TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

October 30, 2019

Mr. Thomas Poschmann
Beijing Scinor Membrane Technology Co., Ltd
16 Mallard Cove
Centerpoint, New York 11721

Re: Scinor Water America, LLC SMT 600-S26 Hollow Fiber Ultrafiltration Modules
Review and Approval of Challenge Testing
Removal of Microbial Contaminants

Dear Mr. Poschmann:

Membrane filtration systems installed on, or replaced after, April 1, 2012 for the removal of *Cryptosporidium* and *Giardia* must undergo challenge testing to evaluate the membrane's removal efficiency and for the Texas Commission on Environmental Quality (TCEQ) to establish a challenge test log removal value ($LRV_{C\text{-}Test}$) as required by Title 30 of the Texas Administrative Code (30 TAC) §290.42(g)(3). In addition, these TCEQ regulations require a membrane manufacturer to provide the non-destructive performance test (NDPT) and associated quality control release value (QCRV) that will be used to verify that all manufactured membrane modules, which were not subject to challenge testing, will achieve at least the same log removal as those that were challenge tested.

On January 24, 2019, the TCEQ received a copy of the February 22, 2016 report of the challenge study conducted on the Scinor Water America, LLC (Scinor) SMT 600-S26 hollow-fiber (HF) ultrafiltration (UF) membrane modules.

The NSF International challenge study was conducted in accordance with NSF International (NSF)/ American National Standards Institute (ANSI) Standard 419-2015: Public Drinking Water Equipment Performance - Filtration. According to the Test Report, the NSF/ANSI Standard 419 is based on the Environmental Technology Verification (ETV) *Generic Protocol for the Product Specific Challenge Testing of Microfiltration or Ultrafiltration Modules* (May 2011) and the product-specific challenge testing requirements in the United States Environmental Protection Agency (USEPA) Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). The NSF certification of performance is only based on reduction of *Cryptosporidium* as it is linked to QCRV.

CHALLENGE STUDY DATA FOR SCINOR SMT 600-S26 UF MEMBRANE MODULES

We reviewed the submitted challenge study data for compliance with the *Cryptosporidium* treatment requirements in the LT2ESWTR. The criteria for compliance is found in Title 40 of the Code of Federal Regulations (40 CFR) §141.719(b)(2). Additional guidance for compliance with these requirements can be found in the USEPA Membrane Filtration Guidance Manual (EPA 815-R-06-009). Based on our review of the challenge study data for the Scinor SMT 600-S26 UF membrane modules, we have determined that the challenge study is compliant with LT2ESWTR requirements. Please review the conditions in the following pages regarding the approved log removal value demonstrated during challenge testing ($LRV_{C\text{-}Test}$) and the approved NDPT for production membrane modules that did not undergo challenge testing.

TCEQ-APPROVED $LRV_{C\text{-}TEST}$

For the Scinor SMT 600-S26 HF UF modules, the TCEQ is approving a **$LRV_{C\text{-}Test}$ of 6.19** for the removal of *Cryptosporidium* for systems operated in deposition mode. The $LRV_{C\text{-}Test}$ approval by the TCEQ does not apply to systems operated in cross flow mode, as this hydraulic configuration was not demonstrated in this challenge test study. The following are the parameters of the approved challenge study:

Full-scale module tested	Scinor SMT 600-S26 Submerged UF Modules
Number of Independent Modules Tested	5
Criterion of Selected Modules	None*
Serial Numbers of Tested Modules	CC100900002, CC100900003, CC100900004, CC100900006 and CC100900007
Nondestructive Performance Testing (NDPT) Process	Pressure Decay Test
Quality Control Release Value (QCRV)	0.201 pounds per square inch (psi) per minute (min.)
Challenge Particulate	*Bacillus atrophaeus* American Type Culture Collection (ATCC) number 9372 (as a surrogate for *Cryptosporidium*) with an average diameter of 0.8 µm and an average length of 1.8 µm
Detection Limit	1 colony forming unit (CFU) per 100 milliliters (mL)
Feed Concentration Range	1.56×10^6 to 3.97×10^6 CFU per 100 mL**
Max Filtrate Flux Rate	120 gallons per square-foot per day (gfd) @ 25°C
Mode of Operation / Flow Configuration	Deposition mode / Outside In

*In regard to the selection of modules for testing, there was no consideration of manufacturing variability. However, the challenge study established a quality control release value (QCRV) of 0.201 psi/min. based on the highest observed average pressure decay results for the five modules that were tested to establish the $LRV_{C\text{-}Test}$ as required by 40 CFR 141.719(b)(2)(vii) (as discussed on page 14 of the NSF International Test Report). Any membrane module that does not meet the QCRV established in the challenge study is not eligible for the approved $LRV_{C\text{-}Test}$ of 6.19-log.

**As allowed by 40 CFR 141.719(b)(2)(iii), the maximum allowable feed concentration is *3.16×10^6 x Filtrate Detection Limit.* The feed concentrations for module 3 exceeded the maximum allowable feed concentration; however, the approved $LRV_{C\text{-}Test}$ of 6.19 was based on the results from module 5 (the lowest LRV observed for the 5 modules tested).

LIMITS OF TCEQ-APPROVED $LRV_{C\text{-}TEST}$

The TCEQ-approved $LRV_{C\text{-}Test}$ is valid for only the Scinor SMT 600-S26 HF UF modules operated under the parameters used for the challenge testing and only for modules that have passed the NDPT. From our review of the challenge study, an acceptable SMT 600-S26 HF UF module must comply with the following specifications to receive the TCEQ-approved $LRV_{C\text{-}Test}$:

1) Specifications of the approved Scinor SMT 600-S26 HF UF module:
   a) Polyvinylidene Fluoride (PVDF) membrane fiber material;
   b) Nominal membrane pore size of 0.1 µm (0.1 microns);
   c) Fiber inner diameter - 0.6 millimeters (mm);

d) Fiber outer diameter - 1.1 mm;
e) Module diameter - 130 mm;
f) Nominal membrane surface area of 279.9-ft^2;
g) An outside-to-inside flow path;
h) Maximum filtrate flux at 25°C: 120 gfd;
i) Maximum filtrate flow at 25°C: 23.3 gallons per minute (gpm)
j) Maximum operating temperature of 40C (104°F);
k) Maximum trans-membrane pressure (TMP) of 11 psi;
l) Operating pH range: 1 - 11; and
m) Maximum chlorine tolerance: 5,000 milligrams per liter (mg/L).

2) For use by public water systems in Texas for microbial contaminant removal credit, only Scinor SMT 600-S26 HF UF modules that have been certified for performance by NSF International are allowed. As defined in the NSF International challenge study report (pages 1 and 14), this means that only modules that have passed a NDPT with a QCRV of 0.201 psi/min.

3) The manufacturer, Scinor Water America, LLC, must record the results of each SMT 600-S26 HF UF membrane module's NDPT with the module's assigned unique serial number. The NDPT result for each SMT 600-S26 HF UF membrane module delivered to a Texas PWS must be provided upon delivery of the SMT 600-S26 HF UF membrane modules to a system.

4) The manufacturer, Scinor Water America, LLC, must notify the TCEQ in writing if the SMT 600-S26 HF UF membrane modules are modified, or if the NDPT method is modified in any manner. After receiving written notification, the TCEQ shall determine if the modified SMT 600-S26 HF UF membrane module shall be required to undergo challenge testing or if the modified NDPT method is acceptable.

5) The TCEQ shall grant log removal credits to Texas PWSs using membrane filtration for *Giardia* and *Cryptosporidium.* The log removal credits shall not exceed the lower of:
   a) The TCEQ-approved $LRV_{C\text{-}Test}$; or
   b) The maximum removal efficiency that can be verified through a membrane unit's site-specific direct integrity test (LRV_{DIT}).

6) Each SMT 600-S26 HF UF membrane module must conform to American National Standards Institute/NSF International (ANSI/NSF) Standard 61 and must be certified by a testing organization accredited by ANSI.

7) Please note that the approved $LRV_{C\text{-}Test}$ is for the current Federal and Texas statutes, and the EPA and TCEQ rules. If any of these statutes or rules are revised, the TCEQ-approved $LRV_{C\text{-}Test}$ in this letter may also be revised.

Please provide a copy of this letter to each of your Texas PWS customers. This letter is **not** to be construed as:

- A granted TCEQ exception for any Texas PWS to use the Scinor SMT 600-S26 HF UF membrane modules. Each Texas PWS must request and receive site-specific approval to use membrane filtration in accordance with 30 TAC §290.42(g) and §290.39(l);

- TCEQ approval for a Texas PWS to install a Scinor SMT 600-S26 HF UF membrane module; or

- TCEQ approval for the Texas PWS's required concentration time (CT) study.

If you have any questions about this letter, or if we can be of additional assistance, please contact David A. Williams, P.E., at the letterhead address, by e-mail at david.a.williams@tceq.texas.gov, or by telephone at (512) 239-0945.

Sincerely,

David A. Williams, P.E.
Technical Review and Oversight Team
Plan & Technical Review Section
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JPK/daw