WATER QUALITY UPDATE

An Analysis of March 2004 Sampling Data

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

MASSACHUSETTS WATER RESOURCES AUTHORITY

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

MWRA WATER QUALITY UPDATE

March 2004 Highlights

•**For the first time in the history of our water system**, there are no open distribution reservoirs in service within the metropolitan area. Once the water leaves Wachusett Reservoir in Clinton, it does not see the light of day until it comes out of the tap in our homes. Water quality results are already showing increased stability now that no water passes through open reservoirs after treatment. The **Cosgrove Tunnel was reactivated on the 16th**, while the Wachusett Aqueduct was taken offline. The **Norumbega Open Reservoir was taken offline on the 17th**. The covered storage tanks in Weston replace the open reservoir. The **Interim Corrosion Control Facility** was shut down for approximately 43 hours during this transition. Some samples during this period will have a pH closer to 7 rather than the 9.1. There have been no reported water quality complaints during this transition.

•**MWRA achieved CT disinfection requirements for the month** at the Ware Disinfection Facility (WDF), Wachusett Temporary Disinfection Facility (WTDF) and the Cosgrove Disinfection Facility (CDF). CT results appear on Page 5. The running annual averages for DBPs are higher this year as compared to last year see page 7. No community had samples which violated the Total Coliform Rule criteria. See Page 6.

•**MWRA has received 311 "white water" complaints this month.** White water, or cloudy water, is caused by air bubbles in the water and is completely harmless. White water usually happens when it is very cold outside because the solubility of air in water increases as water pressure increases and/or water temperature decreases. Complaints seem to have diminished late in the month. Further information including pictures is available on our website – **//http:/www.mwra.com**.

•**The MWRA has published a notice on the failure by MWRA communities to collect exactly the correct number of lead and copper samples in 2003.** Materials have been provided to water and health departments. For more info call 617 242-5323.

Let us know what you think *(617) 242-5323*

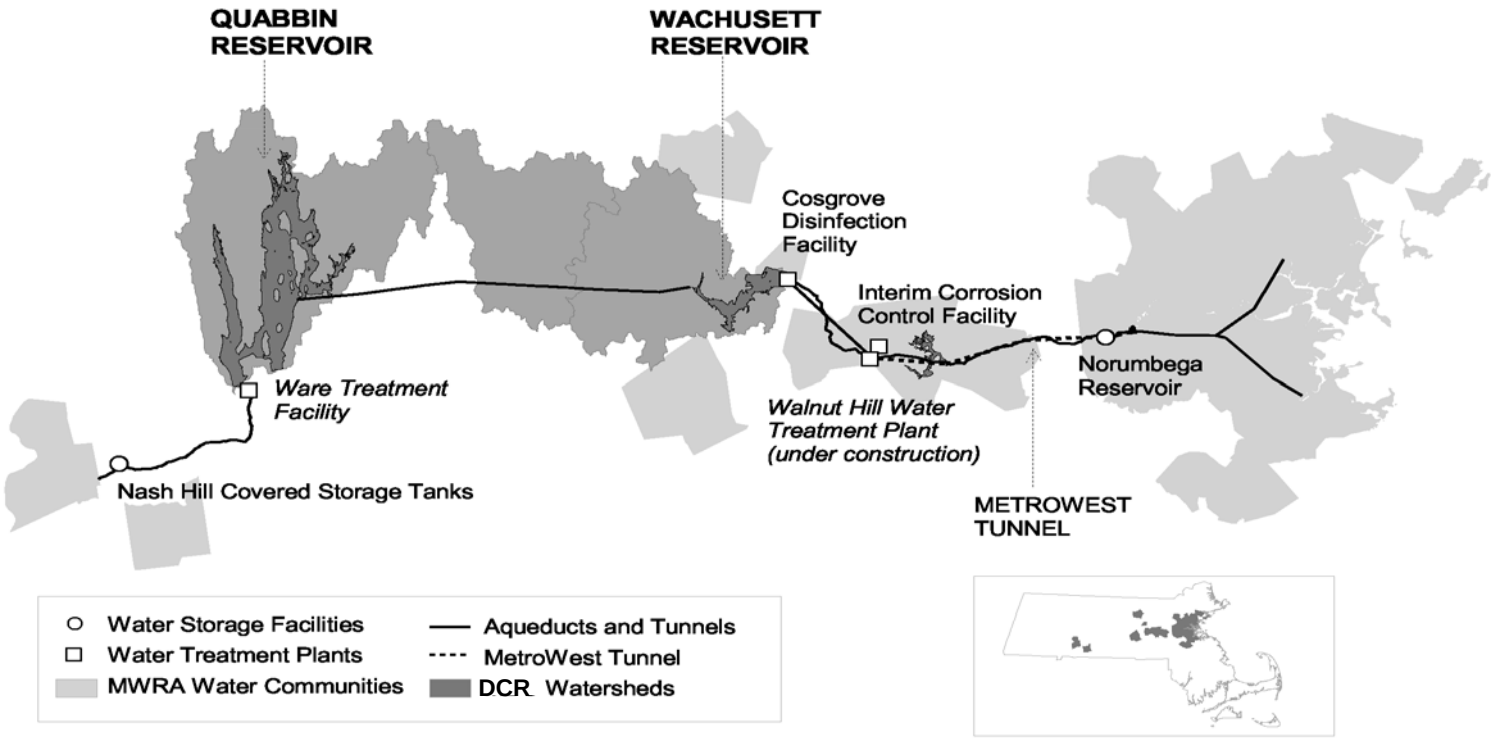
Release Date: April 20, 2004

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 Department of Conservation and Recreation (DCR), 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
March 2004

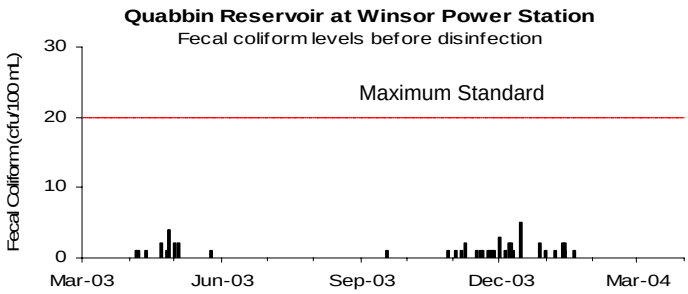
Source Water - Microbial Results

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.

None of the 31 samples were positive during March.

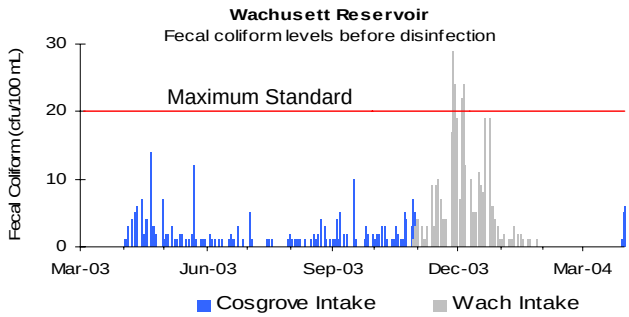


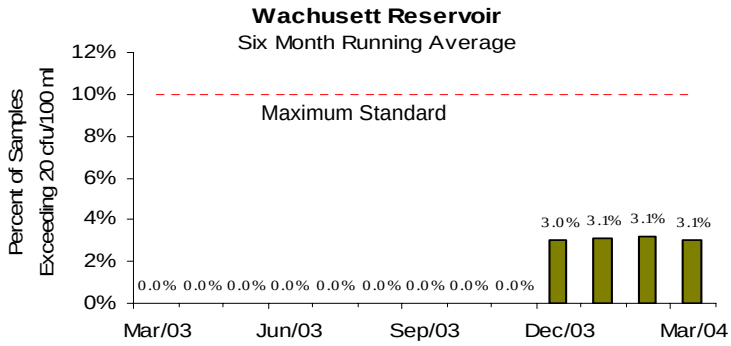
Sample Site: Wachusett Reservoir

Wachusett Reservoir water was sampled at Wachusett Intake before entering the MetroWest and Metropolitan Boston systems from November 2003 until its deactivation on March 16, 2004. The water is sampled at the Cosgrove Intake as of March 17th. For the current six-month period, 3.1% of the (4 samples have exceeded a count of 20 cfu/100ml).

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.

Three of the 23 samples were positive during March. Colony counts were in the single digits.



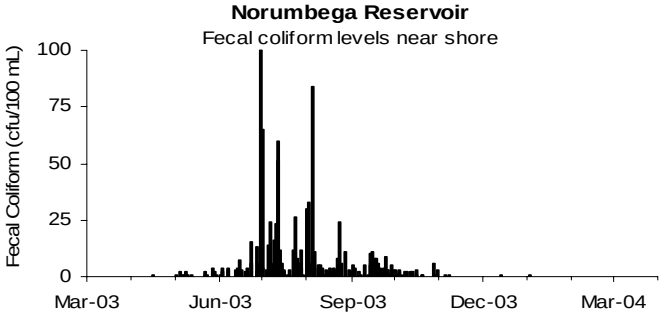


Sample Site: Norumbega Reservoir

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.

None of the daily samples from water taken along the shore were positive for fecal coliform during March. Seasonally, coliform levels tend to increase due to rain, warm temperatures, wind direction, and birds.

The reservoir was taken offline on March 17th and was replaced by covered storage tanks.

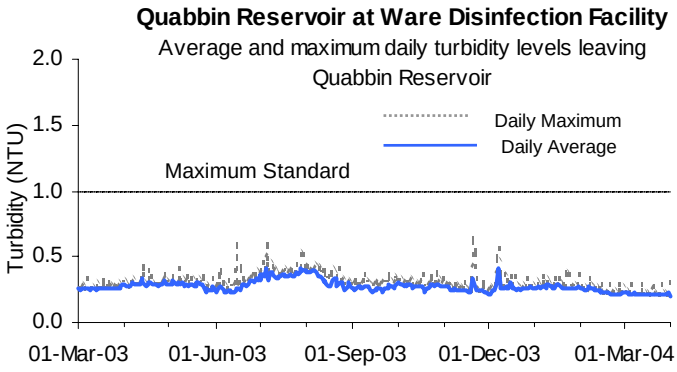


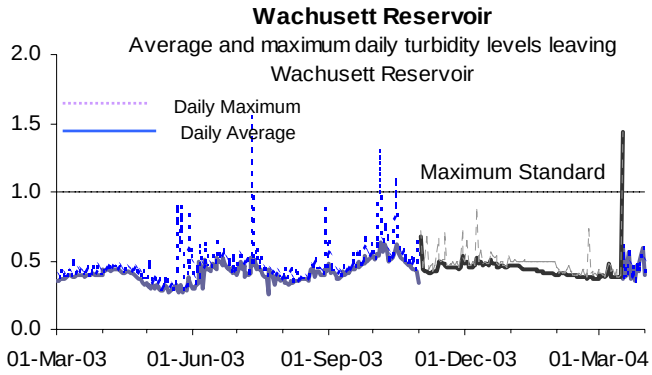
Source Water – Turbidity and Algae Results
March 2004

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. Samples from Wachusett Reservoir were taken at Wachusett Intake before chlorination from November 1, 2003 until March 16, 2004; samples before and after this period are taken at the Cosgrove Intake. 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 Quabbin were within DEP standards for the month. The Wachusett Reservoir had a 15 minute turbidity spike on the 16th which reached 1.4 NTU; there was no interference with disinfection.

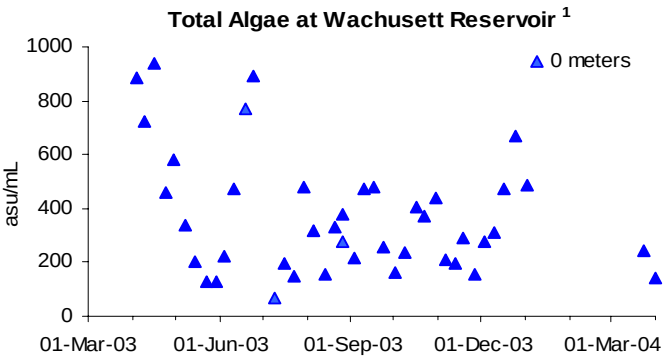


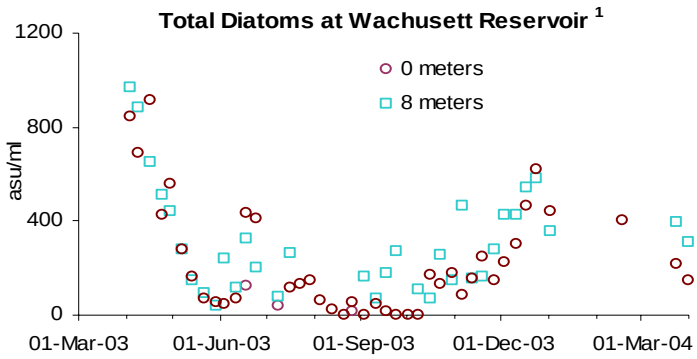


Source Water – Algae Results

Algal levels in reservoirs are monitored by DCR 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 may treat the reservoirs with copper sulfate, an algaecide. Of 335 complaints received during March from local water departments, only three concerned taste and odor that may be due to algae.

The Wachusett Reservoir is no longer frozen at the Intake area. The DCR resumed algae sampling on March 23rd.





1. Algae samples collected between 0 to 3 meters represent the same area of water column and are generally equivalent. These samples will be shown in the graphs as 0 meters.

Treated Water – Disinfection and pH Results
March 2004

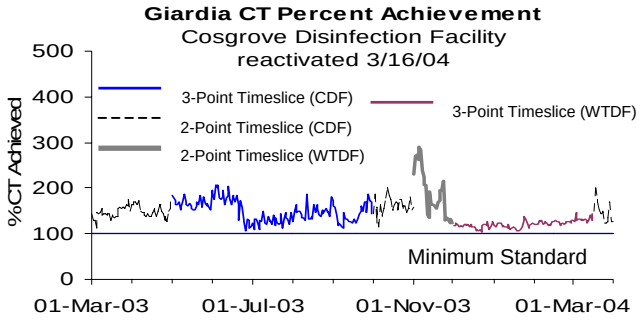
Treated Water - Primary Disinfection

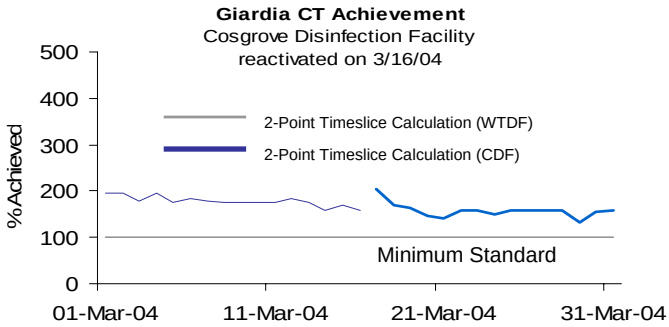
MWRA provides disinfection adequate to achieve EPA's requirement of 99.9% inactivation of *Giardia* cysts and 99.99% inactivation of viruses in drinking water using a calculation based on three sample points that DEP approved in June, 1999. The two-point timeslice, three-point timeslice, or integrated 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.

Wachusett Reservoir - MetroBoston Supply:

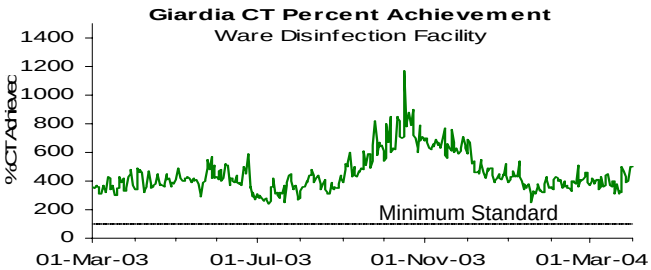
Chlorine dose at the Wachusett Disinfection Facility (WTDF) was lowered to 2.2 mg/L from 2.3 mg/L on the 5th. The WTDF was taken offline on the 16th. The Cosgrove Disinfection Facility (CDF) was reactivated the same day using the 2-time slice calculation. The dose at the CDF has been 1.8 mg/L since the 22nd. CT was met each day in March, as well as every day for the last year.

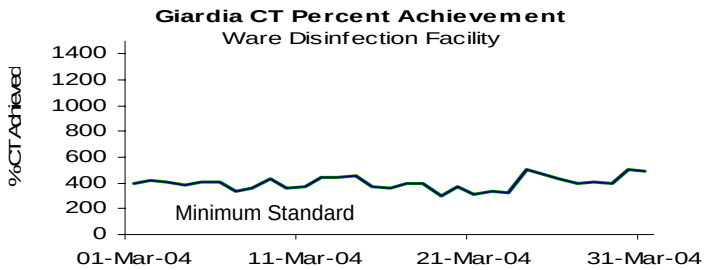




Quabbin Reservoir at Ware Disinfection Facility (CVA Supply):

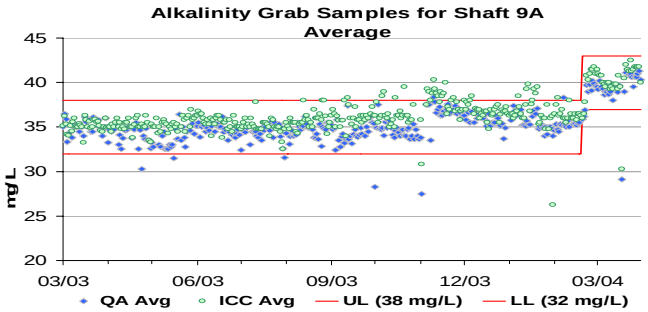
Chlorine dose remained at 1.3 mg/L . CT was met each day in March, as well as every day for the last year.

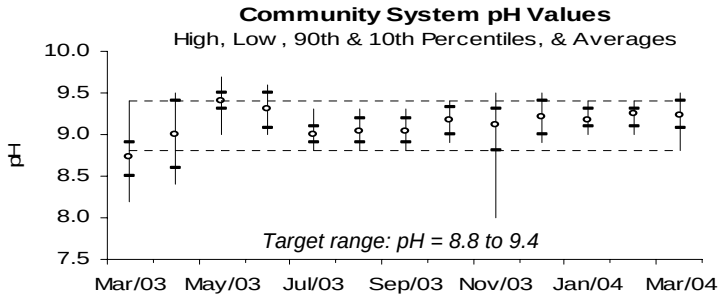




Treated Water – pH and Alkalinity Results

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 is 9.1 and alkalinity is 40 mg/l. MWRA's goal is to have 80% of distribution system pH samples fall between 8.8 and 9.4. MWRA staff collects and analyzes samples for pH from 28 community locations on a biweekly schedule to measure pH levels. In March, 95% of the samples were within the target range.





Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program
March 2004

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

One of the 1,930 community samples (0.05%) system-wide tested positive for confirmed total coliform during the month of March. No samples tested positive for *E. coli*. None of the 708 MWRA samples (0.00%) 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. 1.1% 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?	March 2004 Minimum Chlorine Residual (mg/L)	March 2003 Minimum Chlorine Residual (mg/L)	March 2004 Average Chlorine Residual (mg/L)	March 2003 Average Chlorine Residual (mg/L)
ARLINGTON	56	0 (0%)			0.29	0.15	1.16	1.11
BELMONT	40	0 (0%)			0.58	0.34	1.42	1.21
BOSTON	266	0 (0%)			0.94	0.80	1.60	1.38
BROOKLINE	85	0 (0%)			0.83	1.31	1.62	1.50
CHELSEA	40	0 (0%)			0.46	0.53	1.50	1.29
DEER ISLAND	20	0 (0%)			1.12	1.01	1.42	1.39
EVERETT	53	1 (1.89%)		no	0.49	0.51	1.05	1.01
FRAMINGHAM (c)	72	0 (0%)			0.28	1.08	1.24	1.50
LEXINGTON	45	0 (0%)			1.01	1.18	1.60	1.47
LYNNFIELD	6	0 (0%)			0.51	0.86	1.24	1.37
MALDEN	75	0 (0%)			0.80	0.81	1.03	1.04
MARBLEHEAD	24	0 (0%)			0.27	0.26	1.45	1.20
MARLBOROUGH (b)(c)	52	0 (0%)			0.64	0.92	1.02	1.17
MEDFORD	67	0 (0%)			0.54	0.25	1.52	1.07
MELROSE	45	0 (0%)			0.03	0.06	0.76	0.98
MILTON	40	0 (0%)			0.10	0.75	1.13	1.17
NAHANT	10	0 (0%)			0.07	0.72	1.05	1.25
NEEDHAM (b)	50	0 (0%)			0.04	0.06	0.22	0.35
NEWTON	110	0 (0%)			1.12	0.83	1.69	1.41
NORTHBOROUGH	16	0 (0%)			1.18	1.29	1.56	1.47
NORWOOD	45	0 (0%)			0.49	0.04	1.38	1.16
QUINCY	114	0 (0%)			0.48	0.36	1.48	1.45
REVERE	52	0 (0%)			0.40	1.20	1.39	1.42
SAUGUS	40	0 (0%)			1.44	1.37	1.54	1.47
SOMERVILLE	100	0 (0%)			0.10	0.19	1.25	1.23
SOUTHBOROUGH (c)	10	0 (0%)			0.22	0.17	1.01	1.19
STONEHAM	28	0 (0%)			0.87	1.21	1.64	1.42
SWAMPSCOTT	18	0 (0%)			0.73	0.84	1.39	1.27
WAKEFIELD (b)	44	0 (0%)			0.52	0.48	1.26	1.13
WALTHAM	85	0 (0%)			0.15	0.01	1.14	0.67
WATERTOWN	40	0 (0%)			0.77	0.26	1.40	1.13
WELLESLEY (b)	37	0 (0%)			0.05	0.25	0.42	0.53
WESTBORO HOSPITAL	5	0 (0%)			0.13	0.00	1.00	0.48
WESTON (c)	16	0 (0%)			0.62	1.01	1.27	1.34
WINCHESTER (b)	25	0 (0%)			0.03	0.09	0.63	0.63
WINTHROP	24	0 (0%)			0.85	0.32	1.45	1.34
WOBURN (b)	75	0 (0%)			0.09	0.09	0.72	0.69
Total:	1930	1 (0.05%)						
MASS. WATER RESOURCES AUTHORITY (d)	708	0 (0%)			0.03	0.06	1.42	1.28

(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.

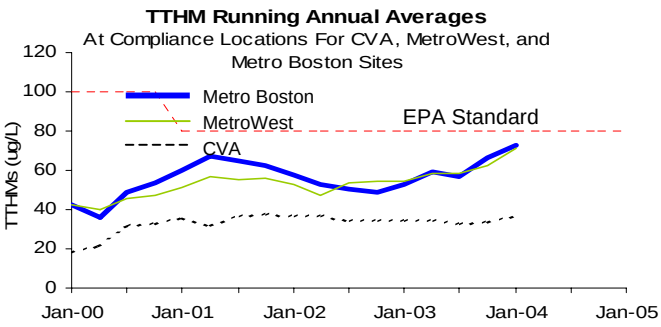
(d) MWRA sampling program includes a subset of community TCR sites as well as sites along the transmission system, tanks and pumping stations.

Treated Water - Disinfection By-Product (DBP) Levels in Communities
March 2004

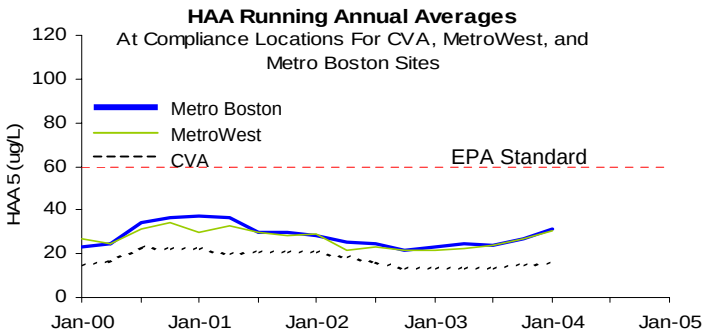
Total Trihalomethanes (TTHMs) and Haloacetic Acids (HAAs) are by-products of disinfection treatment with chlorine. Chlorination levels, the presence of organic precursors, pH levels, the contact time of water with chlorine used for disinfection, and temperature all affect TTHM and HAA levels. DBPs are 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 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.

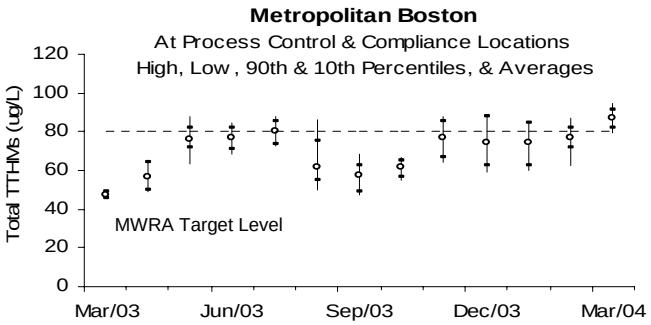
The running annual average for TTHMs and HAA5s at compliance locations, represented in the graphs at the top of the page, remained below current standards. Average monthly HAA5 and TTHM levels at all process control sampling locations for the MetroWest, CVA and Metropolitan Boston communities are higher than those of last year. The CVA system monitoring has been reduced from monthly to quarterly per DEP requirements. The Metropolitan communities are higher than those of last year due in part to the use of the Wachusett Aqueduct and the resulting need for higher chlorine doses.

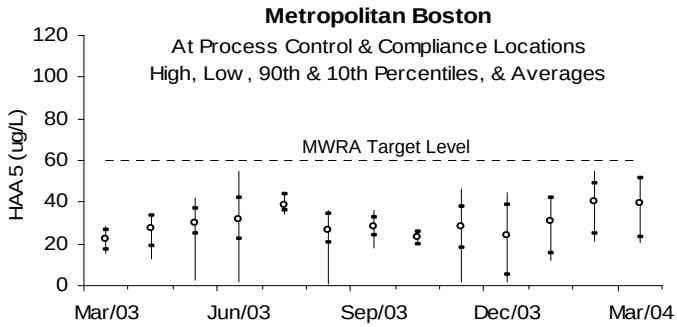
TOTAL TRIHALOMETHANES

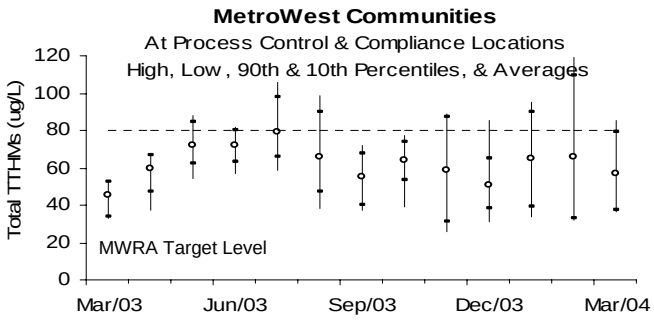


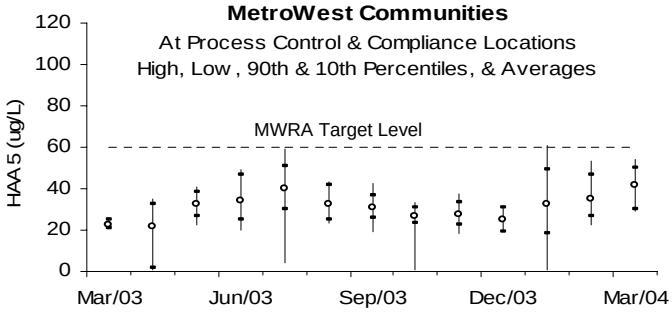
HALOACETIC ACIDS

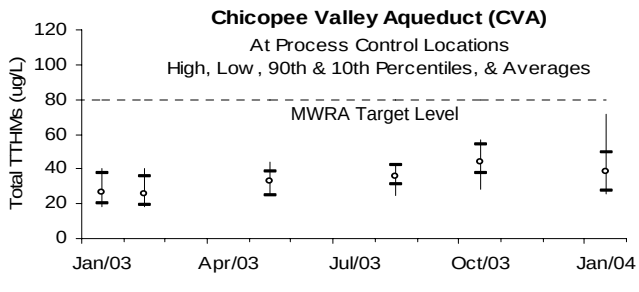


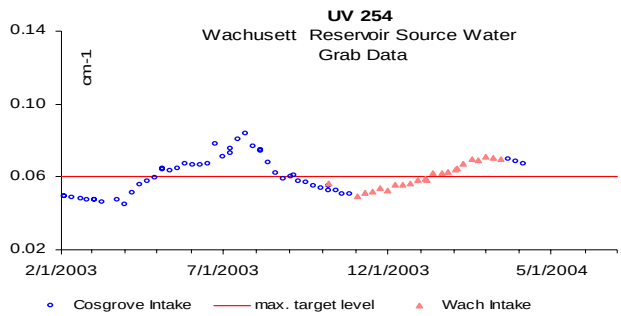












MWRA Monthly Water Quality Analysis
March 2004

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)	Ludlow Monitoring Station (Treated)	Wachusett Reservoir at Cosgrove Intake* (Raw)	ICC Marlboro (Treated)	Comm Ave., Newton (Treated)	Shaft 9A, Malden (Treated)	Standard	Units	Exceedance
Alkalinity	2.8	3.3	5.7	38.5	37.9	39		MG/L	
Aluminum	< *10.0*	< *10.0*	< *10.0*	< *10.0*	*10.4*	*11.4*	50-200 (d)	UG/L	NO
Ammonia-N	0.025	0.011	0.022	< 0.011	0.259	0.252		MG/L	
Antimony	< *0.9*	< *0.9*	< *0.9*	< *0.9*	< *0.9*	< *0.9*	6 (a)	UG/L	NO
Arsenic	< *0.8*	< *0.8*	< *0.8*	< *0.8*	< *0.8*	< *0.8*	50 (a)	UG/L	NO
Barium	*5.9*	*6.2*	10.4	10.4	10.4	10.4	2000 (a)	UG/L	NO
Beryllium	< *0.1*	< *0.1*	< *0.1*	< *0.1*	< *0.1*	< *0.1*	4 (a)	UG/L	NO
Bromate	< 2.5	< 2.5	< 2.5	7.7	* 16.6	< 2.5	10 (a)	UG/L	NO
Bromide	11.3	5.6	18.4	10.4	6.59	6.5		UG/L	
Cadmium	< *0.2*	< *0.2*	< *0.2*	< *0.2*	< *0.2*	< *0.2*	5 (a)	UG/L	NO
Calcium	*2240*	*2290*	4990	4970	5080	5130		UG/L	
Chloride	7.5	8.5	25.1	26.9	26.9	26.9	250 (d)	MG/L	NO
Chlorine, Free	NA	0.77	NS	1.06	NS	NS		MG/L	
Chlorine, Total	NA	NA	NS	NS	1.82	1.92		MG/L	
Chromium	< *0.6*	< *0.6*	< *0.6*	< *0.6*	< *0.6*	< *0.6*	100 (a)	UG/L	NO
Coliform, Fecal, MF Method	0	NS	0	NS	NS	NS	20 (b)	CFU/100 mL	NO
Coliform, Total, MF Method (e)	0	0	0	0	0	0	100 (b) 0 (c)	CFU/100 mL	NO
Copper **	1.0	1.2	*2.7*	*3.2*	*2.7*	*6.2*	1300 (a)	UG/L	NO
Cyanide	< *0.01*	< *0.01*	< *0.01*	< *0.01*	< *0.01*	< *0.01*	0.2 (a)	MG/L	NO
Fluoride	*0.06*	0.10	< 0.78	1.00	0.94	0.98	4 (a)	MG/L	NO
Hardness	*7.8*	*7.9*	16.4	16.3	16.6	16.7		MG/L	
Iron **	*12.0*	*12.5*	*26.3*	*28.6*	*29.6*	*27.9*	300 (d)	UG/L	NO
Lead	< *1.2*	< *1.2*	< *1.2*	< *1.2*	< *1.2*	< *1.2*	15 (a)	UG/L	NO
Magnesium	*540*	*533*	945	932	946	947		UG/L	
Manganese	*2.6*	*2.2*	8.6	7.9	8.3	7.6	50 (d)	UG/L	NO
Mercury	< *0.01*	< *0.01*	< *0.01*	< *0.01*	< *0.01*	< *0.01*	2 (a)	UG/L	NO
Nickel	< *1.0*	< *1.0*	< *1.0*	< *1.0*	< *1.0*	< *1.0*		UG/L	
Nitrate-N	< *0.005*	< *0.005*	*0.034*	*0.029*	*0.085*	*0.027*	10 (a)	MG/L	NO
Nitrate+Nitrite - N	0.025	0.025	0.107	0.112	0.133	0.127			
Nitrite	< *0.005*	< *0.005*	< *0.005*	< *0.005*	< *0.005*	< *0.005*	1 (a)	MG/L	NO
Orthophosphate	< *0.003*	*0.003*	*0.004*	*0.008*	*0.007*	*0.007*		MG/L	
pH	6.5	6.4	7.0	8.9	9.1	9.2		S.U.	
Potassium	*506*	*510*	1030	1060	1080	1080		UG/L	
Selenium	< *0.9*	< *0.9*	< *0.9*	< *0.9*	< *0.9*	< *0.9*	50 (a)	UG/L	NO
Silica (SiO2)	*1070*	*1070*	2970	3420	3400	3360		UG/L	
Silver	< *0.4*	< *0.4*	< *0.4*	< *0.4*	< *0.4*	< *0.4*	100 (d)	UG/L	NO
Sodium	*4.5*	*5.8*	14.8	32.1	32.1	32.5		MG/L	
Specific Conductance	49	53	123	195	*184*	*187*		UMHO/cm	
Standard Plate Count, HPC (48 Hrs @ 35C)	NS	NS	NS	2	3	1	500 (c)	CFU/mL	NO
Sulfate (SO4)	5.5	5.4	7.2	7.3	7.3	7.3		MG/L	
Thallium	< *1.0*	< *1.0*	< *1.0*	< *1.0*	< *1.0*	< *1.0*	2 (a)	UG/L	NO
Total Dissolved Solids	40	60	114	117	131	145		MG/L	
Total Organic Carbon	1.8	1.8	2.6	2.5	2.5	2.6		MG/L	
Total Phosphorus	< 0.005	< 0.005	0.005	0.011	0.013	0.011		MG/L	
UV-254	0.023	0.013	0.071	0.052	0.061	0.062		A	
Zinc **	*1.7*	*2.5*	2.2	1.9	2.4	1.9	5000 (d)	UG/L	NO

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

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

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

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

(e) - Confirmed results only are reported

MCL = Maximum Contaminant Level NA = Not applicable HPC = Heterotrophic Plate Count

* Result under investigation, only one other sample from this location showed a concentration above the detection limit of 2.5 ug/L in the past 3 years 39 samples).

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*.

Table 1 – Cosgrove Intake: *Cryptosporidium* Results (oocysts/100L) 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

Table 2 – Cosgrove Intake: *Giardia* Results (cysts/100L) 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

Table 3 – CVA Intake: *Cryptosporidium* Results (oocysts/100L) 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

Table 4 – CVA Intake: *Giardia* Results (cysts/100L) 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.

Table 5 - 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

Table 6 - 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.