

Appendix C
Year 7 (2015 Permit)
Stormwater Discharge Monitoring Data,
Shallow Groundwater UICs

(Laboratory reports and Excel spreadsheet
are provided electronically)

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Appendix C

Year 7 (2015 Permit), Stormwater Discharge Monitoring Data, Shallow Groundwater UICs

This report presents the stormwater discharge monitoring data collected in Year 7 (July 1, 2021, to June 30, 2022) of the City of Portland (City) 2015 Water Pollution Control Facilities (WPCF) Permit No. 102830 for Class V Stormwater Underground Injection Control Systems (UICs). Year 7 (2015 Permit) sampling was performed in accordance with the City's 2015 *Stormwater Discharge Monitoring Plan* (SDMP). This report is divided into the following sections detailing the locations sampled and the final results from the laboratory analysis:

1. Introduction
2. Sampling Design
 - Year 7 Monitoring Locations
 - Chemical Analysis
3. Results, Exceedances, and Response Actions
4. Analytical Data Validation

As required in Schedule B.5 of the 2015 Permit, data provided in the analytical laboratory reports are included as Table 2. Electronic files of the laboratory reports and an Excel spreadsheet are also included.

Introduction

The City has prepared this report to be included as part of the UIC Management Plan annual report in compliance with Schedule B.5 its 2015 WPCF Permit.¹ The Oregon Department of Environmental Quality (DEQ) issued the City's second WPCF Permit Number 102830 in June 2015, which approved the City's required March 24, 2015, SDMP. The SDMP describes the stormwater monitoring strategy that the City will use throughout its second WPCF Permit term (June 2015 to May 2025) to evaluate stormwater discharges from public rights-of-way to City-owned UICs in areas of shallow groundwater.² Monitoring is conducted to demonstrate that the City's UIC Program protects beneficial uses of groundwater, meets WPCF Permit requirements, and satisfies requirements of the federal Safe Drinking Water Act and state UIC and groundwater regulations.

¹ The full name of the permit is the Water Pollution Facilities Permit for Class V Stormwater Underground Injection Control Systems.

² Areas of shallow groundwater refer to locations where UICs have < 5 feet of vertical separation distance between the bottom of the UIC and the seasonal high groundwater level. Seasonal high groundwater is discussed in Snyder's USGS Report 2008-5059, *Estimated Depth to Ground Water and Configuration of the Water Table in the Portland, Oregon, Area* (2008), <http://pubs.usgs.gov/sir/2008/5059>.

Sampling Design

To comply with the monitoring requirements of the 2015 Permit, the City implements a program to sample stormwater entering the City's UIC system from a subset of UICs located in areas of shallow groundwater and compare stormwater data to permit Action Levels.

There are approximately 120 UICs located in areas of shallow groundwater. Over the length of the 2015 Permit, a sample of 75 UICs will be selected from the list of UICs located in shallow groundwater. The 75 UICs will be broken up into five panels of 15 UICs each. Over the course of the 10-year permit, each panel will be sampled twice to achieve monitoring objectives in the SDMP. With a sample size of 75, approximately 61 percent of the UICs located in shallow groundwater will be sampled at the end of the 10-year period. A finite population correction³ will reduce the width of confidence intervals associated with this design by almost 50 percent, in comparison to a sample size of 75 UICs selected from a population of 10,000. This design therefore has the equivalent power of a much larger sample from the entire UIC population.

A Generalized Random Tessellation Stratified (GRTS) survey design⁴ will be used to select the 75 locations from the list of UICs in areas of shallow groundwater. The GRTS design will result in a random sample that is spatially balanced (i.e., a sample with a spatial distribution that is similar to the spatial distribution of the population).

The GRTS design also allows for simplifying the implementation of a sample design when some UICs are not suitable for sampling. A GRTS sample draw is an ordered list of sample locations that can be evaluated for sampling sequentially. The first 75 UICs on the list that are suitable for sampling are used as the sample, with sequential blocks of 15 UICs making up each of the five panels. For the purpose of choosing 75 UICs to sample, the entire population of UICs located in shallow groundwater areas was placed into random order using the R package *spsurvey*.⁵

Year 7 Monitoring Locations

Year 7 (2015 Permit) sampling was developed in accordance with the SDMP. As this is the 2nd permit term, locations were selected to assist in evaluating UICs located in shallow groundwater (<5 feet of vertical separation distance). Year 7 (2015 Permit) monitoring includes 15 sites (Panel 1) which were previously sampled during the second year of the 2015 Permit. As detailed in the SDMP shallow groundwater sites monitored in years 1 - 5 under the permit are to be repeated in years 6 - 10. See Table 1 and Figures 1 and 2 for site specific information.

³ When sampling more than approximately 5 percent of a finite population, a finite population correction is applied to the standard error of parameter estimates (e.g., annual trends, means, or population percentiles). This correction can significantly increase the precision of parameter estimates when a large proportion of the population is sampled (http://en.wikipedia.org/wiki/Standard_error#Correction_for_finite_population).

⁴ Stevens, D.L., Jr., and A.R. Olsen. 2004. "Spatially-balanced sampling of natural resources." *Journal of the American Statistical Association*. 99: 262–278. In collaboration with the U.S. Environmental Protection Agency, the City utilized the GRTS design to select its UIC stormwater monitoring program locations sampled for 2005 Permit compliance.

⁵ Kincaid, T. M. and A.R. Olsen. 2013. *spsurvey: Spatial Survey Design and Analysis*. R package version 2.6 (<http://www.epa.gov/nheerl/arm>).

Chemical Analysis

As identified in Table 1 of the 2015 Permit, six pollutants are required to be sampled and analyzed for each monitoring location (Benzo[a]pyrene, Pentachlorophenol, Di(2-ethylhexyl)phthalate, total lead, total zinc, and total copper). The list of pollutants and sampling and analytical methods can be found in the SDMP. Monitoring results are summarized below.

Results, Exceedances, and Response Actions

The analytical results from the 15 shallow groundwater monitoring locations are attached in Table 2. All laboratory data sheets are included electronically with this report. Review of the data indicated no Permit Table 1 Action Levels were exceeded, and thus no response actions were required. Collected data were also consistent with UIC monitoring that was conducted in the first WPCF Permit term.

Analytical Data Validation

Analytical results were reviewed to ensure that the data quality objectives defined in the Quality Assurance Project Plan were achieved, and they were determined to be acceptable and usable. A data usability report is attached.

Attachments:

- Table 1 - Year 7 (2015 Permit) UIC Monitoring Location Information
- Table 2 - Year 7 (2015 Permit) Monitoring Results
- Figures 1 and 2 - Year 7 (2015 Permit) UIC Monitoring Location Site Maps
- Data Usability Report
- Flash drive containing lab data sheets and Microsoft Excel database

Table 1: Year 7 (2015 Permit) Monitoring Location Information

Location Code	Approximate Address ^a	Traffic Category ^b	Predominant Land Use ^c	BES UIC ID ^d	DEQ UIC Id	Latitude	Longitude	UIC Depth (feet)	Pretreatment System ^e	Vertical Separation Distance (feet) ^f	Distance to Nearest Well (feet) ^g	Within Two-year Time of Travel from Public Drinking Water Well?
SG-022	11246 SE HAROLD ST	Collector	SFR	AQT769	10102-9792	45.482898	-122.547011	26	Sed MH	-4	898	No
SG-024	12830 SE HOLGATE BLVD	Collector	SFR	ADT454	10102-6315	45.48972702	-122.5324173	20.6	Sed MH	0	1045	No
SG-025	12010 SE REEDWAY ST	Residential	SFR	ADV196	10102-5269	45.48127365	-122.5393906	28	Sed MH	-13	962	No
SG-026	5712 SE 103RD AVE	Collector	SFR	AMT874	10102-117	45.48089981	-122.557251	21.2	Bioswale, Sed MH	0	1457	No
SG-027	11501 SE FOSTER RD	Collector	IND	AQT809	10102-9812	45.476524	-122.544465	16.9	Sed MH	-6	1247	No
SG-029	5500 SE 121ST AVE	Collector	MFR	ADU735	10102-5914	45.48327636	-122.5389481	30	Sed MH	-9	955	No
SG-031	8111 NE HOLMAN ST	Residential	COM	ADV384	10102-3106	45.56826782	-122.5786972	14	Sed MH	-10	2314	No
SG-032	13658 SE CORA ST	Residential	SFR	ADT474	10102-6334	45.4914627	-122.5222931	19.7	Sed MH	1	610	No
SG-033	5423 SE 121ST AVE	Residential	MFR	ADU734	10102-5912	45.48351287	-122.5389404	30	Sed MH	-8	981	No
SG-036	5544 SE 128TH AVE	Collector	SFR	ADT689	10102-5294	45.48270797	-122.5321579	30	Sed MH	-8	1781	No
SG-038	11134 SE STEELE ST	Residential	SFR	ADU731	10102-5910	45.48452758	-122.5483704	30.1	Sed MH	-2	1074	No
SG-039	5918 SE 122ND AVE	Collector	MFR	ADV203	10102-5286	45.47868728	-122.537056	30	Sed MH	-1	1096	No
SG-040	12920 SE HOLGATE BLVD	Collector	SFR	ADT453	10102-6314	45.48973464	-122.5313339	19.6	Sed MH	0	1112	No
SG-044	4406 SE 135TH AVE	Residential	SFR	AMX686	10102-925	45.49053573	-122.5248871	25.4	Sed MH	-9	1003	No
SG-045	12532 SE ELLIS ST	Residential	SFR	ADT688	10102-5293	45.48248672	-122.5341415	30	Sed MH	-8	2137	No

Notes:

^a Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

^b Traffic Category (Residential <1000; Collector or greater >1000 Trips per day).

^c COM = commercial; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial

^d BES UIC number is obtained from the BES Hansen database.

^e Sed MH = Sedimentation manhole

^f The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as “Depth to groundwater” (UIC Database Report) for inclusion in DEQ’s UIC database. Reported to nearest foot. Separation distances are based on December 2008 USGS depth to groundwater data (Snyder, D.T., 2008, Estimated depth to ground water and configuration of the water table in the Portland, Oregon area: U.S. Geological Survey Scientific Investigations Report 2008-5095, 40p. Available at <http://pubs.usgs.gov/sir/2008/5059>).

^g Horizontal distance to nearest groundwater drinking water well (e.g., municipal, domestic, irrigation).

Table 2: Year 7 (2015 Permit) Monitoring Results

Site id	Location Description	Traffic	Node	Date	Analyte		Pentachlorophenol		DEHP		Benzo(a)pyrene		Copper		Lead		Zinc	
					MADL (ug/L)		10		300		2.0		1,300		500		50,000	
					Method		EPA 515.4		EPA 8270-SIM		EPA 8270-SIM		EPA 200.8		EPA 200.8		EPA 200.8	
SG-022	11246 SE Harold St	Collector	AQT769	12/15/21 13:12	=	0.0581	=, J+	2.2	=	0.024	=	8.67	=	5.22	=	63.6		
SG-024	12830 SE Holgate Blvd	Collector	ADT454	2/28/22 11:02	=	4.36	=, J+	15	=	0.051	=	5.49	=	3.47	=	40.2		
SG-025	12010 SE Reedway St	Residential	ADV196	11/15/21 12:35	=	0.0619	=, J+	1.9	=	0.013	=	4.74	=	1.63	=	26.6		
SG-026	5712 SE 103rd Ave	Collector	AMT874	12/15/21 14:43	=	0.0938	=, J+	0.72	=	0.028	=	7.78	=	5.37	=	40.1		
SG-027	11501 SE Foster Rd	Collector	AQT809	11/4/21 14:02	=	0.544	=	2	=	0.011	=	12.5	=	2.43	=	54.8		
SG-029	5500 SE 121st Ave	Collector	ADU735	11/4/21 12:45	=	0.174	=	0.96	<	0.01	=	5.35	=	1.74	=	34.4		
SG-031	8111 NE Holman St	Residential	ADV384	2/28/22 10:18	=	0.0488	=, J+	1.3	<	0.01	=	13.8	=	6.55	=	80.3		
SG-032	13658 SE Cora St	Residential	ADT474	3/21/22 10:57	=	0.0609	<	0.5	<	0.01	=	1.83	=	0.413	=	9.05		
SG-033	5423 SE 121st Ave	Residential	ADU734	11/4/21 12:24	=	0.133	=	1.1	<	0.01	=	4.91	=	1.38	=	21.5		
SG-036	5544 SE 128th Ave	Collector	ADT689	11/4/21 11:28	=	0.488	=	0.8	<	0.01	=	6.7	=	1.38	=	27.1		
SG-038	11134 SE Steels St	Residential	ADU731	11/4/21 13:11	=	0.101	=	0.67	<	0.01	=	2.71	=	0.337	=	10.8		
SG-038	11134 SE Steels St	Residential	ADU731	11/4/21 13:11	=	0.129	=	0.69	<	0.01	=	3.65	=	0.341	=	10.9		
SG-039	5918 SE 122nd Ave	Collector	ADV203	12/15/21 14:12	=	0.468	=, J+	4.4	=	0.022	=	8.12	=	4.02	=	150		
SG-039	5918 SE 122nd Ave	Collector	ADV203	12/15/21 14:12	=	0.481	=, J+	5.2	=	0.023	=	8.39	=	4.21	=	150		
SG-040	12920 SE Holgate Blvd	Collector	ADT453	12/15/21 11:55	=	0.436	=, J+	2.7	=	0.018	=	8.27	=	3.46	=	57.7		
SG-044	4406 SE 135th Ave	Residential	AMX686	11/4/21 11:59	=	0.337	<	0.5	<	0.01	=	4.9	=	0.814	=	13.2		
SG-045	12532 SE Ellis St	Residential	ADT688	11/15/21 13:01	=	0.112	=, J+	0.76	<	0.01	=	3.12	=	0.866	=	13.6		

Notes:

All concentrations are in micrograms/per liter (ug/l).

J+ = estimated, possible high bias

Field duplicates were collected at SG-038 and SG-039.

**CITY OF PORTLAND BUREAU OF ENVIRONMENTAL SERVICES
UIC PROGRAM STORMWATER MONITORING
DATA USABILITY REPORT**

**YEAR 17 MONITORING
NOVEMBER 2021 – MARCH 2022**

1.0 INTRODUCTION

Analytical results for underground injection control (UIC) system stormwater samples collected during Permit Year 7 of the 2015 Water Pollution Control Facilities (WPCF) Permit (PY 17) were reviewed to evaluate data usability and adherence to project data quality objectives (DQOs). All data were evaluated using the project *Quality Assurance Project Plan (QAPP)* and *U.S. EPA Contract Laboratory Program National Functional Guidelines (NFGs) for Data Review (BES 2015, EPA 2017a, 2017b)* for guidance in evaluating the following:

- Field practices, field quality control (QC) samples, daily activity logs, and sample collection logs;
- Sample chain of custody (COC) and receipt documentation, preparation and analytical holding times, and reporting and detection limits for chemicals of interest; and
- Laboratory data quality, in terms of precision, accuracy, representativeness, completeness, and comparability (PARCC) as described in Section 2.5 of the QAPP.

2.0 SAMPLING SUMMARY

The City Bureau of Environmental Services (BES) Field Operations section performed sample collection and field parameter measurements for all compliance monitoring. Samples were collected from 15 locations during one “event” from November 15, 2021 through March 21, 2022. Sample locations are summarized in Table 1 attached to this summary.

Samples were collected in general accordance with the *Sampling and Analyses Plan (SAP)* and QAPP, contained in the final UIC *Stormwater Discharge Monitoring Plan (SDMP)*. The SDMP includes all stormwater monitoring conducted at City UICs for UIC permit compliance.

3.0 ANALYTICAL SUMMARY

The BES Water Pollution Control Laboratory (WPCL) performed analyses for all compliance samples collected for PY 17. Laboratory procedures were performed in general accordance with the QAPP except as noted below. The permit-required analytes measured during PY17 are listed below.

Analyte	Method	MRL (µg/L)	MADL (µg/L)	Lab
Pentachlorophenol	EPA 515.4	0.04	10	WPCL
Di(2-ethylhexyl)phthalate	EPA 8270-SIM	1.0	60	WPCL

Analyte	Method	MRL (µg/L)	MADL (µg/L)	Lab
Benzo(a)pyrene	EPA 8270-SIM	0.01	2.0	WPCL
Total Copper	EPA 200.8	0.2	1,300	WPCL
Total Lead	EPA 200.8	0.1	500	WPCL
Total Zinc	EPA 200.8	0.5	5,000	WPCL

MRL = method reporting limit

MADL = maximum allowable discharge limit

4.0 QAPP COMPLIANCE AND DATA USABILITY

BES Monitoring Coordination & Analysis (MCA) conducted an independent data usability assessment to ensure the data are usable. Findings are summarized below.

4.1 Field Practices

Field Data Sheets

Field data sheets (FDSs) are included in this report as Attachment 1. FDSs are used to record general and sample-specific information regarding site conditions, time of sample collection, visual stormwater observations, sample collection difficulties, deviations from the SDMP, and any information relating to potential pollutant sources. These logs were reviewed by both the Field Operations team leader and by MCA for completeness and consistency. No significant issues were identified during review of field documents.

Field measurements including temperature, conductivity, and pH are recorded on WPCL COCs so that field data can be entered into the LIMS by the WPCL sample custodian. COCs are included with the analytical laboratory reports in Appendix E of the PY17 Annual Report.

Field and Lab QC Samples

One equipment blank per year and one field decontamination blank per event were collected and analyzed for the same parameters as stormwater samples. Field duplicate samples are collected at a frequency of one duplicate for every 10 locations sampled. Extra sample volume is also collected by field teams at selected locations to provide enough volume to perform matrix QC analyses. Typically, a laboratory will choose samples at random for matrix spike / matrix spike duplicate (MS/MSD) analyses; however, for this project there is an interest in evaluating potential matrix effects specific to stormwater discharged to publicly-owned UICs. Results of field and laboratory QC samples are discussed in respective sections below.

No issues were encountered that required resampling.

4.2 Data Usability Assessment

General

Discrete samples were collected at 15 sample locations, in addition to two field duplicates, one field decontamination blank, and one equipment blank. Samples were delivered to WPCL on the same business day that they were collected. Laboratory sample receipt forms indicate that all sample containers arrived intact, and all container labels matched the COC documentation.

Some data were flagged as estimated using various flags to illustrate specific laboratory QC failures. Following review of laboratory reports, case narratives, and field QC data by IMS, some of these flags were carried through as appropriate, and replaced with qualifiers presented below. Additional qualifiers were added, where necessary. Qualified data are still considered valid and usable (though should be used with caution), except for results that may have been qualified with an “R” (rejected). Qualifiers used for PY 17 Event reporting are listed below:

J	Estimated concentration
J-	Estimated, possible/potential low bias
J+	Estimated, possible/potential high bias
U	Not detected above MDL

Note that laboratory PARCC review for this report is generally limited to permit-required analytes and analyses necessary for reporting. For example, laboratory QC is reviewed for all samples analyzed by EPA Method 8270-SIM; however, relative percent differences (RPDs) for field duplicates are only calculated for UIC permit-required analytes. Additional review may be conducted where laboratory QC issues indicate more pervasive issues that may impact data quality for analytes not required for permit compliance monitoring.

Method Detection Limits

All method reporting limit (MRL) and detection limit (MDL) targets for permit-required analytes were met as specified in the QAPP (BES 2015).

MRLs were increased for selected analytes on individual samples where dilution was required in order to quantify analytes detected that were outside initial instrument calibration. Several samples required dilutions due to matrix interference for individual analytes. MRLs and MDLs did not exceed Permit action levels for any “non-detect” sample analytical results.

Matrix Spikes

Extra sample volume is collected by field crews at one out of every ten sample locations so that matrix QC can be performed on matrices specific to this monitoring effort. Where the laboratory does not have sufficient volume, a laboratory control sample (LCS) duplicate is analyzed in accordance with the respective methods.

4.2.1 Holding Times

Maximum allowable holding times, measured from the time of sample collection to the time of preparation or analysis, were met for each project sample collected for PY17 permit compliance.

4.2.2 Blanks

In accordance with EPA guidelines, positive sample results should be reported unless the concentration of the compound in the project sample is less than or equal to 10 times (10x) the amount in any blank for metals and the common organic laboratory contaminants (methylene chloride, acetone, 2-butanone, cyclohexane, and phthalate esters), or 5 times (5x) the amount for other target compounds. Target compounds were not detected in associated blank samples (trip,

equipment, method) prepared and analyzed concurrently with the project samples, except for the following:

Analysis	Sample	Analyte	Concentration (µg/L)	Samples Affected, Comments
8270-SIM	FDBLANK (11/15/21)	Bis(2-ethylhexyl) phthalate	0.5 J+	Detected at the method detection limit but likely due to high Continuing Calibration Verification (CCV) Result (see Section 4.2.7)

4.2.3 System Monitoring Compounds

System monitoring/surrogate compounds are added to each sample prior to analysis of organic parameters by EPA methods 8270-SIM and 515.4 to confirm the efficiency of the sample preparation procedure. The calculated recovery for each surrogate compound was evaluated to confirm the accuracy of the reported results. All surrogate recoveries were within the acceptance limits specified in the QAPP except as noted below:

Analysis	Batch	Samples Affected	Comments
8270-SIM	B21K114	SG-038	Fluoranthene-d10 results (151%) slightly above laboratory acceptance limit, Pyrene result qualified with “J+”, for estimated possible/probable high bias.

4.2.4 Laboratory Control Samples

For Laboratory Control Samples (LCSs), samples of deionized water are analyzed following the addition of a known amount of analyte in order to confirm the ability of the analytical instrument to accurately quantify target compounds. LCSs were analyzed at the appropriate QAPP-specified frequency. Additionally, all LCS recoveries were within the acceptance limits for accuracy specified in the QAPP except for the following:

Analysis	Batch	Samples Affected	Comments
8260	B21K077	none	Dichlorodifluoromethane result (59%) below laboratory acceptance limit, all results non-detect, analytes not typically detected in stormwater, no action taken.
8260	B21K240	none	Dichlorodifluoromethane result (61%) below laboratory acceptance limit, all results non-detect, analytes not typically detected in stormwater, no action taken.
8260	B21L254	SG-022, SG-026, SG-039, SG-039DUP, SG-040	Benzo(a)anthracene result (136%) above laboratory acceptance limit, detects qualified with “J+”, for estimated, possible/potential high bias.
8260	B22C033	none	Six LCS results below laboratory acceptance limits, all results non-detect, analytes not typically detected in stormwater, no action taken.

Analysis	Batch	Samples Affected	Comments
8270-SIM	B22C007	SG-024, SG-031	Benzo(a)anthracene (134%), Chrysene (140%), Butyl Benzyl Phthalate (185%), and Bis(2-ethylhexyl)phthalate results (193%) above laboratory acceptance limits, detects qualified with “J+”, for estimated, possible/potential high bias.

No action was taken where LCS results were above acceptance limits and all associated sample results were non-detect.

4.2.5 Matrix Spike/Matrix Spike Duplicates

For Matrix Spikes (MS)/Matrix Spike Duplicates (MSD), stormwater samples are analyzed following the addition of a known amount of analyte in order to evaluate any matrix effects that interfere with the ability of the analytical instrument to accurately quantify target compounds. Typically, results are not qualified based on MS/MSD results alone unless recoveries are well outside control limits. MS/MSDs were analyzed at the appropriate QAPP-specified frequency. Additionally, all MS recoveries and MS/MSD RPDs were within the acceptance limits for accuracy specified in the QAPP except as noted below:

Analysis	Batch	Samples Affected	Comments
8270-SIM	B21L254	none	Several MS/MSD results were low or high, RPDs were acceptable, source sample from different project, no other QC issues for those analytes, no action taken.
8270-SIM	B22C007	none	Naphthalene (136%/144%) MS1/MSD1 results slightly above laboratory acceptance limits. RPDs acceptable, no other QC issues, source sample from different project, no action taken.

No action was taken where MS/MSD results were above acceptance limits and all associated sample results were non-detect, or where spike amounts were too low relative to sample concentrations.

4.2.6 Duplicates

Field and laboratory duplicate samples were analyzed at the appropriate frequency and all recoveries were within the range specified in the QAPP except as noted below:

Analysis	Sample	Analyte	Concentration (µg/L)	Samples Affected, Comments
200.8	Other project	Mercury, dissolved	0.000728/0.000933 (25%)	Laboratory duplicate RPD failed, results < 5x MRL, no action taken.
200.8	Other project	Chromium	1.65/0.890 (260)	Laboratory duplicate RPD failed, source sample from different project, no other QC issues, no action taken.
200.8	SG-038	Copper	3.65/2.71 (29.6%)	Field duplicate RPD failed, high result qualified with J+, low result qualified with J-.

4.2.7 Other QC Issues

All continuing calibration verification results were within acceptance limits except as noted below:

Analysis	Batch	Sample(s) Affected	Comments
8260	B21K077	none	Bromobenzene, chlorobenzene, and 1,4-Dichlorobenzene continuing calibration results were low, all sample results non-detect, analytes not typically detected in stormwater, no action taken.
8260	B21K240	none	2-Butanone, Chloroethane, 2-Hexanone, and 4-Methyl-2-pentanone continuing calibration results were low, all sample results non-detect, analytes not typically detected in stormwater, no action taken.
8270-SIM	B21K262	SG-025, SG-045, FDBLANK (11/15/21)	Bis(2-ethylhexyl)phthalate continuing calibration result was high, detect qualified with J+ for estimated, potential/possible high bias.
8260	B21K240	none	Chloromethane and Vinyl Chloride continuing calibration results were low, all sample results non-detect, analytes not typically detected in stormwater, no action taken.
8260	B21L254	SG-022, SG-026, SG-039, SG-039DUP, SG-040	Bis(2-ethylhexyl)phthalate continuing calibration result was high, detects qualified with "J+", for estimate possible/probable high bias.
8260	B21L263	none	Nine continuing calibration results were low, all sample results non-detect, analytes not typically detected in stormwater, no action taken.
8260	B22A056	none	Chloromethane, Dichlorodifluoromethane, and Vinyl Chloride continuing calibration results were low, all sample results non-detect, analytes not typically detected in stormwater, no action taken.
8260	B22C033	none	Seven continuing calibration results were low, all sample results non-detect, analytes not typically detected in stormwater, no action taken.
8260	B22C373	none	Chrysene and Di-n-octyl Phthalate continuing calibration results were low, all sample results non-detect, this has not been frequently detected for this project, no action taken.

No action was taken where CCV results were above acceptance limits and all associated sample results were non-detect.

4.3 Data Usability Summary

Appropriate sample collection and analytical methods were used for all samples and analyses, ensuring good comparability with other data. Analytical accuracy and precision were determined to be generally acceptable, with noted exceptions. Qualifiers were assigned based on other analytical QC results that exceeded project data quality criteria.

All other data reported should be considered valid as reported, representative of the samples collected, and acceptable for further use.

5.0 REFERENCES

City of Portland Bureau of Environmental Services (BES). 2015. *Quality Assurance Project Plan - Stormwater Underground Injection Control System Monitoring*. Prepared for Oregon Department of Environmental Quality (ODEQ). August 2006, revised March 2015.

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6.0 GENERAL

This summary report was prepared by the MCA sections of BES. For any questions concerning this report, contact Aaron Wieting at 503-823-5437.

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Prepared by: Aaron B. Wieting, R.G., BES MCA

Reviewed by: Joel Bowker, R.G., BES UIC Program

