



DETROIT, MI

Detroit Water and Sewerage Department serves Detroit and 127 southeastern Michigan communities.

Detroit Earned a Water Quality and Compliance Grade of Good for 2000 and 2001

The city had relatively few contaminants at comparatively low levels.

- ▶ No violations were reported for Detroit in 2000 or 2001. Some contaminants were detected in Detroit tap water at levels below the EPA's enforceable standards but still of potential concern. These include:
 - ▶ **total trihalomethanes**, by-products of chlorine treatment in drinking water that are linked with cancer and possibly miscarriages and birth defects
 - ▶ **haloacetic acids**, by-products of chlorine disinfection that may cause cancer
 - ▶ **total coliform bacteria**, microbial contaminants whose presence is a potential indicator that disease-causing organisms may be present in tap water
 - ▶ **lead**, which can cause permanent brain, kidney, and nervous system damage, as well as problems with growth, development, and behavior

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

- ▶ The reports were readable, included prominent information for people particularly vulnerable to contamination, and avoided unqualified statements about the water's safety. But they inexplicably failed to disclose the level of haloacetic acid in the city's water, an apparent violation of the EPA's rules for

right-to-know reports, and reported on levels of other contaminants in ways that were unclear.²

Detroit Earned a Source Water Protection Grade of Poor

- ▶ The Detroit River and Lake St. Clair, the sources of tap water for the city of Detroit and nearby suburban communities, are particularly vulnerable to point source pollution, spills, and urban runoff. Lake Huron, another source of Detroit drinking water, is also vulnerable to contamination, although the water quality is generally fairly good.

Noteworthy

- ▶ Aging water pipes in Detroit leak more than 35 billion gallons of water each year, costing city residents more than \$23 million each year.³ In response to this and other problems of the city's aging water infrastructure, the Detroit Water and Sewerage Department (DWSD) has proposed a capital improvement program for water and sewage system projects that will total \$4.3 billion over the next five years.⁴ The drinking water projects through 2006 alone total \$871 million.⁵ This program focuses on maintaining the "quality of water provided to residents; improving water system reliability by replacing aging infrastructure to reduce the growing incidence of main breaks; ensuring environmental protection for all Detroit-area residents through upgraded treatment facilities; improving employee safety through system modifications; and increasing efficiency of services to all customers by taking advantage of new technology."⁶ Among the major projects in the capital improvement program include completion of the Water Works Park II Treatment Plant; replacement of aging water mains; department-wide instrumentation and systems upgrades to water facilities; rehabilitation and upgrades of pump stations and reservoirs; upgrades of drinking water treatment plants, including plans to use ozone to better control *Cryptosporidium*; upgrades of other equipment and buildings; and upgrades of computer systems that control the water system.⁷

DETROIT	
System Population Served	4.2 million ¹
Water Quality and Compliance	2000 ▶ Good 2001 ▶ Good
Right-to-Know Report—Citizenship	2000 ▶ Good 2001 ▶ Good
Source Water Protection	Poor
REPORT CARD	

KEY CONTAMINANTS IN DETROIT’S WATER

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

Detroit’s Violations History

Since 1995, Detroit has had no reported monitoring or health-based drinking water violations. However, during the period from May 1991 to August 1995, and then again in July 1998, Detroit’s public water system demonstrated a pattern of total coliform bacteria—*monitoring* violations. In most cases, the city failed to collect the required number of bacteria samples. In other instances, as recently as 1998, the city failed to retest large numbers of positive coliform bacteria results within 24 hours, as required.⁸ Some of these violations, including the 1998 instance, were not reported in the EPA’s compliance database, called SDWIS-Fed.⁹ NRDC urges the EPA to correct these inaccuracies as soon as possible so that public citizens may access correct information about their drinking water online.

While Detroit has not had a reported health or monitoring violation since 1998, the city’s noticeable pattern of past monitoring violations is a concern. Monitoring the drinking water supply for contaminants is an essential element of maintaining healthy drinking water because it provides the data that confirms safety. Routine checks and recording of contaminant levels may highlight for system administrators patterns of contaminant levels that indicate future drinking water quality problems.

MICROBIOLOGICAL CONTAMINANTS

Total Coliform Bacteria

National Standard (MCL)

5% maximum in any month¹⁰

National Health Goal (MCLG)

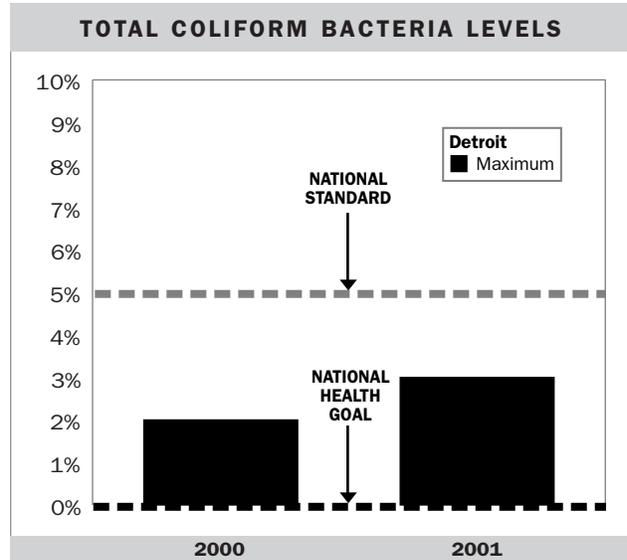
0—no known fully safe level

1998 Levels

Monitoring violation for failure to monitor adequately for total coliform bacteria

2000 Levels

2% in highest month, total coliform positive¹¹



2001 levels

3% in highest month, total coliform positive¹²

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. The DWSD has failed several times in the past to monitor for total coliform bacteria in accordance with EPA rules, most recently in 1998.

INORGANIC CHEMICALS

Arsenic

National Standard (MCL)

50 ppb (average) effective through 2005

10 ppb (average) effective in 2006

National Health Goal (MCLG)

0—no known fully safe level

2000–2001 Levels

Not detected; high levels found in other areas nearby in southeastern Michigan

LEVELS PRESENT LITTLE OR NO CONCERN IN DETROIT

LEVELS PRESENT HIGH CONCERN IN NEARBY AREAS IN SOUTHEASTERN MICHIGAN

Arsenic—the product of mining and industrial processes, past use of arsenic-containing pesticides, and natural leaching or erosion from rock—is a known and potent human carcinogen that has been linked to a variety of other diseases. Arsenic is found most commonly in groundwater supplies. Because tap water served by the DWSD comes from surface water, the

chemical was not detected in Detroit's drinking water. Nonetheless, arsenic contamination is a major concern for smaller water systems in southeastern Michigan outside Detroit that rely on groundwater supplies—particularly those towns on the “thumb” of Michigan, in Genesee, Huron, Ingham, Lapeer, Livingston, Oakland, Saginaw, Sanilac, Shiawassee, Tuscola, and Washtenaw Counties. More specific information on these counties' arsenic readings is available in their respective right-to-know reports.

Lead

National Standard (TT)

15 ppb (action level, at 90th percentile)¹³

National Health Goal (MCLG)

0—no known fully safe level

2000 Levels¹⁴

7 ppb at the 90th percentile home; 2 of 101 homes tested exceeded national standard¹⁵

2001 Levels¹⁶

6 ppb at the 90th percentile home; 1 of 57 homes tested exceeded national standard

LEVELS PRESENT SOME 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 Detroit routinely exceeded the drinking water action level for lead in the

early 1990s, a concerted effort by the DWSD has brought levels down to well below the national standard.¹⁷ Because most homes tested in the DWSD service area were well below action level of 15 ppb and because only about 1 to 2 percent of high-risk homes exceeded the action level, lead-related health effects are expected to be very rare in Detroit. 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

National Standard (MCL)

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

National Health Goal (MCLG)

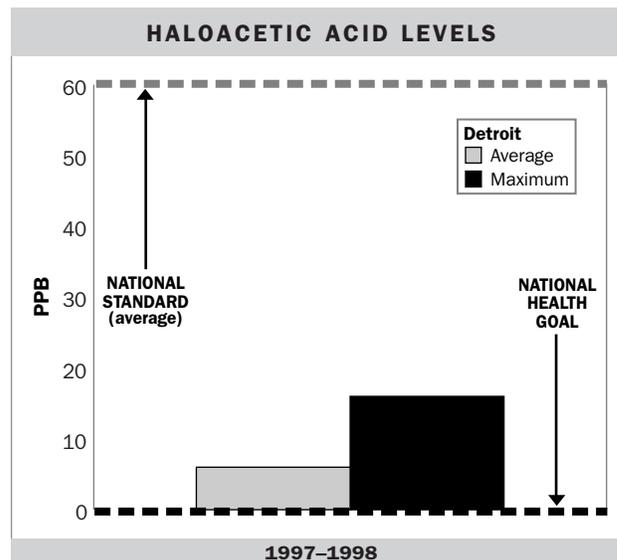
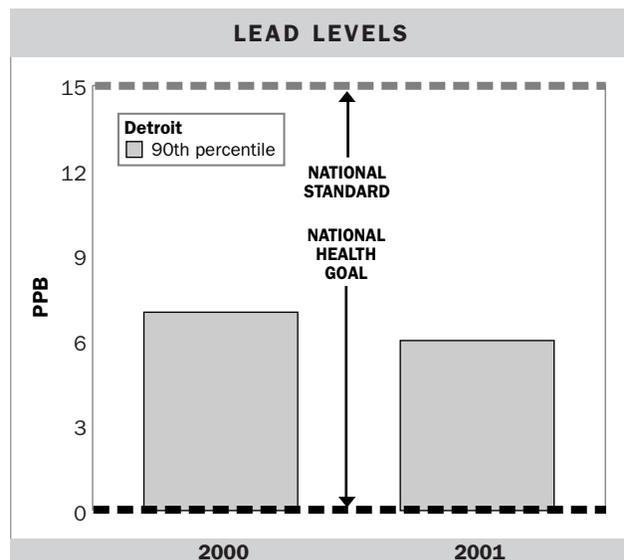
0—no known fully safe level¹⁸

1997–1998 Levels	Average	Maximum
	6 ppb	14 ppb

At the treatment plant, the most recent year for which results are published.¹⁹ (Note that these figures likely understate tap levels.)

LEVELS PRESENT SOME CONCERN

Haloacetic acids (HAAs), by-products of chlorine disinfection, may cause cancer and, potentially, reproductive and other health problems. Detroit has failed to publish any recent HAA data and included none at all



in its 2001 right-to-know report, in apparent violation of EPA regulations.²⁰ The 2000 report included only 1997 and 1998 data, and even that data was collected at the treatment plant, before the water went out into the distribution system resulting in a likely understatement of the actual HAA levels in the water that customers drink. (HAA levels tend to increase as chlorine continues to react with organic matter in the water.) Still, the levels appear likely to be well below the new national standard for HAAs.

Total Trihalomethanes

National Standard (MCL)

100 ppb (average) effective through 2001
 80 ppb (average) effective in 2002

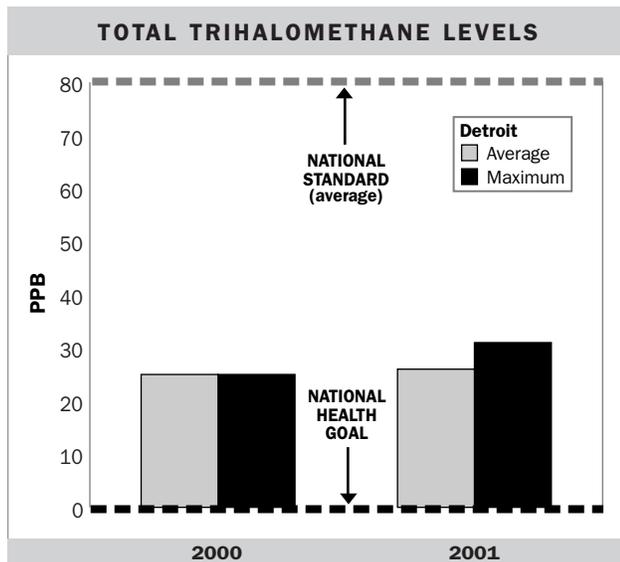
National Health Goal (MCLG)

0—no known fully safe level²¹

2000 Levels²²	Highest Running	
(see discussion below)	Annual Average	Maximum
	25 ppb	25 ppb
2001 Levels²³	Highest Running	
(see discussion below)	Annual Average	Maximum
	26 ppb	31 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. Detroit’s reporting of TTHM levels, summarized above, is confusing, because the DWSD



does not appear to report the actual annual averages or actual peak single sample maximums. Instead, the DWSD reports only the “highest level detected,” which is explained in a note to be “the highest running annual average” and the “range of detection.” Although the presence of any TTHMs poses some cancer risk, the levels reported in DWSD water are well below the new EPA standard of 80 ppb.

DETROIT’S RIGHT-TO-KNOW REPORTS

Detroit’s Right-to-Know Reports Earned a Grade of Good for 2000 and 2001

On the good-citizen side of the ledger:

- ▶ The reports were readable and colorful. The 2000 report included a vivid map and narrative on the utility’s source water for drinking water.
- ▶ The reports prominently displayed special information for people especially vulnerable to contamination, as well as information on the risks from lead in tap water.
- ▶ The reports avoided unqualified statements of safety.
- ▶ The reports included specific information on how citizens can participate in decisions and meetings affecting the Detroit water supply.

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

- ▶ Average and peak levels of TTHMs and some other contaminants were not clearly identified in the table, which lists “highest level detected” and “range of detection” but nothing labeled as average. The EPA’s rules require averages and single location peaks of TTHMs to be reported. A note in the 2001 report confusingly says that the “level detected is the highest running annual average,” without explaining whether this is a system-wide average or a single location average.
- ▶ The reports included no information on specific known or potential polluters in Detroit’s watershed. Nor did maps indicate locations or types of polluters. EPA rules require utilities to name known sources of any specific contaminant found in their tap water.²⁴ Even where this is not required or where 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 reports did not provide information on the health effects of some contaminants found at levels below EPA standards but above EPA health goals, such as trihalo-methanes and haloacetic acids.
- ▶ The 2000 report failed to include any definition of the abbreviation *ppb*, for parts per billion, a unit used in the regulation of drinking water contaminants and often used in the Detroit report.
- ▶ The right-to-know reports failed to clearly articulate the methods used to treat drinking water.

THREATS TO DETROIT'S SOURCE WATER

Detroit Earned a Source Water Protection Grade of Poor

Detroit's watershed is highly vulnerable to contamination.²⁵ The EPA Index of Watershed Indicators (IWI) database indicates that Detroit's watershed, which contains Detroit's drinking water sources (Lake St. Clair, the Detroit River, and Lake Huron), is seriously impaired and slightly vulnerable to more contamination.^{26, 27, 28} Although the database is outdated, it remains one of the only EPA resources available that can assess possible threats to source water.

Detroit's drinking water sources are particularly susceptible to contamination from urban runoff, a type of pollution that occurs when water passes through an urban environment and picks up particles, dirt, and chemicals and flows into the water resources of the area. According to IWI's most recent data (1990), 46 percent of the watershed's land area is more than a quarter impervious—which is to say that water cannot readily penetrate at least 46 percent of the land area in the watershed.²⁹ As it travels along streets and other hard surfaces, runoff becomes increasingly polluted; the result is that Detroit's drinking water sources are likely to experience a heavy loading of pollutants from urban runoff.

Furthermore, Detroit's watershed is likely to be contaminated by agricultural pollutants, as indicated by the vulnerability indicator of agricultural runoff potential. This indicator is a composite of nitrogen runoff, pesticide runoff, and sediment delivery to surface waters. From

1990 to 1995, IWI estimates a moderate potential impact from agricultural runoff on Detroit's watershed.³⁰ Pesticide and nitrogen runoff have the potential to pollute Detroit's drinking water sources, and sediment delivery to rivers and streams is determined to be moderate.

Under federal law, the DWSD must complete a source water assessment (SWA) by 2003. The SWA examines all of sources of drinking water and the quality of those source waters and will be an important tool in protecting source water. Protecting drinking water at the source is the most effective way to prevent contamination.

Current and Future Threats to Source Water

The Detroit area faces several threats to drinking water sources. The Detroit River is the source of water for all Detroit customers, and the DWSD takes in water from the river through two intakes near the mouth of Lake St. Clair and one farther south near Lake Erie.³¹ (Another DWSD intake brings water in from Lake Huron and provides it to the DWSD's Lake Huron treatment plant in St. Clair County, north of Port Huron. After treatment, that water serves the area north of Detroit.³²)

The Detroit area is both a major industrial center and a major agricultural area. Both produce pollution affecting the quality of source waters.

The Detroit Metro Area League of Women Voters has completed an excellent detailed review of the city's drinking water and the local sources of water pollution.³³ We summarize many of the league's findings here.

The Detroit River is vulnerable to point source pollution, spills, and urban runoff. The quality of the Detroit River varies, depending upon the location, mixing, and other variables. The river receives pollution from upstream loadings (from Lake St. Clair and even Lake Huron) and more significantly from the heavily polluted Rouge River, as well as industry along its banks.³⁴

Among the biggest upstream sources of pollution are petrochemical industries in Sarnia on the Canadian side of the St. Clair River. Along the Detroit River, the Detroit and Windsor sewage plants, storm sewers, combined sewer overflows, and chemical and auto plants are among the biggest polluters.³⁵

The Detroit sewage plant, which discharges near Zug Island, is one of the biggest in the world and is the

largest single polluter of the river. Detroit’s sources of drinking water are affected by a combined sewer overflow (or CSO) contamination problem. Combined sewer overflows occur during wet weather, when large volumes of rainwater runoff from streets are captured by storm sewers and then combine with waste from “sanitary” sewers containing human waste.³⁶ The excess untreated or poorly treated sewage flows into the Detroit and Rouge Rivers, taking with it human waste and many other contaminants. To deal with the problem, the Detroit Water and Sewerage Department developed a Long Term CSO Control Plan, which was submitted to the Michigan Department of Environmental Quality in 1996 and covers activities through 2005. According to DWSD materials, the plan commits to reduce overflow into source water, including rainwater control methods, in-system storage, plant expansion, and end-of-pipe treatment.³⁷ At this time, the success of this plan is unclear.

In addition to the CSO problem, the Detroit League of Women Voters’ study raised serious concerns about the adequacy of the monitoring and enforcement of the “pretreatment program” that is supposed to control the 700 or more industrial users who send their waste to the Detroit plant.³⁸

As a result of these pollution sources, the Detroit River from Lake St. Clair to Zug Island, where the Rouge River enters the Detroit, is sometimes polluted—especially when chemical or oil has been spilled or when polluted sediments from Lake St. Clair are resuspended by temperature changes. Usually, however, the river is not seriously degraded along this stretch. That said, the Detroit River’s quality rapidly deteriorates along the U.S. shoreline, roughly from Zug Island downstream to Lake Erie, and the Trenton Channel is seriously polluted.³⁹

PROTECTING DETROIT’S DRINKING WATER

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

Detroit Water and Sewerage is the third largest water and sewer utility in the United States and provides drinking water to 43 percent of the state’s population and 127 communities in southeastern Michigan.⁴⁰

In the public water system’s five treatment plants, chlorine disinfection, flocculation, fluoridation, and filtration are used to treat water before it is sent into the distribution system and to residents’ taps.⁴¹ Detroit reported in its 2000 right-to-know report that it intends to upgrade its water treatment and to install a new \$275 million ozonation facility by 2003. This facility could substantially reduce the levels of such troublesome disinfection by-products as trihalomethanes and haloacetic acids. In addition, ozone is an extremely effective disinfectant in killing the parasite *Cryptosporidium*, which is resistant to chlorine.

Activated carbon and other treatments could essentially eliminate many organic chemicals found in the city’s water, including the precursors to disinfection by-products such as trihalomethanes or haloacetic acids. Other cities, such as Cincinnati, Ohio, have installed this technology at a cost of about \$25 per household per year.

In 1994, NRDC published a report on threats to public health as a result of outdated drinking water treatment and distribution systems. NRDC found that ancient distribution systems are often the cause of waterborne disease outbreaks and that the threat to public health would be greatly reduced if water systems were upgraded with more efficient technology.⁴² As noted above, Detroit subsequently launched a \$4.3 billion construction effort to improve the city’s water treatment and infrastructure, which will at least in part address these problems.⁴³

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.

DETROIT
Detroit Water and Sewerage Department ⁴⁴ County Served: Wayne 735 Randolph Street Detroit, MI 48226 313-964-9570 (Public Affairs Division) www.dwsd.org
WATER UTILITY INFORMATION

► **Contact Detroit Water and Sewerage**, 313-964-9570, to see what can be done to protect source water and drinking water.

► **Attend meetings of the Detroit Water and Sewerage Department** (contact information below). Check DWSD's right-to-know report for public meeting dates, times, and locations. DWSD has produced several fact sheets and public education materials on the combined sewer overflow problem. Be sure to ask for those materials in addition to the right-to-know report.

► **Get involved in source water assessment and protection efforts** by contacting Clean Water Action in Michigan, 517-203-0754, or the Clean Water Network, 202-289-2395 or cleanwater@igc.org.

Peer reviewers for the Detroit report included Cyndi Roper, Clean Water Action, and Dr. Linda Greer, senior scientist, NRDC.

NOTES

1 Detroit Water and Sewerage Department, "2001 Consumers Annual Report on Water Quality."

2 See 40 C.F.R. §141.153(d)(1)(ii) & (iii).

3 "Leaky Water Pipes Create Heavy Water Loss, Cost for Detroit," *US Water News Online* (August 1, 2002), available online at www.win-water.org/win_news/080102article.html.

4 Detroit Water and Sewerage Department, "Fact Sheet: Working Around the Clock to Provide Excellence in Water and Sewer Service!" (January 2003), available online at www.dwsd.org/about/fact_sheet.pdf.

5 City of Detroit Budget Department, *Proposed Capital Agenda for the Period 2001-02 to 2005-06* at p. 294, available online at [www.ci.detroit.mi.us/budget/Capital Agenda Part3.pdf](http://www.ci.detroit.mi.us/budget/Capital%20Agenda%20Part3.pdf).

6 DWSD *Fact Sheet*, note 3 above.

7 City of Detroit *Proposed Capital Agenda*, note 4 above, at p. 294.

8 City of Detroit Department of Water and Sewerage, "Notice of Violation of Water Quality Monitoring Requirements," *The Detroit Legal News*, July 9, 1998.

9 Safe Drinking Water Information System (SDWIS-Fed), USEPA database, available online at http://oaspub.epa.gov/enviro/sdw_report.first_table?report_id=410636&pwsid=MI0001800&state=MI&source=Surface%20water%20&population=944985&sys_num=0.

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 Detroit Water and Sewerage Department, "2000 Consumers Annual Report on Water Quality," p. 5.

12 Detroit Water and Sewerage Department, "2001 Consumers Annual Report on Water Quality," p. 8.

13 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.

14 Detroit Water and Sewerage Department, "2000 Consumers Annual Report on Water Quality," pp. 10-11.

15 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 distribution system. If the amount of lead detected in the samples is more than 15 ppb at the 90th percentile, meaning that 90 percent of samples have 15 ppb or less lead, 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, such additional measures as chemical treatment are required. If those measures do not work, the system may have to replace lead portions of its distribution system.

16 Detroit Water and Sewerage Department, "2001 Consumers Annual Report on Water Quality," pp. 6 and 8.

17 Letter from Frederick R. Scarcella, P.E., Division of Water Supply, Bureau of Environmental and Occupational Health, State of Michigan Department of Environmental Quality, to Detroit Water and Sewerage Department, regarding lead and copper monitoring, August 19, 1992. Certified lead and copper reporting lab sheets dated July 8, 1992, are attached.

18 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.

19 Detroit Water and Sewerage Department, "2000 Consumers Annual Reports on Water Quality," p. 8, and "1999 Consumers Annual Report on Water Quality," p. 8.

20 See note 2.

21 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.

22 Detroit Water and Sewerage Department, "2000 Consumers Annual Report on Water Quality," p. 8. Please note that parts per billion values were rounded up to the nearest whole number.

23 See note 5.

24 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 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 polluters be identified.

- 25 Index of Watershed Indicators, USEPA database, available online at www.epa.gov/iwi/hucs/04090004/score.html, visited October 15, 2001.
- 26 For Lake St. Clair's IWI rating see, for example, www.epa.gov/iwi/hucs/04090002/score.html.
- 27 Index of Watershed Indicators, USEPA database, see www.epa.gov/iwi/hucs/04090004/score.html
- 28 Index of Watershed Indicators, USEPA database, see, for example, www.epa.gov/iwi/hucs/04080103/score.html and www.epa.gov/iwi/hucs/04080102/score.html
- 29 See note 17.
- 30 Index of Watershed Indicators, USEPA database. Available online at: www.epa.gov/iwi/hucs/04090004/score.html.
- 31 Detroit Water and Sewerage Department, "2000 Consumers Annual Report on Water Quality," p. 4.
- 32 Ibid.
- 33 Detroit Metro Area League of Women Voters, Drinking Water Project Committee, "The Detroit Water System: A Citizen's Look at Drinking Water in Southeastern Michigan" (1989).
- 34 Ibid.
- 35 Ibid.
- 36 For more general information on combined sewer overflows, please refer to NRDC's CSO fact sheet, available online at www.cwn.org, visited October 15, 2001.
- 37 *Reducing Detroit's Combined Sewer Overflows*, Detroit Water and Sewerage Department Combined Sewer Overflow Control Project, May 1999.
- 38 Detroit Metro Area League of Women Voters, Drinking Water Project Committee, "The Detroit Water System: A Citizen's Look at Drinking Water in Southeastern Michigan" (1989).
- 39 Ibid.
- 40 Detroit Water and Sewerage Department, "2001 Consumers Annual Report on Water Quality," p. 5, "Working Around the Clock to Provide Excellence in Water and Service!" Provided to NRDC by DWSD in August 2001.
- 41 Data sheets on Northeast, Southwest, Lake Huron, and Springwells Treatment Plants. Provided by DWSD. Dated January 2001, February 1997, September 1997, and September 1997, respectively.
- 42 Cohen, B., and Olson, E., *Victorian Water Treatment Enters the 21st Century: Public Health Threats from Water Utilities' Ancient Treatment and Distribution Systems*, Natural Resources Defense Council, 1994.
- 43 "Water Woes: Detroit Water Department in Midst of \$4.3 million construction effort," OnDetroit Section, p. 6, *The Detroit News*, May 2, 2001.
- 44 Detroit Water and Sewerage Department, "2000 Consumers Annual Report on Water Quality."