



PUBLIC HEALTH DIVISION  
Drinking Water Services

Tina Kotek, Governor

Oregon  
**Health**  
Authority

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April 25, 2023

Yone Akagi, PE  
Portland Water Bureau  
Via email: [Yone.Akagi@portlandoregon.gov](mailto:Yone.Akagi@portlandoregon.gov)

**Re: Bull Run Filtration Facility (PR#145-2022)**  
**Portland Water Bureau (PWS ID#00657)**  
**Conditional Approval**

Dear Yone:

Thank you for your submittal to the Oregon Health Authority's Drinking Water Services (DWS) of plan review information for the Bull Run Filtration Facility for Portland Water Bureau. On October 31, 2022, our office received a land use compatibility statement as well as plans and specifications. A construction schedule was also submitted. A plan review fee of \$3,300 was received on September 28, 2022. A geotechnical report was submitted on January 23, 2023.

**Project elements:**

The project includes installation of a surface water filtration plant as required under a Bilateral Compliance Agreement with DWS. The plant is designed for a maximum near-term hydraulic capacity of 142 MGD (71 MGD per train) in order to meet peak day demands of 135 MGD. The plant is a zero liquid discharge plant with a recycle rate of approximately 5%. The proposed conventional treatment plant includes:

- An inlet structure;
- Ozone system as an additive bid item, with no treatment credit sought
- Two flash mix trains;
- Four flocculation and sedimentation trains (sedimentation using parallel plate settlers);
- Two banks of 6 deep-bed filters (12 filters total) with 54 inches of anthracite and 12 inches of silica sand;
- Two CT basins (1.56 million gallons each);
- Two buried clearwells (2.37 million gallons each) and

- Proposed chemical addition of alum and polyaluminum chloride (coagulants), sodium hypochlorite and liquid ammonium sulfate (disinfection in the CT basins followed by chloramination in the clearwells), cationic polymer (coagulant aid), nonionic polymers (floc aid, thickening aid, filter aid), soda ash and carbon dioxide (corrosion control). If ozone is installed, sodium bisulfite would be used as a quenching agent.

### **Evaluation Summary**

Details are included in the attached Major Unit Process (MUP) evaluation. The MUP was completed using a maximum of 85 MGD per train (170 MGD total) per PWB's request. Each train of the flash static mixer is designed for a peak of 90 MGD (180 MGD total) while filters were designed to 142 MGD at 8 gpm/ft<sup>2</sup> with one filter out of service.

- The water system has designed the treatment plant to provide 4-log inactivation of viruses, 2-log removal of *Cryptosporidium* and 3-log removal/inactivation of *Giardia*. A pre-construction MUP evaluation was conducted on one of two identical trains highlighted in Figure 1 and summarized in Figure 2 in the MUP attachment.
- Results support a 2.5-log removal credit of *Giardia* at a flow rate of 85 MGD per train (170 MGD total flow) as illustrated in the performance potential graphs in the attached MUP evaluation. 3.0-log *Cryptosporidium* removal is granted for conventional filtration.
- The plant may begin operation at a filter loading rate of 8 gpm/ft<sup>2</sup>. However, DWS requires that PWB demonstrate how the pilot filter data from the study adequately matches the full-scale filter at the filter loading rates (8, 10 and 12 gpm/ft<sup>2</sup>) used in the study. DWS would be looking for a representative sampling that compares the data in the pilot study to the full-size filter (DWS and PWB can discuss this point further at a later date).
- The required 4-log inactivation of viruses and 0.5-log inactivation of *Giardia* is anticipated to be achieved in the CT basins through contact with chlorine (sodium hypochlorite). An interim figure of 18.6 minutes should be used for CT determinations when the plant goes online. 18.6 minutes was estimated using a peak hour demand of 85 MGD through each CT basin, baffling factor of 70%, chlorine residual of 2 mg/L and CT basin water level of 15.5-ft.
- Once construction is complete, a new MUP evaluation will be required to evaluate as-built conditions if substantial design changes are made.

### **Conditions**

The plans are approved with the following conditions:

- Section A of the Land Use Compatibility Statement (LUCS) must indicate the project

“is” compatible and be resubmitted prior to initiation of construction. Note that the conditional approval letter is only valid with a signed LUCS as indicated above.

- All items in contact with potable water must meet NSF Standard 61 or equivalent. All chemicals in contact with potable water must meet NSF Standard 60 or equivalent.
- Once the parallel plate settler vendor is selected, information must be submitted on the surface overflow rate. An estimated rate of 4 gpm/ft<sup>2</sup> was used for the MUP.
- Flow control to filters when one filter is out of service must ensure that the filter loading rate of 8 gpm/ft<sup>2</sup> to the remaining filters is not exceeded.
- A narrative must be submitted explaining how post-backwash filter profiles will be generated each quarter and be made available for regulatory inspection.
- An operations and maintenance manual must be available for review for the new facility. This must include standard operating procedures for calibration and maintenance of instruments used for compliance monitoring and process control.
- The roof access hatches on the clearwells must have curbing around the opening and a lockable watertight cover that overlaps the curbing.
- Coliform bacteria sample results must be submitted after disinfection of the CT basins/clearwells is complete prior to being put into service.
- Once construction is complete, a tracer study to determine contact time in the CT basins is required. A proposal for conducting the tracer study must be submitted prior to the tracer study being conducted. Final approval for the treatment plant can be granted prior to completion of the tracer study.

**Until we receive verification that the conditions have been met and final approval has been issued, the facility is not approved for use.** Upon completion of the project, the engineer must verify in writing that construction was completed according to the submitted plans. If substantial changes are made, a set of as-built drawings must be submitted. Documentation demonstrating how the above conditions were met should reference Plan Review #145-2022 and can be emailed to me at [Carrie.L.Gentry@oha.oregon.gov](mailto:Carrie.L.Gentry@oha.oregon.gov).

In addition to the above conditions, I have the following comments:

- Note that once customers start receiving water from this facility, the water system will be required to do two 6-month rounds of lead and copper sampling at the original number of sample sites.
- A new MUP evaluation may be required once construction is completed, if the construction is different from the design presented.
- The following initial sampling will need to be completed at the new entry point to the distribution system: IOCs, VOCs, SOCs and radionuclides. This should be done during

the start-up phase of the treatment plant.

- As previously discussed, the new water treatment plant facility will require a WT-4 direct-responsible-charge (DRC) operator.
- A filter backwash recycle form and guidance to assist with completing the form is attached. Prior to completion of the water treatment plant facility, please provide information showing how PWB plans to manage the 5% blended recycled water without exceeding 10%.
- Note that a disinfection profile will be required once PWB has 12-months of CT data from the new water treatment plant.

If you have any questions, please feel free to call me at (971) 201-9794.

Sincerely,



Carrie Gentry, PE  
Regional Engineer  
Drinking Water Services

Encl: Major Unit Process Evaluation Results  
Filter Backwash Form (Word document)  
Filter Backwash Guidance (3 pdfs)