Public Health Division

Center for Health Protection, Drinking Water Services

Tina Kotek, Governor

22 October 2024

Dave Elder
City of St. Helens
984 Oregon Street
St. Helens, OR 97051

Re: Membrane Module Replacement (PR#123-2024)
City of St. Helens (WS ID#00724)
Conditional Approval

Dear Mr. Elder:

Thank you for your submittal to the Oregon Health Authority's Drinking Water Services (DWS) of plan review information for the membrane module replacement for City of St. Helens. On 3 October 2024, our office received narrative, plan sheet, and a plan review fee of $3,300. We received an ariaFILTRA cut sheet on Microza® UNA Modules October 20th.

The project includes replacing the obsolete **Pall USV 6203** with its designated replacement, the **UNA-620A** modules. The difference, according to Pall, is "the potting material changed from an Epoxy based material to a Urethane based material." The new modules were verified by OHA-DWS in 2010 (listed online here).

The plans are approved subject to the following conditions:

Membrane Filtration Process

1. Direct Integrity Testing (DIT) parameters will need to be verified and programmed into the PLC/SCADA system. These parameters include:
    a. 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.
    b. A **maximum pressure decay rate (PDR_{max})**, which is set no higher than 0.074

$^{psi}/_{min}$ that indicates a failure of the DIT and prompts an automatic shut-down of the filtration skid.

2. Indirect Integrity Testing is performed by continuously monitoring individual filter effluent (IFE) turbidity on each membrane unit. If IFE turbidity readings are above 0.15 NTU for a period of greater than 15 minutes, the associated membrane unit must immediately be taken off-line and a DIT performed.

3. Assure pressure transducers are both sensitive enough and calibrated frequently enough to produce accurate readings. (see Table A in Appendix A for details)

4. An operations and maintenance manual is developed that includes a diagnosis and repair plan of the modules (*e.g.*, pinning individual lumen) such that the ability to remove pathogens is not compromised.

When final approval is granted, each membrane filter unit will be granted log removal credits (LRCs) for pathogen removal as shown in Table 1. The LRCs are based on a verification of the Challenge Study Report for the **UNA-620A** membrane modules.

Table 1 – Filter Log Removal Credit (LRC)

Pathogen	Removal Credit (log_{10})
Giardia lamblia	4.0
Cryptosporidium sp.	4.0
Viruses	0.0

The 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 will need to be established prior to Final Approval.**

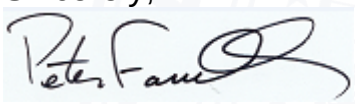
To remain in compliance, $LRV_{ambient}$ must be equal to or greater than the LRC for *Cryptosporidium* shown in Table 1. $LRV_{ambient}$ values displayed in SCADA should be calculated using the formulae and variables shown in the membrane supplier's calculations. Additional information on the $LRV_{ambient}$ calculations, and its use as a

compliance parameter are included in Appendix B – Demonstrating Compliance and Performance Using $LRV_{ambient}$.

Until we receive verification that the conditions have been met and final approval has been issued, the membrane filter 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 #123-2024 & can be emailed to me at peter.r.farrelly@oha.oregon.gov.

If you have any questions, please feel free to email me or call me at 971.201.6428.

Sincerely,



Pete Farrelly, PE
Regional Engineer
Drinking Water Services

cc: Aaron Kunders, City of St. Helens

enc:
Appendix A – Operating Limits and Definitions of Terms
Appendix B – Demonstrating Compliance and Performance Using $LRV_{ambient}$