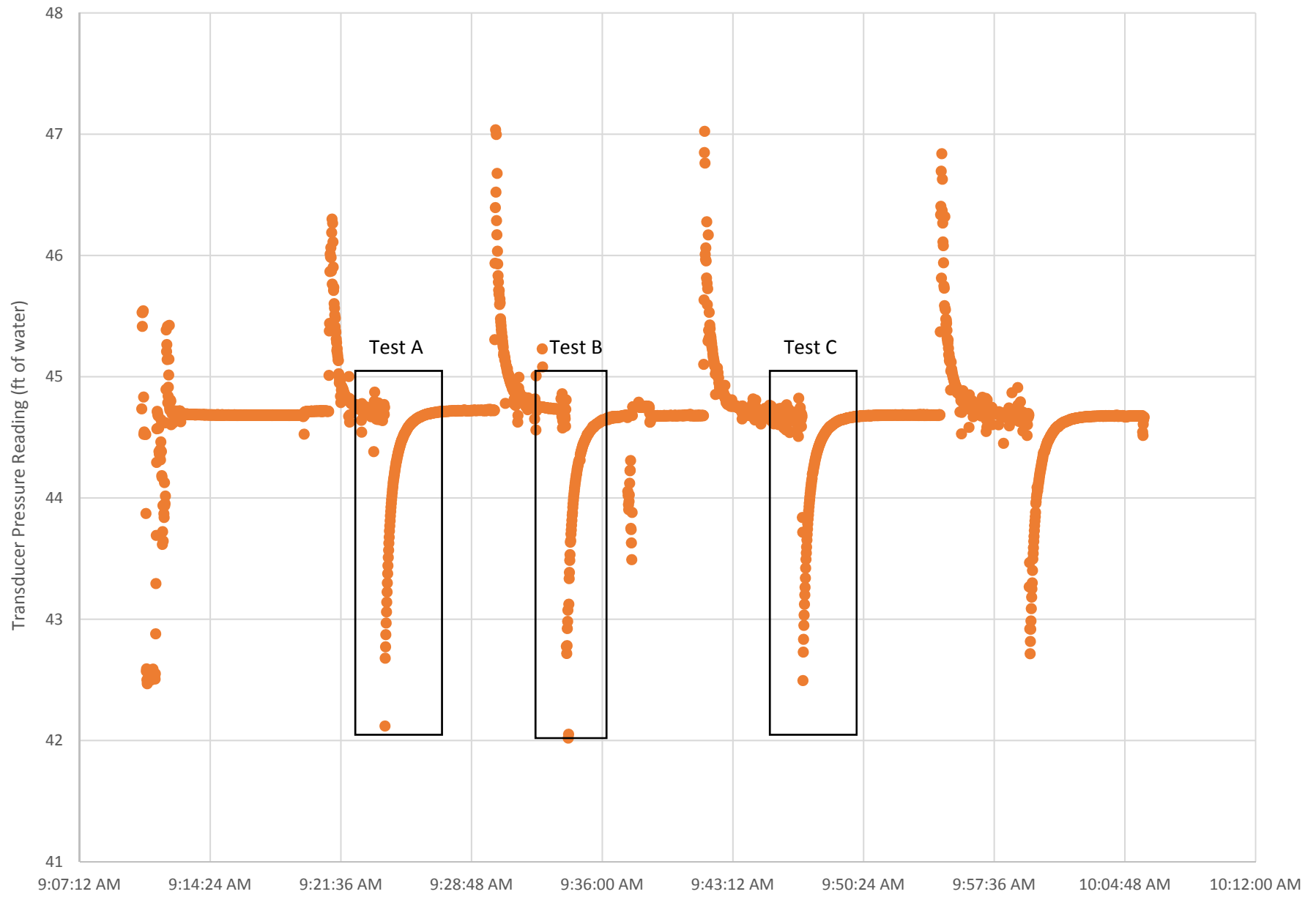
Static Water Column Height: 17. ft  
 Screen Length: 10. ft  
 Well Radius: 0.25 ft

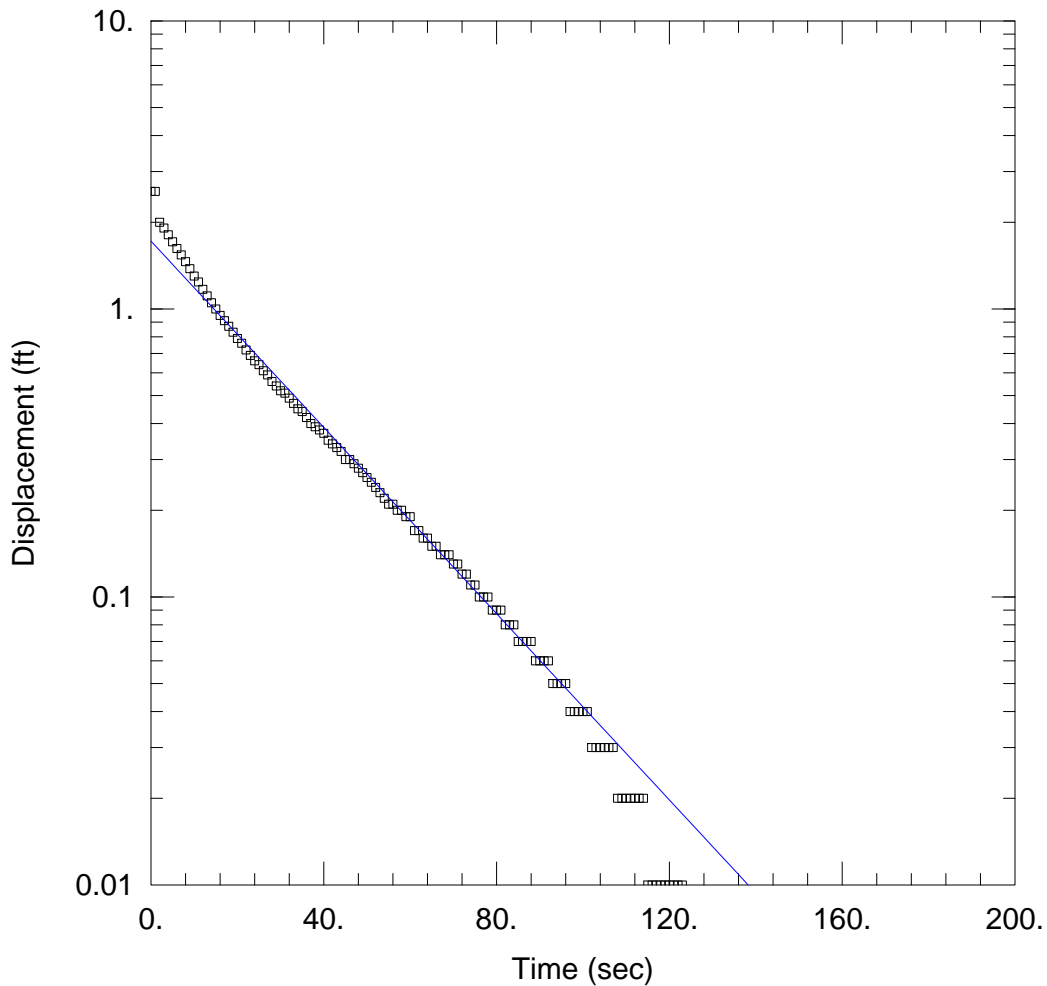
### SOLUTION

Aquifer Model: Unconfined  
 $K =$  25.07 ft/day

Solution Method: Bower-Rice  
 $y_0 =$  0.9236 ft

# T4S1MW-03s





### WELL TEST ANALYSIS

Data Set: \\...\T4S1MW03S\_a.aqt  
 Date: 08/09/17

Time: 12:07:13

### PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: T4S1MW03S  
 Test Date: 11/07/2016

### AQUIFER DATA

Saturated Thickness: 11.1 ft

Anisotropy Ratio (Kz/Kr): 0.1

### WELL DATA (T4S1MW03S)

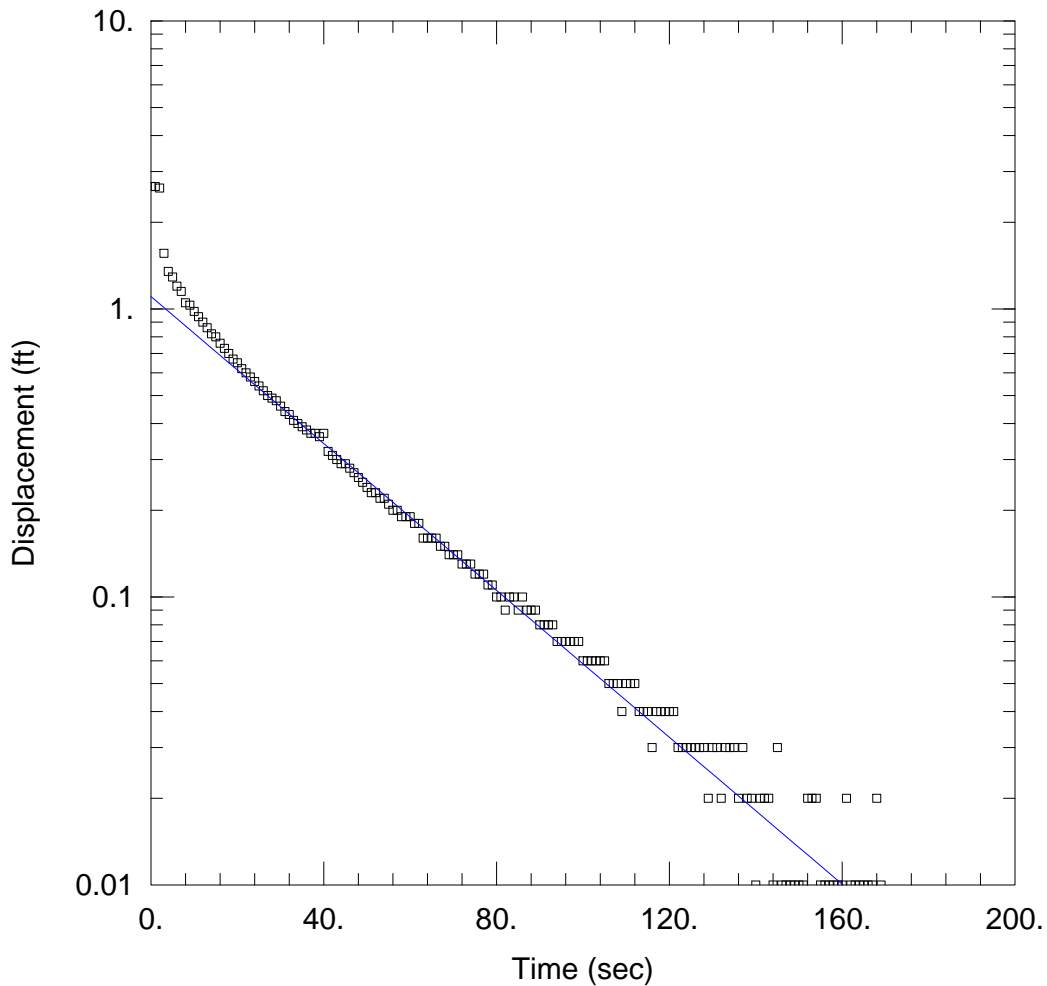
Initial Displacement: 2.56 ft  
 Total Well Penetration Depth: 11.1 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 11.1 ft  
 Screen Length: 10. ft  
 Well Radius: 0.1667 ft

### SOLUTION

Aquifer Model: Unconfined  
 K = 3.75 ft/day

Solution Method: Bower-Rice  
 y0 = 1.719 ft



WELL TEST ANALYSIS

Data Set: \\...\T4S1MW03S\_b.aqt  
 Date: 08/09/17

Time: 12:09:16

PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: T4S1MW03S  
 Test Date: 11/07/2016

AQUIFER DATA

Saturated Thickness: 11.1 ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

WELL DATA (T4S1MW03S)

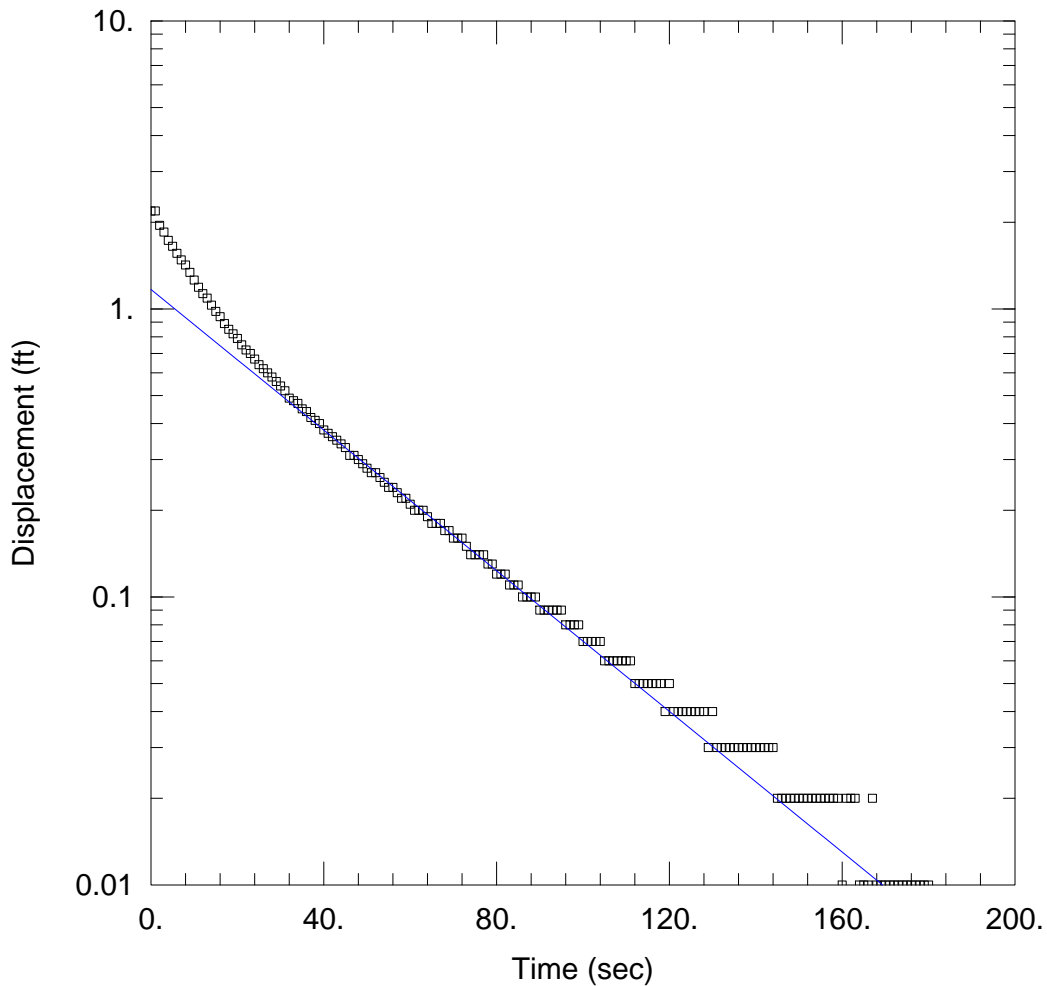
Initial Displacement: 2.661 ft  
 Total Well Penetration Depth: 11.1 ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 11.1 ft  
 Screen Length: 10. ft  
 Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined  
 K = 2.957 ft/day

Solution Method: Bower-Rice  
 $y_0 =$  1.104 ft



WELL TEST ANALYSIS

Data Set: \\...\T4S1MW03S\_c.aqt  
 Date: 08/09/17

Time: 12:10:55

PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: T4S1MW03S  
 Test Date: 11/07/2016

AQUIFER DATA

Saturated Thickness: 11.1 ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

WELL DATA (T4S1MW03S)

Initial Displacement: 2.187 ft  
 Total Well Penetration Depth: 11.1 ft  
 Casing Radius: 0.08333 ft

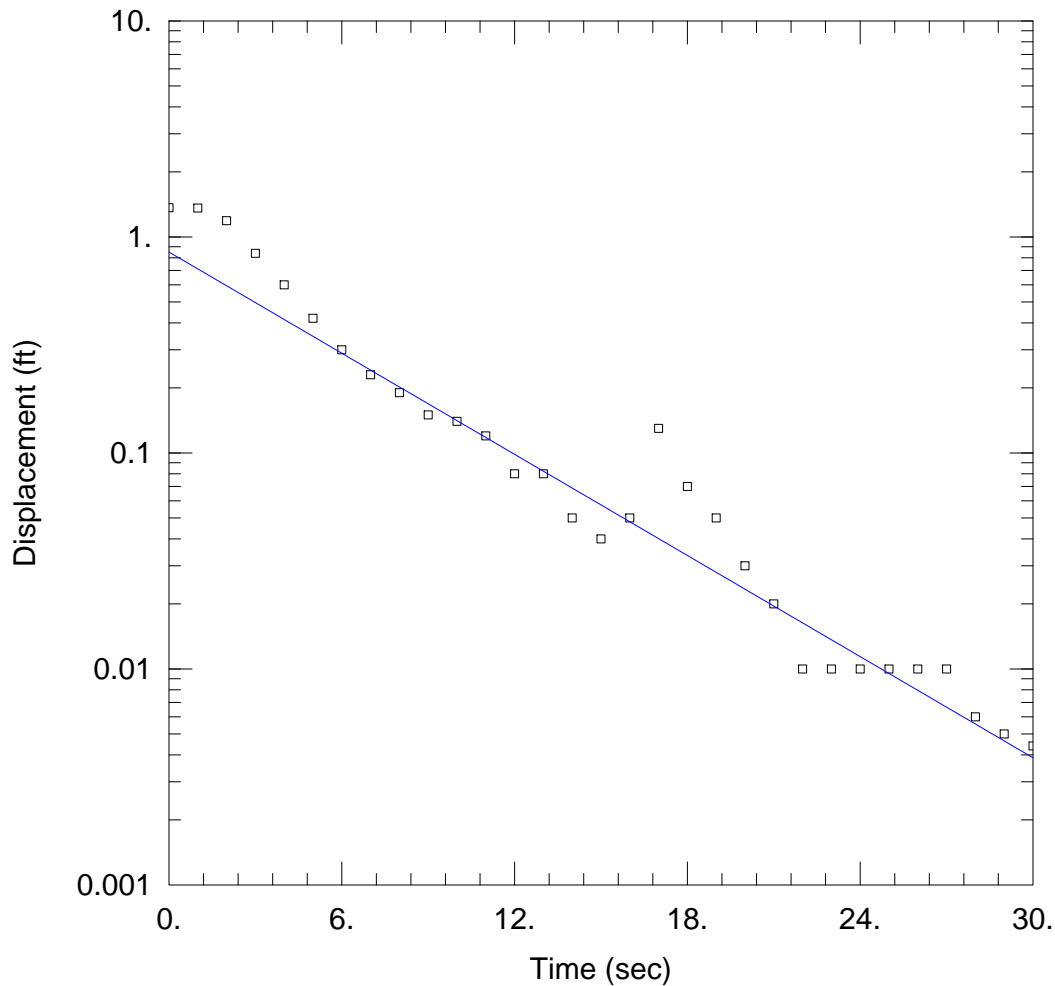
Static Water Column Height: 11.1 ft  
 Screen Length: 10. ft  
 Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined  
 K = 2.831 ft/day

Solution Method: Bower-Rice  
 $y_0$  = 1.168 ft





WELL TEST ANALYSIS

Data Set: \\...\T4S1MW22\_a.aqt  
 Date: 08/09/17

Time: 12:32:37

PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: T4S1MW22  
 Test Date: 11/07/2016

AQUIFER DATA

Saturated Thickness: 14.68 ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

WELL DATA (T4S1MW22)

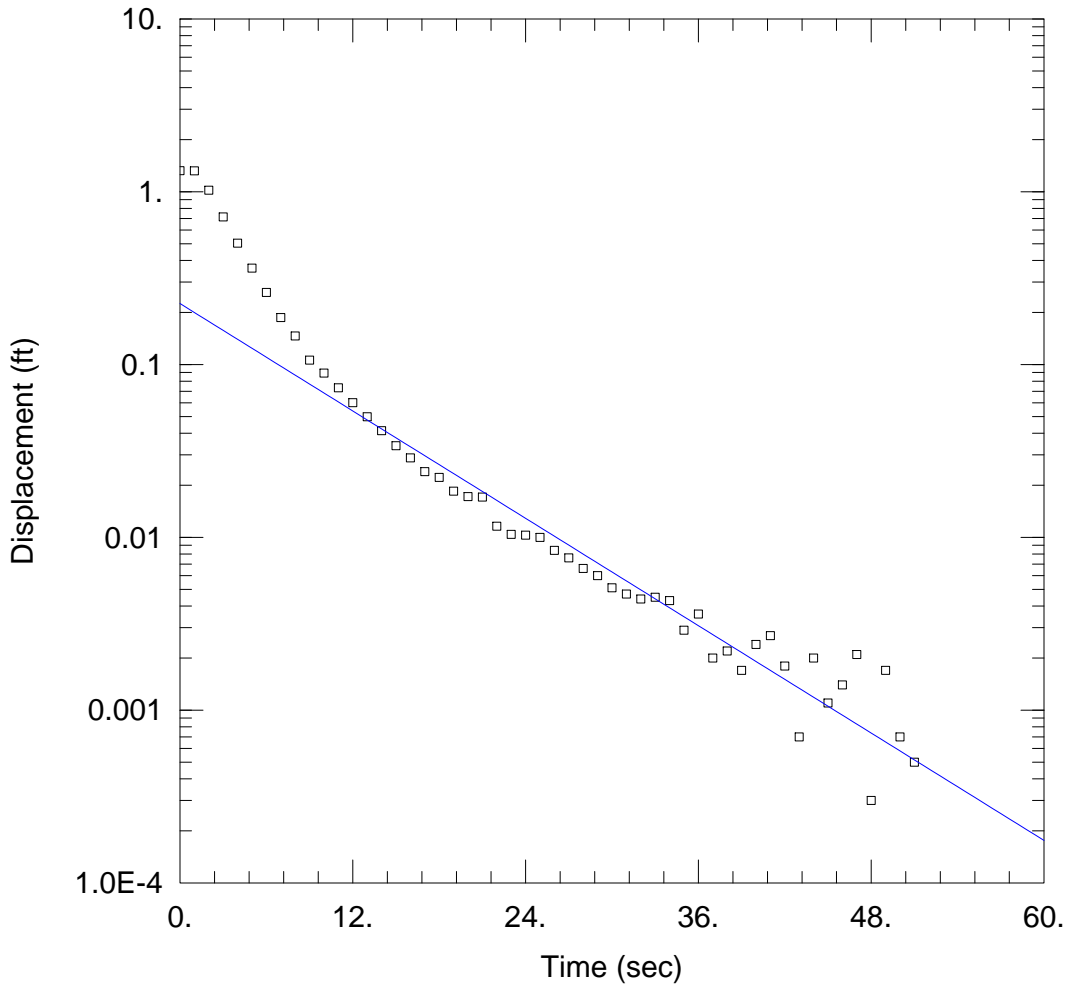
Initial Displacement: 1.365 ft  
 Total Well Penetration Depth: 10. ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 14.68 ft  
 Screen Length: 10. ft  
 Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined  
 K = 16.29 ft/day

Solution Method: Bower-Rice  
 $y_0 =$  0.8511 ft



WELL TEST ANALYSIS

Data Set: \\...\T4S1MW22\_b.aqt  
 Date: 08/09/17

Time: 12:33:42

PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: T4S1MW22  
 Test Date: 11/07/2016

AQUIFER DATA

Saturated Thickness: 14.68 ft

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

WELL DATA (T4S1MW22)

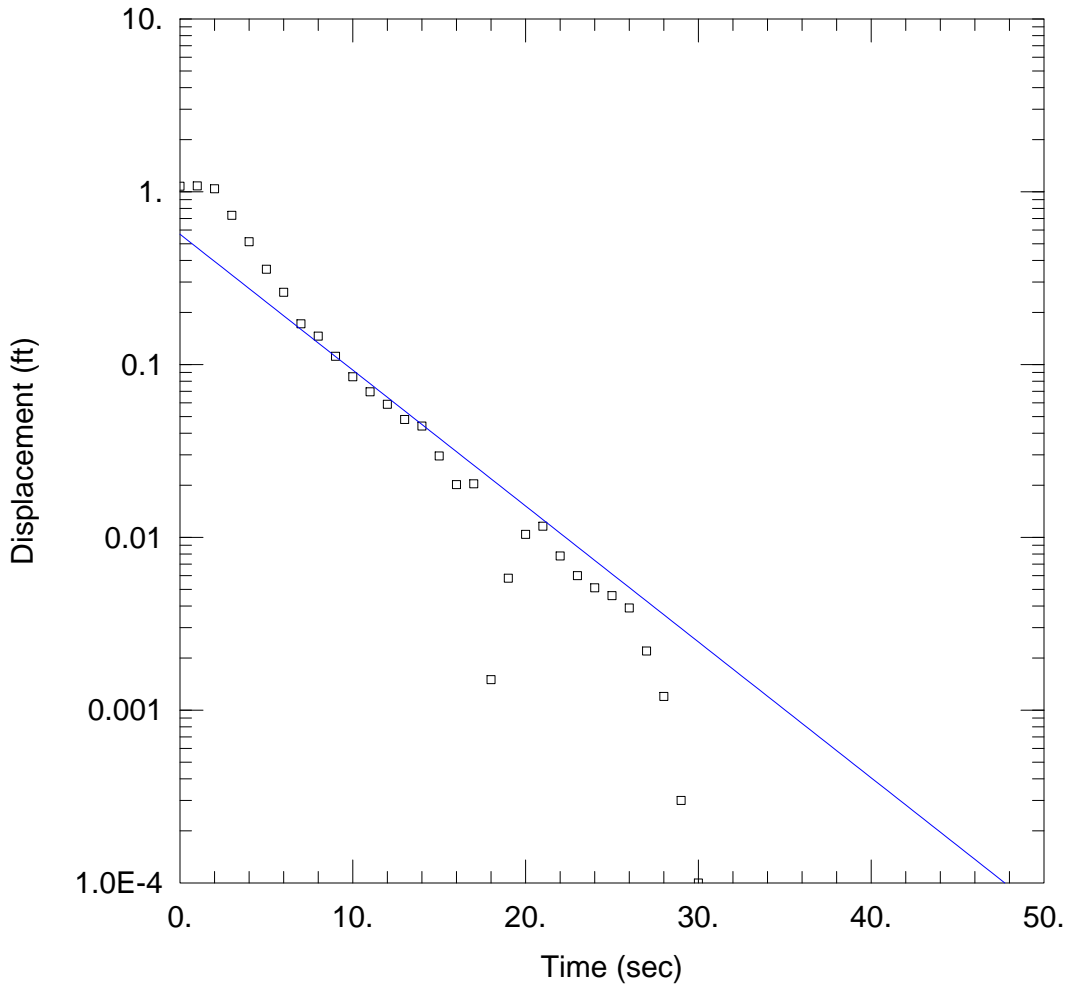
Initial Displacement: 1.325 ft  
 Total Well Penetration Depth: 10. ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 14.68 ft  
 Screen Length: 10. ft  
 Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined  
 K = 10.81 ft/day

Solution Method: Bower-Rice  
 $y_0$  = 0.2253 ft



WELL TEST ANALYSIS

Data Set: \...\T4S1MW22\_c.aqt  
 Date: 08/09/17

Time: 12:34:11

PROJECT INFORMATION

Company: Northwest Pipe Company  
 Client: Northwest Pipe Company  
 Location: Portland, OR  
 Test Well: T4S1MW22  
 Test Date: 11/07/2016

AQUIFER DATA

Saturated Thickness: 14.68 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (T4S1MW22)

Initial Displacement: 1.077 ft  
 Total Well Penetration Depth: 10. ft  
 Casing Radius: 0.08333 ft

Static Water Column Height: 14.68 ft  
 Screen Length: 10. ft  
 Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined  
 K = 16.42 ft/day

Solution Method: Bower-Rice  
 y0 = 0.5676 ft

# Attachment G

## BIOCHLOR Screenshots

# BIOCHLOR Natural Attenuation Decision Support System

Version 2.2  
Excel 2000

Northwest Pipe  
Southeast Area  
Run Name

TYPE OF CHLORINATED SOLVENT:

Ethenes   
Ethanes

## 1. ADVECTION

Seepage Velocity\* Vs  (ft/yr)  
 Hydraulic Conductivity K  (cm/sec)  
 Hydraulic Gradient i  (ft/ft)  
 Effective Porosity n  (-)

## 2. DISPERSION

Alpha x\*  (ft)  
 (Alpha y) / (Alpha x)\*  (-)  
 (Alpha z) / (Alpha x)\*  (-)  
 Calc. Alpha x

## 3. ADSORPTION

Retardation Factor\*   
 Soil Bulk Density, rho  (kg/L)  
 Fraction Organic Carbon, foc  (-)  
 Partition Coefficient Koc  (L/kg)  
 PCE  (L/kg)  (-)  
 TCE  (L/kg)  (-)  
 DCE  (L/kg)  (-)  
 VC  (L/kg)  (-)  
 ETH  (L/kg)  (-)  
 Common R (used in model)\* =

## 4. BIOTRANSFORMATION

**Zone 1**

Reaction	$\lambda$ (1/yr)	half-life (yrs)	Yield
PCE → TCE	<input type="text" value="1.200"/>	<input type="text" value=""/>	0.79
TCE → DCE	<input type="text" value="0.950"/>	<input type="text" value=""/>	0.74
DCE → VC	<input type="text" value="1.700"/>	<input type="text" value=""/>	0.64
VC → ETH	<input type="text" value="7.000"/>	<input type="text" value=""/>	0.45

**Zone 2**

Reaction	$\lambda$ (1/yr)	half-life (yrs)
PCE → TCE	<input type="text" value="0.000"/>	<input type="text" value=""/>
TCE → DCE	<input type="text" value="0.000"/>	<input type="text" value=""/>
DCE → VC	<input type="text" value="0.000"/>	<input type="text" value=""/>
VC → ETH	<input type="text" value="0.000"/>	<input type="text" value=""/>

## 5. GENERAL

Simulation Time\*  (yr)  
 Modeled Area Width\*  (ft)  
 Modeled Area Length\*  (ft)  
 Zone 1 Length\*  (ft)  
 Zone 2 Length\*  (ft)  
 Zone 2 = L - Zone 1

## 6. SOURCE DATA

Source Options

Source Thickness in Sat. Zone\*  (ft)  
 Width\* (ft)   
 Conc. ( $\mu\text{g/L}$ )\* C1

PCE	<input type="text" value="299.0"/>
TCE	<input type="text" value="127.0"/>
DCE	<input type="text" value="366.0"/>
VC	<input type="text" value="17.5"/>
ETH	<input type="text" value="0"/>

## 7. FIELD DATA FOR COMPARISON

Conc. ( $\mu\text{g/L}$ )	130	883	988						
PCE Conc. ( $\mu\text{g/L}$ )	1.47	.127	.014						
TCE Conc. ( $\mu\text{g/L}$ )	3.86	.15	.15						
DCE Conc. ( $\mu\text{g/L}$ )	3.5	.15	.15						
VC Conc. ( $\mu\text{g/L}$ )	0.1	.008	.012						
ETH Conc. ( $\mu\text{g/L}$ )	0.0	.0	.0						
Distance from Source (ft)	130	883	988						
Date Data Collected	2017								

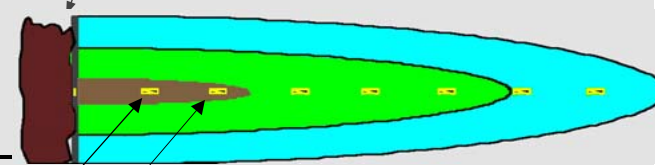
## 8. CHOOSE TYPE OF OUTPUT TO SEE:

## Data Input Instructions:

115 → 1. Enter value directly...or  
 or  
 0.02 → 2. Calculate by filling in gray cells. Press Enter, then   
 (To restore formulas, hit "Restore Formulas" button)  
 Variable\* → Data used directly in model.

Test if Biotransformation is Occurring →

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

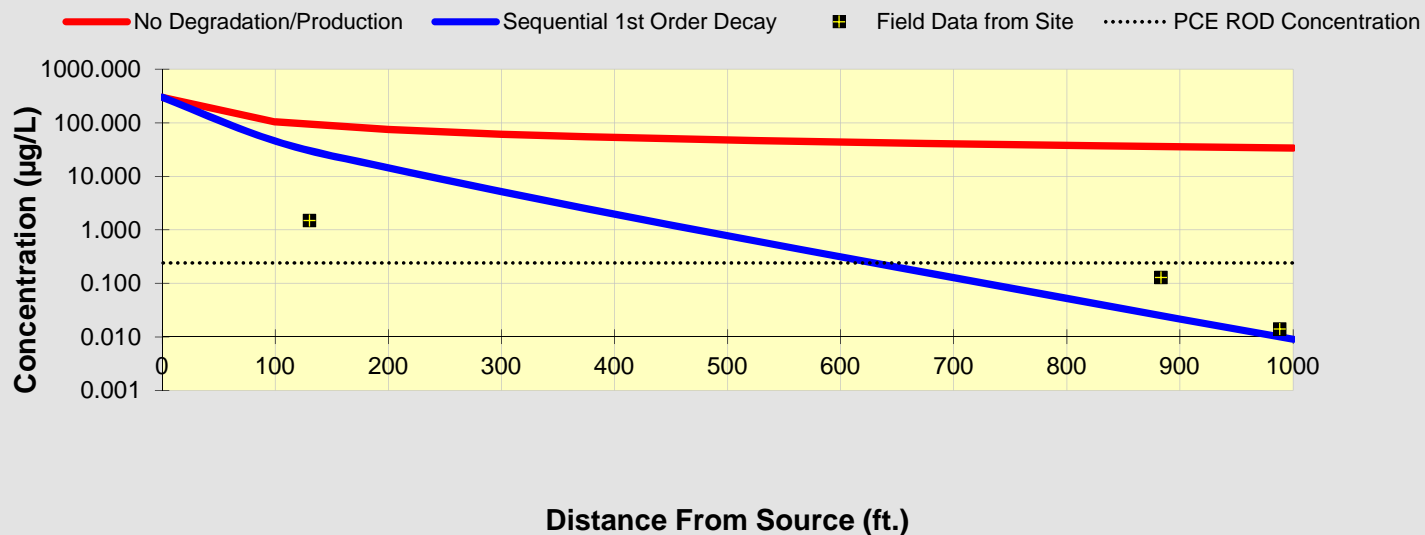
Observed Centerline Conc. at Monitoring Wells

### DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE ( $\mu\text{g/L}$ ) at Z=0

<b>PCE</b>	<b>Distance from Source (ft)</b>											
	0	100	200	300	400	500	600	700	800	900	1000	
<b>No Degradation</b>	299.000	103.238	74.203	60.920	52.904	47.397	43.315	40.134	37.564	35.432	33.626	
<b>Biotransformation</b>	299.0000	45.339	14.311	5.160	1.968	0.774	0.311	0.126	0.052	0.022	0.009	

<b>Monitoring Well Locations (ft)</b>											
	130	883	988								
<b>Field Data from Site</b>	1.470	0.127	0.014								



- [See PCE](#)
- [See TCE](#)
- [See DCE](#)
- [See VC](#)
- [See ETH](#)

**Prepare Animation**

**Time:**

1,000.0 Years

Log  $\longleftrightarrow$  Linear

**Return to Input**

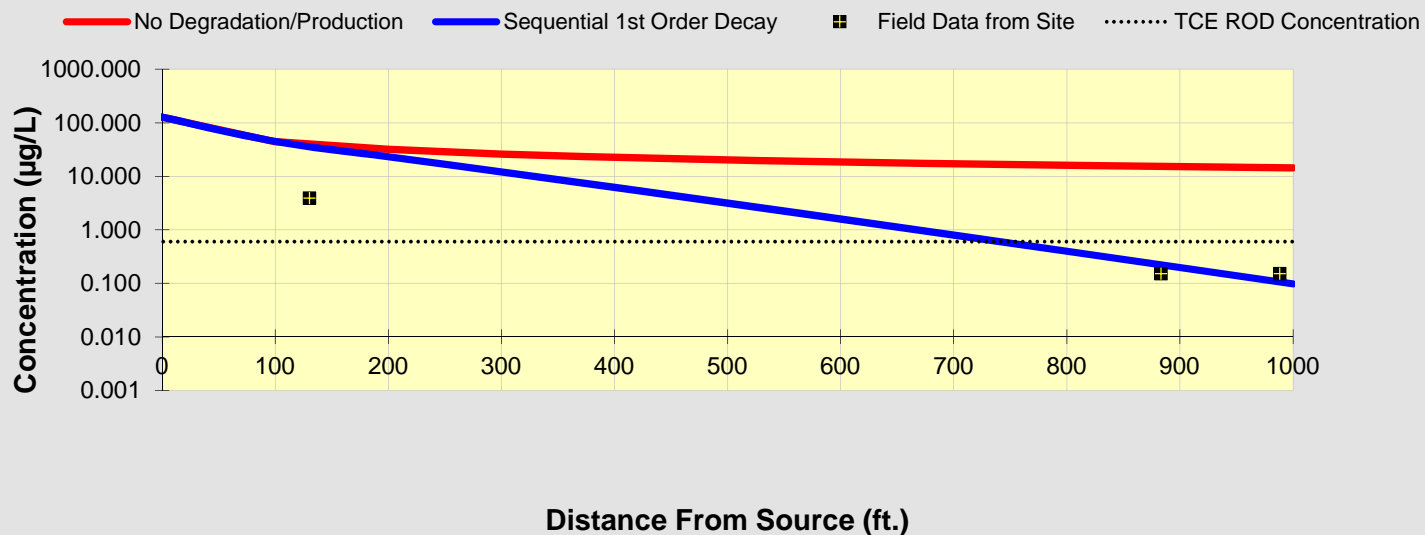
**To All**

**To Array**

### DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE ( $\mu\text{g/L}$ ) at Z=0

TCE	Distance from Source (ft)										
	0	100	200	300	400	500	600	700	800	900	1000
No Degradation	127.000	43.850	31.518	25.876	22.471	20.132	18.398	17.047	15.955	15.050	14.283
Biotransformation	127.0000	44.620	23.146	12.044	6.190	3.146	1.586	0.794	0.396	0.196	0.097

Field Data from Site	Monitoring Well Locations (ft)										
	130	883	988								
	3.860	0.150	0.150								



- See PCE
- See TCE
- See DCE
- See VC
- See ETH

Prepare Animation

Time:  
  
Log  $\longleftrightarrow$  Linear

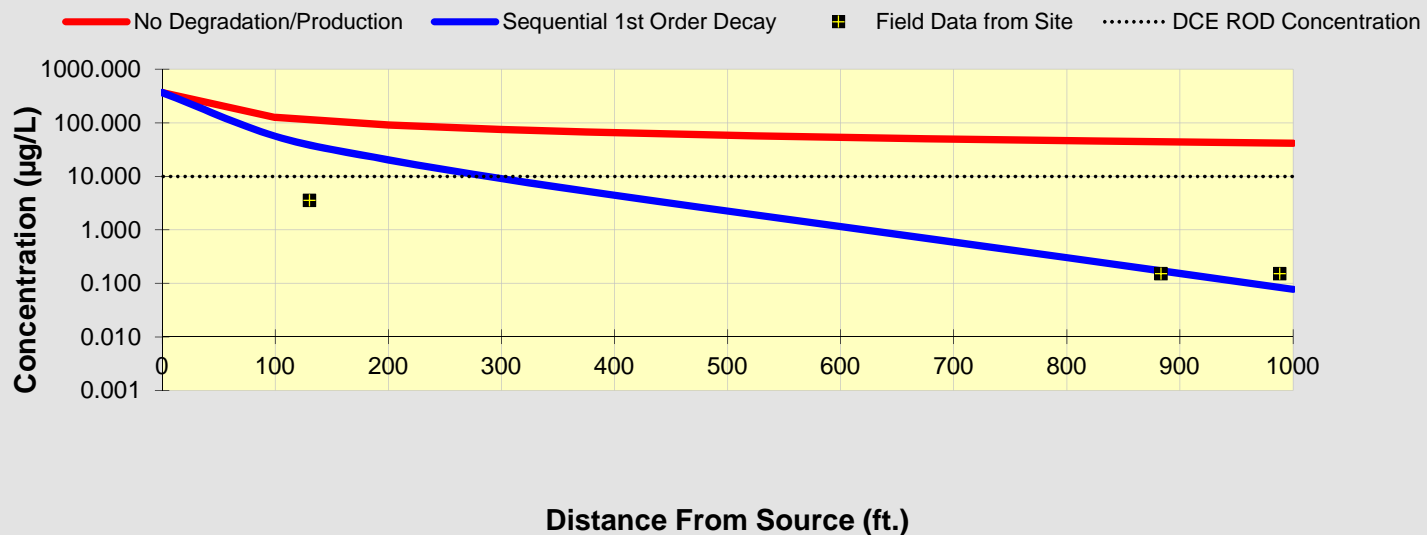
Return to Input

To All

To Array

### DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE ( $\mu\text{g/L}$ ) at Z=0

	Distance from Source (ft)											
	0	100	200	300	400	500	600	700	800	900	1000	
<b>DCE</b>												
No Degradation	366.000	126.372	90.830	74.571	64.759	58.018	53.022	49.127	45.982	43.372	41.161	
Biotransformation	366.0000	55.995	20.253	9.051	4.420	2.238	1.146	0.588	0.301	0.153	0.077	
Monitoring Well Locations (ft)												
	130	883	988									
Field Data from Site	3.500	0.150	0.150									



- See PCE
- See TCE
- See DCE
- See VC
- See ETH

Prepare Animation

**Time:**

1,000.0 Years

Log ↔ Linear

Return to Input

To All

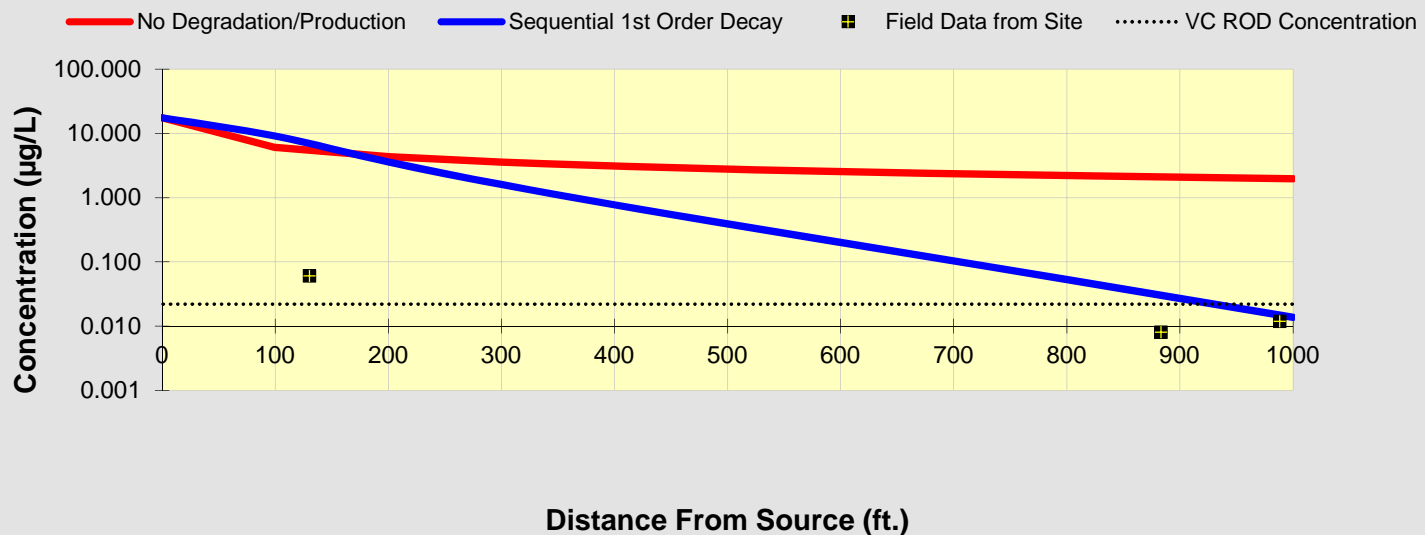
To Array

### DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE ( $\mu\text{g/L}$ ) at Z=0

<b>VC</b>	<b>Distance from Source (ft)</b>										
	0	100	200	300	400	500	600	700	800	900	1000
<b>No Degradation</b>	17.500	6.042	4.343	3.566	3.096	2.774	2.535	2.349	2.199	2.074	1.968
<b>Biotransformation</b>	17.5000	9.097	3.598	1.598	0.773	0.391	0.200	0.103	0.053	0.027	0.014

<b>Monitoring Well Locations (ft)</b>											
	130	883	988								
<b>Field Data from Site</b>	0.060	0.008	0.012								



- See PCE
- See TCE
- See DCE
- See VC
- See ETH

Prepare Animation

**Time:**

1,000.0 Years

Log  $\longleftrightarrow$  Linear

Return to Input

To All

To Array