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Wastewater Treatment: Overview and Background

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Summary

The Clean Water Act prescribes performance levels to be attained by municipal sewage treatment plants in order to prevent the discharge of harmful wastes into surface waters. The Act also provides financial assistance so that cities can construct treatment facilities in compliance with the law. The availability of funding for this purpose continues to be a major concern of cities and states. This report provides background on municipal wastewater treatment issues, federal treatment requirements and funding, and recent legislative activity. Meeting the nation's wastewater infrastructure needs efficiently and effectively is likely to remain an issue of considerable congressional interest. This report will be updated as developments warrant.

Introduction

Waste discharges from municipal sewage treatment plants are a significant source of water quality problems throughout the country. States report that municipal discharges are the second leading source of water quality impairment in all of the nation's waters (rivers and streams, lakes, and estuaries and coastal waters). Pollutants associated with municipal discharges include nutrients (which can stimulate growth of algae that deplete dissolved oxygen which is essential for aquatic ecosystems, since most fish and other aquatic organisms "breathe" oxygen dissolved in the water column), bacteria and other pathogens (which may impair drinking water supplies and recreation uses), as well as metals and toxic chemicals from industrial and commercial activities and households.

The Clean Water Act (CWA) prescribes performance levels to be attained by municipal sewage treatment plants in order to prevent the discharge of harmful quantities of waste into surface waters and to ensure that residual sewage sludge meets environmental quality standards. It requires secondary treatment of sewage (equivalent to removing 85% of raw wastes), or treatment more stringent than secondary where needed to achieve water quality standards and desired use of a river, stream, or lake.

Federal Aid for Wastewater Treatment

In addition to prescribing municipal treatment requirements, the CWA authorizes the principal federal program to aid wastewater treatment plant construction. Congress established this program, essentially in its current form, in the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). Since then Congress has appropriated $75.6 billion to assist cities in complying with the Act (see **Table 1**). These provisions were intended to help achieve the overall objectives of the Act: restoring and maintaining the chemical, physical, and biological integrity of the nation's waters.

Title II of P.L. 92-500 authorized grants to states for wastewater treatment plant construction under a program administered by the Environmental Protection Agency (EPA). Federal funds are provided through annual appropriations under a state-by-state allocation formula contained in the Act; the formula (which has been modified several times since 1972) is based on states' financial need for treatment plant construction and population. States used their allotments to make grants to cities to build or upgrade categories of wastewater treatment projects including treatment plants, related interceptor sewers, correction of infiltration/inflow of sewer lines, and sewer rehabilitation.

Amendments enacted in 1987 (P.L. 100-4) initiated a new grants program to support State Water Pollution Control Revolving Funds (SRFs). States continue to receive federal grants, but now they provide a 20% match and use the combined funds to make loans to communities. This program, authorized in Title VI of the Act, entirely replaced the previous Title II program in FY1991. Monies used for construction will be repaid to states to create a "revolving" source of assistance for other communities. Federal contributions to SRFs were intended to assist in making a transition to full state and local financing by FY1995; SRFs were to be sustained through repayment of loans made from the fund after that date. The intention was that states would have greater flexibility to set priorities and administer funding in exchange for an end to federal aid after 1994, when CWA authorizations expired. However, although most states believe that the SRF is working well today, early funding and administrative problems, plus remaining funding needs (discussed below), delayed the anticipated shift to full state responsibility. Congress has continued to appropriate funds to assist wastewater construction activities, as shown in **Table 1**. (This table does not include appropriations for congressionally earmarked water infrastructure project grants in individual communities, which have totaled $6.5 billion from FY1989 through FY2005.)

Table 1. CWA Wastewater Treatment Funding

($ in millions)

Fiscal Year	Authorizations	Appropriations
1973-84	46,180	40,544
1985-89	12,000	10,747
1990-94	8,400	9,869
1995-99		6,657
2000-04		6,724
2005		1,901
Total:	**66,580**	**75,632**

Source: *Budget of the United States Government, Appendix*, various years.

How the SRF Works. The SRF program represents a major shift in how the nation finances wastewater treatment needs. In contrast to the Title II construction grants program, which provided grants directly to localities, SRFs are loan programs. States use their SRFs to provide a range of loan assistance to communities, including project construction loans made at or below market rates (interest-free loans are permitted by the Act), refinancing of local debt obligations, and providing loan guarantees or purchasing of insurance. Loans are to be repaid to the SRF within 20 years, beginning within one year after project completion, and the locality must dedicate a revenue stream (from user fees or other sources) to repay the loan to the state.

States must agree to use SRF monies first to ensure that wastewater treatment facilities are in compliance with deadlines, goals, and requirements of the Act. After meeting this "first use" requirement, states may also use the funds to support other types of water quality programs, such as those dealing with nonpoint source pollution and protection of estuaries.

In addition, states must agree to ensure that communities meet a range of requirements (such as requiring the applicant to study innovative and alternative treatment technologies in project design and requiring that locally prevailing wages be paid for wastewater treatment plant construction, pursuant to the Davis-Bacon Act). In addition, states must comply with "cross-cutting" requirements associated with receipt of federal grants, such as promotion of equal employment opportunities and participation by minority-owned businesses. These requirements, which promote a variety of national policy goals, also applied under the Title II program.

As under the previous Title II program, decisions on which projects will receive assistance are made by states using a priority ranking system that considers the severity of local water pollution problems. Financial considerations of the loan agreement (interest rate, repayment schedule, the recipient's dedicated source of repayment) are additional key factors evaluated under the SRF program.

All states have established the legal and procedural mechanisms to administer the loan program and are eligible to receive SRF capitalization grants. Some with prior experience using similar financing programs moved quickly, while others had difficulty in making a transition from the previous grants program to one that requires greater financial management expertise for all concerned. Nearly one-half of the states currently leverage their funds by using federal capital grants and state matching funds as collateral to borrow in the public bond market for purposes of increasing the pool of available funds for project lending. Leveraged bonds today comprise about 27% of total SRF funds; loan repayments comprise about 10%.

Small communities and states with large rural populations have had the largest problems with the SRF program. Many small towns did not participate in the previous grants program and are more likely to require major projects to achieve compliance with the law. Yet many have limited financial, technical, and legal resources and have encountered difficulties in qualifying for and repaying SRF loans. These communities often lack an industrial tax base and thus face the prospect of very high per capita user fees to repay a loan for the full capital cost of sewage treatment projects. Compared with larger cities, many are unable to benefit from economies of scale which can affect project costs. Still, small communities have been participating in the SRF program: since 1989,

nationally, 62% of all loans and other assistance (comprising 23% of total funds loaned) have gone to assist towns and cities with less than 10,000 population.

Other Federal Assistance. While the Clean Water Act is the principal federal program of this type, some other assistance is available. (For additional information, see CRS Report RL30478, *Federally Supported Water Supply and Wastewater Treatment Programs*.) The Department of Agriculture (USDA) operates grant and loan programs for water supply and wastewater facilities in rural areas, defined as areas of not more than 10,000 persons. In recent years, approximately 65% of loan funds and 57% of grant funds have been obligated to water projects, the remainder to waste disposal projects. FY2005 appropriations total $548 million, sufficient to support more than $1.4 billion in program activity (counting both appropriations and repaid loans). Two other programs are:

- The Community Development Block Grant (CDBG) program administered by the Department of Housing and Urban Development. FY2005 funds total $4.1 billion. Water and waste disposal projects compete with many other funded public activities and are estimated to account for 10 to 20% of CDBG obligations.

- The Economic Development Administration (EDA) of the Department of Commerce provides project grants for construction of public facilities, including water and sewer systems, as part of approved overall economic development programs in areas of lagging economic growth. In FY2005, EDA's public works and economic development program is funded at $166 million.

How Localities Pay for Construction Costs. Local governments have primary responsibility for wastewater treatment; they own and operate more than 17,000 treatment plants and 24,000 collection systems nationwide. Construction of these facilities has historically been financed with revenues from federal grants, state grants to supplement federal aid, and broad-based local taxes (property tax, retail sales tax, or in some cases, local income tax). More recently, cities and counties have turned to fees or charges levied on users of public services to cover all or a portion of local capital costs.

Shifting the Clean Water Act aid program from categorical grants to the SRF loan program has had the practical effect of making localities ultimately responsible for 100% of project costs, rather than less than 50% of costs. This has occurred concurrently with other financing challenges: the need to fund other environmental services, such as drinking water and solid waste management; and increased operating costs (new facilities with more complex treatment processes are more costly to operate). Options that localities face, if intergovernmental aid is not available, include raising additional local funds (through increased user fees, developer charges, general or dedicated taxes), reallocating funds from other local programs, or failing to comply with federal standards. Each option carries with it certain practical, legal, and political problems.

Water Quality Improvements. Over the past 35 years, the nation has made considerable progress in controlling and reducing certain kinds of chemical pollution of rivers, lakes, and streams. Between 1968 and 1995, biological oxygen demand (BOD_5) pollutant loadings discharged from sewage treatment plants declined by 45%, despite increased industrial activity and a 35% growth in population.

The total population served by sewage treatment plants that provide a minimum of secondary treatment increased from 85 million in 1972 to 208 million in 2000, representing 75% of the U.S. population. However, about 6.4 million people are served by facilities that provide less than secondary treatment, which federal law generally requires. About 60 million people are served by well functioning on-site septic systems and do not need centralized municipal treatment.

Despite improvements, other water quality problems related to municipalities remain to be addressed. A key concern is "wet weather" pollution: overflows from combined sewers (from sewers that carry sanitary and industrial wastewater, groundwater infiltration, and stormwater runoff which may discharge untreated wastes into streams) and separate stormwater sewers (sewers that carry only sanitary waste). Untreated discharges from these sewers, which typically occur during rainfall events, can cause serious public health and environmental problems, yet costs to control wet weather problems are high in many cases. In addition, toxic wastes discharged from industries and households to sewage treatment plants cause water quality impairments, operational upsets, and contamination of sewage sludge.

Remaining Needs. Although more than $75 billion in federal aid has been provided since 1972, funding needs remain very high: an additional $181 billion nationwide, according to the most recent Needs Survey estimate by EPA and the states, published in August 2003. Needs for wastewater treatment are $57 billion, or 32% of the total. The estimated cost to control combined sewer overflows is $51 billion, and control of storm sewer overflows is estimated to be $88.5 billion. Total needs increased 21% between 1996 and 2000, in part reflecting costs of improvements needed to meet increasingly stringent water quality standards for treatment plants, as well as correction of storm sewer overflows, and renewal of existing infrastructure. About $16 billion is needed for projects in small communities. The largest needs in small communities are for improved secondary treatment and new collector sewers. These estimates do not include potential costs, largely unknown, to upgrade physical protection of wastewater facilities against possible terrorist attacks that could threaten water infrastructure systems, an issue of great interest since September 11, 2001.

In September 2002, EPA released a study called the Gap Analysis that assesses the difference between current spending for wastewater infrastructure and total funding needs (both capital and operation and maintenance). EPA estimates that, over the next two decades, the United States needs to spend nearly $390 billion to replace existing wastewater systems (including for some projects not eligible for CWA funding, such as system replacement) and to build new ones. According to the Gap Analysis, if there is no increase in investment, there will be about a $6 billion gap between current annual capital expenditures for wastewater treatment and projected spending needs. The study also estimates that, if wastewater spending increases by 3% annually, the gap would shrink by nearly 90%. At issue has been what should the federal role be in assisting states and cities, especially in view of such high projected funding needs.

Outside groups, including a coalition called the Water Infrastructure Network (WIN), have offered proposals which have attracted some congressional interest that seek a multi-billion dollar investment program in wastewater and drinking water infrastructure. Finding the revenues to support such a large spending increase is an important part of the debate. Bush Administration officials have said that infrastructure funding needs go

beyond what the federal government can do on its own, and they advocate a combination of strategies including utility management practices (improved rate structures, system consolidation) and efficiencies (asset management to better anticipate future needs).

Recent Legislative Activity and Issues

Authorizations for SRF capitalization grants expired in FY1994, making it a likely issue of congressional interest. In the 104th Congress, the House passed a comprehensive reauthorization bill (H.R. 961), which included SRF provisions to address problems that have arisen since 1987, including assistance for small and disadvantaged communities and expansion of projects and activities eligible for SRF assistance. However, no legislation was enacted, because of controversies over other parts of the bill.

In the 105th and 106th Congresses, committees held hearings on water infrastructure and considered proposals to extend CWA assistance. One focus was on projects needed to control wet weather water pollution, overflows from combined and separate stormwater sewer systems. The 106th Congress enacted a bill authorizing $1.5 billion of CWA grant funding for wet weather sewerage projects (included in the FY2001 Consolidated Appropriations bill, P.L. 106-554). In the 107th Congress, House and Senate committees approved bills to extend the Act's SRF program through FY2007 (H.R. 3930, S. 1961). Neither bill received further action, in large part due to controversies over application of the Davis-Bacon Act, which requires that contractors, engaging in certain federal contract construction, pay workers on such projects not less than the locally prevailing wage for comparable work, and over the formula for allocating SRF grants among the states.

The SRF program again received legislative attention in the 108th Congress. In October 2004, the Senate Environment and Public Works Committee reported S. 2550. It would have authorized $41.25 billion over five years for wastewater and drinking water infrastructure programs, including $20 billion for the clean water SRF program. The reported bill included a new formula for state-by-state allocation of clean water SRF grants, renewal of the sewer overflow grant program, and provisions such as extended loan repayments and subsidies for disadvantaged communities. In July 2003, a House Transportation and Infrastructure subcommittee approved H.R. 1560; it also would have authorized $20 billion for clean water SRF grants for five years. It included several provisions intended to benefit economically disadvantaged and small communities, such as allowing extended loan repayments (30 years, rather than 20) and principal forgiveness and negative interest loans for communities that meet a state's affordability criteria. It would have required communities to plan for capital replacement needs and to implement an asset management plan for the repair and maintenance of infrastructure. Neither bill received further action for reasons including controversies over the Davis-Bacon Act, differences over funding allocation formulas, and Administration opposition to funding levels in both measures.

Meeting the nation's wastewater infrastructure needs efficiently and effectively is likely to remain an issue of considerable congressional interest. Issues debated recently are likely to recur. These include extending SRF assistance to help states and cities meet the estimated $181 billion or more in funding needs; modifying the program to assist small and economically disadvantaged communities; and enhancing the SRF program to address a number of water quality priorities beyond traditional treatment plant construction, particularly managing wet weather pollutant runoff, which is the leading cause of stream and lake impairment nationally.