



MASSACHUSETTS WATER RESOURCES AUTHORITY

WATER QUALITY UPDATE An Analysis of June 2001 Sampling Data

This is a monthly report containing information about the quality of water supplied by MWRA. We hope this report is useful to you as a local water supplier, public health official, water consumer or observer of MWRA's system performance. It provides a more detailed review of water quality than the annual water quality report that is mailed each June to every customer in our service area. To view this annual report, please visit www.mwra.com/water/html/awqr.htm.

Indicators of Water Quality

MWRA routinely uses six general indicators of water quality:

- Microbial
- Corrosiveness (pH and alkalinity)
- Disinfection By-Products
- Turbidity & Algae
- Disinfectant Residual
- Mineral Analysis

Tests are conducted on water sampled at the source reservoirs (source or raw water) and also on water after treatment sampled from MWRA or community lines (treated water). A map on Page 2 indicates the location of reservoirs, treatment facilities, and service communities. Testing frequencies vary by parameter. The following pages contain information on all of the above indicators.

June 2001 Highlights

- **MWRA's Annual Water Quality Report was mailed.** A copy of this document will be distributed to each of the over 800,000 households served by MWRA. Look for copies in the mail or view results at MWRA's Web site (www.mwra.com/water/html/awqr.htm). A press release from June 14 may also be viewed at www.mwra.com.
- **MWRA treated Wachusett Reservoir and Norumbega Reservoir for algae on June 15.** Levels of *Anabaena*, which can cause taste and odor problems, were beginning to increase. Copper sulfate was applied to control this growth. Algae levels will be watched closely over coming months. See Page 4 for data about algae.
- **Chlorine dose decreased from 1.8 mg/L to 1.7 mg/L at Cosgrove Disinfection Facility (CDF) on 6/8** in order to reduce DBP levels. MWRA also resumed use of its 3-point CT calculation and adjusted its pH target. MWRA met CT disinfection requirements every day during June at both CDF and WDF. See Page 5 for CT achievement results and pH levels in communities, Page 7 for DBP results.
- **Full-scale summer monitoring for nitrification in the distribution system resumed on June 4.** The chlorine:ammonia ratio maintained at Norumbega treatment facilities was increased from 4.5:1 to 4.6:1 on June 14 to lower nitrification potential in the distribution system. The chlorine dose at Norumbega remained unchanged at 1.8 mg/L. MWRA will measure levels of total chlorine, nitrate and nitrite, free ammonia, and HPCs at various points in the distribution system to observe the extent to which warmer temperatures affect chlorine residuals.
- **No city or town that used MWRA labs to analyze water samples taken from community sampling sites violated the Total Coliform Rule in June.** *E. coli* was not detected at any sample site. See Page 6 for details.

*For more information, please contact MWRA at (617) 242-5323, or visit www.mwra.com
100 First Avenue, Charlestown Navy Yard, Boston, MA 02129.*

*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.*

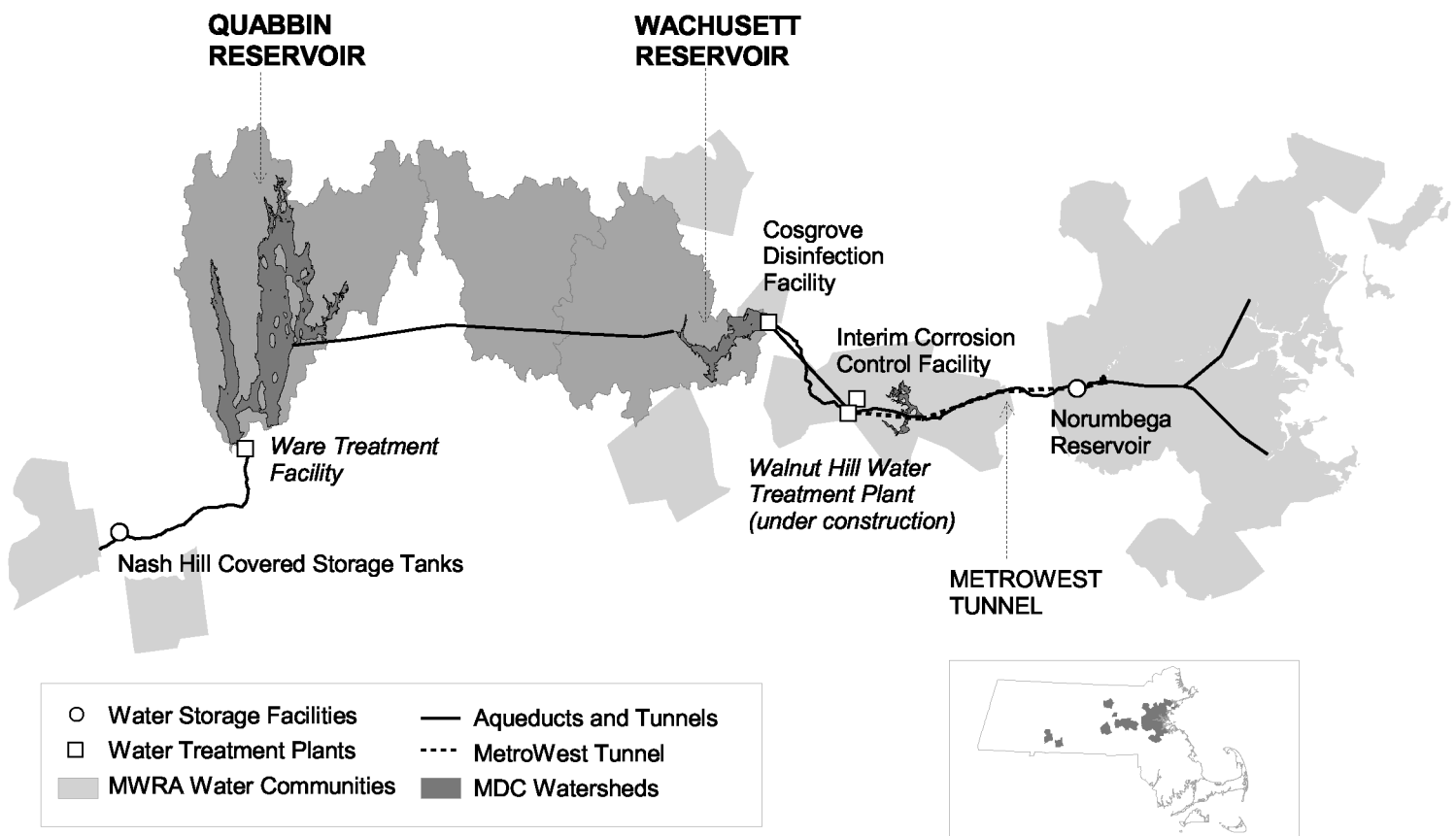
Release Date: July 20 2001

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. Thirty of the customer communities are fully supplied by MWRA. The other communities use MWRA water to augment their own supplies, either on a regular basis or in times of water shortage. 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 reservoir water for the Chicopee Valley Aqueduct (CVA) system, serving South Hadley Fire District #1, Chicopee, and Wilbraham. 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.



Federal Safe Drinking Water Act (SDWA)

The 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 provides testing services for many of the communities, and 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

June 2001

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.

No samples were positive during June. MWRA met the six-month running average standard for fecal coliform continuously at this location over the last year.

Sample Site: Wachusett Reservoir

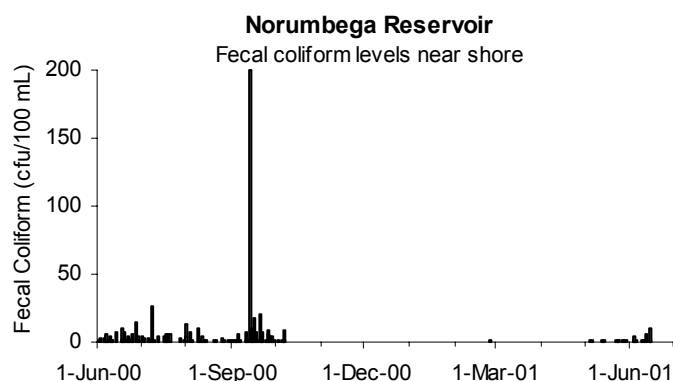
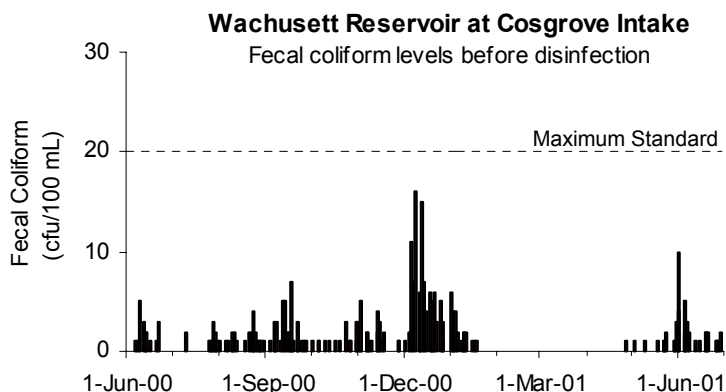
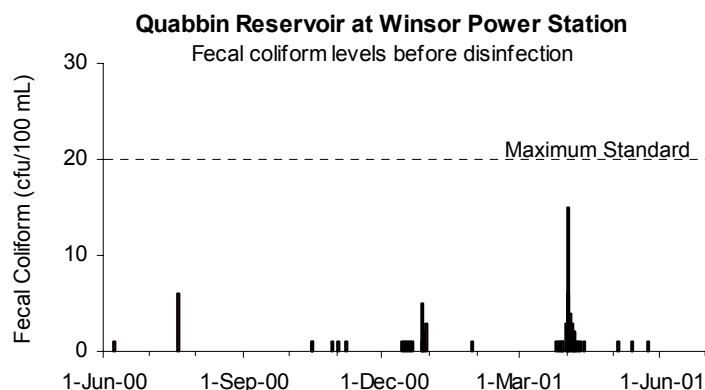
Wachusett Reservoir water is sampled at Cosgrove Intake before entering the MetroWest and Metropolitan Boston systems. Fecal coliform levels tend to increase during the winter, because, when water bodies near Wachusett ice over, waterfowl seek open water. Many roost at Wachusett, which tends to freeze later in the year than smaller ponds nearby.

14 of 21 samples taken were positive for fecal coliform, but all were below the standard. Most positive results were in single digits. MWRA met the six-month running average standard for fecal coliform continuously at this location over the last year. Levels of presumptive total coliforms have trended up since April. Additional testing is required to confirm that these are coliform bacteria. MWRA staff are monitoring levels closely.

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.

8 of 31 samples from water taken along the shore were positive for fecal coliform during June. Only one sample showed coliforms in double digits per 100 mL.



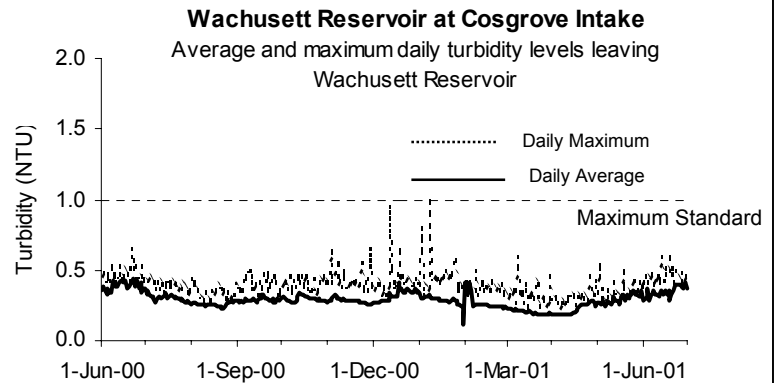
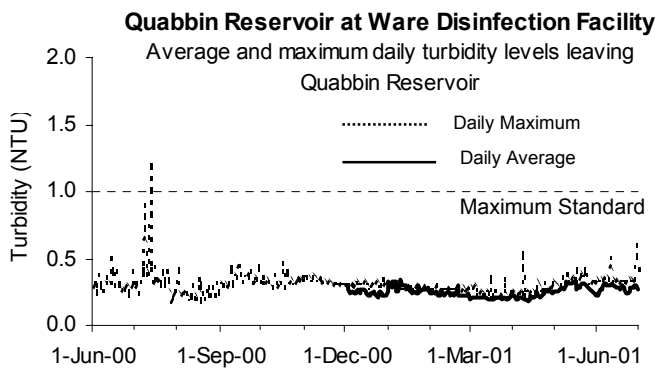
Source Water – Turbidity and Algae Results

June 2001

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.

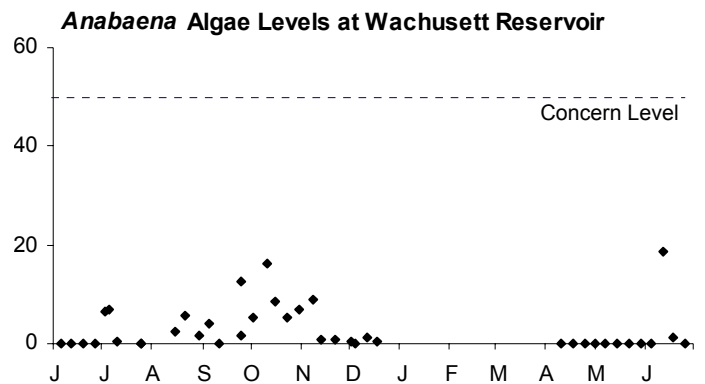
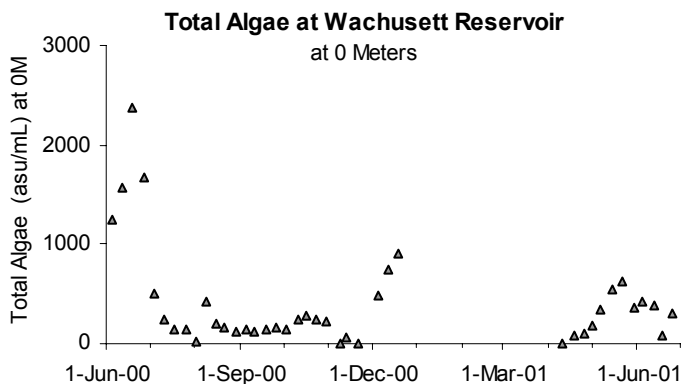
Since December, samples for turbidity are collected at the Ware Disinfection Facility before chlorination. These samples represent reservoir water entering the CVA system. Samples are also taken at Cosgrove Intake, representing water quality before chlorination for source water serving the MetroWest 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 Quabbin Reservoir and at Wachusett Reservoir were within DEP standards for the month Occasional elevated turbidity levels at Wachusett Reservoir over the past several months may be related to work on the Cosgrove Intake sluice gates.



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 algae blooms, MWRA treats the reservoirs with copper sulfate, an algaecide. MWRA last treated Wachusett Reservoir for algae on 6/15/01 in order to reduce levels of *Anabaena*. *Anabaena* will continue to be monitored closely, as it typically blooms in June & July. Of 55 complaints received during June from local water departments, 6 concerned clogged filters or taste and odor that may be due to algae.



Treated Water – Disinfection and pH Results

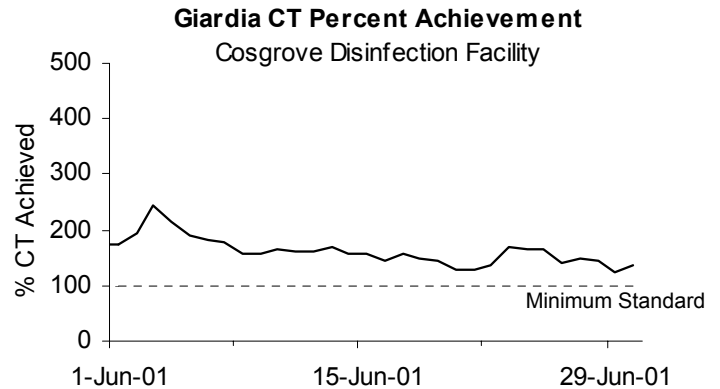
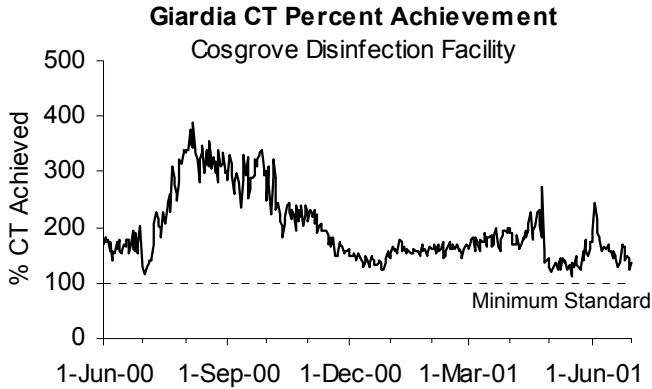
June 2001

Treated Water - Primary Disinfection

Wachusett Reservoir at Cosgrove Disinfection Facility (MetroBoston Supply):

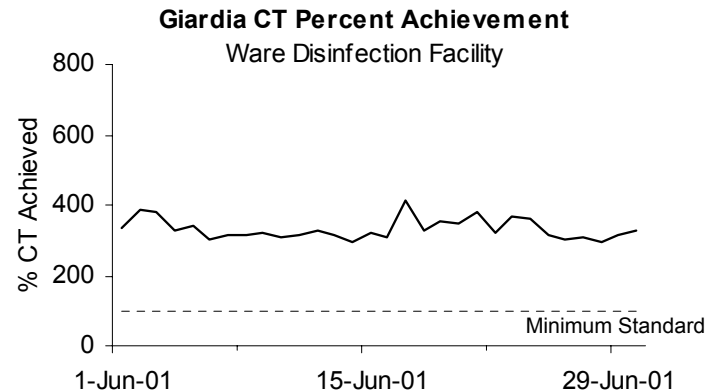
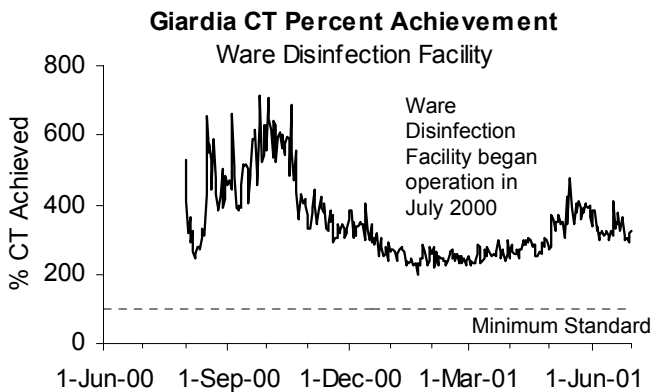
MWRA provides disinfection adequate to achieve EPA's requirement of 99.9% inactivation of *Giardia* cysts and 99.99% inactivation of viruses in drinking water using a calculation based on three sample points that DEP approved in June, 1999. CT achievement for *Giardia* assures CT achievement for viruses. 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 water temperature, pH, and other factors. MWRA calculates daily CT inactivation rates at maximum flow, as specified by EPA regulations.

A sample pump went into service on 6/6 just downstream of Cosgrove Disinfection Facility (CDF), enabling MWRA to resume use of the 3-point CT calculation to meet disinfection requirements with a lower dose. CT was met each day in June, as well as every day for the last year.



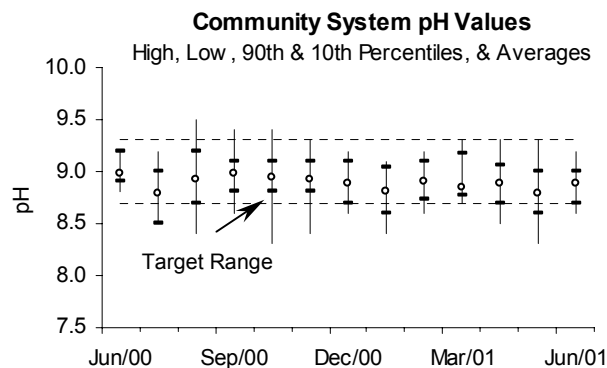
Quabbin Reservoir at Ware Disinfection Facility (CVA Supply):

CT was met each day in June, as well as every day since reporting began in August, 2000.



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 targets pH levels between 8.7 and 9.3 to minimize leaching of lead. In order to maintain these levels this summer, the target pH at Shaft 4 increased from 9.3 to 9.4 on 6/1 to counter a seasonal downward drift of pH levels in the distribution system. MWRA staff collects and analyzes samples for pH from 26 community locations on a biweekly schedule to measure pH levels. In June, about 97% of samples were within the target range.



Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program June 2001

Background

While all communities collect bacteria samples for the TCR, 37 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.

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

Two of the 1738 samples tested positive for total coliform during the month of June. No samples tested positive for *E. coli*. Public notification was not required by any city or town that uses MWRA laboratories.

All of the thirty-six communities that submitted chlorine residual data maintained an average disinfectant residual of at least 0.2 mg/L. Eleven communities had one or more samples with a disinfectant residual lower than 0.2 mg/L. Three fully-served communities had average residuals lower than last year by 15% or more.

TCR results by Community

Town	Samples Tested for Coliform (a)	Total Coliform # (%) Positive	E.coli % Positive	Public Notification Required?	June 2001 Minimum Chlorine Residual (mg/L)	June 2000 Minimum Chlorine Residual (mg/L)	June 2001 Average Chlorine Residual (mg/L)	June 2000 Average Chlorine Residual (mg/L)
ARLINGTON	56	0 (0%)	0.0%		0.15	0.14	1.08	1.18
BELMONT	32	0 (0%)	0.0%		0.20	0.30	1.02	1.12
BOSTON	238	0 (0%)	0.0%		0.48	0.18	1.58	1.67
BROOKLINE	68	0 (0%)	0.0%		1.10	1.00	1.77	1.80
CHELSEA	32	0 (0%)	0.0%		0.19	0.68	1.37	1.64
CHICOPEE	60	0 (0%)	0.0%		0.30		0.69	
EVERETT	40	0 (0%)	0.0%		1.30	0.80	1.58	1.45
FRAMINGHAM (c)	72	0 (0%)	0.0%		0.24	0.09	1.27	1.13
LEXINGTON	36	0 (0%)	0.0%		1.05	1.50	1.54	1.77
LYNNFIELD	6	0 (0%)	0.0%		1.17	0.96	1.43	1.45
MALDEN	60	0 (0%)	0.0%		0.07	0.03	1.17	0.98
MARBLEHEAD	24	0 (0%)	0.0%		0.70	0.72	1.48	1.60
MARLBOROUGH (b)(c)	56	1 (1.79%)	0.0%		0.21	0.13	1.03	0.69
MEDFORD	68	0 (0%)	0.0%		0.10	0.1	1.03	1.10
MELROSE	36	0 (0%)	0.0%		0.10	0.10	1.21	1.21
MILTON	32	0 (0%)	0.0%		0.88	0.91	1.35	1.46
NAHANT	10	0 (0%)	0.0%		0.02	0.08	0.26	0.81
NEEDHAM (b)	41	0 (0%)	0.0%		0.02	0.01	0.87	0.52
NEWTON	88	0 (0%)	0.0%		0.88	0.55	1.50	1.62
NORTHBORO	14	0 (0%)	0.0%		1.41		2.02	
NORWOOD	40	0 (0%)	0.0%		0.05	0.05	0.79	0.70
QUINCY	92	0 (0%)	0.0%		0.40	0.20	1.44	1.50
REVERE	52	0 (0%)	0.0%		0.66	0.16	1.52	1.52
SAUGUS	32	0 (0%)	0.0%		1.32	1.60	1.56	1.70
SOMERVILLE	80	0 (0%)	0.0%		0.20	0.10	1.19	0.93
SOUTHBORO (c)	11	0 (0%)	0.0%		0.30	0.30	0.86	0.96
STONEHAM	28	0 (0%)	0.0%		0.59	0.50	1.56	1.52
SWAMPSCOTT	18	0 (0%)	0.0%		0.90	0.62	1.20	1.10
WAKEFIELD (b)	44	0 (0%)	0.0%		0.30	0.18	1.06	1.20
WALTHAM	68	0 (0%)	0.0%		0.10	1.00	1.48	1.57
WATERTOWN	40	0 (0%)	0.0%		0.60	0.05	1.39	1.18
WELLESLEY (b)	41	1 (2.44%)	0.0%		0.10	0.10	0.52	0.41
WESTBORO HOSPITAL	4	0 (0%)	0.0%					
WESTON (c)	18	0 (0%)	0.0%		0.09	0.09	1.19	0.90
WINCHESTER (b)	20	0 (0%)	0.0%		0.16	0.16	0.86	0.92
WINTHROP	24	0 (0%)	0.0%		0.70	0.60	1.23	1.47
WOBURN (b)	57	0 (0%)	0.0%		0.03		0.71	
Total:	1738	2 (0.1%)						

(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 chloraminate

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

June 2001

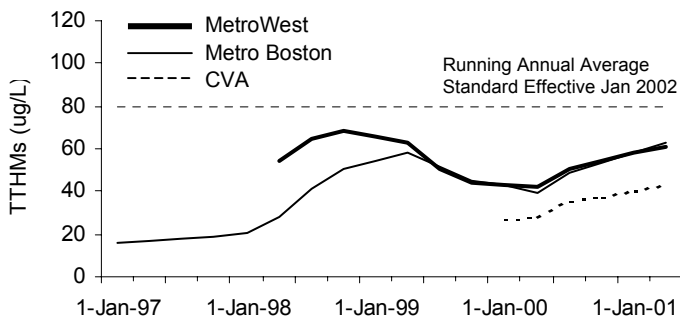
Total Trihalomethanes (TTHMs) and Haloacetic Acids (HAAs) are by-products of disinfection treatment with chlorine. Chlorination levels, the presence of organic precursors, pH levels, the contact time of water with chlorine used for disinfection, and temperature all affect TTHM and HAA levels. DBPs are of concern due to their potential adverse health effects at high levels. EPA recently established new running annual average standards of 80 ug/L for TTHMs and 60 ug/L for HAA 5 that take effect January 2002. 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 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.

TTHM levels are slightly above those of last year, but the running annual average for TTHMs, represented in the graph at the top left of the page, remained below both current and future standards. HAA 5 levels are slightly below those of last year at MetroWest and Metro locations.

TOTAL TRIHALOMETHANES

TTHM Running Annual Averages

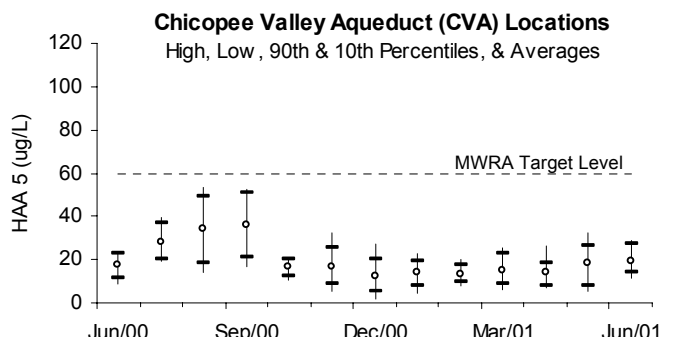
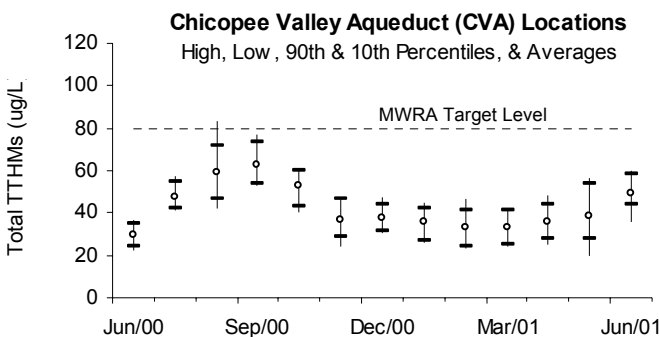
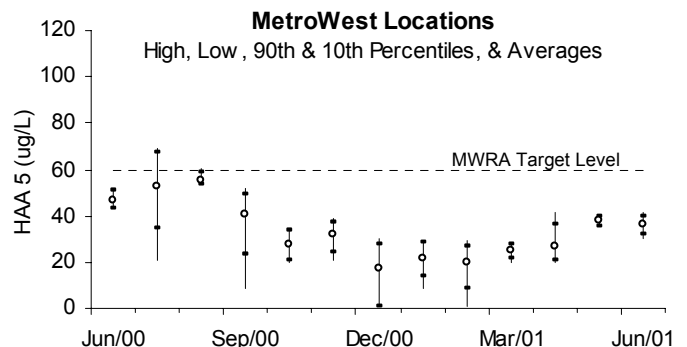
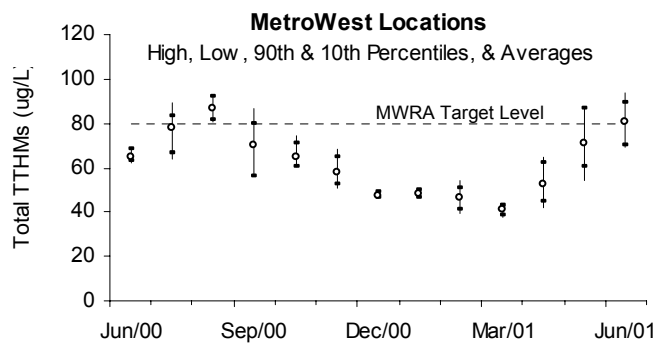
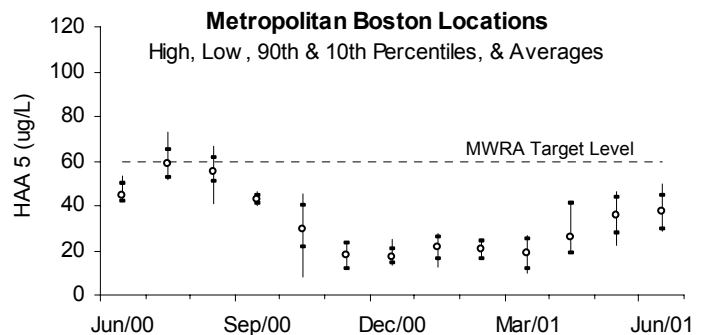
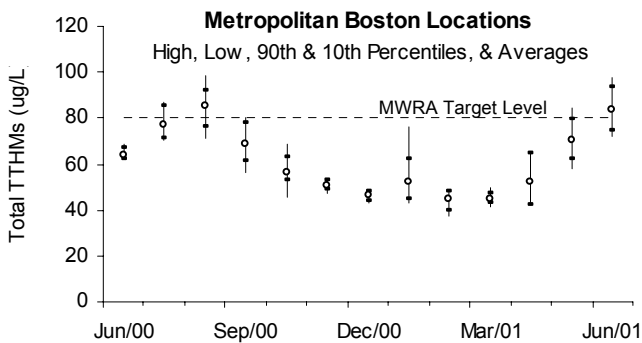
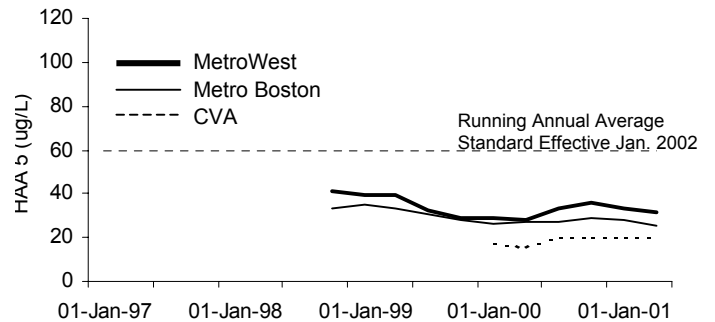
For CVA, MetroWest, and Metro Boston Sites



HALOACETIC ACIDS

HAA Running Annual Averages

For CVA, MetroWest, and Metro Boston Sites



MWRA Monthly Water Quality Analysis

June 2001

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.

Component	CVA System →		Metropolitan Boston →				Standards →		
	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)	MCL Standard	Units	Exceedance
Alkalinity	2.9	3.4	5.2	31	31	29.2		MG/L	
Aluminum	< 15	< 15	17	38.6	18.8	24.4	50-200 (a)	UG/L	NO
Ammonia-N	0.008	< .005	0.016	< .005	0.354	0.366		MG/L	
Antimony	< .9	< .9	< .9	< .9	< .9	< .9		UG/L	
Arsenic	< .8	< .8	< .8	< .8	< .8	< .8	50 (b)	UG/L	NO
Barium	6.46	6.24	9.34	9.25	9.1	9.48	2000 (b)	UG/L	NO
Beryllium	< .1	< .1	< .1	< .1	< .1	< .1	4 (b)	UG/L	NO
Bromate	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	10	UG/L	NO
Bromide	9.7	< 2.5	12.7	7.61	6.2	5.6		UG/L	
Cadmium	< .2	< .2	< .2	< .2	< .2	< .2	5 (b)	UG/L	NO
Calcium	2110	2290	4440	4420	4480	4450		UG/L	
Chloride	6.3	7.7	19.5	23.6	26.1	26.4	250 (a)	MG/L	NO
Chlorine, Free	-	0.32	-	0.42	0.23	0.23		MG/L	
Chlorine, Total	-	-	-	0.52	1.64	1.80		MG/L	
Chromium	< .6	< .6	< .6	< .6	< .6	< .6	100 (b)	UG/L	NO
Coliform, Fecal, MF Method	0	-	5	-	-	-	20 (c) 0 (d)	CFU/100 mL	NO
Coliform, Total, MF Method (g)	7	0	30	0	0	0	100 (c) 0 (d)	CFU/100 mL	NO
Color	4	2	13	10	16	12	15 (a)	C.U.	YES
Copper **	< 3	12.2	< 3	< 3	< 3	< 3	1300 (b)	UG/L	NO
Cyanide	< .01	< .01	< .01	< .01	< .01	< .01	0.2 (b)	MG/L	NO
Fluoride	< .02	0.05	< .02	1.10	1.07	1.06	4 (b)	MG/L	NO
Hardness	7.4	7.8	14.6	14.6	14.7	14.5		MG/L	
Iron **	6.6	6.5	22.3	19.2	21.6	24.8	300 (a)	UG/L	NO
Lead	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	15 (b)	UG/L	NO
Magnesium	508	501	850	858	845	831		UG/L	
Manganese	4.2	2.5	8.6	4.1	8.1	9.1	50 (a)	UG/L	NO
Mercury	< .01	< .01	< .01	< .01	< .01	< .01	2 (b)	UG/L	NO
Nickel	< 1	< 1	< 1	< 1	< 1	< 1		UG/L	
Nitrate-N	0.028	0.012	0.131	0.145	0.107	0.490	10 (b)	MG/L	NO
Nitrite	< .005	< .005	< .005	< .005	< .005	< .005		MG/L	
Orthophosphate	0.003	0.004	0.007	0.009	0.009	0.009		MG/L	
pH	6.6	7.0	6.8	8.8	8.8	9.0		S.U.	
Potassium	492	470	889	888	916	908		UG/L	
Selenium	< .9	< .9	< .9	< .9	< .9	< .9	50 (b)	UG/L	NO
Silica (SiO2)	1590	1560	2650	3110	2720	2960		UG/L	
Silver	< .4	< .4	< .4	< .4	< .4	< .4	100 (a)	UG/L	NO
Sodium	4.0	4.7	12.0	24.0	24.7	25.5		MG/L	
Specific Conductance	42	46	63	158	109	164		UMHO/C	
Standard Plate Count, HPC (48 Hrs @ 35C)	31	40	10	6	0	42	500 (d)	CFU/mL	NO
Sulfate (SO4)	5.8	5.8	7.5	7.6	7.7	7.6		MG/L	
Thallium	< 1	< 1	< 1	< 1	< 1	< 1		UG/L	
Total Dissolved Solids	25	32	59	89	89	87		MG/L	
Total Organic Carbon	2.13	1.82	2.65	2.54	2.84	2.79		MG/L	
Total Phosphorus	0.005	< .005	0.009	0.009	0.012	0.011		MG/L	
Trihalomethanes, Total (f)	-	31	-	61	81	84	100 (b) (e)	UG/L	NO
Turbidity	0.37	0.39	0.61	0.67	0.51	0.42	1 (c)	NTU	NO
UV-254	0.02	0.02	0.066	0.050	0.055	0.06		A	
Zinc **	0.9	2.7	3.7	2.8	3.7	3.1	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 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 downstream of Wachusett and Quabbin Reservoirs.

(e) = THM compliance is based on a running annual average of samples collected at DEP approved locations. A new standard of 80 UG/L goes into effect in January 2002.

(f) = Average TTHM result for weekly samples collected in the month of June 2001.

(g) - Confirmed results only are presented.

MCL = Maximum Contaminant Level

CFU = Colony Forming Unit

S.U. = Standard Units

UG/L = micrograms per liter = parts per billion

NS = No sample

C.U. = Color Unit

NTU = Nephelometric Turbidity Unit

MG/L = milligrams per liter = parts per million

< = less than method detection limit

** = Metal results may be elevated due to local plumbing at the sample tap.

HPC = Heterotrophic Plate Count

umhos = ohms/1000

Inv Res = Invalid sample result

Most results are based on single grab samples collected on June 4 & 5, 2001 and analyzed by MWRA and contract laboratories.