



PUBLIC HEALTH DIVISION  
Drinking Water Services

Kate Brown, Governor

Oregon  
**Health**  
Authority

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November 5, 2019

Peter Blumanthal, PE  
Westech Engineering, Inc.  
3841 Fairview Industrial Drive, SE, Suite 100  
Salem, OR 97302

**Re: Water Treatment Plant (PR#138-2019)  
City of Jefferson (PWS ID#00408)  
SRF Project # SD-16-155  
Conditional Approval**

Dear Mr. Blumanthal:

Thank you for your submittal to the Oregon Health Authority's Drinking Water Services (DWS) of plan review information for the new membrane treatment plant for the City of Jefferson. On September 11, 2019, our office received plans, specifications and a land use compatibility statement. A plan review fee of \$3,300 was received on September 13, 2019. Because of the multiple components of this project, the plan review fee is \$4,125.

The project includes installation of a new raw water pump station, a membrane treatment plant (Pall UNA-620A, two racks with 62 modules per rack); baffled clearwell; chemical treatment including aluminum chlorohydrate for pretreatment and soda ash for corrosion control; gas chlorine and UV for disinfection (Trojan UVSwift 2L12 units); a finished water pump station and associated piping and appurtenances. This phase of the membrane treatment plant will have a 2 mgd capacity and will utilize gas chlorine for disinfection. Future expansions of the membrane plant will increase the capacity to 4 mgd (then 6 mgd) and will utilize UV for disinfection. The future membrane expansion will need to be submitted for plan review prior to installation.

The membrane treatment plant is granted 4-log removal of *Giardia* and 4-log removal of *Cryptosporidium*. These log removals correspond with a 35-psi maximum transmembrane pressure (TMP) and 120-gpd/ft<sup>2</sup> maximum flux rate. The water system will meet the 4-log inactivation of viruses and 0.5-log post-filtration inactivation of *Giardia* with gas chlorine.

The plans are approved with the following conditions:

### General

- An additional plan review fee of \$825 must be submitted to our department. A check, payable to “OHA Drinking Water” can be mailed to the address below.
- All items in contact with potable water must meet NSF Standard 61. Chemicals must meet NSF Standard 60.

### Membrane Plant

- A pilot study must be conducted with a new membrane filter installation, either prior to installation or during commissioning of the new membrane plant. Pilot studies can help determine operational issues and impacts of raw water quality on membrane fouling.
  - Testing must include TOC, turbidity, inorganic and organic scaling contaminants and should include encompass several backwash cycles, two enhanced flux maintenance washes, and at least one clean-in-place.
- Regardless of when the pilot testing is conducted, testing must be done during commission to demonstrate the ability to meet direct integrity test resolution (applied test pressure requirements) and sensitivity requirements (LRVDIT) and should show that the membrane is capable of meeting control limits for LRV, pressure decay rate, and turbidity (e.g. 0.15 NTU).
  - Baseline permeability or resistance should also be established during this commissioning period.
- A new Upper Control Limit (UCL, measured in psi/min) must be established for the treatment plant. This calculates the maximum decay rate and is typically provided by the manufacturer. Pall will be able to provide you with this value, based on the variables for the modules. They should provide you with the calculation of the UCL, along with the equation, variables and assumptions used.
- Each membrane rack will have a calibratable Hach TU-5400 for continuous indirect integrity monitoring. The combined turbidimeter location (also a Hach TU-5400) must be prior to the UV units.
- A direct integrity test (DIT) must be performed if the turbidity on a unit is greater than 0.15 NTU for more than 15 minutes. This must be programmed into the SCADA unit. A DIT is also required a minimum of once per day of operation. If the DIT fails, then the unit must be automatically taken off-line.
- Each unit must have inlet and outlet pressure transducers. These transducers must be able to be calibrated (so they must be installed such that they are accessible). The sensitivity of the transducers must be less than 10% of the UCL. Please ensure that the pressure transducers can accurately measure the upper control limit for each skid.

- The water system's operation and maintenance manual must be updated to include a diagnosis and repair plan for the new membrane plants' modules. The manual should include a written integrity verification program that includes triggers and schedules.
- The SCADA system must be able to calculate the Log Removal Value (LRV) – i.e. continuous calculation of the LRV using inputs.
- Information must be provided on what parameters and values trigger a backwash (i.e. turbidity, transmembrane pressure, time) and what maximum transmembrane pressure triggers the chemical clean-in-place.
- Cross-connection protection (in the form of block and bleed) for chemicals used in the chemical cleaning process is required.

## UV

- The Trojan UV units chosen have a 3.5 log inactivation credit for *Cryptosporidium* and *Giardia*. During the current phase of the treatment plant installation, it is my understanding that the UV units will not be used for disinfection. Note that the following are required of UV units installed for disinfection purposes:
  - An automatic water flow shut-off if intensity/dose falls below a specified value.
  - A flow restrictor or alternative to assure max flow is not exceeded.
  - Visual verification (i.e. indicator light or SCADA display) of operation of lamps.
  - Equipment must be able to withstand the working pressure of the water system.
  - The units must be accessible for cleaning and replacement of the lamp sleeves and sensors.
  - No bypass is allowed around the UV system (plans did not indicate a bypass).
  - Filtered UVT data must be provided.
  - After installation, performance testing must verify the ability to accurately measure UVT, intensity and flowrate.
  - After installation, the ability to calculate off-spec water volume produced must be verified, particularly during power quality sags.

## Chlorination

- Sample taps must be provided before and after disinfectant application.
- 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.

## Clearwell

- OAR 333-061-0050(6)(a)(B) requires that reservoirs be constructed on undisturbed soil, bedrock or other stable foundation material capable of supporting the structure when

full. Generally, DWS receives a geotechnical report to show compliance with this rule. Information must be submitted showing how this construction standard is met.

- Ground-level reservoirs that are located partially below ground must have footing drains discharging to daylight to carry away ground water which may accumulate around the perimeter of the structure.
- Screen vent(s) must be provided above the highest water level.
- The outlet end of the drain/overflow must be fitted with angle-flap valve or equivalent protection and must discharge with an airgap to a watercourse or storm drain capable of accommodating the flow.
- A tracer study will be required to demonstrate contact time through the clear well. A proposal for conducting the tracer study must be submitted to DWS in advance for review and approval. The estimated contact time through the clearwell is 60 minutes.
- Coliform bacteria sample result(s) must be submitted after disinfection of the clearwell(s) is complete.
- Bypass piping around the clearwell(s) is not allowed (no bypass piping was noted on the plans).

**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 #138-2019 and can be emailed to me at [Carrie.L.Gentry@state.or.us](mailto:Carrie.L.Gentry@state.or.us) or mailed to:

Attn: Carrie Gentry  
OHA-Oregon Drinking Water Services  
PO Box 14450  
Portland, OR 97293-0450

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

- The water system should also have the ability to track permeability, normalized permeability and resistance for the purpose of tracking performance over time. Transmembrane pressure, flux, DIT results and turbidity are all needed for compliance purposes and should be able to be easily determined.
- The replacement of the treatment plant will not increase the treatment classification; the existing Treatment 2 certifications are sufficient for the new plant. Future plans to use UV for disinfection and adding additional membrane units does not appear to increase

the treatment classification.

- Once installation of the treatment plant is complete and final approval is given, the water system will need to conduct two 6-month rounds of lead and copper sampling at the original number of sample sites (20). This schedule will be set up during the final approval process.
- A disinfection profile may be required for the water system, along with a calculated disinfection benchmark. This will be summarized in the final approval letter.

If you have any questions, please feel free to call me at (971) 673-0191.

Sincerely,

Carrie Gentry, PE  
Regional Engineer  
Drinking Water Services

ec: Michelle Byrd, REHS, OHA/DWS  
Michelle Bilberry, Business Oregon,

cc: Jeff Buskirk, City of Jefferson