PHILADELPHIA, PA

Philadelphia Earned a Water Quality and Compliance Grade of Fair in Both 2000 and 2001

Philadelphia had no reported violations but had levels of **chlorination by-products** that averaged near the new EPA standard and occasionally spiked above it. In addition, the city had significant **lead** levels, possible medical evidence of waterborne disease, and occasional contamination with pesticides and industrial chemicals.

▶ The Philadelphia Water Department had no recent reported violations of current, pending, or proposed national standards in 1999–2001.[1]

▶ Levels of chlorination by-products, specifically **total trihalomethanes** (TTHMs) and **haloacetic acids** (HAAs), averaged as high as 80 percent of the new national standards and occasionally spiked above those standards. HAAs and TTHMs are by-products of chlorine disinfection and may cause cancer and, potentially, reproductive and other health problems. At levels measured in Philadelphia tap water, TTHMs and HAAs came in well above health goals and are of potential health concern.

▶ **Lead** levels, although not in violation of EPA standards, were found in excess of the health goal and were cause for concern—particularly in Philadelphia schools and homes with young children. 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.

PHILADELPHIA
System Population Served **1,600,000**[2]
Water Quality and Compliance **2000▶Fair** **2001▶Fair**
Right-to-Know Report—Citizenship **2000▶Good** **2001▶Good**
Source Water Protection **Poor**
REPORT CARD

▶ Medical journal studies have reported illnesses in children and the elderly associated with Philadelphia tap water, which may be the result of ***Cryptosporidium*** *(Crypto),* which has been found in the city's source waters. *Crypto* is a waterborne microbial disease-carrying pathogen that presents health concerns, especially to individuals with weakened immune systems. The city has improved its treatment somewhat to try to address these problems.

▶ Chemical spills, runoff, discharges of cancer-causing and other **toxic pollutants,** and **microbial contaminants** periodically contaminate the Schuylkill and Delaware Rivers and sometimes city tap water. Occasionally pollutant levels exceed national health goals but are found at levels below national standards. An effort to inventory and address these pollution problems has begun.

Philadelphia's Right-to-Know Reports Earned a Grade of Good for 2000 and 2001

▶ The reports included much important information and were generally well presented.

▶ The reports could have been more complete in their discussions of sources of pollutants and health threats to consumers.

Philadelphia Earned a Source Water Protection Rating of Poor

▶ The city's water sources are threatened by contamination from treated and untreated sewage, industrial point sources, transportation accidents and spills, urban, suburban, and agricultural runoff, acid mine drainage, and drought. Philadelphia has put a major effort into assessing this pollution and is trying to encourage protection of its source water, but the city does not control its watersheds, and the state does not adequately regulate pollution of these waters.

Noteworthy

▶ As of June 2001, the Philadelphia Water Department's projected capital budget is $150 million per year for drinking water, wastewater, and stormwater expenditures combined.[3] Press accounts reported Philadelphia's drinking water capital improvement budget alone to be $46 million per year.[4] Reported planned capital

improvements include rehabilitation of the sampling lines at the Queen Lane Treatment Plant, improvements to operations, including aeration tanks at water pollution control plants, storm flood relief, and replacement of 27 miles of water mains in Philadelphia each year.[5] In correspondence with NRDC, the city's water department forecast future capital budgets of $50 million a year for treatment plant improvements, including drinking water, wastewater, and biosolids recycling, and $25 million per year for drinking water conveyance improvements.[6]

KEY CONTAMINANTS IN PHILADELPHIA'S WATER

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

MICROBIOLOGICAL CONTAMINANTS

Cryptosporidium *and* Giardia

National Standard
Treatment Technique (TT)

Draft Proposed New National Standard[7]
<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)

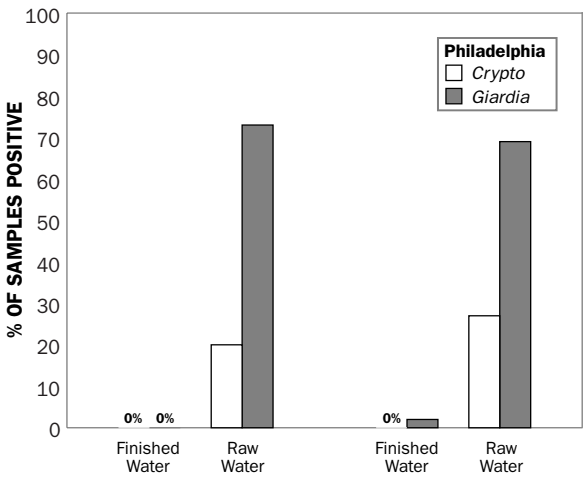
National Health Goal (MCLG)
0—no known fully safe level

National Requirements for *Crypto*
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.

2000 Levels[8]
Crypto in finished water: 0% of samples positive (0 of 36)
Crypto in raw water: 20% of samples positive
Giardia in finished water: 0% of samples positive (0 in 36)
Giardia in raw water: 73% of samples positive

2001 Levels[9]
Crypto in finished water: 0% of samples positive (0 of 58)
Crypto in raw water: 27% of samples positive
Giardia in finished water: 2% of samples positive (1 in 58)
Giardia in raw water: 69% of samples positive

***CRYPTOSPORIDIUM* AND *GIARDIA* LEVELS**



National Requirements
All large- and medium-size water utilities that use surface water must monitor for *Crypto* and *Giardia*, report results in their right-to-know reports, and use advanced treatment if significant levels are found.

LEVELS PRESENT HIGH CONCERN

Cryptosporidium (*Crypto*) and *Giardia* are waterborne microbial disease-carrying pathogens that presents health concerns, especially to individuals with weakened immune systems, including HIV/AIDS patients, the elderly, children, and people who have undergone organ transplants. Under a negotiated EPA rule that is out in draft proposed form and is soon scheduled to be proposed formally in *The Federal Register,* water utilities that find significant levels of *Crypto* will have to use more effective treatment to kill the pathogen. Existing rules require *Giardia* control as well. Philadelphia has now joined the EPA-industry "Partnership for Safe Water" and reports that it has been keeping its turbidity levels lower than required by EPA rules in recent years, in an effort to increase the likelihood that *Crypto, Giardia*, and other microbes are filtered out.

Total Coliform Bacteria

National Standard (MCL)
5% maximum in any month[10]

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

1999 Levels
0.4% in highest month, total coliform positive[11]

2000 Levels
0.4% in highest month, total coliform positive[12]

2001 Levels
0.9% in highest month, total coliform positive[13]

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 occasionally found in Philadelphia's water but at levels well below the national standard. That said, the presence of any coliform in Philadelphia's distribution system could indicate that regrowth of bacteria may be occuring in the city's aging pipes.

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
0.14 NTU maximum

2001 Levels
0.083 NTU maximum

LEVELS PRESENT SOME 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.

A team of medical and public health researchers at the Harvard School of Public Health launched an investigation, eventually published in 1997, into the possible health consequences of potential microbiological contamination of drinking water in Philadelphia. They used turbidity as a possible indicator of contamination and a measure of how effectively water treatment plant filters are working. (For example, a spike in turbidity levels can interfere with effective disinfection and can indicate that water filters are performing poorly.) In two peer-reviewed published studies, Schwartz *et al.* found an association between spikes in Philadelphia's turbidity levels and hospital admissions for the elderly and children for acute gastrointestinal illness, which often can be caused by water contamination.[14,15]

The first study, published in 1997, found that although the Philadelphia system was filtered and in compliance with existing federal standards, emergency room visits and admissions of children into Children's Hospital of Philadelphia for gastrointestinal illness spiked after a short lag time following spikes in turbidity levels in city tap water.[16] The Harvard investigators found about a 10 percent increase in emergency room visits for gastrointestinal illness by children three years old or older, and a 6 percent increase in visits by younger children. Actual hospital admissions for gastrointestinal illness increased 31 percent for older children and 13 percent for younger children after turbidity spikes. All associations were statistically significant. A second study by the Harvard team found similar results for elderly Philadelphians, based on 1992 to 1993 water quality data and Medicare records.[17] They found a 9 percent increase in hospital admissions for gastrointestinal illness among people over 65 shortly after a spike in city water turbidity. Again, the increases in illness were statistically significant.

City water department officials dispute the Harvard studies, arguing that the high correlation between turbidity spikes and hospital visits does not demonstrate causality. They also assert they have made subsequent improvements in the water filtration system. Dr. Joel Schwartz of Harvard concluded that "there needs to be more improvement."[18]

INORGANIC CONTAMINANTS

Lead

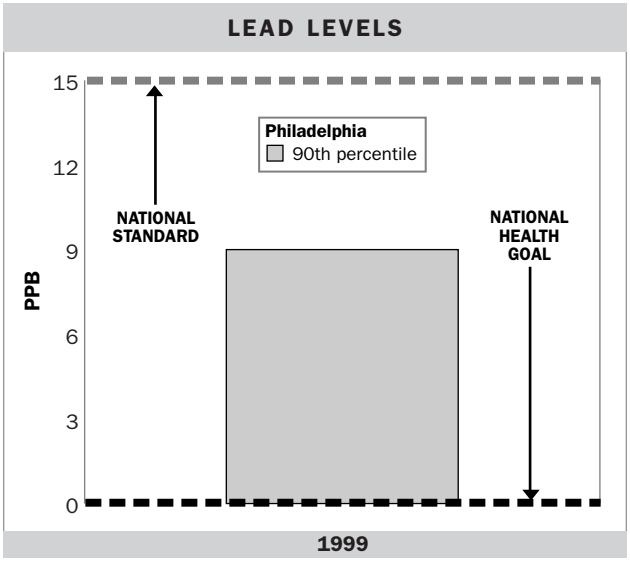
National Standard (TT)
15 ppb (action level, at 90th percentile)[19]

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

1999 Levels (most recent reported data)[20]
9 ppb or less at 90th percentile home; 4 out of 59 homes tested exceeded national standard

LEVELS PRESENT HIGH CONCERN

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.[21] Philadelphia reports that it complied with the EPA's action level for lead, but a recent study of lead in drinking water in the city's schools turned up results that are cause for serious concern. In 2000, many schoolchildren in Philadelphia were reportedly exposed to lead levels from some water fountains in excess of 50 ppb—far above the national action level.[22] Apparently school district officials knew of the lead problem years before taking remedial action. In October 2000, school district officials agreed to close down water outlets with high levels and instead provide bottled water. In fact, a study published in the *Journal of Toxicology* concluded that "64.8 percent of Philadelphia school buildings had water containing mean lead levels exceeding current Environmental Protection Agency (EPA) action levels," with 26 percent of buildings having levels greater than 50 ppb—more three times greater than the EPA action level.[23]

Nitrate

National Standard (MCL)
10 ppm (peak standard; if confirmation is taken within 24 hours, then two samples are averaged)

National Health Goal (MCLG)
10 ppm

1999 Levels
4.9 ppm maximum[24]

2000 Levels
4.3 ppm maximum[25]

2001 Levels
4.1 ppm maximum[26]

LEVELS PRESENT SOME CONCERN

Nitrates are the product of fertilizers and human or animal waste and can cause shortness of breath, nausea, vomiting, diarrhea, lethargy, loss of consciousness, and even death in infants.[27] Philadelphia's peak levels reported were about half of the EPA standard.

ORGANIC CONTAMINANTS

Atrazine

National Standard (MCL)
3 ppb (average)

National Health Goal (MCLG)
3 ppb

1999 Levels[28]
No data

2000 Levels[29]
Maximum: 0.20 ppb (no average reported)

2001 Levels[30]
No data

LEVELS PRESENT SOME CONCERN

Atrazine, a pesticide widely used on corn, poses health risks that include damage to major organs, potential reproductive problems, and possibly cancer.[31] Philadelphia's reported average atrazine levels at the tap were lower than those of many Midwestern utilities; based on this available data, these levels are not viewed as a major concern.

Dichloromethane (DCM)

National Standard (MCL)
5 ppb (average)

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

2001 Levels[32]
Maximum: 0.6 ppb

LEVELS PRESENT SOME CONCERN

Dichloromethane—an industrial chemical used as a paint remover, solvent, and cleaning agent, as well as an agricultural fumigant, among other things—can damage the nervous system, liver, and blood and cause cancer.[33] Philadelphia says that in 2001, only one

sample was found to contain dichloromethane, at a level well below the national standard, but it is not clear how long the public was exposed to this chemical in tap water. The city reported that "one sample from the Baxter plant was positive for dichloromethane. It is discharge of pharmaceutical and chemical industries in the river."

Haloacetic Acids

National Standard (MCL)
60 ppb (average) effective in 2002; no previous standard[34]

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

1999 Levels	Average	Maximum
	42 ppb	102.2 ppb

(Individual water treatment plants (WTPs) not listed)[35]

2000 Levels[36]	Average	Maximum
Baxter	35 ppb	46 ppb
Belmont	20 ppb	30 ppb
Queen Lane	24 ppb	24 ppb

2001 Levels[37]	Average	Maximum
Baxter	37 ppb	55 ppb
Belmont	37 ppb	67 ppb
Queen Lane	30 ppb	51 ppb

LEVELS PRESENT HIGH CONCERN

Haloacetic acids (HAAs), by-products of chlorine disinfection, may cause cancer and, potentially, reproductive and other health problems.[38] Philadelphia's levels average as high as 62 percent of the EPA's new average-based standard for HAAs; spike levels occasionally have exceeded the standard.

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[39]

1999 Levels[40]	Average	Maximum
Baxter	57 ppb	88 ppb
Belmont	64 ppb	64 ppb
Queen Lane	49 ppb	85 ppb

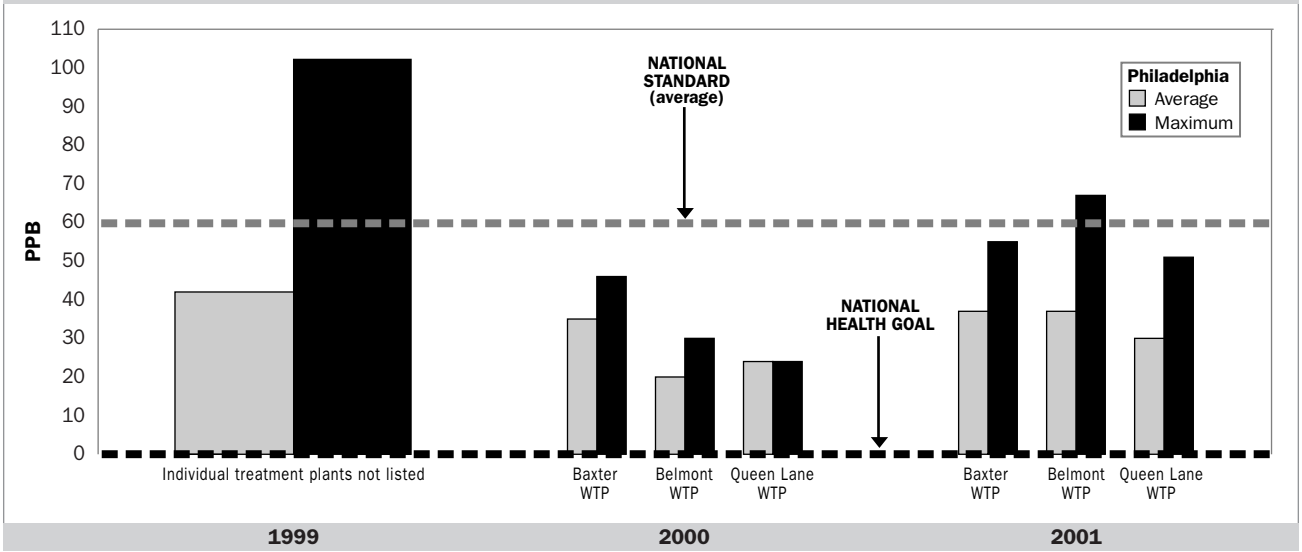
2000 Levels[41]	Average	Maximum
Baxter	51 ppb	95 ppb
Belmont	51 ppb	83 ppb
Queen Lane	37 ppb	56 ppb

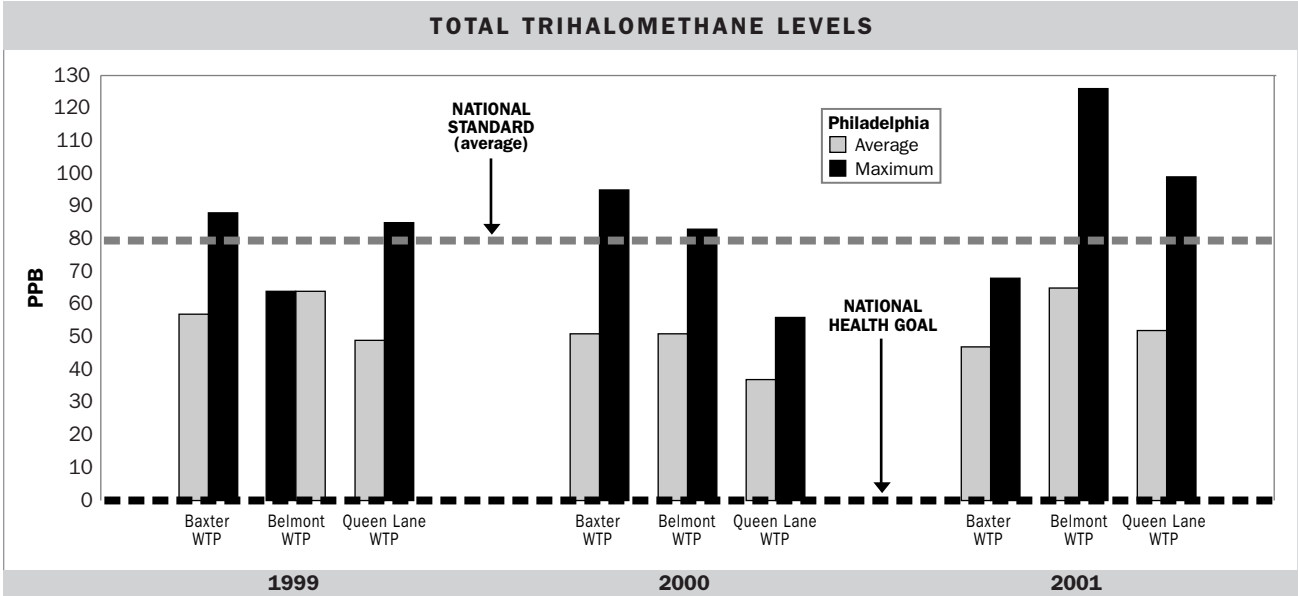
2001 Levels[42]	Average	Maximum
Baxter	47 ppb	68 ppb
Belmont	65 ppb	126 ppb
Queen Lane	52 ppb	99 ppb

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.[43] Philadelphia has relatively high levels of TTHMs in its drinking water. Indeed, the city's highest TTHM levels have frequently been above the new standard of 80 ppb. However, these spikes were not violations of national standards because the standards are based on average TTHM levels—and the city's average levels remained below the new national standard of 80 ppb. A 2002 report

HALOACETIC ACID LEVELS





by the Environmental Working Group found that 24 percent of pregnancies, or 5,936 pregnancies, in Philadelphia were exposed to TTHM levels above the EPA's standard—second in the number of pregnancies only to the Maryland suburbs of Washington, D.C.[44] Because some spikes found in Philadelphia were comparable to the levels found in preliminary studies to pose a risk, those in the first three months of pregnancy should exercise caution, according to Dr. David Ozonoff, chair of the Environmental Health Department at Boston University School of Public Health.

Toluene

National Standard (MCL)
1 ppm (1,000 ppb) (average)

National Health Goal (MCLG)
1 ppm (1,000 ppb)

2001 Levels[45]
Maximum: 51 ppb

Toluene—a volatile organic chemical that is a component of gasoline and other petroleum fuels used to produce benzene and urethane, as well as in solvents and thinners—can cause nervous disorders such as spasms and tremors, impairment of speech, hearing, vision, memory, and coordination, as well as liver and kidney damage.[46] According to Philadelphia, a toluene problem occurred when "the Belmont plant experienced a brief chemical spill in the Schuylkill River during the first quarter of 2001. It is discharged from petroleum factories." The levels reportedly found in the city's water supply were significant—more than 50 ppb—but still well below the national standard and health goal.

Vinyl Chloride

National Standard (MCL)
2 ppb (average)

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

2001 Levels[47]
Maximum: 1.1 ppb

LEVELS PRESENT HIGH CONCERN

Vinyl chloride—used in the manufacture of cars, electrical wire insulation and cables, piping, industrial and household equipment, and medical supplies, and also heavily used by the rubber, paper, and glass industries—can potentially damage the nervous system and liver and cause cancer.[48] Philadelphia reported that "one sample from each treatment plant during the last quarter of 2001 was found to have vinyl chloride, which comes from PVC plastic and plastic industry discharges to the river." The levels detected were more than half of the EPA standard and above the 0 health goal. It is not clear how long the exposure lasted.

Other Industrial Chemicals and Pesticides

Other chemicals in Philadelphia tap water include:

▶ **Di-(2-ethylhexyl)phthalate,** a probable carcinogen used in making plastic, was found in 2000 in city tap water at less than 1 ppb—below the 6 ppb national standard but above the national health goal of 0.[49]

LEVELS PRESENT SOME CONCERN

▶ **Hexachlorocyclopentadiene** was found in city tap water at low levels in 2000 and 2001, at less than 1 ppb, compared to the 50 ppb standard.[50, 51, 52] Hexachlorocyclopentadiene—an industrial chemical used to make other chemicals such as pesticides, flame retardants, resins, dyes, pharmaceuticals, and plastics—causes gastrointestinal distress and liver, kidney, and heart damage.

▶ **Pentachlorophenol** was found in 2000 and 2001 at well below the 1 ppb national standard. Pentachlorophenol, used to preserve telephone polls, railroad ties, and other wood, may cause central nervous system and reproductive problems, liver and kidney damage, and cancer. The health goal for pentachlorophenol is 0.[53, 54]

LEVELS PRESENT SOME CONCERN

▶ **Simazine** was found in 2000, at less than 1 ppb. The standard is 4 ppb.[55] Simazine, a widely used weed killer that is the chemical cousin of atrazine (also found in the city's tap water), can damage the testes, kidneys, liver, and thyroid and can cause gene mutations and cancer.

LEVELS PRESENT SOME CONCERN

PHILADELPHIA'S RIGHT-TO-KNOW REPORTS

Philadelphia's Right-to-Know Reports Earned a Grade of Good for 2000 and 2001

On the good-citizen side of the ledger:

▶ The reports provided details about the source water assessment procedure for Philadelphia's drinking water, as well as information on how to get involved or get more information.

▶ The reports were relatively user-friendly. The maps showing sources of drinking water and treatment plant locations were colorful and easy to read.

▶ The reports offered specifics on how the water is treated and provided diagrams.

▶ On the front page, the reports avoided overarching statements reassuring customers that their water is completely safe. Appropriately, Philadelphia's reports were more cautious, stating that "Philadelphia's water is safe and healthy for most people. For people with special health concerns, please see the information" later in the report.[56] (As noted below, the city's website did provide such false assurances, however.)

▶ The reports included on the first page prominent directions in Spanish on how to obtain a copy of the report.

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

▶ The reports included neither a map nor any detailed narrative noting the specific polluters in the watershed who contributed to the contamination of the water supply. EPA rules require utilities to specifically identify known sources of contaminants in their source water; the reports commonly gave only generalized information on potential sources of contaminants in the city's water, such as "discharge from chemical factories," rather than specifying known polluter(s).[57] Another example: the 2001 report cited contamination of the city's Belmont plant's water with elevated levels of toluene but did not cite the spill's specific culprit.

▶ The reports did not provide information on the health effects of some contaminants found at levels below EPA standards but above EPA health goals, including total trihalomethanes and haloacetic acids. Although not legally required, this information would have assisted local citizens in protecting their health and in fighting for better water protection.

▶ A front-page bold statement referred people with special health concerns to important health information at the end of the report. This information should ideally have been prominently displayed at the beginning of the report.

▶ In apparent response to a *Philadelphia Inquirer* story, based on an Environmental Working Group report on the city's problem with total trihalomethanes (TTHMs), the city's website asks: "Is Our Water Safe to Drink? The Answer is Yes. Absolutely! You Bet!" The water department alleges that the *Inquirer* overstated the risks. NRDC disagrees and concurs with the *Inquirer* and the Environmental Working Group that questions about possible health effects from the city's relatively elevated, albeit legal, TTHM levels are legitimate. The water department's reassurance that the city's water

was "absolutely" safe was contradicted by its own statements in its water quality report that vulnerable populations are at special risk from *Crypto,* microbial contaminants, and lead. If this overarching statement assuring absolute safety had appeared in the report itself, Philadelphia's report would have been substantially downgraded.

THREATS TO PHILADELPHIA'S SOURCE WATER

Philadelphia Earned a Source Water Protection Grade of Poor

Spills, discharges, and runoff contaminate Philadelphia's river sources with pollutants, such as pesticides, industrial chemicals, and microbes; this has earned Philadelphia a grade of Poor for source water protection. Philadelphia's drinking water comes from the Schuylkill and Delaware rivers, which are threatened by contamination from treated and untreated sewage, industrial point sources, transportation accidents and spills, urban, suburban, and agricultural runoff, acid mine drainage, and drought.[58, 59] While Philadelphia has made an effort to encourage pollution control in its watersheds, the city has little or no control over most pollution sources in the watersheds feeding these rivers, and state pollution controls in these watersheds are incomplete at best.[60]

As part of the source water assessment process, Philadelphia and the Pennsylvania Department of Environmental Protection say they are taking extra steps to better protect Philadelphia's sources of drinking water. However, as these watershed assessments make clear, and as the Schuylkill Watershed Conservation Plan's extraordinarily comprehensive final report concludes, many additional steps are needed to better protect the city's water sources.[61]

The city's source waters are also threatened by overuse, because the Philadelphia Water Department's customers are not the only people who rely on the Delaware River for their drinking water. In fact, more than 17 million people reportedly depend on Delaware River water for drinking water and other uses.[62]

The EPA's Index of Watershed Indicators (IWI) calculates the overall threat to the two rivers Philadelphia uses for source water as a 6, on a scale of 1 (for low threat) to 6 (for high threat).[63] Philadelphia officials say IWI is outdated and unreliable. Officials say their preliminary reviews have found that the IWI data is "off by at least 30 percent in our watershed."[64] However, the state-sponsored source water assessments in which the city is participating, under the twin umbrellas of the Schuylkill and the Delaware River Source Water Assessment Partnerships, agree that the Schuylkill and Delaware Rivers are threatened by point and nonpoint sources of contamination.[65] We rate the protection of these water sources as Poor based on all available data, not simply the EPA data.

NRDC agrees with the city that a comprehensive, up-to-date, specific, and accurate source water inventory is desperately needed for Philadelphia's source water, and supports the city's and state's significant efforts to undertake a detailed assessment. However, with respect to the overall control of threats to the Delaware and Schuylkill Rivers, available data show significant water quality threats to these rivers and incomplete pollution controls, earning a Poor rating for control of threats in the watersheds.[66]

PROTECTING PHILADELPHIA'S DRINKING WATER

The following are approaches to treating Philadelphia's drinking water and information on how residents can help protect their local water.

Treatment Options Available for Contaminants of Greatest Concern

Philadelphia gets much of its water from the Delaware River watershed, with headwaters in upstate New York, flowing to reservoirs in the Philadelphia area where particles in the water are allowed to settle. It is then treated locally at one of three treatment plants with chlorine disinfection, flocculation, coagulation, sedimentation, filtration, and fluoridation.[67]

Philadelphia's disinfection by-product levels are high compared to many cities that use surface waters and could possibly be reduced somewhat with additional treatment. For example, enhanced coagulation,

activated carbon, and/or the use of an alternative primary disinfectant such as ozone or ultraviolet light could reduce by-product levels further. In addition, although Philadelphia claims never to have found viable *Cryptosporidium* in its *finished* drinking water, it has found it in its source water. Ozone or ultraviolet light disinfection would offer a measure of additional assurance that *Crypto* poses no risk to Philadelphia residents. These disinfection technologies are far more effective at killing these and other resistant parasites than is chlorine, the disinfectant Philadelphia now uses.

From Assessment to Protection

Philadelphia and the state of Pennsylvania at the time of this writing had not yet completed a source water assessment for Philadelphia, which must be done by 2003. The assessment for the Schuylkill River was slated to be done sometime after the final public meetings (held in 2002), and the Delaware River assessment is expected to be completed by July 2003.[68] These assessments will include a determination on the "susceptibility and vulnerability" of Philadelphia's water supplies. The Pennsylvania Department of Environmental Protection and the Philadelphia Water Department report that they intend to undertake "protection implementation" in addition to assessment.

As part of the source water assessment, several ambitious projects are under way, including, "runoff modeling of the entire watershed for 12 different contaminants in a 8,000-square-mile watershed, examination of land use and water quality trends, detailed inventories of the thousands of point sources upstream from intakes, and development of decision and ranking tools to prioritize the various sources for future protection efforts."[69] Other projects include the Belmont Water Intake Protection Project, the Manayunk Canal and Schuylkill River Watershed Improvement Program, and the Schuylkill Center for Environmental Education Student Non-Point Pollution Education Project.[70] In addition, the water department has worked to create local watershed partnerships to analyze and prevent urban runoff and other causes of water contamination.

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.

▶ **Attend meetings of the local water supplier,** the Philadelphia Water Department. Check the right-to-know report or call and ask for dates, times, and locations.

▶ **To get involved in the source water assessment effort,** contact the groups above and Chris Crockett, Philadelphia Water Department, Office of Watersheds, at 215-685-6234, or by e-mail at Chris.Crockett@phila.gov. Information is also available at www.phillywater.org/Delaware/default.htm and at www.phillywater.org/Schuylkill/default.htm.

▶ **Learn more from these groups:**

- Clean Water Action in Philadelphia, 215-640-8800 or Philadelphia@cleanwater.org
- Clean Water Network, www.cwn.org, cleanwater@igc.org.

Peer reviewers for the Philadelphia report included Robert Wendelgass, Clean Water Action.

PHILADELPHIA

Kumar Kishinchand, Commissioner
Philadelphia Water Department[71]
ARAMark Tower, 1101 Market Street, 3rd Floor
215-685-6300
www.phila.gov/water/index.html

WATER UTILITY INFORMATION

NOTES

1 Safe Drinking Water Information System, U.S. Environmental Protection Agency database, available online at: http://oaspub.epa.gov/enviro/sdw_report.first_table?report_id=546695&pwsid=PA1510001&state=PA&source=Surface%20water%20&population=1600000&sys_num=0, last visited on 04/26/02.

2 Ibid.

3 Personal communication from Richard Roy, City of Philadelphia Water Department, June 4, 2001, p. 4.

4 "Larger Cities Report Capital Improvement Needs," *WaterWorld*, Vol. 17, No. 12: December 2001, p. 1.

5 See note 58. See also personal communication from Richard Roy, City of Philadelphia Water Department, June 4, 2001, p. 4.

6 Letter from Richard Roy, water commissioner, City of Philadelphia, to Erik Olson, NRDC, June 4, 2001.

7 See EPA, Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) Preproposal Draft Regulatory Language for Stakeholder Review, available online 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."

8 Philadelphia Water Department. "Drinking Water Quality 2000," available online at www.Philadelphiawater.org/wqr2000/wqr2000.htm, last visited April 15, 2002. Published April 2001.

9 Philadelphia Water Department. "Drinking Water Quality 2001." Available online at: www.Philadelphiawater.org/wqr2001/wqr2001.htm Last visited September 15, 2002. Published April 2002.

10 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.

11 Philadelphia Water Department, "Drinking Water Quality 1999," p. 4.

12 See note 8.

13 See note 9.

14 Schwartz, J., Levin, R., and Goldstein, R., "Drinking water turbidity and Gastrointestinal Illness in the Elderly of Philadelphia," *Journal Epidemiol. Community Health* 2000; 54:45-51 45, available online at http://jech.bmjjournals.com/cgi/reprint/54/1/45.pdf.

15 Schwartz, J., Levin, R., and Hodge, K., "Drinking Water Turbidity and Pediatric Hospital Use for Gastrointestinal Illness in Philadelphia," *Epidemiology*, 1997 Nov; 8(6):607-9.

16 Ibid.

17 Schwartz, J., Levin, R., and Goldstein, R., "Drinking Water Turbidity and Gastrointestinal Illness in the Elderly of Philadelphia," *Journal Epidemiol. Community Health* 2000; 54:45-51 45, available online at http://jech.bmjjournals.com/cgi/reprint/54/1/45.pdf.

18 Ibid, quoting Professor Joel Schwartz, Harvard School of Public Health.

19 The action level standard for lead is different from 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 See note 11.

21 See EPA, "Consumer Fact Sheets on Lead," www.epa.gov/safewater/Pubs/lead1.html and www.epa.gov/safewater/standard/lead&co1.html, and IRIS summary for lead available online at www.epa.gov/iris/subst/0277.htm.

22 Dabney, Michael, "Families Troubled About Lead in a School's Drinking Water: Health of Children at Bethune Elementary at Issue," *The Philadelphia Tribune*, April 6, 2001.

23 Bryant, S.D., Greenberg, M.; Crof, R., "Lead Contaminated Drinking Water in Philadelphia Schools," Abstract, *Journal of Toxicology: Clinical Toxicology*, No. 5, Vol. 39. p. 552, August 1, 2001.

24 Philadelphia Water Department, "Drinking Water Quality 1999."

25 See note 8.

26 See note 9.

27 See Chapter 5.

28 See note 11.

29 See note 8.

30 See note 9.

31 EPA, "Consumer Fact Sheet: Atrazine," available online at www.epa.gov/safewater/dwh/c-soc/atrazine.html.

32 See note 4.

33 Information derived from EPA, "Consumer Fact Sheet on Dichloromethane," available online at www.epa.gov/safewater/dwh/c-voc/dichloro.html.

34 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.

35 Philadelphia Water Department, "Drinking Water Quality 1999," p. 5.

36 See note 8.

37 See note 9.

38 Health effects information on disinfection by-products is summarized from NRDC, "Trouble on Tap" (1995); NRDC, "Bottled Water: Pure Drink or Pure Hype?" (1999), available online at www.nrdc.org/water/drinking/bw/bwinx.asp, and EPA, draft Preamble for Stage 2 Disinfection Byproducts Regulation, available online at www.epa.gov/safewater/mdbp/st2dis-preamble.pdf.

39 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.

40 See note 11.

41 See note 8.

42 See note 9.

43 See note 38.

44 Environmental Working Group, "Consider the Source: Farm Runoff, Chlorination By-products, and Human Health," January 2002, Table 1, available online at www.ewg.org/reports/ConsiderTheSource/es.html, last visited April 16, 2002.

45 See note 9.

46 Information derived from EPA, "Consumer Fact Sheet on Toluene," available online at www.epa.gov/safewater/dwh/c-voc/toluene.html.

47 See note 9.

48 Information derived from EPA, "Consumer Fact Sheet on Vinyl Chloride," available online at www.epa.gov/safewater/dwh/c-voc/vinylchl.html.

49 See note 8, and Philadelphia Water Department, "Drinking Water Quality 2000," available online at www.Philadelphiawater.org/wqr2000/wqr2000.htm, last visited Septembe 15, 2002. Published April 2001.

50 EPA, "Consumer Fact Sheet on Hexachlorocyclopentadiene," available online at www.epa.gov/safewater/dwh/c-soc/hexachl2.html.

51 See note 8.

52 See note 9.

53 See note 8.

54 See note 9.

55 See note 8.

56 See note 8.

57 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 the EPA allows reliance upon general lists of potential sources or where the water system is not aware of the specific source of pollution, where the water system is aware of the pollution source, the rules require that polluters be identified.

58 See notes 8 and 9. See also, EPA, Index of Watershed Indicators, available online at www.epa.gov/iwi/hucs/02040203/score.html. See also Enviromapper for Water, note 63.

59 Delaware River Source Water Assessment Partnership, Fact Sheet, available online at www.delawareswa.org, last visited May 5, 2002; Delaware River Source Water Assessment Partnership, Fact Sheet, available online at www.schuylkillswa.org, last visited May 5, 2002.

60 See, *e.g.*, Academy of Natural Sciences, Patrick Center, Natural Lands Trust, and The Conservation Fund, Schuylkill Watershed Conservation Plan (2001), available online at www.schuylkillplan.org/plan1.html.

61 Ibid.

62 Avril, Tom, "Water Worries; Some Reservoir Levels Haven't Been This Low in Decades. And Demand Has Kept Growing. Officials Are Debating Short- and Long-Term Measures," *Philadelphia Inquirer,* December 17, 2001.

63 See, *e.g.*, EPA, Enviromapper for Water, available online at http://map2.epa.gov/scripts/.esrimap?name=iwi2&threshold=6&zoomFactor=2&layersCode=00000100111&IWIColor=0&queryCode=99&fipsCode=37&IndexMap=on&cursorX=177&cursorY=158&Cmd=ZoomInByScalar&CmdOld=ZoomInByScalar&Left=-75.8231509898486&Bottom=39.5885591442952&Right=-74.8856509898486&Top=40.2916841442952&layer_5=5&layer_8=8&layer_9=9&layer_10=10&mapOption=ZoomIn&zoomInScalar=2.0&zoomRadius=0.0&LocationMap=on&zoomOutScalar=2.0&click.x=265&click.y=162

64 Letter from Richard Roy, water commissioner, City of Philadelphia, to Erik Olson, NRDC, dated June 4, 2001.

65 See note 59.

66 Ibid, and see note 62.

67 See note 8.

68 Personal communication with Christopher Crockett, manager, Source Water Protection Program, Philadelphia Water Department, April 18, 2002. See also www.phillywater.org/Delaware/default.htm and www.phillywater.org/Schuylkill/default.htm.

69 Personal communication (e-mail) from Christopher Crockett, Source Water Protection Program, Philadelphia Water Department, April 18, 2002.

70 Water Resource Education Network. Information on local projects in Philadelphia County, available online at http://pa.lwv.org/wren/projects/phila.html, last visited April 26, 2002.

71 See note 8.