Groundwater Data Quality Evaluation for Northwest Pipe Company, Portland, Oregon

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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 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 parent/field duplicate relative percent difference exceedances.

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

This DQE report includes 10 normal groundwater samples, one trip blank, and one field duplicate (FD) collected October 7 through October 9, 2019. These samples were reported under three sample delivery groups: 580-89826-1, 580-89879-1, and 580-89897-1. A list of samples included in this DQE is presented in Table 1. Four 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.

Field Duplicates

In accordance with the *NWP SAP*, one field duplicate (FD) was collected from well MW06, all precision criteria were met, with the following exception listed in Table 4:

Vinyl chloride exceeded the FD relative percent difference (RPD) acceptance criteria. The associated N/FD pair were qualified as estimated detects. Results were flagged "J" for the exceedance.

Laboratory Control Samples

LCS and LCSDs were analyzed at the required frequency and the accuracy and precision criteria were met.

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 exceptions listed in Table 5:

The recoveries for the MS and SD performed on sample MW02-100819-0 and T4S1MW09-100719-0 were greater than the upper control limit for chloride and sulfate. The associated detected sample results were 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. STL-SEA neglected to send a collected Trip Blank in SDG 580-89826-1 to the sub-contracted laboratory performing VOCs by SW8260B-SIM.

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. Precision was exceeded for one VOC analyte analyzed by SW8260C-SIM, two results were qualified as estimated.

3. MS/SD recoveries were greater than the upper control limit for Method E300.0; four results were qualified as estimated.

4. The precision and accuracy of the data, as measured by field and laboratory QC indicators, demonstrates that the NWP SAP goals for project use were met.

5. 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
580-89826-1	07-Oct-19	WATER	N	T4S1MW03s-100719-0	580-89826-1	EMXT
			N	T4S1MW03s-100719-0	580-89826-1	STL-SEA
			N	T4S1MW03s-100719-0	580-89826-1	TAMI
			N	T4S1MW09-100719-0	580-89826-1	EMXT
			N	T4S1MW09-100719-0	580-89826-1	TAMI
			N	T4S1MW09-100719-0	580-89826-1	STL-SEA
			MS	T4S1MW09-100719-0MS	580-89826-1	TAMI
			MS	T4S1MW09-100719-0MS	580-89826-1	STL-SEA
			SD	T4S1MW09-100719-0SD	580-89826-1	STL-SEA
			SD	T4S1MW09-100719-0SD	580-89826-1	TAMI
580-89879-1	08-Oct-19	WATER	N	MW02-100819-0	580-89879-1	STL-SEA
			N	MW02-100819-0	580-89879-1	TAMI
			MS	MW02-100819-0MS	580-89879-1	STL-SEA
			MS	MW02-100819-0MS	580-89879-1	TAMI
			SD	MW02-100819-0SD	580-89879-1	STL-SEA
			SD	MW02-100819-0SD	580-89879-1	TAMI
			N	MW04-100819-0	580-89879-1	STL-SEA
			N	MW04-100819-0	580-89879-1	TAMI
			N	T4S1MW22-100819-0	580-89879-1	TAMI
			N	T4S1MW22-100819-0	580-89879-1	STL-SEA
			N	T4S1MW23-100819-0	580-89879-1	TAMI
			N	T4S1MW23-100819-0	580-89879-1	STL-SEA
580-89897-1	09-Oct-19	WATER	N	MW01-100919-0	580-89897-1	TAMI
			N	MW01-100919-0	580-89897-1	STL-SEA
			N	MW01-100919-0	580-89897-1	EMXT
			MS	MW01-100919-0MS	580-89897-1	STL-SEA
			SD	MW01-100919-0SD	580-89897-1	STL-SEA
	08-Oct-19		N	MW02-100819-0	580-89897-1	EMXT
			N	MW02-100819-0	580-89897-1	TAMI
	09-Oct-19		N	MW03-100919-0	580-89897-1	EMXT
			N	MW03-100919-0	580-89897-1	STL-SEA

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	QAQC Type	Sample Identification	SDG	Laboratory
580-89897-1	09-Oct-19	WATER	N	MW03-100919-0	580-89897-1	TAMI
	08-Oct-19		N	MW04-100819-0	580-89897-1	EMXT
			N	MW04-100819-0	580-89897-1	TAMI
	09-Oct-19		N	MW05-100919-0	580-89897-1	STL-SEA
			N	MW05-100919-0	580-89897-1	TAMI
			N	MW05-100919-0	580-89897-1	EMXT
			N	MW06-100919-0	580-89897-1	EMXT
			N	MW06-100919-0	580-89897-1	STL-SEA
			N	MW06-100919-0	580-89897-1	TAMI
			FD	MW100-100919-0	580-89897-1	TAMI
			FD	MW100-100919-0	580-89897-1	STL-SEA
			FD	MW100-100919-0	580-89897-1	EMXT
	08-Oct-19		N	T4S1MW22-100819-0	580-89897-1	EMXT
			N	T4S1MW22-100819-0	580-89897-1	TAMI
			N	T4S1MW23-100819-0	580-89897-1	EMXT
			N	T4S1MW23-100819-0	580-89897-1	TAMI
	09-Oct-19		TB	TRIPBLANK-100919-0	580-89897-1	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	580-89826-1	T4S1MW03s-100719-0	E300.0A	10/7/2019	10/8/2019		10/9/2019
TAMI		T4S1MW03s-100719-0	RSK-175	10/7/2019	10/8/2019		10/16/2019
		T4S1MW03s-100719-0	SM5310B	10/7/2019	10/8/2019		10/15/2019
EMXT		T4S1MW03s-100719-0	SW8260B-SIM	10/7/2019	10/10/2019	10/14/2019	10/14/2019
STL-SEA		T4S1MW09-100719-0	E300.0A	10/7/2019	10/8/2019		10/9/2019
TAMI		T4S1MW09-100719-0	RSK-175	10/7/2019	10/8/2019		10/16/2019
		T4S1MW09-100719-0	SM5310B	10/7/2019	10/8/2019		10/15/2019
EMXT		T4S1MW09-100719-0	SW8260B-SIM	10/7/2019	10/10/2019	10/14/2019	10/14/2019
STL-SEA		T4S1MW09-100719-0MS	E300.0A	10/7/2019	10/8/2019		10/9/2019
TAMI		T4S1MW09-100719-0MS	SM5310B	10/7/2019	10/8/2019		10/15/2019
STL-SEA		T4S1MW09-100719-0SD	E300.0A	10/7/2019	10/8/2019		10/9/2019
TAMI		T4S1MW09-100719-0SD	SM5310B	10/7/2019	10/8/2019		10/15/2019
STL-SEA	580-89879-1	MW02-100819-0	E300.0A	10/8/2019	10/9/2019		10/9/2019
		MW02-100819-0	E300.0A	10/8/2019	10/9/2019		10/22/2019
TAMI		MW02-100819-0	SM5310B	10/8/2019	10/9/2019		10/16/2019
STL-SEA		MW02-100819-0MS	E300.0A	10/8/2019	10/9/2019		10/22/2019
TAMI		MW02-100819-0MS	SM5310B	10/8/2019	10/9/2019		10/16/2019
STL-SEA		MW02-100819-0SD	E300.0A	10/8/2019	10/9/2019		10/22/2019
TAMI		MW02-100819-0SD	SM5310B	10/8/2019	10/9/2019		10/16/2019
STL-SEA		MW04-100819-0	E300.0A	10/8/2019	10/9/2019		10/9/2019
		MW04-100819-0	E300.0A	10/8/2019	10/9/2019		10/22/2019
TAMI		MW04-100819-0	SM5310B	10/8/2019	10/9/2019		10/16/2019
STL-SEA		T4S1MW22-100819-0	E300.0A	10/8/2019	10/9/2019		10/22/2019
		T4S1MW22-100819-0	E300.0A	10/8/2019	10/9/2019		10/9/2019
TAMI		T4S1MW22-100819-0	SM5310B	10/8/2019	10/9/2019		10/15/2019
STL-SEA		T4S1MW23-100819-0	E300.0A	10/8/2019	10/9/2019		10/22/2019
		T4S1MW23-100819-0	E300.0A	10/8/2019	10/9/2019		10/9/2019
TAMI		T4S1MW23-100819-0	SM5310B	10/8/2019	10/9/2019		10/15/2019
STL-SEA	580-89897-1	MW01-100919-0	E300.0A	10/9/2019	10/10/2019		10/10/2019
		MW01-100919-0	E300.0A	10/9/2019	10/10/2019		10/23/2019
TAMI		MW01-100919-0	RSK-175	10/9/2019	10/10/2019		10/18/2019
		MW01-100919-0	SM5310B	10/9/2019	10/10/2019		10/15/2019
EMXT		MW01-100919-0	SW8260B-SIM	10/9/2019	10/11/2019	10/15/2019	10/15/2019
STL-SEA		MW01-100919-0MS	E300.0A	10/9/2019	10/10/2019		10/23/2019
		MW01-100919-0SD	E300.0A	10/9/2019	10/10/2019		10/23/2019
TAMI		MW02-100819-0	RSK-175	10/8/2019	10/10/2019		10/18/2019

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
EMXT	580-89897-1	MW02-100819-0	SW8260B-SIM	10/8/2019	10/11/2019	10/14/2019	10/14/2019
		MW02-100819-0	SW8260B-SIM	10/8/2019	10/11/2019	10/15/2019	10/15/2019
STL-SEA		MW03-100919-0	E300.0A	10/9/2019	10/10/2019		10/10/2019
		MW03-100919-0	E300.0A	10/9/2019	10/10/2019		10/23/2019
TAMI		MW03-100919-0	RSK-175	10/9/2019	10/10/2019		10/18/2019
		MW03-100919-0	SM5310B	10/9/2019	10/10/2019		10/15/2019
EMXT		MW03-100919-0	SW8260B-SIM	10/9/2019	10/11/2019	10/15/2019	10/15/2019
TAMI		MW04-100819-0	RSK-175	10/8/2019	10/10/2019		10/18/2019
EMXT		MW04-100819-0	SW8260B-SIM	10/8/2019	10/11/2019	10/15/2019	10/15/2019
STL-SEA		MW05-100919-0	E300.0A	10/9/2019	10/10/2019		10/10/2019
		MW05-100919-0	E300.0A	10/9/2019	10/10/2019		10/23/2019
TAMI		MW05-100919-0	RSK-175	10/9/2019	10/10/2019		10/18/2019
		MW05-100919-0	SM5310B	10/9/2019	10/10/2019		10/15/2019
EMXT		MW05-100919-0	SW8260B-SIM	10/9/2019	10/11/2019	10/15/2019	10/15/2019
STL-SEA		MW06-100919-0	E300.0A	10/9/2019	10/10/2019		10/10/2019
		MW06-100919-0	E300.0A	10/9/2019	10/10/2019		10/23/2019
TAMI		MW06-100919-0	RSK-175	10/9/2019	10/10/2019		10/18/2019
		MW06-100919-0	SM5310B	10/9/2019	10/10/2019		10/15/2019
EMXT		MW06-100919-0	SW8260B-SIM	10/9/2019	10/11/2019	10/15/2019	10/15/2019
STL-SEA		MW100-100919-0	E300.0A	10/9/2019	10/10/2019		10/23/2019
		MW100-100919-0	E300.0A	10/9/2019	10/10/2019		10/10/2019
TAMI		MW100-100919-0	RSK-175	10/9/2019	10/10/2019		10/18/2019
		MW100-100919-0	SM5310B	10/9/2019	10/10/2019		10/15/2019
EMXT		MW100-100919-0	SW8260B-SIM	10/9/2019	10/11/2019	10/15/2019	10/15/2019
TAMI		T4S1MW22-100819-0	RSK-175	10/8/2019	10/10/2019		10/18/2019
EMXT		T4S1MW22-100819-0	SW8260B-SIM	10/8/2019	10/11/2019	10/14/2019	10/14/2019
		T4S1MW22-100819-0	SW8260B-SIM	10/8/2019	10/11/2019	10/15/2019	10/15/2019
TAMI		T4S1MW23-100819-0	RSK-175	10/8/2019	10/10/2019		10/18/2019
EMXT		T4S1MW23-100819-0	SW8260B-SIM	10/8/2019	10/11/2019	10/14/2019	10/14/2019
		TRIPBLANK-100919-0	SW8260B-SIM	10/9/2019	10/11/2019	10/14/2019	10/14/2019

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 = Matrix		Matrix spike duplicate recovery criteria greater than the upper control limit			
			J	Other	4
Category = Matrix		Matrix spike recovery greater than the upper control limit			
			J	Other	4
SW8260B-SIM	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 detected, but the associated numerical value is considered an estimated quantity.

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
Method (Matrix): SW8260C-SIM (WATER)					
Vinyl Chloride	MW06-100919-0	110 ug/L	J	FD>RPD	30.77 vs 30
	MW100-100919-0	150 ug/L	J	FD>RPD	30.77 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 detected, but the associated numerical value is considered an estimated quantity.

Criteria:

FD>RPD = Field duplicate RPD criteria exceeded

TABLE 5

Matrix Spike Precision/Accuracy - Qualified Data

Analyte	Sample Identification	Result	MS/MSD Qualifier*	MS Recovery	Criteria
Method (Matrix): E300.0A (WATER)					
Chloride	MW02-100819-0	2.9 mg/L	J	%R = 112 LCL=90 UCL=110	MS>UCL
	MW02-100819-0	2.9 mg/L	J	%R = 112 LCL=90 UCL=110	SD>UCL
	T4S1MW09-100719-0	1 mg/L	J	%R = 112 LCL=90 UCL=110	MS>UCL
	T4S1MW09-100719-0	1 mg/L	J	%R = 112 LCL=90 UCL=110	SD>UCL
Sulfate	MW02-100819-0	1.5 mg/L	J	%R = 111 LCL=90 UCL=110	MS>UCL
	MW02-100819-0	1.5 mg/L	J	%R = 111 LCL=90 UCL=110	SD>UCL
	T4S1MW09-100719-0	6.3 mg/L	J	%R = 112 LCL=90 UCL=110	MS>UCL
	T4S1MW09-100719-0	6.3 mg/L	J	%R = 112 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 6

Site Completeness by Analyte - Qualified Data

Method	Analyte	Units	Number of Occurrences							Contractor Completeness (%)	Overall Completeness (%)
			Analyses	Detects	Non-detects	Blank Flags	J-Flags	Contractor R-Flags	Total R-Flags		
E300.0A	Chloride	MG/L	11	11			2			100	100
	Nitrate-N	MG/L	11	9	2		5			100	100
	Sulfate	MG/L	11	11			2			100	100
RSK-175	Methane	UG/L	11	11						100	100
SM5310B	Total Organic Carbon	MG/L	11	11						100	100
SW8260B-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		2			100	100

% = Percent
J-Flags = Estimated results
R-Flags = Rejected results
mg/L = milligrams per liter
ug/L = micrograms per liter