



SEATTLE, WA

Seattle Public Utilities Earned a Water Quality and Compliance Grade of Poor for 2000 but Improved to Fair in 2001¹

Although Seattle's watershed controls are among the nation's best, the city exceeded the national action level for lead, had high levels of cancer-causing chlorination by-products (which it reduced in 2001 by installing new treatment), had elevated turbidity levels, and found *Cryptosporidium* in its source waters. Major additional new treatment slated to start in 2004 should significantly improve Seattle's water quality and its grade.

- ▶ In 2000, water from Seattle's Tolt Water Treatment Plant had levels of **haloacetic acids** (by-products of chlorine disinfection that may cause cancer) that exceeded the new national standard, which went into effect in 2002. A new treatment plant for the Tolt supply started operating in 2001 and brought the levels of these chemicals below the new standard.
- ▶ In 2000, water from the Tolt treatment plant had elevated levels of **total trihalomethanes**, by-products of chlorine treatment in drinking water linked with cancer, miscarriages, and birth defects. The levels approached, without exceeding, the national standard that went into effect in 2002. Levels decreased significantly once the new Tolt facility started operating in 2001.
- ▶ Seattle exceeded the national action level for **lead** and subsequently entered into an agreement with the state requiring the city to take steps to control the problem by 2004. 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.

- ▶ Tolt and Cedar source waters have tested positive for ***Cryptosporidium***, a waterborne microbial disease-causing organism that presents health concerns, especially to individuals with weakened immune systems. The new Tolt treatment plant, which opened in 2001, uses ozone disinfection and so is likely to kill the *Crypto* in that supply. In 2004, the Cedar supply is supposed to get a new ozone/ultraviolet light plant that should kill *Crypto*.
- ▶ In the Cedar supply, **turbidity** occasionally peaked at high levels. 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.

Noteworthy

- ▶ Seattle's water exceeded 1 of 11 criteria established under the Safe Drinking Water Act for judging whether systems using surface water must filter their water. As a result, Seattle negotiated an agreement with the Washington Department of Health to implement additional watershed protection and treatment measures.

Seattle's Right-to-Know Reports Earned a Grade of Fair for 2000 and 2001

- ▶ The reports generally appeared to comply with EPA rules, included important information about water treatment, and resisted the temptation to describe the city's water as "absolutely safe."
- ▶ The reports buried the news that Seattle substantially exceeded the national action level for lead.
- ▶ Seattle prominently made the questionable claim that "No Compounds Were Detected at Above the Allowable Levels"—in spite of the exceedance of the lead action level and the city's failure to meet state watershed protection criteria. This triggered a state "Agreed Order" to build a new treatment plant.

SEATTLE	
System Population Served 595,430 in Seattle, 1.3 million in metro area ²	
Water Quality and Compliance 2000 ▶ Poor 2001 ▶ Fair	
Right-to-Know Report—Citizenship 2000 ▶ Fair 2001 ▶ Fair	
Source Water Protection Excellent	
REPORT CARD	

Seattle Earned a Source Water Protection Rating of Excellent

- ▶ Seattle's two sources of drinking water, the Cedar River and the South Fork of the Tolt River, are not likely to become polluted.
- ▶ Seattle Public Utilities has undertaken extensive source water protection efforts.

Noteworthy

- ▶ Seattle says it needs to "invest in the foundation of our water system—the pipes, pumps, and plants that keep safe and reliable water flowing to our homes and businesses."³ The city says its water system needs \$80 to \$120 million per year in capital improvements.⁴
- ▶ Seattle's system has to rehabilitate water mains, construct the Cedar Water Treatment Facility (to reduce threats from *Crypto*, chlorination by-products, and lead), upgrade the automated system used to monitor and control water supply facilities, build improvements to the water distribution system (pump stations, tanks, and standpipes), and complete improvements to the Landsburg Dam on the Cedar River.
- ▶ Moreover, major investments are expected in safety and security, including implementation of a program to cover reservoirs, complete seismic upgrades for water tanks, enhanced water system security, and installation of a warning system on the Lake Youngs Dam. Also planned are investments to protect the environment through habitat improvements in the Cedar River Watershed and to encourage water conservation.

KEY CONTAMINANTS IN SEATTLE'S WATER

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

MICROBIOLOGICAL CONTAMINANTS

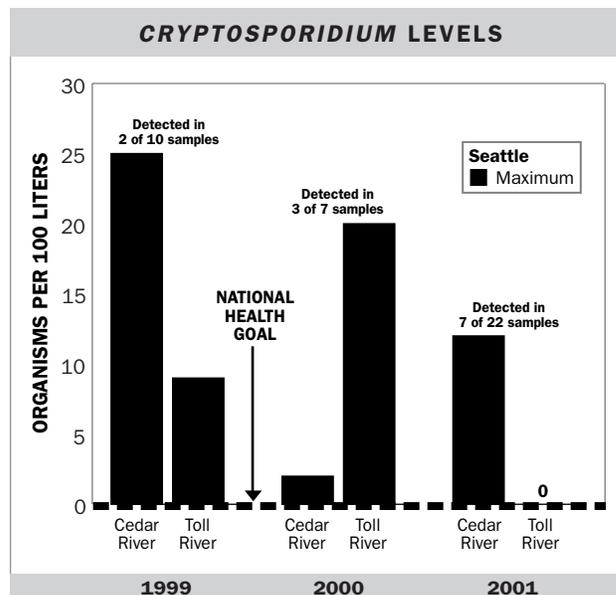
Cryptosporidium (*Crypto*)

National Standard (MCL)

Treatment Technique (TT)

Draft Proposed New National Standard⁵

<7.5 organisms/100 liters (average); no additional treatment
 7.5–100 organisms/100 liters (average); some additional treatment (>90% *Crypto* kill)



100–300 organisms/100 liters (average); significant additional treatment (>99% *Crypto* kill)
 >300 organisms/100 liters (average); advanced treatment (>99.7% *Crypto* kill)

National Health Goal (MCLG)

0—no known fully safe level

National Requirements

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

1999 Levels⁶ Maximum

Cedar River 25 organisms per 100 liters
 Tolt River 9 organisms per 100 liters
 Detected in 2 of 10 samples; no average levels provided

2000 Levels⁷ Maximum

Cedar River 2 organisms per 100 liters
 Tolt River 20 organisms per 100 liters
 Detected in 3 of 7 samples; no average levels provided

2001 Levels⁸ Maximum

Cedar River 12 organisms per 100 liters
 Tolt River 0
 Detected in 7 of 22 samples; no average levels provided

LEVELS PRESENT HIGH CONCERN

Cryptosporidium (*Crypto*) is a waterborne microbial disease-carrying pathogen 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.

Positive samples of *Crypto* were found in Seattle’s Tolt and Cedar source waters but at levels that are unlikely to trigger major treatment requirements. The new treatment plant for the Tolt supply, which came online in 2001 using ozone disinfection, is likely to kill most of the *Crypto* in that supply. However, Seattle acknowledges the current treatment for the Cedar supply is not effective at killing *Crypto*. Thus, immunocompromised consumers using the Cedar supply may be at some microbial risk, at least until Seattle’s planned new ozone and ultraviolet light treatment plant for this supply comes online, now slated for 2004. Ozone and UV light are likely to kill most *Crypto* from that water supply.

Total Coliform Bacteria

National Standard (MCL)

5% maximum in any month⁹

National Health Goal (MCLG)

0—no known fully safe level

1999 Levels

0.3% in highest month, total coliform positive¹⁰

2000 Levels

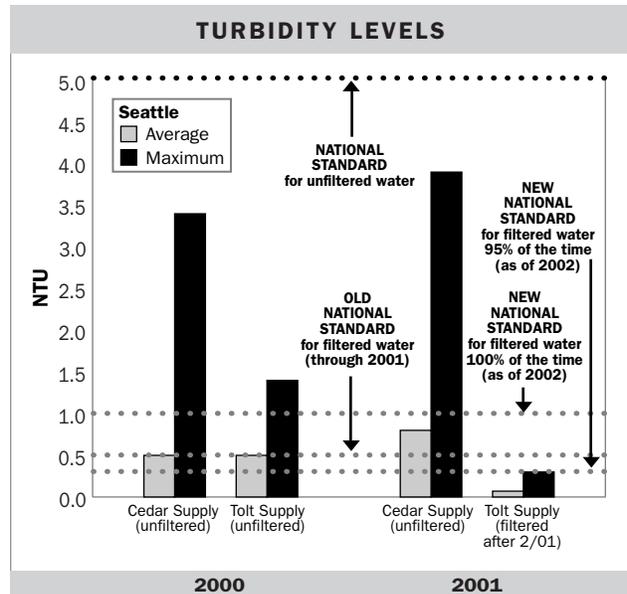
0.3% in highest month, total coliform positive¹¹

2001 Levels

0.9% in highest month, total coliform positive¹²

LEVELS PRESENT SOME CONCERN

Total coliform bacteria are microbial contaminants whose presence is a potential indicator that disease-causing organisms may be present in tap water. The federal standard allows up to 5 percent total coliform-positive samples per month. The health goal for any type of coliform bacteria is 0. The coliform bacteria finding in Seattle of less than 1 percent in peak months is not viewed as serious, though it may indicate that there may be some bacteria regrowth in water mains after water leaves the treatment plant. Some studies suggest that serious regrowth problems may allow disease-causing pathogens to subsist in pipes. Rehabilitation and renewal of the water distribution system will help the Seattle system ensure that bacterial problems in its pipes are addressed and prevented from becoming serious.



Turbidity (Cloudiness)

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 (in 2002)

1 NTU 100% of the time (in 2002)

Unfiltered water

5 NTU maximum, 100% of the time

(applies currently to Cedar, and to Tolt before the new plant opened in 2/01)

2000 Levels¹³

	Average	Maximum
Cedar (unfiltered)	0.5 NTU	3.4 NTU
Tolt (unfiltered)	0.5 NTU	1.4 NTU

2001 Levels¹⁴

	Average	Maximum
Cedar (unfiltered)	0.8 NTU	3.9 NTU
Tolt (filtered as of 2/01)	0.07 NTU	0.3 NTU

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. The new Tolt plant reportedly is in compliance with EPA standards for turbidity. The unfiltered Cedar supply has had turbidity problems, including spikes that exceeded a new EPA standard for filtered water supplies. Since the Cedar supply is not filtered, a less stringent standard applies, and the spike is not a violation. However, the application of the relaxed

standard is predicated on the assumption that the water meets all criteria for avoiding filtration, which the Cedar supply did not. Moreover, Seattle has found *Crypto* and *Giardia* in its source and finished water, precisely the types of pathogens that high turbidity could shield from effective disinfection. The new Cedar supply ultraviolet and ozone treatment plant will reduce this concern when it is completed in 2004, though even the effectiveness of ultraviolet and ozone could be reduced if turbidity levels are high enough.

INORGANIC CONTAMINANTS

Lead

National Standard (TT)

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

National Health Goal (MCLG)

0—no known fully safe level

1997–1998 Levels (Most Recent Testing Reported)

19 ppb at 90th percentile home;¹⁶ 53 of 390 (14%) homes tested exceeded the national action level

EXCEEDS ACTION LEVEL

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. In recent years, the public water system in Seattle has exceeded the federal drinking water

action level for lead (called the Lead and Copper Rule), and a bilateral enforcement agreement has a schedule that it must follow in order to come into complete compliance (see discussion of Seattle's violations history below).¹⁷ The city reports that it will soon install new treatment methods to control corrosion, thus reducing lead at the tap, and that it will also make reservoir improvements. The city "expects to meet the action level in the future" when it renews testing in 2003–2004. 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 2002; no previous standard

National Health Goal (MCLG)

0—no known fully safe level¹⁸

1999 Levels ¹⁹	Average	Maximum
Cedar	21 ppb	36 ppb
Tolt	69 ppb	92 ppb

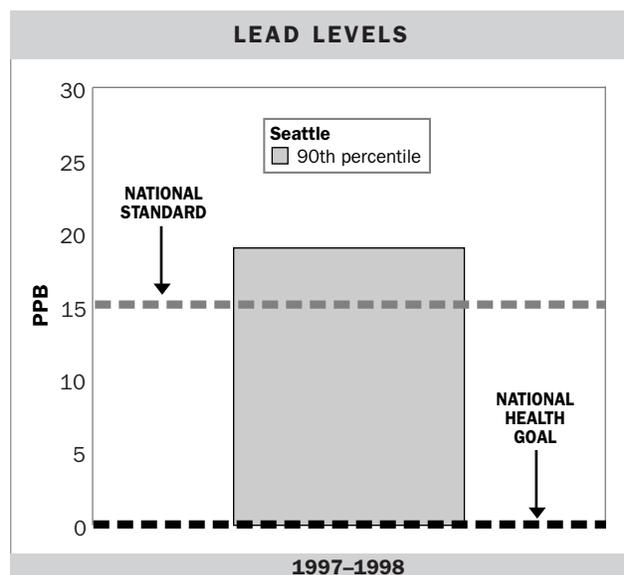
2000 Levels ²⁰	Average	Maximum
Cedar	21 ppb	36 ppb
Tolt	69 ppb	92 ppb

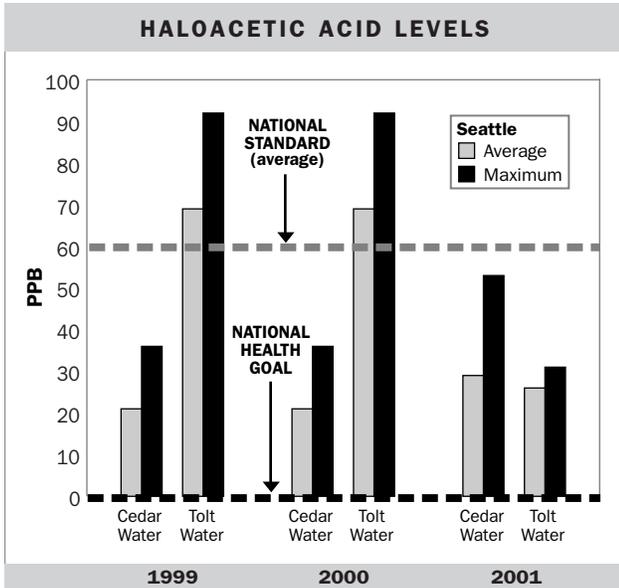
2001 Levels ²¹	Average	Maximum
Cedar	29 ppb	53 ppb
Tolt	26 ppb	31 ppb

LEVELS PRESENT SOME CONCERN

Haloacetic acids (HAAs), by-products of chlorine disinfection, may cause cancer and, potentially, reproductive and other health problems. According to monitoring samples taken in 1997 and 1998 for the Tolt supply, which generally serves areas north of Green Lake, the average level of haloacetic acids exceeded the EPA's new maximum allowable level of 60 ppb, which went into effect later, in January 2002.²² This reading is the main cause (along with excessive lead) of Seattle's poor drinking water quality and compliance grade for 2000.

The new Tolt treatment facility's state-of-the-art ozone treatment substantially reduced haloacetic acid





levels to less than half of the new standard. The Cedar supply, generally serving areas south of Green Lake, has similar low levels of haloacetic acids.

Total Trihalomethanes

National Standard (MCL)

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

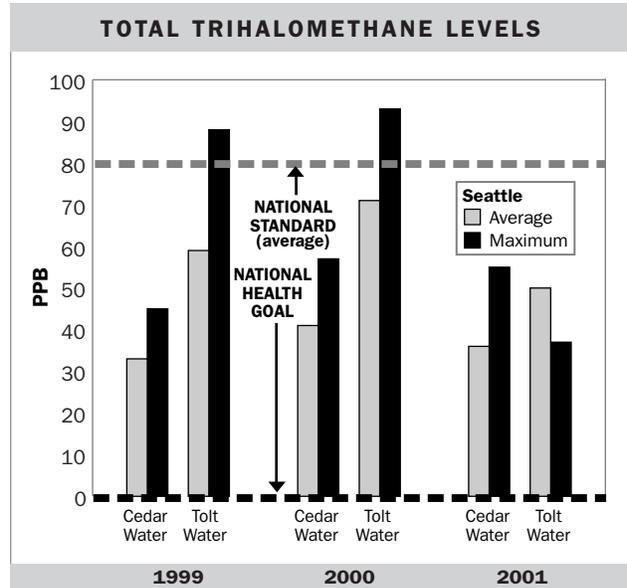
National Health Goal (MCLG)

0—no known fully safe level²³

Year	Supply	Average	Maximum
1999 Levels ²⁴	Cedar	33 ppb	45 ppb
	Tolt	59 ppb	88 ppb
2000 Levels ²⁵	Cedar	41 ppb	57 ppb
	Tolt	71 ppb	93 ppb
2001 Levels ²⁶	Cedar	55 ppb	36 ppb
	Tolt	37 ppb	50 ppb ²⁷

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. The levels of TTHMs in Cedar water are below the levels linked to miscarriages and fetal development problems; but the Tolt water readings, particularly the 2000 high of 93 ppb, may be of concern, according to Dr. David Ozonoff, director of the Environmental Health Department at Boston University School



of Public Health. That said, TTHM levels have been reduced since the new Tolt treatment facility came on line. While exact figures for average TTHMs for the portion of 2001 after the Tolt plant was opened are not available, NRDC’s evaluation of preliminary data indicates that the levels likely averaged about 40 ppb in 2001 after the installation of the new plant.²⁸

Violations History and Action Level Exceedances

Seattle has had an historic pattern of high levels of lead in tap water in many homes in the city (see lead section above).²⁹ The city reportedly failed to comply with legal requirements to treat water to reduce corrosivity that would reduce leaching of lead into tap water. In 2001, Seattle Public Utilities (SPU) signed two agreements with the Washington State Department of Health, both legal documents filed in court, that set out schedules for compliance with certain drinking water regulations. First, SPU signed a bilateral compliance agreement that sets out a schedule by which SPU must comply with the EPA’s Lead and Copper Rule. This agreement requires SPU to construct new corrosion control facilities, conduct monitoring at residents’ taps, and construct a new filtration plant, which Seattle now reportedly has completed, among other things.³⁰ Second, SPU has signed an agreed order that was executed as a consequence of the Cedar water supply exceeding 1 of 11 criteria required to provide unfiltered drinking water in 1992.³¹

SPU has taken steps to inform the federal government of inaccuracies in the EPA drinking water database, the Safe Drinking Water Information System (SDWIS). As of early 2003, the EPA had yet to act on these reported inaccuracies.³² In 1998, SPU pointed out that two major violations, a turbidity violation and exceeding requirements necessary for unfiltered water, were not reported in SDWIS. Of the then nine violations (although now, inexplicably, just four are recorded) reported by SDWIS, only two appeared to be accurate, according to SPU.³³

In addition, a monitoring violation from October 2000 was not reported in SDWIS.³⁴ SPU failed to collect a daily sample from the Cedar River.³⁵ The sample was required to assess disinfection effectiveness, and although SPU alleges that the violation was “minor,” the public was notified in Seattle’s right-to-know report for the year 2000.³⁶

SEATTLE’S RIGHT-TO-KNOW REPORTS

Seattle’s Right-to-Know Reports Earned a Grade of Fair for 2000 and 2001

On the good-citizen side of the ledger:

- ▶ Overall, the reports were colorful, attractively formatted, and generally appeared to comply with the EPA’s rules.
- ▶ The reports provided a map of the source waters.
- ▶ The reports briefly summarized source water assessment and protection efforts.
- ▶ The reports described how the city’s water is treated.
- ▶ The 2000 report included information on some of the health effects of disinfection by-products, although it only noted cancer risks and failed to mention the reproductive effects observed in many studies. The 2001 report did not mention these chemicals’ health effects, but the levels of these chemicals had dropped by then, when the new Tolt treatment plant opened.
- ▶ Unlike many other cities, Seattle resisted the temptation to say that the city’s water is “absolutely safe” or to make other sweeping claims about the complete safety of the water.
- ▶ The reports admit that the city is operating under a state bilateral compliance agreement, a legal consent

order approved by a court. This order requires Seattle to address the failure to meet the surface water treatment rule criteria and the lead problem by building the new Cedar treatment plant by 2004.

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

- ▶ The reports only obliquely acknowledged, in a section deep into the report, that Seattle substantially exceeded the action level for lead. Indeed, early sections of the reports made no mention of the lead problem.
- ▶ Seattle’s 2001 report prominently makes a questionable claim that “no compounds were detected above the allowable levels.” This would be true if “allowable levels” were defined so narrowly as to include *only* contaminants regulated by EPA’s “maximum contaminant levels.” But the statement is untrue if one considers Seattle’s detection of lead above the action level, or its exceedance of the filtration-avoidance criteria. The EPA’s action level for lead was established as part of an enforceable treatment technique. Exceeding the action level alone is not a violation of federal law, although it clearly has adverse health implications; but exceeding an action level and then failing to take required treatment and other steps to fix the problem in a specified time frame is a violation. Seattle has not yet taken those required steps and is under a consent order to do so.
- ▶ Seattle’s exceedance of the criteria in the state’s agreed order on filtration avoidance for the Cedar supply in 2001 is mentioned only parenthetically and is not highlighted in any table.
- ▶ While the reports mention the state bilateral enforcement agreement, they state that “there was no public health risk associated” with the city’s failure to meet the state requirement that triggered the order. Obviously, the reason for the state order requiring better treatment was to improve public health protection; Seattle later admits that the “new treatment facility will improve public health protection by disinfecting against *Cryptosporidium*”
- ▶ Mandatory special information for people at high risk from drinking water contaminants, such as elderly people and people living with HIV/AIDS, while included in the report, is not prominently displayed. Rather, it is included on the last page of the reports.

► The reports include neither maps nor any detailed narrative noting any specific pollutants in its watersheds. EPA rules require utilities to name any specific known sources of a contaminant found in their tap water and encourage discussion of information on specific local potential sources of pollution.³⁷ It may be, however, that Seattle, which has an aggressive source water protection program, concluded that no specific source of pollution could be identified in its watershed.

THREATS TO SEATTLE'S SOURCE WATER

Seattle Earned a Source Water Protection Grade of Excellent

Seattle's drinking water comes from two surface water sources, the Cedar River and the South Fork Tolt River. SPU is the primary owner of the watersheds for these rivers. The Tolt River, whose watershed is entirely owned by SPU, provides drinking water for one-third of the population. The Cedar River, whose watershed is 70 percent owned by SPU and 30 percent owned by the U.S. Forest Service, provides water to the remaining two-thirds of the SPU-served population.³⁸ The city of Seattle reports that information concerning the vulnerability and condition of these watersheds is not available on the EPA's Index of Watershed Indicators (IWI) database.³⁹

Seattle has implemented very extensive source water protection programs. As part of those efforts, Seattle does not permit agricultural, industrial, and recreational activities in the watersheds, and residential use of the watersheds is prohibited.⁴⁰ Results from a survey performed by the Washington State Department of Health indicate that the Cedar River and the South Fork Tolt River have a low risk of contamination.⁴¹ Because the drinking water supply comes from surface water sources, it is easily vulnerable to contamination; however, the source waters are not extremely vulnerable as a result of the strong watershed protection program. The city has confirmed that other than possible contamination from wildlife, few or no sources of contamination are in the watershed area.⁴² Based upon available information, therefore,

NRDC has given Seattle a source water protection rating of Excellent.

Under federal law, Washington state drinking water authorities must complete a Source Water Assessment (SWA) by 2003. The SWA assesses all of the 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 of preventing drinking water contamination.

PROTECTING SEATTLE'S DRINKING WATER

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

Treatment Options Available for Contaminants of Greatest Concern

Cedar River water is treated with screening, chlorination, fluoridation, and corrosion control with the addition of lime.⁴³ Tolt River water treatment consists of screening, ozonation, coagulation and flocculation, filtration, chlorination, fluoridation, and corrosion control with the addition of lime and carbon dioxide.⁴⁴ Seattle has recently worked to decrease high levels of such disinfection by-products as haloacetic acids in its drinking water. Several major treatment projects have already been completed or are in the works. Tolt River water is now filtered at a new treatment facility that became operational in February 2001; a new Cedar River water treatment facility is scheduled to be operational in 2004 and will include state-of-the-art disinfection using ozonation and ultraviolet (UV) light. This facility is required under the agreed order.

Once these new treatment plants are both in place, Seattle will have among the most advanced treatment plants in the United States. One improvement that should be considered in Seattle is the use of activated carbon and enhanced coagulation to eliminate the organic chemicals found in the city's water, including disinfection by-product precursors. Other cities have installed this technology at a cost of about \$25 per household per year.

SEATTLE

Seattle Public Utilities⁴⁵
710 Second Avenue
Seattle, WA 98104-1713
206-615-0827
www.cityofseattle.net/util/services/WaterQuality

WATER UTILITY INFORMATION

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**, Seattle Public Utilities. Check the website, the right-to-know report, or call and ask for dates, times, and locations. Ask about the progress of its Source Water Assessment Program (SWAP), which should be completed by 2003.

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

► **Learn more from these groups:**

- WashPIRG, www.washpirg.org
- Washington Physicians for Social Responsibility, www.wpsr.org
- Washington Toxics Campaign, www.watoxics.org
- Clean Water Network, www.cwn.org

Peer reviewers of the Seattle report included Ivy Sager-Rosenthal, WashPIRG, and Dr. Tim Takaro, Washington Physicians for Social Responsibility.

NOTES

1 Seattle earned a grade of Poor in 2000 because the haloacetic acid levels reported in Seattle's 2000 and 1999 right-to-know reports exceed the standard that went into effect in January 2002. Seattle reported low levels of other contaminants, but under NRDC's grading method applied to all water systems covered in this report, Seattle can earn no better than a Poor grade if its water in 2000 or 2001 exceeded the new standard. Had a contaminant level exceeded the standard in effect at the time, Seattle's water would have earned a failing grade.

2 Safe Drinking Water Information System (SDWIS-Fed), U.S. Environmental Protection Agency database, available online at http://oaspub.epa.gov/enviro/sdw_report.first_table?report_id=687801&pwsid=WA5377050&state=WA&source=Surface%20water%20&population=595430&sys_num=0, last visited September 7, 2001.

3 See Seattle Public Utilities, "Frequently Asked Questions," www.ci.seattle.wa.us/util/services/rates/2003FAQsWater.htm (which is summarized in this section).

4 Ibid.

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

6 Seattle Public Utilities, "Drinking Water Quality Annual Report," p. 3, June 2000.

7 Seattle Public Utilities, "Drinking Water Quality Annual Report," p. 8, June 2001.

8 Seattle Public Utilities, "Drinking Water Quality Annual Report," p. 4, May 2002.

9 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.

10 Seattle Public Utilities, "Drinking Water Quality Annual Report," p. 5, June 2000.

11 Seattle Public Utilities, "Drinking Water Quality Annual Report," p. 5, June 2001.

12 Seattle Public Utilities, "Drinking Water Quality Annual Report," p. 2, May 2002.

13 See note 7.

14 See note 8.

15 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.

16 Seattle Public Utilities, "Drinking Water Quality Annual Report," p. 4, June 2000.

17 Bilateral Compliance Agreement for Seattle Public Utilities, Compliance with the Lead and Copper Rule, states "SPU exceeded the 15 ug/L lead action level at the 90th percentile sample during both rounds of customer tap monitoring in 1992. The results were 18.8 mg/L and 20.0 ug/L (p.1)," May 2001.

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 See note 10.

20 See note 11.

21 See note 12.

22 See note 10.

23 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.

24 See note 10.

25 See note 11.

26 See note 12.

27 The trihalomethanes average for 2001 is a running annual average based on 2000–2001 data, so some of the samples that averaged to get the 50 ppb level were from 2000, before the Tolt treatment plant was online and before TTHM levels were reduced.

28 See “Seattle Public Utilities: 2001 Annual Analysis of Cedar & Tolt Water Supplies, Samples Collected May 22, 2001,” and “Seattle Public Utilities: 2002 Annual Analysis of Cedar & Tolt Water Supplies, Samples Collected April 30, 2002,” available online at www.cityofseattle.net/util/services/waterquality.

29 In 1992, Seattle exceeded the action level for lead, with levels as high as 20 ppb (Bilateral Compliance Agreement, May 2001). Other problems have been detected. For example, in 1998, KIRO-TV Investigations, a local TV news channel, tested lead levels in 10 Seattle-area public schools’ drinking fountains during spring break recess. KIRO concluded that 3 of the 10 schools had lead levels in excess of 15 ppb, which are high levels of concern (website announcement, KIRO-TV, Seattle, 1998, provided by WDOH).

30 Bilateral Compliance Agreement between Seattle Public Utilities and Washington State Department of Health, Subject: Compliance with the Lead and Copper Rule, signed May 2001.

31 Agreed Order, Docket No. 94-015, State of Washington, Department of Health, 12/22/99.

32 See EPA SDWIS, http://oaspub.epa.gov/enviro/sdw_report.first_table?report_id=687801&pwsid=WA5377050&state=WA&source=Surface%20water%20&population=619300&sys_num=0, last visited February 2003.

33 Memorandum regarding “SDWIS Data Inaccuracies,” from Julie Hutchins, Seattle Public Utilities, to Fran Haertel, US EPA OGWDW, October 13, 1998.

34 See notes 2 and 32.

35 Letter from Lynn Kirby, Water Quality Engineer, SPU, to Robert James, Regional Engineer, NW Drinking Water Operations, January 2, 2001.

36 See note 11.

37 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 where the water system is aware of the pollution source, the rules require that polluters be identified.

38 See note 12.

39 Letter from Lyn Faas, regulatory compliance manager, SPU, to Erik Olson, NRDC, June 6, 2001.

40 Ibid. See also SPU, “Cedar River Watershed,” www.ci.seattle.wa.us/util/cedarwatershed, and SPU, “South Fork Tolt River,” www.ci.seattle.wa.us/util/watershed/tolt/default.htm.

41 See note 12.

42 See Ibid, and notes 39 and 40.

43 See note 11.

44 See notes 10–12.

45 See note 12.