



Mingus Mapps, Commissioner
Gabriel Solmer, Director

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Information: 503-823-7404
portlandoregon.gov/water



May 10, 2023

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 January – March 2023.

If you have any questions regarding this report, please feel free to contact me at (503) 823-1251 or yone.akagi@portlandoregon.gov.

Sincerely,

Yone Akagi, P.E.
Water Quality Manager

Enclosure

Cc: Ann Levy, Kimberly Gupta, David Peters

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Status Report

Bilateral Compliance Agreement

May 10, 2023



Reporting Period: January 1, 2023 – March 31, 2023

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 January 1 – March 31, 2023.

1. Intake Monitoring and Genotyping Results

Intake monitoring results for *Cryptosporidium* were submitted to OHA in monthly compliance reports on February 15, 2023, March 15, 2023, and April 14, 2023, and are provided in Appendix A.

The PWB lab processed 29 intake and three non-intake *Cryptosporidium*-positive samples for genotyping during the reporting period and results are provided in Appendix B. Four of the 32 samples processed (12.5 percent) were successfully genotyped for *Cryptosporidium*. Table 1 shows the four positive *Cryptosporidium* samples that were successfully genotyped from the 29 intake samples. None of the non-intake *Cryptosporidium*-positive samples were successfully genotyped.

The species *C. ubiquitum* was detected in one intake sample (BC92814). *C. ubiquitum* can infect a broad range of mammalian hosts including humans. While human infection by this species is occasionally reported worldwide, to our knowledge it has not been implicated in any waterborne outbreaks (Chalmers 2012).

The remaining three intake samples were reported as genotypes that are not known to be human infectious. One of the samples (BC92811) was a PNW17a (ground squirrel/deer mouse isolate) and match 100 percent to water samples collected in the Bull Run Watershed in 2017 (PWB 2017). To date, the PNW17a (ground squirrel/deer mouse isolate) has been identified 16 times in water samples since Water Year 2017.

Table 1. Positive *Cryptosporidium* Genotyping Results for Intake Water Samples January 1 - March 31, 2023

Sample ID	Collection Date	<i>Cryptosporidium</i> Types from GenBank	Match to Bull Run Scat Samples
BC92811	1/8/2023	PNW17a (deer mouse/ground squirrel isolate) ¹	yes
BC92814	1/11/2023	<i>C. ubiquitum</i>	yes
BC93405	1/23/2023	<i>C. sp.</i> ground squirrel genotype II	no
BC94389	2/15/2023	<i>C. sp.</i> isolate ²	no

¹ PNW17a (deer mouse/ground squirrel isolate) refers to the following GenBank *Cryptosporidium* Isolate IDs and matches the following Accession Nos., respectively: *C. sp.* Sld05d ground squirrel isolate DQ295015, *C. sp.* deer mouse PNWR6CMT524967, *C. sp.* deer mouse PNWR6B MT524968, *C. sp.* deer mouse PNWR5 MT524969, *C. sp.* *P. maniculatus* KX082685, and *C. sp.* wild rodent strain KM199844.

² This PWB sequence was not assigned as a *Cryptosporidium* species or genotype due to a low percent ID match (96.86%) to GenBank submissions. The closest match was *Cryptosporidium sp.* Sby03b isolate from a ground squirrel submitted in GenBank by Atwill et al., 2004.

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. 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 three security incidents or observations. None of the reported incidents occurred inside the water supply drainage boundary.

Sanitary Facilities

Sanitary facility condition inspections covering all portable facilities within the watershed during the reporting period are summarized in Table 2. No deficiencies were observed.

Table 2. Sanitary Facility Condition Inspections

Inspection Date	Location	Deficiencies
1/5/2023	Main Gate	None
	Rd 10/Rd 14 Junction	None
	Headworks Parking Lot	None
	Bear Creek House – ADA	None
	Bear Creek House – Unit #1 of 2	None
	Bear Creek House – Unit #2 of 2	None
	Bear Creek House – Permanent Facilities	None

Landslides

The most recent annual aerial inspection of the Bull Run Watershed, including the South Fork landslide, was completed on July 13, 2022. The next inspection is planned for the summer of 2023.

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 January 4, February 17, and March 27, 2023. Wildlife-specific inspections were conducted by Water Quality staff on January 19, February 19, and March 16, 2022. One vulnerability was noted during the reporting period. A tree on the north side slope fell and damaged a section of the Diversion Pool fence. It was repaired and secured the following morning.

Tributary Water Monitoring Results

The results received during the reporting period for water samples collected at tributary locations are presented in Table 3. A total of 11 samples were collected from the four major tributaries during the reporting period and analyzed using EPA Method 1623.1. *Cryptosporidium* was detected in three of the samples and submitted for genotyping. None of the samples were successfully genotyped (Appendix B).

Table 3. Results of Tributary Water Samples Reported January 1 - March 31, 2023

ID No.	Collection Date	Report Date	Location	<i>Crypto.</i> (count)	<i>Giardia</i> (count)	Volume (L)
BC93037	1/9/2023	1/11/2023	Key Station 15 – North Fork	0	0	50
BC93038	1/9/2023	1/11/2023	Key Station 18 – Mainstem	0	0	50
BC93039	1/9/2023	1/12/2023	Key Station 35 – South Fork	6	0	50
BC93040	1/10/2023	1/12/2023	Key Station 44 – Fir Creek	1	0	20.25
BC94124	2/6/2023	2/14/2023	Key Station 15 – North Fork	0	0	19
BC94125	2/6/2023	2/14/2023	Key Station 18 – Mainstem	0	0	27
BC94126	2/6/2023	2/15/2023	Key Station 35 – South Fork	1	0	21
BC94127	2/6/2023	2/14/2023	Key Station 44 – Fir Creek	0	0	24.5
BC95161	3/6/2023	3/28/2023	Key Station 15 – North Fork	0	0	50
BC95163	3/6/2023	3/28/2023	Key Station 35 – South Fork	0	0	50
BC95164	3/6/2023	3/28/2023	Key Station 44 – Fir Creek	0	0	50

Scat Monitoring Results

The *Cryptosporidium* PCR and genotyping results received during the reporting period for wildlife scat samples are presented in Table 4. Three of the 33 total scat samples were *Cryptosporidium*-positive and were identified as *C. andersoni*, *C. galli*, and *C. parvum*, respectively. *C. andersoni* and *C. parvum* are known to be human-infectious; *C. galli* is not.

Table 4. Results of Wildlife Scat *Cryptosporidium* Samples Reported January 1 to March 31, 2023

Sample ID	Wildlife	Collection Date	Report Date	PCR Result	Genotype / Sequence Result
221201-1003	Grouse	12/1/2022	1/4/2023	Negative	
221201-1010	Roosevelt elk	12/1/2022	1/4/2023	Negative	
221201-1047	Bobcat	12/1/2022	1/4/2023	Positive	<i>C. andersoni</i>
221201-1053	Bobcat	12/1/2022	1/4/2023	Positive	<i>C. galli</i>
221201-1109	Bobcat	12/1/2022	1/4/2023	Negative	
221201-1156	Roosevelt elk	12/1/2022	1/4/2023	Negative	
221201-1203	Black-tailed deer	12/1/2022	1/4/2023	Negative	
221201-1210	Black-tailed deer	12/1/2022	1/4/2023	Negative	
221201-1218	Black-tailed deer	12/1/2022	1/4/2023	Negative	
221206-1208	Roosevelt elk	12/6/2022	1/4/2023	Negative	
221206-1216	Black-tailed deer	12/6/2022	1/4/2023	Negative	
221206-1238	Black-tailed deer	12/6/2022	1/4/2023	Negative	
221206-1253	Grouse	12/6/2022	1/4/2023	Negative	
221206-1257	Black-tailed deer	12/6/2022	1/4/2023	Negative	
230112-1240	Roosevelt elk	1/12/2023	2/1/2023	Positive	<i>C. parvum</i>
230112-1256	Roosevelt elk	1/12/2023	2/1/2023	Negative	
230112-1351	Swallow sp.	1/12/2023	2/1/2023	Negative	
230117-0826	Black-tailed deer	1/17/2023	2/1/2023	Negative	
230117-0837	Roosevelt elk	1/17/2023	2/1/2023	Negative	
230117-1113	Grouse	1/17/2023	2/1/2023	Negative	
230117-1119	Roosevelt elk	1/17/2023	2/1/2023	Negative	
230117-1158	Roosevelt elk	1/17/2023	2/1/2023	Negative	
230117-1227	Black-tailed deer	1/17/2023	2/1/2023	Negative	
230117-1234	Roosevelt elk	1/17/2023	2/1/2023	Negative	
230206-1217	Roosevelt elk	2/6/2023	3/1/2023	Negative	
230206-1226	Roosevelt elk	2/6/2023	3/1/2023	Negative	
230209-1229	Bobcat	2/9/2023	3/1/2023	Negative	
230216-1230	Snowshoe hare	2/16/2023	3/1/2023	Negative	
230216-1222	Snowshoe hare	2/16/2023	3/1/2023	Negative	
230216-1147	Snowshoe hare	2/16/2023	3/1/2023	Negative	
230216-1029	Snowshoe hare	2/16/2023	3/1/2023	Negative	
230216-1021	Snowshoe hare	2/16/2023	3/1/2023	Negative	
230216-0941	Coyote	2/16/2023	3/1/2023	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.

This section summarizes extreme weather from the fourth quarter of 2022 as well as the continued watershed impact observed during the first quarter of 2023. This information was previously shared with OHA on February 15, 2023 as part of PWB's response to OHA's February 3, 2023 letter requesting additional information related to the elevated concentrations of *Cryptosporidium*.

November 2022 event:

A significant rainstorm event in the Bull Run Watershed occurred in early November 2022, causing PWB to shut down the Bull Run source and serve 100 percent groundwater from November 5 to 21, 2022, due to elevated turbidity at the raw water intake. An atmospheric river rain event occurred November 4 to 5, with most of the intense rain occurring in the first 24 hours. November 4 precipitation totals ranged from 3.3 inches in the lower elevations to 9.2 inches in the higher elevations of the watershed. This intense rain melted snow across the watershed, delivering a large volume of water equivalent to an additional inch of rain. As a result, stream flows increased markedly, and the reservoirs, which were extremely low after a long dry season, experienced rapid refill rates. The Main Stem Bull Run River recorded a maximum stream flow of more than 11,000 cfs and the Reservoir 1 level gained over 53 feet of water overnight. The Bull Run drinking water supply was shut down early in the morning of November 5, with turbidity at the intake not exceeding 2 NTU. Turbidity at the raw water intake during the shutdown, when Bull Run water was not being served to the public, eventually reached 10.9 NTU.

Along with the rise in turbidity, *Cryptosporidium* concentrations at the intake increased. Nine out of the 17 samples collected in November were positive, with the highest concentrations at 4 oocysts/50 L in four of the samples. The average concentration for the month of November was 1.5 oocysts/50 L. Detections continued in December at an average concentration of 1.9 oocysts/50 L, which was the same monthly average as in January 2021. Turbidity, while declining gradually since the event, remained above 1 NTU until December 27. A turbidity event of this magnitude has not occurred in recent years; the last major turbidity event was in January 2011.

Cryptosporidium was also detected at all four upstream tributary key stations, which feed Bull Run Reservoirs 1 and 2, on November 15 and December 13, 2022. This indicates that *Cryptosporidium* throughout the watershed was mobilized since the November rain event.

Another moderately high-flow event occurred near the end of December 2022, causing a maximum stream flow of 3,360 cfs at Main Stem Bull Run River on December 27, the highest peak flow since the November atmospheric river event.

January 2023 *Cryptosporidium* levels and response:

In the first week of January 2023, *Cryptosporidium* concentrations at the intake increased to levels higher than previously observed. The highest single sample concentration was 10 oocysts/50 L on January 2. The average concentration for the first week of January was 7 oocysts/50 L. Average weekly concentrations for the next four weeks were between 3.5 and 4.5 oocysts/50 L, with a range of 0 to 8 oocysts/50 L. The average monthly concentration for January 2023 was 4.45 oocysts/50 L. Figure 1 shows PWB's intake *Cryptosporidium* monitoring results for Water Year 2023 through March 2023, plotted in time series with intake turbidity and stream flow at Main Stem Bull Run River.

Cryptosporidium concentrations declined in early February and remained between 0 to 2 oocysts/50 L through March.

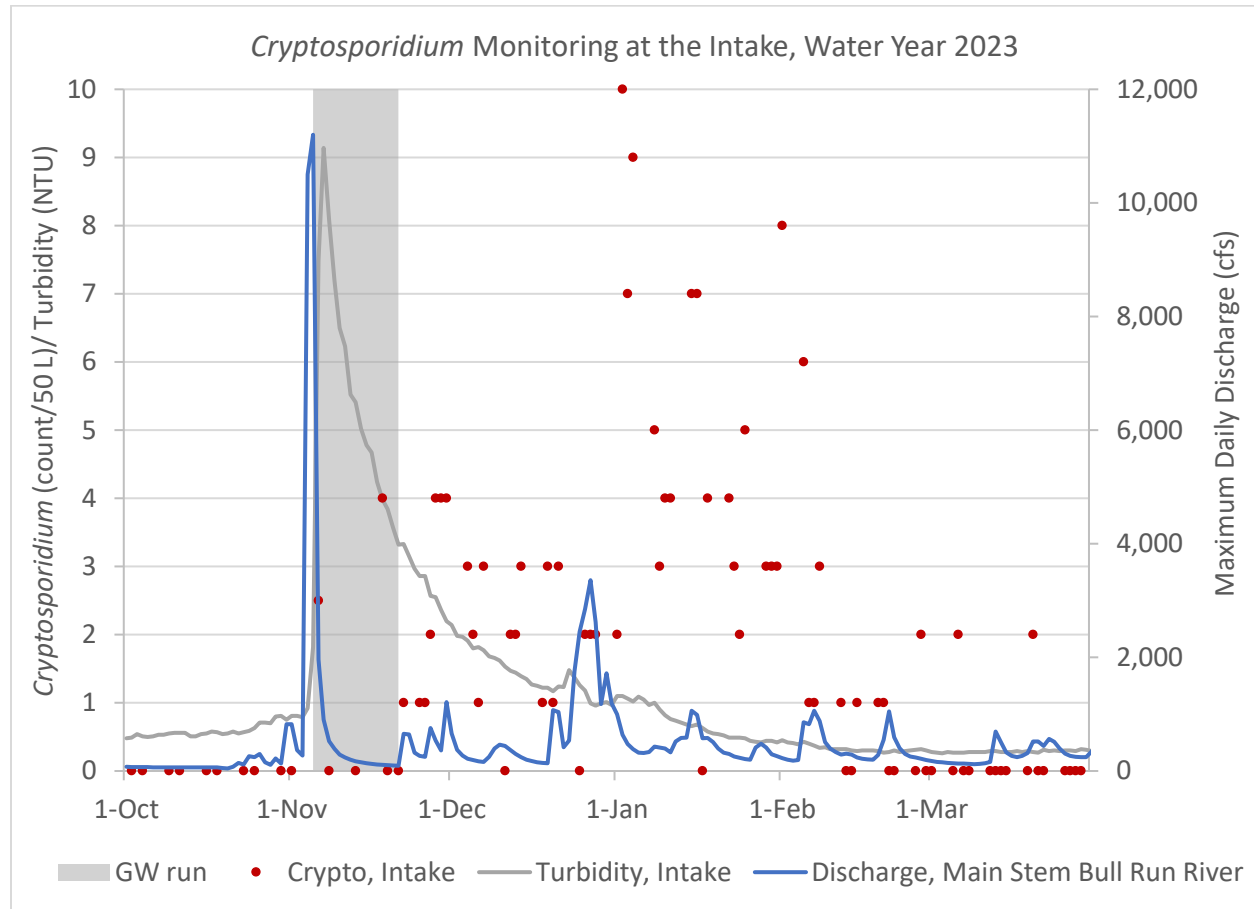


Figure 1. The Water Bureau’s raw water intake *Cryptosporidium* data in oocysts/50 L for Water Year 2023 plotted with intake turbidity and the maximum daily discharge from the Main Stem Bull Run River gauging station upstream of Reservoir 1. Turbidity shown on the graph is a daily value as measured by online instrument. From November 5 to 21, 2022, the Water Bureau shut down the Bull Run source and served 100 percent groundwater (GW), as shown in the gray shaded area.

Per the BCA and the OHA-approved plans, PWB performs the following routine ongoing investigations, activities, and notifications:

- Ongoing watershed inspections, tributary monitoring, and wildlife scat sampling,
- Increased intake monitoring until no *Cryptosporidium* is detected for three weeks,
- Notifications to OHA and Multnomah County Health Department (MCHD) for every detection,
- Public Notifications every week when detecting *Cryptosporidium*,
- Monthly public health surveillance meetings with MCHD and OHA, and
- Annual Clinician Alert and provider brochures/posters.

In early January 2023, after receiving results of 10 oocysts/50 L, the Water Bureau expedited analysis, conducted additional watershed inspections and increased communication and consultation with its public health partners. Specifically, the Water Bureau:

- Expedited Method 1623.1 analysis,
- Expedited genotyping analysis of positive samples,

- Re-inspected the Diversion Pool and noted nothing unusual (the Diversion Pool is inspected daily),
- Surveyed the Reservoir 2 shorelines by boat and noted nothing unusual (such as unusual signs of wildlife or erosion),
- Inspected the sanitary facilities within the water supply drainage (located at Bear Creek House) and found nothing unusual,
- Confirmed with watershed Security Rangers that there have been no unusual findings such as domesticated animal incursion (Rangers routinely inspect the watershed and boundary), and
- Held additional public health surveillance meetings with MCHD and OHA.

PWB consulted frequently with public health officials from OHA and MCHD to review and interpret the available data. MCHD reported that cryptosporidiosis cases in the community appeared to be within normal, low levels. It was determined by public health officials on a weekly basis that no additional precautions needed to be taken due to the increases in *Cryptosporidium* detections at the intake.

No other significant watershed events or changes were observed during the reporting period.

3. Filtration Facility Construction Update

In the past quarter, the pilot plant testing operations continued 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 Project Team received the 100 percent design submittal for PWB review in January, returned comments to the designer, and continued efforts to finalize bid set documents with the designer and contractor. The Project Team has also been developing an early works package and Guaranteed Maximum Price (GMP) documents to present to City Council for approval this summer.

The Land Use team submitted the Clackamas County Land Use application package and continued to provide Land Use application support that may be needed in response to comments from either Multnomah County or Clackamas County Land Use staff. The Project Team has continued to support construction sequencing, permitting, and commissioning and startup efforts. Facility grading and building permits have been submitted to the City of Gresham for review.

In February, the Filtration Pipelines Project (Pipelines) Team returned adjudicated 90 percent design package comments to the designer. The designer began the 100 percent Pipelines design package including incorporating scope changes related to one finished water pipe. The contractor and designer continued working with PWB on a procurement plan, Construction Management Plan, and basis for 90 percent GMP, including preparing bid packages related to subcontracts. The designer and contractor continued to refine cost and schedule estimates. The Land Use team continued to provide Land Use application support that may be needed in response to comments from Multnomah County Land Use staff.

An EPA WIFIA quarterly report was submitted at the end of the previous quarter and included progress on three treatment projects receiving financial support under the WIFIA program.

Both project teams continue to work with various county and community groups, as needed. The team continues to collaborate with neighbors. Project updates are provided to property owners near the

future facility and pipelines, as well as to other relevant stakeholders through email, surveys, and teleconferencing. Project updates and feedback are posted [online](#). A Good Neighbor Agreement was finalized and signed by PWB in June 2021, and continues to guide Project strategy as PWB prepares for construction later in 2023.

References

Atwill, E. R., Phillips, R., Pereira, M. D., Li, X., & McCowan, B. (2004). Seasonal shedding of multiple *Cryptosporidium* genotypes in California ground squirrels (*Spermophilus beecheyi*). *Applied and environmental microbiology*, 70(11), 6748–6752.

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

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

Appendices

Appendix A: Intake Monitoring Reports

Appendix B: *Cryptosporidium* Genotyping Results for Intake and Tributary Water Samples

Appendix A: Intake Monitoring Reports



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

Cryptosporidium and Giardia Laboratory Analysis Report

<u>Water System Information</u>			<u>Sample Information</u>		
PWS ID:	OR4100657		Collection Month & Year:	Jan. 2023	
PWS Name:	Portland Water Bureau 1900 N Interstate Avenue Portland, Oregon 97227		Report Date:	February 8, 2023	
			Monitoring Regime:	Bilateral Compliance Agreement	
County:	Multnomah		Source Water:	Bull Run Intake - WTP-A	

PWB Sample ID	Loc ID	Sample Collection Date	Sample Type	Sample Volume Filtered (L)	Analysis Method	<i>Cryptosporidium</i>			<i>Giardia</i>		
						No. of Oocysts Spiked	No. of Oocysts Counted	Oocyst Matrix Spike Recovery (%)	No. of Cysts Spiked	No. of Cysts Counted	Cyst Matrix Spike Recovery (%)
BC92645	Intake 2PIS	1/1/2023	Field	50	1623.1	0	2		0	0	
BC92646	Intake 2PIS	1/2/2023	Field	50	1623.1	0	10		0	1	
BC92647	Intake 2PIS	1/3/2023	Field	50	1623.1	0	7		0	0	
BC92648	Intake 2PIS	1/3/2023	MS	50.5	1623.1	99	90	83.8	98	85	86.7
BC92649	Intake 2PIS	1/4/2023	Field	50	1623.1	0	9		0	0	
BC92811	Intake 2PIS	1/8/2023	Field	50	1623.1	0	5		0	1	
BC92812	Intake 2PIS	1/9/2023	Field	50	1623.1	0	3		0	0	
BC92813	Intake 2PIS	1/10/2023	Field	50	1623.1	0	4		0	0	
BC92814	Intake 2PIS	1/11/2023	Field	50	1623.1	0	4		0	0	
BC93124	Intake 2PIS	1/15/2023	Field	50	1623.1	0	7		0	0	
BC93125	Intake 2PIS	1/16/2023	Field	50	1623.1	0	7		0	0	
BC93126	Intake 2PIS	1/17/2023	Field	50	1623.1	0	0		0	1	
BC93127	Intake 2PIS	1/18/2023	Field	50	1623.1	0	4		0	0	
BC93404	Intake 2PIS	1/22/2023	Field	50	1623.1	0	4		0	0	
BC93405	Intake 2PIS	1/23/2023	Field	50	1623.1	0	3		0	0	
BC93406	Intake 2PIS	1/24/2023	Field	50	1623.1	0	2		0	0	
BC93407	Intake 2PIS	1/25/2023	Field	50	1623.1	0	5		0	0	
BC93735	Intake 2PIS	1/29/2023	Field	50	1623.1	0	3		0	2	
BC93736	Intake 2PIS	1/30/2023	Field	50	1623.1	0	3		0	0	
BC93737	Intake 2PIS	1/31/2023	Field	50	1623.1	0	3		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: 02/08/2023



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

Cryptosporidium and Giardia Laboratory Analysis Report

<u>Water System Information</u>				<u>Sample Information</u>			
PWS ID:	OR4100657			Collection Month & Year:	Feb. 2023		
PWS Name:	Portland Water Bureau 1900 N Interstate Avenue Portland, Oregon 97227			Report Date:	March 6, 2023		
County:	Multnomah			Monitoring Regime:	Bilateral Compliance Agreement		
				Source Water:	Bull Run Intake - WTP-A		

PWB Sample ID	Loc ID	Sample Collection Date	Sample Type	Sample Volume Filtered (L)	Analysis Method	<i>Cryptosporidium</i>			<i>Giardia</i>		
						No. of Oocysts Spiked	No. of Oocysts Counted	Oocyst Matrix Spike Recovery (%)	No. of Cysts Spiked	No. of Cysts Counted	Cyst Matrix Spike Recovery (%)
BC93738	Intake 2PIS	2/1/2023	Field	50	1623.1	0	8		0	1	
BC94053	Intake 2PIS	2/5/2023	Field	50	1623.1	0	6		0	0	
BC94054	Intake 2PIS	2/6/2023	Field	50	1623.1	0	1		0	2	
BC94055	Intake 2PIS	2/7/2023	Field	50	1623.1	0	1		0	1	
BC94056	Intake 2PIS	2/7/2023	MS	50.75	1623.1	99	77	76.7	99	84	83.8
BC94057	Intake 2PIS	2/8/2023	Field	50	1623.1	0	3		0	0	
BC94386	Intake 2PIS	2/12/2023	Field	50	1623.1	0	1		0	0	
BC94387	Intake 2PIS	2/13/2023	Field	50	1623.1	0	0		0	0	
BC94388	Intake 2PIS	2/14/2023	Field	50	1623.1	0	0		0	1	
BC94389	Intake 2PIS	2/15/2023	Field	50	1623.1	0	1		0	0	
BC94665	Intake 2PIS	2/19/2023	Field	50	1623.1	0	1		0	0	
BC94666	Intake 2PIS	2/20/2023	Field	50	1623.1	0	1		0	0	
BC94667	Intake 2PIS	2/21/2023	Field	50	1623.1	0	0		0	0	
BC94668	Intake 2PIS	2/22/2023	Field	50	1623.1	0	0		0	0	
BC94838	Intake 2PIS	2/26/2023	Field	50	1623.1	0	0		0	0	
BC94839	Intake 2PIS	2/27/2023	Field	50	1623.1	0	2		0	0	
BC94840	Intake 2PIS	2/28/2023	Field	50	1623.1	0	0		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: 03/06/2023



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

***Cryptosporidium and Giardia* Laboratory Analysis Report**

<u>Water System Information</u>					<u>Sample Information</u>		
PWS ID:	OR4100657				Collection Month & Year:	March 2023	
PWS Name:	Portland Water Bureau 1900 N Interstate Avenue Portland, Oregon 97227				Report Date:	April 4, 2023	
					Monitoring Regime:	Bilateral Compliance Agreement	
County:	Multnomah				Source Water:	Bull Run Intake - WTP-A	

PWB Sample ID	Loc ID	Sample Collection Date	Sample Type	Sample Volume Filtered (L)	Analysis Method	<i>Cryptosporidium</i>			<i>Giardia</i>		
						No. of Oocysts Spiked	No. of Oocysts Counted	Oocyst Matrix Spike Recovery (%)	No. of Cysts Spiked	No. of Cysts Counted	Cyst Matrix Spike Recovery (%)
BC94841	Intake 2PIS	3/1/2023	Field	50	1623.1	0	0		0	0	
BC95025	Intake 2PIS	3/5/2023	Field	50	1623.1	0	0		0	0	
BC95026	Intake 2PIS	3/6/2023	Field	50	1623.1	0	2		0	0	
BC95027	Intake 2PIS	3/7/2023	Field	50	1623.1	0	0		0	0	
BC95029	Intake 2PIS	3/7/2023	MS	50.5	1623.1	99	86	86.9	100	78	78
BC95028	Intake 2PIS	3/8/2023	Field	50	1623.1	0	0		0	0	
BC95238	Intake 2PIS	3/12/2023	Field	50	1623.1	0	0		0	0	
BC95239	Intake 2PIS	3/13/2023	Field	50	1623.1	0	0		0	0	
BC95240	Intake 2PIS	3/14/2023	Field	50	1623.1	0	0		0	0	
BC95241	Intake 2PIS	3/15/2023	Field	50	1623.1	0	0		0	0	
BC95517	Intake 2PIS	3/19/2023	Field	50	1623.1	0	0		0	0	
BC95518	Intake 2PIS	3/20/2023	Field	50	1623.1	0	2		0	0	
BC95519	Intake 2PIS	3/21/2023	Field	50	1623.1	0	0		0	0	
BC95520	Intake 2PIS	3/22/2023	Field	50	1623.1	0	0		0	0	
BC95726	Intake 2PIS	3/26/2023	Field	50	1623.1	0	0		0	0	
BC95727	Intake 2PIS	3/27/2023	Field	50	1623.1	0	0		0	0	
BC95728	Intake 2PIS	3/28/2023	Field	50	1623.1	0	0		0	0	
BC95729	Intake 2PIS	3/29/2023	Field	50	1623.1	0	0		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 Faroogui

Date Reviewed: 04/05/2023

Appendix B: *Cryptosporidium* Genotyping Results for Intake and Tributary Water Samples

Genotyping Results: Positive = PCR positive and *Cryptosporidium* species/genotype/isolate identified; Negative = PCR negative and sequencing was not conducted or *Cryptosporidium* not identified; n/a = not applicable due to QC failure and genotyping was not completed

PWB Sample ID	Location	Collection Date	Genotype Result	Sequencing Results			
				Sequence Length (base pairs)	Species / Genotype / Isolate	GenBank Accession ID	GenBank Max Identity (%)
BC92645	Intake	1/1/2023	Negative				
BC92646	Intake	1/2/2023	Negative	195	Unidentified non-Crypto Eukaryote	KX771899	97.89
BC92647	Intake	1/3/2023	Negative				
BC92649	Intake	1/4/2023	Negative				
BC92811	Intake	1/8/2023	Positive	438	PNW17a (deer mouse/ground squirrel)	DQ295015	100
BC92812	Intake	1/9/2023	Negative				
BC92813	Intake	1/10/2023	Negative				
BC92814	Intake	1/11/2023	Positive	434	<i>C. ubiquitum</i>	AY030086	100
BC93039	Key Station 35	1/9/2023	n/a				
BC93040	Key Station 44	1/9/2023	n/a				
BC93124	Intake	1/15/2023	Negative				
BC93125	Intake	1/16/2023	Negative				
BC93127	Intake	1/18/2023	n/a				
BC93404	Intake	1/22/2023	Negative				
BC93405	Intake	1/23/2023	Positive	294	<i>C. sp.</i> ground squirrel genotype II	KT027480	99.66
BC93406	Intake	1/24/2023	Negative				
BC93407	Intake	1/25/2023	Negative				
BC93735	Intake	1/29/2023	Negative				
BC93736	Intake	1/30/2023	Negative				
BC93737	Intake	1/31/2023	Negative				
BC93738	Intake	2/1/2023	Negative				
BC94053	Intake	2/5/2023	n/a				

Gentotyping Results: Positive = PCR positive and *Cryptosporidium* species/genotype/isolate identified; Negative = PCR negative and sequencing was not conducted or *Cryptosporidium* not identified; n/a = not applicable due to QC failure and genotyping was not completed

PWB Sample ID	Location	Collection Date	Genotype Result	Sequencing Results			
				Sequence Length (base pairs)	Species / Genotype / Isolate	GenBank Accession ID	GenBank Max Identity (%)
BC94054	Intake	2/6/2023	n/a				
BC94055	Intake	2/7/2023	n/a				
BC94057	Intake	2/8/2023	n/a				
BC94126	Key Station 35	2/6/2023	Negative				
BC94386	Intake	2/12/2023	Negative				
BC94389	Intake	2/15/2023	Positive	382	C. sp. isolate	AY462231	96.86
BC94665	Intake	2/19/2023	Negative				
BC94666	Intake	2/20/2023	Negative				
BC94839	Intake	2/27/2023	Negative				
BC95026	Intake	3/6/2023	Negative				