

# STATE OF COLORADO

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Executive Director and Chief Medical Officer

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

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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 HFS-2020 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 HFS-2020 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 HFS-2020 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 HFS-2020 Module and the Wigen ultrafiltration skids are outlined in Tables 1 and 2 as well as Section 4.3.8 of the DCPWS.

This acceptance supersedes the previous acceptance of the Toray HFS-2020 modules dated October 9, 2012.

This acceptance addresses the following items:

- Toray HFS-2020 Module
- Wigen Ultrafiltration Skids utilizing the Toray HFS-2020 modules

This acceptance applies only to the Toray HFS-2020 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:

- Wigen Water Technologies Ultrafiltration Skid System, Technical Submission for Review by CDPHE, March, 2012
- Toray's LT2 Validation Support Document, Model HFS-2020, August 4, 2011

- MWH, Final Report, California Department of Public Health Conditional Acceptance Testing, Toray Torayfil Membrane, Revision July 2007
- UL Website – Toray Industries HFS-2020 module
- Email correspondence Michael Bourke, Wigen Water Technology and Division – Technical Schematics of Block and Bleed System for UF Skid

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 HFS-2020 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 HFS-2020 Technical Specifications and Conditions of Acceptance**

<b>Filter Manufacturer</b>	<b>Toray Industries Inc.</b>
<b>Filter Model</b>	<b>Torayfil® HFS-2020</b>
Surface area per module (ft <sup>2</sup> )	775
Maximum Flux (gfd -gallons per sq. ft. per day) @ 20 °C	120
Maximum Flux (gfd) @ 1 °C	68
Max Transmembrane Pressure lbs per square inch differential (psid)	29
Alarm Transmembrane Pressure (psid)	29
Maximum Inlet Pressure – lbs per square inch gauge (psig)	39
Minimum direct integrity test pressure (starting pressure)	20 psig
Direct integrity testing failure criteria <b>NOTE:</b> Each installation must calculate	Calculated Log Removal Value * (LRV) < 4 Per Toray Specification, or > 0.12 psi/min decay
Prefiltration	200 micron pre-screen
<b>Additional Operations and Maintenance Criteria</b>	
<ol style="list-style-type: none"> <li>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.</li> <li>2. The public water system must keep records of the following operational parameters (available for Department review):               <ol style="list-style-type: none"> <li>a. Integrity test date, results (pass or fail), and initials of person performing the test</li> <li>b. Calculated LRV for each integrity test</li> <li>c. Clean in place (CIP) dates with clean water permeability and integrity test result.</li> <li>d. Filter maintenance and fiber repair results</li> <li>e. Filter replacement date and reason for replacement.</li> </ol> </li> <li>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.</li> </ol>	

**Table 2: Pre-Accepted Skids Conditions of Acceptance:**

Skid Type	Wigen Ultrafiltration
<b>Skid Model Number</b>	<b>Not specified – individual submittal must specify differences between general schematic and site-specific drawings.</b>
Maximum Daily Production (gallons) Based on max flux @ temperature – See Table 1	Not verified. Site Specific.
Cross connection control (DCPWS 4.3.8.8(b)(vii))	Verified. Valves 2051, 2053, 2054 closed. Valve 2052 open to drain section of pipe.
Individual Skid Effluent Turbidity (DCPWS 4.3.8.10(a)and (d))	Not Verified.
Flow Control (DCPWS 4.3.8.10 (c) and (e))	Not Verified.

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