America's Authority in Membrane Treatment

AMTA

American Membrane Technology Association

Improving America's Water Through Membrane Filtration and Desalting

November 14, 2011

Attn: Paula Wilson
State of Idaho
Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

Dear Ms. Wilson:

The American Membrane Technology Association (AMTA) is pleased to offer the Idaho Department of Environmental Quality (IDEQ) comments on the draft rules proposed that affect the implementation and use of membrane technologies for the treatment of drinking water in the State of Idaho. As a professional organization dedicated to the successful use and implementation of membrane technologies, our membership includes water utilities, government agencies, engineers and consultants, and manufacturers. AMTA is also affiliated with various membrane treatment plant operator associations, including one that is in the early stages of formation in the Pacific Northwest. Using these resources AMTA has reviewed the draft rules and offers the following comments:

1. **Requirements for Bin 1**
   - AMTA believes that, should IDEQ wish to make a differentiation for Bin 1 treatment plants using membrane filtration, the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) Guidance makes provisions to allow these facilities to avoid reporting Log Removal Values (LRVs). The references that lead us to this conclusion are:
     - Membrane Filtration Guidance Manual (EPA 815-R-06-009)
       - page 1-2, Section 1.1, last paragraph, 1st sentence: "*The LT2ESWTR builds on the previous surface water treatment rules by requiring additional treatment for those systems with elevated influent Cryptosporidium levels*"

- page 1-3, Section 1.1, first paragraph, 1st and last sentences: "*The regulatory framework established under the LT2ESWTR applies only to membrane.*" and "*The LT2ESWTR regulatory framework could be employed for other applications of membrane filtration (e.g., for the removal of Giardia, viruses, or other pathogens), albeit solely at the discretion of the State filtration processes used to achieve Cryptosporidium removal for rule compliance.*"
- page 1-7, Section 1.4, first sentence: "*As shown in Table 1.1, the LT2ESWTR only requires additional treatment measures for those drinking water systems with source water Cryptosporidium levels greater than or equal to 0.075 oocysts/L – Bins 2, 3 and 4.*"
- Page 1-7, Section 1.4, "Case 2": "*The utility conducts source water monitoring for Cryptosporidium and determines that its source water is in Bin 1 (i.e., concentrations less than 0.075 oocysts/L). In this case, the system may continue to operate under the previous surface water treatment rules (i.e., the SWTR and either the IESWTR or the LT1ESWTR) as administered by the State. No additional action is required under the LT2ESWTR.*"

In the end, the LT2ESWTR LRV calculation is not so far off the IESWTR requirement because the IEWSTR requires the states to establish a methodology for demonstrating that an alternative filtration technology consistently meets the 3-log *Giardia* and 2-log Cryptosporidium removal requirement:

- Implementation Guidance for the Interim Enhanced Surface Water Treatment Rule (EPA 816-R-01-011)
  - Page III-33
    "*§142.16 Special primacy requirements. (g)*(2) State practices or procedures.(iv): *Section 141.173(b) of this chapter—For filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, how the state will determine that a public water system may use a filtration technology if the PWS demonstrates to the state, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of §141.172(b) of this chapter, consistently achieves 99.9 percent removal and/or inactivation of* Giardia lamblia *cysts and 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of* Cryptosporidium *oocysts. For a system that makes this demonstration, how the state will set turbidity performance*

requirements that the system must meet 95% of the time and that the system may not exceed at any time at a level that consistently achieves 99.9 percent removal and/or inactivation of Giardia lamblia *cysts, 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of* Cryptosporidium *oocysts."*

- Page IV-35

  "Q: *How will a state approve an alternative filtration technology that reduces the turbidity to levels that cannot be reliably measured using turbidimeters? How will the PWS determine compliance with the IESWTR turbidity requirements?*

  A: States are required by §142.16(g)(iv) to explain how they plan to approve alternative technologies and establish turbidity performance requirements for such technologies. The state would approve the above-referenced alternative filtration technology in the same manner it would use for other technologies that might be less effective in terms of turbidity removal and would then establish performance standards that would ensure appropriate inactivation/removal of *Giardia lamblia* and viruses and removal of *Cryptosporidium*. For purposes of compliance, it would not be necessary to measure down to the level of actual turbidity removal. It is only necessary to accurately measure turbidity at the levels established by the state as performance standards for the technology. The state may require an equally stringent performance requirement such as frequent integrity testing for membrane systems."

- Page II-5, Table II-2: Federally Reported Violations for the IESWTR; for "systems serving 10,000 using alternative filtration technologies"; "exceedances of the state-set maximum turbidity performance requirements for systems using alternative filtration technologies.
- Page II-6; for "systems serving 10,000 using alternative filtration technologies"; "failure to meet the state-set turbidity performance requirements in 95% of monthly measurements for systems using alternative filtration technologies."

Therefore, the path followed by most states has been to require LRV calculations to demonstrate log-removal of pathogens.

2. **Redundancy in system designs** – Section 525, 1st Paragraph
   - The draft rules, as written, requires at least two membrane filtration units, and in all cases the ability to maintain maximum day demand. This requirement creates a cost burden to utilities that may otherwise have their

system wide reliability met through the use of other sources (e.g., groundwater wells).

3. **Direct Integrity Testing.** – Section 525.02.b
   - It would be good to state in the rule that IDEQ will accept product approvals from other states with primacy.
   - Of critical importance to the calculation of log-removal credits by the membrane treatment system, AMTA recommends that IDEQ address the calculation of the Log Removal Value (LVR) value parameter, knows as "volumetric concentration factor" (VCF) by stating in the final rule that either calculated or experimental determinations of this number are permissible. Industry experience has shown that the method of VCF calculation presented in the MFGM is overly conservative for some systems and makes compliance with LRV requirements difficult to achieve. Experimental determination, while more costly, provides a realistic representation of the VCF.
   - Direct integrity testing criteria for virus removal credits: It is unclear to AMTA if IDEQ "really" wants to grant virus removal credits to UF membranes. The draft rule (525.02.b.ii.) states that for a membrane to receive virus removal credit:

     > *"the direct integrity test shall have a resolution capable of detecting a response at the absolute molecular weight cut-off or other parameter that describes the exclusion capability of the membrane."*

     The only guidance available to the water industry on how this can be accomplished is in the MFGM (Appendix E), which is not a practicable test method because the MFGM suggests that the test resolution (i.e., pressure in a pressure decay test) be adjusted *"to coincide with the lower bound of the size range characterizing the pathogen of interest."* The reason that this is not a practicable requirement is that the pressure required in a common pressure decay test (i.e., the test method used to calculate LRV for *Crytosporidium*) to meet the resolution standard for virus (0.02 um) is as high as 2,100 psi, far exceeding burst pressures for membrane modules. This is pointed on page E-2 of the MFGM:

     > *"The most significant factor limiting the virus removal credit awarded to UF is the infeasibility of using current direct integrity test methods to detect a virus-sized breach (as discussed in section E.3). Thus, it is possible that a number of very small integrity breaches could allow the passage of viruses through the membrane barrier undetected, contaminating the filtrate. While this mode of failure may not be as common as a broken fiber, such a very small integrity breach may occur as the membranes age or as a result of degradation due to exposure to incompatible treatment chemicals."*

The MFGM does acknowledge (in Appendix E, page E-1) that: "*Although the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) only regulates the use of membrane filtration for the removal of* Cryptosporidium *for the purposes of compliance with the rule requirements, States could opt to apply the regulatory framework in a broader context to other applications of membrane filtration, at their discretion.*" Basically, what EPA has stated is that the IESWTR still governs virus removal and that the LT2ESWTR MFGM can be used at the states' discretion in this area. Some states have taken this opportunity to provide an alternative means for crediting membranes for virus removal. Examples include:

- Minnesota has shown, along with product approvals that demonstrate virus removal, that a direct integrity test designed for evaluating the removal of *Cryptosporidium* (pressure decay tests) can be used to describe the "exclusion capability of the membrane".
- California has stated that, along with product approvals that demonstrate virus removal, all new membrane plants will receive a minimum of 0.5 log virus credit without meeting criteria to test at the "exclusion capability of the membrane".

In the end, if IDEQ wishes to provide any virus removal credits to UF membranes, an alternative approach is needed to the one currently presented in the draft rule.

4. **Indirect Integrity Monitoring** – Section 525.02.c
   - The draft rule states that turbidimeters are required on each rack for indirect integrity monitoring and establishes a control limit of 0.15 NTU (measured at 15 minute intervals). This requirement poses some logistical problems for membrane treatment systems that are sensitive to false turbidity readings due to entrained air and a change in the membrane wettability, which are a result of routine backwashing and chemical cleaning practice. However, this is a technical problem which likely has a technical solution. AMTA recommends that IDEQ address this by either:
     - Allowing a time delay for indirect turbidity monitoring after cleaning and integrity tests. (AMTA is unsure of how this may be accomplished under the current regulatory framework, however, if IDEQ can provide an exception, the technical aspects of operating a membrane plant call for one); or
     - Requiring in the rule that flow through turbidimeters should be equipped with upstream air relief or trapping devices.

5. **Pilot Testing** – Section 525.01.c
    - Based upon industry experience, AMTA recognizes the importance of pilot testing for surface waters where seasonal variation may influence the design of a membrane system in such as way as to affect the reliable flow of water that can be produced. Such seasonal water quality issues as turn-over of lake water, temperature and turbidity resulting from seasonal run-off are of concern as they may affect the production capacity of a membrane system. To this order, AMTA recommends that IDEQ address the duration of pilot testing in the following ways:
        - Option 1: Leaving the duration of pilot testing can be left to the discretion of a professional engineer, whose responsibility is regulated by the state to include "protection of public health and safety". This would include ensuring that the treatment plant can reliably produce the water needed to meet peak flows, including fire protection needs.
        - Option 2: Requiring only "4 seasons of pilot testing" – this is wording that has been used in the State of Wisconsin. Here, the pilot testing duration may be shorted to as little as 6 to 9 months depending upon the source water quality. The determination of the best 4 seasons to conduct this testing may again be left to the discretion of a professional engineer.
        - Option 3: IDEQ may direct the "Engineer's discretion" to a degree by requiring "Proof pilot tests" (i.e., abbreviated pilot tests designed to verify test conditions selected by a professional engineer). These tests can be shorter in duration and less expensive than tests focused on experimentally determining operating conditions over long periods of time. The premise of this approach is that for some waters and some membrane products, 12 months (or 4 seasons) of pilot testing may not be required because pilot testing is not performed to demonstrate water quality (third party testing challenge data and existing installations are typically the basis for demonstrating membrane filtration capabilities), rather it is performed to verify design criteria that affect the reliable production capacity of the membrane treatment system. Therefore in waters with limited risk of fouling (i.e., low TOC and low turbidity waters), and in circumstances where fouling characteristics are understood (within the factors of safety of the design), pilot testing is not necessary to establish these criteria. Some examples where proof pilot testing (or no pilot testing) may be acceptable include:
            - groundwaters under the influence,

- waters with existing membrane plants,
- waters where pilot test data as already been generated,
- extensively tested products where test data on "similar waters" is available

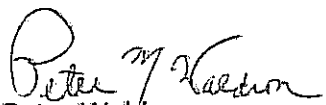
6. **Plant Startup** – Section 525.02.a.iv
   - The draft rule states that a passing a direct integrity test would be prerequisite to sending treated water to the distribution system. It should be noted that in some instances, options available for disposal of water used for flushing preservatives out membrane modules and start-up water may be limited. AMTA suggests that:
     - If IDEQ requires this condition to be met, that they also require in the rule that, as part of the plan review process, securing a method for disposal of start-up water be a requirement. This may include installing permanent piping (with an appropriate backflow prevention method) to circulate water from a finished water storage tank to the head of the treatment plant, demonstrating that sewer disposal is viable, demonstrating hydraulic capacity is available to recycle flow through the backwash water recovery system, or furnishing an installed outfall (which would require an NPDES permit) to the source water body.

7. **Reporting** –Section 525.02.e
   - The draft rule would require utilities to report both direct integrity monitoring results for values that exceed the control limit and indirect (turbidity) monitoring results that trigger a direct integrity test result. This change in the existing rule would be of benefit to users of membrane technologies because the current rule requires reporting the highest measured pressure decay rate and combined turbidity reading on each day of the reporting cycle.
   - The draft rule states (Section 525.02.b.v) that reporting frequency may be decreased to weekly if the system shows less than 5% direct integrity test failures after one year of daily testing. AMTA is concerned that, after decreasing the testing frequency to weekly, this criteria may be more difficult to comply with if the weekly tests are used to determine a 5% across the year/month. AMTA suggests that IDEQ provide a separate (higher) failure rate to address this circumstance. Doubling the 5% criteria to 10% would afford plants more lee-way in an individual month to account for a sample size discrepancy that may otherwise cause them to fail their integrity test criteria.

AMTA recognizes the importance of this rule making process to the State of Idaho as it affects Idaho's obligation to comply with the Federal Long Term 2 Enhanced Surface Water Treatment Rule. This rule and the rule making process are of critical importance to protecting public health and safety. IDEQ and AMTA share a common goal of providing water utilities the tools that they need to successfully implement membrane technologies in a manner that provides this service to the public. We appreciate the opportunity to offer these comments to your draft rule. If you should have any further questions, please feel free to contact us.

Sincerely,

AMERICAN MEMBRANE TECHNOLOGY ASSOCIATION



Peter Waldron
President