

## Verified by the Canadian ETV Program



### Mainstream BioFiltration Drinking Water Treatment System

Technology Fact Sheet for Mainstream Water Solutions Inc.

## Performance Claim

The efficacy of the Mainstream BioFiltration Drinking Water Treatment System for treating drinking water and removing *Cryptosporidium* and *Giardia* (oo)cyst-sized particles has been tested employing raw water from the town of Craik drinking water source, seeded with microspheres 4 – 4.9  $\mu\text{m}$  (mean 4.5  $\mu\text{m}$ ), and filtered using Mainstream filtration processes. The turbidity, temperature, pH and total organic carbon (TOC) content of raw water were  $1.46 \pm 0.01$  NTU,  $3.4 \pm 0.3$  °C,  $8.05 \pm 0.16$ , and  $22.65 \pm 0.64$  mg/L, respectively, and those of the MSSF (Modified Slow Sand Filter) effluent [BAC (Biologically Activated Carbon) filter influent] were  $0.47 \pm 0.0$  NTU,  $3.36 \pm 0.42$  °C,  $7.90 \pm 0.27$ , and  $22.55 \pm 0.65$  mg/L. Test results show that the decimal elimination capacity (DEC) of the MSSF and BAC filter for the removal of microspheres were at least 2 logs and 1 log with 95% confidence, respectively.

## Performance Conditions

The Mainstream BioFiltration Drinking Water Treatment System employed for testing and performance verification consisted of a pilot-scale MSSF and a BAC filter, a flow meter, a Carter cassette pump, a static mixer that was placed in front of individual filters being tested, and a holding tank for storing treated water.

The pilot unit was installed and operated in the water treatment plant (WTP) of the town of Craik, Saskatchewan, and received raw water from the town's drinking water supply source. Craik obtains its drinking water from Arm Lake, Saskatchewan, which is located about 1.5 km North East of the WTP.

The verification tests were conducted between March 28 and April 2, 2011 employing microsphere beads of the size 4.0 – 4.9  $\mu\text{m}$  as surrogates for *C. parvum*. During the testing period, the water flow rate was maintained to correspond to a hydraulic loading rate of about 0.34 – 0.35 m/h and 0.88 – 0.92 m/h for MSSF and BAC filter, respectively. The microsphere surrogate beads employed were Nile Red and Yellow: The former bead was employed to test MSSF filtration ability and the latter was used to test BAC filtration ability. The surrogate concentrations in the influent streams were approximately 52,000 – 57,000 and 24,000 – 26,000 counts (n)/L, respectively.

## Technology Application

The Mainstream filtration processes are designed to treat drinking water and remove *C. parvum* and *Giardia* (oo)cysts and other pathogens from drinking water.

## Technology Description

The technology is a drinking water treatment system that employs a modified biological slow sand filter (MSSF) and a Biological Activated Carbon (BAC) filter to treat drinking water and remove pathogens – bacteria, viruses, and protozoan – that are major public health concerns. Slow sand filtration process (SSF) is the oldest water treatment process and one of the most reliable processes that is commonly being used to remove *C. parvum* and *Giardia* (oo)cysts from potable water supply. It is simple to operate and has been used in Europe since 1882. The Mainstream BioFiltration Drinking Water Treatment System employs a modified slow sand filter and a biological activated carbon (BAC) filter sequentially. The technology is, principally, similar to conventional SFFs except for its maintenance procedures; the former filter is cleaned hydraulically while the latter is cleaned employing scraping and re-sanding procedures.

## Verification

The verification was conducted by Amiri Clean Water Technologies – the Verification Entity (VE) – using the Canadian ETV Program's General Verification Protocol (February, 2007). The verification was based on Mainstream efficacy testing results of MSSF and BAC filter for the removal of *C. parvum* and *Giardia* (oo)cyst-sized particles from raw drinking water sources. Those tests were conducted by Dr. Tanya Dahms and Ms. Supriya Bhat, M. Sc., the independent testing agents.

## What is the ETV Program?

The Canadian Environmental Technology Verification (ETV) Program is delivered by The Bloom Centre for Sustainability (BLOOM) under a license agreement from Environment Canada. The Canadian ETV Program is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

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