15 May 2025

Miff Devin
Port of Morrow
PO Box 200
Boardman, OR 97818

sent only via email

Re: Membrane Filtration Plants (PR# 79-2024)
Port of Morrow (WS ID# 01328)
Conditional Approval

Dear Mr. Devin:

Thank you for your submittal to the Oregon Health Authority's Drinking Water Services (DWS) of plan review information for the water treatment plants for Port of Morrow (PoM). On 14 April 2025, our office received plans for both filtration plants, and a plan review fee of $825. Identical membrane filtration systems and UV reactors will be installed at two separate sites: Airport WTP & East Beach WTP. This letter covers both duplicate plans.

The project includes membrane filters and UV reactors at separate sites:
Membrane Filter -
Five (5) skids, each with 144 modules of Aria Filtra UNA-620A membranes
Four skids for primary operation while one remains in standby mode
UV Reactor -
De Nora Sentinel 24" 2-lamp *(formerly Calgon)*

The plans are approved subject to the following conditions:

- All wetted parts must conform to NSF standard 61, or equivalent certification.
- All chemicals must conform to NSF standard 60, or equivalent certification.

MEMBRANE FILTER CONDITIONS { -0050(4)(c)(G) }

- Direct Integrity Testing (DIT) parameters will need to be verified and programmed into the PLC/SCADA system. These parameters include:

  - An ongoing **log removal value ($LRV_{ambient}$)** reflective of particle and pathogen removal in the 3 micron or less size range that is calculated every 15 minutes based on current ambient operating conditions and the most recent DIT result. In summary, $LRV_{ambient}$ is the performance indicator used to demonstrate the minimum 4.0-log (99.99%) *Cryptosporidium* removal that the membrane filters have been credited with.
  - A **maximum pressure decay rate (PDR_{max})**, which will be set no higher than the number codified in the final approval letter after Port of Morrow meets the conditions in this letter and provides more parameters for monitoring membrane performance. The PDR_{max} [expressed as $^{psi}/_{min}$] is an air leakage rate in the membrane that, if exceeded, will indicate a failure of the DIT and prompt an automatic shut-down of the filtration skid.
- Indirect Integrity Testing must be performed by continuously monitoring individual filter effluent (IFE) turbidity on each membrane unit. If IFE turbidity readings are above 0.15 NTU for more than 15 minutes, the skid must immediately be taken off-line and a DIT performed.
- An operations and maintenance manual must be developed that includes a diagnosis and repair plan such that the ability to remove pathogens is not compromised.

UV REACTOR CONDITIONS { -0050(5)(K) }

- Sample tap must be provided upstream of the UV reactors for UV Transmittance (UVT) sampling.
- There must be visual verification of the operation of the lamps (*e.g.,* indicator light).
- Lamps and UV sensors 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 a UV reactor.

UV REQUIREMENTS -

Once the UV treatment system is operational, the following requirements must be met:

- Performance testing on start-up must verify the items listed in the UVDGM example. (2-page excerpt enclosed)
  - Assure ability to calculate and totalize off-specification water volume produced, particularly during power sags.

- 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%. See enclosed example.

- Monitoring UVT of filtered water must be at least monthly for at least one year. Monitoring frequency can be reconsidered after that time. The plans for the UV system assume a UV transmittance of 85% or higher. Any water treated with a lower transmittance is considered off-spec and the volume of that water must be calculated and reported.

CHLORINE CONTACT TANK CONDITIONS { -0050(6)(A) }

- An approved waiver from the construction standards is necessary to allow the drain to be located in the sidewall instead of the floor of the contact tank, similar to the one granted for the Internet Parkway reservoir. Please submit a completed waiver application form for review. I have attached a copy of the form, which is also available online here: www.healthoregon.org/pwsplanreview.
- Sample taps must be provided both upstream and downstream of the contact tank.
- A flow meter must be provided on the effluent line downstream of the contact tank.

DISINFECTION FACILITY CONDITIONS { -0050(5) }

- The chlorine generation units must be certified to NSF Standard 61 or equivalent.
- Sample taps must be provided both upstream and downstream of the chlorine injection points.

When final approval is granted each membrane filter unit and UV reactor or disinfection system will be granted log removal credits (LRCs) for pathogen removal and inactivation as shown below in Table 1. The Removal LRCs and Inactivation LRCs are based on a verifications of the Challenge Study Reports for the Aria Filtra UN620A membrane modules and De Nora's Sentinel 24" UV Reactor, respectively:

PATHOGEN INACTIVATION CREDITS

Table 1 – Filter Log Removal Credit (LRC)

Pathogen	Removal Credit (log_{10})	Inactivation Credit (log_{10})	Total Credit (log_{10})
Giardia lamblia	4.0	0.5-variable	4.5
Cryptosporidium sp.	4.0	0.5-variable	4.5
Viruses [1]	0.0	4.0	4.0

[1] *Viral inactivation comes from chlorination system*

The Removal LRCs are only valid provided operations are within the limits shown in Appendix A – Explanation of Operating Limits and Terms. Ensure SCADA/PLC programming accounts for the operating limits in Appendix A (*e.g.*, set system alarms to ensure operating limits are met). **Some of the limits in Appendix A are yet to be determined as indicated by "TBD" and must be established prior to Final Approval.**

To remain in compliance, $LRV_{ambient}$ must be equal to or greater than the LRC for *Crypto.* shown in Table 1. $LRV_{ambient}$ values displayed in SCADA should be calculated using the formulae and variables shown in the membrane supplier's calculations. Additional information on the $LRV_{ambient}$ calculations, and its use as a compliance parameter are included in Appendix B – Demonstrating Compliance and Performance Using $LRV_{ambient}$.

ADDITIONAL COMMENTS:

- A tracer study must be conducted to determine the baffling factor, or effective volume, of the contact tank. A plan for the tracer study must be submitted for review and approval before conducting the study.
- 4-log inactivation of viruses must be achieved through CT and a minimum free chlorine residual of 0.2 mg/L must be maintained at the entry point to the distribution system at all times. It is my understanding that the required CT will be achieved in the chlorine contact tank alone and will not rely on contact time in the 2 MG reservoir.
- The water system will require at least one operator certified at Water Distribution Level 1 and Water Treatment Level 2, and possibly at Water Treatment Level 3 depending on how much the average daily demand increases. The classification worksheet used to determine the required operator levels is online here.

- When the new plants start serving water, the disinfection byproduct sampling schedule will change to one TTHM and one HAA5 sample per calendar quarter.

Until we receive verification that the conditions have been met and final approval has been issued, the membrane filtration plants and UV reactors are 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 # 79-2024 and can be emailed to me, peter.r.farrelly@oha.oregon.gov & cc:d to Bill Goss, William.H.Goss@oha.oregon.gov.

If you have any questions, please feel free to email me or call me at 971.201.6428.
Bill can be reached at 541.966.0900.

Sincerely,

Pete Farrelly, PE
Regional Engineer
Drinking Water Services

cc:

Bill Goss, PE, OHA/DWS
John McAllister, PE, Port of Morrow
Adam Odell, PE, Stantec

enc:

App. A – Membrane Filters – Explanation of Operating Limits and Terms
App. B – SCADA Req'ts – Demonstrating Compliance & Performance with $LRV_{ambient}$
UVDGM Table 6-1-5 Performance Testing – 2 pages
Membrane reporting form (pdf | xlsx)
UV reporting form (forthcoming at final approval)
Sensor Calibration Form (not required to be reported)
Waiver from construction standards application form