For more information, please contact MWRA at (617) 242-5323, or visit www.mwra.com.

Release Date: January 20, 2003

WATER QUALITY UPDATE

An Analysis of December 2002 Sampling Data

MASSACHUSETTS WATER RESOURCES AUTHORITY

100 First Avenue, Charlestown Navy Yard, Boston, MA 02129

To cut costs, starting next month the Water Quality Update will be sent without an envelope and your address here. To further save money, you can receive the Update via e-mail. Just send your e-mail to Joshua.Das@mwra.state.ma.us.

December 2002 Highlights

•**MWRA achieved CT disinfection requirements for the month** at both Ware Disinfection Facility (WDF) and Cosgrove Disinfection Facility (CDF). Chlorine dose at CDF remained at 1.6 mg/L. Dose at Ware Disinfection Facility remained at 1.2 mg/L. Dose at Norumbega remained at 1.6 mg/L. Levels of disinfection by-products (DBPs) were slightly lower than those in December for the CVA, MetroWest and Metropolitan communities. CT results appear on Page 5. Not a single community sample violated the Total Coliform Rule criteria. See Page 6. DBP results appear on Page 7.

•**Bird harassment and observation at Wachusett Reservoir** continues. MDC staff continued activities that included weekend shifts, weekend harassment about 2 hours before sunset, and observation and harassment Monday through Friday from 8 AM to 3:00 PM. Boat-based harassment has been effective in keeping waterfowl away from Cosgrove Intake. Fecal coliform numbers at Cosgrove are elevated, but are below the standard of 20 cfu/ 100mL. See Page 3 for details.

•**20 discolored water complaints in Arlington on the 9th** were the result of an activation of a water main on Lake Street to supply water to the area. The original water supply main near the Alewife Brook Sewer Pump Station in Somerville was isolated for repairs.

•**The Nor'Easter on the 25th** caused the Cosgrove Disinfection Facility (CDF) to have a power failure and lose SCADA communications. CDF was on emergency power for approximately 8 hours. The facility was fully staffed until the SCADA communications was restored on the 27th.

•**High winds from the storm on the 25th** caused the turbidity at the Ware Disinfection Facility to exceed the DEP standard of 1 NTU. The facility was shutdown for approximately 7 hours until the winds decreased in strength. Coliform samples were negative for this period of time. CT was monitored and maintained as well. See page 4 for details.

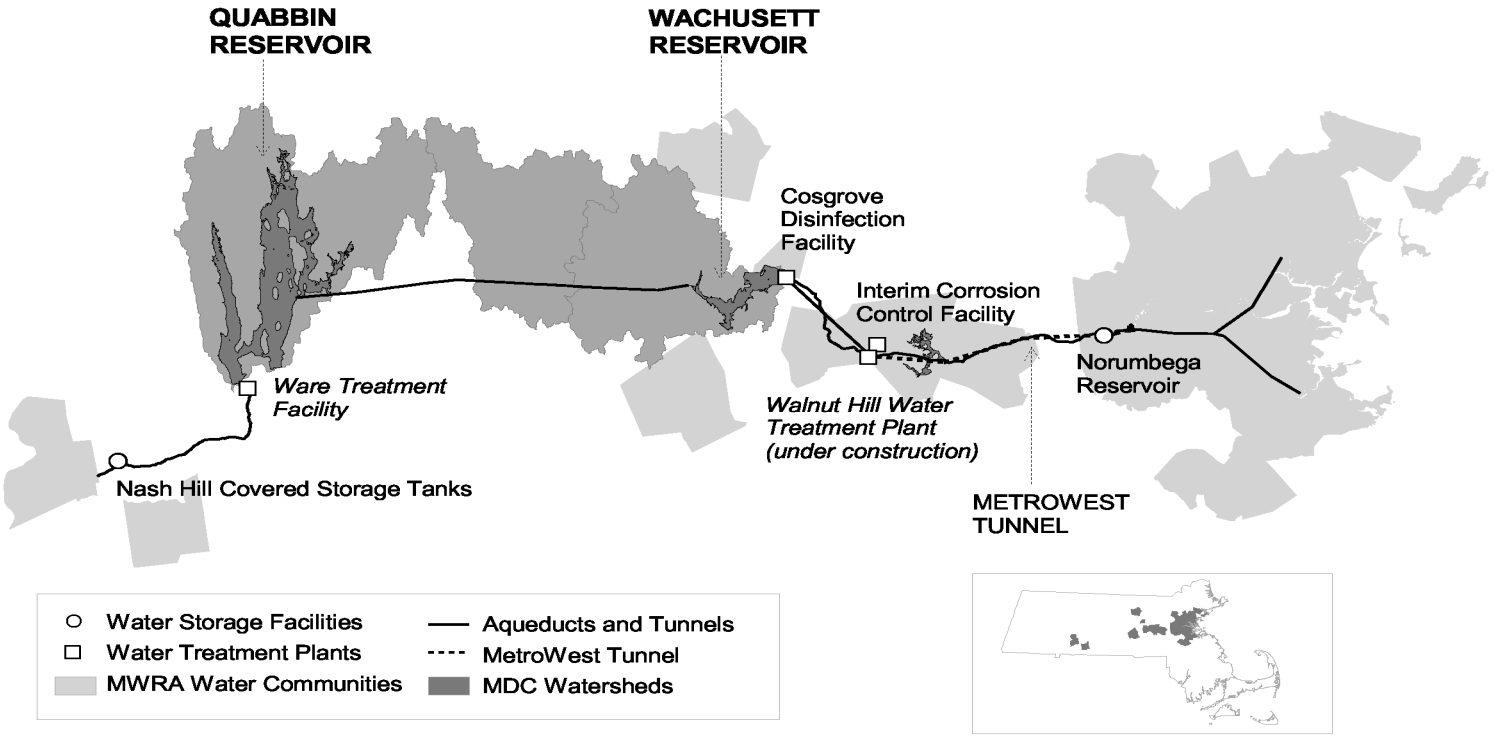
For more information, please contact MWRA at (617) 242-5323, or visit www.mwra.com. For further information regarding health concerns, please contact the Department of Public Health/Division of Epidemiology at (617) 983-6800 or Boston Public Health Commission at (617) 534-5611.

Water Quality Update
This is a monthly report containing information about the quality of water supplied by MWRA. It provides a more detailed review of water quality than the annual water quality report that is mailed each June to customers in our service area. The report is available at www.mwra.com.

The Water System
MWRA provides about 250 million gallons of water each day to 46 cities and towns in Massachusetts. Each municipality is responsible for distributing the water within its own community. More than two million people are served by the MWRA water supply system.

Quabbin Reservoir is the primary source of water for our system and one of the country's largest water supply impoundments, with a capacity of 412 billion gallons. Quabbin water represents source water for the Chicopee Valley Aqueduct (CVA) system. Water is transferred from Quabbin Reservoir to the 65 billion gallon Wachusett Reservoir in Clinton via the Quabbin Aqueduct. Wachusett water represents source water for MetroWest and Metropolitan Boston communities. The watershed areas of the Quabbin and Wachusett Reservoirs total 401 square miles. The Metropolitan District Commission (MDC), which manages the watersheds, and MWRA are committed to protection of the water supply through aggressive watershed protection as the first line of defense against water contamination. Three-quarters of the watersheds are protected lands and over 80% are either forest or wetlands.

The map below indicates the location of reservoirs, treatment facilities, and service communities.



Indicators of Water Quality

Tests are conducted on water sampled at the source reservoirs (source or raw water) and also on water after treatment (treated water). MWRA routinely uses six general indicators of water quality: microbial, corrosiveness, disinfection by-products, turbidity and algae, disinfectant residual, and mineral analysis. Testing frequencies vary by parameter.

The Federal Safe Drinking Water Act (SDWA) sets standards for source and treated water quality. The standards relate to coliform, turbidity, watershed protection, disinfection and disinfection by-products, over 120 potential chemical contaminants, and waterborne disease outbreaks. MWRA monitors for these parameters on schedules ranging from daily to annually.

Customer communities must also meet certain standards under the SDWA concerning distribution of treated drinking water. The Total Coliform Rule (TCR) helps to alert communities to possible microbial contamination as well as the adequacy of residual disinfection within the local distribution system. MWRA tests over 1500 samples per month. Under the SDWA, a violation of the TCR occurs when greater than 5% of the samples in a community are positive for total coliform during a month.

Source Water – Microbial Results
December 2002

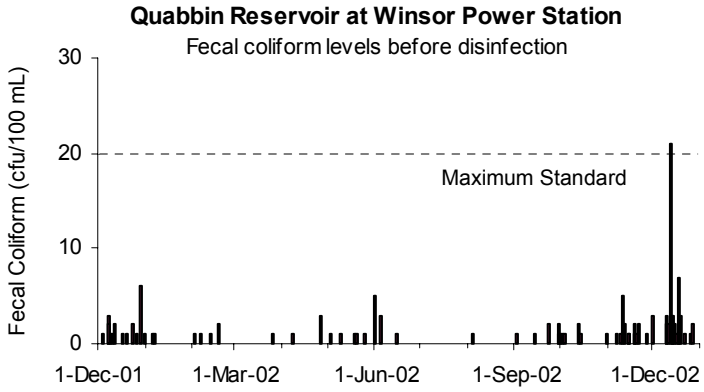
Source Water - Microbial Results

Total coliform bacteria are monitored in both source and treated water to provide an indication of overall bacteriological activity. Most coliforms are harmless. Fecal coliform is a subclass of the coliform group which are identified by their growth at temperatures comparable to those in the intestinal tract of mammals. They act as indicators of possible fecal contamination. The Surface Water Treatment Rule for unfiltered supplies requires that no more than 10% of source water samples prior to disinfection over any six-month period have over 20 fecal coliforms per 100ml.

Sample Site: Quabbin Reservoir

Quabbin Reservoir water is sampled at Winsor Dam before entering the CVA system. MWRA met the six-month running average standard for fecal coliform continuously at this location over the last year.

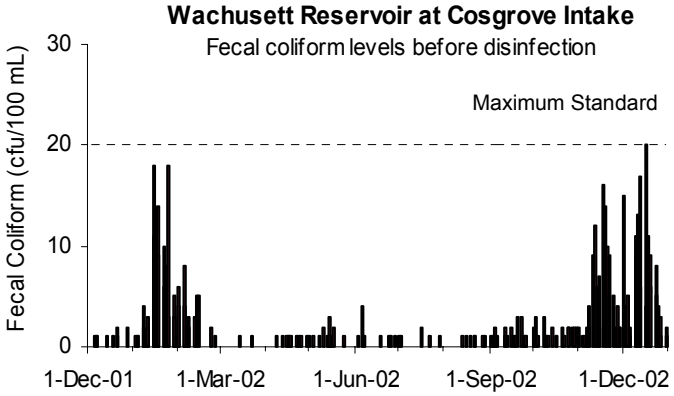
Fifteen of the 31 samples were positive during December. One sample exceeded the 20 cfu/ 100ml standard with a result of 21 cfu/ 100ml on the 12th. All samples taken after this date have been below 10 cfu/ 100ml. This is the first time since October 1995 that a sample has exceeded the standard at Quabbin Reservoir.



Sample Site: Wachusett Reservoir

Wachusett Reservoir water is sampled at Cosgrove Intake before entering the MetroWest and Metropolitan Boston systems. MWRA met the six-month running average standard for fecal coliform continuously at this location over the last year.

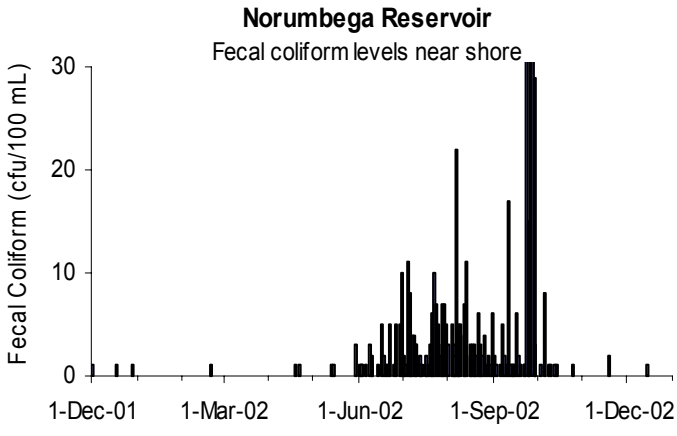
Fecal coliform levels tend to increase during the winter, because, when water bodies near Wachusett ice over, waterfowl seek open water. Many roost at Wachusett, which tends to freeze later in the year than smaller ponds nearby. MDC has an active bird harassment program to move the birds away from the intake area. 22 of 22 samples were positive for fecal coliform. Colony counts did not exceed the standard of 20 cfu/ 100 ml.



Sample Site: Norumbega Reservoir

Norumbega Reservoir in Weston receives flows from Wachusett for temporary storage each day during low demand hours, which are then discharged during high demand. Norumbega water is sampled from the shore near the gatehouse before disinfection. Coliform levels are elevated periodically, partly because samples collected from the shore of this small reservoir are more susceptible to local disturbances. Covered storage is scheduled to replace this open reservoir in 2004.

1 of 31 samples from water taken along the shore was positive for fecal coliform during December. Colony count was in the single digits.

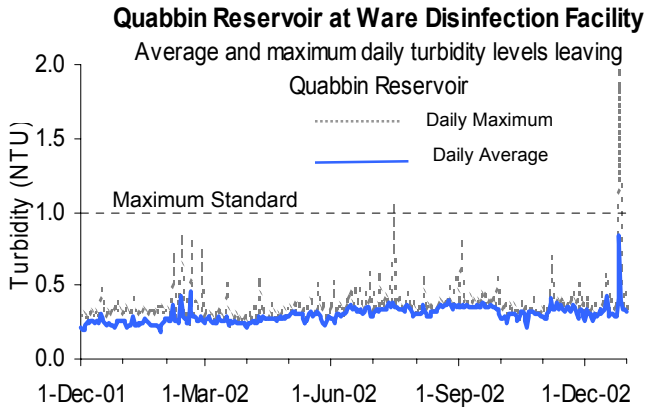


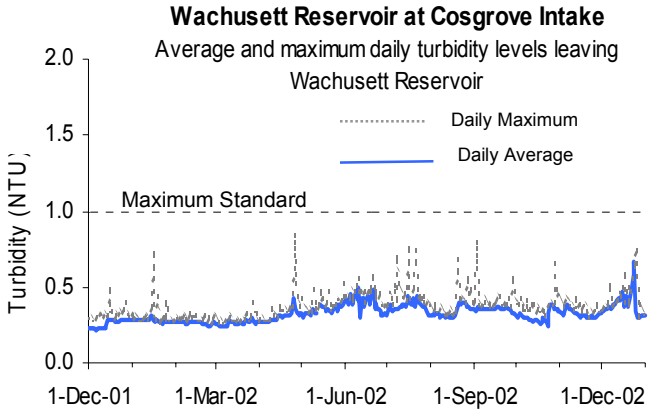
Source Water – Turbidity and Algae Results
December 2002

Source Water – Turbidity Results

Turbidity is a measure of suspended and colloidal particles including clay, silt, organic and inorganic matter, algae and microorganisms. The effects of turbidity depend on the nature of the matter that causes the turbidity. High levels of particulate matter may have a higher chlorine demand or may protect bacteria from the disinfectant effects of chlorine, thereby interfering with the disinfectant residual throughout the distribution system.

Samples for turbidity from Quabbin Reservoir are collected at the Ware Disinfection Facility before chlorination. These samples represent reservoir water entering the CVA system. Samples are also taken at Cosgrove Intake, representing water quality before chlorination for source water serving the MetroWest and Metropolitan Boston systems. The Massachusetts Department of Environmental Protection standard for source water turbidity for unfiltered water supply systems is a maximum of 1.0 NTU; the EPA standard is a maximum of 5.0 NTU. Maximum turbidity results at Wachusett Reservoir were within DEP standards for the month. Quabbin Reservoir exceeded the DEP standard on the 25th and 26th due to high winds as a result of the Nor'Easter storm. The turbidity reached 1.96 NTU. The facility was shutdown for approximately 7 hours until the winds decreased in strength. The elevation of the reservoir is lower than usual which exposes the shore line. This situation can elevate turbidity levels when winds increase disturbing the shore line.

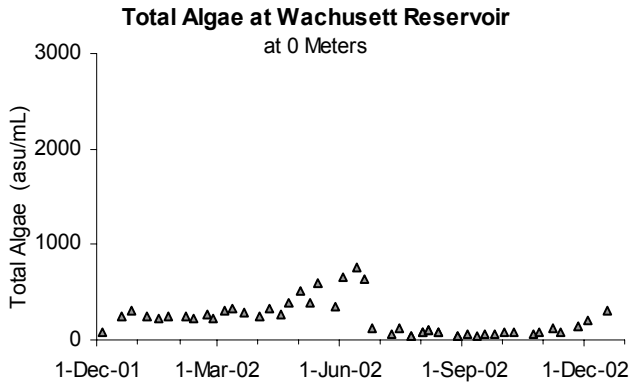


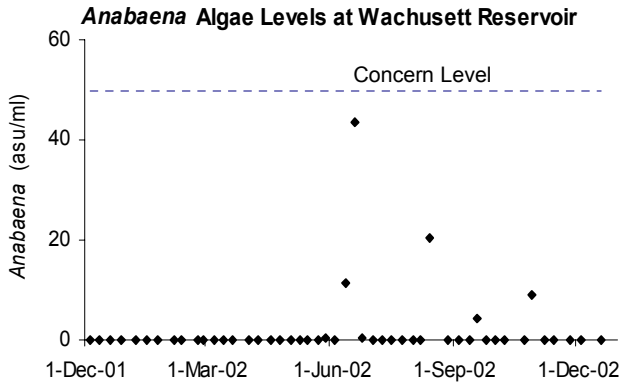


Source Water – Algae Results

Algal levels in reservoirs are monitored by MDC and MWRA. These results, along with taste and odor complaints, are used to make decisions on source water treatment for algae control.

Most taste and odor complaints at the tap are due to algae, which originate in source reservoirs, typically in trace amounts. Occasionally, a particular species grows rapidly, increasing its concentration in water. When *Synura, Anabaena*, or other nuisance alga blooms, MWRA treats the reservoirs with copper sulfate, an algaecide. Of 33 complaints received during December from local water departments, only 1 concerned taste and odor that may be due to algae.





Treated Water – Disinfection and pH Results
December 2002

Treated Water - Primary Disinfection

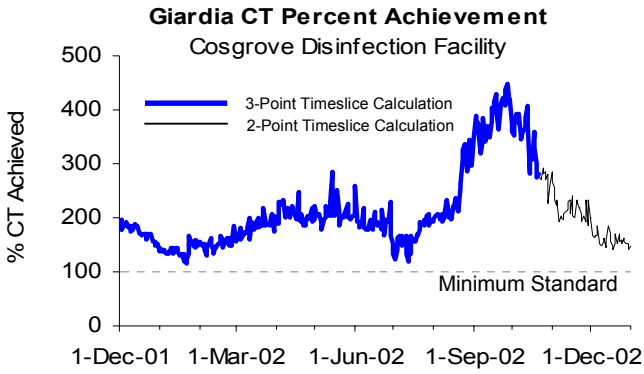
Wachusett Reservoir at Cosgrove Disinfection Facility (MetroBoston Supply):

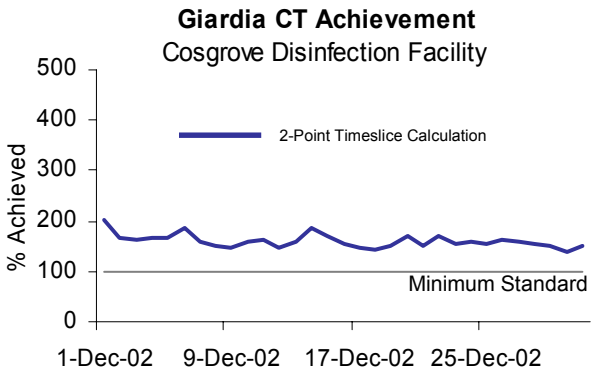
MWRA provides disinfection adequate to achieve EPA's requirement of 99.9% inactivation of *Giardia* cysts and 99.99% inactivation of viruses in drinking water using a calculation based on three sample points that DEP approved in June, 1999. The two-point timeslice, three-point timeslice, or integrated methods are alternative calculation methods which can also be used to comply with CT regulations.

CT achievement for *Giardia* assures CT achievement for viruses, which have a lower CT requirement. The concentration (C) of the disinfectant in the water over time (T) yields a measure of the effectiveness of disinfection, CT. The required CT varies with disinfectant type, water temperature, pH, and other factors. MWRA calculates daily CT inactivation rates at maximum flow, as specified by EPA regulations.

On October 22, 2002, a sample pump at Shaft A failed, depriving MWRA of sample results necessary to calculate the three-point timeslice. The two-point method remained the best available measure of CT compliance approved by DEP. The sample pump is to be replaced in the summer of 2003.

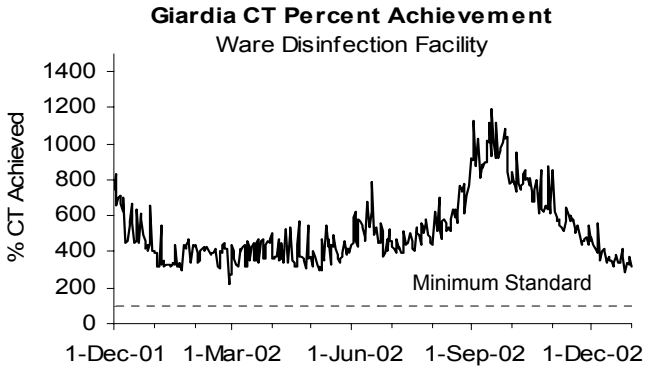
Chlorine dose remained at 1.6 mg/L. CT was met each day in December, as well as every day for the last year.

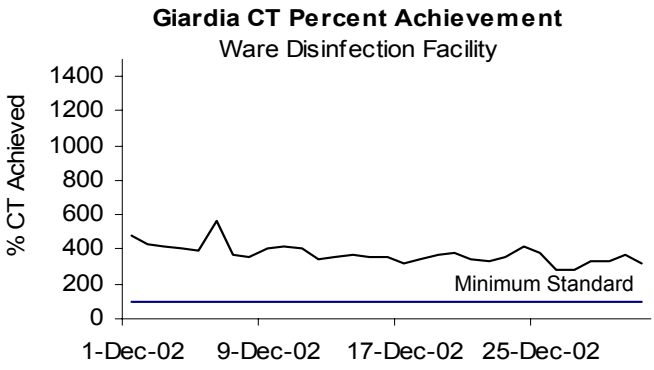




Quabbin Reservoir at Ware Disinfection Facility (CVA Supply):

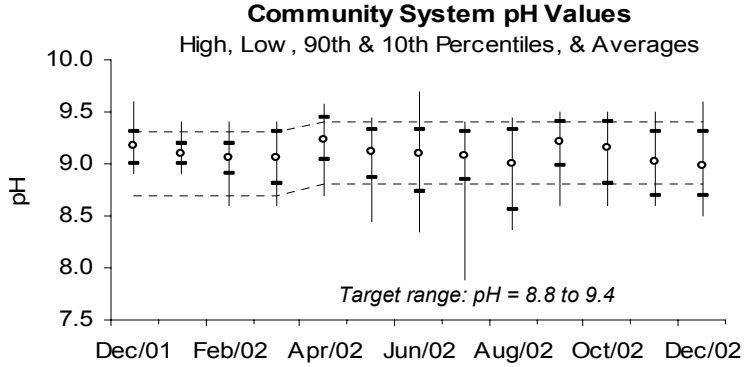
Chlorine dose remained at 1.2 mg/L. CT was met each day in December, as well as every day for the last year.





Treated Water – pH Results

MWRA adjusts the alkalinity and pH of Wachusett water to reduce its corrosivity in order to minimize the leaching of lead and copper from service lines and home plumbing systems into the water. MWRA's target for distribution system pH was raised from 9.0 to 9.1 on March 25th per DEP. Upper and lower target bands were adjusted to 8.8 and 9.4: MWRA's goal is to have all distribution system samples fall between these targets. MWRA staff collects and analyzes samples for pH from 26 community locations on a biweekly schedule to measure pH levels. In December, about 81% of the samples were within the target range.



Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program
December 2002

Background

While all communities collect bacteria samples for the Total Coliform Rule (TCR), 36 cities and towns (including Westboro State Hospital) use the MWRA Laboratory for Total Coliform Rule compliance testing. These communities collect samples for bacteriological analysis and measure water temperature and chlorine residual at the time of collection. Cambridge conducts their own monitoring. The other 9 MWRA customer communities have their samples tested elsewhere and these towns should be contacted directly for their monthly results.

There are 144 sampling locations for which the MWRA is required to report TCR results. This includes a subset of the community TCR locations as well as sites along the MWRA transmission system, water storage tanks and pumping stations.

The SDWA requires that no more than 5% of all samples may be total coliform positive in a month (or that no more than 1 sample be positive when less than 40 samples are collected each month). Public notification is required if this standard is exceeded.

Escherichia coli (*E.coli*) is a specific coliform species that is almost always present in fecal material and whose presence indicates likely bacterial contamination of fecal origin. If *E. coli* are detected in a drinking water sample, this is considered evidence of a critical public health concern. Additional testing is conducted immediately and joint corrective action by DEP, MWRA, and the community is undertaken. Public notification is required if follow-up tests confirm the presence of *E. coli* or total coliform. MWRA considers a disinfectant residual of 0.2 mg/L a minimum target level at all points in the distribution system.

Highlights

None of the 1880 community samples (0.00% system-wide) tested positive for confirmed total coliform during the month of November. None of the 726 MWRA samples tested positive for confirmed total coliform. No samples tested positive for *E. coli*. No towns failed the TCR rule for the month.

All thirty-six communities that submitted chlorine residual data maintained an average disinfectant residual of at least 0.2 mg/L. 1.8% of the community samples had a disinfectant residual lower than 0.2 mg/L.

TCR results by Community

Town	Samples Tested for Coliform (a)	Total Coliform # (%) Positive	E.coli % Positive	Public Notification Required?	December 2002 Minimum Chlorine Residual (mg/L)	December 2001 Minimum Chlorine Residual (mg/L)	December 2002 Average Chlorine Residual (mg/L)	December 2001 Average Chlorine Residual (mg/L)
ARLINGTON	56	0 (0%)			0.03	0.07	0.97	1.15
BELMONT	40	0 (0%)			0.14	0.30	0.95	0.85
BOSTON	252	0 (0%)			0.77	0.04	1.44	1.48
BROOKLINE	85	0 (0%)			1.15	1.00	1.55	1.47
CHELSEA	40	0 (0%)			0.54	0.80	1.34	1.49
EVERETT	50	0 (0%)			0.01	1.30	0.92	1.60
FRAMINGHAM (c)	72	0 (0%)			0.55	0.17	1.47	1.45
LEXINGTON	45	0 (0%)			0.34	1.00	1.38	1.57
LYNNFIELD	6	0 (0%)			0.23	0.29	1.01	0.87
MALDEN	75	0 (0%)			0.07	0.06	1.02	1.07
MARBLEHEAD	24	0 (0%)			0.24	0.25	1.19	1.31
MARLBOROUGH (b)(c)	60	0 (0%)			0.62	0.70	1.28	1.35
MEDFORD	85	0 (0%)			0.12	0.40	0.94	1.16
MELROSE	45	0 (0%)			0.02	0.10	0.72	1.26
MILTON	32	0 (0%)			0.75	0.01	1.19	1.25
NAHANT	10	0 (0%)			0.08	0.01	1.01	0.82
NEEDHAM (b)	50	0 (0%)			0.07	0.11	0.99	1.15
NEWTON	88	0 (0%)			1.02	0.43	1.43	1.40
NORTHBOROUGH	13	0 (0%)			0.96	0.96	1.79	1.66
NORWOOD	36	0 (0%)			0.01	0.05	1.07	0.75
QUINCY	113	0 (0%)			0.11	0.20	1.25	1.53
REVERE	65	0 (0%)			0.31	0.99	1.34	1.48
SAUGUS	40	0 (0%)			1.32	1.40	1.45	1.49
SOMERVILLE	100	0 (0%)			0.13	0.30	1.26	1.19
SOUTHBOROUGH (c)	12	0 (0%)			0.11	0.40	1.22	1.09
STONEHAM	28	0 (0%)			1.06	0.36	1.43	1.59
SWAMPSCOTT	18	0 (0%)			0.63	0.59	1.28	1.12
WAKEFIELD (b)	44	0 (0%)			0.16	0.44	1.11	1.25
WALTHAM	68	0 (0%)			0.01	0.10	0.78	1.45
WATERTOWN	40	0 (0%)			0.04	0.30	1.00	1.27
WELLESLEY (b)	36	0 (0%)			0.07	0.15	0.46	0.41
WESTBORO HOSPITAL	6	0 (0%)			0.10		1.62	
WESTON (c)	17	0 (0%)			0.62	0.23	1.26	0.84
WINCHESTER (b)	25	0 (0%)			0.08	0.06	0.50	0.59
WINTHROP	24	0 (0%)			0.53	0.40	1.34	1.35
WOBURN (b)	80	0 (0%)			0.05	0.02	0.65	0.51
Total:	1880	0 (0%)						
MASS. WATER RESOURCES AUTHORITY (d)	726	0 (0%)			0.01	0.02	1.30	1.39

(a) The number of samples collected depends on the population served and the number of repeat samples required.

(b) These communities are partially supplied, and may mix their chlorinated supply with MWRA chloraminated supply.

(c) These communities locally chloraminate.

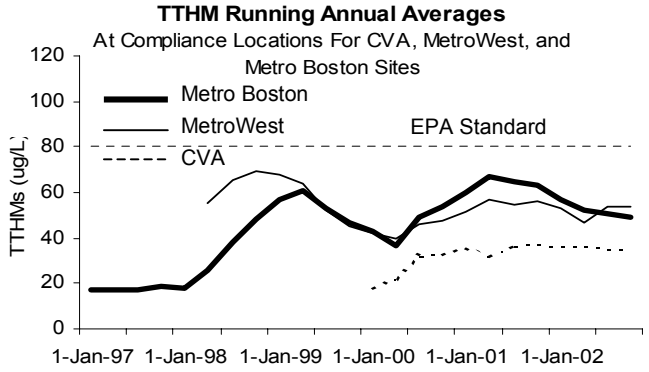
(d) MWRA sampling program includes the subset of communities as well as sites along the transmission system, tanks and pumping stations.

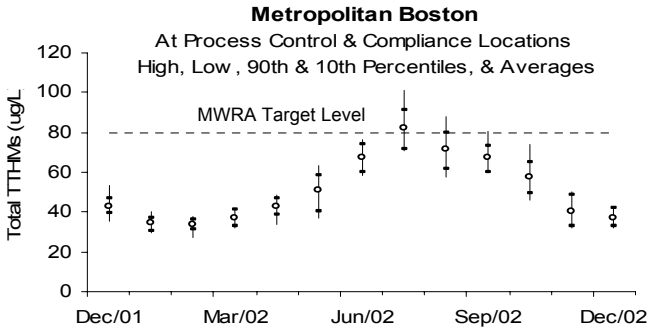
Treated Water - Disinfection By-Product (DBP) Levels in Communities
December 2002

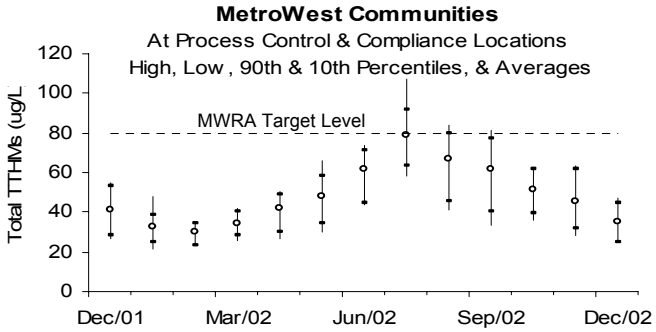
Total Trihalomethanes (TTHMs) and Haloacetic Acids (HAAs) are by-products of disinfection treatment with chlorine. Chlorination levels, the presence of organic precursors, pH levels, the contact time of water with chlorine used for disinfection, and temperature all affect TTHM and HAA levels. DBPs are of concern due to their potential adverse health effects at high levels. The EPA running annual average standards are 80 ug/L for TTHMs and 60 ug/L for HAA 5. DEP requires that compliance samples be collected quarterly. MWRA samples weekly at some locations, monthly and quarterly at others. **Metro Boston numbers are used for compliance purposes;** results presented below from CVA and MetroWest sampling sites enable MWRA staff to monitor control of MWRA treatment processes. Individual CVA and MetroWest communities are responsible for their own compliance monitoring and reporting. They must be contacted directly for their results.

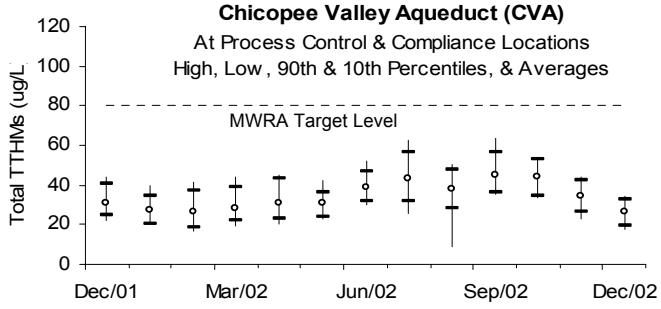
The running annual average for TTHMs and HAA5s at compliance locations, represented in the graphs at the top of the page, remained below current standards. Average monthly TTHM and HAA5 levels at all process control sampling locations for the CVA, MetroWest and Metropolitan Boston communities are slightly lower than those of last year.

TOTAL TRIHALOMETHANES

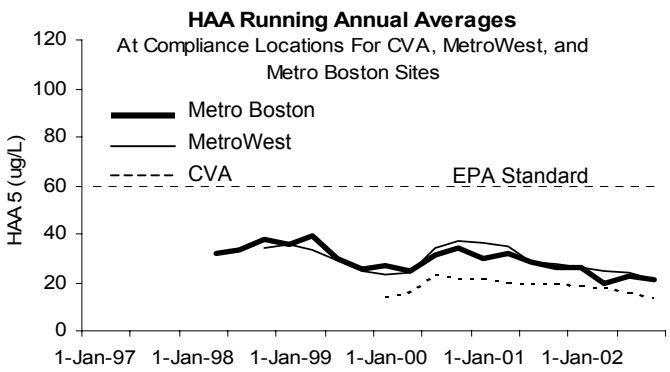


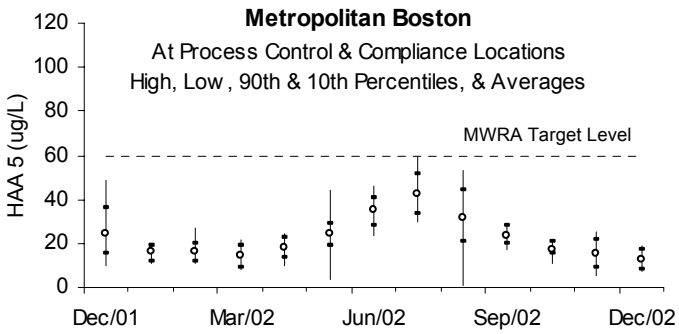


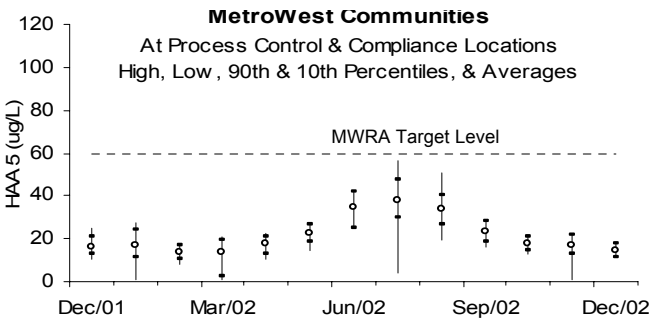


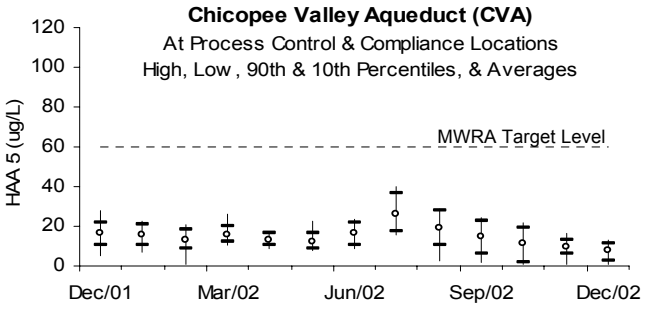


HALOACETIC ACIDS









MWRA Monthly Water Quality Analysis
December 2002

This page provides information on water quality at six locations in the MWRA transmission system. Results reflect a "snapshot" in time and may not represent typical conditions. Elevated levels of a particular parameter may occur from time to time. MWRA staff review these numbers carefully and follow-up unusual results by re-analyzing samples, collecting new samples, or auditing sample sites. More rigorous daily or weekly monitoring of select parameters at these and other locations provides a better overall picture of water quality and is reported for some parameters elsewhere in this document. Monitoring for a number of parameters in this table will be reduced to quarterly, if they either (1) have minimal variability or (2) are always below detection levels.

CVA System → | Metropolitan Boston → | Standards →

Component	Quabbin Reservoir at Ware Disinfection Facility (Raw)	Nash Hill Storage Tanks (Treated)	Wachusett Reservoir at Cosgrove Intake (Raw)	ICC, Marlboro (Treated)	Comm Ave., Newton (Treated)	Shaft 9A, Malden (Treated)	Standard	Units	Exceedance
Alkalinity	3.3	3.5	4.7	33.1	32.5	33.1		MG/L	
Aluminum	Quarterly	Quarterly	< 15	< 15	< 15	< 15	50-200 (a)	UG/L	NO
Ammonia-N	0.014	< 0.005	0.009	< 0.005	0.335	0.351		MG/L	
Antimony	Quarterly	Quarterly	< 0.9	< 0.9	< 0.9	< 0.9		UG/L	
Arsenic	Quarterly	Quarterly	< 0.8	< 0.8	< 0.8	< 0.8	50 (b)	UG/L	NO
Barium	Quarterly	Quarterly	7.3	7.2	7.3	7.1	2000 (b)	UG/L	NO
Beryllium	Quarterly	Quarterly	< 0.1	< 0.1	< 0.1	< 0.1	4 (b)	UG/L	NO
Bromate	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	10 (b)	UG/L	NO
Bromide	10.3	< 2.5	13.4	5.4	2.8	3.5		UG/L	
Cadmium	Quarterly	Quarterly	< 0.2	< 0.2	< 0.2	< 0.2	5 (b)	UG/L	NO
Calcium	Quarterly	Quarterly	4150	4000	4060	3980		UG/L	
Chloride	6.2	Quarterly	16.2	17.6	17.2	18.2	250 (a)	MG/L	NO
Chlorine, Free	NS	0.35	NS	0.90	NS	NS		MG/L	
Chlorine, Total	NS	NS	NS	NS	1.76	1.74		MG/L	
Chromium	Quarterly	Quarterly	< 0.6	< 0.6	< 0.6	< 0.6	100 (b)	UG/L	NO
Coliform, Fecal, MF Method	1	NS	15	NS	0	0	20 (c)	CFU/100 mL	NO
Coliform, Total, MF Method (e)	4	0	14	0	0	0	100 (c) 0 (d)	CFU/100 mL	NO
Copper **	< 0.9	11.5	2.5	4.5	15.4	6.9	1300 (b)	UG/L	NO
Cyanide	Quarterly	Quarterly	< 0.01	< 0.01	< 0.01	< 0.01	0.2 (b)	MG/L	NO
Fluoride	Quarterly	Quarterly	0.12	1.17	1.18	1.20	4 (b)	MG/L	NO
Hardness	Quarterly	Quarterly	13.7	13.3	13.4	13.2		MG/L	
Iron **	Quarterly	Quarterly	14.0	18.4	19.6	16.8	300 (a)	UG/L	NO
Lead	Quarterly	Quarterly	< 1.2	< 1.2	< 1.2	< 1.2	15 (b)	UG/L	NO
Magnesium	Quarterly	Quarterly	810	797	791	790		UG/L	
Manganese	Quarterly	Quarterly	14.5	25.6	18.1	13.5	50 (a)	UG/L	YES
Mercury	Quarterly	Quarterly	< 0.01	< 0.01	< 0.01	< 0.01	2 (b)	UG/L	NO
Nickel	Quarterly	Quarterly	< 1.0	< 1.0	< 1.0	< 1.0		UG/L	
Nitrate-N	0.016	0.017	0.047	0.044	0.045	0.045	10 (b)	MG/L	NO
Nitrite	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		MG/L	
Orthophosphate	Quarterly	Quarterly	0.003	0.006	0.009	0.006		MG/L	
pH	6.9	7.1	7.0	7.2	9.0	9.1		S.U.	
Potassium	Quarterly	Quarterly	754	760	759	771		UG/L	
Selenium	Quarterly	Quarterly	< 0.9	< 0.9	< 0.9	< 0.9	50 (b)	UG/L	NO
Silica (SiO2)	Quarterly	Quarterly	1340	1890	1860	1840		UG/L	
Silver	Quarterly	Quarterly	< 0.4	< 0.4	< 0.4	< 0.4	100 (a)	UG/L	NO
Sodium	Quarterly	Quarterly	9.7	25.2	24.4	25.5		MG/L	
Specific Conductance	44	Quarterly	82	144	Quarterly	Quarterly		UMHO/C	
Standard Plate Count, HPC (48 Hrs @ 35C)	NS	NS	26	0	4	NS	500 (d)	CFU/mL	NO
Sulfate (SO4)	Quarterly	Quarterly	6.7	7.0	6.9	6.9		MG/L	
Thallium	Quarterly	Quarterly	< 1.0	< 1.0	< 1.0	< 1.0		UG/L	
Total Dissolved Solids	33	35	52	83	81	83		MG/L	
Total Organic Carbon	1.63	Quarterly	1.70	1.78	1.75	1.80		MG/L	
Total Phosphorus	< 0.005	0.005	< 0.005	0.007	0.015	0.010		MG/L	
UV-254	0.017	0.013	0.031	0.024	0.033	0.033		A	
Zinc **	Quarterly	Quarterly	4.1	3.4	6.5	4.6	5000 (a)	UG/L	NO

(a) = Secondary MCL standard (aesthetic related). DEP "Drinking Water Regulations", 310CMR 22.00.

(b) = Primary MCL standard (health related). DEP "Drinking Water Regulations", 310CMR 22.00.

(c) = Primary MCL standard (health related), applies to source (raw) water only. DEP "Drinking Water Regulations", 310CMR 22.00.

(d) = Primary MCL standard (health related). DEP "Drinking Water Regulations", 310CMR 22.00. Applies to samples of treated water downstream of Wachusett and Quabbin Reservoirs.

(e) - Confirmed results only are reported

MCL = Maximum Contaminant Level
CFU = Colony Forming Unit
S.U. = Standard Units
UG/L = micrograms per liter = parts per billion
NS = No sample
NTU = Nephelometric Turbidity Unit
MG/L = milligrams per liter = parts per million
< = less than method detection limit
HPC = Heterotrophic Plate Count
** = Metal results may be elevated due to local plumbing at the sample tap.
Quarterly = Reduced to Quarterly Monitoring
Inv Res = Invalid sample result
µmhos = ohms/1000

Most results are based on single grab samples collected on December 2, 2002 and analyzed by MWRA and contract laboratories.

NOTE: MWRA tests for cadmium and mercury are more sensitive than the EPA-set levels of detection and reporting. For cadmium any level below 1.0 ug/L and for mercury any level below 0.2 ug/L are under the EPA minimum detection limits. MWRA will continue to report any result below these detection limits here in the monthly report but will follow EPA reporting requirements and not report them in the EPA-regulated annual Consumer Confidence Report.

Pathogen Monitoring Program
December 2002

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 to better understand our watershed and to ensure that our source waters are free from potential disease-causing organisms. 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 3 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*.

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

Table 1 – Cosgrove Intake: *Giardia* and *Cryptosporidium* Results (oocysts/100L) for Wachusett Reservoir – Last 6 Months (ND – Not Detected)

Sample Date	*Giardia* Presumed	*Giardia* Confirmed	*Crypto* Presumed	*Crypto* Confirmed	Detection Limit
2-Jul-02	ND	ND	ND	ND	1.01
9-Jul-02	ND	ND	ND	ND	1.06
15-Jul-02	ND	ND	ND	ND	1.06
22-Jul-02	ND	ND	ND	ND	1.06
29-Jul-02	ND	ND	ND	ND	0.53
5-Aug-02	ND	ND	ND	ND	1.06
12-Aug-02	ND	ND	ND	ND	0.53
20-Aug-02	ND	ND	ND	ND	1.59
26-Aug-02	ND	ND	ND	ND	0.53
3-Sep-02	ND	ND	ND	ND	1.06
9-Sep-02	ND	ND	ND	ND	1.06
16-Sep-02	ND	ND	ND	ND	1.55
24-Sep-02	ND	ND	ND	ND	1.06
30-Sep-02	ND	ND	ND	ND	0.97
7-Oct-02	ND	ND	ND	ND	1.03
15-Oct-02	ND	ND	ND	ND	1.06
21-Oct-02	ND	ND	ND	ND	1.06
28-Oct-02	ND	ND	ND	ND	1.06
4-Nov-02	ND	ND	ND	ND	1.06
12-Nov-02	ND	ND	ND	ND	1.05
19-Nov-02	ND	ND	ND	ND	1.06
25-Nov-02	ND	ND	ND	ND	1.06
3-Dec-02	ND	ND	ND	ND	2.09
9-Dec-02	ND	ND	ND	ND	4.23
17-Dec-02	ND	ND	ND	ND	2.11
23-Dec-02	ND	ND	ND	ND	1.06
30-Dec-02	ND	ND	ND	ND	2.11

Table 3 – CVA Intake: *Giardia* and *Cryptosporidium* Results (oocysts/100L) for Quabbin Reservoir – Last 4 Months (ND – Not Detected)

Sample Date	*Giardia* Presumed	*Giardia* Confirmed	*Crypto* Presumed	*Crypto* Confirmed	Detection Limit
05-Aug-2002	ND	ND	ND	ND	1.06
20-Aug-2002	ND	ND	ND	ND	1.04
03-Sep-2002	ND	ND	ND	ND	1.06
16-Sep-2002	ND	ND	ND	ND	1.06
15-Oct-2002	ND	ND	ND	ND	0.53
28-Oct-2002	ND	ND	ND	ND	1.04
05-Nov-2002	ND	ND	ND	ND	1.06
18-Nov-2002	ND	ND	ND	ND	1.06
09-Dec-2002	ND	ND	ND	ND	0.53
16-Dec-2002	ND	ND	ND	ND	0.53

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 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; 18 of 82 (22%) filters analyzed between May 2001 and December 2002 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 0.1 oocyst/100 liters. Tufts has also tested for *Giardia* using the same testing method as above. In 23 samples taken since July 2002, there have been no positives, presumptive or confirmed.

Cryptosporidium Sampling: May 2001 – December 2002

# Samples	# Positives	# Confirmed	Average (oocysts/100L)	Range of detects (oocysts/100L)
82	18 (22%)	5 (6%)	0.08	0.1 – 1.1

Giardia Sampling: July 2002 – December 2002

# Sampling	# Positives	# Confirmed	Average (cysts/100L)	Range of detects (cysts/100L)
23	0	0	0	-

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.