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Texas Commission on Environmental Quality

Protecting Texas by Reducing and Preventing Pollution

March 20, 2013

Mr. William Sellerberg, P.E.
Pall Corporation
25 Harbor Park Drive
Port Washington, NY 11050

Re: Pall Corporation Microza UNA 620A Hollow-Fiber Microfiltration Membranes
Review and Approval of Challenge Testing

Dear Mr. Sellerberg:

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-Test}) 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.

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 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 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 for the Log Removal Values for Quality Control Release Value Challenges of the Pall Microza UNA-620A Microfiltration Membrane*, 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 October 2, 2012). Based on our review, we have determined that the challenge study is compliant with LT2ESWTR requirements. Please review the following in regards to the approved log removal value demonstrated during challenge testing (LRV_{C-Test}) and the NDPT for production membrane modules that did not undergo challenge testing.

TCEQ APPROVED LRV_{C-TEST}

The TCEQ is approving a **LRV_{C-Test} of 5.68** 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	076191107, 073101207, 086490607, 096430707, 095850606
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 oocysts</i>
Detection Limit for <i>E. Coli</i>	1 Colony Forming Unit (CFU) per 100 milliliter (mL)
Detection Limit for <i>Cryptosporidium oocysts</i>	Less than 1 <i>oocyst</i> per 20 liter (L)
Feed Concentration Range for <i>E. Coli</i>	0.63 x 10 ⁶ CFU /100 mL to 2.54 x 10 ⁶ CFU/100 mL
Feed Concentration Range for <i>Cryptosporidium oocysts</i>	120,186 <i>oocysts</i> per 20 L to 241,902 <i>oocysts</i> per 20 L
Maximum Flux Rate	86 gallons per square-foot per day (gfd)
Mode of Operation	Deposition (Dead-End)

LIMITS OF TCEQ APPROVED LRV_{C-TEST}

The TCEQ approved LRV_{C-Test} 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_{C-Test}:

- 1) Specifications of the approved Pall Corporation Microza UNA 620A modules:
 - a) Constructed of polyvinylidene fluoride (PVDF) hollow-fiber membranes;
 - b) A module outside diameter of 6.5 inches;

- c) Module length of 85 inches;
 - d) Housing material- ABS resin;
 - e) Potting material- polyurethane resin;
 - f) Membrane Charge- negative;
 - g) Membrane surface characteristics- hydrophobic;
 - h) A nominal pore size of 0.1 microns;
 - i) Nominal membrane surface area of 538-square feet (ft²);
 - j) An outside to inside flow path;
 - k) Operated in deposition mode;
 - l) Maximum filtrate flux rate of 86 gfd;
 - m) Maximum operating temperature of 104 ° F;
 - n) Maximum transmembrane pressure of 43.5 pounds per square-inch (psi);
 - o) A pH operating range of 1.0 to 10.0 (long-term operation);
 - p) Allowable pH range for cleaning of 1.0 to 13.0; and
 - q) Maximum chlorine tolerance during cleaning of 10,000 parts per million (ppm).
- 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:
 - a) Wetted module pressurized to 7 psi for 7 minutes to displace remaining air.
 - b) Module pressurized to 29 psi with air for one minute.
 - c) Any module exhibiting a bubble stream is subject to repair and any module with more than 40 defective fibers will be discarded.
 - d) 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 to a system. 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_{DIT}) of the membrane filtration unit.

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- 7) Each Pall Microza UNA 620A membrane module must conform to American National Standards Institute/National Sanitation Foundation (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.

If you have questions concerning this letter, or if we can be of additional assistance, please contact David 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 and Technical Review Section
Texas Commission on Environmental Quality



Ada Lichaa, P.G., Manager
Plan and Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

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