Baltimore, MD

Baltimore Earned a Water Quality and Compliance Grade of Failing for 2000 but Improved to Good in 2001

The city failed to meet turbidity standards in 2000 but improved performance in 2001. The city also had levels of lead, haloacetic acids, and total trihalomethanes that approached but did not exceed national standards, presenting health concerns.

▶ Baltimore violated the national **turbidity** standard in February 2000 and was forced to issue an unusual city-wide boil-water alert. Turbidity, cloudiness, can indicate that water may be contaminated with *Cryptosporidium* or other pathogens that present human health concerns. This potentially serious health risk is the reason Baltimore received a failing water quality grade. Baltimore had no reported violations in 2001 and substantially improved its performance for turbidity and certain other contaminants, earning a grade of Good.

▶ In 2000 and 2001, Baltimore came close to exceeding the national standard 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.

▶ Though still below the national standard, average levels of **haloacetic acids,** by-products of chlorine disinfection that may cause cancer, may still present health risks because national standards for these chemicals are not fully health protective.

BALTIMORE
System Population Served **1,600,000[1]**
Water Quality and Compliance **2000▶Failing** **2001▶Good**
Right-to-Know Report—Citizenship **2000▶Fair** **2001▶Good**
Source Water Protection **Fair**
REPORT CARD

▶ Although average levels measured below national standards, we noted in 2001 a spike in levels of **total trihalomethanes**, by-products of chlorine treatment in drinking water, linked with cancer, miscarriages, and birth defects.

Baltimore's Right-to-Know Reports Earned a Grade of Fair in 2000 and Good in 2001

▶ The reports included extensive information about the turbidity violation as well as advice on minimizing lead exposure. But the Web report in 2000 violated EPA rules by listing only the peak and the range of levels of contaminants, and the 2000 and 2001 reports included a number of errors and violations of EPA right-to-know requirements.

Baltimore Earned a Source Water Protection Grade of Fair

▶ The city's water sources have moderately high vulnerability to pollution from agricultural and urban runoff, a high vulnerability to pollution from population growth, and significant atmospheric deposition of nitrogen and phosphorous.

KEY CONTAMINANTS IN BALTIMORE'S WATER

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

MICROBIOLOGICAL CONTAMINANTS

Turbidity

National Standards (TT) (in Nephelometric Turbidity Units, or NTU)
Filtered water
0.5 NTU 95% of the time (through 2001)
0.3 NTU 95% of the time (effective in 2002)
1 NTU 100% of the time (effective in 2002)
Unfiltered water
5 NTU maximum, 100% of the time

2000 Levels
8 NTU maximum

2001 Levels
0.4 NTU maximum

2000 LEVELS PRESENT VIOLATION
2001 LEVELS PRESENT HIGH CONCERN

Turbidity is a measure of the cloudiness of water and is used as an indicator that water may be contaminated with *Cryptosporidium* or other pathogens that present human health concerns. In addition, turbidity can interfere with water disinfection because it can impede the effectiveness of chlorine or other chemical disinfectants. In February 2000, the water at Baltimore's Ashburton Filtration Facility measured 8 units of turbidity, exceeding the national standard. The spike presented a potentially serious health risk, forcing the city to issue a citywide boil-water order to its consumers. In 2001, the city substantially improved its record, with a high turbidity level of 0.4 NTU.

INORGANIC CONTAMINANTS

Lead

National Standard (TT)
15 ppb (action level, at 90th percentile)[2]

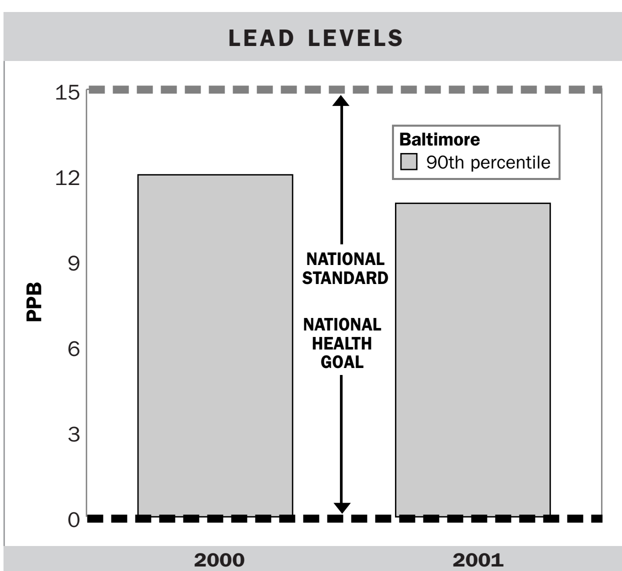
National Health Goal (MCLG)
0—no known fully safe level

2000 Levels[3]
12 ppb at the 90th percentile home; no violation

2001 Levels[4]
11 ppb at the 90th percentile home; three homes tested exceeded the 15 ppb national standard; no violation

LEVELS PRESENT HIGH CONCERN

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. Although Baltimore appears to have met the EPA lead rule's requirement that no more than 10 percent of homes tested can exceed the action level of 15 ppb, Baltimore's 11 to 12 ppb test result indicates that many residents may be consuming unnecessarily high lead levels, a particular concern for children and pregnant women. Consumers, particularly those with infants or young children who are more susceptible to lead, may want to test their water for lead (call the Drinking Water Hotline, 800-426-4791, to find a lab) or may want to flush their faucet of lead by running it for a minute or so before drinking from it or making a baby bottle with the water (save the water for plants or other uses).



ORGANIC CONTAMINANTS

Haloacetic Acids

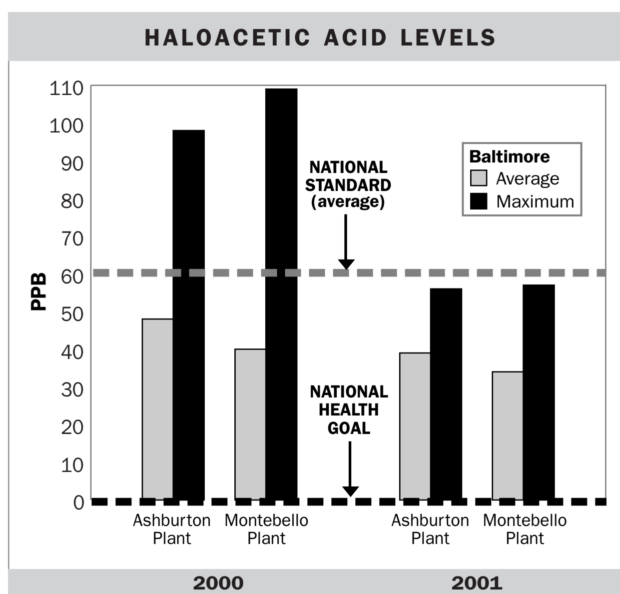
National Standard (MCL)
60 ppb (average) effective 2002; no previous standard

National Health Goal (MCLG)
0—no known fully safe level[5]

2000 Levels[6]	Average	Maximum
Ashburton Plant	48 ppb	98 ppb
Montebello Plant	40 ppb	109 ppb

2001 Levels[7]	Average	Maximum
Ashburton Plant	39 ppb	56 ppb
Montebello Plant	34 ppb	57 ppb

LEVELS PRESENT HIGH CONCERN



Haloacetic acids (HAAs), by-products of chlorine disinfection, may cause cancer and, potentially, reproductive and other health problems. Baltimore's levels averaged below 40 ppb in 2001, lower than the city's 2000 levels, and lower than a new 60 ppb EPA standard that became effective in 2002. Occasional haloacetic acid level spikes in Baltimore's water exceed the new standard, although no violation is threatened because the standard is based on average, not peak, levels. As discussed in Chapter 5, the EPA standard is not based exclusively upon health but rather is based on a weighing of treatment options, costs, and other considerations versus health risks. Baltimore's elevated levels of haloacetic acids present a serious health concern.

Total Trihalomethanes

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

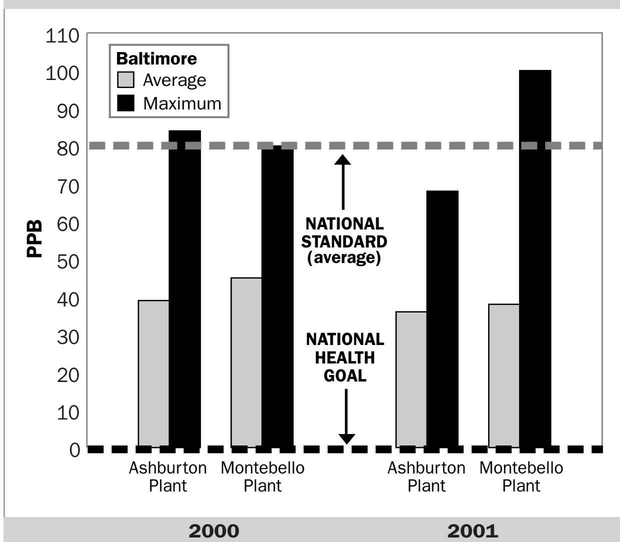
National Health Goal (MCLG)
0—no known fully safe level[8]

2000 Levels[9]	Average	Maximum
Ashburton Plant	39 ppb	84 ppb
Montebello Plant	45 ppb	80 ppb
2001 Levels[10]	Average	Maximum
Ashburton Plant	36 ppb	68 ppb
Montebello Plant	38 ppb	100 ppb

LEVELS PRESENT SOME 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. As discussed in Chapter 5, the EPA standard is not based exclusively upon health but rather on a weighing of treatment options, costs, and other considerations versus health risks. Baltimore's levels of trihalomethanes (particularly the occasional high spikes above the standard) are of some health concern but do not constitute a violation. The standard is based on average levels, and the city's averages are well below the new EPA standard.

TOTAL TRIHALOMETHANE LEVELS



BALTIMORE'S RIGHT-TO-KNOW REPORTS

Baltimore's Right-to-Know Reports Earned a Grade of Fair in 2000 and Good in 2001

On the good-citizen side of the ledger:

▸ The 2000 report made extensive note of the EPA's health effects information in discussing the city's violation of turbidity.

▸ The report offered a variety of good information on the website and gave advice on minimizing lead exposure by flushing home taps and on not using hot water from the tap.

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

▸ The Web report for 2000 violated EPA rules by listing the peak and the range of levels of contaminants (such as haloacetic acids and trihalomethanes) but not average levels. As a result, it was impossible for consumers to determine whether Baltimore complied with the EPA's standards, which are based on average levels. Baltimore fixed the problem in its 2001 report.

▸ Neither year's report specified the number of samples taken for lead analysis, so the information that three samples exceeded EPA's action level in 2001 was impossible to interpret. The report included several other errors:

- ▸ The values for the highest levels detected of arsenic, chromium, and lead were reported in the 2000 report in parts per million, while the health goals and the EPA standards were listed in parts per billion. This violates EPA reporting rules, and for the average consumer, comparison would be difficult. This problem was fixed in the 2001 report.

- In the "Key to Abbreviations," the legend for ppb was incorrect in 2000.
- The 2001 Web version of the report included no key abbreviations, no glossary, and no explanations of units. This violates EPA right-to-know report rules.
- The values for nitrates in the 2000 Web report did not match values in the copy mailed to consumers.
- Some key information in data tables was truncated and unreadable on the Web, including information on the sources of some contaminants in the 2001 report and information on the contaminants in the 2000 report.

- The reports included neither maps nor any detailed narrative noting the specific polluters in the watershed. EPA rules require the reports to name any specific polluters known by the water system.
- The reports also did not provide information on the health effects of some contaminants found at levels *below* EPA standards but *above* EPA health goals. Although not legally required, this information would have assisted citizens in protecting their health and in working for better drinking water.

THREATS TO BALTIMORE'S SOURCE WATER

Baltimore Earned a Source Water Protection Grade of Fair

Baltimore's water supply relies on surface water from rainfall and snowmelt, collected and stored in reservoirs outside the city. Three major impoundments (the Liberty, Loch Raven, and Prettyboy Reservoirs) derive water from two water sources (Gunpowder and Patapsco Watersheds) and one river (the Susquehanna). Water from the Liberty Reservoir and upstream sources is treated at the Ashburton Water Filtration Plant, while water from Loch Raven and Prettyboy Reservoirs is treated at the Montebello plant.

EPA's Index of Watershed Indicators has determined that the Gunpowder and Patapsco Watersheds have less serious contamination problems but is highly vulnerable to contamination. The watersheds received an overall index rating of 4, on a scale of 1 to 6, with 6 being the worst rating.[11] (For more information on the Index of Watershed Indicators and other data sources, please refer to the discussion of NRDC's grading methodology for its Source Water Protection grade.) In particular, the Gunpowder and Patapsco Watersheds are highly susceptible to contamination from urban runoff–pollution that occurs when water passes through an urban environment, picking up particles, dirt, and chemicals, and flows into the water resources of the area.

The watersheds are also affected by agricultural runoff, with a potential for nitrogen, pesticide, and sediment runoff from farm fields into the rivers and streams that serve as the city's water supply. In addition, a state monitoring waiver has apparently been issued for certain pesticides used in the watershed, with the result that concentrations of these chemicals are not documented in the public record.

Similarly, the Susquehanna River is also threatened by a variety of point and nonpoint pollution sources, including agriculture, runoff from urbanization, sewage, and industry sources. The EPA's IWI has ranked it as a 4 on the 1 to 6 scale, based upon these threats.[12]

PROTECTING BALTIMORE'S DRINKING WATER

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

Treatment Options Available for Contaminants of Greatest Concern

Baltimore's treatment plants process river water using several methods:

- prechlorination—dosing the water with chlorine prior to other treatment
- coagulation—adding a chemical to help the mud and suspended matter in the water clump together
- flocculation—stirring the water to encourage clumping
- sedimentation—allowing clumps to settle to the bottom
- filtration—running the water through sand to filter out some remaining suspended solids
- fluoridation—adding fluoride
- postchlorination—adding chlorine after other treatments to ensure that some chlorine is in the water and in the pipes to prevent recontamination

▶ corrosion control treatment—adding a chemical to make the water less acidic so that it will not leach lead and other metals from the pipes

Baltimore could reduce disinfection by-products somewhat by switching to chloramines, a process by which ammonia is added to the water immediately after chlorine, instead of the current practice of adding chlorine alone. This approach could also improve the taste and odor of the water. Unlike chlorine, chloramines are considered less reactive and do not form as many disinfection by-products.

Contaminant levels could be further reduced with additional treatment. For example, enhanced coagulation, use of granular activated carbon—essentially the same concept as charcoal in a fish tank filter—and/or the use of such alternative disinfectants as ozone or ultraviolet light could reduce disinfection by-product levels further. Moreover, ozone or ultraviolet light are far more effective than chlorine at killing such disease-causing pathogens as *Cryptosporidium*. Such synthetic organic chemicals as pesticides and disinfection by-products could be substantially reduced with granular activated carbon, which some cities have installed to improve water quality, taste, and odor at a cost of about $25 per household per year.

One option for reducing lead levels in Baltimore's tap water is improved and optimized corrosion inhibitors. Current corrosion inhibitors still allow significant lead leaching. Another alternative is strategic replacement of lead service lines in areas with serious lead problems.

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.

BALTIMORE
City of Baltimore, Department of Public Works The Abel Wolman Municipal Building 200 North Holliday Street, Room 300 Baltimore, MD 21202 410-396-3500 www.baltimorecity.gov/government/dpw/water.html
WATER UTILITY INFORMATION

▶ **Attend meetings of the Baltimore Department of Public Works** for citizens on local water issues. Ask for dates, times, and locations.

▶ **Get involved in source water assessment and protection** efforts by contacting the Department of Public Works.

▶ **Learn more from these groups:**

- ▶ Clean Water Action, www.cleanwater.org
- ▶ Clean Water Network, www.cwn.org

Peer reviewers of the Baltimore summary included Brenda Afzal, Environmental Health Education Center, University of Maryland, School of Nursing, Baltimore; and Linda Greer, Ph.D., senior scientist, NRDC.

NOTES

1 The Environmental Protection Agency, Safe Drinking Water Information Database.

2 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.

3 Baltimore City Department of Public Works, "Water Quality Report for 2000."

4 Baltimore City DPW, "Water Quality Report for 2001."

5 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. This one is better and more technically correct.

6 See note 3.

7 See note 4.

8 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.

9 See note 3.

10 See note 4.

11 EPA, IWI, available online at www.epa.gov/iwi/hucs/02060003/score.html.

12 EPA, IWI, available online at www.epa.gov/iwi/hucs/02050003/score.html.