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 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

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
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
Method (Matrix): E200.7F (WATER)					
Iron, dissolved					
	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
E200.7F									
	MW-06-020217-0	WATER	Iron, dissolved	R1213	6100	MW-06-020217-1	6090	0.16	50
E300.0A									
	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
RSK-175									
	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
SM5310B									
	MW-06-020217-0	WATER	Total Organic Carbon	R1213	1.15	MW-06-020217-1	1.12	2.64	30
SW8260C									
	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 Completeness (%)	Overall Completeness (%)
			Analyses	Detects	Non-detects	Blank Flags	J-Flags	Contractor R-Flags	Total R-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