STATE OF COLORADO

John W. Hickenlooper, Governor
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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

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

June 23, 2011

Jack Barker
Owner/CEO
Innovative Water Technologies
29625 Industrial Park Road
Rocky Ford, CO 81067

Subject: Updated acceptance of the GE/Zenon Homespring Model UF211 as an Alternative Filtration Technology to meet the *Colorado Primary Drinking Water Regulations* (CPDWR) requirements for *Giardia lamblia* and *Cryptosporidium* Removal

Dear Mr. Barker;

Per our meeting on June 1, 2011, the Water Quality Control Division (the Division) has received and reviewed the additional information for the GE/Zenon Homespring filtration system including its incorporation into the Sunspring filtration system in accordance with Article 1.11.2 and Article 7 of the *Colorado Primary Drinking Water Regulations* (CPDWR). The design meets or exceeds the requirements of the *State of Colorado Design Criteria for Potable Water Systems* and is accepted for use as an Alternative Filtration Technology subject to the performance conditions outlined in Table 1 and the Additional Design Criteria given in Table 2.

The acceptance was revised from both the March 16, 2007 letter to reflect current pre-filter products and membrane skids as well as correct other manufacturer requested modifications. The March 16, 2007 acceptance letter is therefore superseded.

This acceptance addresses the following items:

- GE/Zenon Homespring UF211 filter and housing
- IWT UF 5, 10, 20, 30, 40, 50 pre packaged filtration skids
- IWT Sunspring SS24 and SS36 skids

This acceptance applies only to the GE Homespring Filtration system and associated IWT filtration skids and does not constitute construction approval for installation in public water systems. **Review and construction approval for the design of any public water system proposing to use this technology will be handled on an individual basis by the Division as required by Article 1.11.2 of the *Colorado Primary Drinking Water Regulations* (CPDWR).**

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

- March 16, 2007 Colorado Acceptance of the GE Homespring Filtration Unit

  - June 2005 Bio Vir Laboratories Inc. Purifier Test Report
  - NSF Standard 53 Certification
- Specifications sheet and drawing for the IWT UF 5-50
- Specifications sheet for the Sunspring SS24 and SS36
- WQA Certificate of Compliance (gold seal) for Sunspring SS24 and SS36 (12/20/2010)

Any change orders or addenda that address treatment or piping must be submitted to this office for review and acceptance by the Division prior to use in Colorado by a regulated public water system. This includes any changes made to the UF211 or to the IWT skids including piping layouts and pre-filters. The Division will review any additional third party verification reports and issue a revised acceptance letter if appropriate.

Table 1. Homespring UF211 Conditions of Acceptance:

Compliance Credit Granted to meet the requirements of the CPDWR *	
Giardia lamblia	3.0 – Log
Cryptosporidium	3.0 – Log
Virus	no credit granted
*** NOTE:** Compliance credit awarded is simply for meeting minimum requirements of the CDPWR Article 7 (Surface Water Treatment Rules - SWTR) and does NOT reflect demonstrated performance of the micro or ultrafiltration system in any way. Actual removals in these types of systems can frequently exceed 4.5-5.0 log removal of *Giardia, cryptosporidium,* or testing surrogates. The Division highly recommends that water systems compare manufacturer literature to determine the absolute performance of any system selected. These filters may be used as final compliance filters as part of a multiple treatment barrier approach to meeting SWTR requirements (Article 7, CPDWR). In addition to the above filtration, the water system MUST provide a minimum of **4.0-Log virus inactivation** by disinfection. Also, please note that the Division will evaluate the filter log removal credit and compliance monitoring criteria for systems that are classified as Bin 2 or higher as part of Article 7.4 of the CPDWR on a case- by-case basis.	
Technical Specifications – Membrane Element	
Filter Manufacturer	**GE/Zenon**
Filter Model	**UF211**
Maximum Flow Rate (per filter)	4.5 gallons per minute (valid over temperatures 0 – 30 °C)
Maximum Daily Production (gallons)	5000 gallons per day
Maximum Transmembrane Pressure	40 pounds per square inch differential (psid)
Maximum Inlet Pressure	100 pounds per square inch (psig)
Minimum Outlet Pressure (backpressure)	35 pounds per square inch (psig)
Turbidity Performance Standards	< 0.1 NTU 95% of the time Not to exceed 0.5 NTU

Pre-filtration	Pre-filtration is required when raw water turbidity exceeds **5 NTU.** • Submittals should include at least **6 raw water turbidity measurements**, **TWO** taken in April, **TWO** taken in May and **TWO** taken in June Pre-filtration may consist of filtration previously installed at a facility or proposed new pre-filtration. Individual design submittals will need to provide documentation that proposed pre filtration both: • Meets applicable ANSI/NSF 61 requirements • Removes sufficient turbidity to function as a pretreatment barrier (Can be a statement from the manufacturer).

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

Technical Specifications – Skids								
Skid Manufacturer	**IWT**							
Skid Type	**IWT UF**						**Sunspring**	
Skid Model Number	**UF5 – 1 filter**	**UF10 – 2 filters**	**UF20 - 4 filters**	**UF30–6 filters**	**UF40 – 8 filters**	**UF50 – 10 filters**	**SS24 – 1 filter**	**SS36 – 2 filters**
Maximum Daily Production (gallons)	5,000	10,000	20,000	30,000	40,000	50,000	5,000	10,000

Table 3: Homespring/IWT Additional Design Criteria:

Additional Design Criteria
1. Bypass piping to divert water around the filter will not be approved.
2. All systems used for compliance with the CPDWR Article 7 (surface water treatment) shall have the following on EACH filter: a. Influent solenoid valve b. Effluent check valve
3. A means to restrict or control flow across each filter shall be provided (flow restrictor on the effluent of the filter is allowable).
4. A 20 micron prefilter is required for the Homespring units.
5. A means to measure the flow across the filtration process shall be provided.
6. Systems shall provide a discussion justifying how the design flow of 4.5 gpm per filter will be maintained. Water systems design documentation must take into account peaking factors and instantaneous demand for filtration and must not take the daily production (6500 gallons per day) unless there is evidence that the flow is consistent throughout the day. a. Example: If a school is a public water system (operating hours 7 AM to 7 PM daily) and provides the Division information that it utilizes 12,000 gallons per day; they may NOT

only provide two filtration units. While 12,000 gallons per day equates to about 8.5 gpm as an average flow, this doesn't take into account that the school is closed throughout the night and not using water. The school would need to provide justification as to why only two filters would be necessary – perhaps the water plant runs 24 hours per day and fills a tank which can handle the peak demand during the day. If on the other hand, the school only operates the water plant during business hours, they may need to provide three or even four filter units in order to meet the required demand.

7. Pressure gauges shall be installed to properly monitor differential pressure on each filter. The public water system may use differential pressure gauges or individual inlet and outlet gauges and calculate differential pressure. Pressure transducers are an acceptable alternative to permanent gauges. The method of pressure measurement must be called out as part of the design submittal.
8. A pressure relief valve is required on inlet to each set to deploy at 100 psi.
9. The overall water treatment system design shall include provisions for protection from water hammer and pressure surges.
10. Adequate backflow prevention must be provided for the waste line. "Clean in Place" waste shall be properly disposed of via permitted or accepted methods.

Additional Operations and Maintenance Criteria

1. An Integrity Test Kit must be available for each installation and an individual who has obtained the Certified Homespring Technician certificate will be required to conduct integrity tests. Alternately, the Division will waive this requirement if the public water system is operated by a contractor who has the necessary training certificate and possesses a single Integrity Test Kit for multiple systems.
    a. Maintenance and integrity testing shall be performed only by a Certified Homespring Technician. The PWS can either employ an individual who has obtained the Certified Homespring Technician certificate or must have a routine maintenance contract with a Certified Homespring Technician. Article 9 of Title 25, C.R.S., requires that every water treatment facility and water distribution system be under the supervision of a certified operator holding a certificate in a class equal or greater than the minimum class required for the classification of the facility or water system. Please see the CDPHE Water and Wastewater Operators Certification Requirements Regulation 100 for additional information.
2. Integrity tests must be performed at least once per calendar week that the membrane produces treated water for distribution. If a filter fails an integrity test, the filter shall be removed from service immediately and replaced with a functional filter. The Division shall be notified within 24 hours in the event of a treatment failure.
3. The water system shall keep records of the following operational parameters (to be reviewed during a Sanitary Survey):
    a. Integrity test date, results (pass or fail), and initials of person performing the test
    b. CIP dates
    c. Filter replacement date and reason for replacement.
4. Water systems must maintain an operation and maintenance manual for the Homespring filtration system. All integrity tests and CIP procedures shall follow manufacturer prescribed procedures.
5. Chemicals used for CIP shall be certified under ANSI/NSF 60.

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

cc: Chia Kung
Global Product Manager – Membranes
Pentair Residential Filtration, LLC
5730 North Glen Park Rd.
Milwaukee, WI 53209

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