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PWS\_CG Travis\_CO\_20210527\_Challenge

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY  
*Protecting Texas by Reducing and Preventing Pollution*

May 27, 2021

Mr. Erick Cornfoot, P.Eng.  
c/o Ms. Alicia Suarez, Pall Water  
839 State Route 13  
Cortland, NY 13045-8998

Re: Pall Corporation Microza UNA-620A Hollow-Fiber Microfiltration Membranes  
Review and Approval of Challenge Testing for Systems Operated in Excess Recirculation  
(XR) Mode and Deposition Mode

Dear Mr. Cornfoot,

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<sub>C-Test</sub>) as required by Title 30 of the Texas Administrative Code (30 TAC) §290.42(g)(3). In addition, these 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 that were not subject to challenge testing will achieve at least the same log removal as those that were challenge tested. **This letter replaces and supersedes the March 20, 2013 TCEQ letter which approved a challenge study for Pall Microza UNA-620A microfiltration modules operated only in dead-end (deposition) mode.**

**CHALLENGE STUDY FOR PALL MICROZA UNA-620A MICROFILTRATION MODULES**

We reviewed the submitted challenge study data for compliance with the *Cryptosporidium* treatment requirements in the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). The criteria for compliance are 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 United States Environmental Protection Agency (USEPA) Membrane Filtration Guidance Manual (EPA 815-R-06-009). The TCEQ reviewed challenge study data presented in the *Report of Comparative Study of Microbial Log Removal Values for Five Pall Microza UNA-620A Microfiltration Membranes in Both Dead-End (D-E) and Suspension (XR) Operational Modes*, prepared by Peter Dwyer, Kellen Sawyer, Damon Burt and M. Robin Collins, Ph.D., P.E. of the Water Treatment Technology Assistance Center at the University of New Hampshire (revised December 23, 2019). **Based on our review, we have determined that the challenge study is compliant with LT2ESWTR requirements.** Please review the following regarding the approved log removal value demonstrated during challenge testing (LRV<sub>C-Test</sub>) and the NDPT for production membrane modules that did not undergo challenge testing.

**TCEQ APPROVED LRV<sub>C-TEST</sub>**

The TCEQ is approving a **LRV<sub>C-Test</sub> of 5.84 for deposition mode and a LRV<sub>C-Test</sub> of 5.65 for suspension mode** for the removal of *Cryptosporidium* for the Pall Microza UNA-620A hollow-fiber microfiltration membrane modules. The following are the parameters of the approved challenge study:

Full-scale module tested	Pall Corporation Microza UNA-620A HF MF Modules
Number of Independent Modules Tested	5
Criterion of Selected Modules	Random selection from different manufacturing lots
Serial Numbers of Tested Modules	918951216, 919210716, 917310717, 092380218, 081060318
Nondestructive Performance Testing (NDPT)Process	Bubble Propagation Test
Quality Control Release Value (QCRV)	Less than one bubble per minute when the module is pressurized to 29 pounds per square-inch (psi) with air
Challenge Particulate	<i>E. Coli</i> (as a surrogate for <i>Cryptosporidium</i> ) and inactivated <i>Cryptosporidium</i> oocysts
Detection Limit for <i>E. Coli</i>	1 Colony Forming Unit (CFU) per 100 milliliter (mL)
Feed Concentration Range for <i>E. Coli</i>	4.48 x 10 <sup>5</sup> CFU /100 mL to 3.66 x 10 <sup>6</sup> CFU/100 mL
Maximum Flux Rate	95 gallons per square-foot per day (gfd)
Mode of Operation	Deposition (Dead-End) Mode Suspension (excess recirculation or XR) Mode with 14% of the raw water flow (12.5% of the total feed flow) returned feed tank

**LIMITS OF TCEQ APPROVED LRV<sub>C-TEST</sub>**

The TCEQ approved LRV<sub>C-Test</sub> is only valid for the Pall Corporation Microza UNA-620A hollow-fiber microfiltration membrane modules operated under the parameters that were used for the challenge testing and only for modules that have passed the NDPT. From our review of the challenge study, an acceptable Pall Corporation Microza UNA-620A membrane module must comply with the following to receive the approved LRV<sub>C-Test</sub>:

- 1) Specifications of the approved Pall Corporation Microza UNA-620A modules:
  - Constructed of polyvinylidene fluoride (PVDF) hollow-fiber membranes.
  - Module: 6 inches in diameter, 80 inches in length.
  - Housing material: Acrylonitrile butadiene styrene (ABS) resin.
  - Potting material: polyurethane resin.
  - Membrane charge: negative.
  - Membrane surface characteristics: hydrophobic.
  - A nominal pore size of 0.1 microns.
  - Nominal membrane surface area of 538-square feet (ft<sup>2</sup>).
  - An outside to inside flow path.
  - Operated in deposition mode and XR mode.
  - Maximum operating temperature of 104° F.
  - Maximum transmembrane pressure of 43.5 psi.

- 2) Prior to shipment to a Texas public water system, each new Pall Corporation Microza UNA-620A membrane module must have passed the NDPT, a bubble propagation test as specified by Pall Corporation and as described below:
  - Wetted module pressurized to 7 psi for 7 minutes to displace remaining air.
  - Module pressurized to 29 psi with air for one minute.
  - Any module exhibiting a bubble stream is subject to repair and any module with more than 40 defective fibers will be discarded.
  - Minimum passing result is less than one bubble per minute.
- 3) If the NDPT result for a Pall Corporation Microza UNA-620A membrane module exceeds the QCRV, the Pall Corporation Microza UNA-620A membrane module will not be allowed at a Texas public water system for microbial contaminant removal credit.
- 4) Pall Corporation must notify the TCEQ in writing if the Pall Corporation Microza UNA-620A membrane modules as challenge tested by Water Treatment Technology Assistance Center at the University of New Hampshire are modified or the NDPT method is modified in any manner. After receiving written notification, the TCEQ will determine if the modified Pall Corporation Microza UNA-620A membrane module will be required to undergo new challenge testing or if the modified NDPT method is acceptable.
- 5) Pall Corporation must record the results of each Pall Microza UNA-620A membrane module's NDPT with the module's assigned unique serial number. The NDPT result for each Pall Microza UNA-620A membrane module delivered to a Texas public water system must be provided upon delivery of the Pall Microza UNA-620A membrane modules. Each Texas public water system must provide the TCEQ with the NDPT result for each module installed for microbial contaminant removal credit.
- 6) The TCEQ shall grant Texas public water systems using membrane filtration log removal credits for *Giardia* and *Cryptosporidium* that does not exceed the lower of:
  - a) The TCEQ approved  $LRV_{C-Test}$ ; or
  - b) The maximum removal efficiency that can be verified through the site-specific direct integrity test ( $LRV_{DIR}$ ) of the membrane filtration unit.
- 7) Each Pall Microza UNA-620A membrane module must conform to American National Standards Institute/NSF International (ANSI/NSF) Standard 61 and be certified by a testing organization accredited by ANSI.
- 8) Please note that the approved  $LRV_{C-Test}$  is for the current Federal and Texas statutes and EPA and TCEQ rules. If any of these statutes or rules are revised, the TCEQ approved  $LRV_{C-Test}$  in this letter may also be revised.

Please provide a copy of this letter to each of your Texas public water system customers and their consulting engineers. This letter is **not** to be construed as:

- A TCEQ granted exception for any Texas public water system to use the Pall Microza UNA-620A membranes. Each Texas public water system 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 public water system to install Pall Microza UNA-620A membranes; or
- TCEQ approval for a Texas public water system's required concentration time (CT) study.

Mr. Erick Cornfoot, P.Eng.  
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If you have questions concerning this letter, or if we can be of additional assistance, please contact Ms. Marlo Wanielista Berg, P.E. at the letterhead address, or by e-mail at [marlo.berg@tceq.texas.gov](mailto:marlo.berg@tceq.texas.gov).

Sincerely,



Marlo Wanielista Berg, P.E.  
Technical Review and Oversight Team  
Plan and Technical Review Section  
Water Supply Division  
Texas Commission on Environmental Quality



Joel Klumpp, Manager  
Plan and Technical Review Section  
Water Supply Division  
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JPK/mew