



Technical Brief

Cyst Reduction in Water

Background

The Waterborne Disease and Outbreak Surveillance System (WBDOSS) is a national surveillance system that was initiated in 1971 as a partnership between the US Centers for disease control (CDC), the Council of State and Territorial Epidemiologists (CSTE), and the US Environmental Protection Agency (EPA). In the last published biannual report (2005 – 2006), 14 states reported 28 water born disease outbreaks (WBDOs), with a total of 20 associated with drinking water. The 20 drinking water-associated outbreaks caused illness among an estimated 612 persons and were linked to four deaths. During the same period, a total of 78 WBDOs associated with recreational water (pools, spas, lakes and similar surface waters), were reported by 31 states. Illness occurred in 4,412 persons, resulting in 116 hospitalizations and five deaths. *Cryptosporidium* is the most reported causative agent for these recreational water outbreaks while *Giardia* is a common causative agent for drinking water.

Cryptosporidium parvum and *Giardia lamblia* are protozoans, or single cell parasites, that are commonly found in the intestinal tract of humans and animals. As parasites, they can only grow within a living host and do not multiply in the environment, but rather exist as oocysts or spores. The parasites and spores are found in every region of the world and can be a contaminant in most water from lakes, streams and some groundwater sources under direct influence of surface water. Wastewater treatment facilities may discharge effluent containing the oocysts either due to overcapacity or inadequate treatment. Secondly, runoff from agricultural operations or from natural sources containing the spores can enter surface waters. Wells that do not come into contact with surface water or wastewater are generally free from contamination.

The organisms and the oocysts are very resistant to the commonly used chlorine disinfection methods and the oocysts themselves are typically 3 to 4 microns in size, creating a challenge for removal in many municipal and private water systems. The standard for removal has been established by ANSI/NSF and is specified under Standard 53, Drinking Water Treatment Units – Health Effects. It specifies the use of 1 micron filters that have demonstrated removal of cysts at minimum levels of 99.95%.

Summary of Test Method

ANSI/NSF 53 specifies the challenge of 3.0 micron polystyrene microspheres at a minimum level of 50,000 microspheres per liter of water. The system is maintained at 60 psig and is cycled on and off for 16 hours with an eight hour rest period. On the eighth cycle, the filter is challenged and the effluent is measured to determine efficiency. The filter is then loaded with test dust to simulate plugging. The filter is challenged and the effluent measured when the flow is reduced by 25%, 50% and 75%. The minimum requirement is a 99.95% reduction of the 3 micron polystyrene microspheres.

Discussion

Graver Technologies QCR Series filters are constructed with 1 micron polypropylene media that is intended to be used for cyst reduction. Samples were submitted to an independent laboratory for testing to ANSI/NSF 53 standards. Lab results are in Table 1 on the reverse side.

Table 1

Particle			Volume			
Sample Point	Size (Microns)	Influent (Particles/L)	Effluent (Particles/L)	Percent Reduction	Flow Rate (GPM)	Treated (Gallons)
Flush	3	<1	<1	–	10	–
8th cycle	3	96,903	18	99.98	9.4	702
25% Red.	3	138,861	32	99.98	7.2	953
50% Red.	3	144,189	18	99.99	4.9	1,473
75% Red.	3	153,846	12	99.99	2.3	1,875

Based upon the results, Graver Technologies QCR filter exceeds the minimum reduction level for the polystyrene microsphere challenge and therefore meets the requirement for cyst reduction as specified in ANSI/NSF 53.

Graver QCR Series filters have been approved by several states to meet the requirements of the recently mandated Surface Water Treatment Rules (SWTR).

For further information, contact Graver Technologies at 800-510-0932 or www.gravertech.com or your local Graver Technologies representative.