

MASSACHUSETTS WATER RESOURCES AUTHORITY  
100 First Avenue, Charlestown Navy Yard, Boston, MA 02129



WATER QUALITY UPDATE  
**An Analysis of August 2014 Sampling Data**

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

### August 2014 Highlights

- **In August, MWRA met all regulatory targets for *Cryptosporidium* inactivation at the Carroll Water Treatment Plant**, achieving greater than 99% *Cryptosporidium* inactivation using UV. Less than 5% Off-Spec water was produced. See page 5.
- **MWRA met all regulatory targets for the month** at the Ware Disinfection Facility and the Carroll Water Treatment Plant achieving at least 99.9% *Giardia* inactivation at all times. Results appear on Page 5. Two communities violated the Total Coliform Rule criteria. See Page 7.
- **E.coli bacteria were identified in a sample from the Wellesley distribution system**. Of 11 routine samples collected August 19, one sample indicated the presence of total coliform bacteria (no *E. coli*). Repeat samples also showed the presence of total coliform, including one location with *E. coli*. Since the location with these positives was near a water storage tank, the town immediately removed the tank from service and issued a Boil Order. All repeat samples collected after that were coliform free, and the boil water order was lifted on August 23. Pierce Reservoir tank is undergoing repairs. No other MWRA community was affected. See Page 7.
- **Did you know** that MWRA's web site has an archive of Monthly Water Quality Updates from 2001 onward at <http://www.mwra.com/monthly/wqupdate/qual3wq.htm>?
- **MWRA reduced the length of the printed copy of the Monthly Water Quality Update to reduce printing and postage costs**. A longer more detailed version will continue to be posted on the MWRA web site. You can help us save paper and money by requesting an electronic copy of the Update – call (617) 242-5323 or email [Joshua.Das@mwra.com](mailto:Joshua.Das@mwra.com).

We are continually updating the report. Let us know what you think (617) 242-5323  
Call (617) 242-5323 or email [Joshua.Das@mwra.com](mailto:Joshua.Das@mwra.com)

Release Date: September 20, 2014

## 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](http://www.mwra.com). Note that some data listed within this report is provisional and subject to verification and correction.

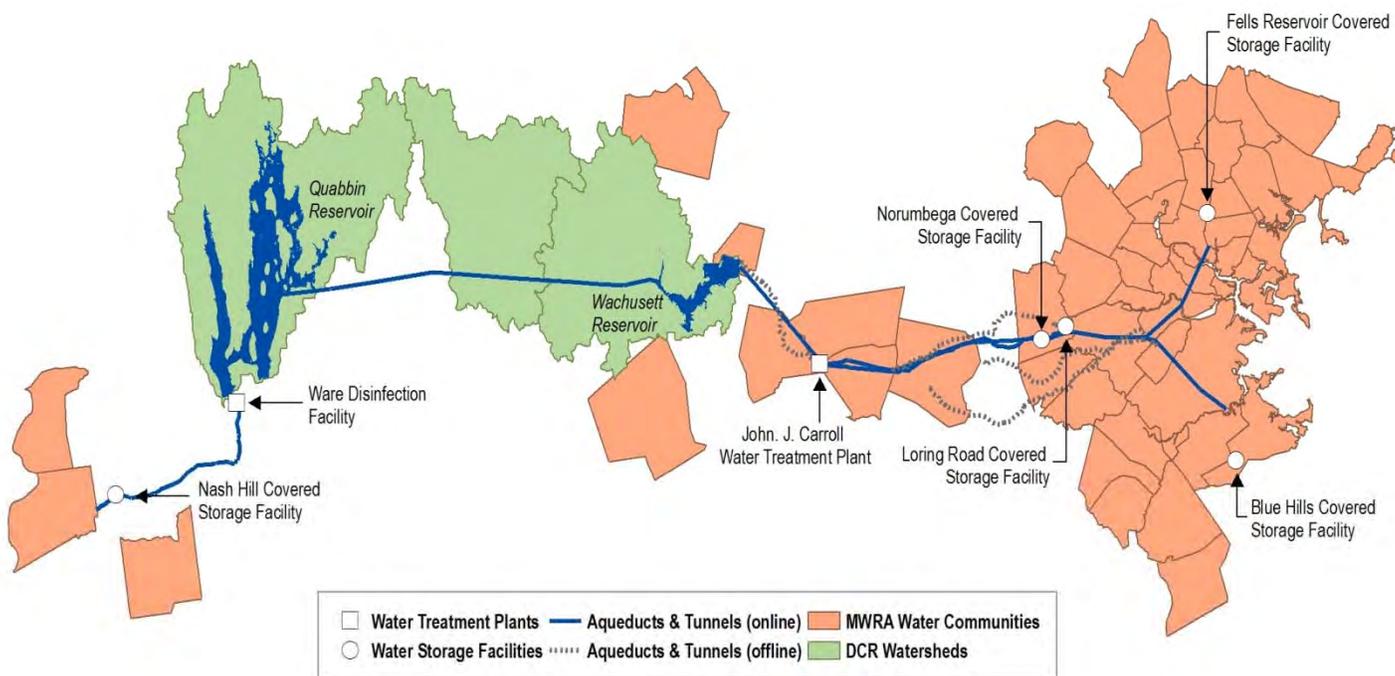
## The Water System

The MWRA supplies wholesale water to local water departments in 51 communities, 45 in greater Boston and MetroWest, three in Western Massachusetts, and as a back-up supply for three others. 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, and about 200 million gallons are supplied each day.

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 401-square mile watershed areas of the Quabbin and Wachusett Reservoirs are naturally protected with over 85% of the watersheds covered in forest and wetlands. The Department of Conservation and Recreation (DCR), which manages the watersheds, and MWRA are committed to safety of the water supply through intensive watershed protection as the first line of defense against water contamination.

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 monitors for a variety of parameters that tell us about the disinfection, corrosivity, and the organic and inorganic constituents in the water. 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, pathogens, and over 120 potential chemical contaminants. Testing frequencies vary by parameter.

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 2,000 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 and UV Results

## August 2014

### 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. However, fecal coliform, a subclass of the coliform group, 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 water supplies allows for no more than 10% of source water samples prior to disinfection over any six-month period to have more than 20 fecal coliforms per 100mL.

### Sample Site: Quabbin Reservoir

Quabbin Reservoir water is sampled at the Ware Disinfection Facility (WDF) raw water tap before being treated and entering the CVA system.

Two of the 31 samples were positive during August. None of the samples exceeded a count of 20 cfu/100mL. **For the current six-month period, 0.0% of the samples have exceeded a count of 20 cfu/100mL.**

### Sample Site: Wachusett Reservoir

Wachusett Reservoir water is sampled at the CWTP raw water tap in Marlborough before being treated and entering the MetroWest/Metropolitan Boston systems.

In the wintertime when smaller water bodies near Wachusett Reservoir freeze up, many waterfowl will roost in the main body of the reservoir - which freezes later. This increased bird activity tends to increase fecal coliform counts. DCR has an active bird harassment program to move the birds away from the intake area.

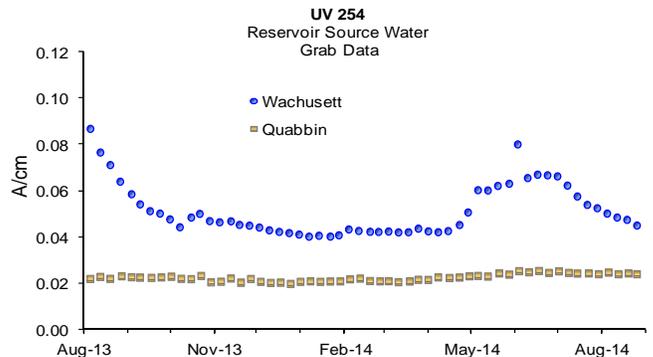
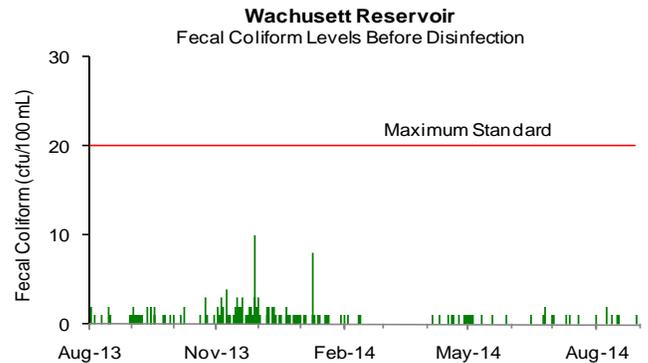
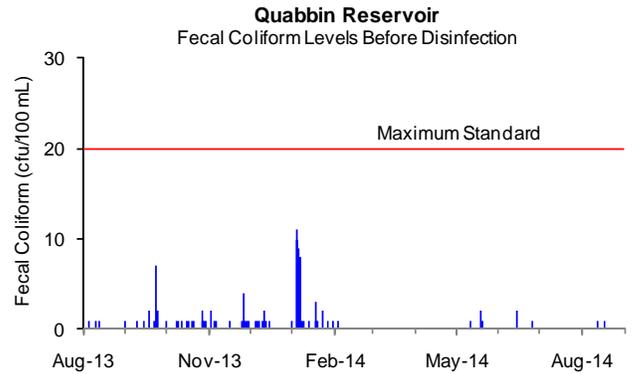
Five of the 31 samples were positive during August. None of the samples exceeded a count of 20 cfu/100mL. **For the current six-month period, 0.0% of the samples have exceeded a count of 20 cfu/100mL.**

### Source Water - UV Absorbance

UV Absorbance at 254nm wavelength (UV-254), is a measure of the amount and reactivity of natural organic material in source water. Higher UV-254 levels cause increased ozone and chlorine demand resulting in the need for higher ozone and chlorine doses, and can increase the level of disinfection by-products. UV-254 is impacted by tributary flows, water age, sunlight and other factors. Hurricanes can have a significant and long lasting impact.

Quabbin Reservoir UV-254 levels are currently around 0.024 A/cm.

Wachusett Reservoir UV-254 levels are currently around 0.045 A/cm.



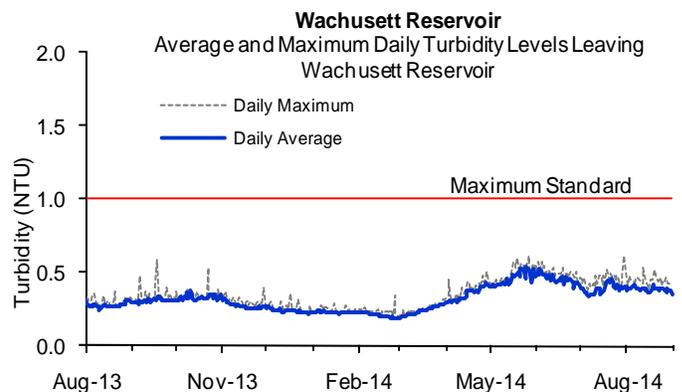
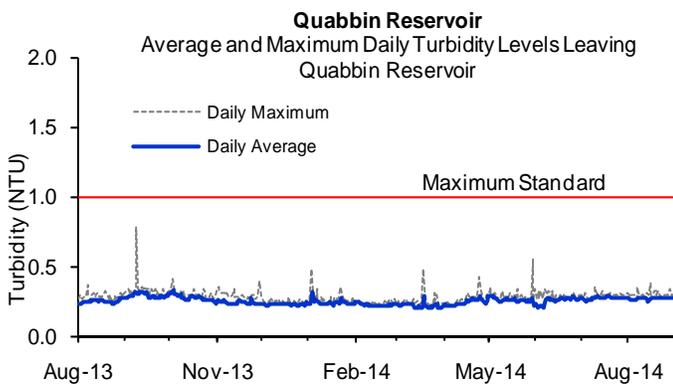
# Source Water – Turbidity and Algae Results August 2014

## 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 disinfectant demand or may protect bacteria from disinfection effects, thereby interfering with the disinfectant residual throughout the distribution system.

There are two standards for turbidity: all water must be below 5 NTU (Nephelometric Turbidity Units), and water can only be above 1 NTU if it does not interfere with effective disinfection.

Turbidity of Quabbin Reservoir water is monitored continuously at the Ware Disinfection Facility (WDF) before chlorination. Turbidity of Wachusett Reservoir is monitored continuously at the Carroll Water Treatment Plant (CWTP) before ozonation. Maximum turbidity results at Quabbin and Wachusett were within standards for the month.

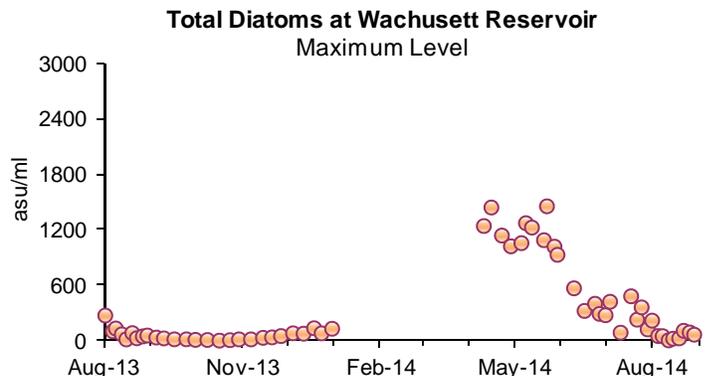
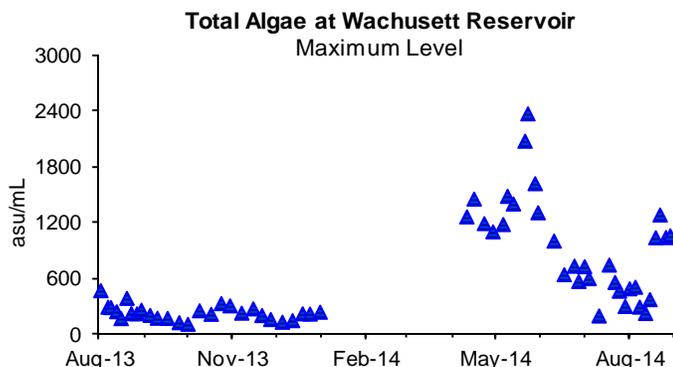


## Source Water - Algae Levels

Algae levels in Wachusett Reservoir 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.

Taste and odor complaints at the tap may be 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 bloom, MWRA may treat the reservoir with copper sulfate, an algacide. During the winter and spring, diatom numbers may increase. While not a taste and odor concern, consumers using filters may notice more frequent changing of the filters is needed.

No complaints which may be related to algae were reported during August from local water departments.



# Treated Water – Disinfection Results

## August 2014

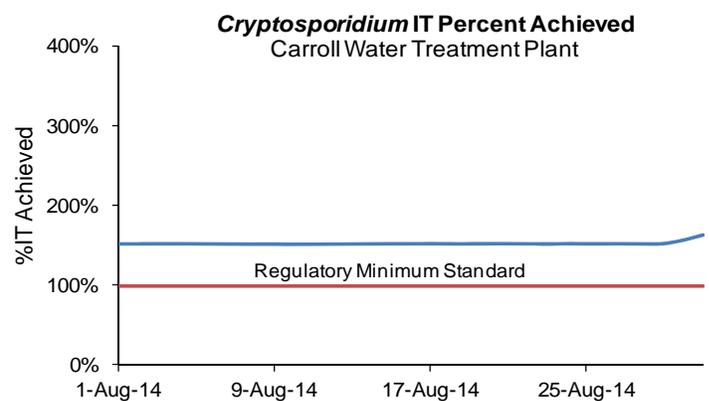
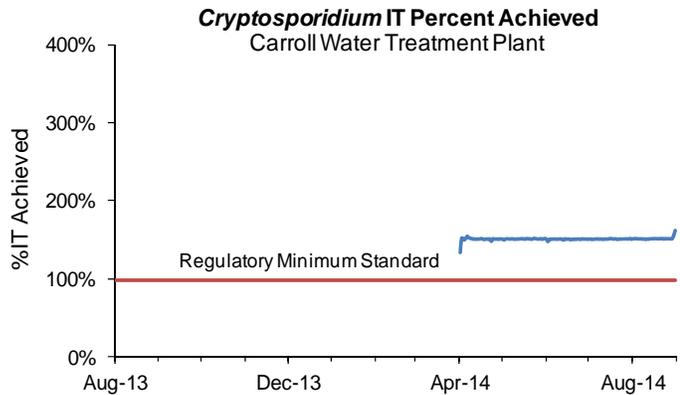
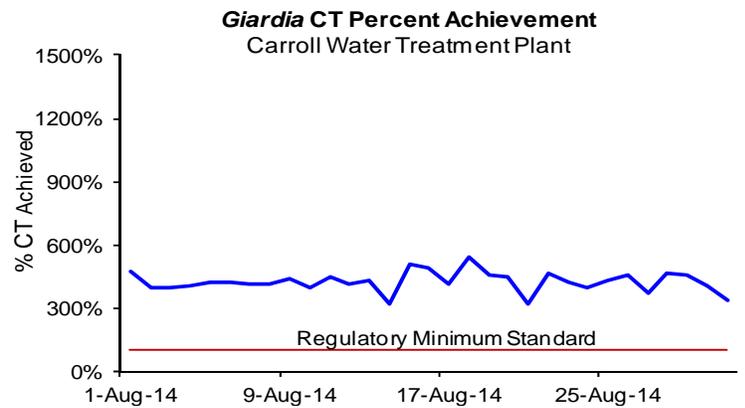
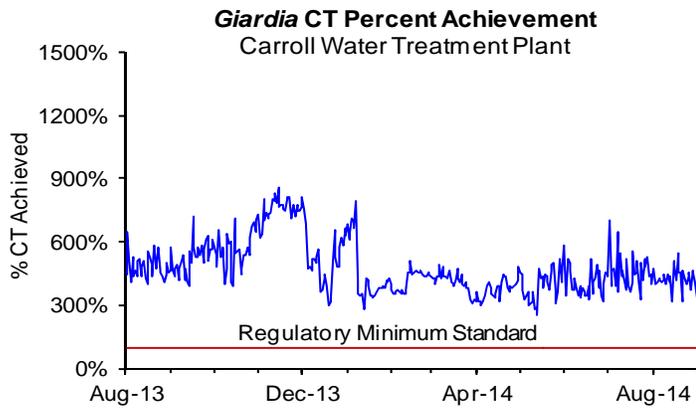
### Treated Water - Primary Disinfection

At the Carroll Water Treatment Plant (CWTP), MWRA meets the required 99.9% (3-log) inactivation of *Giardia* using ozone (reported as CT: concentration of disinfectant x contact time) and the required 99% (2-log) inactivation of *Cryptosporidium* using UV (reported as IT: intensity of UV x time). MWRA calculates inactivation rates hourly and reports *Giardia* inactivation at maximum flow and *Cryptosporidium* inactivation at minimum UV dose. MWRA must meet 100% of required CT and IT.

CT achievement for *Giardia* assures CT achievement for viruses, which have a lower CT requirement. For *Cryptosporidium*, there is also an “off-spec” requirement. Off-spec water is water that has not reached the full required UV dose or if the UV reactor is operated outside its validated ranges. No more than 5% off-spec water is allowed in a month.

### Wachusett Reservoir - MetroWest/MetroBoston Supply:

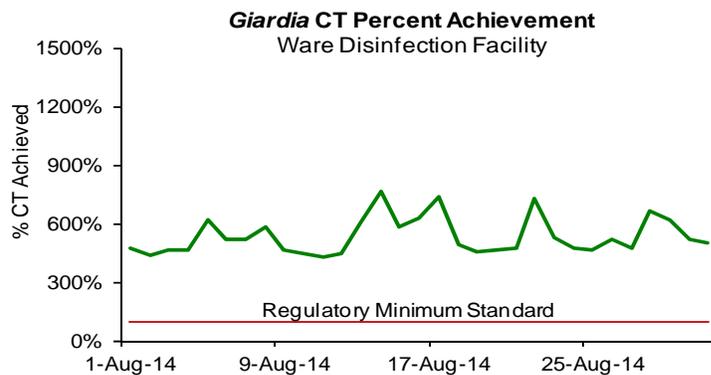
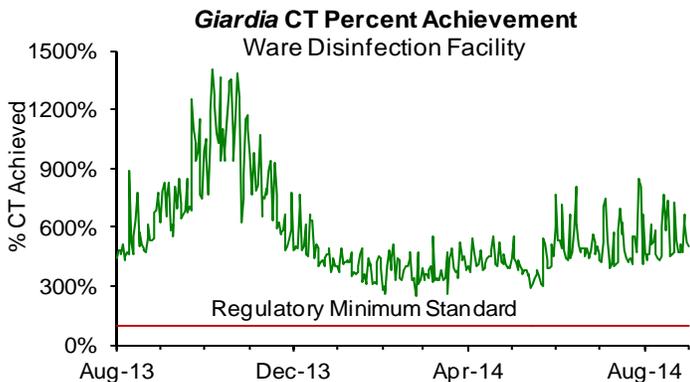
- Ozone dose at the CWTP varied between 1.8 to 2.0 mg/L for August.
- *Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system for August.
- *Cryptosporidium* IT was maintained above 100% during the month. Off-spec water was less than 5%.



# Treated Water – Disinfection, pH and Alkalinity Results August 2014

## Quabbin Reservoir at Ware Disinfection Facility (CVA Supply):

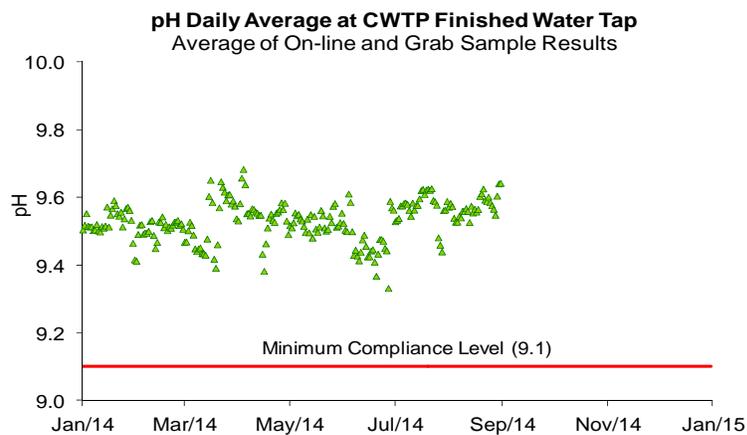
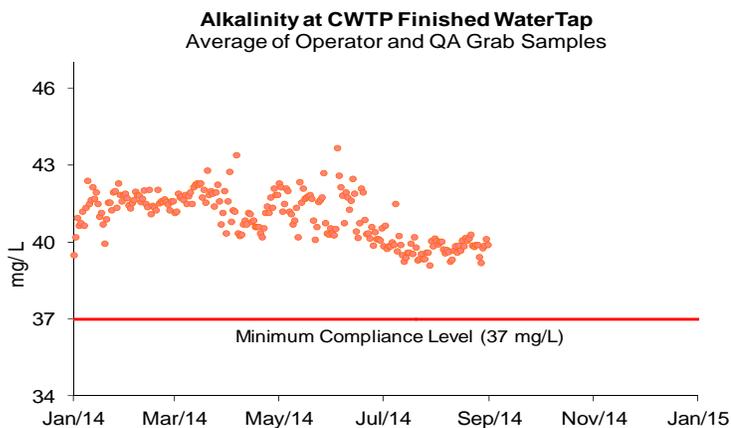
*Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system for August. The chlorine dose at Ware Disinfection Facility (WDF) is adjusted in order to achieve MWRA's seasonal (June 1 – October 31) target of  $\geq 1.0$  mg/L at Ludlow Monitoring Station. The chlorine dose at WDF was 1.6 mg/L for August.



## Treated Water - pH and Alkalinity Compliance:

MWRA adjusts the alkalinity and pH of Wachusett water to reduce its corrosivity, which minimizes the leaching of lead and copper from service lines and home plumbing systems into the water. MWRA's target for distribution system pH is 9.3; the target for alkalinity is 40 mg/L. Per DEP requirements, samples from the CWTP Fin B tap have a minimum compliance level of 9.1 for pH and 37 mg/L for alkalinity. Samples from 27 distribution system taps have a minimum compliance level of 9.0 for pH and 37 mg/L for alkalinity. Results must not be below this level for more than 9 days in a six-month period. MWRA tests finished water pH and alkalinity daily at the CWTP Fin B sampling tap. When CWTP undergoes winter maintenance, samples are collected at the CWTP Fin A sampling tap. Distribution system samples are collected in March, June, September, and December.

In August and over the past six months, no sample results were below the target levels.



# Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program

## August 2014

While all communities collect bacteria samples and chlorine residual data for the Total Coliform Rule (TCR), data from the 43 systems that use MWRA's Laboratory are reported below.

The MWRA TCR program has 142 sampling locations. These locations include sites along MWRA's transmission system, water storage tanks and pumping stations, as well as a subset of the community TCR locations.

The TCR requires that no more than 5% of all samples in a month may be total coliform positive (or that no more than one 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 whose presence likely indicates potential contamination of fecal origin. If *E.coli* are detected in a drinking water sample, this is considered evidence of a critical public health concern. Public notification is required if follow-up tests confirm the presence of *E.coli* or total coliform.

A disinfectant residual is intended to maintain the sanitary integrity of the water; MWRA considers a residual of 0.2 mg/L a minimum target level at all points in the distribution system.

### Highlights

Thirteen of the 1,941 community samples (0.67%) system-wide tested positive for total coliform during the month of August. Six of the 620 MWRA samples (0.97%) tested positive for total coliform. Bedford and Wellesley have violated the TCR for August. During a routine sampling in Wellesley, one sample indicated the presence of total coliform bacteria on August 19. Repeat samples showed the presence of total coliform, including one location with *E.coli*. Since the positive sample was located near a water storage tank, the town immediately removed the tank from service on August 21 and issued a Boil Order. All repeat samples collected afterwards were coliform free and the boil water order was lifted on August 23. Pierce Reservoir tank is undergoing repairs. No other MWRA or community sample tested positive for *E.coli*. Only 5.3% of the samples had chlorine residuals lower than 0.2 mg/L.

		# Coliform Samples (a)	Total Coliform # (%) Positive	E.coli # Positive	Public Notification Required?	Chlorine Residuals (mg/L)						
						2014 Minimum	2013 Minimum	2014 Average	2013 Average	2014 % <0.2	2013 % <0.2	
MWRA	d	MWRA Locations	123	5 (4.07%)	0	No	1.70	0.99	2.56	2.60	0%	0%
		Communities in Program	497	1 (0.20%)	0	No	0.01	0.01	1.97	1.71	2%	4%
		<b>Total: MWRA</b>	<b>620</b>	<b>6 (0.97%)</b>	<b>0</b>	<b>No</b>	<b>0.01</b>	<b>0.01</b>	<b>2.09</b>	<b>1.89</b>	<b>2%</b>	<b>3%</b>
Fully Served		ARLINGTON	52	0 (0%)	0		0.01	0.01	1.25	1.06	21%	23%
		BELMONT	32	0 (0%)	0		0.90	0.01	1.71	1.18	0%	16%
		BOSTON	240	0 (0%)	0		1.05	0.09	2.13	1.82	0%	0%
		BROOKLINE	68	0 (0%)	0		0.16	0.30	1.87	1.96	2%	0%
		CHELSEA	52	0 (0%)	0		1.32	1.20	1.90	1.76	0%	0%
		DEER ISLAND	16	0 (0%)	0		1.01	0.65	1.87	1.51	0%	0%
		EVERETT	52	0 (0%)	0		1.01	0.24	1.12	1.00	0%	0%
		FRAMINGHAM	72	0 (0%)	0		0.20	0.20	2.05	1.45	0%	0%
		LEXINGTON	36	0 (0%)	0		0.75	0.34	2.23	1.62	0%	0%
		LYNNFIELD	6	0 (0%)	0		0.25	0.55	0.85	1.30	0%	0%
		MALDEN	72	0 (0%)	0		0.66	1.52	1.91	1.60	0%	0%
		MARBLEHEAD	24	0 (0%)	0		0.27	0.21	1.93	1.84	0%	0%
		MEDFORD	68	0 (0%)	0		1.21	0.48	1.87	1.64	0%	0%
		MELROSE	36	0 (0%)	0		0.02	0.02	0.98	0.57	33%	42%
		MILTON	32	0 (0%)	0		1.29	0.74	1.85	1.60	0%	0%
		NAHANT	10	0 (0%)	0		0.12	0.08	1.56	0.75	20%	30%
		NEWTOWN	92	0 (0%)	0		0.11	0.09	1.83	1.65	8%	2%
		NORWOOD	33	0 (0%)	0		0.04	0.02	1.40	0.89	15%	36%
		QUINCY	92	0 (0%)	0		0.07	0.03	1.54	0.87	7%	24%
		READING	40	0 (0%)	0		0.07	0.02	1.22	0.88	13%	28%
		REVERE	60	0 (0%)	0		1.24	0.37	1.99	1.29	0%	0%
		SAUGUS	32	0 (0%)	0		1.47	0.87	1.89	1.59	0%	0%
		SOMERVILLE	84	0 (0%)	0		1.07	1.08	1.74	1.75	0%	0%
		SOUTHBOROUGH	10	0 (0%)	0		0.26	0.46	1.69	1.81	0%	0%
		STONEHAM	28	0 (0%)	0		0.98	0.02	1.92	1.70	0%	3%
		SWAMPSCOTT	17	0 (0%)	0		0.45	0.14	1.42	0.97	0%	6%
		WALTHAM	81	3 (3.70%)	0	No	0.56	0.16	2.08	1.76	0%	1%
		WATERTOWN	40	0 (0%)	0		0.63	0.35	2.10	1.92	0%	0%
		WESTBORO HOSPITAL	8	1 (12.50%)	0	No	0.09	0.03	0.41	0.06	63%	100%
		WESTON	16	0 (0%)	0		0.46	0.10	1.61	1.82	0%	19%
		WINTHROP	24	0 (0%)	0		0.16	0.12	1.54	0.90	4%	8%
		<b>Total: Fully Served</b>	<b>1525</b>	<b>4 (0.26%)</b>								
	CVA & Partially Served	b	BEDFORD	34	5 (14.71%)	0	Yes	0.07	0.06	1.24	0.57	9%
CANTON			29	0 (0%)	0		0.03	-	0.82	-	35%	-
HANSCOM AFB			9	0 (0%)	0		0.08	0.02	1.14	0.49	11%	31%
MARLBORO			42	0 (0%)	0		1.28	0.16	2.52	2.23	0%	2%
NEEDHAM			41	0 (0%)	0		0.07	0.08	0.85	1.01	17%	29%
NORTHBORO			16	0 (0%)	0		0.06	0.08	1.44	1.57	13%	38%
WAKEFIELD			45	0 (0%)	0		0.25	0.05	1.37	1.07	0%	5%
WELLESLEY			67	4 (5.97%)	1	Yes	0.02	0.05	0.84	0.73	18%	17%
WILMINGTON			29	0 (0%)	0		0.11	0.06	1.56	1.30	3%	14%
WINCHESTER			28	0 (0%)	0		0.12	0.25	1.54	1.49	11%	0%
WOBURN			60	0 (0%)	0		0.02	0.01	1.14	1.08	13%	12%
SOUTH HADLEY FD1			16	0 (0%)	0		0.15	0.28	0.48	0.65	6%	0%
			<b>Total: CVA &amp; Partially Served</b>	<b>416</b>	<b>9 (2.16%)</b>							
	<b>Total: Community Samples</b>	<b>1941</b>	<b>13 (0.67%)</b>									

(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) Part of the Chicopee Valley Aqueduct System. Free chlorine system.

(d) MWRA total coliform and chlorine residual results include data from 125 community pipe locations as described above. In most cases these community results are accurately indicative of MWRA water as it enters the community system; however, some are clearly strongly influenced by local pipe conditions. Residuals in the MWRA system are typically between 1.0 and 2.8 mg/L.

# Treated Water - Disinfection By-Product (DBP) Levels in Communities August 2014

Total Trihalomethanes (TTHMs) and Haloacetic Acids (HAA5s) are by-products of disinfection treatment with chlorine. TTHMs and HAA5s are of concern due to their potential adverse health effects at high levels. EPA's running annual average (RAA) standard is 80 µg/L for TTHMs and 60 µg/L for HAA5s. For the MetroBoston system, effective Q2 2013, under the Stage 2 DBP Rule, compliance is based on locational running annual averages (LRAA). Sampling locations have increased from 16 to 32 each quarter. Data prior to Q1 2013 reports the running annual average, and since Q1 2013, the maximum LRAA is reported (in addition to min and max values).

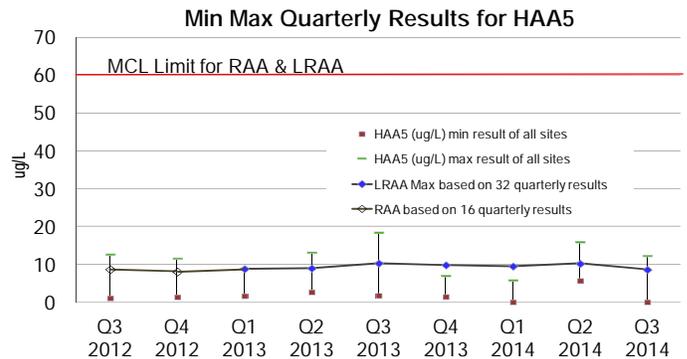
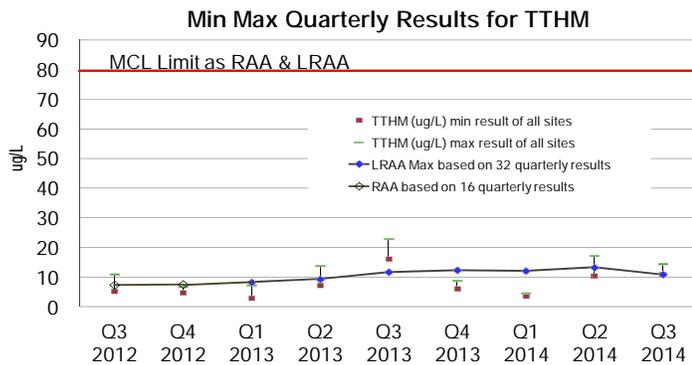
For the CVA communities, effective Q3 2013, under the Stage 2 DBP Rule, compliance is based on a LRAA for each community. Sampling locations have increased from 12 to 14 each quarter. Prior to Q3 2013, the running annual average is reported, and since Q3 2013, the maximum LRAA is reported (in addition to min and max values). The chart below combines all three CVA communities data.

Partially served and CVA communities are responsible for their own compliance monitoring and reporting, and must be contacted directly for their individual results.

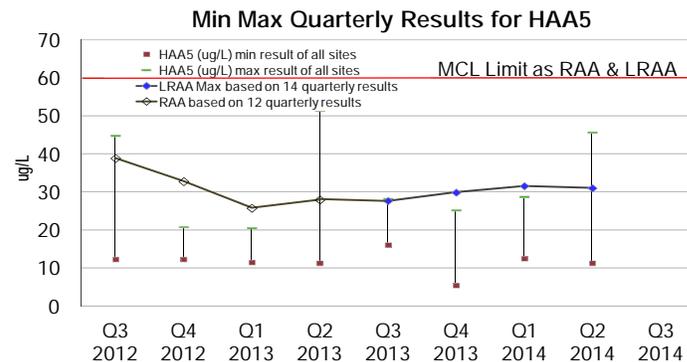
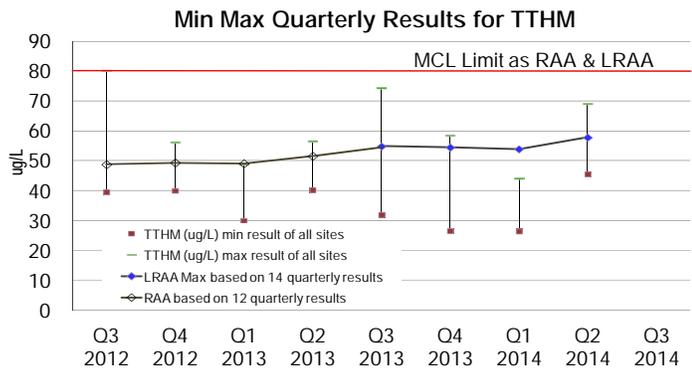
Bromate is tested monthly per DEP requirements for water systems that treat with ozone. Bromide in the raw water may be converted into bromate following ozonation. EPA's RAA Maximum Contaminant Level (MCL) standard for bromate is 10 µg/L.

The RAA for TTHMs and HAA5s for MWRA's Compliance Program (represented as the line in the top two graphs below) remain below current standards. The Max LRAA in the first quarter for TTHMs = 11.0 µg/L; HAA5s = 8.6 µg/L. The current RAA for Bromate = 0.0 µg/L. CVA's DBP levels continue to be below current standards.

## MetroBoston Disinfection By-Products



## CVA Disinfection By-Products



# MWRA Monthly Water Quality Analysis

## August 2014

This page provides information on water quality at four locations in the MWRA transmission system. Results reflect a "snapshot" in time and may not represent typical conditions. Monitoring for parameters indicated in regular font is quarterly as they either have minimal variability or are always below detection limits. The "Wachusett System" locations represent raw water from the Wachusett Reservoir (CWTP inlet) and finished water leaving the treatment plant (CWTP Finished water tap). The "CVA System" locations represent raw water from the Quabbin Reservoir (WDF) and finished water after all treatment (LMS). See [www.mwra.com](http://www.mwra.com) for additional information on other parameters which are monitored less frequently. All samples are analyzed by MWRA and contract laboratories.

CVA System
Wachusett System
Standards

Ware Disinfection Facility (Raw)
Metro-Boston
→

Component	Quabbin Res. at Ware Disinfection Facility (Raw)	Ludlow Monitoring Station (Treated)	Carroll Water Treatment Plant Inlet (Raw)	Carroll Water TP Fin. Water Tap (Treated)	Health Standard	Aesthetics or Other Standards	Units	Method Reporting Limit
Alkalinity	3.3	4.4	5.8	39.8			MG/L	0.05
Aluminum	U	U	U	U		50-200 (c)	UG/L	15.0
Ammonia-N, Total	U	0.01	0.01	0.38			MG/L	0.005
Antimony	U	U	U	U	6 (b)		UG/L	0.4
Arsenic	U	U	U	U	10 (b)		UG/L	1.0
Barium	5.8	5.9	8.8	9.0	2000 (b)		UG/L	2.0
Beryllium	U	U	U	U	4 (b)		UG/L	0.3
Bromate	U	U	U	U	10 (b)		UG/L	5.0
Bromide	10.0	U	13.1	8.6			UG/L	5.0
Cadmium <sup>(1)</sup>	U	U	U	U	5 (b)		UG/L	0.5
Calcium	2090	2140	4640	4700			UG/L	50
Chloride	7.2	9.0	22.6	25.9		250 (c)	MG/L	0.5
Chlorine, Free		1.34			4 (b)(d)		MG/L	0.02
Chlorine, Total				2.75	4 (b)(d)		MG/L	0.02
Chromium, Total	U	U	U	U	100 (b)		UG/L	1.0
Coliform, Fecal, MF Method	U		1		20 (a)		CFU/100 mL	1
Coliform, Total, Collert Method	184	U	357	U	100 (a) 0 (b)		MPN/100 mL	1
Copper **	U	U	5.0	5.2		1300 (e) 1000 (f)	UG/L	3.0
Cyanide	U	U	U	U	0.2 (b)		MG/L	0.01
Fluoride <sup>(3)</sup>	0.02	0.02	0.07	1.02	4 (b)		MG/L	0.02
Hardness <sup>(2)</sup>	7.5	7.6	15.2	15.4			MG/L	0.194
Iron **	7.4	7.0	29.3	29.3		300 (c)	UG/L	6.0
Lead	0.07	0.07	U	U		15 (e)	UG/L	0.05
Magnesium	554	550	888	899			UG/L	35
Manganese	1.91	1.60	6.21	6.34		50 (c) 300 (g)	UG/L	0.1
Mercury <sup>(1)</sup>	U	U	U	U	2 (b)		UG/L	0.05
Nickel	U	U	U	U			UG/L	0.5
Nitrate-N	U	U	0.052	0.046	10 (b)		MG/L	0.005
Nitrite	U	U	U	0.006	1 (b)		MG/L	0.005
Orthophosphate	0.008	U	0.009	0.013			MG/L	0.0025
pH	6.7	7.1	6.7	9.6			S.U.	
Potassium	523	516	868	945			UG/L	200
Selenium	U	U	U	U	50 (b)		UG/L	1.0
Silica (SiO2)	2020	1970	2200	2640			UG/L	200.0
Silver	U	U	U	U		100 (c)	UG/L	1.0
Sodium	5.1	6.3	13.5	32.4			MG/L	0.2
Specific Conductance	46	55	98	176			UMHO/cm	0.3
Standard Plate Count, HPC	9		42	U	500 (b)		CFU/mL	1
Sulfate (SO4)	4.1	4.1	5.8	5.9		250 (c)	MG/L	1.0
Thallium	U	U	U	U	2 (b)		UG/L	0.3
Total Dissolved Solids	43.0	47.0	77.0	118.0		500 (c)	MG/L	13
Total Organic Carbon	2.0	2.0	2.5	2.7			MG/L	0.3
Total Phosphorus	U	U	U	U			MG/L	0.05
UV-254	0.025	0.019	0.050	0.034			A/cm	0.000965
Zinc **	2.6	1.6	U	U		5000 (c)	UG/L	1.5

(a) = Primary MCL standard (health related), applies to source (raw) water only. DEP "Drinking Water Regulations", 310CMR 22.00. Fecal standard takes precedence when both fecal and total coliform are tested.  
 (b) = Primary MCL standard (health related). DEP "Drinking Water Regulations", 310CMR 22.00. Applies to samples of treated water downstream of Wachusett and Quabbin Reservoirs. Most based on annual average.  
 (c) = Secondary MCL standard (aesthetic related). DEP "Drinking Water Regulations", 310CMR 22.00.  
 (d) = Maximum Residual Disinfectant Level. DEP "Drinking Water Regulations", 310CMR 22.00. Based on annual average.  
 (e) = Refers to 90th percentile Action Level.  
 (f) = Refers to a single sample, secondary MCL.  
 (g) = DEP Advisory Level, reference [www.mass.gov/eea/docs/dep/water/drinking/alpha/i-thru-z/mangfactsheet.pdf](http://www.mass.gov/eea/docs/dep/water/drinking/alpha/i-thru-z/mangfactsheet.pdf)

U = Less than method reporting limit  
 MCL = Maximum Contaminant Level  
 [ ] = Not Applicable  
 S.U. = Standard Units

CFU = Colony Forming Unit  
 NTU = Nephelometric Turbidity Unit  
 MG/L = milligrams per liter = parts per million  
 UG/L = micrograms per liter = parts per billion

MPN = Most Probable Number  
 HPC = Heterotrophic Plate Count (48 Hrs @ 35 °C)  
 \*\* = Metal results may be elevated due to local plumbing at the sample tap.  
**Italic Bold = Samples from August**  
 Regular Font = Quarterly results from July samples

Samples listed are monthly samples taken from single grab samples on August 4, 5 and 7, 2014. Cyanide test is performed annually. Results shown are from January 2014.

- NOTES:**
- (1) Due to MWRA lab equipment having higher sensitivity, MWRA's tests for several parameters are more sensitive than the EPA-set levels of detection and reporting. For example, the EPA minimum detection limit for cadmium is 1 ug/L and 0.2 ug/L for mercury, and MWRA lab tests and reports at lower than these detection limits.
  - (2) MWRA water is considered soft. Water hardness is characterized by the amount of dissolved minerals in the water, in particular calcium and magnesium. MWRA water has a hardness of about 15-20 mg/l or about 1 grain/gallon (1 grain/gallon = 17.1 mg/L). For comparison, hard water would have greater than 75 mg/l hardness.
  - (3) Fluoride dose is 1.0 mg/L with a desired range of 0.8 to 1.2 mg/L.