

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: Shannon Fitzsimmons/Jacobs

REVIEWED BY: Bernice Kidd/Jacobs

REFERENCE: Northwest Pipe Company GWM 2Q Event – May 8 and May 9, 2019

DATE: June 10, 2019

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 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 *NFGs for Inorganic Superfund Methods Data Review* (EPA, 2016).

Findings

The overall summaries of the data validation findings are contained in Tables 1 through 7 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. Presents the results that are qualified because of blank contamination.

- **Table 5:** Laboratory Control Sample – Qualified Data. Presents the results that are qualified because of matrix spike/matrix spike duplicate recovery exceedances.
- **Table 6:** Matrix Spike Precision/Accuracy - Qualified Data. Presents the results that are qualified because of matrix spike/matrix spike duplicate recovery exceedances.
- **Table 7:** Site Completeness by Analyte – Qualified Data. Presents the percent completeness by method, analyte, and matrix.

This DQE report includes 10 normal groundwater samples, one IDW sample, two trip blanks, and one field duplicate (FD) collected May 8 and May 9, 2019. These samples were reported under two sample delivery groups: 580-86047-1 and 580-86076-1. A list of samples included in this DQE are presented in Table 1. Five methods were used to analyze the groundwater samples and are provided in Table 2. The majority of analyses were performed by TestAmerica Laboratory, Seattle, Washington (STL-SEA) and TestAmerica Laboratory, Irvine, California (TAMI). One low-level method was subcontracted to EMAX Laboratories Inc, Torrance, California (EMXT) to achieve lower reporting limits. Samples were collected and delivered by overnight carrier to STL-SEA, STL-SEA was responsible for shipment of samples to TAMI and EMXT.

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 using the *NFGs* as guidance. 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, with the following exceptions listed in Table 4:

Chloride and Nitrate as Nitrogen analyzed by E300.0A were detected in the method blank. The associated sample results less than five times the concentrations in the blank were flagged “U” and should be considered as non-detects.

Field Duplicates

In accordance with the *NWP SAP*, one field duplicate (FD) was collected from well MW06, and all precision criteria were met.

Laboratory Control Samples

LCS and LCSDs were analyzed at the required frequency and the accuracy and precision criteria were met, with the following exceptions listed in Table 5:

The LCS and LCSD relative percent difference (RPD) exceeded the acceptance criteria for trichloroethene, tetrachloroethene and *cis*-1,2-dichloroethene by SW8260C. The associated sample results were flagged “J” for the precision exceedance.

Matrix Spikes

Matrix spikes and matrix spike duplicates were analyzed at the required batch frequency and all accuracy and precision criteria were met, with the following exception listed in Table 6:

The recoveries for the MS and SD performed on sample T4SIMW23-050919-0 were greater than the upper control limit for Nitrate as Nitrogen. The associated detected sample result was qualified as estimated and flagged “J”.

Results

Analysis for tetrachloroethene, trichloroethylene, *cis*-1,2-dichloroethene, and vinyl chloride were analyzed by SW8260B-SIM in the groundwater samples due to the low-level reporting limit required.

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 7.
2. There was blank contamination for two anions by E300.0, nine results were qualified as non-detects.
3. Precision was exceeded for three VOC analytes analyzed by SW8260C, three results were qualified as estimated.
4. MS/SD recoveries were greater than the upper control limit for Method E300.0; one result was qualified as estimated.
5. 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.
6. 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
580-86047-1	08-May-19	WATER	N	MW02-050819-0	580-86047-1	EMXT
			N	MW02-050819-0	580-86047-1	STL-SEA
			N	MW02-050819-0	580-86047-1	TAMI
			N	MW04-050819-0	580-86047-1	STL-SEA
			N	MW04-050819-0	580-86047-1	TAMI
			N	MW04-050819-0	580-86047-1	EMXT
			N	T4SIMW03s-050819-0	580-86047-1	STL-SEA
			N	T4SIMW03s-050819-0	580-86047-1	TAMI
			N	T4SIMW03S-050819-0	580-86047-1	EMXT
			N	T4SIMW09-050819-0	580-86047-1	STL-SEA
			N	T4SIMW09-050819-0	580-86047-1	EMXT
			N	T4SIMW09-050819-0	580-86047-1	TAMI
			MS	T4SIMW09-050819-0MS	580-86047-1	STL-SEA
			MS	T4SIMW09-050819-0MS	580-86047-1	TAMI
			SD	T4SIMW09-050819-0SD	580-86047-1	STL-SEA
			SD	T4SIMW09-050819-0SD	580-86047-1	TAMI
			N	T4SIMW22-050819	580-86047-1	EMXT
			N	T4SIMW22-050819	580-86047-1	STL-SEA
			N	T4SIMW22-050819	580-86047-1	TAMI
			TB	TRIP BLANK-050819	580-86047-1	EMXT
580-86076-1	09-May-19	WATER	N	IDW DRUM 2-050919	580-86076-1	STL-SEA
			N	MW01-050919-0	580-86076-1	STL-SEA
			N	MW01-050919-0	580-86076-1	TAMI
			N	MW01-050919-0	580-86076-1	EMXT
			N	MW03-050919-0	580-86076-1	EMXT
			N	MW03-050919-0	580-86076-1	STL-SEA
			N	MW03-050919-0	580-86076-1	TAMI
			N	MW05-050919-0	580-86076-1	EMXT
			N	MW05-050919-0	580-86076-1	STL-SEA
			N	MW05-050919-0	580-86076-1	TAMI
			N	MW06-050919-0	580-86076-1	EMXT

TABLE 1
Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	QAQC Type	Sample Identification	SDG	Laboratory
580-86076-1	09-May-19	WATER	N	MW06-050919-0	580-86076-1	STL-SEA
			N	MW06-050919-0	580-86076-1	TAMI
			FD	MW100-050919-0	580-86076-1	STL-SEA
			FD	MW100-050919-0	580-86076-1	TAMI
			FD	MW100-050919-0	580-86076-1	EMXT
			N	T4SIMW23-050919-0	580-86076-1	EMXT
			N	T4SIMW23-050919-0	580-86076-1	STL-SEA
			N	T4SIMW23-050919-0	580-86076-1	TAMI
			MS	T4SIMW23-050919-OMS	580-86076-1	STL-SEA
			SD	T4SIMW23-050919-OSD	580-86076-1	STL-SEA
			TB	TRIPBLANK-050919	580-86076-1	EMXT

SDG = Sample delivery group
EMXT = EMAX Laboratories Inc.
STL-SEA = TestAmerica Seattle
TAMI = TestAmerica Irvine

QAQC Type

FD = Field Duplicate
MS = Matrix Spike
N = Normal
SD = Matrix Spike Duplicate
TB = Trip Blank

TABLE 2
Sample Chronology - Data Summary

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
STL-SEA	580-86047-1	MW02-050819-0	E300.OA	5/8/2019	5/9/2019		5/9/2019
TAMI		MW02-050819-0	RSK-175	5/8/2019	5/9/2019		5/14/2019
		MW02-050819-0	SM5310B	5/8/2019	5/9/2019		5/15/2019
EMXT		MW02-050819-0	SW8260C-SIM	5/8/2019	5/10/2019	5/16/2019	5/16/2019
STL-SEA		MW04-050819-0	E300.OA	5/8/2019	5/9/2019		5/9/2019
TAMI		MW04-050819-0	RSK-175	5/8/2019	5/9/2019		5/14/2019
		MW04-050819-0	SM5310B	5/8/2019	5/9/2019		5/15/2019
EMXT		MW04-050819-0	SW8260C-SIM	5/8/2019	5/10/2019	5/21/2019	5/21/2019
STL-SEA		T4SIMW03s-050819-0	E300.OA	5/8/2019	5/9/2019		5/9/2019
TAMI		T4SIMW03s-050819-0	RSK-175	5/8/2019	5/9/2019		5/14/2019
		T4SIMW03s-050819-0	SM5310B	5/8/2019	5/9/2019		5/15/2019
EMXT		T4SIMW03S-050819-0	SW8260C-SIM	5/8/2019	5/10/2019	5/16/2019	5/16/2019
STL-SEA	580-86076-1	T4SIMW09-050819-0	E300.OA	5/8/2019	5/9/2019		5/9/2019
TAMI		T4SIMW09-050819-0	RSK-175	5/8/2019	5/9/2019		5/14/2019
		T4SIMW09-050819-0	SM5310B	5/8/2019	5/9/2019		5/15/2019
EMXT		T4SIMW09-050819-0	SW8260C-SIM	5/8/2019	5/10/2019	5/16/2019	5/16/2019
STL-SEA		T4SIMW09-050819-OMS	E300.OA	5/8/2019	5/9/2019		5/9/2019
TAMI		T4SIMW09-050819-OMS	SM5310B	5/8/2019	5/9/2019		5/15/2019
STL-SEA		T4SIMW09-050819-OSD	E300.OA	5/8/2019	5/9/2019		5/9/2019
TAMI		T4SIMW09-050819-OSD	SM5310B	5/8/2019	5/9/2019		5/15/2019
STL-SEA		T4SIMW22-050819	E300.OA	5/8/2019	5/9/2019		5/9/2019
TAMI		T4SIMW22-050819	RSK-175	5/8/2019	5/9/2019		5/14/2019
		T4SIMW22-050819	SM5310B	5/8/2019	5/9/2019		5/15/2019
EMXT		T4SIMW22-050819	SW8260C-SIM	5/8/2019	5/10/2019	5/16/2019	5/16/2019
	T4SIMW22-050819	SW8260C-SIM	5/8/2019	5/10/2019	5/21/2019	5/21/2019	
	TRIP BLANK-050819	SW8260C-SIM	5/8/2019	5/10/2019	5/16/2019	5/16/2019	
STL-SEA	580-86076-1	IDW DRUM 2-050919	SW8260C	5/9/2019	5/10/2019	5/10/2019	5/10/2019
		MW01-050919-0	E300.OA	5/9/2019	5/10/2019		5/11/2019
		MW01-050919-0	E300.OA	5/9/2019	5/10/2019		5/15/2019
TAMI		MW01-050919-0	RSK-175	5/9/2019	5/10/2019		5/14/2019
		MW01-050919-0	SM5310B	5/9/2019	5/10/2019		5/15/2019
EMXT		MW01-050919-0	SW8260C-SIM	5/9/2019	5/14/2019	5/16/2019	5/16/2019
		MW01-050919-0	SW8260C-SIM	5/9/2019	5/14/2019	5/21/2019	5/21/2019
STL-SEA		MW03-050919-0	E300.OA	5/9/2019	5/10/2019		5/11/2019
		MW03-050919-0	E300.OA	5/9/2019	5/10/2019		5/15/2019
TAMI		MW03-050919-0	RSK-175	5/9/2019	5/10/2019		5/14/2019

TABLE 2
Sample Chronology - Data Summary

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
TAMI	580-86076-1	MW03-050919-0	SM5310B	5/9/2019	5/10/2019		5/15/2019
EMXT		MW03-050919-0	SW8260C-SIM	5/9/2019	5/14/2019	5/21/2019	5/21/2019
STL-SEA		MW05-050919-0	E300.0A	5/9/2019	5/10/2019		5/11/2019
		MW05-050919-0	E300.0A	5/9/2019	5/10/2019		5/15/2019
TAMI		MW05-050919-0	RSK-175	5/9/2019	5/10/2019		5/14/2019
		MW05-050919-0	SM5310B	5/9/2019	5/10/2019		5/15/2019
EMXT		MW05-050919-0	SW8260C-SIM	5/9/2019	5/14/2019	5/21/2019	5/21/2019
STL-SEA		MW06-050919-0	E300.0A	5/9/2019	5/10/2019		5/11/2019
		MW06-050919-0	E300.0A	5/9/2019	5/10/2019		5/15/2019
TAMI		MW06-050919-0	RSK-175	5/9/2019	5/10/2019		5/14/2019
		MW06-050919-0	SM5310B	5/9/2019	5/10/2019		5/15/2019
EMXT		MW06-050919-0	SW8260C-SIM	5/9/2019	5/14/2019	5/21/2019	5/21/2019
STL-SEA		MW100-050919-0	E300.0A	5/9/2019	5/10/2019		5/11/2019
		MW100-050919-0	E300.0A	5/9/2019	5/10/2019		5/15/2019
TAMI		MW100-050919-0	RSK-175	5/9/2019	5/10/2019		5/14/2019
		MW100-050919-0	SM5310B	5/9/2019	5/10/2019		5/15/2019
EMXT		MW100-050919-0	SW8260C-SIM	5/9/2019	5/14/2019	5/21/2019	5/21/2019
STL-SEA		T4SIMW23-050919-0	E300.0A	5/9/2019	5/10/2019		5/15/2019
		T4SIMW23-050919-0	E300.0A	5/9/2019	5/10/2019		5/11/2019
TAMI		T4SIMW23-050919-0	RSK-175	5/9/2019	5/10/2019		5/14/2019
		T4SIMW23-050919-0	SM5310B	5/9/2019	5/10/2019		5/15/2019
EMXT		T4SIMW23-050919-0	SW8260C-SIM	5/9/2019	5/14/2019	5/16/2019	5/16/2019
STL-SEA		T4SIMW23-050919-OMS	E300.0A	5/9/2019	5/10/2019		5/11/2019
		T4SIMW23-050919-OMS	E300.0A	5/9/2019	5/10/2019		5/15/2019
		T4SIMW23-050919-OSD	E300.0A	5/9/2019	5/10/2019		5/11/2019
		T4SIMW23-050919-OSD	E300.0A	5/9/2019	5/10/2019		5/15/2019
EMXT		TRIPBLANK-050919	SW8260C-SIM	5/9/2019	5/14/2019	5/16/2019	5/16/2019

SDG = sample delivery group

EMXT = EMAX Laboratories Inc

STL-SEA = TestAmerica Seattle

TAMI = TestAmerica Irvine

TABLE 3
Overall Flagging Summary

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes	
E300.0A	WATER	Category = Blank	Laboratory blank contamination less than the reporting limit	U	Protocol	9
		Category = Matrix	Matrix spike duplicate recovery criteria greater than the upper control limit	J	Other	1
		Category = Matrix	Matrix spike recovery greater than the upper control limit	J	Other	1
SW8260C	WATER	LCS RPD criteria exceeded	Category = LaboratoryControlSample	J	Protocol	3

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

- = = Analyte was detected greater than the quantitation limit.
- J = The analyte was detected, but the associated numerical value is considered an estimated quantity.
- U = The analyte was analyzed for but was not detected above the detection limit.

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
Blank Contamination - Qualified Data

Analyte	Sample Identification	Result	Blank Contamination Qualifier*	Criteria	Comments
Method (Matrix): E300.0A (WATER)					
Chloride					
	MW02-050819-0	2.9 mg/L	U	LB<RL	blank target = 0.683mg/L
	MW04-050819-0	3.4 mg/L	U	LB<RL	blank target = 0.683mg/L
	T4SIMW03s-050819-0	1.5 mg/L	U	LB<RL	blank target = 0.683mg/L
	T4SIMW09-050819-0	1.6 mg/L	U	LB<RL	blank target = 0.683mg/L
Nitrate-N					
	MW01-050919-0	0.5 mg/L	U	LB<RL	blank target = 0.122mg/L
	MW03-050919-0	0.2 mg/L	U	LB<RL	blank target = 0.122mg/L
	MW06-050919-0	0.13 mg/L	U	LB<RL	blank target = 0.122mg/L
	MW100-050919-0	0.14 mg/L	U	LB<RL	blank target = 0.122mg/L
	T4SIMW23-050919-0	0.48 mg/L	U	LB<RL	blank target = 0.122mg/L

mg/L = milligrams 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 was not detected above the detection limit.

Criteria:

LB<RL = Laboratory blank contamination less than the reporting limit

TABLE 5

Laboratory Control Sample - Qualified Data

Analyte	Sample Identification / QAQC Type	Result	LCS Qualifier*	LCS Recovery	Criteria
Method (Matrix): SW8260C (WATER)					
trichloroethene	IDW DRUM 2-050919 / N	4.8 ug/L	J	RPD = 24.74 Limit =20	LCSRPD
tetrachloroethene	IDW DRUM 2-050919 / N	21 ug/L	J	RPD = 21.16 Limit =20	LCSRPD
cis-1,2-Dichloroethene	IDW DRUM 2-050919 / N	49 ug/L	J	RPD = 26.63 Limit =20	LCSRPD

%R = percent recovery
 ug/L = micrograms per liter

QAQC Type

N = Normal Environmental Sample
 FD = Field Duplicate

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

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

Criteria:

LCSRPD = LCS RPD criteria exceeded

TABLE 6

Matrix Spike Precision/Accuracy - Qualified Data

Analyte	Sample Identification	Result	MS/MSD Qualifier*	MS Recovery	Criteria
Method (Matrix): E300.0A (WATER)					
Nitrate-N	T4SIMW23-050919-0	0.48 mg/L	J	%R = 111 LCL=90 UCL=110	MS>UCL
	T4SIMW23-050919-0	0.48 mg/L	J	%R = 111 LCL=90 UCL=110	SD>UCL

%R = percent recovery

LCL = lower control limit

UCL = upper control limit

mg/L = milligrams per liter

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

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

Criteria:

MS>UCL = Matrix spike recovery greater than the upper control limit

SD>UCL = Matrix spike duplicate recovery criteria greater than the upper control limit

TABLE 7
Site Completeness by Analyte - Qualified Data

Method	Analyte	Units	Number of Occurrences					Contractor R-Flags	Total	Contractor Completeness (%)	Overall
			Analyses	Detects	Non- detects	Blank Flags	J-Flags				
E300.0A	Chloride	MG/L	11	7	4				100	100	
	Nitrate-N	MG/L	11	6	5		3		100	100	
	Sulfate	MG/L	11	11			1		100	100	
RSK-175	Methane	UG/L	11	10	1				100	100	
SM5310B	Total Organic Carbon	MG/L	11	11					100	100	
SW8260C	cis-1,2-Dichloroethene	UG/L	1	1			1		100	100	
	Tetrachloroethene (PCE)	UG/L	1	1			1		100	100	
	Trichloroethene (TCE)	UG/L	1	1			1		100	100	
	Vinyl Chloride	UG/L	1	1					100	100	
SW8260C-SIM	cis-1,2-Dichloroethene	UG/L	11	9	2				100	100	
	Tetrachloroethene (PCE)	UG/L	11	8	3				100	100	
	Trichloroethene (TCE)	UG/L	11	8	3				100	100	
	Vinyl Chloride	UG/L	11	8	3				100	100	

% = Percent

J-Flags = Estimated results

R-Flags = Rejected results

mg/L = milligrams per liter

ug/L = micrograms per liter