

WATER QUALITY UPDATE

An Analysis of January 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.

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.

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.

January 2001 Highlights

- **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.
- **Routine bird harassment at Wachusett was suspended on 1/9 when the reservoir froze,** and routine observation was suspended on 1/11. Periodic observation of the reservoir will continue in order to monitor ice cover, but no harassment will be required until ice cover melts.
- **Algae monitoring at Wachusett was suspended** until ice cover at Cosgrove Intake clears. 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.
- **Chlorine dose at Cosgrove remained at 2.0 mg/L,** which had been set on 12/27/00 to meet CT requirements as water temperatures declined. Dose at Ware Disinfection Facility remained unchanged during the month at 1.2 mg/L. Dose at Norumbega also remained unchanged during January at 1.8 mg/L. DBPs continue to be at low levels. See Page 7 for DBP results.
- **Maximum turbidity levels fluctuated at Wachusett Reservoir analyzers.** Results were still within the standard. Spikes may be due to work in progress at Cosgrove Intake sluice gates. In addition, plumbing changes on 1/2/01 to water lines that feed the on-line turbidity analyzer may have affected turbidity readings that day. See Page 4 for details.
- **A combination of sodium bicarbonate and sodium carbonate will be used for a short time at the ICCF in March** to maintain a pH of 9.0 and alkalinity 30 mg/L. 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.
- **Arlington Covered Reservoir returned to service on January 4.** This completed a thorough inspection, repair, and clean-up of this facility, which began when results from one sample taken on 8/7/2000 tested positive for *E. coli*. The tank was taken off-line on 8/8, then drained and cleaned before its return to service. A new sample tap was installed in August to eliminate concerns with possible sample contamination in the future.
- **The MDC Web site features a December draft of the Quabbin Watershed Protection Plan.** See <http://www.state.ma.us/mdc/quabplan.html> to review this document. Comments on the draft plan are welcome.

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

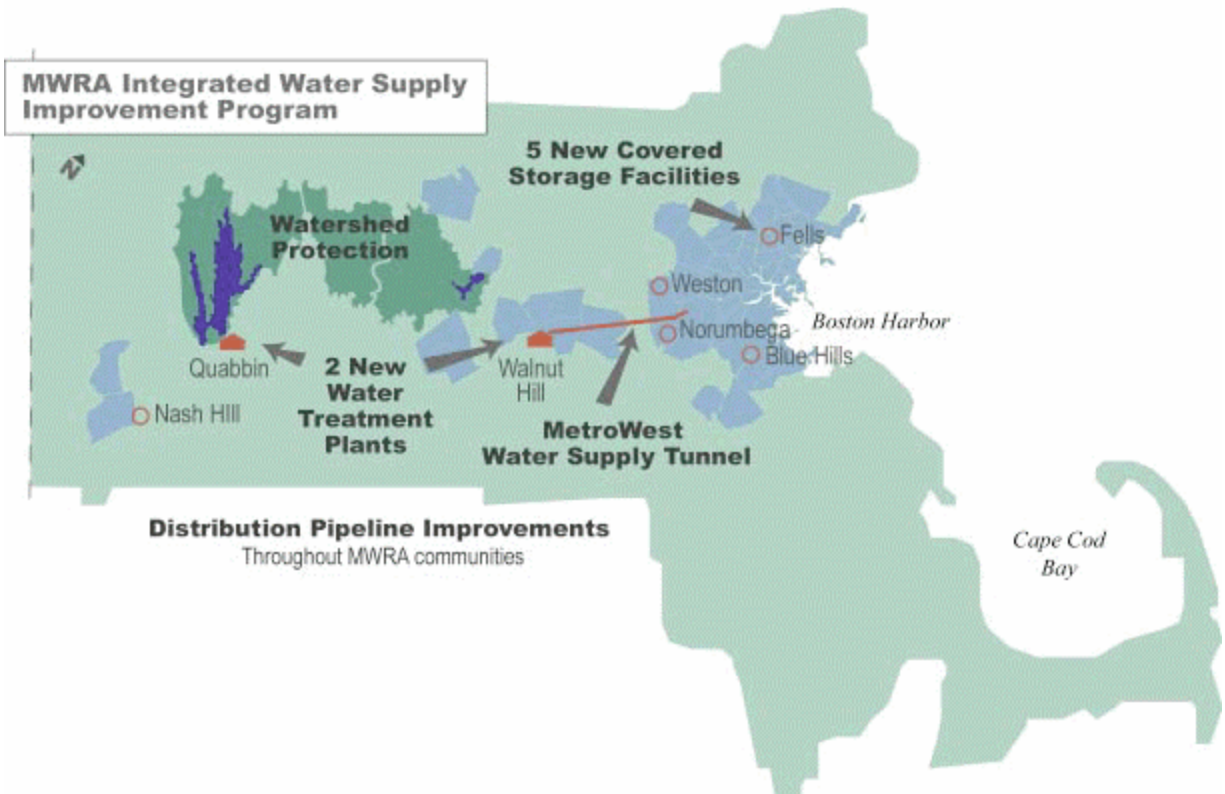
100 First Avenue, Charlestown Navy Yard, Boston, MA 02129

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.

The Water 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

January 2001

Source Water - Microbial Results

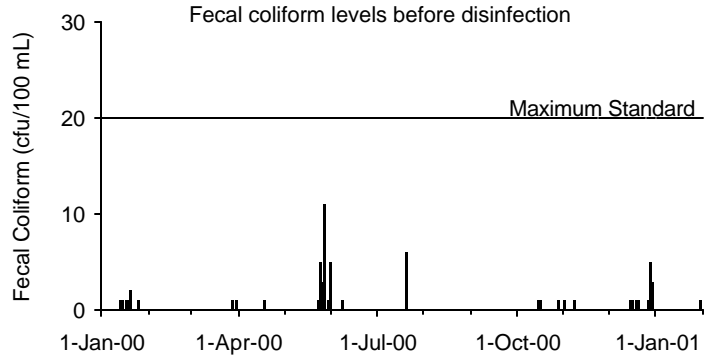
Total coliform bacteria are monitored in both source and treated water to provide an indication of overall bacteriological activity. Most coliforms are harmless. Fecal coliform is a subclass of the coliform group which are identified by their growth at temperatures consistent with intestinal environments. 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 Windsor Dam before entering the CVA system.

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

Quabbin Reservoir at Windsor Power Station

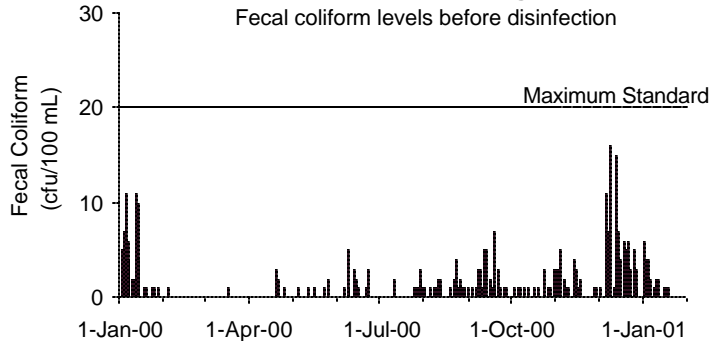


Sample Site: Wachusett Reservoir

Wachusett Reservoir water is sampled at Cosgrove Intake before entering the metropolitan Boston system. Fecal coliform counts for the month were all below the 20 cfu/100 ml standard. 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 samples in the last six months have exceeded the SWTR.

Wachusett Reservoir at Cosgrove Intake

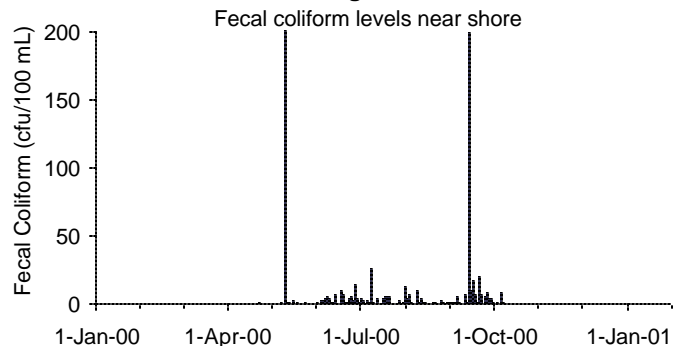


Sample Site: Norumbega Reservoir

Norumbega Reservoir in Weston receives flows from Wachusett for temporary storage each day during low demand hours and 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.

No samples from water taken along the shore were positive for fecal coliform during January. These results are identical to those of last January.

Norumbega Reservoir



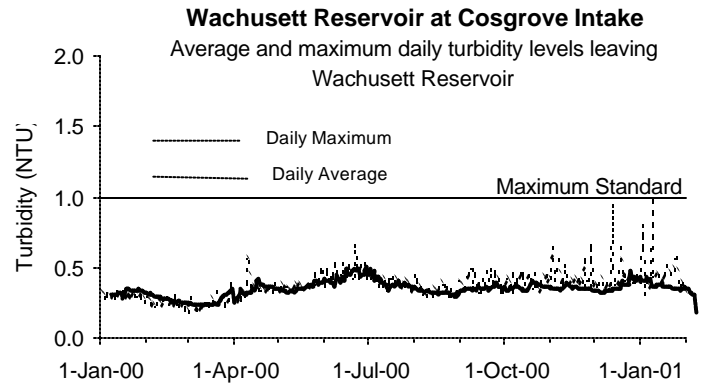
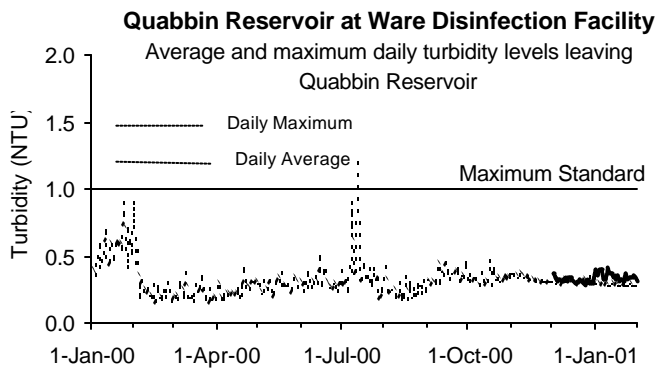
Source Water – Turbidity and Algae Results

January 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.

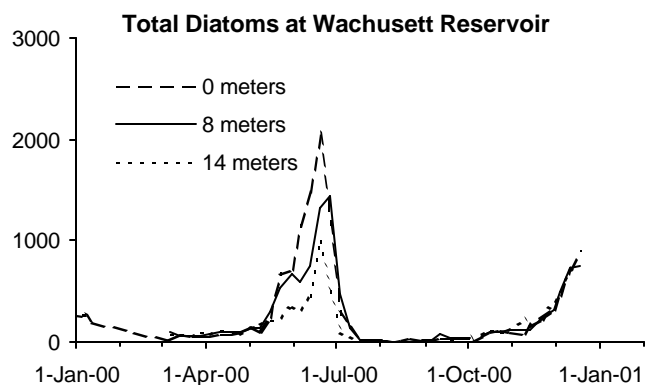
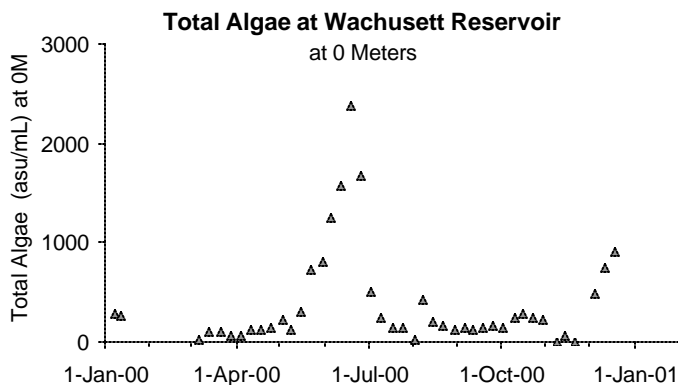
Samples for turbidity are collected at Winsor Dam before chlorination and represent reservoir water entering the CVA system. Samples are also taken from Cosgrove Intake, representing water quality before chlorination for source water serving Metropolitan Boston. The Massachusetts Department of Environmental Protection standard for source water turbidity for unfiltered water supply system 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, although levels were elevated on 2 days this month, possibly due to maintenance work under way at Cosgrove Intake. A maximum of 0.797 was reported for 1/2/01 and a maximum of 0.997 was reported for 1/8/01.



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. Diatom levels are expected to increase until spring. Diatoms may result in fouling of home filter systems. Of 182 complaints received during January from local water departments, 4 concerned clogged filters and 2 concerned 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

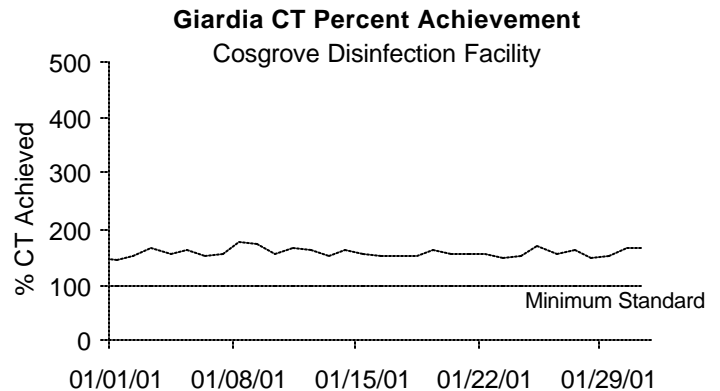
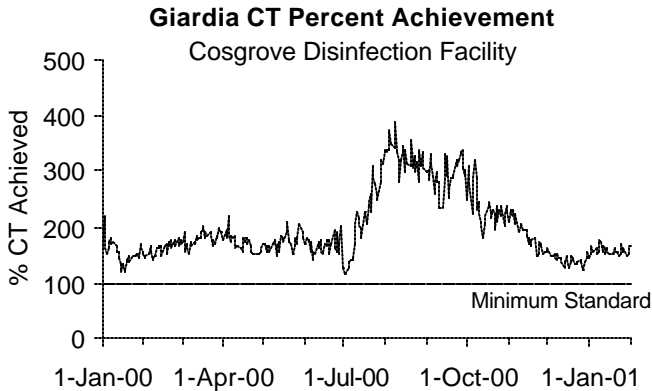
January 2001

Treated Water - Primary Disinfection

Wachusett Reservoir at Cosgrove Disinfection Facility (MetroBoston Supply):

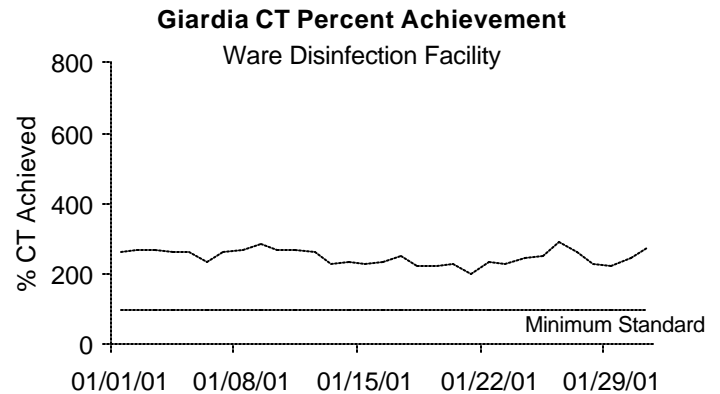
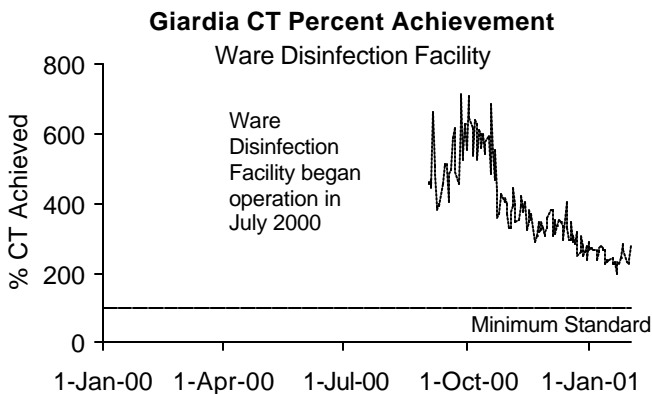
MWRA provides disinfection adequate to achieve EPA's requirement of 99.9% inactivation of *Giardia* cysts and 99.99% inactivation of viruses in drinking water using a calculation based on two sample points that DEP approved in May, 1999. The concentration (C) of the disinfectant in the water over time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



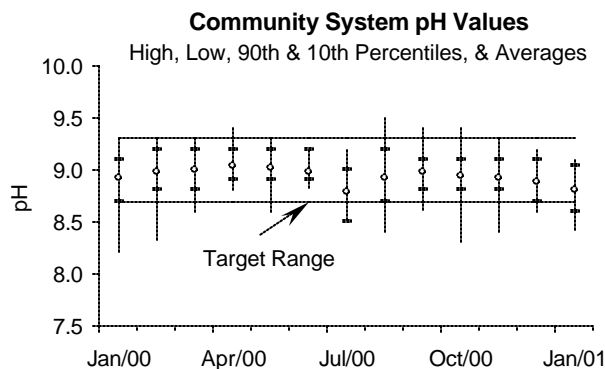
Quabbin Reservoir at Ware Disinfection Facility (CVA Supply):

CT was met each day in January, as well as every day since reporting began in September, 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. About 84% of samples were within the target range. 2 pH readings of 8.4 appeared in samples taken from sites in Melrose and Norwood. 1 pH reading of 8.5 appeared in a sample taken from a site in Marblehead. An additional 8 readings of 8.6 were recorded for the month.



Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program

January 2001

Background

Thirty-six cities and towns use the MWRA Laboratory for Total Coliform Rule compliance testing. These communities collect samples for bacteriological analysis and measure chlorine residual at the time of collection. Cambridge conducts their own monitoring and provides their data to MWRA. The other 12 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

2 of the 2050 samples (0.1%) tested positive for total coliform during the month of January. 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. 12 communities had one or more samples with a disinfectant residual lower than 0.2 mg/L. Two 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?	January 2001 Minimum Chlorine Residual (mg/L)	January 2000 Minimum Chlorine Residual (mg/L)	January 2001 Average Chlorine Residual (mg/L)	January 2000 Average Chlorine Residual (mg/L)
ARLINGTON	56				0.28	0.42	1.37	1.46
BELMONT	40				0.30	0.20	1.14	1.04
BOSTON	266				0.42	0.51	1.77	1.84
BROOKLINE	85				1.30	1.30	1.88	1.90
CAMBRIDGE	95	1 (1.05%)			0.03	0.16	1.73	1.83
CHELSEA	40				1.05	0.60	1.68	1.56
CHICOPEE	60				0.40		0.77	
EVERETT	50				1.00	0.00	1.54	1.45
FRAMINGHAM (c)	72				0.40	0.04	1.49	1.42
LEXINGTON	45				1.50	1.50	1.76	1.83
LYNNFIELD	6				0.50	0.61	1.20	1.24
MALDEN	75				0.05	0.02	1.22	1.30
MARBLEHEAD	24				0.27	0.19	1.54	1.55
MARLBOROUGH (b)(c)	51	1 (1.96%)			0.92	0.34	1.30	1.13
MEDFORD	85				0.10	0.10	1.18	1.06
MELROSE	45				0.10	0.10	1.23	1.41
MILTON	40				0.94	1.03	1.39	1.48
NAHANT	10				0.29	0.33	1.18	1.24
NEEDHAM (b)	51				0.00	0.05	0.57	0.40
NEWTON	88				0.99	0.60	1.46	1.53
NORTHBORO	14				0.15		0.41	
NORWOOD	50				0.05	0.05	0.92	0.86
QUINCY	115				0.30	0.20	1.50	1.49
REVERE	65				0.70	0.48	1.70	1.66
SAUGUS	40				1.50	1.40	1.66	1.64
SOMERVILLE	100				0.30	0.30	1.43	1.06
SOUTHBORO (c)	10				0.30	0.40	1.14	0.70
STONEHAM	28				1.39	1.20	1.75	1.61
SWAMPSCOTT	18				1.44	0.49	1.55	1.22
WAKEFIELD (b)	44				0.33	0.60	1.38	1.77
WALTHAM	85				0.20	0.60	1.52	1.45
WATERTOWN	40				0.50	0.90	1.31	1.35
WELLESLEY (b)	36				0.25	0.10	0.44	0.38
WESTON (c)	18				0.93	0.62	1.48	1.29
WINCHESTER (b)	25				0.08	0.22	0.54	0.75
WINTHROP	24				0.80	0.30	1.53	1.70
WOBURN	54				0.03		0.67	
Total:	2050	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 chloramine

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

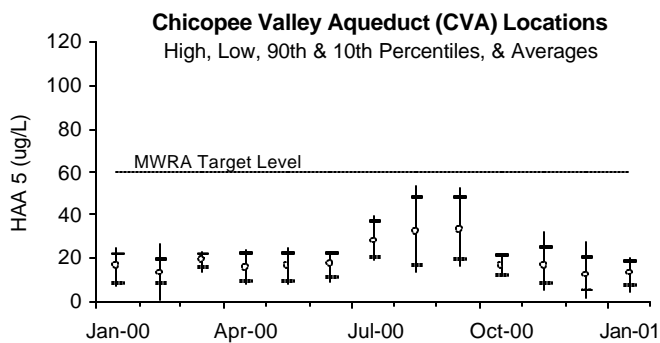
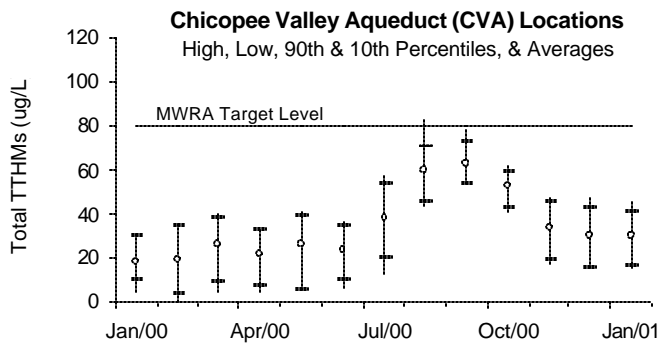
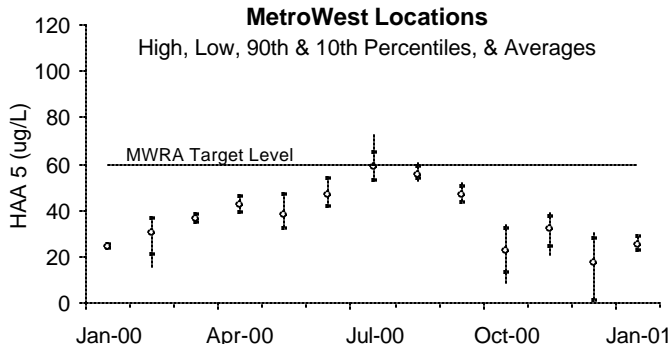
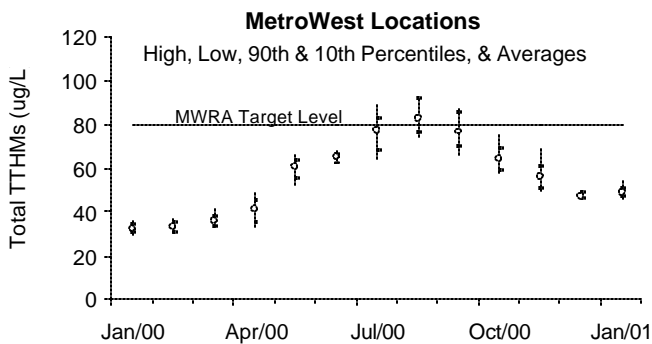
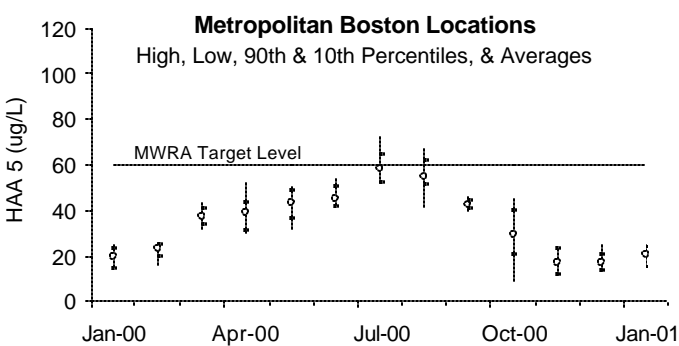
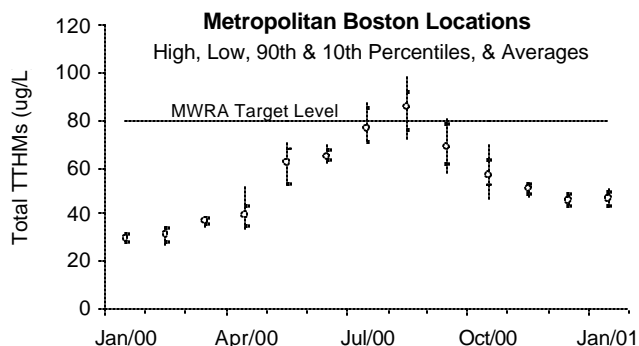
January 2001

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. TTHMs are of concern due to their potential adverse health effects at high levels. EPA recently established a new standard of 80 ug/L for TTHMs and 60 ug/L for HAA 5. DEP requires that samples be collected quarterly; MWRA samples weekly at some locations, monthly and quarterly at others. These graphs report results on a monthly, quarterly, and running annual average basis.

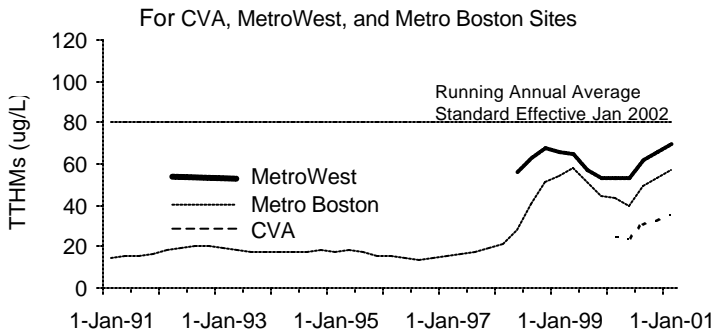
Average DBP levels were normal in January. TTHM levels are slightly above those of last year, but the running annual average for TTHMs, represented in the graphs at the bottom left of the page, remained below both the current standard of 100 ug/L and more stringent standards that take effect in 2002. The difference in DBP 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. TTHM levels decline as dose and temperature decline.

TOTAL TRIHALOMETHANES

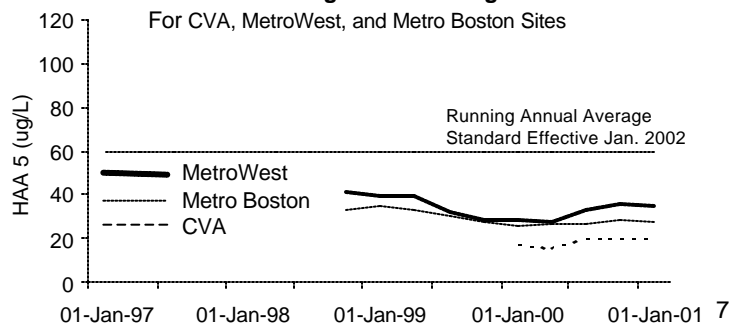
HALOACETIC ACIDS



Compliance Measurement TTHM Running Annual Averages



Compliance Measurement HAA Running Annual Averages



MWRA Monthly Mineral Analysis

January 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	3.1	3.5	5.2	31	30	31.9		MG/L	
Aluminum	< 15	< 15	< 15	20.9	17.9	< 15	50-200 (a)	UG/L	NO
Ammonia-N	0.010	< .005	0.009	< .005	0.399	0.415		MG/L	
Antimony	< .9	< .9	< .9	< .9	< .9	< .9		UG/L	
Arsenic	< .8	< .8	< .8	< .8	< .8	< .8	50 (b)	UG/L	NO
Barium	6.32	5.78	7.51	7.75	7.6	7.55	2000 (b)	UG/L	NO
Beryllium	< .2	< .2	< .2	< .2	< .2	< .2	4 (b)	UG/L	NO
Bromate	< 5	< 5	< 2.5	< 5	< 5	< 5	10	UG/L	NO
Bromide	10.8	4.0	11.7	7.48	6.4	5.7		UG/L	
Cadmium	< .2	< .2	< .2	< .2	< .2	< .2	5 (b)	UG/L	NO
Calcium	2140	2250	3750	3800	3800	3810		UG/L	
Chloride	5.8	7.0	15.0	16.3	17.5	17.4	250 (a)	MG/L	NO
Chlorine, Free	-	0.56	-	0.80	0.41	0.22		MG/L	
Chlorine, Total	-	-	-	1.82	1.76	1.81		MG/L	
Chromium	< .6	< .6	< .6	< .6	< .6	< .6	100 (b)	UG/L	NO
Coliform, Fecal, MF Method	0	-	1	0	-	-	20 (d)	CFU/100 mL	NO
Coliform, Total, MF Method	0	0	0	0	0	0	100 (d)	CFU/100 mL	NO
Color	3	3	11	10	10	12	15 (a)	C.U.	NO
Copper **	< 1	64.5	7.3	6.3	94.3	4.3	1300 (b)	UG/L	NO
Cyanide	< .01	< .01	< .01	< .01	< .01	< .01	0.2 (b)	MG/L	NO
Fluoride	0.05	0.03	0.04	1.16	1.10	1.04	4 (b)	MG/L	NO
Hardness	7.5	7.7	12.4	12.6	12.6	12.6		MG/L	
Iron **	11.4	12.0	13.4	17.7	17	16.2	300 (a)	UG/L	NO
Lead	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	15 (b)	UG/L	NO
Magnesium	514	500	740	755	754	744		UG/L	
Manganese	4.0	4.0	6.7	6.7	7.6	8.2	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	0.015		0.057	0.058	0.060	0.060	10 (b)	MG/L	NO
Nitrite	< .005		< .005	< .005	< .005	< .005		MG/L	
Orthophosphate	0.003		0.005	0.009	0.010	0.009		MG/L	
pH	7.0	7.0	6.7	8.8	8.4	8.8		S.U.	
Potassium	473	494	762	765	853	766		UG/L	
Selenium	< .9	< .9	< .9	< .9	< .9	< .9	50 (b)	UG/L	NO
Silica (SiO2)	1300	1330	1710	2190	2170	2340		UG/L	
Silver	< .4	< .4	< .4	< .4	< .4	< .4	100 (a)	UG/L	NO
Sodium	3.7	4.5	8.2	20.5	22.5	21.0		MG/L	
Specific Conductance	-	-	88	138	136	140		UMHOS	
Standard Plate Count, HPC (48 Hrs @ 35C)	35	42	5	3	0	1	500 (d)	CFU/mL	NO
Sulfate (SO4)	5.8	5.8	7.4	7.1	7.4	7.7		MG/L	
Thallium	< 1	< 1	< 1	< 1	< 1	< 1		UG/L	
Total Dissolved Solids	< 25	< 25	35	65	62	67		MG/L	
Total Organic Carbon	1.94	1.75	2.32	2.29	2.39	2.32		MG/L	
Total Phosphorus	0.006	0.007	0.007	0.012	0.012	0.015		MG/L	
Trihalomethanes, Total (TTHMS) (f)	-	27	-	31	48	50	100 (b) (e)	UG/L	NO
Turbidity	0.41	0.70	0.42	0.70	0.39	0.97	1 (c)	NTU	NO
UV-254	0.02	0.02	0.04514	0.034	0.044	0.05		A	
Zinc **	< 6	< 6	< 6	< 6	17.1	< 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 January 2001.

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 January 8 & 9, 2001 and analyzed by MWRA and contract laboratories.