



PUBLIC HEALTH DIVISION  
Drinking Water Services

Kate Brown, Governor

Oregon  
**Health**  
Authority

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June 10, 2022

Matt Gribbins, PE  
Water Treatment Plant Project Manager  
Tualatin Valley Water District  
Via email

**Re: WWSP Water Treatment Plant (PR#154-2021)  
Willamette Water Supply Program (PWS ID#01545)  
Conditional Approval**

Dear Mr. Gribbins:

Thank you for your submittal to the Oregon Health Authority's Drinking Water Services (DWS) of plan review information for the Willamette Water Supply water treatment plant project for Willamette Water Supply System Commission (WWSS). On September 22, 2021, our office received plans, specifications, land use compatibility statement and a plan review fee of \$3,300. The UV validation report for the Calgon Carbon Corporation 48" Sentinel Chevron UV reactor was submitted on December 26, 2021. The submittal included a request for a waiver from construction standards for OAR 333-061-0050(6)(a)(M), which requires a drain at the lowest point of a storage facility. The approved waiver is attached.

The project includes installation of a new conventional surface water treatment plant, including a new raw water intake at the existing City of Wilsonville's Willamette River treatment plant. WWSS' new treatment plant will be located in Sherwood and will have an initial capacity of 66 MGD.

The facility includes flash mix units, three ballasted flocculation basins (with three additional future basins planned), two ozone contactors (with two more future contactors planned), eight rapid sand filters (with six more future filters planned), three reactors (with one future reactor planned), a 10 million-gallon concrete clearwell and finished water pumps. The plant recycles water back to the raw water point of the treatment plant.

The design of the plant is based on the City of Wilsonville's water treatment plant (WTP). Caustic soda and carbon dioxide are added to the raw water. Liquid alum and sodium hypochlorite are added to the flash mix. The coagulated water travels to the three ballasted flocculation basins where polymer is added. Settled water travels to the ozone contactors where ozone gas is applied (with potential future hydrogen peroxide injection). Calcium thiosulfate is injected at the end of the ozone contactors to quench the ozone. Filter aid polymer is injected ahead of the (12") sand and (72") GAC filters. UV is applied to filtered water. Sodium hypochlorite and caustic soda are added to the finished water before the clearwell, with an option to add carbon dioxide. Finished water pumps take the water to the 66" finished water pipe to the transmission pipeline.

The water system is required to 4-log inactivation of viruses, 2-log removal of *Cryptosporidium* and 3-log removal/inactivation of *Giardia*. The filtration portion of the plant is granted a 2.5-log removal of *Giardia* and also provides the appropriate *Cryptosporidium* removal. The UV provides 3-log inactivation of *Giardia*, which covers the remaining 0.5-log required. UV also provides 3-log inactivation of *Cryptosporidium*. The required 4-log inactivation of viruses is achieved in the clearwell through contact with chlorine.

As noted above, the design is based on Wilsonville's WTP. The submittal requested a filtration loading rate to match Wilsonville's current rate of 10.1 gpm/ft<sup>2</sup>, although the submittal also noted that filters will not exceed a filtration rate of 7.5 gpm/ft<sup>2</sup>. The rate of 10.1 gpm/ft<sup>2</sup> is acceptable, based on the new WWSS WTP demonstrating that optimization goals are met. This rate may be limited if optimization goals are not met. The theoretical flow in MGD of this process using this filter loading rate is greater than the initial capacity of 66 MGD. Note that calculations for the theoretical flowrate are based on having one filter out of service.

Similarly, Wilsonville's ballasted flocculation rate of 27 gpm/ft<sup>2</sup> is acceptable based on previous pilot study results. This rate is also acceptable based on the new WTP demonstrating that optimization goals are met, and again, the rate may be limited if optimization goals are not met. The theoretical flow in MGD in this process exceeds the initial plant capacity of 66 MGD. Additional conversations should take place on how DWS calculates the theoretical flow in MGD for this process, as this could be a limiting factor for the eventual re-rating of the plant.

The medium-pressure Calgon UV reactor was validated using the calculated-dose approach outlined in the UV Disinfection Guidance Manual (UVDGM) providing a range of inactivation credits sufficient for WWSP's needs at flowrates ranging from 3 to 52.7 MGD (per reactor) and a UV transmittance (UVT) range of 75% to 98.1%.

## **The plans are approved with the following conditions:**

### General conditions:

- All items in contact with potable water must meet NSF 61 or equivalent. The submittal indicated that all items would meet NSF 61. All chemicals must meet NSF standard 60 or equivalent.

### WTP conditions:

- There appears to be a non-potable process water feed line that feeds into the UV effluent. Generally, we'd expect non-potable water to be returned to the front of the plant. Please provide more detail on volume and source of this feed.
- Flow control to filters when one filter is out of service must ensure that the allowed filter loading rate to the remaining filters is not exceeded.
- Individual Filter Effluent (IFE) turbidimeters are required, as is a Combined Filter Effluent (CFE) turbidimeter after treatment, prior to the clearwell. IFEs were noted in the plans.
- A narrative must be submitted explaining how filter profiles will be generated each quarter and be made available for regulatory inspection.
- SCADA screenshots must be submitted showing high and low alarms (both call-out and auto shutdown/backwash/filter-to-waste), including setpoints for chlorine and turbidity. UV setpoints would be a recommendation, not a condition.
- An operations and maintenance manual must be submitted 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.

### UV conditions:

- Performance testing on start-up must verify the items listed in the UVDGM example. (2-page excerpt enclosed).
- WTP must have the ability to calculate and totalize off-specification water volume produced, particularly during power sags. (Record off-spec water volumes in WWSP's monthly report form, which will be provided during the final approval stage of the project.)
- Sample tap must be provided upstream of the UV reactors for UVT sampling.
- There must be visual verification of the operation of the lamps (e.g., indicator light).
- Lamps and UV sensor must be accessible for replacement.
- UV reactors must withstand system pressures, and a simple mercury containment plan in the rare event of mercury amalgam lamp breakage must be developed.
- There must be no bypass piping around the UV reactors.

- All wetted parts must meet NSF Standard 61 or equivalent.

#### Chlorine for virus inactivation conditions:

- Chlorinator piping must be designed to prevent the contamination of the potable water system by backflow of untreated water or water having excessive concentrations of chlorine.
- Testing equipment must be provided to determine the chlorine residual. The equipment must be a DPD-test kit or other EPA approved method of testing. The specifications listed three options; please ensure that the analyzers selected meet this requirement.

#### Clearwell conditions:

- Ground-level reservoirs (clearwells) must be constructed on undisturbed soil, bedrock, or other stable foundation material capable of supporting the structure when full. Generally, a geotechnical report is submitted to demonstrate this requirement. I did not find a geotechnical report in the submittal documents, though I may have missed it. Please submit the geotechnical report or other information that shows that the clearwell site meets this requirement.
- A flowmeter on the effluent line is required.
- There must be no bypass around the clearwell. No bypass was noted.
- Coliform bacteria sample result(s) must be submitted after disinfection of the clearwell is complete.
- Once construction is complete, a tracer study to determine contact time in the clearwell is required. A proposal for conducting the tracer study must be submitted to Nicole Alfafara (DWS- Portland) prior to the tracer study. Nicole can be reached at (503) 278-1531. The estimated contact time in the baffled clearwell is 35.8 minutes. With an estimated baffling factor of 0.28, the overall estimated contact time is expected to be 10 minutes. With an anticipated residual of 1.0 mg/L, the estimated contact time exceeds the expected required CT of 8.9.
- Clarification must be provided as to the first user. The assumption is that the first user is the WTP, and that the facility will be served from fully treated and disinfected water post-clearwell.

**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 #154-2021 and can be emailed to me at [Carrie.L.Gentry@dhsola.state.or.us](mailto:Carrie.L.Gentry@dhsola.state.or.us).

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

- Note that once the water systems start receiving water from this WTP, each water system will be required to do two 6-month rounds of lead and copper sampling at the original (not reduced) number of sample sites.

Once the WTP is operational, the following requirements must be met for the UV reactors:

- UV intensity sensor calibration must be checked monthly using a reference sensor. The sensor needs to be re-calibrated or replaced when the calibration is off by more than 20%.
- Monitor UVT of filtered water at least monthly for at least one year. Monitoring frequency can be reconsidered after that time. Since the plans for the UV system assumes at least 75% UV transmittance, any water treated with a lower transmittance is considered off-spec and the volume of that water must be calculated and reported.

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

Sincerely,



Carrie Gentry, PE  
Regional Engineer  
Drinking Water Services

ec: Nicole Alfafara, OHA/DWS

encl: Approved waiver from construction standards  
2 page UVDGM excerpt  
Water Treatment Plant Optimization Goals handout