COLORADO
Department of Public Health & Environment

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

August 5, 2014

Dave Stewart, PhD, P.E.
Stewart CMF
3801 Automation Way, Suite 200
Fort Collins, CO
80525

Subject: Acceptance of the Stewart CMF/ ATECH Innovations GMBH ceramic microfiltration modules as an Alternative Filtration Technology to meet the *Colorado Primary Drinking Water Regulations* requirements for *Giardia lamblia* and *Cryptosporidium* Removal

Dear Mr. Stewart;

The Colorado Department of Public Health and Environment's Water Quality Control Division ("the Department") has received and reviewed the information for the Stewart CMF/ ATECH Innovations GMBH ceramic microfiltration modules (GMBH modules)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 GMBH modules meet or exceed 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 Stewart CMF/ ATECH Innovations GMBH ceramic microfiltration modules are outlined in Table 1as well as Section 4.3.8 of the DCPWS.

This acceptance addresses the following items:

- Stewart CMF/ ATECH Innovations GMBH ceramic microfiltration modules

This acceptance applies only to the GMBH modules 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 and filtration skids. **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:

- "CDPHE: Drinking Water Program Alternative Treatment Technology Application" prepared by Stewart Environmental Consultants, LLC – February 2014
- "Report of Challenge Testing of the ATECH Innovations GMBH Membrane and Module" prepared by Stewart Environmental Consultants, LLC – May 15, 2014
- IAPMO R&T Lab TEST REPORT – Report Number: 1974-14001 – May 19, 2014 verfiying NSF 61 Compliance

- "Request for Information Response: Drinking Water Alternative Filtration Technology Application Stewart CMF/ATECH Innovations GMBH ceramic microfiltration module as an Alternative Filtration Technology to meet requirements for Giardia lamblia and Cryptosporidium Removal as required by 5 CCR 1003-11, Regulation 11: Colorado Primary Drinking Water Regulations (Regulation 11)" prepared by Stewart Environmental Consultants, LLC – June 19, 2014
- "Questions and Clarifications for New Technology Report, Stewart CMF, LLC Ceramic Membranes" prepared by Stewart Environmental Consultants, LLC – July 10, 2014
- "Ceramic Microfiltration Treatment System Operations and Maintenance Manual" prepared by Stewart Environmental Consultants, LLC – July, 2014
- Email correspondence between the CDPHE and Stewart Environmental Consultants, LLC, May – July, 2014

Any addenda that will modify the modules 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 GMBH modules materials of construction and 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: GMBH Modules Technical Specifications and Conditions of Acceptance

Filter Manufacturer	**ATECH Innovations – Stewart Environmental**
Filter Model	**GMBH Ceramic Membranes – 0.1 micron (Al_2O_3)**
Maximum Flux (gfd -gallons per sq. ft. per day) @ 20 °C	314
Maximum Flux (gfd) @ 1 °C	179
Max Transmembrane Pressure lbs per square inch differential (psid)	25
Alarm Transmembrane Pressure (psid)	20
Maximum Inlet Pressure – lbs per square inch gauge (psig)	1000 psig
Minimum direct integrity test pressure (starting pressure)	25 psig
Direct integrity testing failure criteria	>0.8 psig per minute decay – per Stewart approved protocol and sensitivity testing
Prefiltration	Case specific based on raw water quality.
Additional Operations and Maintenance Criteria	
1. If a filter fails an integrity test, the filter must be removed from service immediately and replaced with a functional filter prior to being returned to operation. 2. The public water system must keep records of the following operational parameters (available for Department review): a. Integrity test date, results (pass or fail), and initials of person performing the test. b. Clean in place (CIP) dates with clean water permeability and integrity test result.	

c. Filter maintenance.

d. Filter replacement date and reason for replacement.

3. Public water systems must maintain an operation and maintenance manual for the micro/ultratfiltration system. All integrity tests and CIP procedures must follow manufacturer prescribed procedures.

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 contact me by telephone at (303) 692-3002 or by email at tyson.ingels@state.co.us.

Sincerely,

Digitally signed by Tyson Ingels, P.E.
DN: cn=Tyson Ingels, P.E., o, ou, email=tyson.ingels@state.co.us, c=US
Date: 2014.08.05 14:57:12 -06'00'

Tyson Ingels, P.E.
Lead Drinking Water Engineer
Engineering Section
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