

CRS Report for Congress

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Safe Drinking Water Act: Issues in the 109th Congress

July 17, 2006

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Summary

In the 109th Congress, key drinking water issues have involved water infrastructure funding and problems caused by specific contaminants, such as the gasoline additive methyl tertiary butyl ether (MTBE), perchlorate, and lead in drinking water. Congress last reauthorized the Safe Drinking Water Act (SDWA) in 1996, and although funding authority for most SDWA programs expired in FY2003, reauthorization bills have not been proposed, as the Environmental Protection Agency (EPA), states, and water systems remain focused on implementing the requirements of the 1996 amendments.

One SDWA amendment has been enacted in the 109th Congress. The Energy Policy Act of 2005, Section 322, amended SDWA to preclude the EPA from regulating the injection of any fluids, except diesel fuel, into underground sources of drinking water for hydraulic fracturing purposes related to oil, gas, and geothermal production.

Congress also has considered legislation to address concerns about drinking water contamination by perchlorate, the key ingredient in solid rocket fuel. The House passed H.R. 18 and H.R. 186, which would establish groundwater remediation programs in California, where most perchlorate contamination has been identified. Other bills would direct the EPA to issue a SDWA standard for perchlorate.

The 107th Congress added drinking water security provisions to the SDWA in the Bioterrorism Preparedness Act. The act required community water systems to conduct vulnerability assessments and prepare emergency plans, and it called for drinking water security research. In the 109th Congress, several bills, including a reported bill, S. 2145, would add further water security requirements for certain water systems.

An overriding SDWA issue involves the cumulative cost and complexity of drinking water standards and the ability of water systems, especially small systems, to comply with standards. The issue of the affordability of drinking water standards, such as the new arsenic standard, has merged with the larger debate over the federal role in assisting communities with financing drinking water infrastructure.

Congress authorized a drinking water state revolving fund (DWSRF) program in 1996 to help communities finance projects needed to comply with drinking water standards. For FY2006, Congress provided \$837.5 million for this program. However, studies show that a large funding gap exists and could continue to grow as SDWA requirements increase and infrastructure ages. The Senate Environment and Public Works Committee has reported S. 1400, the Water Infrastructure Financing Act, to authorize increased funding for the DWSRF and parallel wastewater programs, and to provide grant assistance for small communities. Several other bills would establish a grant program to help small communities comply with drinking water standards and provide greater compliance flexibility for small water systems. This report, which will be updated as warranted, replaces CRS Issue Brief IB10118, *Safe Drinking Water Act: Implementation and Issues*, by Mary Tiemann.

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Most Recent Developments

After amending the Safe Drinking Water Act in the first session,¹ Congress has addressed drinking water quality issues in the second session primarily through the appropriations process. On May 18, the House passed H.R. 5386 (H.Rept. 109-465), the Department of Interior, Environment, and Related Agencies Appropriations Act for FY2007, which includes funding for the Environmental Protection Agency (EPA). The House bill would provide, as requested, \$841.5 million for the drinking water state revolving fund (DWSRF) program to provide financial assistance to help public water systems comply with drinking water standards. On June 29, the Senate Committee on Appropriations reported their version of H.R. 5386 (S.Rept. 109-275), which also contained \$841.5 million for the DWSRF program, \$4 million more than FY2006 funding. The Senate-reported bill would require the EPA to make available at least \$11 million for small water system compliance assistance (specifically, at least \$5.5 million for alternative technology projects to help small systems comply with the disinfection byproducts [DBP] rules and related regulations, and at least \$5.5 million for a competitive grant program to provide technical assistance to help small systems comply with these the regulations for DBPs arsenic rule).

Introduction

The Safe Drinking Water Act (SDWA)² is the key federal law for protecting public water supplies from harmful contaminants. First enacted in 1974 and broadly amended in 1986 and 1996, the act is administered through programs that regulate contaminants in public water supplies, provide funding for infrastructure projects, protect sources of drinking water, and promote the capacity of water systems to comply with SDWA regulations. The 1974 law established the federal-state structure in which states and tribes may be delegated primary enforcement and implementation authority (primacy) for the drinking water program by the EPA, which is the federal

¹ The Energy Policy Act of 2005 (P.L. 109- 58, Section 322) amended SDWA §1421(d) to preclude the EPA from regulating the injection of any fluids, except diesel fuel, into underground sources of drinking water for hydraulic fracturing purposes related to oil, gas, and geothermal production. Responding to a court ruling, the EPA had required the state of Alabama to regulate underground injection of fluids for hydraulic fracturing purposes (specifically, coalbed methane production) under its SDWA underground injection program. For more information, see CRS Report RL32873, *Key Environmental Issues in the Energy Policy Act of 2005 (P.L. 109-58, H.R. 6)*, coordinated by Brent D. Yacobucci.

² Title XIV of the Public Health Service Act (42 U.S.C. 300f-300j-26).

agency responsible for administering the law. The state-administered Public Water Supply Supervision (PWSS) program remains the basic program for regulating public water systems, and the EPA has delegated primacy for this program to all states, except Wyoming and the District of Columbia (which SDWA defines as a state); the EPA has responsibility for implementing the PWSS program in these two jurisdictions.

Congress passed the SDWA in 1974, after a nationwide study of community water systems revealed widespread water quality problems and health risks resulting from inadequate facilities, poor operating procedures, and poor management of water supplies in communities of all sizes. Much progress has been made since then, and 91 drinking water contaminants are now regulated. In 2004, the EPA reported that the population served by community water systems that met all health-based standards increased from 83% in 1994 to 91% in 2002.³ Nonetheless, drinking water safety concerns and challenges remain. The EPA and state enforcement data indicate that water systems still incur tens of thousands of violations of SDWA requirements each year. These violations primarily involve monitoring and reporting requirements, but also include thousands of violations of standards and treatment techniques. Moreover, monitoring and reporting violations create uncertainty as to whether systems actually met the applicable health-based standards. Concern also exists over the potential health effects of contaminants for which standards have not been set, such as perchlorate and methyl tertiary butyl ether (MTBE), and the act requires the EPA to continually evaluate unregulated contaminants that may be candidates for regulation.

The 1996 SDWA Amendments

The 104th Congress made numerous changes to the act with the SDWA Amendments of 1996 (P.L. 104-182), culminating a multiyear effort to amend a law that was widely criticized as having too little flexibility, too many unfunded mandates, and an arduous but unfocused regulatory schedule. Among the key provisions, the 1996 amendments authorized a drinking water state revolving loan fund (DWSRF) program to help public water systems finance projects needed to comply with SDWA rules. The amendments also established a process for selecting contaminants for regulation based on health risk and occurrence, gave the EPA some added flexibility to consider costs and benefits in setting most new standards, and established schedules for regulating certain contaminants (such as *Cryptosporidium*, disinfection byproducts, arsenic, and radon). The law added several provisions aimed at building the capacity of water systems (especially small systems) to comply with SDWA regulations; it also imposed many new requirements on the states, including programs for source water assessment, operator certification and training, and compliance capacity development. The amendments also required that community water suppliers provide customers with annual “consumer confidence reports” that provide information on regulated contaminants found in the local

³ U.S. Environmental Protection Agency, *Providing Safe Drinking Water in America: 2002 National Public Water Systems Compliance Report*, EPA 305-R-04-001, December 2004, 96 p.

drinking water. The law authorized appropriations for most SDWA programs through FY2003, and although funding authority generally has expired, broad reauthorization bills have not been proposed, as the EPA, states, and public water systems remain focused on implementing and complying with the requirements of the 1996 amendments.

Regulated Public Water Systems

Federal drinking water regulations apply to some 159,000 privately and publicly owned water systems that provide piped water for human consumption to at least 15 service connections or that regularly serve at least 25 people. (The law does not apply to private residential wells.) Of these systems, 52,838 are *community water systems* (CWSs) that serve a total residential population of roughly 272 million year-round. All federal regulations apply to these systems. (Roughly 15% of community systems are investor-owned.) Nearly 18,650 public water systems are *non-transient, non-community water systems* (NTNCWSs), such as schools or factories, that have their own water supply and serve the same people for more than six months but not year-round. Most drinking water requirements apply to these systems. Another 84,740 systems are *transient non-community water systems* (TNCWSs) (e.g., campgrounds and gas stations) that provide their own water to transitory customers. TNCWSs generally are required to comply only with regulations for contaminants that pose immediate health risks (such as microbial contaminants), with the proviso that systems that use surface water sources must also comply with filtration and disinfection regulations.

Of the 52,838 community water systems, roughly 84% serve 3,300 or fewer people. While large in number, these systems provide water to just 9% of the population served by all community systems. In contrast, 8% of community water systems serve more than 10,000 people, and they provide water to 81% of the population served. Fully 85% (16,545) of non-transient, non-community water systems and 97% (84,740) of transient noncommunity water systems serve 500 or fewer people. These statistics give some insight into the scope of financial, technological, and managerial challenges many public water systems face in meeting a growing number of complex federal drinking water regulations. **Table 1** provides statistics for community water systems.

Table 1. Size Categories of Community Water Systems

System size (population served)	Number of community water systems	Population served (millions)	Percentage of community water systems	Percentage of population served
Very small (25-500)	30,006	4.96	57%	2%
Small (501-3,300)	14,212	20.14	27%	7%
Medium (3,301-10,000)	4,707	27.35	9%	10%
Large (10,001-100,000)	3,541	99.81	7%	37%
Very large (>100,000)	372	120.25	1%	44%
Total	52,838	272.5	100%	100%

Source: Adapted from US Environmental Protection Agency, *Factoids: Drinking Water and Ground Water Statistics for 2004*, at [http://www.epa.gov/safewater/data/pdfs/data_factoids_2004.pdf].

Safe Drinking Water Issues

Various drinking water issues have received attention this Congress, including infrastructure funding needs; the capacity of public water systems, especially small systems, to comply with SDWA regulations; the security of water supplies; and contamination of drinking water by specific contaminants, including lead and unregulated contaminants such as MTBE and perchlorate. Although appropriations for most SDWA programs were authorized through FY2003, SDWA reauthorization has not been on the agenda in the 109th Congress. Rather, legislation has addressed specific drinking water issues, such as infrastructure funding and security, and contamination of water supplies by particular contaminants, such as lead, MTBE, and perchlorate. As with other EPA-administered statutes having expired funding authority, Congress continues to appropriate funds for SDWA programs.

Regulating Drinking Water Contaminants

Standard-Setting. The Safe Drinking Water Act directs the EPA to promulgate a National Primary Drinking Water Regulation for a contaminant if the Administrator determines that (1) it may have adverse health effects, (2) it is likely to be present in public water systems with a frequency and at levels of public health concern, and (3) its regulation presents a meaningful opportunity for health risk reduction. The regulations generally include numerical standards that establish the highest level of a contaminant that may be present in water supplied by public water systems. Where it is not economically or technically feasible to measure a contaminant at very low concentrations, the EPA may establish a treatment technique in lieu of a standard.

Developing a drinking water regulation is a complex process, and the EPA must address a variety of technical, scientific, and economic issues. The agency must (1) determine the extent of occurrence of a contaminant in sources of drinking water; (2) evaluate the potential human exposure and risks of adverse health effects to the general population and to sensitive subpopulations; (3) ensure that analytical methods are available for water systems to use in monitoring for a contaminant; (4) evaluate the availability and costs of treatment techniques that can be used to remove a contaminant; and (5) assess the impacts of a regulation on public water systems, the economy, and public health. Regulation development typically is a multiyear process. The EPA may expedite procedures and issue interim standards to respond to urgent threats to public health.

After reviewing health effects studies, the EPA sets a nonenforceable maximum contaminant level goal (MCLG) at a level at which no known or anticipated adverse health effects occur and that allows an adequate margin of safety. The EPA also considers the risk to sensitive subpopulations, such as infants and children. For carcinogens and microbes, the EPA generally sets the MCLG at zero. Because MCLGs are based only on health effects and not on analytical detection limits or the availability or cost of treatment technologies, they may be set at levels that are not feasible for water systems to meet.

Once the MCLG is established, the EPA then sets an enforceable standard, the maximum contaminant level (MCL). The MCL generally must be set as close to the MCLG as is “feasible” using the best technology or other means available, taking costs into consideration (SDWA §1412(b))⁴. The EPA has relied on legislative history to determine the meaning of “feasible.” Most recently, the Senate report accompanying the 1996 amendments stated that “feasible” means the level that can be reached by large, regional drinking water systems applying best available treatment technology. The Senate committee explained that this approach is used because 80% of the population receives its drinking water from large community water systems, and thus, safe water can be provided to most of the population at very affordable costs.⁵

However, because standards are based on cost considerations for large systems, Congress expected that standards could be less affordable for smaller systems. An issue in the 1996 reauthorization debate concerned whether the costs of some standards were justified, given their estimated risk-reduction benefits. As amended, the act now requires the EPA, when proposing a standard, to publish a determination as to whether or not the benefits of a proposed standard justify the costs. If the EPA determines that the benefits do not justify the costs, the EPA, in certain cases, may promulgate a standard that is less stringent than the feasible level and that “maximizes health risk reduction benefits at a cost that is justified by the benefits.”⁶

Recent and Pending Rules. The EPA’s recent rulemaking activities include a January 4, 2006, rule package (71 *Federal Register* 387) that expands existing requirements to control pathogens (especially *Cryptosporidium*) and disinfectants (e.g., chlorine) and their byproducts (e.g., chloroform). These rules, the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule) and the Stage 2 Disinfectant and Disinfection Byproduct Rule (Stage 2 DBP) complete a series of statutorily mandated rules the EPA has promulgated that impose increasingly strict controls on the presences of pathogens and disinfectants and their byproducts in water systems⁷. The EPA also has promulgated rules for several radionuclides, including revised radium standards (effective December 2003) and a revised standard for arsenic (effective January 2006). These regulations potentially can impose

⁴ For a more detailed discussion, see CRS Report RL31243, *Safe Drinking Water Act: A Summary of the Act and Its Major Requirements*, by Mary Tiemann.

⁵ SDWA does not discuss how the EPA should consider cost in determining feasibility; thus, the EPA has relied on legislative history for guidance. Congress most recently expressed its view on this matter in the Senate report accompanying the 1996 Amendments. The report states that “[f]easible means the level that can be reached by large regional drinking water systems applying best available treatment technology.... This approach to standard setting is used because 80% of the population receives its drinking water from large systems and safe water can be provided to this portion of the population at very affordable costs.”(U.S. Senate. *Safe Drinking Water Amendments Act of 1995*, Report of the Committee on Environment and Public Works on S. 1316. S.Rept. 104-169. p. 14. Nov. 7, 1995.) (Approximately 80% of the population is served by community water systems that serve a population of 10,000 or more.)

⁶ SDWA §1412(b)(6); 42 U.S.C. 300g-1.

⁷ Information on the rules can be found at [<http://www.epa.gov/safewater/disinfection>].

significant new costs on those water systems that must adopt new treatment techniques to comply with the new requirements. (See discussion below on small system compliance issues.)

In July 2006, the EPA submitted for publication in the *Federal Register* a revised Lead and Copper Rule. The EPA is proposing the revisions to address weaknesses identified during a review of that rule, following the discovery of high lead levels in Washington, DC, tap water in 2004.⁸ In addition, the EPA has nearly completed a rulemaking to establish disinfection requirements for systems relying on ground water. Expected in August 2006, the Groundwater Rule is intended to protect against fecal bacteria contamination in these systems. The EPA also expects to promulgate a radon rule in late 2006, and is evaluating numerous contaminants, including perchlorate and MTBE, for possible regulation.

Perchlorate. The key ingredient of solid rocket fuel, perchlorate is used heavily by the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), and related industries. It is also used in road flares, fireworks, and a variety of other products. This highly soluble and persistent compound has long been disposed of on the ground and has been detected in sources of drinking water that serve more than 11 million people, usually at low levels. Perchlorate is known to disrupt the uptake of iodine in the thyroid, potentially affecting thyroid function. A key concern is that, if sufficiently severe, impaired thyroid function in pregnant women can impair brain development in fetuses and infants.

The EPA identified perchlorate as a candidate for regulation in 1998 but concluded that information was insufficient at that time to make a regulatory determination. The EPA listed perchlorate as a priority for further research on health effects and treatment technologies, and for collecting occurrence data. In 2002, the EPA issued a controversial draft risk assessment for perchlorate that concluded that potential human health risks of perchlorate exposure include effects on the developing nervous systems and thyroid tumors. The findings were based on rat studies that observed benign tumors and adverse effects in fetal brain development. The draft assessment included a revised draft reference dose (RfD) intended to protect the most sensitive groups against these effects. That dose roughly translated to a drinking water standard of 1 part per billion (ppb). The EPA's 1999 draft level had translated to a standard of roughly 32 ppb.

Because an RfD provides the basis for determining the level at which a drinking water standard is set, and because these standards are, in turn, the basis of environmental cleanup standards, DOD and other perchlorate users and manufacturers have followed the EPA's perchlorate risk assessment efforts closely. Interagency debate over the draft assessment persisted, and in March 2003, the EPA, the DOD, NASA, and other federal agencies asked the National Research Council (NRC) to review the science for perchlorate and the EPA's draft risk assessment.

⁸ The proposed rule and further information on the Lead and Copper Rule and the EPA's review of the rule are available at [<http://www.epa.gov/safewater/lcrmr/index.html>].

The NRC released its study in January 2005.⁹ The NRC committee broadly agreed with several of the EPA's findings; however, the committee suggested several changes to the draft risk assessment. Among other findings, the committee noted that, unlike rats, humans have multiple mechanisms to compensate for iodide deficiency and thyroid disorders, and that studies of rats are of limited use for assessing human health risk associated with perchlorate exposure. The committee recommended that the EPA base its assessment on human data. The NRC calculated an RfD for perchlorate that incorporates an uncertainty factor to protect the most sensitive populations. This RfD would translate to a drinking water equivalent level of 24.5 ppb. (If the EPA were to develop an MCL, the agency would likely lower this number to reflect the amount of perchlorate exposure that the EPA determines comes from other sources, especially food.) The EPA has adopted the NRC's recommended RfD but has not decided whether to set a standard for perchlorate.¹⁰

In the 109th Congress, the House has passed two bills that address perchlorate-contaminated groundwater in California: H.R. 186 would authorize the Secretary of the Interior to make grants to the Santa Clara Valley Water District for groundwater remediation projects, and H.R. 18 would authorize grants for local water authorities within the Santa Anna River watershed. The National Defense Authorization Act for 2007, H.R. 5122, as passed the House, would require the Secretary of Defense to report to Congress a study of the scope of perchlorate contamination at Formerly Used Defense Sites. Among other bills that have been introduced, H.R. 3053 would authorize the restoration of perchlorate-contaminated groundwater in Eastern Santa Clara River Basin. Companion bills H.R. 4798/S. 2298 would authorize grants for remediating California water supplies and sources contaminated by perchlorate, authorize grants for developing perchlorate cleanup technologies, and express the sense of Congress that the EPA should set a drinking water standard for perchlorate. H.R. 213 would require the EPA to set a standard by July 31, 2007. As passed the House, the National Defense Authorization Act for FY2007 (H.R. 5122) would require the Secretary of Defense to report to Congress the results of a study of the scope of perchlorate contamination at Formerly Used Defense Sites.

Lead in Drinking Water. Lead from various sources (including paint in older homes, soil, and water) poses one of the main environmental threats to children's health. The EPA has long regulated lead in drinking water, and last revised the regulation for lead in 1991. In early 2004, the issue of lead contamination reemerged after water monitoring revealed high amounts of lead in tap water in Washington, DC. In response to this event, the EPA undertook a national review of lead monitoring by water systems to determine whether the problem in the District was widespread. In October 2004, the EPA announced that the national data from 73,000 water utilities indicated that lead in drinking water was not a widespread problem.

However, the EPA also assessed national compliance with the lead rule and began reviewing the rule to determine whether major changes were needed.

⁹ National Research Council, *Health Implications of Perchlorate Ingestion*, Board on Environmental Studies and Toxicology, National Academies Press, January 2005, 177 p.

¹⁰ For further discussion, see CRS Report RS21961, *Perchlorate Contamination of Drinking Water: Regulatory Issues and Legislative Actions*, by Mary Tiemann.

Elements of the rule that received most scrutiny included the public notification, monitoring, and lead service line replacement requirements. The EPA found monitoring and public notification deficiencies in the rule, and in November 2004, the EPA issued a guidance memo to clarify sampling requirements for public water systems. The EPA also revised its 1994 guidance on testing for lead in school drinking water. In March 2005, the EPA initiated a Drinking Water Lead Reduction Plan, based on its review of the lead rule. Under the plan, the EPA outlined a proposal to tighten and clarify monitoring and public notification requirements, and to revise treatment and lead service line replacement requirements. In July 2006, the EPA formally proposed changes to the lead rule.¹¹

Methyl Tertiary Butyl Ether (MTBE). This gasoline additive has been widely used to meet the Clean Air Act requirement that reformulated gasoline (RFG) contain at least 2% oxygen to improve combustion. RFG is required for use in areas that fail to meet the federal ozone standard and are classified as “severe” or “extreme” nonattainment. However, numerous incidents of water contamination by MTBE prompted calls for restrictions on MTBE’s use. At least 25 states, including California and New York, have enacted limits or phase-outs of the additive. The EPA has not developed a drinking water standard for MTBE, but at least seven states have set their own MTBE standard.

The primary source of MTBE in drinking water has been petroleum releases from leaking underground storage tank (UST) systems. Once released, MTBE moves through soil and into water more rapidly than other gasoline components, thus making it more likely to reach drinking water sources. The EPA estimates that UST leaks involving MTBE can be two to four times more costly to clean up than conventional gasoline leaks, which generally cost from \$100,000 to \$125,000 to remediate.

Because of data gaps, the EPA has not issued a health advisory or drinking water standard for MTBE; however, the EPA’s Office of Research and Development concluded in 1993 that the inhalation evidence would support classifying MTBE as a “possible human carcinogen.”¹² In 1997, the EPA issued a drinking water advisory for MTBE based on consumer acceptability (for taste and smell), because even small amounts of MTBE can render water undrinkable because of its strong taste and odor. Advisories provide information on contaminants that are not regulated under SDWA. They are not enforceable, but provide guidance to water suppliers and others regarding potential health effects or consumer acceptability. Although the MTBE advisory is not based on health effects, the EPA stated at that time that keeping MTBE levels in the range of 20-40 parts per billion or lower for consumer

¹¹ For further discussion of this issue, see CRS Report RS21831, *Lead in Drinking Water: Washington, DC, Issue and Broader Regulatory Implications*, by Mary Tiemann.

¹² U.S. Environmental Protection Agency, *Health Risk Perspectives on Fuel Oxygenates*, Office of Research and Development, the EPA 600/R-94/217, 1994, p. 8. See also *Assessment of Potential Health Risks of Gasoline Oxygenated with Methyl Tertiary Butyl Ether (MTBE)*, the EPA/600/R-93/206, 1993, [<http://www.epa.gov/ncea/pdfs/mtbe/gasmte.pdf>].

acceptability reasons would also provide a large margin of safety from potential adverse health effects.

The EPA has taken steps that could lead to the issuance of a drinking water standard for MTBE. In 1998, the EPA included MTBE on a list of contaminants that are potential candidates for regulation. Compounds on the contaminant candidate list are categorized as regulatory determination priorities, research priorities, or occurrence priorities. The EPA placed MTBE in the category of contaminants for which further occurrence data collection and health effects research are priorities. Thus, although the EPA did not select MTBE for regulation, the agency planned to pursue research to fill data gaps so that a regulatory determination may be made. However, most current MTBE research is focused on inhalation risks, and very little research is being done specifically to assess the risks of exposure to MTBE via drinking water. The next round of regulatory determinations is scheduled for August 2006.

Congress responded to MTBE contamination concerns in the Energy Policy Act of 2005 (P.L. 109-58, H.R. 6). Title XV, Subtitle B, of the act is the “Underground Storage Tank Compliance Act,” which adds new leak prevention provisions to the UST regulatory program under the Solid Waste Disposal Act. It authorizes an appropriation of \$200 million from the Leaking Underground Storage Tank (LUST) Trust Fund annually for six years, specifically for addressing petroleum tank leaks involving MTBE or renewable fuels (e.g., ethanol) and another \$200 million annually for six years for the EPA and states to administer the general leaking petroleum tank cleanup program. These provisions authorize the EPA and states to use LUST funds to enforce the new leak prevention provisions and authorize Trust Fund appropriations for this purpose. However, the act’s motor fuels tax language (which extends the LUST Trust Fund tax through March 2011) prohibits the use of the trust fund for any new purposes. P.L. 109-58 does not ban MTBE, but it removes the Clean Air Act requirement that reformulated gasoline contain oxygenates, which prompted greater use of MTBE. A Senate provision authorizing the EPA to regulate the sale a motor fuel or additive if it caused water pollution also was dropped in conference.¹³

Of major concern to drinking water suppliers was the House version of H.R. 6, which included a retroactive “safe harbor” provision to prohibit products liability lawsuits, alleging manufacturing or design defects, against producers of fuels containing MTBE and renewable fuels. The provision would not have affected other liability (such as liability for cleanup costs or negligence for spills). With liability ruled out for design defects, manufacturing defects, and failure to warn of hazardous products, MTBE manufacturers would likely be more difficult to reach under these

¹³ For details, see CRS Report RL32865, *Renewable Fuels and MTBE: A Comparison of Selected Provisions in the Energy Policy Act of 2005 (H.R. 6)*, by Brent D. Yacobucci et al.; CRS Report RS21201, *Leaking Underground Storage Tanks: Program Status and Issues*, by Mary Tiemann; and CRS Report RL32787, *MTBE in Gasoline: Clean Air and Drinking Water Issues*, by James E. McCarthy and Mary Tiemann.

other bases of liability.¹⁴ The safe harbor provision was opposed by many states, local government organizations, and water suppliers. Opponents argued that a products liability shield would effectively leave gas station owners liable for cleanup, and because these businesses often have few resources, the burden for cleanup would fall to communities, water systems, the states, and private well owners. Proponents argued that a liability safe harbor was merited, given that MTBE has been used to meet federal Clean Air Act mandates, and that the key problem was leaking tanks, not MTBE. The Senate bill included a safe harbor for renewable fuels but not MTBE, and it was not retroactive. Unable to work out a broadly acceptable compromise, conferees dropped the safe harbor provision from the legislation. Although the MTBE ban also was dropped from the legislation, the use of MTBE is expected to decline as the act did repeal the oxygenate requirement, effective nationwide in May 2006.

Drinking Water Infrastructure Funding

Drinking Water State Revolving Fund. A persistent SDWA issue concerns the ability of public water systems to upgrade or replace infrastructure to comply with federal drinking water regulations and, more broadly, to ensure the provision of a safe and reliable water supply. In the 1996 SDWA Amendments, Congress responded to growing complaints about the act's unfunded mandates and authorized a drinking water state revolving loan fund (DWSRF) program to help water systems finance infrastructure projects needed to meet drinking water standards and address the most serious health risks. The program authorizes the EPA to award annual capitalization grants to states. States then use their grants (plus a 20% state match) to provide loans and other assistance to public water systems. Communities repay loans into the fund, thus making resources available for projects in other communities. Eligible projects include installation and replacement of treatment facilities, distribution systems, and certain storage facilities. Projects to replace aging infrastructure are eligible if they are needed to maintain compliance or to further public health protection goals.

Authorizations of appropriations for the DWSRF program totaled \$9.6 billion, including \$1 billion for each of FY1995 through FY2003. Congress has provided nearly \$8.6 billion for this program, including roughly \$843 million for FY2005 and \$837.5 million for FY2006 (after applying two rescissions of 0.474% and 1%). For FY2007, the President requested \$841.5 million for this program, and the House and the Senate Committee on Appropriations each have approved this amount.

Through June 2005, the EPA had awarded \$6.56 billion in capitalization grants, which, when combined with the state match, bond proceeds, and other funds, amounted to \$12.4 billion in DWSRF funds available for loans and other assistance. Also through June 2005, 7,912 projects received assistance, and total assistance provided by the program reached \$9.44 billion.¹⁵

¹⁴ For a discussion of legal issues, see CRS Report RS21676, *The Safe Harbor Provision for Methyl Tertiary Butyl Ether (MTBE)*, by Aaron M. Flynn.

¹⁵ See also CRS Report RS22037, *Drinking Water State Revolving Fund: Program Overview* (continued...)

Funding Issues. The DWSRF program is well regarded, but many organizations and state and local officials argue that greater investment in water infrastructure is needed. The EPA's 2003 drinking water infrastructure needs survey concluded that systems need to invest \$276.8 billion in infrastructure improvements over 20 years to comply with drinking water regulations and to ensure the provision of safe water.¹⁶ The survey includes funds needed for compliance with several recent rules (including the arsenic rule and the disinfectants and disinfection byproducts rules) and several proposed rules (e.g., radon). The survey also identified \$1 billion in security-related needs. All infrastructure projects in the needs assessment promote the health objectives of the act, but only \$45.1 billion (16.3%) of the total need is attributable to SDWA compliance. Of this amount, \$35.2 billion is needed to address existing regulations, and \$30.2 billion (86%) is needed for projects to address microbiological contamination. Nearly two-thirds of the need (\$183.6 billion) is for transmission and distribution projects. Although aging, deteriorated infrastructure often poses a threat to drinking water safety, these needs are largely unrelated to federal mandates.

A related issue is the need for communities to address infrastructure costs that are outside the scope of the DWSRF program and generally ineligible for such assistance. Ineligible categories include future growth, ongoing rehabilitation, and system operation and maintenance. Often, these basic infrastructure costs far exceed SDWA compliance costs.

In 2002, the EPA issued its municipal wastewater and drinking water infrastructure funding gap analysis, which identified potential funding gaps between projected needs and spending from 2000 through 2019.¹⁷ This analysis estimated the potential 20-year funding gap for drinking water and wastewater infrastructure capital and operations and maintenance (O&M), based on two scenarios: a "no revenue growth" scenario and a "revenue growth" scenario that assumed spending on infrastructure would increase 3% per year. Under the "no revenue growth" scenario, the EPA projected a funding gap for drinking water capital investment of \$102 billion (roughly \$5 billion per year) and an O&M funding gap of \$161 billion (\$8 billion per year). Using revenue growth assumptions, the EPA estimated a 20-year capital funding gap of \$45 billion (\$2 billion per year), and no gap for O&M. In response to the Gap Analysis, the EPA's FY2004 budget request proposed that funding for the DWSRF program be continued at a level of \$850 million annually through FY2018. The EPA's budget justification explained that this funding level would allow DWSRFs to revolve at a cumulative level of \$1.2 billion (more than double the previous goal of \$500 million) and would help close the funding gap for drinking water infrastructure needs.

¹⁵ (...continued)

and *Issues*, by Mary Tiemann.

¹⁶ U.S. Environmental Protection Agency, *Drinking Water Infrastructure Needs Survey and Assessment: Third Report to Congress*, June 2005, EPA 816-R-05-001, available at [<http://www.epa.gov/safewater/needssurvey/index.html>].

¹⁷ U.S. Environmental Protection Agency, *The Clean Water and Drinking Water Infrastructure Gap Analysis Report*, Report No. EPA 816-R-02-020, September 2002, 50 p.

Other assessments also have revealed a funding gap. In 2000, the Water Infrastructure Network (WIN) (a coalition of state and local officials, water providers, environmental groups and others) reported that over the next 20 years, water and wastewater systems need to invest \$23 billion annually more than current investments to meet SDWA and Clean Water Act health and environmental priorities and to replace aging infrastructure. WIN and other groups have proposed multibillion dollar investment programs for water infrastructure. Others, however, have called for more financial self-reliance within the water sector.

Water infrastructure funding issues have received attention in the 109th Congress. The Senate Environment and Public Works Committee has reported S. 1400, the Water Infrastructure Financing Act (S. Rept 109-186). This bill would amend SDWA and the Clean Water Act to reauthorize both SRF programs (authorizing \$15 billion over five years for the DWSRF). It also would direct the EPA to establish grant programs for small or economically disadvantaged communities for critical drinking water and water quality projects; authorize loans to small systems for preconstruction, short-term, and small project costs; and direct the EPA to establish a demonstration program to promote new technologies and approaches to water quality and water supply management. At markup, the committee adopted an amendment to apply Davis-Bacon prevailing wage requirements, in perpetuity, to projects receiving DWSRF assistance. Action on similar legislation in the 108th Congress was stalled largely by such an amendment. The Davis-Bacon measure remains contentious, and further action on S. 1400 is uncertain.

In the face of uncertainty over increased federal assistance for water infrastructure, the EPA, states, communities, and utilities have been examining alternative management and financing strategies to address SDWA compliance costs and broader infrastructure maintenance and repair costs. Strategies include establishing public-private partnerships (privatization options range from contracting for services to selling system assets), improving asset management, and adopting full-cost pricing for water services.¹⁸

Drinking Water Security

Congress addressed several drinking water security issues in the Bioterrorism Preparedness Act of 2002 (P.L. 107-188, H.Rept. 107-481), which amended SDWA to require community water systems to conduct vulnerability assessments and prepare emergency response plans (new SDWA section 1433). The act also added sections 1434 and 1435, directing the EPA to review methods by which terrorists or others could disrupt the provision of safe water supplies and to review methods for preventing, detecting, and responding to disruptions. Introduced in July 2005, S. 1426 would reauthorize appropriations for sections 1434 and 1435 and require the EPA to report to Congress on progress and problems with their implementation.

¹⁸ For further discussion of infrastructure issues, see CRS Report RL31116, *Water Infrastructure Needs and Investment: Review and Analysis of Key Issues*, by Claudia Copeland and Mary Tiemann.

A key provision of the Bioterrorism Preparedness Act required each community water system serving more than 3,300 individuals to assess their vulnerability to terrorist attacks and other intentional acts to disrupt the provision of a safe and reliable water supply. Combined, these systems serve more than 90% of the population served by community water systems. The law required these systems to certify to the EPA that they conducted a vulnerability assessment and to provide the EPA with a copy of the assessment. The law also required the systems to prepare or revise emergency response plans incorporating the results of the assessments no later than six months after completing them. **Table 2** outlines the deadlines by which utilities had to submit their assessments to the EPA and complete emergency response plans.

The Bioterrorism Act authorized \$160 million for FY2002, and sums as may be needed for FY2003 through FY2005 to provide financial assistance to community water systems to assess vulnerabilities, prepare response plans, and address security enhancements and significant threats. The emergency supplemental appropriations for FY2002 (P.L. 107-117) provided \$90 million for assessing the vulnerabilities of drinking water utilities and security planning, and \$5 million for state grants for assessing drinking water safety. In FY2002, the EPA awarded roughly \$53 million in grants to help the largest systems complete vulnerability assessments by the March 31, 2003, deadline. Essentially all systems met that deadline.

Table 2. Community Water System Requirements Under the Bioterrorism Preparedness Act of 2002

System size by population (approx. no. of systems)	Vulnerability assessments due dates	Emergency response plans due dates
100,000 or more (425)	March 31, 2003	September 30, 2003
50,000 - 99,999 (460)	December 31, 2003	June 30, 2004
3,301 - 49,999 (7,500)	June 30, 2004	December 31, 2004

Federal grants were not available for smaller systems covered by the Bioterrorism Act's requirements. Instead, the EPA, states, and water organizations have provided vulnerability assessment tools, guidance documents, training, and technical assistance to support security enhancement efforts among these systems. Similar assistance also has been provided for the remaining 84% of community water systems that serve 3,300 or fewer and were not required to do vulnerability assessments and emergency planning.

For FY2003, the EPA requested \$16.9 million for vulnerability assessments for small and medium-sized systems and \$5 million for state water security coordinators to work with the EPA and utilities in assessing water security. P.L. 108-7 included this amount, plus \$2 million for the National Rural Water Association to help small systems with vulnerability assessments, and \$1 million to the American Water Works Association to provide security training.

For FY2004, the EPA requested and received \$32.4 million for critical water infrastructure protection, including \$5 million for state water security coordination

grants. This funding supported states' efforts to work with water and wastewater systems to develop and enhance emergency operations plans; conduct training in the implementation of remedial plans in small systems; and develop detection, monitoring, and treatment technology to enhance water security. The EPA used funds to assist the nearly 8,000 community water systems that serve water to populations between 3,300 and 100,000 and are subject to the Bioterrorism Act.

For FY2005, the EPA requested \$5 million for state water security grants and \$6.1 million for other critical infrastructure protection efforts (including \$2 million for the Water Information Sharing and Analysis Center, which shares sensitive security information with water systems). The EPA noted that the \$21.3 million reduction reflected a shift in priorities from assistance for vulnerability assessments. In P.L. 108-447, Congress provided the requested amount.

The President requested \$5 million for state water security grants for FY2006. The request also included \$44 million for the Water Sentinel Program. The EPA proposed this water security initiative in response to its water security responsibilities under Homeland Security Presidential Directive (HSPD) 7. Consistent with the Bioterrorism Act, HSPD 7 designates the EPA as the lead agency for water infrastructure security. The goal of the Water Sentinel initiative is to establish pilot early warning systems in several cities through water monitoring and surveillance for chemical and biological contaminants, and to build the analytical capacity to support the surveillance program. For this initiative, the EPA's FY2006 appropriations act (P.L. 109-54) included \$8.1 million, after rescissions. In H.Rept. 109-80, the House Appropriations Committee urged the EPA to develop clear goals for the Water Sentinel program and justify the request more clearly for FY2007. Congress also provided \$5 million (\$4.93 after rescissions) for state water security grants.

The FY2007 budget request includes \$4.95 million for state water security grants. In addition, the request again includes a significant amount, \$41.7 million, for the Water Sentinel Program (\$33.6 million more than Congress provided for FY2006). The EPA continues to argue that this program is an essential component of its water security activities, noting that its purpose is to demonstrate an effective contamination warning system that could be adopted by drinking water utilities of various sizes.¹⁹ The EPA FY2007 funding bill, H.R. 5386, as passed by the House, would provide \$16.7 million, or \$25 million less than requested for the Water Sentinel Program. The Senate committee would provide \$18.13 million, which is \$23.6 million less than requested, but \$10 million above the FY2006 enacted level.

Chemical Facility Security. Another issue receiving attention this Congress concerns the security of chemical facilities that are located where a terrorist attack could cause harm to nearby populations. Although the Bioterrorism Preparedness Act required community water systems to conduct vulnerability assessment and prepare emergency response plans, it did not require systems to address vulnerabilities they might have identified. A particular concern is the onsite storage of hazardous, gaseous chemicals that pose potential risks to local communities. S.

¹⁹ See also CRS Report RL31294, *Safeguarding the Nation's Drinking Water: The EPA and Congressional Actions*, by Mary Tiemann.

2855, introduced in May 2006, would amend SDWA to require community water treatment facilities to replace hazardous, gaseous chemicals with inherently safer technologies (e.g., switching from the use of chlorine gas to liquid chlorine). This legislation would require the EPA Administrator to provide grants to high-consequence facilities for use in paying capital expenditures needed to make the transition to the use of inherently safe technologies (IST). Both S. 1995 and S. 2781 would amend the Clean Water Act to address security at wastewater treatment facilities. S. 2781 was ordered to be reported in May 2006; this bill would not require adoption of IST.

Broader chemical facility security bills also have been offered in the 109th Congress that have implications for water utilities. These bills generally authorize the Secretary of the Department of Homeland Security (DHS) to regulate chemical facilities that pose certain risks, including certain water treatment plants. S. 2145, reported, as amended, by the Senate Homeland Security and Governmental Affairs Committee, and its companion bill, H.R. 4999, would direct the Secretary of DHS to issue rules designating chemical facilities subject to regulation, and to establish security performance standards that regulated facilities must meet. Facilities would be required to submit to DHS vulnerability assessments, security plans, and emergency response plans for terrorist incidents. H.R. 5695 shares several similarities with S. 2145 but would exempt water facilities that are covered by the bill from redundant requirements (such as conducting vulnerability assessments), unless DHS determined that more stringent security requirements were needed. S. 2486 would cover a wider range of facilities and establish a general duty to ensure that a facility is designed, operated, and maintained in safe manner. The bill defines this obligation to include use of inherently safer technology to the maximum extent practicable. H.R. 1562 would require consultation between DHS and the EPA, and focuses on stronger security and emergency planning measures, rather than requiring changes in technology. H.R. 2237 would expand the EPA's existing authority to oversee chemical facilities but would require consultation with DHS.

Several water and local government organizations, including the American Water Works Association (AWWA), have sought exemptions from S. 2145 and other bills that would give DHS authority to regulate water utilities that use hazardous chemicals (such as chlorine gas), noting that the EPA already has an established water security program and has been designated the lead agency for water infrastructure security. The AWWA further opposes bills that would require water utilities to switch treatment processes, without considering specific utility circumstances and local water and climate characteristics. Others argue that mandating the adoption of safer technologies is warranted because of the potential risk that hazardous chemicals, and particularly gaseous chlorine, may pose to communities.²⁰

²⁰ For a detailed discussion of issues and legislation, see CRS Report RL31530, *Chemical Facility Security*, by Linda-Jo Schierow.

Small Systems Issues

A key SDWA issue involves the financial, technical, and managerial capacity of small systems to comply with SDWA regulations. Some 84% (44,000) of the nation's 52,800 community water systems are small, serving 3,300 persons or fewer, and 57% (30,000) of the systems serve 500 persons or fewer. Many small systems face challenges in complying with SDWA rules and, more fundamentally, in ensuring the quality of water supplies. Major problems include deteriorated infrastructure, lack of access to capital, limited customer and rate base, inadequate rates, diseconomies of scale, and limited managerial and technical capabilities. Although these systems serve just 9% of the population served by community water systems, the sheer number of small systems has created challenges for policymakers.

In the earliest SDWA debates, Congress recognized that setting standards based on technologies affordable for large cities could pose problems for small systems. During the reauthorization debate leading up to the 1996 amendments, policymakers gave considerable attention to the question of how to help small systems improve their capacity to ensure consistent compliance with the SDWA. The 1996 amendments added provisions aimed at achieving this goal, including a requirement that states establish strategies to help systems develop and maintain the technical, financial, and managerial capacity to meet SDWA regulations. Congress also revised provisions on standard-setting (§1412(b)), variances (§1415(e)), and exemptions (§1416) to increase consideration of small system concerns.

Small System Variances. Since 1996, the SDWA has required the EPA, when issuing a regulation, to identify technologies that meet the standard and that are affordable for systems that serve populations of 10,000 or fewer. If the EPA does not identify "compliance" technologies that are affordable for these systems, then the EPA must identify small system "variance" technologies. A variance technology need not meet the standard, but must protect public health. States may grant variances to systems serving 3,300 persons or fewer if a system cannot afford to comply with a rule (through treatment, an alternative source of water, or other restructuring) and if the system installs a variance technology. With EPA approval, states also may grant variances to systems serving between 3,300 and 10,000 people.

To date, the EPA has determined that affordable compliance technologies are available for all drinking water regulations. Consequently, the agency has not identified any small system variance technologies, and no small system variances have been available. However, several recent rules (such as the arsenic and radium rules and the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP) have caused growing concern that the EPA is not using the tools Congress provided in the 1996 amendments to help small systems comply with SDWA regulations. As discussed below, the EPA currently is reevaluating its affordability criteria. Based on this reevaluation, the EPA may authorize states to grant small system variances for the Stage 2 DBP, which the EPA published on January 4, 2006.

Exemptions. The act's exemption provisions also are intended to provide compliance flexibility in certain cases. States or the EPA may grant temporary exemptions from a standard if, due to certain compelling factors (including cost), a system cannot comply on time. For example, all systems are required to comply with

the new arsenic standard five years after its promulgation date. An exemption would allow three more years for qualified systems. Small systems (serving 3,300 persons or fewer) may be eligible for up to three additional 2-year extensions, for a total exemption duration of 9 years (and for a total of up to 14 years to achieve compliance). In the preamble to the arsenic rule published in January 2001, the EPA noted that exemptions will be an important tool to help states address the number of systems needing financial assistance to comply with this rule and other SDWA rules (66 *Federal Register* 6988). However, because of the administrative burden to the state, the exemption authority may not be widely used. As of late 2004, 13 states had indicated that they would use the exemptions process for the arsenic rule. However, because the exemption process is resource-intensive for states, it is unclear whether states will use this authority with much frequency.

Affordability Issues and Compliance. Prompted by intense debate over the revised arsenic standard and its potential cost to small communities, the conference report for the EPA's FY2002 appropriations (H.Rept. 107-272) directed the EPA to review its affordability criteria and how small system variance and exemption programs should be implemented for arsenic. Congress directed the EPA to report on its affordability criteria, administrative actions, potential funding mechanisms for small system compliance, and possible legislative actions.

EPA's 2002 report to Congress, *Small Systems Arsenic Implementation Issues*, summarized actions the EPA was undertaking to address these directives. Major activities included (1) reviewing the small system affordability criteria and variance process; (2) developing a small community assistance plan to improve access to financial and technical assistance, improve compliance capacity, and simplify the use of exemptions; and (3) implementing a \$20 million research and technical assistance strategy. In 2002, the EPA issued *Implementation Guidance for the Arsenic Rule*, which includes guidance to help states grant exemptions. The EPA has offered technical assistance to small systems and has sponsored research on low-cost treatment technologies for arsenic. Also, the EPA is working with small communities to maximize loans and grants under SDWA and the U.S. Department of Agriculture water infrastructure programs.²¹

Congress continues to express concern about the cost to communities to comply with the arsenic rule. The conference report for the Consolidated Appropriations Act for FY2005 directed the EPA to report to Congress on the extent to which communities will be affected by the arsenic rule, and to propose compliance alternatives and make recommendations to minimize compliance costs. Congress also provided \$8.3 million for research on cost-effective arsenic removal technologies.

On March 3, 2006, the EPA proposed three options for revising its affordability criteria for determining whether a compliance technology is unaffordable for small systems (71 *Federal Register* 10671). States could use the criteria to grant small-

²¹ For information on USDA and other assistance programs, see CRS Report RL30478, *Federally Supported Water Supply and Wastewater Treatment Programs*, by Betsy A. Cody et al.

system variances when systems cannot afford to comply with a standard. Using the current draft criteria, the EPA considers a technology affordable unless the average compliance cost exceeds 2.5% of the area's median household income, and to date, the EPA has determined that affordable technologies are available for all SDWA standards. The three proposed options are well below that level: 0.25%, 0.50%, and 0.75%. The revised criteria are also expected to address how to ensure that a variance technology would be protective of public health. According to the EPA, the final criteria would apply only to the EPA's newly promulgated Stage 2 DBP and future rules.

In the 109th Congress, various bills have been introduced to help small public water systems comply with the arsenic standard and other rules. The EPA's FY2007 funding bill, as reported by the Senate Committee on Appropriations (H.R. 5386, S.Rept. 109-275), would require the EPA to make available at least \$11 million for small system compliance assistance. S. 1400, the water infrastructure financing bill reported by the Senate Environment and Public Works Committee, would increase DWSRF funding and create a grant program for priority projects, including projects to help small systems comply. S. 41 and H.R. 1315 would direct states to grant qualified small water systems exemptions for naturally occurring contaminants. H.R. 4495 would give small systems two more years to comply with the arsenic rule. S. 2161 would prevent the enforcement of SDWA regulations for small systems unless the EPA has identified a variance technology and sufficient DWSRF funds are made available. Furthermore, S. 2161 would establish new affordability criteria for treatment technologies. Companion bills H.R. 2417 and S. 689 would require the EPA to establish a small system grant program to help qualified communities comply with standards, delay state enforcement of the arsenic rule until states implement the grant program, and prevent the EPA from enforcing a standard during the grant application process.

Congressional Hearings, Reports, and Documents

- U.S. Congress. House. Committee on Energy and Commerce. Subcommittee on Environment and Hazardous Materials. *Tapped Out: Lead in the District of Columbia and the Providing of Safe Drinking Water*. Hearing, July 22, 2004, 108th Cong., 2nd sess. 155 p. (H.Rept. 108-97).
- U.S. Congress. House. Committee on Government Reform. *Public Confidence, Down the Drain: the Federal Role in Ensuring Safe Drinking Water in the District of Columbia*. Hearing, March 5, 2004, 108th Cong., 2nd sess. 268 p. (H.Rept. 108-161).
- U.S. Congress. House. Committee on Government Reform. Subcommittee on Energy Policy, Natural Resources and Regulatory Affairs. *The EPA Water Enforcement: Are We on the Right Track?* Hearing, October 14, 2003, 108th Cong., 1st sess. 201p. (H.Rept. 108-157).
- U.S. Congress. House. Committee on Transportation and Infrastructure. Subcommittee on Water Resources and Environment. *Aging Water Supply Infrastructure*. Hearing, April 28, 2004, 108th Cong., 2nd sess. 78 p. (H.Rept. 108-63).
- U.S. Congress. Senate. Committee on Environment and Public Works. *Water Infrastructure Financing Act*. Report to accompany S. 2550. Oct. 7, 2004. 116 p. (S.Rept. 108-386).

For Additional Reading

- U.S. Environmental Protection Agency. *The Clean Water and Drinking Water Infrastructure Gap Analysis Report*. Report No. EPA 816-R-02-020. September 2002. 50 p.
- U.S. Environmental Protection Agency. *Providing Safe Drinking Water in America: 2002 National Public Water Systems Compliance Report*. Report No. EPA 305-R-04-001. Dec. 2004. 96 p.
- National Research Council. *Health Implications of Perchlorate Ingestion*. Board on Environmental Studies and Toxicology. National Academies Press. Jan. 2005. 177 p.