MASSACHUSSETS WATER RESOURCES AUTHORITY
http://www.mwra.com

Pathogen Monitoring Program – 2003 Review
March 2004

Samples at Cosgrove and CVA Intakes

Even though testing for *Giardia* and *Cryptosporidium* is not required by EPA or the MA DEP, MWRA has been monitoring for *Cryptosporidium* and *Giardia* in source waters since 1994. MWRA's routine sampling started out with monthly samples, and is now weekly at the Cosgrove Intake, and monthly at the Chicopee Valley Aqueduct Intake. Currently all samples at both intakes are analyzed by Erie County Water Authority laboratory, under contract to the MWRA. Each 100-liter sample is tested using the current EPA-approved ICR method. Since July 1997, only 4 samples collected from Cosgrove Intake have been presumptive positive for the presence of *Giardia*. No samples have been confirmed positive. No samples have been presumptive or confirmed positive for *Cryptosporidium*.

Cosgrove Intake: *Cryptosporidium* Results for Wachusett Reservoir Source Intake: January 2003 – December 2003

Number of Samples	Number Positive	No. Confirmed	Average (oocysts/100L)	Range of detects (oocysts/100L)
52	0	0	0	0

Cosgrove Intake: *Giardia* Results for Wachusett Reservoir Source Intake: January 2003 – December 2003

Number of Samples	Number Positive	No. Confirmed	Average (oocysts/100L)	Range of detects (oocysts/100L)
52	1	0	0.02	0.53

CVA Intake: *Cryptosporidium* Results for Quabbin Reservoir Source Intake: January 2003- December 2003

Number of Samples	Number Positive	No. Confirmed	Average (oocysts/100L)	Range of detects (oocysts/100L)
26	0	0	0	0

CVA Intake: *Giardia* Results for Quabbin Reservoir Source Intake: January 2003- December 2003

Number of Samples	Number Positive	No. Confirmed	Average (oocysts/100L)	Range of detects (oocysts/100L)
26	0	0	0	0

Note: A complete record of results can be found on the MWRA website at www.mwra.com.

New Research Effort

MWRA is currently engaged in a voluntary, joint research effort with Tufts University looking at levels of *Cryptosporidium* in drinking water using a new, highly sensitive test method. This monitoring is part of a larger multi-city study looking at levels of *Cryptosporidium* exposure in

the population and potentially related levels in drinking and recreational waters. Since the routine, EPA-approved ICR method used by the MWRA has had few detects, no statistical comparisons of human exposure to drinking water were possible. As a result, MWRA and Tufts decided to use a more sensitive method to determine the variability, if any, of levels of *Cryptosporidium* and *Giardia*.

The research monitoring uses a weekly composite sample (some water each day for the entire week) of 1,000 liters at Shaft 9A, a site within the water system that is representative of water delivered to customers in the MetroBoston system. The water is filtered through a Genera filter, widely used in Europe, and then analyzed. All *Cryptosporidium* oocysts, both confirmed and empty, are counted. This method, using a large sample volume and an improved filter is more than 60 times more sensitive than the current EPA-approved ICR method used by MWRA.

The data collected so far is consistent with MWRA's past data. As was expected, the much higher sample volumes and the more sensitive testing have yielded some positive samples; 21 of 136 (15%) filters analyzed between May 2001 and December 2003 were positive for *Cryptosporidium*. All but one of the positives has been below the nominal detection limit of the ICR method (1-oocyst/100 liters), and the running average is around 0.06 oocyst/100 liters. Tufts has also tested for *Giardia* using the same testing method as above. In 77 samples taken between July 2002 and December 2003, there were two detections, with a running average of 0.01 cyts/100 L.

Research Sampling - *Cryptosporidium* Results: January 2003 – December 2003

Number of Samples	Number Positive	Number Confirmed	Average (oocysts/100L)	Range of detects (oocysts/100L)
50	3 (6%)	0	0.01	0.1 – 0.2

Research Sampling - *Giardia* Results: January 2003 – December 2003

Number of Samples	Number Positive	Number Confirmed	Average (cysts/100L)	Range of detects (cysts/100L)
50	2 (4%)	1 (2%)	0.01	0.1 – 0.4

Testing Limitations and Response Protocol

It is important to note that *Cryptosporidium* and *Giardia* monitoring has significant limitations. The tests do not clearly distinguish between live and dead cysts, cannot determine if an organism is in fact infectious to humans, and the infectious dose of various strains of *Cryptosporidium* is not well understood. Nonetheless, in 1996, MWRA adopted a trigger level of 10 oocysts per 100 liters (recommended by Rose and Haas, leading researchers in pathogen and risk/health analysis) above which notification and other actions would be undertaken. Total number of positives, both confirmed and empty oocysts, are included in this standard. No special actions are required for levels below this standard. Even with the new, more sensitive testing method, the average level found is 100 times less than the 10-oocyst per 100 liter standard, and no sample has ever exceeded this standard. Furthermore, MWRA's current treatment is capable of inactivating (killing) at least 99.9% of any *Giardia* which may be present and viable. MWRA's new ozone plant under construction at Walnut Hill is designed to inactivate *Cryptosporidium,* as well as *Giardia,* and will meet EPA's regulations that are set to be published in 2005 and become effective in 2012.