Boston, MA

Boston Earned a Water Quality and Compliance Grade of Poor in 2000 and 2001

The city has ongoing problems with uncovered reservoirs and is in dispute with the EPA over filtration for pathogens; in addition, Boston's water exceeded the national action level for lead in its unfiltered water, and contains *Cryptosporidium.* The city also reported high levels of total trihalomethanes—presenting major health concerns.

▶ In 2001, Boston's water failed to meet the national action level for **lead**. Lead—which enters drinking water supplies from the corrosion of pipes or faucets—can adversely affect blood pressure, red blood cells, and kidney and nervous system function and, especially in infants and children, cause permanent brain damage, decreased intelligence, and problems with growth, development, and behavior. Boston's tap water lead levels have been reduced somewhat in recent years, but they remain a serious health concern.

▶ Levels of **total trihalomethanes**—by-products of chlorine treatment in drinking water that are linked with cancer and, potentially, miscarriages and birth defects—averaged about 84 percent of the EPA's new standard and occasionally spiked to levels above the new standard. No violation was recorded because the EPA's standard is based on average levels.

▶ ***Cryptosporidium*** (*Crypto*) may also be a concern. *Crypto* is a waterborne microbial disease-carrying pathogen that can present health risks, especially to individuals with weakened immune systems. It has been found in Boston's watersheds, reservoirs, and, according to preliminary results, at low levels in parts of the distribution system (pipes).[2]

BOSTON
System Population Served **574,283**[1]
Water Quality and Compliance **2000 ▶ Poor** **2001 ▶ Poor**
Right-to-Know Report—Citizenship **2000 ▶ Poor** **2001 ▶ Poor**
Source Water Protection **Good**
REPORT CARD

Noteworthy

▶ Whether Boston's source water protection is adequate to protect public health is a matter of controversy. Boston and its wholesale water supplier, the Massachusetts Water Resources Authority (MWRA) have been locked in a long-running dispute with the EPA over whether the city must filter its drinking water. The EPA says that Boston violated federal rules requiring either filtration or full protection of its watersheds from pathogens. A court ruled in 2001 that while the EPA was correct that the MWRA/Boston had previously violated EPA rules, the past violation was insufficient to automatically trigger mandatory filtration.[3]

▶ Boston uses an uncovered reservoir to hold treated ("finished") tap water, which can become contaminated with disease-causing pathogens. Boston says "a small percentage" of this water is inadequately disinfected, representing a violation of state rules and necessitating the posting of public notices that say, "inadequately treated water may contain disease-causing organisms."[4] Boston promises to fix the problem by late 2003.

Boston's Right-to-Know Reports Earned a Grade of Poor in 2000 and 2001

▶ The MWRA's recent right-to-know reports are relatively user-friendly and avoid previous statements assuring customers that the water is "safe." However, the 2000 report prominently asserted on the front page, "MWRA follows, and even goes beyond, federal and state standards." To the contrary, several MWRA-supplied towns exceeded the EPA action level for lead; many MWRA-supplied towns violated the coliform bacteria standard; and the EPA listed the MWRA as being in violation of U.S. standards requiring filtration or source water protection in 2000.

Moreover, in 2001, the MWRA was required to notify the public of inadequately disinfected water from its uncovered reservoir. No representation was made in the 2001 report that there were no violations, but the exceedance of the lead action level and the

MWRA's violations of the coliform standard (outside Boston) were not noted until deep into the report. Furthermore, the section of the 2001 report that discussed Boston's failure to meet the EPA's lead action level was headlined "Good News on Lead."

Boston Earned a Source Water Protection Grade of Good

▶ There are active and largely effective watershed protection efforts in the Boston watersheds. However, development pressures, nonpoint source pollution (*e.g.*, agricultural runoff and septic systems), and recreational use pose risks in parts of the watersheds serving the city, particularly the Wachusett. The EPA has ranked the entire Chicopee Watershed, which includes the Quabbin Reservoir, as a 6 on a watershed threat scale from 1 (low threat) to 6 (high threat).[5] Taken as a whole, NRDC has ranked the overall watershed as Good, based upon the EPA's assessments, the watershed's vulnerability, some pollution sources, and active and largely effective watershed protection efforts in much of the area.

Noteworthy

▶ **Boston and the MWRA have $1.7 billion in drinking water protection and improvement underway.** The MWRA's Integrated Water Supply Improvement Program is a 10-year, $1.7 billion series of projects, "to protect watersheds and build new water treatment and transmission facilities." The effort is more than halfway completed, and the 10-year plan is scheduled to be completed by 2004. Thereafter, from 2004 to 2011, hundreds of millions of dollars are slated for additional capital improvement projects to upgrade the Boston and MWRA water supply system. Among the major components are:

- **The MetroWest Water Supply Tunnel.** This nearly finished project will add a 17-mile-long tunnel to connect the Walnut Hill treatment plant to greater Boston, to back up the aging Hultman Aqueduct, constructed in 1941.
- **Water Storage Tanks.** The MWRA is building covered storage tanks to replace open finished tap water reservoirs in order to reduce risk that contaminants will get into the water, as required by state rules; their completion is expected by 2004.
- **Pipeline Rehabilitation.** The MWRA and local water departments are replacing, cleaning, and relining older pipes that are crumbling, likely to burst, or filling with sediment.
- **Walnut Hill Water Treatment Plant.** This drinking water treatment plant is supposed to be completed in 2004, when it will consolidate treatment steps and put ozone disinfection into place for Boston.

KEY CONTAMINANTS IN BOSTON'S WATER

The following contaminants have been found in Boston's drinking water supply. For more information on health threats posed by specific contaminants, see Chapter 5.

MICROBIOLOGICAL CONTAMINANTS

Cryptosporidium

National Standard (MCL)
Treatment Technique (TT)

Draft Proposed New National Standard[6]
<7.5 organisms/100 liters (average); no additional treatment
7.5–100 organisms/100 liters (average); some additional treatment (>90% *Crypto* kill)
100–300 organisms/100 liters (average); significant additional treatment (>99% *Crypto* kill)
>300 organisms/100 liters (average); advanced treatment (>99.7% *Crypto* kill)

National Health Goal (MCLG)
0—no known fully safe level

National Requirements
Most large- and medium-size water utilities that use surface water are required to monitor for *Crypto* and report results in their right-to-know reports; they eventually may be required to use advanced treatment if significant levels are found.

Levels[7]
The MWRA monitors for *Cryptosporidium* in Boston's intakes and Quabbin Reservoir before treatment; it also occasionally monitors the water transmission system. In addition, the Metropolitan District Commission (MDC) tests for protozoa in source waters. The test results are summarized below:

1995–1998 Quabbin System[8]
Watershed:
50% contained presumed *Crypto*
8% contained confirmed *Crypto*
Reservoir:
36% contained presumed *Crypto*
27% contained confirmed *Crypto*

Water at Chicopee Valley Aqueduct (CVA) Intake to Water System:
6% contained presumed *Crypto*
0% contained confirmed *Crypto*

2000 Wachusett System[9]
Watershed:
5%–21% contained presumed *Crypto*
0% contained confirmed *Crypto*

1999–2002 Cosgrove Intake[10]
Water at Cosgrove Intake
0% contained presumed *Crypto*
0% contained confirmed *Crypto*

Water in Distribution System (preliminary)[11]	Average 1 oocyst/ 1000 liters	Maximum >10 oocysts/ 1000 liters

LEVELS PRESENT HIGH CONCERN

Cryptosporidium (Crypto) is a waterborne microbial disease that presents human health concerns, especially to individuals with weakened immune systems, including HIV/AIDS patients, the elderly, children, and people who have undergone organ transplants. When water utilities find significant levels of *Crypto,* they must eventually use advanced treatment.

From the data released by the MWRA, it does not appear that the utility will meet the EPA's preliminary criteria for levels, triggering additional treatment requirements. The public health implications of the MWRA system's *Crypto* and other microbiological findings in the Quabbin and Wachusett systems and the distribution system are highly controversial. The finding of low levels of *Crypto* and other microbes in water samples are cause for some concern, according to some health experts, including Dr. David Ozonoff of Boston University's School of Public Health. In addition, in light of methodological difficulties that make it extremely difficult to find and confirm the viability of *Crypto,* little reassurance can be taken from the fact that the MWRA found no *Crypto* at its intakes. Because the MWRA's water is not filtered and is not currently treated to kill *Crypto,* Boston and MWRA officials are essentially contending that the watershed protections they have adopted—and the time of travel, dilution, and perhaps current treatment, taken together—reduce the risks of *Crypto* to acceptable levels. They argue that the water supply currently is relatively safe and that it will be safer still when a new ozone treatment plant is put on-line in 2004. The EPA and cited experts do not share Boston's confidence; they maintain that filtration is the only way to assure safety. But the EPA lost its lawsuit to force such filtration.

Total Coliform Bacteria

National Standard
5% maximum in any month[12]

National Health Goal
0—no known fully safe level

2000 Levels in Boston
2% highest month, total coliform positive[13]

2001 Levels in Boston
0.4% highest month, total coliform positive[14]

LEVELS PRESENT HIGH CONCERN

Total coliform bacteria are microbial contaminants whose presence is a potential indicator that disease-causing organisms may be present in tap water. Coliform bacteria are sometimes found in Boston's water, but the city reports that it has been in compliance with the EPA's total coliform rule since its violation in 1996. The federal standard allows up to 5 percent coliform-positive samples per month, so the coliform bacteria finding in Boston—at levels well below this standard—is not viewed as a serious health threat to consumers. However, the finding of any coliform in the city's distribution systems is a possible indication that modest regrowth of bacteria or biofilm may still be occurring in the city's pipes. The Boston Water & Sewer Commission has been operating under an

Year 2000 Data—Total Coliform Results[15]

Community	Highest % of Positve Samples and Month	Violations of EPA's 5% Limit
Boston	2.0% (July)	No
Cambridge	1.1% (July)	No
Framingham	4.6% (July)	No
Malden	2.9% (August)	No
Marlborough	2.4% (May)	No
Needham	2.2% (March)	No
Revere	3.5% (September)	No
Somerville	9.2% (September)	Yes
Southborough	1 of 13 (March)	No
Swampscott	6.1% (August)	Yes
Wellesley	7.0% (December)	Yes
Weston	3.7% (July)	No
Winthrop	1.4% (November)	No

Year 2001 Data—Total Coliform Results[16]

Community	Highest % of Positve Samples and Month	Violations of EPA's 5% Limit
Boston	0.4% (April and November)	No
Cambridge	2.5% (July)	No
Framingham	3.7% (January)	No
Marlborough	2.0% (January)	No
Northborough	25.0% (July)	Yes
Somerville	1.2% (July)	No
Southborough	1 of 16 (August)	No
Wakefield	4.0% (September)	No
Wellesley	2.4% (June)	No
Weston	8.3% (July)	Yes
Winthrop	10.0% (July)	Yes

administrative consent order since 1996 to address past coliform and regrowth problems. Because Boston's coliform levels reportedly have been in compliance in its distribution system, coliform issues did not adversely affect Boston's water quality and compliance grade in this report. In 2000 and 2001, other MWRA-supplied cities did have coliform violations, however (see tables above) NRDC researchers did not count these exceedances outside of city limits against Boston's grade.

Treated Tap Water Reservoir Is Unprotected

Boston uses one finished (treated) water reservoir, which remains uncovered and thus unprotected—the Norumbega, in which drinking water can become contaminated with potentially disease-causing pathogens; in some cases, the water is not adequately disinfected to kill those bacteria. The Norumbega Reservoir violates regulations requiring that the water must be covered or treated, and therefore the state forced Boston and the MWRA to issue public notices of violation in 2001–2002. The notices stated that a small percentage of water coming from the Norumbega Reservoir violates standards and that this "inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites, which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches."[17] By December 2003, a covered tank will replace the reservoir so that this problem may be resolved.[18]

INORGANIC CONTAMINANTS

Lead

National Standard (TT)
15 ppb (action level, at 90th percentile)[19]

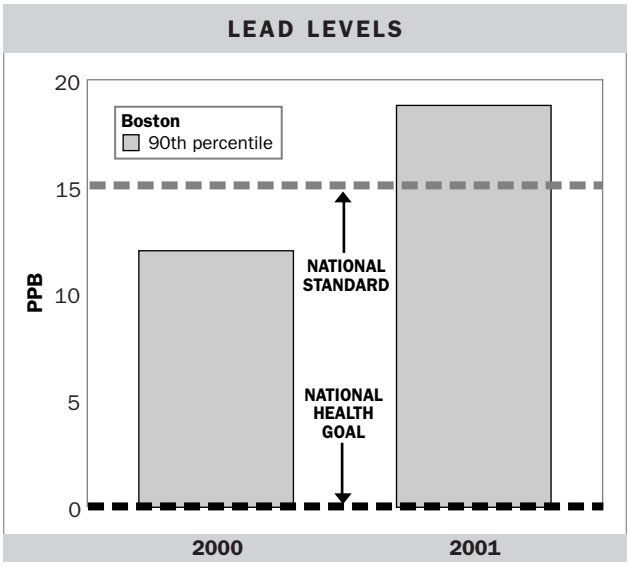
National Health Goal (MCLG)
0—no known fully safe level

2000 Levels in Boston[20]
12 ppb or less at the 90th percentile home

2001 Levels in Boston[21]
18.8 ppb at the 90th percentile home—*exceeds EPA action level*
52 of 442 (11.7%) homes tested exceeded national standard, failing the action level

EXCEEDS ACTION LEVEL

Lead—which enters drinking water supplies from the corrosion of pipes or faucets—can cause permanent brain damage, decreased intelligence, and problems with growth, development, and behavior, as well as adversely affect blood pressure, red blood cells, and kidney and nervous system function. The MWRA admits that in 1993, it "had the unfortunate distinction of having some of the highest measured first flush lead samples in the nation."[22] Indeed, a scientific study published in 1999 found that men in Boston who drank a glass or more a day of water containing elevated lead levels (more than 50 ppb) in the 1970s continued to have high lead levels in their bones 20 years later.[24] This



Lead Levels in Boston Metro Area Drinking Water—Year 2000[23]

Participating Communities	Number of Sampled Homes That Met AL of 15 ppb	90% of Homes Were Below This Number (Compare to AL of 15 ppb)
Arlington	12 of 15	19 ppb
Bedford (mixed)	23 of 23	6 ppb
Belmont	13 of 15	15 ppb
Boston	25 of 25	12 ppb
Brookline	15 of 15	7 ppb
Cambridge	60 of 60	5 ppb
Canton (mixed)	34 of 34	8 ppb
Chelsea	14 of 15	9 ppb
Everett	14 of 15	12 ppb
Framingham	11 of 15	27 ppb
Lexington	11 of 15	31 ppb
Lynnfield W.D.	7 of 8	13 ppb
Malden	13 of 15	15 ppb
Marblehead	14 of 15	8 ppb
Marlborough (mixed)	29 of 30	7 ppb
Medford	12 of 15	25 ppb
Melrose	14 of 15	5 ppb
Milton	14 of 15	13 ppb
Nahant	8 of 9	7 ppb
Needham (mixed)	58 of 60	7 ppb
Newton	13 of 15	22 ppb
Norwood	7 of 15	30 ppb
Peabody (mixed)	25 of 30	31 ppb
Quincy	12 of 12	8 ppb
Revere	12 of 12	6 ppb
Saugus	13 of 15	15 ppb
Somerville	8 of 11	18 ppb
Southborough	15 of 18	21 ppb
Stoneham	13 of 14	7 ppb
Swampscott	15 of 15	9 ppb
Wakefield (mixed)	12 of 60	31 ppb
Waltham	15 of 15	4 ppb
Watertown	13 of 15	14 ppb
Wellesley	56 of 60	6 ppb
Weston	18 of 20	11 ppb
Winchester (mixed)	27 of 30	11 ppb
Winthrop	12 of 15	40 ppb
Woburn (mixed)	12 of 16	24 ppb

Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow. **Maximum Contaminant Level Goal (MCLG):** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety. The MCLG for lead is 0. **Mixed:** Community partially supplied by MWRA and mixed with local water supply. **ppb:** Parts per billion. Note: Cambridge, Canton, Wakefield and Woburn data are from 1999 or earlier as 2000 sampling was not required.

past exposure may present specific health concerns because lead in bone can be mobilized with aging, particularly in menopausal and postmenopausal women whose bodies may mobilize stored bone lead as hormonal changes occur; this in turn may advance health effects.

Lead is present in Boston tap water because it leaches from pipes and water fixtures at any point between the source water in western Massachusetts and the tap. Water corrosivity hastens the leaching process. Fortunately, with improved treatment to control corrosivity, lead levels in city tap water have dropped in recent years. Recent tests show MWRA treatment apparently has brought down lead levels within the Boston city limits substantially since the early 1990s.

However, according to MWRA data, Boston still failed the EPA action level for lead in 2001. As noted in the chart at left, some areas just outside Boston also served by the MWRA exceeded the lead action level in 2000 (Arlington, Framingham, Lexington, Medford, Newton, Norwood, Peabody, Somerville, Southborough, Wakefield, Winthrop, and Woburn). NRDC researchers did not account for these exceedances in determining Boston's grade.

Consumers, particularly those with infants or young children, may want to test their water for lead; to find a laboratory, contact the Drinking Water Hotline, 800-426-4791. Or consumers may choose to flush faucets of lead by running water for approximately one minute before ingestion. (Excess water may be saved for plants or other uses.)

ORGANIC CONTAMINANTS

Haloacetic Acids (HAA)

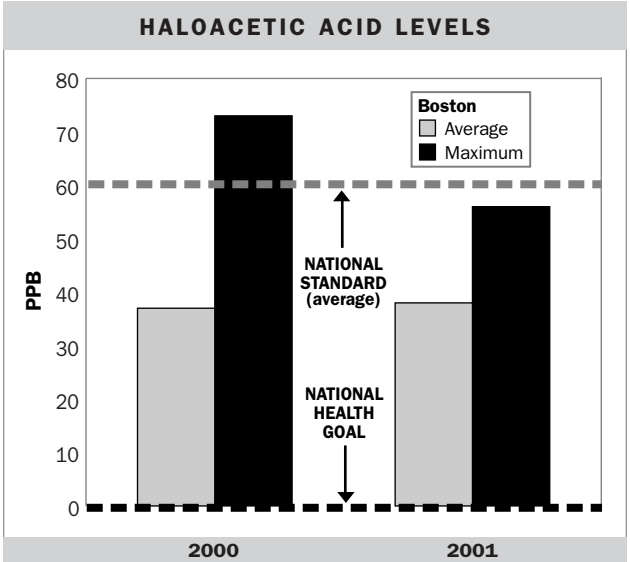
National Standard (MCL)
60 ppb (average) effective in 2002; no previous standard

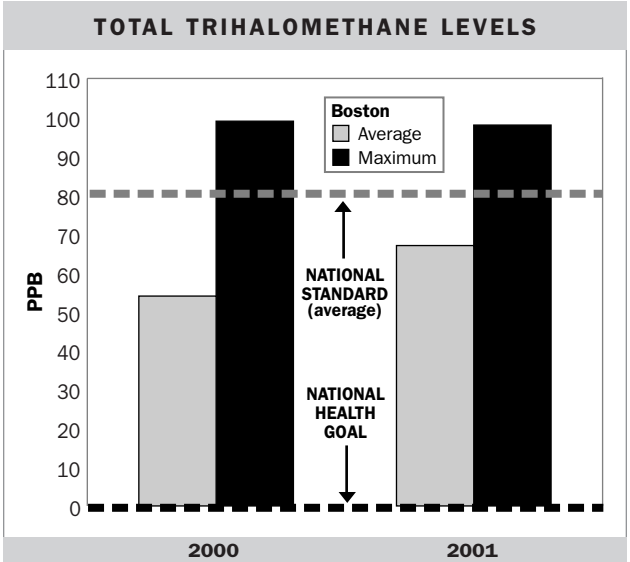
National Health Goal (MCLG)
0—no known fully safe level[25]

2000 Levels[26]	Average	Maximum
	37 ppb	73 ppb
2001 Levels[27]	Average	Maximum
	38 ppb	56 ppb

LEVELS PRESENT HIGH CONCERN

Haloacetic acids (HAAs), by-products of chlorine disinfection, may cause cancer and, potentially, reproductive and other health problems. Boston's haloacetic





acid levels averaged about half the new national standard, which went into effect in January 2002.

Total Trihalomethanes

National Standard (MCL)
100 ppb (average) effective through 2001
80 ppb (average) effective in 2002

National Health Goal (MCLG):
0—no known fully safe level[28]

2000 Levels[29]	Average 54 ppb	Maximum 99 ppb
2001 Levels[30]	Average 67 ppb	Maximum 98 ppb

LEVELS PRESENT HIGH CONCERN

Total trihalomethanes (TTHMs)—contaminants that result when chlorine is used to treat drinking water and then interacts with organic matter in the water—are linked with cancer and, potentially, to miscarriages and birth defects. Boston has relatively elevated levels of TTHMs in its drinking water during some parts of the year. The highest levels detected in 2000–2001 spiked above today's new standard of 80 ppb, which went into effect in January 2002. However, even if the new national standard had been enforceable at the time, Boston's levels would not have constituted a violation because the city average was below the standard. That said, the presence of significant TTHM levels is a concern because any substantial exposure poses a risk. As discussed in Chapter 5, the national standard is not based exclusively upon health but rather on a weighing of treatment options, costs, and other considerations versus health risks. Because Boston has committed to installing ozone as a primary disinfectant in 2004, levels of chlorination by-products are likely to decrease.

BOSTON'S RIGHT-TO-KNOW REPORTS

Boston's Right-to-Know Reports Earned a Grade of Poor for 2000 and 2001

On the good-citizen side of the ledger:

▶ The format of the city's right-to-know reports and tables was relatively user-friendly.

▶ Maps showing sources of drinking water and treatment plant locations were colorful and easy to read.

▶ The reports included directions in Spanish and 14 other languages urging consumers who do not speak English to get a translation or to speak to someone who understands it; some reports were fully translated into Spanish.

▶ The front pages of the 2000 and 2001 reports commendably avoided the 1999 report's prominent and overarching assertion reassuring customers that their water was "safe" without qualification. The 2000 report noted many comments from the public objecting to that statement as misleading. Commentators observed that the 1999 assertion of safety probably kept many people from reading the rest of the report, including people with weakened immune systems who were warned

only deep into the report that the water might not be safe for them.

On the could-be-a-better-citizen side of the ledger:

▸ A sweeping assertion of water safety in the 1999 report reappeared in the 2001 online report's FAQ section, stating that "even if you don't read beyond this page, we want to assure you that your water supply is safe."[31] This statement may stop many readers from carefully reviewing the report, which warns vulnerable people about special risks they face and notes that Boston and surrounding areas failed to meet the lead action level.

▸ The first page of the 2000 report asserted, "no MWRA-served community violated the standards set by the U.S. EPA." In fact, according to the EPA, the MWRA violated standards requiring filtration or source water protection in 2000, although the court declined to order the MWRA to filter. Also, many MWRA-served communities exceeded the EPA action level for lead, while others violated the EPA standard for total coliform bacteria. Although violating the EPA surface water treatment rule and exceeding the lead action level did not constitute maximum contaminant level violations, the flat and prominent statement that the MWRA did not violate any EPA standards may nonetheless have misled many consumers.

▸ The 2001 report noted that lead levels in Boston had dropped since 1992 but did so under the headline, "Good News on Lead"—in the same year that Boston failed to meet the EPA's action level for lead.

▸ The reports included neither maps nor any detailed narratives noting known or potential specific polluters in the watershed who may contribute to the contamination of the water supply. EPA rules require utilities to name known sources of any specific contaminant found in their tap water.[32] Even where this is not required or if the specific polluter cannot be tied with assurance to a specific contaminant, EPA rules encourage water systems to highlight significant sources of contamination in the watershed. The Metropolitan District Commission's (MDC) extensive reviews of the MWRA's source water have identified certain specific businesses and activities that are known or suspected to release pollutants into the source water, but none of these specific sources are discussed in the right-to-know reports.[33] For example, the MDC noted in a recent report that the greatest threat to the water supply posed by agricultural activities is from animal waste possibly containing pathogens; the report went on to state that the MDC had to initiate enforcement action to control overgrazing and remove an uncovered manure pile near a tributary of the water supply. The MDC also notes several other specific areas where construction, development, septic systems, and other sources are known or potential polluters of the source water.[34]

▸ The reports failed to provide information on the health effects of some contaminants—such as TTHMs—found at levels below EPA standards but above EPA health goals. Although not legally required, this information would assist local citizens in protecting their health and in fighting for better protection of their water.

▸ The reports would have been improved by the inclusion of descriptions of the source water assessment procedure for Boston's drinking water, as well as information on how to get involved and learn more.

▸ The required statement for people with special health concerns about important health information should have been prominently displayed on the report's first page.

THREATS TO BOSTON'S SOURCE WATER

Boston Earned a Source Water Protection Grade of Good

Boston's water comes from western and central Massachusetts and is stored in reservoirs fed by watersheds that are protected to varying degrees. Unlike most major cities in the United States, Boston's water is not treated with coagulants to remove dirt and particles. Neither is it filtered.

The Metropolitan District Commission's Division of Watershed Management (DWM) has had a watershed protection plan for the Wachusett Reservoir and Quabbin Reservoir/Ware River watershed since 1991. According to the DWM, 75 percent of the Quabbin, 57 percent of the Ware, and 52 percent of the Wachusett are protected open space.[35] Working with partner groups, MDC adopted watershed protection regulations and best

management plans applicable to many potential pollution sources, completed detailed sanitary surveys and source water assessments, worked with others to protect the watershed through acquisition of property and easements, and now actively inspects, monitors, and patrols the watershed to find pollution sources.

The water faces development pressures, nonpoint source pollution in the form of agricultural runoff and septic systems, spills, wildlife-related contamination problems from geese and other sources, and recreational use issues in parts of the three watersheds, particularly the Wachusett. The DWM has been seeking to identify and address many of these problems.

The EPA has ranked the whole Chicopee Watershed, in which the Quabbin Reservoir is located, as a 6 on a watershed threat scale from 1 (low) to 6 (high).[36] Development pressure and runoff are the threats, according to the EPA, warranting a rating of "more serious" water quality threats and "high vulnerability" to contamination. However, the immediate area around the Quabbin is mostly protected open space. Aggressive land acquisition and source water protection programs are reducing current and potential pollution threats.

The Ware River, on the other hand, is part of a watershed the EPA ranks as a 1 on the same scale, based on good water quality and low vulnerability.[37]

NRDC has ranked overall watershed protection, therefore, as Good, based upon the MDC's and MWRA's active and largely effective watershed protection efforts in much of the area, the EPA's and MDC's assessments and discussion of potential vulnerability, and the existence of some pollution sources in parts of the watersheds.

PROTECTING BOSTON'S DRINKING WATER

Following are approaches to treating Boston's drinking water and information on how residents can help protect their local water.

Treatment Options Available for Contaminants of Greatest Concern

Boston's disinfection by-product levels are fairly high compared to many cities and could be reduced with improved treatment. For example, use of activated carbon or of an alternative primary disinfectant such as ozone or ultraviolet light would reduce by-product levels. Boston has publicly announced plans to use ozone at a new treatment plant in Walnut Hill, slated for completion in 2004. This step, particularly assuming the continued use of chloramines instead of chlorine as a residual disinfectant, should substantially reduce disinfection by-product levels.

In addition, preliminary unpublished results show fairly low levels of *Cryptosporidium* in Boston's *finished* drinking water, and it is well documented that *Crypto* and other microbial contaminants are sometimes found in some of the city's source waters and reservoirs (though apparently not at its Cosgrove water intake). This is one reason, together with concerns about bacteria and certain other issues, that the EPA sued the MWRA to require filtration of its water. Ozone, the primary disinfectant to be used at the planned Walnut Hill treatment plant, or ultraviolet light would somewhat reduce *Crypto* levels. The court found that the ozone plant plus watershed protections were sufficient, but the EPA and other experts disagreed and urged that filtration was necessary in order to protect public health.

Violations and Litigation in Boston

Boston and the MWRA have been locked in a long-running dispute with the EPA over whether the city must filter its drinking water. According to the EPA, Boston violated federal rules requiring either filtration or full protection of its watersheds from pathogens (germs).[38] The MWRA fought the EPA in court, arguing that its water is clean and that a planned treatment at the new Walnut Hill Water Treatment Plant, scheduled to be in place by 2004, will adequately protect public health. The new plant will use ozone to disinfect but will not filter the water—which the EPA deems is necessary. The EPA believes that filtration is needed as an additional barrier to waterborne disease and will ensure full removal of some pathogens, including *Crypto*, which may not be killed by ozone.

Recent court rulings have sided with the MWRA, finding that while it had violated the EPA's filtration requirements and while filtration together with

disinfection would constitute superior treatment, the MWRA is not at fault: the court stated that the water is fairly clean, filtration would be expensive, and the planned treatment and pipe cleanup should bring waterborne risks to an acceptable level.[39] The court also found a threat of bacterial "regrowth" posed by ozonation but noted that the threat could be addressed more effectively through pipe rehabilitation, flushing, and corrosion control than through filtration. The court also accepted the MWRA's argument that the installation of a $180 million filtration system would undermine the MWRA's efforts to take on other projects (such as pipe replacement) that would be needed with or without the presence of a filtration system. Regarding watershed protection, the court said that the MWRA's purchase of lands close to the Wachusett Reservoir had helped to create a barrier against human-made contamination and that filtration would reduce popular support for maintaining strict environmental protection of the protected areas. The court of appeals affirmed in 2001.

Despite this ruling, the EPA and some public health experts continue to believe that Boston should filter its water to prevent waterborne disease. They note that Boston has in the past violated the EPA's criteria for avoiding filtration (most recently in 1999) and contend that the MWRA "ozone-only" approach could miss some pathogens and could allow bacteria to regrow in the pipes.[40]

How Individuals Can Protect Source Water

Citizens can help protect the city's drinking water by working to protect its sources—both by conserving water in their daily lives and by getting involved in community decision making about water resources.

BOSTON

Boston Water & Sewer Commission
980 Harrison Avenue
Boston, MA 02119
617-989-7000
Boston Water & Sewer Commission: www.bwsc.org
Mass. Water Resource Agency:

WATER UTILITY INFORMATION

▸ **Attend meetings of the Boston Water & Sewer Commission** (see contact information, this page). Check the right-to-know report and website, or call and ask for dates, times, and locations.

▸ **Get involved in source water assessment and protection** efforts by contacting the utility or find a state government contact by calling the Safe Drinking Water Hotline at 800-426-4791.

▸ Learn more from these groups:

- ▸ Clean Water Action in Boston, 617-338-8131; e-mail bostoncwa@cleanwater.org
- ▸ Clean Water Network, www.cwn.org, cleanwater@igc.org.

Peer reviewers of the Boston report included Dr. Jeffrey Griffiths, Tufts University School of Medicine; Iris Vicencio-Garaygay, MASSPIRG; and John McNabb, Clean Water Action—Massachusetts.

NOTES

1 Safe Drinking Water Information System, U.S. EPA database, available online at http://oaspub.epa.gov/enviro/, last visited on April 26, 2002.

2 Metropolitan District Commission, Division of Watershed Management (MDC/DWM), *Watershed Protection Plan Update: Quabbin Reservoir Watershed and Ware River Watershed*, pp. 2–46 (December 2000); Metropolitan District Commission, Division of Watershed Management, "Watershed Protection Plan Update for Metropolitan Boston Water System: Wachusett Reservoir" (1998); letter from Stephen Estes-Smargiassi, MWRA to Erik Olson, NRDC, August 12, 2002 and attachments.

3 Environmental Protection Agency, Safe Drinking Water Information System, available online at http://oaspub.epa.gov/enviro/sdw_report.first_table?report_id=655489&pwsid=MA3035000&state=MA&source=Purchased%20surface%20water%20&population=574283&sys_num=0. See also the district court's two written opinions indicating that the MWRA was not in compliance with the filtration avoidance requirements, *United States v. Massachusetts Water Resources Authority*, 48 F. Supp. 2d 65 (D. Mass. 1999) (district court had equitable discretion not to order filtration remedy for drinking water act violation); *United States v. Massachusetts Water Resources Authority*, 97 F. Supp. 2d 155 (D. Mass. 2000) (declining to order filtration remedy based on equities of the case).

4 MWRA, "2001 Report on Your Tap Water," [right-to-know report], p. 7 (2002), Legal Notice on Norumbega Reservoir (2002).

5 EPA, Index of Watershed Indicators (IWI) database, Chicopee Massachusetts, watershed, available online at www.epa.gov/iwi/hucs/01080204/score.html.

6 See EPA, Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) Preproposal Draft Regulatory Language for Stakeholder Review, posted at www.epa.gov/safewater/mdbp/st2dis.html The 1, 2, and 2.5 minimum log removal requirements are converted into percentage removals for simplicity. This rule has not been formally proposed in *The Federal Register* but was agreed to by the EPA, NRDC, public health groups, cities, and the water utility industry. See *Ibid* for the "FACA Stakeholder Agreement in Principle."

7 The MWRA has collected C*rypto* and *Giardia* data regularly in its source waters and at its Cosgrove and CVA intakes since 1994. Letter from Stephen

Estes-Smargiassi, MWRA, to Erik Olson, NRDC, August 12, 2002, and attachments. These data are only occasionally included in publicly released water quality data reports. See, *e.g.*, MWRA, "Water Quality Updates," available online at www.mwra.state.ma.us/water/html/qual3.htm. See also, Metropolitan District Commission, "Water Quality Report 2001: Wachusett Reservoir and Watershed" (2002), p. 20, mentioning that the MDC did not monitor in 2001 for *Crypto*.

8 Metropolitan District Commission, Division of Watershed Management (MDC/DWM), *Watershed Protection Plan Update: Quabbin Reservoir Watershed and Ware River Watershed* pp. 2–46, Table 2-12 (December 2000).

9 Metropolitan District Commission, "Water Quality Report 2000: Wachusett Reservoir and Watershed," p. 22 (2001).

10 MWRA, "Cosgrove Intake *Giardia* and *Cryptosporidium* Results, oocysts/100L," (data for January 1999–July 2002), attached to letter from Stephen Estes-Smargiassi, MWRA, to Erik Olson, NRDC, August 12, 2002.

11 Letter from Stephen Estes-Smargiassi, MWRA, to Erik Olson, NRDC, August 12, 2002.

12 Note that the contaminant levels are presented as a percentage. Total coliform is regulated as a percentage of positive samples that are present in water. The national health standard of 5 percent means that if more than 5 percent of the utility's total coliform samples test positive, then the national health standard has been violated. To say that a sample tests positive is to say that there are total coliform bacteria present in the sample. Therefore, for compliance purposes, the utilities provide the percentage of total coliform samples that tested positive.

13 MWRA, "2000 Report on Your Tap Water" [right-to-know report], "Total Coliform Results" table.

14 MWRA, "2001 Report on Your Tap Water" [right-to-know report], "Total Coliform Results" table.

15 See note 13.

16 See note 14.

17 MWRA, "2001 Report on Your Tap Water" [right-to-know report], p. 7 (2002); MWRA, Legal Notice on Norumbega Reservoir (2002).

18 MWRA, Legal Notice on Norumbega Reservoir (2002).

19 The action level standard for lead is different than the standard for most other contaminants. Water utilities are required to take many samples of lead in the tap water at homes they serve, including some "high-risk" homes judged likely to have lead in their plumbing or fixtures. If the amount of lead detected in the samples is more than 15 ppb at the 90th percentile (which means that 90 percent of the samples have 15 ppb or less), then the amount is said to exceed the action level. Under the complex EPA lead rule, a water system that exceeds the action level is not necessarily in violation. If a system exceeds the action level, additional measures such as chemical treatment to reduce the water's corrosivity (ability to corrode pipes and thus its ability to leach lead from pipes) must be taken. If this chemical treatment does not work, the water system may have to replace lead portions of its distribution system if they are still contributing to the lead problem.

20 MWRA, "2000 Report on Your Tap Water" [right-to-know report], "Lead Results" table.

21 MWRA, "2001 Report on Your Tap Water" [right-to-know report], "Lead and Copper Results" table.

22 Letter from Stephen Estes-Smargiassi, MWRA, to Erik Olson, NRDC, dated August 13, 2001.

23 See note 20.

24 Serrano, PV, Sparrow, D, Hu, H, "Relationship of Lead in Drinking Water to Bone Lead Levels Twenty Years Later in Boston Men: The Normative Aging Study," *Journal of Occupational Environmental Medicine,* May 1999; 41(5), p. 349–55.

25 Some of the haloacetic acids have national health goals of 0 and others have nonzero goals. For the sake of simplicity and understandability, since there is a single haloacetic acid standard, and because it is essentially chemically impossible under normal conditions in tap water to create one regulated haloacetic acid without creating the others at some level, we have listed the national health goal as 0.

26 MWRA, "2000 Report on Your Tap Water" [right-to-know report], "Reservoir Water Test Results—After Treatment" table.

27 MWRA, "2001 Report on Your Tap Water" [right-to-know report], "Reservoir Water Test Results—After Treatment" table.

28 Total trihalomethanes (TTHMs) consist of a sum of the levels of four closely related chemicals—chloroform, dibromochloromethane, bromoform, and bromodichloromethane—which occur together at varying ratios when water is chlorinated. The latter two TTHMs have health goals of 0. The EPA promulgated and then withdrew (after a court decision) a 0 health goal for chloroform and has not yet issued a new goal for chloroform. Dibromochloromethane has a health goal of 60 ppb. Since water systems generally report only the combined TTHM level, and since it is essentially chemically impossible to create one trihalomethane in tap water without some level of the others, we list the health goal for TTHMs as 0.

29 See note 26.

30 See note 27.

31 BWSC, "FAQs," available online at www.bwsc.org/tab_menus/frameset4.htm.

32 See EPA regulations at 40 C.F.R. §141.153(d)(4)(ix), which provide that the right-to-know report must include "the likely source(s) of detected contaminants to the best of the operator's knowledge. Specific information about the contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator." While EPA allows reliance upon general lists of potential sources where the water system is not aware of the specific source of pollution and where the water system is aware of the pollution source, the rules require that the polluter to be identified.

33 See, *e.g.*, Metropolitan District Commission, Division of Watershed Management, "Watershed Protection Plan Update: Quabbin Reservoir Watershed and Ware River Watershed" (2000).

34 Ibid.

35 Metropolitan District Commission, Division of Watershed Management, "Watershed Protection Plan Update for Metropolitan Boston Water System: Wachusett Reservoir" (1998); Metropolitan District Commission, Division of Watershed Management, "Ware River Watershed: MDC/DWM Public Access Management Plan Update" (2000); Metropolitan District Commission, Division of Watershed Management, "Watershed Protection Plan Update: Quabbin Reservoir Watershed and Ware River Watershed" (2000).

36 See note 5.

37 EPA, Index of Watershed Indicators (IWI) database, Nashua watershed, available online at www.epa.gov/iwi/hucs/01070004/score.html.

38 See note 3.

39 *United States v. Massachusetts Water Resources Authority,* 256 F.3d 36 (1st Cir. 2001), affirming *United States v. Massachusetts Water Resources Authority,* 48 F. Supp. 2d 65 (D. Mass. 1999) (district court had equitable discretion not to order filtration remedy for drinking water act violation); *United States v. Massachusetts Water Resources Authority,* 97 F. Supp. 2d 155 (D. Mass. 2000) (declining to order filtration remedy based on equities of the case).

40 See EPA Briefs filed in *U.S. v. MWRA,* note 39; EPA, "Statement from EPA Spokesman Payton Fleming Regarding MA-DEP Decision," (November 13, 1998), available online at www.epa.gov/region1/pr/1998/111398.html; EPA, "MWRA Filtration Point-Counterpoint" (1997), available online at www.epa.gov/NE/pr/1997/qanda.html.