

STATE OF COLORADO

John W. Hickenlooper, Governor
Larry Wolk, MD, MSPH
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
Located in Glendale, Colorado
www.colorado.gov/cdphe



Colorado Department
of Public Health
and Environment

May 23, 2014

Susan L. Guibert, P.E.
Toray Membrane, USA
13435 Danielson Street
Poway, CA 92064

Subject: Acceptance of the Toray HFU-2020N Ultrafiltration Membrane Module as an Alternative Filtration Technology to meet the *Colorado Primary Drinking Water Regulations* requirements for *Giardia lamblia* and *Cryptosporidium* Removal

Dear Ms. Guibert;

The Colorado Department of Public Health and Environment's Water Quality Control Division ("the Department") has received and reviewed the information for the Toray HFU-2020N Ultrafiltration Module in accordance with Section 11.8(2)(b)(ii) and 11.10(5)(j) of the *Colorado Primary Drinking Water Regulations* (Regulation 11), 5 CCR 1002-11. The Toray HFU-2020N module meets or exceeds the requirements of the *State of Colorado Design Criteria for Potable Water Systems* (DCPWS) Sections 1.11, 4.3.8 and the requirements of Regulation 11. The technology is conditionally accepted for use as an Alternative Filtration Technology and granted the removal credit in Table 4.1, Section 4.3.8.2 of the DCPWS. The technical specifications and conditions of acceptance for the Toray HFU-2020N Module are outlined in Table 1 as well as Section 4.3.8 of the DCPWS.

This acceptance addresses the following items:

- Toray HFU-2020N Module

This acceptance applies only to the Toray HFU-2020N Module and does not constitute construction approval for installation at any public water system. Each individual submittal to the Department must demonstrate conformance with Section 4.3.8 of the DCPWS for each installation of the filters. **Review and approval for the design of any public water system proposing to use this technology will be handled on a case-by-case basis by the Department as required by Section 11.4 of Regulation 11.**

As part of this review, the Department has evaluated the following documents:

- Toray Membrane USA, Inc. Alternative Technology Acceptance Application – March 27, 2014
- February 19, 2014 California Department of Public Health Conditional Acceptance of the Toray HFU-2020N Ultrafiltration Membrane
- California Department of Public Health Conditional Acceptance Testing for Toray HFU-2020N Membrane – 775 ft² Prepared by MWH Americas, Inc. (March 2012).

- Toray Membrane Module Instruction Manual – Model: Pressured Type PVDF Hollow Fiber Membrane Module “HFU Series” (type N) Revised December 2012
- UL Website – Toray Industries HFU-2020N module

Any addenda that will modify the module must be submitted to the Department for review and acceptance prior to use in Colorado by a regulated public water system. This requirement includes any changes made to the Toray HFU-2020N Module, materials of construction, or associated interfaces with process piping. The Department will review any additional third party verification reports and issue a revised acceptance letter if appropriate.

Table 1: Toray HFU-2020N Technical Specifications and Conditions of Acceptance

Filter Manufacturer	Toray Industries Inc.
Filter Model	HFU-2020N
Surface area per module (ft ²)	775
Maximum Flux (gfd -gallons per sq. ft. per day) @ 20 °C	100
Maximum Flux (gfd) @ 1 °C	57
Max Transmembrane Pressure lbs per square inch differential (psid)	29
Alarm Transmembrane Pressure (psid)	29
Maximum Inlet Pressure – lbs per square inch gauge (psig)	43.5
Minimum direct integrity test pressure (starting pressure)	20 psig
Direct integrity testing failure criteria NOTE: Each installation must calculate	Calculated Log Removal Value* (LRV) < 4 Per Toray Specification, or > 0.17 psi/min decay
Prefiltration	200 micron pre-screen
Additional Operations and Maintenance Criteria	
<ol style="list-style-type: none"> 1. If a filter fails an integrity test, the filter must be removed from service immediately and replaced with a functional filter or repaired prior to being returned to operation. 2. The public water system must keep records of the following operational parameters (available for Department review): <ol style="list-style-type: none"> a. Integrity test date, results (pass or fail), and initials of person performing the test b. Calculated LRV for each integrity test c. Clean in place (CIP) dates with clean water permeability and integrity test result. d. Filter maintenance and fiber repair results e. Filter replacement date and reason for replacement. 3. Public Water systems must maintain an operation and maintenance manual for the micro/ultrafiltration system. All integrity tests and CIP procedures must follow manufacturer prescribed procedures. 	

Susan Guibert, P.E.
Toray Membrane USA
May 23, 2014
Page 3

Please be aware that any point source discharges of water from treatment facilities are potentially subject to a discharge permit under Colorado's State Discharge Permit System. Any point source discharges to state waters without a permit are subject to civil or criminal enforcement action.

Please direct any further correspondence regarding this acceptance to:

Tyson Ingels, P.E.
Colorado Department of Public Health and Environment
Water Quality Control Division
4300 Cherry Creek Drive South
Denver, CO 80246

If you have any questions or comments, please call Tyson Ingels at 303-692-3002.

Sincerely,

Tyson Ingels, P.E.
Lead Drinking Water Engineer
Engineering Section
Water Quality Control Division
Colorado Department of Public Health and Environment