



MASSACHUSETTS WATER RESOURCES AUTHORITY

WATER QUALITY UPDATE An Analysis of February 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
- Turbidity & Algae
- Corrosiveness (pH and alkalinity)
- Disinfectant Residual
- Disinfection By-Products
- 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.

February 2001 Highlights

- **A combination of sodium bicarbonate and sodium carbonate will be used for a short time at the ICCF** beginning March 19th to maintain a pH of 9.0 and alkalinity 30 mg/L. Fluoride will also be turned off for about one week. Currently, MWRA uses sodium carbonate and carbon dioxide to maintain these treatment levels. Construction at Walnut Hill will cause a short interruption of feed water to the ICCF, necessitating this change.
- **Routine gull harassment remains suspended** until Wachusett ice cover melts. MDC staff continued periodic observation of the reservoir during the month to monitor ice cover. Fecal coliform levels at Wachusett Reservoir were below the standard every day for the month. There have been no fecal coliform counts above 20 since January 1999, the longest number of months below the standard in recent record. Results appear on Page 3.
- **Algae sampling also remains suspended due to freezing.** Complaints that may be due to algae were few in number. The last available sample indicated a rapid increase in levels of *Asterionella*, a diatom, which is normal for this time of year and through spring. Elevated diatom levels may cause home filters to foul rapidly, requiring more frequent maintenance. See Page 4 for latest results.
- **Maximum turbidity levels at Wachusett Reservoir were well within standards**, despite continued cleaning of sluice gates and wet wells at Cosgrove Intake. MWRA staff have been monitoring work at this site closely to make sure that it does not affect turbidity levels and downstream coliform levels. See Page 4 for details.
- **Chlorine doses remained unchanged** at Cosgrove Disinfection Facility (2.0 mg/L), Ware Disinfection Facility (1.2 mg/L), and Norumbega (1.8 mg/L). MWRA met CT achievement requirements at both Cosgrove and Ware. DBPs continue to be at low levels. See Page 5 for CT results, Page 7 for DBP results.
- **No total coliform positives appeared in samples** taken in cities and towns that use MWRA labs to prepare TCR results. See Page 6 for results.
- **MWRA released its proposed water and sewer assessments for FY02.** The Authority also re-financed high-interest bonds to save \$33 million. Also, MWRA Executive Director Doug MacDonald accepted a position as Secretary of Transportation for the State of Washington. See details on all these stories at www.mwra.com.

*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.*

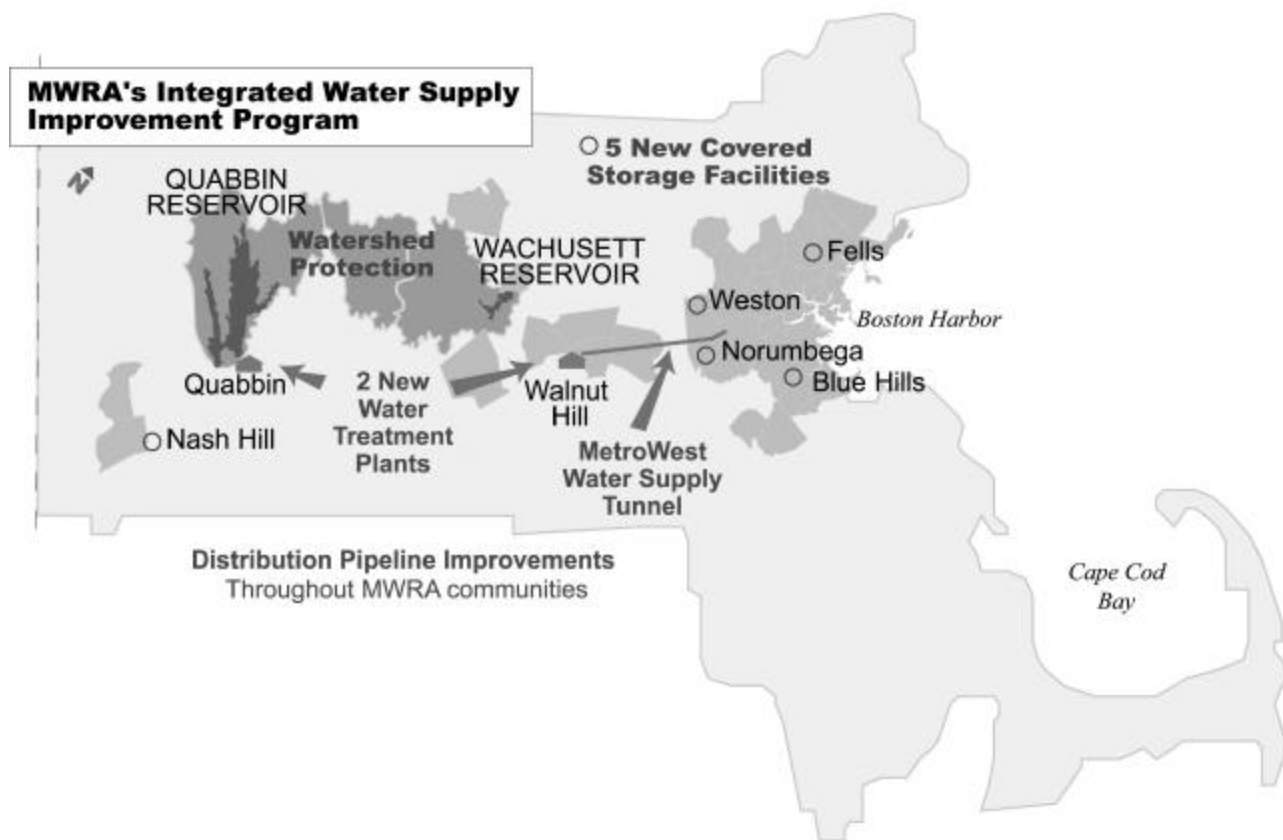
Release Date: March 20 2001

The Water System

MWRA provides about 250 million gallons of water each day to 46 cities and towns in eastern and central 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 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

February 2001

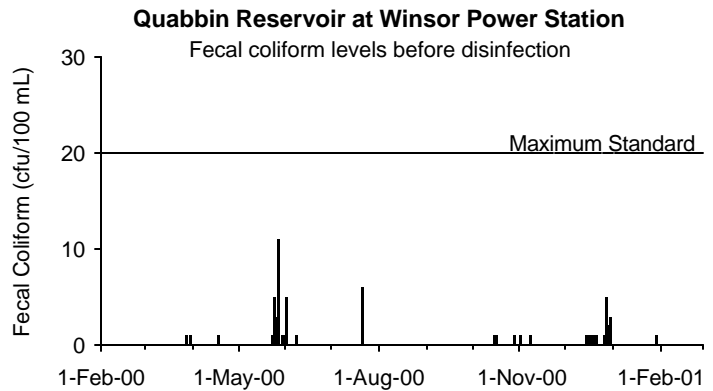
Source Water - Microbial Results

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 consistent with intestinal environments. They act as indicators of possible fecal contamination. The Surface Water Treatment Rule for unfiltered supplies requires that no more than 10% of samples 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.

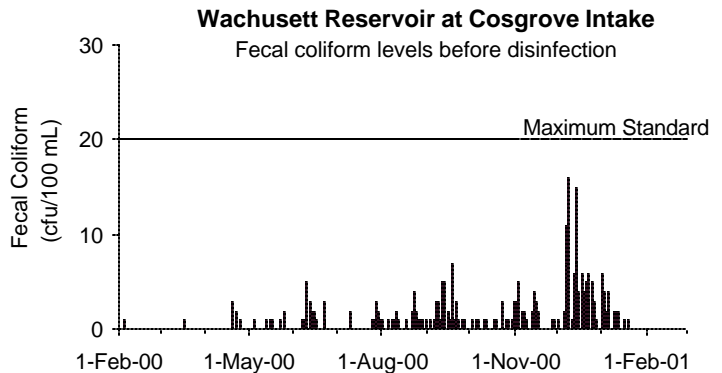
Fecal coliform levels for this month all met the standard. MWRA met the six-month running average standard for fecal coliform continuously at this location over the last year.



Sample Site: Wachusett Reservoir

Wachusett Reservoir water is sampled at Cosgrove Intake before entering the MetroWest and Metropolitan Boston systems. Fecal coliform tests for the month were all negative. 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.

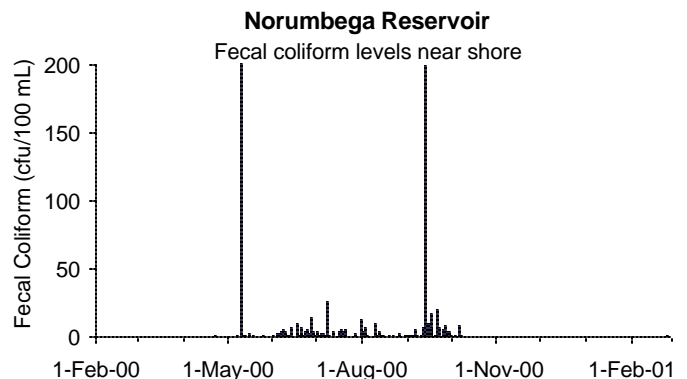
Wachusett froze over in late December. Coliform levels are expected to be low until the reservoir thaws. No sample in the last year has exceeded the SWTR.



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.

Only 1 sample from water taken along the shore was positive for fecal coliform during February.

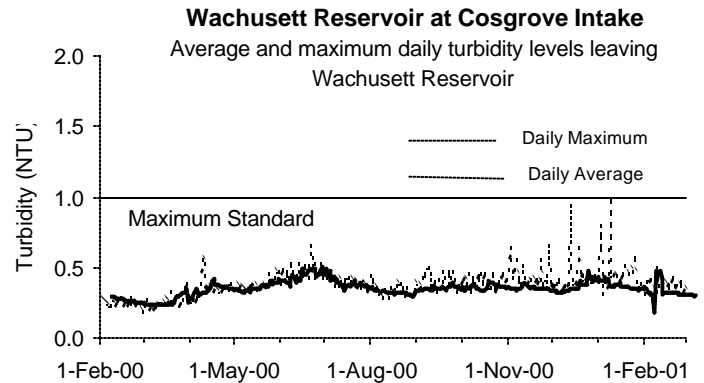
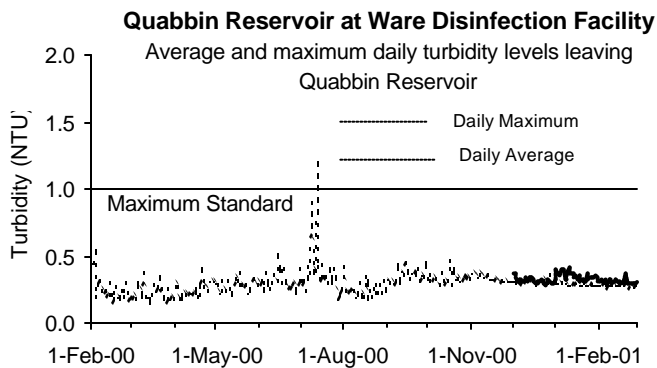


Source Water – Turbidity and Algae Results February 2001

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.

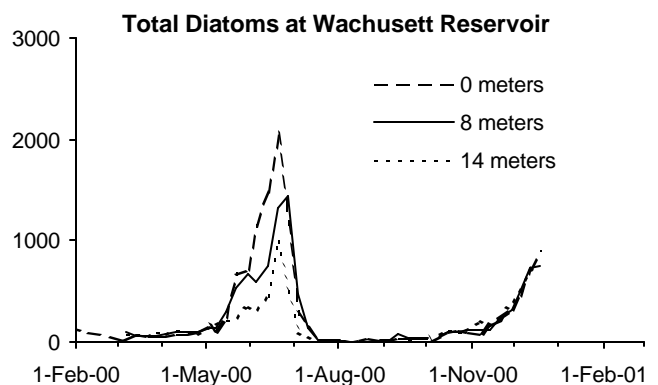
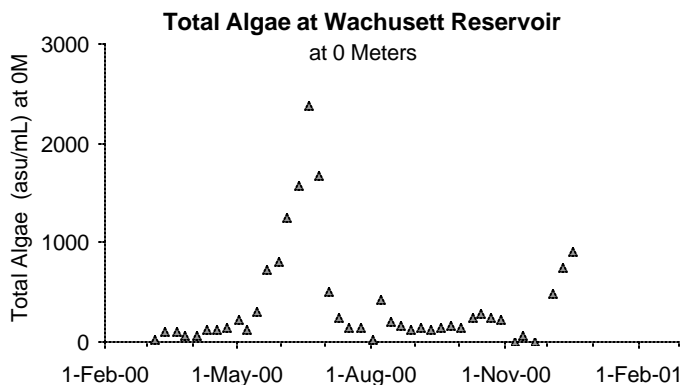
Since December, samples for turbidity are collected at the Ware Disinfection Facility before chlorination and represent reservoir water entering the CVA system. Samples are also taken at Cosgrove Intake, representing water quality before chlorination for source water serving the MetroWest and Metropolitan 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. An unusually high turbidity result from a grab sample taken from Quabbin Reservoir on July 12th was not corroborated by a continuous analyzer at the site and may have resulted from sampling error. Maximum turbidity results at Wachusett Reservoir were within DEP standards. Occasional elevated turbidity levels over the past several months may be related to elevated diatom levels or 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 7/7/00. The reservoir froze over in late December; samples cannot be collected until the reservoir thaws. Diatoms, which may result in rapid fouling of home filter systems, are expected to increase until spring. Of 68 complaints received during February from local water departments, none concerned clogged filters or taste and odor that may be due to algae, indicating that algae levels have not affected these water quality measures very much this season.



Treated Water – pH and Disinfectant Residual Results

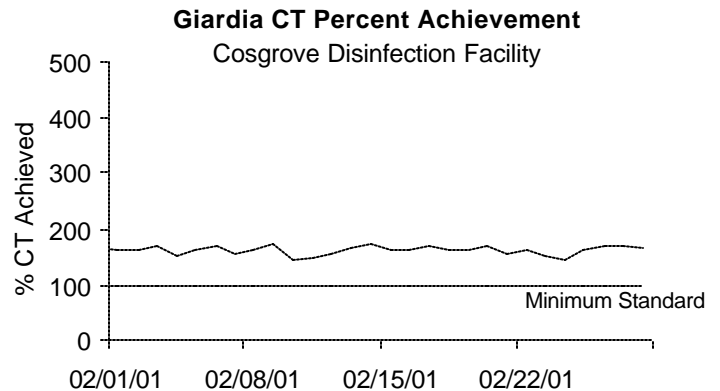
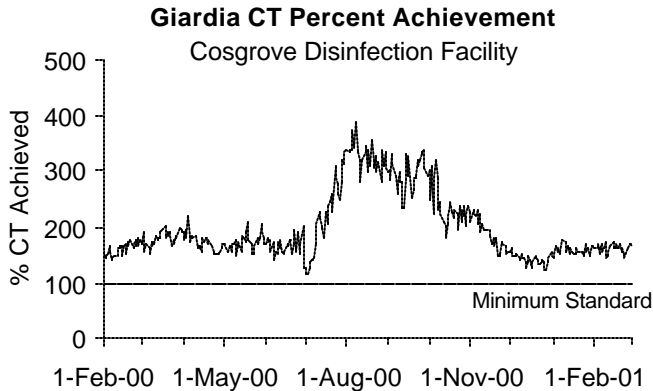
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Treated Water - Primary Disinfection

Wachusett Reservoir at Cosgrove Disinfection Facility (MetroBoston Supply):

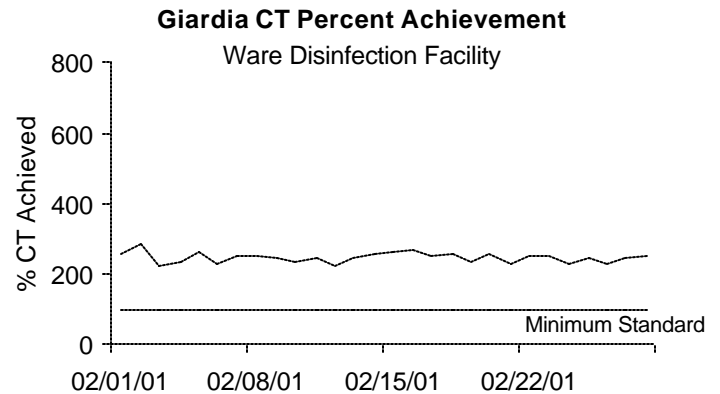
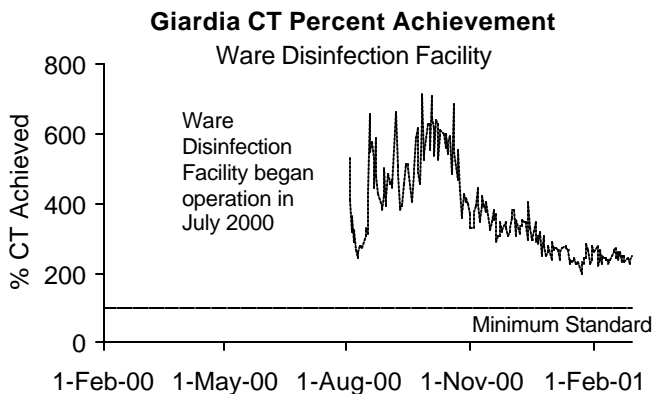
MWRA provides disinfection adequate to achieve EPA's requirement of 99.9% inactivation of *Giardia* cysts and 99.99% inactivation of viruses in drinking water using a calculation based on two sample points that DEP approved in May, 1999. The concentration (C) of the disinfectant in the water over time (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.

At Wachusett, CT was met each day in February, as well as every day for the last year.



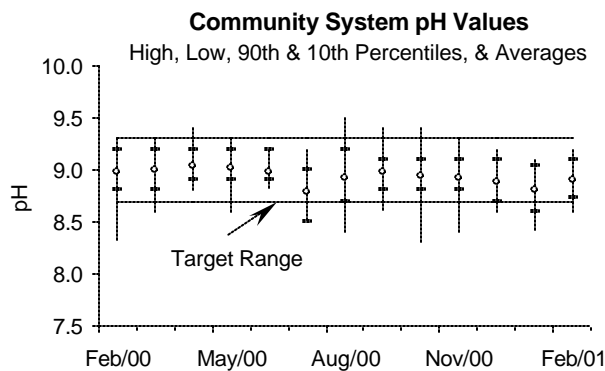
Quabbin Reservoir at Ware Disinfection Facility (CVA Supply):

CT was met each day in February, 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. In June 1996, the Interim Corrosion Control (ICC) facility went on-line; this facility provides corrosion control to communities east of and including Marlborough. MWRA targets pH levels between 8.7 and 9.3 to minimize leaching of lead. MWRA staff collects and analyzes pH samples from 26 community locations on a biweekly schedule. In February, slightly more than 98% of samples were within the target range. One pH reading of 8.6 appeared in a sample taken from a site in Lynnfield. All other results were within the target range.



Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program

February 2001

Background

While all communities collect bacteria samples for the TCR, 36 cities and towns 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 and provides their data to MWRA. 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

None of the 1815 samples tested positive for total coliform during the month of February. 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-seven communities that submitted chlorine residual data maintained an average disinfectant residual of at least 0.2 mg/L. Nine 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?	February 2001 Minimum Chlorine Residual (mg/L)	February 2000 Minimum Chlorine Residual (mg/L)	February 2001 Average Chlorine Residual (mg/L)	February 2000 Average Chlorine Residual (mg/L)
ARLINGTON	56	0 (0%)			0.32	0.43	1.36	1.56
BELMONT	32	0 (0%)			0.40	0.60	1.23	1.32
BOSTON	224	0 (0%)			0.60	0.87	1.84	1.92
BROOKLINE	68	0 (0%)			1.40	1.50	1.87	1.93
CAMBRIDGE	92	0 (0%)			0.14	0.25	1.76	1.98
CHELSEA	32	0 (0%)			0.75	0.81	1.57	1.61
CHICOPEE	63	0 (0%)			0.30		0.79	
EVERETT	40	0 (0%)			1.30	0.20	1.53	1.45
FRAMINGHAM (c)	72	0 (0%)			0.66	0.05	1.54	1.34
LEXINGTON	36	0 (0%)			1.49	1.70	1.74	1.92
LYNNFIELD	6	0 (0%)			0.68	0.08	1.46	1.18
MALDEN	60	0 (0%)			0.07	0.02	1.16	1.37
MARBLEHEAD	24	0 (0%)			0.52	0.22	1.58	1.62
MARLBOROUGH (b)(c)	48	0 (0%)			0.95	0.41	1.29	1.03
MEDFORD	68	0 (0%)			0.10	0.10	1.16	1.13
MELROSE	36	0 (0%)			0.10	0.10	1.26	1.49
MILTON	32	0 (0%)			0.97	0.94	1.38	1.52
NAHANT	10	0 (0%)			0.19	0.43	1.27	1.25
NEEDHAM (b)	41	0 (0%)			0.01	0.02	0.28	0.22
NEWTON	91	0 (0%)			0.95	1.17	1.57	1.63
NORTHBORO	14	0 (0%)			0.20		0.57	
NORWOOD	40	0 (0%)			0.05	0.05	0.83	0.93
QUINCY	92	0 (0%)			0.30	0.20	1.54	1.59
REVERE	52	0 (0%)			1.29	0.79	1.75	1.83
SAUGUS	32	0 (0%)			1.50	1.50	1.68	1.69
SOMERVILLE	83	0 (0%)			0.30	0.30	1.30	1.06
SOUTHBORO (c)	11	0 (0%)			0.20	0.50	1.15	0.86
STONEHAM	28	0 (0%)			1.39	1.20	1.76	1.47
SWAMPSCOTT	18	0 (0%)			1.15	1.11	1.32	1.45
WAKEFIELD (b)	44	0 (0%)			0.26	0.41	1.48	1.68
WALTHAM	67	0 (0%)			0.60	0.80	1.55	1.62
WATERTOWN	40	0 (0%)			0.70	0.50	1.30	1.60
WELLESLEY (b)	36	0 (0%)			0.25	0.05	0.48	0.34
WESTON (c)	18	0 (0%)			1.01	1.23	1.66	1.85
WINCHESTER (b)	20	0 (0%)			0.10	0.20	0.70	0.72
WINTHROP	24	0 (0%)			0.90	1.10	1.53	1.71
WOBURN	65	0 (0%)			0.02		0.68	
Total:	1815	0 (0%)						

(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

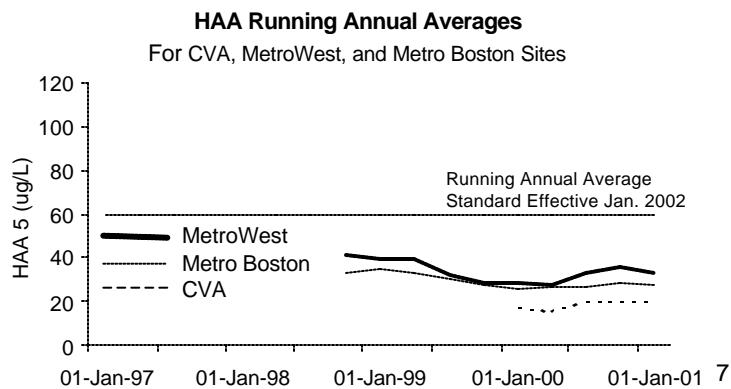
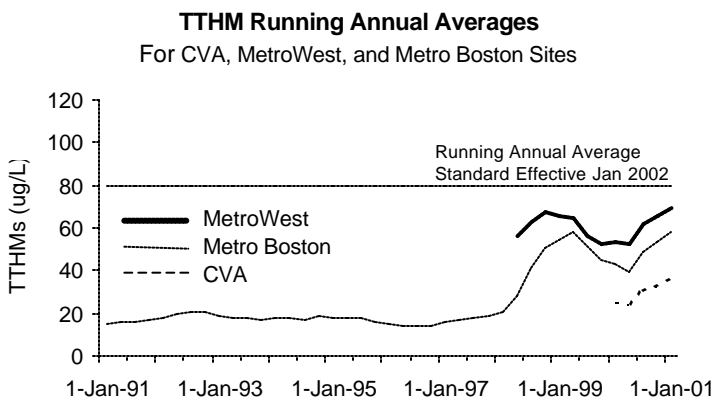
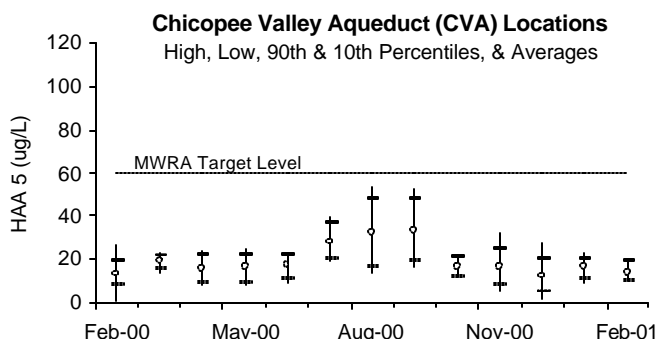
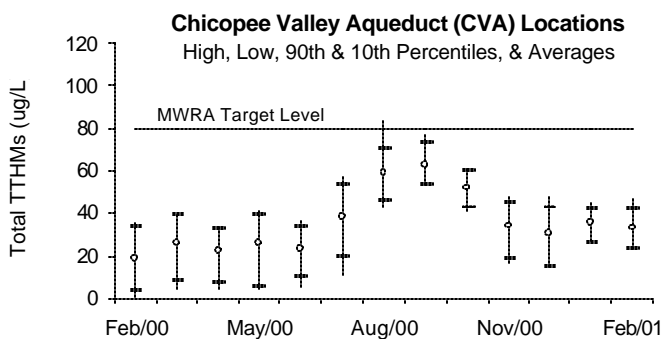
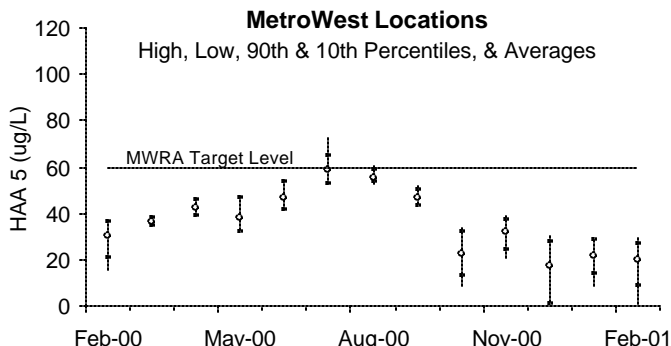
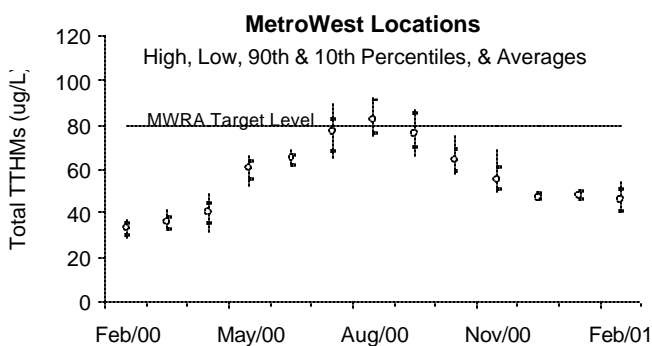
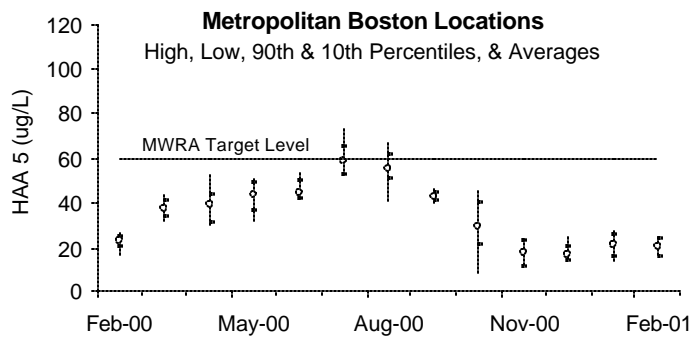
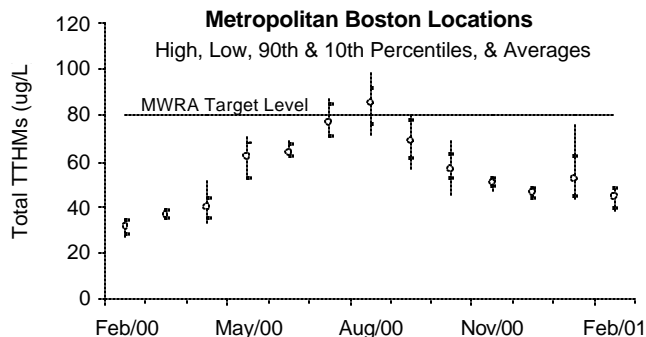
February 2001

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. **MWRA compliance is based on results for Metropolitan Boston only, however.** 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.

Average DBP levels were normal in February. TTHM levels are slightly above those of last year, but the running annual average for TTHMs, represented in the graphs at the bottom left of the page, remained below both current and future standards. HAA 5 levels are comparable to those of last year. The difference in TTHM levels in MetroWest and Metropolitan Boston locations between this year and last is due both to higher levels of Total Organic Carbon (TOC) at Wachusett this year and to increased chlorine doses.

TOTAL TRIHALOMETHANES

HALOACETIC ACIDS



MWRA Monthly Water Quality Analysis

February 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)	Chicopee Water Treatment Plant (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	3.8	5.3	31	31	30.1		MG/L	
Aluminum	< 15	< 15	< 15	< 15	< 15	< 15	50-200 (a)	UG/L	NO
Ammonia-N	< .005	< .005	< .005	< .005	0.398	0.383		MG/L	
Antimony	< .9	< .9	< .9	< .9	< .9	< .9		UG/L	
Arsenic	< .8	< .8	< .8	< .8	< .8	< .8	50 (b)	UG/L	NO
Barium	6.24	6.05	7.77	7.64	7.76	7.72	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	9.0	3.5	14.7	9.5	5.3	5.1		UG/L	
Cadmium	< .03	< .03	< .03	< .03	< .03	< .03	5 (b)	UG/L	NO
Calcium	2120	2260	3730	3760	3790	3820		UG/L	
Chloride	5.2	6.3	13.6	15.3	15.2	15	250 (a)	MG/L	NO
Chlorine, Free	-	0.32	-	0.73	0.45	0.07		MG/L	
Chlorine, Total	-	-	-	1.24	1.90	1.88		MG/L	
Chromium	< .6	< .6	< .6	< .6	< .6	< .6	100 (b)	UG/L	NO
Coliform, Fecal, MF Method	0	-	0	0	-	-	20 (d)	CFU/100 mL	NO
Coliform, Total, MF Method	1	0	0	0	0	0	100 (d)	CFU/100 mL	NO
Color	3	2	17	17	16	10	15 (a)	C.U.	YES
Copper **	< 1	98.7	7.6	5.1	2.1	18.8	1300 (b)	UG/L	NO
Cyanide	< .01	< .01	< .01	< .01	< .01	< .01	0.2 (b)	MG/L	NO
Fluoride	0.09	0.05	0.08	0.99	1.00	0.95	4 (b)	MG/L	NO
Hardness	7.4	7.7	12.4	12.5	12.6	12.6		MG/L	
Iron **	10.7	11.1	25.8	14.6	12.9	13.5	300 (a)	UG/L	NO
Lead	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	15 (b)	UG/L	NO
Magnesium	511	508	747	745	752	754		UG/L	
Manganese	3.2	2.6	5.9	5.0	4.8	6.6	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	0.017	0.022	0.064	0.062	0.063	0.104	10 (b)	MG/L	NO
Nitrite	< .005	< .005	< .005	< .005	< .005	< .005		MG/L	
Orthophosphate	< .0025	< .0025	< .0025	0.010	0.010	0.009		MG/L	
pH	6.6 (a)	- (g)	6.7	8.6	8.8	8.8		S.U.	
Potassium	468	476	774	776	797	794		UG/L	
Selenium	< .9	< .9	< .9	< .9	< .9	< .9	50 (b)	UG/L	NO
Silica (SiO2)	1430	1440	1780	2340	2280	2250		UG/L	
Silver	< .4	< .4	< .4	< .4	< .4	< .4	100 (a)	UG/L	NO
Sodium	3.8	4.8	8.5	21.8	22.1	21.9		MG/L	
Specific Conductance	-	-	84	134	136	135		UMHO/C	
Standard Plate Count, HPC (48 Hrs @ 35C)	21	10	6	1	2	1	500 (d)	CFU/mL	NO
Sulfate (SO4)	5.3	5.3	6.8	6.8	6.5	6.6		MG/L	
Thallium	< 1	< 1	< 1	< 1	< 1	< 1		UG/L	
Total Dissolved Solids	39	29	37	80	76	75		MG/L	
Total Organic Carbon	1.92	2.02	2.04	2.07	2.20	2.06		MG/L	
Total Phosphorus	0.007	0.009	0.006	0.012	0.014	0.010		MG/L	
Trihalomethanes, Total (TTHMS) (f)	-	25	-	34	47	48	100 (b) (e)	UG/L	NO
Turbidity	0.31	0.36	0.53	0.61	0.26	0.40	1 (c)	NTU	NO
UV-254	0.02	0.02	0.045	0.033	0.044	0.04		A	
Zinc **	< 6	< 6	< 6	< 6	< 6	< 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 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 February 2001.
- (g) - Results taken from grab samples processed at WDF. No pH results for Chicopee for the week.

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 February 5 & 6, 2001 and analyzed by MWRA and contract laboratories.