PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

Mingus Mapps, Commissioner
Gabriel Solmer, Director

1120 SW Fifth Avenue, Room 405
Portland, Oregon 97204-1926
Information: 503-823-7404
portlandoregon.gov/water

February 10, 2022

Carrie Gentry
Oregon Health Authority
Drinking Water Services
PO Box 14450
Portland, OR 97293-0450

Subject: Bilateral Compliance Agreement – Quarterly Status Report

Dear Carrie:

This letter and attachment constitutes the Portland Water Bureau's (PWB) submission of its quarterly status report for the Bilateral Compliance Agreement, Section IV.D.6 (Oregon Health Authority; December 18, 2017). This report covers the period of October – December 2021.

If you have any questions regarding this report, please feel free to contact me at (503) 823-7648 or yone.akagi@portlandoregon.gov.

Sincerely,

Yone Akagi, P.E.

Enclosure
Cc: Ann Levy, Chris Wanner, David Peters

Please contact us for translation or interpretation, or for accommodations for people with disabilities.
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Status Report

Bilateral Compliance Agreement

February 10, 2022

Reporting Period: October 1, 2021 – December 31, 2021

As part of the Bilateral Compliance Agreement (BCA) Interim Measures, Section IV.D.6 requires that Portland Water Bureau (PWB) provide Oregon Health Authority – Drinking Water Services (OHA) a status report every quarter until *Cryptosporidium* treatment compliance is achieved. The report is intended to be a summary and must be submitted no later than 10 days after the end of the first month following the end of each calendar quarter. The following information must be included:

1. Intake monitoring results and genotyping results received the previous quarter;
2. Watershed activities conducted the previous quarter including inspections (security, sanitary facilities, landslides, diversion pool fence), significant events or changes, and tributary or scat monitoring results received the previous quarter; and
3. Status of progress towards construction of filtration facility and any milestones specific in Section III of the BCA

This status report covers the period of October - December 2021.

1. Intake Monitoring and Genotyping Results

Intake monitoring results for *Cryptosporidium* were submitted to OHA in monthly compliance reports November 15, 2021, December 15, 2021, and January 14, 2022 and are provided in Appendix A.

The PWB lab continued to generate genotyping results from *Cryptosporidium*-positive slides. Seventy-one intake and non-intake water samples were processed for genotyping during the reporting period. Of these, 56 samples were processed for Water Year 2020[1] and 15 samples were processed for Water Year 2022. Twenty-one out of the 71 total samples processed (30%) were successfully genotyped for *Cryptosporidium*. Forty-three of the 71 samples were intake samples and 28 were from non-intake samples and are shown in the *Tributary and Other Non-Intake Water Monitoring Results* section below.

Table 1 shows the positive *Cryptosporidium* DNA sequencing results from the 9 intake samples analyzed during the reporting period. Some samples matched multiple isolates as there was not enough sequence information to distinguish between one over another in GenBank. One sample (BC33408), collected on 1/20/2020, had 3 oocysts on the slide and the sequencing results detected two unique sequences, *C. andersoni* and *C. ubiquitum*. Table 2 lists the 34 *Cryptosporidium*-positive intake samples that were processed but not successfully genotyped.

[1] A total of 57 samples were processed for Water Year 2020. However, 1 sample was reported in the previous quarterly status report.

Table 1. Positive *Cryptosporidium* Water Genotyping Results for Intake Samples

ID No.	Collection Date	Sequence Length (base pairs)	Highly Similar Sequences in GenBank		
			***Cryptosporidium* species/genotype/isolate**	**GenBank Accession No.**	**Max Identity (%)**
BC33408*	1/20/2020	430	*C. andersoni* (Sequence #1)	AB089285	99.3
		434	*C. ubiquitum* (Sequence# 2)	AY030086	100
BC34822	2/4/2020	434	*C. ubiquitum*	AY030086	100
BC34823	2/5/2020	432	*C. meleagridis*	AF112574	98.62
BC35079	2/11/2020	435	*C. ubiquitum*	KY052177	99.76
BC35895	3/3/2020	438	*C.* sp. Sbld05d ground squirrel isolate	DQ295015	100
			C. sp. deer mouse 2014_PNWR6C (PNW17a)	MT524967	
			C. sp. deer mouse 2014_PNWR6B	MT524968	
			C. sp. deer mouse 2014_PNWR5 (PNW17a)	MT524969	
			C. sp. ex P. maniculatus isolate (deer mouse)	KX082685	
			C. sp. wild rodent strain isolate	KM199844	
BC65190	11/14/2021	430	*C.* sp. vole genotype	EF641020	99.26
			C. sp. environmental sequence (water isolate)	AY737564	
BC65191	11/14/2021	443	*C.* sp. novel	AF112574 AF133842	97.04
BC65791	11/28/2021	438	*C.* sp. Sbld05d ground squirrel isolate	DQ295015	100
			C. sp. deer mouse 2014_PNWR6C (PNW17a)	MT524967	
			C. sp. deer mouse 2014_PNWR6B	MT524968	
			C. sp. deer mouse 2014_PNWR5 (PNW17a)	MT524969	
			C. sp. ex P. maniculatus isolate (deer mouse)	KX082685	
			C. sp. wild rodent strain isolate	KM199844	
BC65792	11/29/2021	438	*C.* sp. Sbld05d ground squirrel isolate	DQ295015	100
			C. sp. deer mouse 2014_PNWR6C (PNW17a)	MT524967	
			C. sp. deer mouse 2014_PNWR6B	MT524968	
			C. sp. deer mouse 2014_PNWR5 (PNW17a)	MT524969	
			C. sp. ex P. maniculatus isolate (deer mouse)	KX082685	
			C. sp. wild rodent strain isolate	KM199844	

*Sample BC33408 had two unique sequences

Out of the nine positively identified genotypes in Water Year 2022 and Water Year 2020 at the intake, three samples were identified as *Cryptosporidium* species that have been detected in humans: *C. andersoni*, *C. ubiquitum*, and *C. meleagridis*. Human infection from these three *Cryptosporidium* species is occasionally reported worldwide and to our knowledge they have not been implicated in any waterborne outbreaks (Chalmers 2012; Li et al. 2014; Ryan et al. 2021). Sample BC65191, collected on 11/14/2021, was labelled as a novel *Cryptosporidium* genotype based on GenBank and phylogenetic analysis. The GenBank closest match analysis revealed a 97.04% homology (max identity) at 100% coverage with *C. meleagridis* and *C. parvum*. However, phylogenetic analysis indicates it is more closely aligned with *C.* sp. rat genotype I. This sample also matches 100% to a previous sample (BB81690) collected on 1/3/2017 and deemed a novel *Cryptosporidium* wildlife genotype based on phylogenetic analysis (PWB 2017). All other named *Cryptosporidium* genotypes identified are not known to be human infectious.

Analytical Services, Inc. (ASI) is continuing with validation experiments and troubleshooting, although they had to put the project on hold during this reporting period due to staffing shortages.

Table 2. Negative *Cryptosporidium* Water Genotyping Results for Intake samples

ID No.	Collection Date	PCR Result	Sequence Result
BC29765	10/22/2019	Positive	Unidentified Eukaryote[1]
BC29766	10/22/2019	Negative	
BC30130	10/29/2019	Negative	
BC30131	10/30/2019	Negative	
BC30393	11/1/2019	Negative	
BC30776	11/10/2019	Negative	
BC31116	11/17/2019	Negative	
BC31119	11/19/2019	Positive	Unidentified Eukaryote[1]
BC31741	12/1/2019	Negative	
BC31744	12/4/2019	Negative	
BC31889	12/8/2019	Negative	
BC31890	12/9/2019	Negative	
BC32237	12/16/2019	Negative	
BC32854	1/6/2020	Negative	
BC33153	1/12/2020	Negative	
BC33407	1/19/2020	Negative	
BC33410	1/22/2020	Negative	
BC34552	1/28/2020	Negative	
BC34553	1/29/2020	Negative	
BC34819	2/2/2020	Negative	
BC35080	2/12/2020	n/a[2]	
BC35310	2/16/2020	n/a[2]	
BC35474	2/23/2020	n/a[2]	
BC35475	2/24/2020	n/a[2]	
BC35892	3/1/2020	Negative	
BC35896	3/4/2020	Negative	
BC36415	3/16/2020	Negative	
BC36508	3/31/2020	Negative	
BC37240	4/28/2020	Negative	
BC40490	7/5/2020	Negative	
BC63818	10/17/2021	Negative	
BC65459	11/17/2021	Negative	
BC65460	11/17/2021	Negative	
BC67023	12/27/2021	Negative	

[1]A eukaryote is any cell or organism that possesses a clearly defined nucleus.

[2]n/a: Not applicable; Due to PWB quality control failure, genotyping was not completed.

2. Watershed Activities

The following subsections provide status updates on the inspections conducted and monitoring results received during the reporting period, as well as any significant watershed events or changes identified.

Security

Watershed Rangers routinely conduct security inspections of the Bull Run Watershed Management Unit (BRWMU). On a weekly basis, rangers inspected multiple boundary access points and looked for evidence of illicit activity including trespass. During the reporting period, Rangers submitted 11 security incidents or observations. One of the reported incidents occurred inside the water supply drainage boundary.

PWB continued its efforts to deter illicit activity in the Lolo Pass area. In November 2021, specialty signage addressing Christmas tree harvesting was deployed at the Lolo Pass Gate and along the FR-18 portion of the BRWMU boundary. More data on the results of these efforts is expected in the spring.

Sanitary Facilities

Sanitary facility condition inspections covering all project portable facilities within the watershed during the reporting period are summarized in Table 3. No deficiencies were observed.

A waste transport inspection of a portable facility at Bear Creek House was conducted on October 25, 2021. No deficiencies were observed.

Table 3. Sanitary Facility Condition Inspections

Date	Location	Deficiencies
10/4/2021	Bull Run Lake	None
10/19/2021	Headworks Parking Lot	None
	Rd 10/ Rd 14 Junction	None
	Powerhouse 2	None
	Main gate	None
	Bull Run Rd/ Waterworks Rd	None
10/25/2021	Bear Creek House – ADA	None
	Bear Creek House – Unit #1 of 2	None
	Bear Creek House – Unit #2 of 2	None

Landslides

The most recent aerial inspection of the Bull Run Watershed, including the South Fork landslide, was completed on August 25, 2021. The next annual landslide inspection is planned to be completed in the spring or summer of Water Year 2022.

Diversion Pool Fence

Routine inspections of the Diversion Pool fence were completed daily by Water Treatment Operators. Comprehensive inspections were conducted monthly by Watershed Specialists on October 13, November 30, and December 27. Wildlife-specific inspections were conducted by Water Quality staff on October 14, November 9, and December 9. There were no vulnerabilities noted during the reporting period.

Tributary and Other Non-Intake Water Monitoring Results

The results received during the reporting period for water samples collected at watershed locations other than the intake are presented in Table 4. A total of 20 samples were collected from the major tributaries during the reporting period. In Water Year 2022, *Cryptosporidium* was detected three times from Key Station 18, and twice each from Key Stations 15 and 35.

Table 4. Results of Tributary Water Samples Reported October 1 to December 31, 2021

Collection Date	Report Date	Location	*Cryptosporidium* (count)	*Giardia* (count)	Volume (L)	Method
10/11/2021	10/14/2021	Key Station 15 – North Fork	0	0	50	1623.1
10/11/2021	10/15/2021	Key Station 18 - Mainstem	1	0	50	1623.1
10/11/2021	10/15/2021	Key Station 35 – South Fork	2	1	50	1623.1
10/11/2021	10/14/2021	Key Station 44 – Fir Creek	0	0	50	1623.1
10/22/2021	10/25/2021	Key Station 15 – North Fork	0	0	50	1623.1
10/22/2021	10/26/2021	Key Station 18 - Mainstem	2	0	50	1623.1
10/22/2021	10/26/2021	Key Station 35 – South Fork	1	0	50	1623.1
10/22/2021	10/25/2021	Key Station 44 – Fir Creek	0	0	50	1623.1
11/16/2021	11/23/2021	Key Station 15 – North Fork	1	1	50	1623.1
11/16/2021	11/20/2021	Key Station 18 - Mainstem	0	0	50	1623.1
11/16/2021	11/20/2021	Key Station 35 – South Fork	0	0	50	1623.1
11/29/2021	12/1/2021	Key Station 44 – Fir Creek	0	0	50	1623.1
12/14/2021	12/20/2021	Key Station 15 – North Fork	1	0	50	1623.1
12/14/2021	12/20/2021	Key Station 18 - Mainstem	1	0	50	1623.1
12/14/2021	12/20/2021	Key Station 35 – South Fork	0	0	50	1623.1
12/14/2021	12/20/2021	Key Station 44 – Fir Creek	0	0	50	1623.1
12/20/2021	12/22/2021	Key Station 15 – North Fork	0	0	50	1623.1
12/20/2021	12/22/2021	Key Station 18 - Mainstem	0	0	50	1623.1
12/20/2021	12/22/2021	Key Station 35 – South Fork	0	0	50	1623.1
12/20/2021	12/22/2021	Key Station 44 – Fir Creek	0	0	50	1623.1

Non-intake genotyping results for Water Year 2020 and Water Year 2022 analyzed during the reporting period are presented in Table 5. Twelve out of 29 samples were successfully genotyped. One of the 29 samples could not be successfully genotyped due to quality control (QC) issues. Eight of 12 samples positively genotyped were identified as *Cryptosporidium* isolates not known to be human infectious. Three samples were identified as *C. ubiquitum*, and one was *C. andersoni*. These two species have been detected in humans. *C. ubiquitum* is infectious to a diverse range of host species including domestic and wild ruminants, rodents, as well as humans (Ryan et al. 2014). The main host of *C. andersoni* is cattle, but it has been detected in a few human cases (Ryan et al. 2014). *C. ubiquitum* and *C. andersoni* are occasionally reported worldwide (Ryan et al. 2014) but none have been implicated in any waterborne outbreaks (Ryan et al. 2014; Li et al. 2014; Chalmers 2012).

Table 5. Genotyping Results of Non-Intake Water Samples, Water Year 2020 and 2022

Collection Date	Location[1]	Genotype Result[2]	Highly Similar Sequence Results			
			Sequence Length (bp)	Species /Genotype/Isolate	GenBank Accession ID	GenBank Max Identity (%)
10/21/2019	KS 15	Positive	437	*C.* sp. ground squirrel genotype I	KT027468	98.5
10/21/2019	KS 18	Positive	433	*C.* sp. meadow vole	KY644571	99.76
10/21/2019	KS 35	Positive	429	*C.* sp. environmental (water isolate)	AY737564	99.51
10/30/2019	Res 1	Negative				
10/30/2019	Res 1	Positive	247	*C.* sp. isolate	MT561516	99.17
10/30/2019	Res 1	Negative				
11/19/2019	KS 18-A[3]	Positive	429	*C.* sp. vole genotype *C.* sp. environmental (water isolate)	EF641020 AY737564	99.26
	KS 18-B[3]	Negative				
11/19/2019	KS 35	Positive	434	*C. ubiquitum*	AY030086	100
12/16/2019	KS 44	Negative				
12/20/2019	KS 18	Negative				
1/6/2020	KS 15	Positive	434	*C. ubiquitum*	AY030086	100
1/8/2020	Res 1	Positive	434	*C. ubiquitum*	AY030086	100
1/8/2020	Res 1	Negative				
1/8/2020	Res 1	Negative				
2/4/2020	Res 1	Positive	381	*C.* sp. isolate	KC954242	98.66
2/4/2020	Res 1	Negative				
2/11/2020	KS 18	n/a				
3/4/2020	Res 1	Negative				
6/2/2020	KS 18	Negative				
6/30/2020	KS 15	Negative				
7/28/2020	KS 35	Negative				
8/25/2020	KS 18	Positive	432	*C. andersoni*	AB089285	99.54
10/11/2021	KS 18	Negative				
10/11/2021	KS 35	Negative				
10/22/2021	KS18	Positive	434	*C.* sp. deer mouse *C.* sp. ex *Peromyscus maniculatus* *C.* sp. deer mouse genotype IV	KM199846 KX082684 JQ413348	100
10/22/2021	KS 35	Positive	435	*C.* sp. environmental storm water	AY737567	99.51
11/16/2021	KS 15	Negative				
12/14/2021	KS 15	Negative				
12/14/2021	KS 44	Negative				

[1] Res = Reservoir; KS = Key Station

[2]Genotype Results:

Positive: PCR positive and *Cryptosporidium* species/genotype/isolate identified

Negative: PCR negative and sequencing was not applicable

n/a: Not applicable. Due to PWB QC error, genotyping was not able to be completed

[3] KS 18 sample collected on 11/19/2021 required two microscope slides to be analyzed and each microscope slide had 2 oocysts. Slide A was successfully genotyped; Slide B was negative.

Scat Monitoring Results

The *Cryptosporidium* PCR and genotyping results received during the reporting period for wildlife scat samples are presented in Table 6. Out of a total of 28 samples, three were *Cryptosporidium*-positive.

Table 6. Results of Wildlife Scat *Cryptosporidium* Samples Reported October 1 to December 31, 2022

Sample ID	Wildlife	Collection Date	Report Date	PCR Result	Genotyping Result
211004-1031	Grouse	10/4/2021	11/1/2021	Negative	
211004-1133	Grouse	10/4/2021	11/1/2021	Negative	
211004-1210	Elk	10/4/2021	11/1/2021	Negative	
211004-1215	Elk	10/4/2021	11/1/2021	Negative	
211004-1221	Elk	10/4/2021	11/1/2021	Negative	
211006-1158	Bobcat	10/6/2021	11/1/2021	Negative	
211006-1209	Cougar	10/6/2021	11/1/2021	Negative	
211006-1241	Bobcat	10/6/2021	11/1/2021	Negative	
211006-1317	Grouse	10/6/2021	11/1/2021	Negative	
211012-1227	Grouse	10/12/2021	11/1/2021	Negative	
211014-1125	Bobcat	10/14/2021	11/1/2021	Negative	
211014-1153	Bobcat	10/14/2021	11/1/2021	Positive	PNW15a
211014-1249	Deer	10/14/2021	11/1/2021	Negative	
211014-1252	Deer	10/14/2021	11/1/2021	Negative	
211102-1052	Elk	11/2/2021	12/2/2021	Negative	
211102-1104	Elk	11/2/2021	12/10/2021	Negative	
211102-1149	Bobcat	11/2/2021	12/10/2021	Negative	
211102-1249	Coyote	11/2/2021	12/2/2021	Negative	
211102-1305	Grouse	11/2/2021	12/2/2021	Negative	
211102-1319	Elk	11/2/2021	12/2/2021	Negative	
211102-1333	Elk	11/2/2021	12/2/2021	Negative	
211102-1345	Coyote	11/2/2021	12/2/2021	Negative	
211102-1355	Grouse	11/2/2021	12/2/2021	Positive	*C.* sp. novel
211108-1201	Coyote	11/8/2021	12/2/2021	Positive	*C.* sp. novel
211108-1230	Grouse	11/8/2021	12/2/2021	Negative	
211108-1238	Coyote	11/8/2021	12/2/2021	Negative	
211109-1208	Deer	11/9/2021	12/2/2021	Negative	
211109-1213	Deer	11/9/2021	12/2/2021	Negative	

Significant Watershed Events or Changes

Examples of events or changes in the watershed that may be included in this report include wildfire, flooding or other extreme weather event, a landslide and/or major turbidity event, major changes in operations, or a significant wildlife or domestic animal incident or incursion related to *Cryptosporidium* risk. No significant watershed events or changes were observed during the reporting period. One hundred percent groundwater was served from November 15 at 1600 to November 17 at 1000 due to tree damage at the Lusted Hill treatment facility, outside of the Bull Run Watershed.

3. Filtration Facility Construction Update

Per State and City guidelines, the project team continues to work from home due to the COVID-19 pandemic. Work that continues in the field is done in accordance with health guidelines. The project team has continued project activities to the best extent possible. There are no known significant impacts to the project schedule resulting from the pandemic at this time.

In the past quarter, the pilot plant testing operations were resumed as part of PWB's ongoing effort to characterize the Bull Run water source's response to treatment process refinements.

Work continued on the Filtration Facility Project's (Facility) design. The Facility design team finalized and closed the 30% design comment adjudication process. The Water Bureau received updated cost estimates from the designer and Construction Manager/General Contractor (CM/GC), and began estimate reconciliation. The project team continued the 60% design phase with ongoing bi-weekly discipline meetings and continued holding CM/GC collaboration meetings to get input on specific disciplines and design topics. Towards the end of the quarter the designers previewed the 60% design submittal with key stakeholders and then submitted the 60% design for internal review at the end of December.

The Filtration Pipelines Project (Pipelines) team continued to refine the design for the 30% design package. The 30% design submittal was finalized in November and sent to PWB for internal review. PWB completed its review in early January and designers have begun comment adjudication of the 30% design package. The Pipelines team continued negotiating the pre-construction phase services contract with the CM/GC in December and signed it in early January.

The second EPA WIFIA quarterly report was submitted at the end of October and included progress on three treatment projects receiving financial support under the WIFIA program.

The team continues to work with various county and community groups, including land use and permitting staff with both Multnomah and Clackamas Counties. The team continues to collaborate with neighbors. A Site Advisory Group composed of property owners near the future Facility site and other stakeholders, continues ongoing engagement with project staff through email, surveys, and teleconferencing. Updates with information presented and feedback from the group are posted on the Site Advisory Group webpage with resources to provide additional public feedback. A Good Neighbor Agreement was finalized and signed by the Water Bureau in June. The Site Advisory Group meetings have transitioned to quarterly meetings.

References:

Chalmers R. M. 2012. Waterborne outbreaks of cryptosporidiosis. *Annali dell'Istituto superiore di sanita*, *48*(4), 429–446.

Li, N., Xiao, L., Alderisio, K., Elwin, K., Cebelinski, E., Chalmers, R., Santin, M., Fayer, R., Kvac, M., Ryan, U., Sak, B., Stanko, M., Guo, Y., Wang, L., Zhang, L., Cai, J., Roellig, D., & Feng, Y. 2014. Subtyping *Cryptosporidium ubiquitum*, a zoonotic pathogen emerging in humans. *Emerging infectious diseases*, *20*(2), 217–224.

Ryan, U., Fayer, R., & Xiao, L. 2014. *Cryptosporidium* species in humans and animals: current understanding and research needs. *Parasitology*, *141*(13), 1667–1685.

Portland Water Bureau. 2017. Bull Run LT2 Interim Measures Watershed Report. Portland, Oregon.

Portland Water Bureau Laboratory
2010 N Interstate Ave, Portland, OR 97227

Cryptosporidium and *Giardia* Laboratory Analysis Report

Water System Information		Sample Information	
PWS ID:	OR4100657	**Collection Month & Year:**	Oct. 2021
PWS Name:	Portland Water Bureau 1900 N Interstate Avenue Portland, Oregon 97227	**Report Date:**	November 10, 2021
		Monitoring Regime:	Bilateral Compliance Agreement
		Source Water:	Bull Run Intake - WTP-A
County:	Multnomah		

PWB Sample ID	Loc ID	Sample Collection Date	Sample Type	Sample Volume Filtered (L)	Analysis Method	*Cryptosporidium*			*Giardia*		
						No. of Oocysts Spiked	No. of Oocysts Counted	Oocyst Matrix Spike Recovery (%)	No. of Cysts Spiked	No. of Cysts Counted	Cyst Matrix Spike Recovery (%)
BC63248	Intake 2PIS	10/3/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63249	Intake 2PIS	10/3/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63250	Intake 2PIS	10/5/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63251	Intake 2PIS	10/5/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63252	Intake 2PIS	10/5/2021	MS	25	DAMM PWBL-SOP-61 3	99	80	80.8	99	81	81.8
BC63492	Intake 2PIS	10/10/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63493	Intake 2PIS	10/10/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63494	Intake 2PIS	10/12/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63495	Intake 2PIS	10/12/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63818	Intake 2PIS	10/17/2021	Field	25	DAMM PWBL-SOP-61 3	0	1		0	0	
BC63819	Intake 2PIS	10/17/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63820	Intake 2PIS	10/19/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC63821	Intake 2PIS	10/19/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64148	Intake 2PIS	10/24/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64149	Intake 2PIS	10/24/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64150	Intake 2PIS	10/25/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64151	Intake 2PIS	10/25/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64152	Intake 2PIS	10/26/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64153	Intake 2PIS	10/26/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64154	Intake 2PIS	10/27/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64155	Intake 2PIS	10/27/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64516	Intake 2PIS	10/31/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64517	Intake 2PIS	10/31/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	

Unless otherwise noted, all data were generated in accordance with EPA Method 1623-modified (PWBL-SOP-61 3)/1623.1 and 100% of the filtered volume was examined for each sample.

Reviewed by Marsha Farooqui Date Reviewed: 11/10/2021

Portland Water Bureau Laboratory
2010 N Interstate Ave, Portland, OR 97227

Cryptosporidium and *Giardia* Laboratory Analysis Report

Water System Information		Sample Information	
PWS ID:	OR4100657	**Collection Month & Year:**	Nov. 2021
PWS Name:	Portland Water Bureau	**Report Date:**	December 8, 2021
	1900 N Interstate Avenue	**Monitoring Regime:**	Bilateral Compliance Agreement
	Portland, Oregon 97227	**Source Water:**	Bull Run Intake - WTP-A
County:	Multnomah		

PWB Sample ID	Loc ID	Sample Collection Date	Sample Type	Sample Volume Filtered (L)	Analysis Method	*Cryptosporidium* No. of Oocysts Spiked	*Cryptosporidium* No. of Oocysts Counted	*Cryptosporidium* Oocyst Matrix Spike Recovery (%)	*Giardia* No. of Cysts Spiked	*Giardia* No. of Cysts Counted	*Giardia* Cyst Matrix Spike Recovery (%)
BC64518	Intake 2PIS	11/1/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64519	Intake 2PIS	11/1/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64520	Intake 2PIS	11/1/2021	MS	25	DAMM PWBL-SOP-61 3	99	79	79.8	100	93	93
BC64521	Intake 2PIS	11/2/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64522	Intake 2PIS	11/2/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64523	Intake 2PIS	11/3/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64524	Intake 2PIS	11/3/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64936	Intake 2PIS	11/7/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64937	Intake 2PIS	11/7/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64938	Intake 2PIS	11/8/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64939	Intake 2PIS	11/8/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64940	Intake 2PIS	11/9/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64941	Intake 2PIS	11/9/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64942	Intake 2PIS	11/10/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC64943	Intake 2PIS	11/10/2021	Field	25	DAMM PWBL-SOP-61 3	0	0		0	0	
BC65190	Intake 2PIS	11/14/2021	Field	25	DAMM PWBL-SOP-61 3	0	1		0	0	
BC65191	Intake 2PIS	11/14/2021	Field	25	DAMM PWBL-SOP-61 3	0	1		0	0	
BC65459	Intake 2PIS	11/17/2021	Field	25	DAMM PWBL-SOP-61 3	0	1		0	0	
BC65460	Intake 2PIS	11/17/2021	Field	25	DAMM PWBL-SOP-61 3	0	3		0	0	
BC65544	Intake 2PIS	11/21/2021	Field	50	1623.1	0	0		0	0	
BC65545	Intake 2PIS	11/22/2021	Field	50	1623.1	0	0		0	0	
BC65546	Intake 2PIS	11/23/2021	Field	50	1623.1	0	0		0	0	
BC65547	Intake 2PIS	11/23/2021	MS	50.5	1623.1	99	43	43.4	100	74	74
BC65548	Intake 2PIS	11/24/2021	Field	50	1623.1	0	0		0	0	
BC65791	Intake 2PIS	11/28/2021	Field	50	1623.1	0	2		0	0	
BC65792	Intake 2PIS	11/29/2021	Field	50	1623.1	0	2		0	0	
BC65793	Intake 2PIS	11/30/2021	Field	50	1623.1	0	0		0	0	

Unless otherwise noted, all data were generated in accordance with EPA Method 1623-modified (PWBL-SOP-61 3)/1623.1 and 100% of the filtered volume was examined for each sample.

Reviewed by Marsha Farooqui

Date Reviewed: 12/09/2021

Portland Water Bureau Laboratory
2010 N Interstate Ave, Portland, OR 97227

Cryptosporidium and *Giardia* Laboratory Analysis Report

Water System Information		Sample Information	
PWS ID:	OR4100657	**Collection Month & Year:**	Dec. 2021
PWS Name:	Portland Water Bureau	**Report Date:**	January 6, 2022
	1900 N Interstate Avenue	**Monitoring Regime:**	Bilateral Compliance Agreement
	Portland, Oregon 97227	**Source Water:**	Bull Run Intake - WTP-A
County:	Multnomah		

PWB Sample ID	Loc ID	Sample Collection Date	Sample Type	Sample Volume Filtered (L)	Analysis Method	*Cryptosporidium*			*Giardia*		
						No. of Oocysts Spiked	No. of Oocysts Counted	Oocyst Matrix Spike Recovery (%)	No. of Cysts Spiked	No. of Cysts Counted	Cyst Matrix Spike Recovery (%)
BC65794	Intake 2PIS	12/1/2021	Field	50	1623.1	0	0		0	1	
BC66011	Intake 2PIS	12/5/2021	Field	50	1623.1	0	0		0	0	
BC66012	Intake 2PIS	12/6/2021	Field	50	1623.1	0	0		0	0	
BC66013	Intake 2PIS	12/6/2021	MS	50.75	1623.1	99	50	50.5	100	84	84.0
BC66014	Intake 2PIS	12/7/2021	Field	50	1623.1	0	0		0	0	
BC66015	Intake 2PIS	12/8/2021	Field	50	1623.1	0	0		0	0	
BC66344	Intake 2PIS	12/12/2021	Field	50	1623.1	0	0		0	0	
BC66345	Intake 2PIS	12/13/2021	Field	50	1623.1	0	0		0	0	
BC66346	Intake 2PIS	12/14/2021	Field	50	1623.1	0	0		0	0	
BC66347	Intake 2PIS	12/15/2021	Field	50	1623.1	0	0		0	0	
BC66679	Intake 2PIS	12/19/2021	Field	50	1623.1	0	0		0	0	
BC66680	Intake 2PIS	12/20/2021	Field	50	1623.1	0	0		0	1	
BC66681	Intake 2PIS	12/21/2021	Field	50	1623.1	0	0		0	0	
BC66682	Intake 2PIS	12/22/2021	Field	50	1623.1	0	0		0	0	
BC67022	Intake 2PIS	12/26/2021	Field	50	1623.1	0	0		0	0	
BC67023	Intake 2PIS	12/27/2021	Field	50	1623.1	0	1		0	0	

Unless otherwise noted, all data were generated in accordance with EPA Method 1623/1623.1 and 100% of the filtered volume was examined for each sample.

Reviewed by Marsha Farooqui Date Reviewed: 01/06/2022