Chapter 1

Introduction

This report presents the results of the U.S. Environmental Protection Agency (EPA) assessment of the implementation and enforcement of its 1994 Combined Sewer Overflow (CSO) Control Policy (59 FR 18688). This report directly responds to a Congressional mandate established in December 2000, when Congress amended the Clean Water Act (CWA). In part, the amendments (P.L. 106–554) added Section 402(q)(3), which requires:

> *Not later than September 1, 2001, the Administrator shall transmit to Congress a report on the progress made by the Environmental Protection Agency,* states, *and municipalities in implementing and enforcing the CSO Control Policy.*

EPA undertook report preparation between January and August 2001. During this time EPA developed an extensive methodology, collected data from federal, state, and local sources, performed analyses, coordinated with stakeholders, and prepared this report.

P.L. 106–554 also requires EPA to submit a second Report to Congress by December 2003. The second report will summarize the extent of human health and environmental impacts from CSOs and sanitary sewer overflows (SSOs), quantify and characterize resources spent by municipalities to address these impacts, and evaluate the technologies used by municipalities to control overflows. EPA collected data during the preparation of this first report in anticipation of preparing the second report.

In this chapter:

1.1 Brief History of Combined Sewers and CSOs

Combined sewer systems (CSSs) are wastewater collection systems designed to carry sanitary sewage, industrial and commercial wastewater, and storm water runoff from rainfall or snowmelt in a single system of pipes to a publicly owned treatment works (POTW).

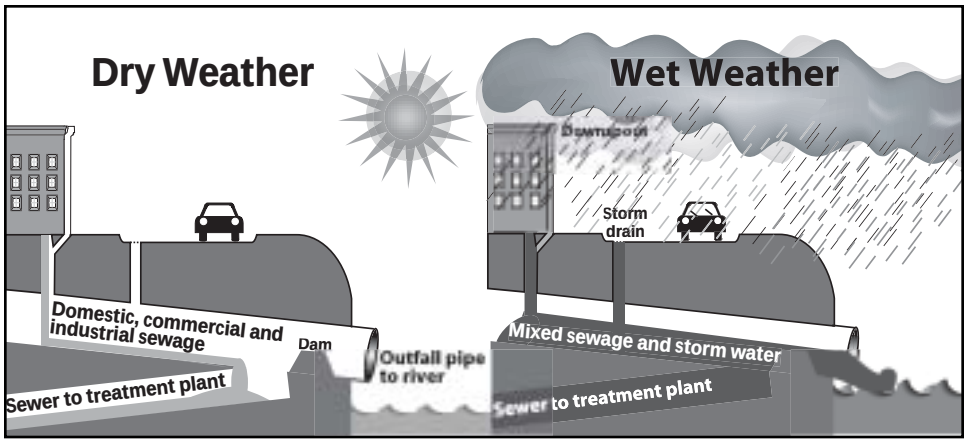
Typical CSO outfall discharge following a storm

Photo: NJ Department of Environmental Protection

Figure 1.1

Typical Combined Sewer Overflow Structure

Combined sewer systems are designed to overflow directly to surface water bodies such as lakes, rivers, estuaries, and coastal waters during wet weather, when wastewater flows exceed the capacity of the sewer system or treatment plant.



CSO outfall to Piney Branch, Washington, D.C.

Photo: Limno-Tech, Inc.

During dry weather, CSSs convey domestic, commercial, and industrial wastewater and limited amounts of infiltrated ground water. When rainfall or snowmelt reaches combined systems, total wastewater flows can exceed the capacity of systems or treatment facilities. Most CSSs are designed to discharge excess wastewater directly to surface water bodies such as lakes, rivers, estuaries, and coastal waters, as shown in Figure 1.1. The untreated discharges—CSOs—can be a major source of water pollution in communities served by CSSs.

CSOs are point source discharges and are subject to National Pollutant Discharge Elimination System (NPDES) permit requirements, including the technology-based and water quality-based requirements of the CWA. EPA has always asserted that CSOs are exempt from CWA secondary treatment standards. EPA's interpretation was upheld in Montgomery Environmental Coalition v. Costle, 646 F2d 568 (D.C. Cir. 1980).

Nationwide, 859 NPDES permits authorize discharges from 9,471CSOs in 32 states. Most of the CSO communities are located in the Northeast and Great Lakes regions, but some are located in the Midwest, Southeast and Pacific Northwest.

Control of CSOs is complex due to site-specific variability in the volume, frequency, and characteristics of CSOs. To address these challenges, EPA issued a National Combined Sewer Overflow Control Strategy on August 10, 1989 (54 FR 37370). The 1989 CSO Control Strategy recommended that all CSOs be identified and categorized according to status of compliance with NPDES requirements. The CSO Control Strategy set forth three objectives:

- Ensure that if CSOs occur, they do so only as a result of wet weather.
- Bring all wet weather CSO discharge points into compliance with the technology-based and water quality-based requirements of the CWA.
- Minimize the impacts of CSOs on water quality, aquatic biota, and human health.

In addition, the CSO Control Strategy charged all states to develop permitting strategies designed to reduce, eliminate, or control CSOs.

In early 1992, EPA accelerated efforts to bring combined sewer systems with CSOs into compliance with the CWA. The efforts included negotiations with representatives of the regulated community, state regulatory agencies, and environmental groups. The initiative resulted in the development of the CSO Control Policy, which was published in the Federal Register on April 19, 1994 (59 FR 18688). The complete text of the CSO Control Policy is provided in Appendix A.

The CSO Control Policy is a comprehensive national strategy to ensure that municipalities, NPDES permitting and water quality standards authorities, EPA, and the public engage in a comprehensive and coordinated planning effort to achieve cost-effective CSO controls that ultimately meet the requirements of the CWA. The key principles of the CSO Control Policy are:

- Provide clear levels of control that would be presumed to meet appropriate health and environmental objectives.
- Provide sufficient flexibility to municipalities, especially financially disadvantaged communities, to consider the site-specific nature of CSOs, and to determine the most cost-effective means of reducing pollutants and meeting CWA objectives and requirements.
- Allow a phased approach to implementation of CSO controls considering a community's financial capability.
- Review and revise, as appropriate, water quality standards and their implementation procedures when developing CSO control plans to reflect the site-specific wet weather impacts of CSOs.

The CSO Control Policy contains provisions for developing appropriate site-specific NPDES permit requirements for all CSSs that overflow due to wet weather events. The CSO Control Policy also includes an enforcement initiative requiring immediate elimination of overflows that occur during dry weather and promoting timely compliance with remaining CWA requirements.

Since 1994, federal, state, and local authorities have undertaken significant efforts to control wet weather discharges such as CSOs. Watershed protection initiatives, including the development of total maximum daily loads (TMDLs) for impaired water bodies nationwide, have further focused attention on the impacts of wet weather discharges.

In December 2000, Congress amended the CWA in recognition of the continuing challenges posed by wet weather discharges, including CSOs. The amendments added Section 402(q)(1) to require conformance with the CSO Control Policy in permitting and enforcement activities. The amendment text is provided in Appendix A.

Chicago's Navy Pier is one of many attractions on the Lake Michigan waterfront.

Photo: Photodisc

Congress also acknowledged the need for funding to address wet weather discharges by authorizing $1.5 billion over fiscal years 2002 and 2003 for use by EPA and states to provide grants for controlling CSOs and SSOs. To date, however, Congress has not appropriated funds for these grant programs.

In addition, Congress recognized the importance of the watershed approach by authorizing "wet weather watershed pilot projects."

CSO separation project underway in Louisville, Kentucky.

Photo: Louisville-Jefferson County Metropolitan Sewer District

1.2 Organization of the Report

The purpose of this report is to detail progress made by EPA, states, and municipalities in implementing and enforcing the CSO Control Policy. The report contains seven chapters, the contents and purpose of which are summarized below.

- Chapter 2 summarizes the history of regulatory efforts to control CSOs. It describes actions and activities leading to the development and release of the 1989 National CSO Control Strategy and the 1994 CSO Control Policy, and includes a summary of both.
- Chapter 3 describes the methodology used to develop this Report to Congress. To understand the implementation, enforcement, and general application of the CSO Control Policy, EPA designed and implemented a comprehensive approach to gather the necessary information and data. This effort included an extensive literature search, numerous site visits, and outreach to stakeholders responsible for the development and implementation of the CSO Control Policy. The data EPA collected from these efforts are summarized in Chapters 4, 5, and 6.
- Chapter 4 presents EPA activities undertaken between 1994 and 2001to implement and enforce the CSO Control Policy. This chapter summarizes technical and financial assistance provided by EPA to the states and municipalities. The chapter details Agency efforts to document environmental benefits of CSO control.
- Chapter 5 summarizes states' activities to implement and enforce the CSO Control Policy. The chapter reports on the issuance of permits and other enforceable orders requiring the development and implementation of the nine minimum controls (NMC) and of long-term control plans (LTCPs) as outlined by the CSO Control Policy. The chapter also describes important aspects of state-specific policies or strategies, technical and financial assistance provided by states to CSO permittees, and documented environmental benefits from CSO control. The state profiles, which summarize each of the 32 states' approach to implementing the CSO Control Policy and controlling CSOs, are presented in Appendix B.

- Chapter 6 describes actions taken by communities to implement CSO controls. This chapter draws heavily from CSO community case studies, provided in their entirety in Appendix C. The chapter provides information on factors perceived by municipalities as impediments to full implementation of the CSO Control Policy. This chapter also discusses the efficacy of CSO controls in reducing pollutant loads and improving water quality. It identifies the specific controls most often used by CSO communities and discusses the benefits of CSO control in meeting other locally defined objectives.

- Chapter 7 evaluates the success of the CSO Control Policy as a means for complying with the requirements of the CWA and provides:

  - An overall assessment of the effectiveness of the CSO Control Policy in controlling CSOs.

  - Assessment of implementation in terms of the four key principles established by the CSO Control Policy.

  - Environmental results related to CSO control.

  - Next steps EPA will pursue to ensure the continued effective implementation and enforcement of the CSO Control Policy.

Chapter 2

Regulatory and Environmental Background for the CSO Control Policy

Establishing a national regulatory approach for CSO control has proven difficult due to the site-specific nature of CSOs and their impacts. CSOs discharge to a wide range of aquatic environments, including rivers, estuaries, lakes, coastal waters, ditches, and ephemeral streams of all sizes. Generally, CSOs are related to wet weather, but the frequency and duration of overflows vary widely from one CSO to another. Moreover, the pollutant characteristics of CSOs vary depending on the location of the collection system, types of residential and industrial development in the area, and types of runoff in the collection system.

CSOs differ from POTWs and industrial point source discharges in many ways. Traditional point source control needs are assessed based on low flow design conditions. CSOs, however, often discharge during high flow conditions. Additionally, many other point sources have continuous discharges, but CSOs are intermittent. For these reasons, it became necessary to develop a national program specifically for controlling CSOs.

This chapter explains the development of the 1994 CSO Control Policy. It uses data and information on CSO impacts, as known at the time the CSO Control Policy was being developed. This chapter provides a brief history of the initial construction and use of combined sewers in the United States; describes characteristics of CSOs and resulting impacts to surface waters; outlines measures taken to regulate and control CSOs from the 1960s to 1994; and provides an overview of the key components of the CSO Control Policy.

2.1 Description of Combined Sewer Systems and CSOs

In the mid-1800s, municipalities began installing public sewer systems to address health and aesthetic concerns. The waste treatment technology of the pre-sewer era, backyard privies and cesspools, were progressively less effective as cities grew. During this period, human waste was dumped into privy vaults and cesspools, and storm water ran into the streets or into surface

In this chapter:

Privy vaults and water pump are located side-by-side in this Pittsburgh neighborhood, circa 1909.

Photo: Paul Underwood Kellogg

drains. Increased population density along with the development of water utilities delivering water by pipe to residences and commercial buildings taxed this system. Cesspools and privy vaults were over capacity, which in turn caused nuisance, public health, and flooding problems (Melosi, 2000).

CSSs were constructed to transport human waste and storm water away from dwellings and inhabited areas. The conveyance of sanitary waste and storm water runoff away from neighborhoods through a sewer pipe into local receiving waters became accepted practice. At this time, little precedent existed for underground sewerage systems, and engineers were reluctant to experiment with expensive capital works. Moreover, waste disposal in waterways was believed safe (Tarr, 1996). The decision to use combined sewers was made following a period of intense debate. Large cities tended to pursue combined sewers given the flood control advantages while smaller communities pursued separate storm and sanitary sewers. Combined sewers provided public health improvements and flood control benefits to local residents, though such projects created impacts on downstream communities (Melosi, 2000).

A better understanding of the disease-causing organisms in sewage and a recognition of health and nuisance conditions prompted a shift to wastewater treatment in the early 1900s. Wastewater treatment plants were sized and designed to treat sanitary waste, not a combination of sanitary waste and storm water runoff. The use of separate, and in some instances parallel, collection systems for storm water runoff and sanitary waste quickly became accepted practice. With the advent of wastewater treatment, the construction of new CSSs generally ceased.

CSSs were retained in many cities because the existing systems provided a network for the centralized collection of human and industrial waste. During dry weather periods, the performance of combined systems was generally adequate. During wet weather, however, the volume of sanitary wastewater and storm water runoff entering the combined systems often exceeded conveyance capacity. When this occurred, combined systems overflowed directly to surface water bodies. Sanitary officials originally believed that overflows were diluted to such an extent that they posed no serious water pollution problems. As designed, CSSs were expected to overflow.

Untreated overflows of raw sewage and storm water—CSOs—began to be viewed as major sources of pollution to receiving waters in the second half of the 20th century. In 1965, the Federal Water Pollution Control Act acknowledged the significance of CSOs by authorizing funding for research, development, and demonstration of techniques for controlling CSOs. Soon after, the American Public Works Association (APWA) conducted one of the first nationwide surveys to assess the extent of the CSO problem (APWA, 1967). APWA's survey found that the number of CSSs exceeded 1,300.

Over the years, estimates of the number of CSSs and CSOs have fluctuated as communities changed their systems and as more consistent information became available. EPA's early research estimated approximately 15,000 overflow points in about 1,100 communities serving a total population of 43 million. In 1993, EPA reported that individual CSOs discharged an average of 50 to 80 times per year, resulting in the delivery of about 1.2 trillion gallons of raw sewage, untreated industrial wastes, and storm water runoff into receiving waters nationwide each year (EPA, 1994a).

EPA's 2001 NPDES file review found 859 CSO permits, which included descriptions of 9,471 permitted outfalls nationwide. The 859 permits cover 772 communities. As shown in Figure 2.1, most CSO communities are located in the Northeast and Great Lakes regions. A listing of CSO permits, by state, is provided in Appendix D.

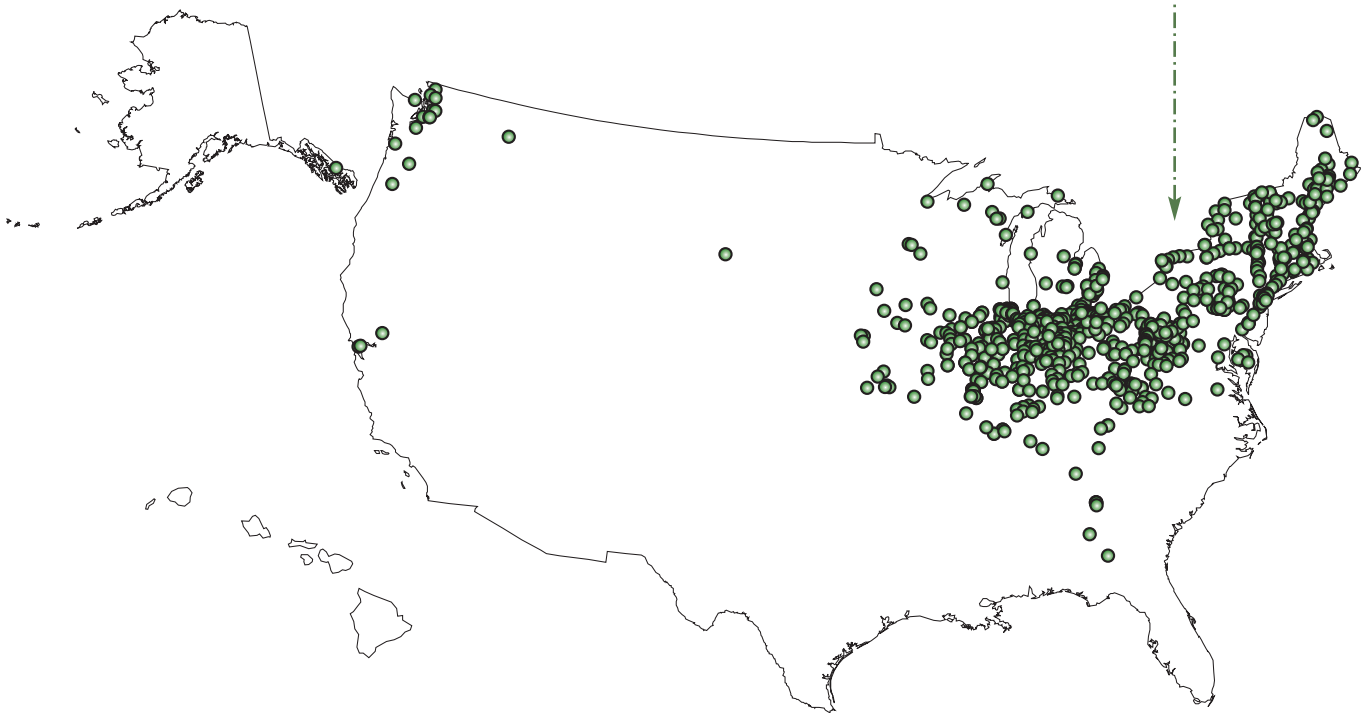
2.2 Environmental and Public Health Impacts of CSOs

CSOs are discharges of raw sewage and storm water, and exhibit the characteristics of both. They contain a combination of untreated human waste and pollutants discharged by commercial and industrial establishments. CSOs also contain solids, metals, bacteria, viruses, and other pollutants washed from city streets and parking lots. CSO impacts include adverse human health effects (e.g., gastrointestinal illness), beach closures, shellfish bed closures, toxicity for aquatic life, and aesthetic impairment. Many CSOs discharge to receiving waters in heavily populated urban areas. The pollutants of

Figure 2.1

National Distribution of CSO Communities

More than half of the nation's 859 CSO permits are held by communities in four states: Illinois, Indiana, Ohio, and Pennsylvania.



concern and the principal consequences of CSOs are presented in Table 2.1.

A tabulation of typical pollutant concentrations in CSOs compared with concentrations from other treated and untreated sources is presented in Table 2.2. As shown, the types of pollutants found in untreated sewage and urban runoff are similar.

Under CWA Section 305(b), EPA prepares biennial national water quality assessment reports to Congress. The *National Water Quality Inventory 1994 Report to Congress* (EPA, 1995a), listed CSOs as a source of water quality impairment, as summarized in Table 2.3. Although CSOs ranked lower on a national level than other major sources, the local impacts of CSOs may be intense and highly visible.

Several assessments of use impairment attributed to CSO discharges were published in the late 1980s and early 1990s. The Natural Resources Defense Council (NRDC) reported in its 1992 *Testing the Waters* report that:

> *High levels of bacteria–primarily from raw sewage–are responsible for the overwhelming majority of [beach] closures and advisories. There have been over 5,000 closings and advisories since 1988. . . .The major causes of high bacteria levels in beach water are: inadequate and overloaded sewage treatment systems, combined sewer overflows, raw sewage overflows, poison runoff, faulty septic systems, and boating wastes (NRDC, 1992).*

The National Oceanic and Atmospheric Administration (NOAA) reported that CSOs are a major cause of contaminated shellfish beds and fish kills (NOAA, 1991). NOAA estimated that between 10 and 20 percent of harvest-limited shellfish acreage, amounting to nearly 600,000 acres, was attributable to CSOs.

The Center for Marine Conservation (CMC) summarized public health risks presented by CSOs as follows:

> *The primary health issue associated with CSOs is the risk of exposure to disease-causing bacteria and viruses. Combined sewers contain human waste that can carry pathogenic organisms. Activities involving water-exposure to these contaminants through swimming or other contact can lead to infectious disease. Some of the common diseases include hepatitis, gastric disorders, dysentery, and swimmer's ear. Other forms of bacteria found in untreated waters can cause typhoid, cholera, and dysentery. Human health is also impacted when fish or shellfish that have been contaminated by combined sewer discharges are consumed (CMC, 1992).*

Referencing EPA's harbor study program and its own Beach Cleanup Results (CMC, 1991), CMC also documented floatables and aesthetic impairment due to CSOs:

> *Although only one percent of debris found by the U.S. EPA's Harbor Studies Program and 4.9 percent of the items found in the*

Table 2.1

CSO Pollutants of Concern and Principle Consequences

CSO discharges contain a variety of pollutants that cause or contribute to many public health and environmental problems.

Pollutant(s)	Principle Consequences
Bacteria (e.g., fecal coliform, *E. coli*, enterococci) Viruses (e.g., hepatitis, diptheria, cholera) Parasites (e.g., giardia, cryptosporidium)	Beach closures Odors Shellfish bed closures Drinking water contamination Adverse public health effects
Trash and floatables	Aesthetic impairment Odors Beach closures
Organic compounds, metals, oil, grease Toxic pollutants	Aquatic life impairment Adverse public health effects Fishing and shellfishing restrictions
Biochemical oxygen demand (BOD)	Reduced oxygen levels and fish kills
Solids deposition	Aquatic habitat impairment Shellfish bed closures
Nutrients (e.g., nitrogen, phosphorous)	Eutrophication, algal blooms Aesthetic impairment

Source: Modified from *Approaches to Combined Sewer Overflow Program Development: A CSO Assessment Report* (AMSA, 1994)

Table 2.2

Typical Pollutant Concentrations Found in CSOs

Comparison of typical ranges of CSO pollutant concentrations with other sources. Some of the higher concentrations are assocated with the "first flush" following a storm.

Contaminant Source	BOD_5 (mg/L)	TSS (mg/L)	Total N (mg/L)	Total P (mg/L)	Fecal Coliform (cts/100mL)
Untreated Domestic Wastewater	100—400	100—350	20— 85	4—15	10^7—10^9
Treated Wastewater - Secondary	<5—30	<5—30	15— 25	<1—5	<200
Urban Runoff	10—250	67—101	0.4—1.0	0.7—1.7	10^3—10^7
CSO	25 —100	150—400	3—24	1–10	10^5–10^7

Source: Prevention and Control of Sewer System Overflows (WEF, 1999a)

Table 2.3

CSOs as a Source of Water Quality Impairment

EPA prepares biennial assessment reports on national water quality. This table specifically looks at identified impacts attributable to CSOs in 1994, when the CSO Control Policy was issued.

Water Body Type	CSO Rank Among Sources	CSO Contribution to 1994 Impairment
Estuary	12	5% of impairment (527 square miles)
Ocean	8	11% of impairment (43 shoreline miles)
Great Lakes	10	3% of impairment (172 shoreline miles)
Rivers and Streams	Not in Top 20	Not a leading source of impairment

Source: National Water Quality Inventory 1995 Report to Congress (EPA, 1995a)

In the late 1980s and early 1990s, floatables from CSO and storm water discharges caused beach closures, adverse impacts on coastal species, and property damage in New Jersey's harbor complex.

Photo: NJ Department of Environmental Protection

National Beach Cleanup Results constituted medical, drug and sewage-related debris, these wastes were more common in eastern cities that have [combined sewer systems]. New Jersey and Massachusetts had five times the national average of sewage-associated wastes, making up 2.8 and 2.6 percent respectively of total trash found. New York and Rhode Island had a significantly higher percent as well (1.6 and 1.1 percent respectively) ..... The Harbor Study found CSO- related wastes like condoms, tampon applicators, fecal matter, grease and food in New York City waters. In Philadelphia, the plume from two CSO discharges was seen to contain condoms, tampons, and fecal matter (CMC, 1991).

Substantial documentation of the consequences of CSOs was available in the early 1990s. These consequences were specifically recognized in the CSO Control Policy (EPA, 1994b), which stated:

> *CSOs consist of mixtures of domestic sewage, industrial and commercial wastewaters, and storm runoff. CSOs often contain high levels of suspended solids, pathogenic microorganisms, toxic pollutants, floatables, nutrients, oxygen-demanding compounds, oil and grease, and other pollutants. CSOs can cause exceedances of water quality standards. Such exceedances may pose risk to human health, threaten aquatic life and its habitat, and impair the use and enjoyment of the Nation's waterways (Section I.A).*

2.3 Initial Efforts to Control CSOs

2.3.1 1965 to 1989

The Federal Water Pollution Control Act of 1965 authorized funding for research, development, and demonstration of techniques for controlling CSOs and storm water. More than 100 grants and contracts totaling $82 million, with a federal share of $39 million (47.5 percent), were devoted to this effort between 1965 and 1972 (EPA, 1973). The absence of an explicit federal mandate for CSO control, however, meant that the problem received little attention.

Passage of the Federal Water Pollution Control Act Amendments of 1972 focused greater attention on CSOs. The legislation established the regulatory framework for controlling point source discharges, including CSOs, through the NPDES program. The legislation also established the Construction Grants Program for wastewater infrastructure (CWA Section 201). Some communities used the Construction Grants Program to control CSOs. Most investment in municipal facilities during the 1970s focused on POTW upgrades to secondary and advanced treatment and expansion, not on wet weather issues.

EPA's 1978 Report to Congress on Control of Combined Sewer Overflows in the United States (EPA, 1978) focused on funding for CSO pollution abatement projects. The report documented the status of grant requests and funding, identified the

time required to achieve CSO control, compared POTWs and CSOs, and presented legislative alternatives to control pollution from CSOs. Based upon the 1978 Needs Survey, the report estimated total national needs for CSO control at $21.16 billion in 1978 dollars ($57.28 billion in 2000 dollars).

Case Law

In 1972 and 1981, CSOs were the subject of two Supreme Court cases involving the City of Milwaukee. In Illinois vs. City of Milwaukee, 406 U.S. 91 (1972), the Court recognized the federal common law of nuisance to abate pollution from CSOs. In 1981, the court ruled that the federal CWA supplants federal common law of nuisance to abate pollution from CSOs, City of Milwaukee v. Illinois, 451 U.S. 304 (1981).

The 1980 ruling in Montgomery Environmental Coalition vs. Costle, 46 F2d 568 (D.C. Cir. 1980), is recognized by many as a landmark case in CSO control. The court accepted EPA's interpretation of the CWA that CSOs are not discharges from POTWs and thus are not subject to the secondary treatment standards applicable to POTWs. The CWA requires non-municipal discharges to comply with NPDES permits that include technology-based best conventional pollutant control technology (BCT) for conventional pollutants and best available technology economically achievable (BAT) for toxics and non-conventional pollutants. Following this decision, EPA and states began to regulate and permit CSOs under the NPDES program. This meant CSOs needed to comply with the technology-based requirements of the CWA and with water quality standards.

Some CSO communities advanced CSO controls during this period, establishing the groundwork for future control. For example:

- The Metropolitan Water Reclamation District of Greater Chicago initiated its CSO control program and construction of the Tunnel and Reservoir Plan (TARP) facilities to store combined sewage in the 1970s.
- The District of Columbia initiated a CSO abatement program in 1979 that led to construction of a swirl concentrator facility, installation of inflatable dams, regulator modifications, and expanded wet weather pumping capacity during the 1980s.
- The City of San Francisco initiated CSO control planning in 1970 and implemented CSO controls during the 1980s, including a deep tunnel that resulted in substantial reductions of CSO frequency and volume.
- The cities of Minneapolis, St. Paul, and South St. Paul committed to large-scale sewer separation.

San Francisco's Islais Creek Transport/Storage Facility stores and conveys flow to the Southeast Plant. With a 600-foot overflow weir and 45 mgd storage capacity, this facility reduced combined sewer overflows from 40 to the allowable 10 per year.

Photo: San Francisco Public Utilities Commission

2.3.2 National Municipal Policy

The National Municipal Policy on Publicly-Owned Treatment Works (NMP), published by EPA on January 30, 1984, was another early impetus for CSO control. The NMP encouraged a collaborative effort between EPA and states in addressing compliance with the CWA at POTWs. The NMP was designed to focus EPA's compliance efforts on three types of POTWs: those that had received federal funding and were out of compliance, all major POTWs, and minor POTWs that discharged to impaired waters. The NMP was intended to facilitate compliance at all POTWs by July 1, 1988.

The NMP recommended that each EPA region draft a strategy to bring POTWs into compliance with the CWA. Each strategy was to inventory all POTWs in the region that had not achieved compliance, an identification of which noncompliant municipalities met the criteria for the NMP, and a plan for each facility to achieve compliance. The 1984 NMP provided some flexibility in the planning process, depending on whether the POTW was proposed, under construction, or operational. All plans required a schedule for compliance. This schedule was meant to enable regions to initiate appropriate enforcement actions, should municipalities fail to meet the negotiated deadlines.

As a result of the NMP, state and federal agencies brought hundreds of enforcement actions against municipalities for noncompliance with the CWA. Several major cases specifically addressed CSO problems at POTWs.

Civil Judicial Actions

A total of 16 CSO Civil Judicial actions resulted from the NMP. Six cases occurred in Region 1, one in Region 2, one in Region 3, and eight in Region 5. The types of CSO violations which led to enforcement actions included:

- NPDES permit violations
- Violations of consent decrees
- Violations of water-quality effluent limits
- Failure to meet construction schedules for CSO abatement

Outcomes of these cases included sewer separation; financial penalties; and development of abatement, construction, and management plans. A summary of the cases is provided in Appendix E. Examples of NMP cases are as follows: an NMP case in Hammond, Indiana, resulted in the issuance of a court ordered consent decree for the development of an implementation plan to eliminate dry weather overflows and a penalty payment of $1,272,604. An NMP case affecting Metropolis, Illinois, which has a population of 7,200, was settled through a consent decree that required correction of its CSO overflow structure and a penalty payment of $17,500. The municipality had violated a construction schedule previously defined in an administrative order.

Additional CSO Enforcement Actions (Before 1989)

EPA initiated 13 judicial enforcement actions during the 1980s. These actions were brought under the CWA, but not under the NMP (Wade Miller Associates, 1989). Six cases occurred in Region 1, three in Region 2, three in Region 5, and one in Region 10. Most of these actions involved CSOs discharging above effluent limits according to provisions in an NPDES permit. The principal effluent limit violations were for BOD, TSS, and fecal coliform. Seven municipalities were identified as having dry weather overflows. The majority of communities were assessed civil penalties for noncompliance with permit limits and were required to develop plans to control CSOs. These cases are also summarized in Appendix E.

2.3.3 1989 National CSO Control Strategy

EPA issued a National CSO Control Strategy in 1989 (54 FR 37370). The National CSO Control Strategy requested that states develop statewide CSO permitting strategies by January 15, 1990. The National CSO Control Strategy also recommended that NPDES permits for municipal systems with CSO discharges, at a minimum, include BAT/BCT technology-based controls established according to the best professional judgement (BPJ) of the permitting authority. Six minimum control measures were recommended:

1. Proper operation and regular maintenance.
2. Maximum use of the collection system for storage.
3. Review and modification of pretreatment programs.
4. Maximum flow delivery to the POTW for treatment.
5. Prohibition of dry weather overflows.
6. Control of solid and floatable material in CSO discharges.

During the next several years, nearly all states with CSSs submitted permitting strategies. EPA approved all submitted plans.

2.3.4 Office of Water Management Advisory Group (MAG)

As EPA, states, and municipalities worked to implement the National CSO Control Strategy in the early 1990s, the consequences of CSOs (described in Section 2.2) continued to receive national attention, and environmental organizations pushed for further action. Municipal organizations were also dissatisfied with the National CSO Control Strategy, as they sought a consistent national approach or policy on CSOs and clarification on how to proceed with CSO control. In addition, some studies suggested that states were implementing strategies and technical approaches to CSO control that varied greatly from the National CSO Control Strategy and from those of other states.

A review of sample state CSO strategies by HydroQual (1992) suggested the following:

- States were employing a variety of wet weather design standards, including overflow frequency, factor of flow method (e.g., 10 times dry weather flow), frequency/duration design storms, and depth/duration design storms.
- States' wet weather design standards were either incorporated into individual permits on a site-specific basis, or adopted as statewide policy or regulation.
- Treatment requirements for wet weather flows varied from state to state as either primary or secondary treatment.

In response to these concerns, EPA formed a Management Advisory Group (MAG) in 1992. The MAG was to assist the Agency in the conceptualization and development of a national CSO policy. The MAG included representatives from states, municipalities, sewerage-related associations, and environmental groups. The MAG was charged with addressing the following issues:

- What CSO controls are appropriate?
- When should CSO controls be implemented?
- How should CSO controls be funded?

In addition to continuing with the six minimum controls identified in the National CSO Control Strategy, MAG recommended three additional controls (MAG, 1992):

- Inspection, monitoring, and reporting of CSOs.
- Pollution prevention, including water conservation, to reduce CSO impacts.
- Public notification for any areas affected by CSOs, especially beach and recreational areas.

The MAG also recommended that a work group be convened, in a modified regulation/negotiation process, to develop a consistent national permitting policy for CSO control.

A work group of CSO stakeholders met during the summer of 1992 to address these issues. The work group included environmental groups, municipalities, municipal associations, and state and federal water authorities. The work group agreed to the following objective:

> *To develop consensus on a consistent set of criteria with an adequate degree of specificity to be used in determining long-term CSO control programs implemented through NPDES permits (MAG, 1993).*

The work group's discussions led to the resolution of many technical, economic, and policy issues raised by stakeholders. Although the work group failed to reach consensus on a policy framework document for CSO control, their work set the stage for what proved to be the foundation of the 1994 CSO Control Policy.

A subset of the MAG workgroup, including EPA, the Association of Metropolitan Sewerage Authorities (AMSA), and NRDC, met in October 1992. Participants of this meeting developed a CSO Framework Document based upon the MAG discussions and recommendations. The CSO Framework Document did not include all enforcement components.

EPA used the CSO Framework Document to develop a policy statement that would provide a consistent national approach for controlling CSOs. Stakeholder support for this initiative continued throughout its development. An example of this support is a letter sent January 13, 1994, signed by five divergent stakeholder groups – AMSA, NRDC, the Environmental Defense Fund, the National League of Cities, and the Association of State and Interstate Water Pollution Control Administrators – to the Office of Management and Budget during the final phases of review. The letter recognized that the CSO Control Policy was "the product of many hours of thoughtful, deliberate negotiations" and "truly represents a fair compromise among many divergent positions and an effective approach to national CSO permit guidance." Moreover, the signatories cautioned that:

> *There is a strong national coalition of support for the Policy as negotiated. Any changes in the structure and requirements set forth in the Policy will, without a doubt, disaffect members of this coalition and undermine the significant progress that would be made by implementing the Policy as it is currently written.*

EPA held a press conference April 11, 1994, to announce the release of the final CSO Control Policy. At the press conference, key stakeholders spoke in support of the CSO Control Policy, and letters were read expressing support from various members of Congress. The CSO Control Policy was published on April 19, 1994 (59 FR 18688). In October 1996, key participants in the development of the CSO Control Policy were presented with the Vice President's Hammer Award for Reinvention in recognition of the success of the CSO Control Policy negotiation.

2.4 The CSO Control Policy

2.4.1 Purpose, Objectives and Key Principles of the CSO Control Policy

The purpose of the CSO Control Policy was twofold: 1) elaboration on EPA's 1989 National CSO Control Strategy; and 2) expeditious compliance with CWA requirements. The CSO Control Policy provided guidance to CSO communities, NPDES authorities, and water standards authorities for planning, selecting, and implementing CSO controls. It also established a substantial role for public involvement during the decision-making process.

The CSO Control Policy reiterated the objectives of the National CSO Control Strategy. In addition, the CSO Control Policy recognized the site-specific nature of CSOs and CSO

This CSO notification sign is posted along Brandywine Creek in Wilmington, Delaware. It warns swimmers of the presence of a CSO and advises that raw sewage and bacteria may be present after storms.

City of Wilmington Department of Public Works

impacts and provided municipalities with flexibility to tailor controls to local situations.

Four key principles of the CSO Control Policy ensure that CSO controls are cost-effective and meet the objectives of the CWA. The key principles are:

- Provide clear levels of control that would be presumed to meet appropriate health and environmental objectives.
- Provide sufficient flexibility to municipalities, especially financially disadvantaged communities, to consider the site-specific nature of CSOs and to determine the most cost-effective means of reducing pollutants and meeting CWA objectives and requirements.
- Allow a phased approach to implementation of CSO controls considering a community's financial capability.
- Review and revise, as appropriate, water quality standards and their implementation procedures when developing CSO control plans to reflect the site-specific wet weather impacts of CSOs.

The CSO Control Policy established objectives for CSO communities and expectations for NPDES and water quality standards authorities. Moreover, the CSO Control Policy presented elements of an enforcement and compliance program to address CSOs that overflow during dry weather and for enforcement of NPDES permits issued in accordance with the CSO Control Policy.

2.4.2 Objectives for CSO Communities

The objectives for CSO communities with NPDES permits are: 1) to implement the NMC and submit documentation on NMC implementation; and 2) to develop and implement an LTCP. The NMC are:

1. Proper operation and regular maintenance programs for the sewer system and the CSOs.
2. Maximum use of the collection system for storage.
3. Review and modification of pretreatment requirements to assure CSO impacts are minimized.
4. Maximizing flow to the POTW for treatment.
5. Prohibition of CSOs during dry weather.
6. Control of solids and floatable materials in CSOs.
7. Pollution prevention.
8. Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts.
9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

Municipalities were expected to implement the NMC and to submit appropriate documentation to NPDES authorities as soon as reasonably possible, but no later than January 1, 1997. Because the CWA required immediate compliance with the technology-based controls, a compliance schedule for implementing the NMC, if necessary, was to be included in an enforceable mechanism. EPA committed to exercise its enforcement discretion and not seek civil penalties for past CSO violations if a CSO community was otherwise in compliance and met the January 1, 1997, deadline.

In addition to the NMC, CSO communities were expected to develop and implement LTCPs that would ultimately result in compliance with the CWA. This process was to be coordinated closely with the NPDES authority and the state authority responsible for water quality standards. EPA expected that LTCPs would include the following minimum elements:

- Characterization, monitoring, and modeling of the CSS
- Public participation
- Consideration of sensitive areas
- Evaluation of alternatives
- Cost/performance considerations
- Operational plan
- Maximization of treatment at the POTW treatment plant
- Implementation schedule
- Post-construction compliance monitoring

In addition, the implementation schedule was expected to include project milestones and a financing plan to design and construct necessary controls as soon as practicable.

The CSO Control Policy set forth two approaches that CSO communities could use in developing LTCPs to show that the plan would achieve compliance with water quality standards:

- The "presumption approach" with performance criteria (i.e., four to six untreated overflow events or 85 percent capture by volume) that would be presumed to provide an adequate level of control to meet water quality standards.
- The "demonstration approach" with development and implementation of a suite of CSO controls that would be sufficient to meet applicable water quality standards.

Under the presumption approach, the permitting authority must determine that the presumption is reasonable in light of data and analyses prepared during LTCP development. Under the demonstration approach, the CSO community may demonstrate that the selected control program described in the LTCP, though not meeting the criteria specified for the presumption approach, would be adequate to meet the water quality-based requirements of the CWA.

Many communities combine public education and pollution prevention by involving civic and youth groups in storm drain stenciling and other watershed protection projects.

Photo: EPA

The sewer utility serving Louisville, Kentucky has restructured its organization to coordinate CSO control needs with other water quality improvement programs.

Photo: Louisville-Jefferson County Metropolitan Sewer District

2.4.3 Expectations for Permitting Authorities

The CSO Control Policy expected permitting authorities to undertake the following activities:

- Review and revise, as appropriate, state CSO permitting strategies developed in response to the National CSO Control Strategy.
- Develop and issue permits requiring CSO communities to 1) immediately implement the NMC and document their implementation; and 2) develop and implement an LTCP.
- Promote coordination among the CSO community, the water quality standards authority, and the general public through LTCP development and implementation.
- Evaluate water pollution control needs on a watershed basis and coordinate CSO control with the control of other point and nonpoint sources of pollution.
- Recognize that it might be difficult for some small communities to meet all of the formal elements of LTCP development, and that compliance with the NMC and a reduced scope LTCP may be sufficient.
- Consider sensitive areas, use impairment, and a CSO community's financial capability in the review and approval of implementation schedules.

2.4.4 Coordination with Water Quality Standards: Development, Review, and Approval

Communities develop and implement LTCPs to meet water quality standards, including the designated uses and criteria to protect those uses for water bodies that receive CSO discharges. The CSO Control Policy recognized that substantial coordination and agreement among the permitting authority, water quality standards authority, the public, and the CSO community would be required to accomplish this objective. The CSO Control Policy also recognized that the development of the LTCP should be coordinated with the review and appropriate revision of water quality standards and their implementation procedures. EPA regulations and guidance provide states with some flexibility to adapt water quality standards and implementation procedures to reflect site-specific conditions, including those related to CSO discharges.

The CSO Control Policy highlights the flexibilities contained in EPA's water quality standards regulations. These include greater specificity in the definition of recreational and aquatic life uses, use modification, partial use designation, and water quality standards variances. EPA must approve or disapprove any change to water quality standards.

2.4.5 Enforcement and Compliance

The CSO enforcement effort described in the CSO Control Policy was to commence with an initiative to address CSOs that occur during dry

weather. This was to be followed by an enforcement effort in conjunction with CSO permitting:

> *Under the CWA, EPA can use several enforcement options to address permittees with CSOs. Those options directly applicable to this Policy are Section 308 Information Requests, Section 309(a) Administrative Orders, Section 309(g) Administrative Penalty Orders, Section 309(b) and (d) Civil Judicial Actions, and Section 504 Emergency Powers. NPDES states should use comparable means.*

EPA recognized that the success of the enforcement effort would depend on expeditious action by NPDES authorities in issuing enforceable permits with NMC requirements and other CWA requirements. Enforcement priorities were to be based upon human health impacts, environmental impacts, and impacts on sensitive areas.

2.5 Summary

Uncontrolled CSOs are a significant source of pollution. They adversely impact public health and the environment. Regulation of CSOs, however, has proven complex because of the intermittent character and site-specific nature of CSO discharges. In addition, unlike POTWs, CSOs are not subject to the CWA secondary treatment standards, but must comply with NPDES permits that include BCT and BAT requirements on a BPJ basis.

As a result of the 1984 National Municipal Policy, state and federal agencies brought hundreds of enforcement actions against municipalities for violations of the CWA. Several cases specifically addressed CSO problems. EPA's 1989 National CSO Control Strategy resulted in state-wide CSO permitting strategies and recommended six minimum measures for CSO control.

The CSO Control Policy was developed between 1992 and 1994. During this time, all parties expressed dissatisfaction with the lack of progress toward CSO control implementation. Stakeholders were strongly committed to developing a consensus-based document that would meet the challenge of guiding CSO facility permitting and control implementation into the 21st century.

The CSO Control Policy was developed to provide clear levels of control that would be presumed to meet appropriate health and environmental objectives. The CSO Control Policy, which dealt with many difficult technical and permitting issues, was innovative in the following ways:

- Recognizing the site-specific nature of CSOs.
- Providing flexibility to municipalities, especially financially disadvantaged municipalities, to determine the most cost-effective means of reducing pollutants and meeting CWA objectives and requirements.
- Recommending the use of the NMC in the form of best

management practices (BMPs) as the minimum technology-based requirements for CSOs.

- Expecting municipalities to develop and implement LTCPs to meet water quality standards, using either a demonstration or presumption approach as well as other CWA requirements.
- Expecting substantial public participation in the decision-making process.
- Giving highest priority to controlling overflows to sensitive areas.
- Expecting that the LTCP development process would be coordinated with the review and revision of water quality standards, as appropriate.
- Encouraging permitting authorities to evaluate water pollution control needs on a watershed basis and to coordinate CSO control efforts with other point and nonpoint source control activities.
- Prioritizing enforcement efforts to address CWA violations due to dry weather CSOs.

The CSO Control Policy was intended to guide the planning, selection, design, implementation, and enforcement of CSO management practices and controls to meet the requirements of the CWA. This report is designed to describe the progress made by EPA, states, and municipalities in meeting these objectives.

Chapter 3

Methodology for Development of the CSO Report to Congress

This chapter documents the methodology that EPA used to prepare this Report to Congress. It summarizes the steps EPA has taken to compile information on the status of the implementation and enforcement of the CSO Control Policy. The chapter lays out EPA's study objectives, analytical approaches, and data sources. It explains essential information collection methods and describes steps EPA took to involve stakeholders in the development of this report. The chapter summarizes quality assurance measures used to enhance the accuracy and precision of results.

3.1 Overview of Study Objectives and Approaches

The overall objective of the report was to accurately describe the nature and extent of activities by EPA, states, and municipalities to implement and enforce the CSO Control Policy. The basic study approach was to collect data and report on implementation and enforcement activities across EPA headquarters and the nine EPA regions and 32 states known to have CSO communities within their jurisdictions. The breadth of EPA and state activities (including policy and guidance development, permitting, implementation, compliance assistance, enforcement, training, research, development and information management activities, among others) made this an extensive undertaking.

EPA emphasized the collection of actual regulatory data from EPA regions and states rather than rely on information from centralized EPA databases and anecdotal data. EPA conducted file reviews and staff interviews in five regions and 16 states, reviewing permit and other regulatory files for over 90 percent of the CSO communities in the United States. EPA's approach was challenging because of the diversity in state CSO programs, but it greatly improved EPA's confidence in its assessment of implementation and enforcement status.

In this chapter:

Fishing contest in Oswego, New York, a CSO community that has implemented the NMC and structural controls, including a swirl concentrator and disinfection system.

Photo: P. MacNeill

A new line is installed as part of a sewer system separation project in New Brunswick, New Jersey.

Photo: NJ Department of Environmental Protection

EPA had developed and maintained a list of potential CSO communities since the late 1980s, but had not validated the list in the field with regions and states. This report afforded EPA the opportunity to evaluate this list, identify additional CSO communities, eliminate others, and compile a relational data base. EPA now has a solid baseline to use to track CSO activities of regions, states and CSO communities. EPA will use this data base for preparation of the second Report to Congress due in 2003. Data base documentation is provided in Appendix F.

EPA took an inclusive approach to preparing this report. The Agency believes that, since the CSO Control Policy had its genesis in intensive stakeholder consultations, it would be appropriate to solicit stakeholder input in evaluating progress to date. The Agency met with stakeholders early to communicate the goals and methods of the study, to offer stakeholders the opportunity to contribute data, and to invite their comments on preliminary findings.

With these objectives as a foundation, EPA undertook the following major study approaches to describe the status of implementation and enforcement of the CSO Control Policy:

- Compile information across EPA headquarters and regions to document major implementation and enforcement actions by EPA offices.
- Gather information from available NPDES authority files to confirm the CSO regulatory universe and to assess progress on a facility/permit-specific basis by communities in initiating CSO controls.
- Interview federal and state officials involved in water quality standards review, permitting, compliance assistance, and enforcement activities to augment the NPDES file data.
- Develop fact sheets describing each state's approach to CSO control and implementation and enforcement of the CSO Control Policy.
- Develop case studies of CSO communities to describe approaches used to address CSO-related problems, to identify successes in CSO control, to develop data on the effectiveness of CSO controls, and to document remaining challenges.
- Meet with interested stakeholders on report preparation, solicited data input, and invited comments on preliminary findings from stakeholders.
- Deliver the Report to Congress within nine months to meet the Congressional deadline.

In conducting this study, EPA found it imperative to focus on the specific Congressional objectives for this report, while at the same time laying the groundwork for the second Report to Congress on impacts, resources, and technologies due in 2003. Thus, this report retains its emphasis on assessing implementation and enforcement and provides only

preliminary insight into the environmental, technological, and resource implications of CSO control.

3.2 Data Sources

EPA developed a comprehensive list of potential sources of information that could be used to assess the implementation and enforcement of the CSO Control Policy. This list included information available from EPA; NPDES authorities and other state programs; CSO communities; and stakeholders such as AMSA, the CSO Partnership, NRDC, and the Water Environment Federation (WEF). The following sections describe the sources of information EPA used to develop this report.

3.2.1 National Data Sources

EPA researched its own files related to development, implementation and enforcement of the CSO Control Policy. EPA maintains a library of CSO-related documents and a chronological record of relevant memoranda and communications. EPA also maintains files with information submitted to the Agency by CSO communities, documenting local efforts to implement the CSO Control Policy. In addition, EPA has a compendium of water enforcement policy and guidance documents that contains several CSO-related documents.

EPA also looked to a number of existing data systems for CSO information. This included the Permits Compliance System (PCS), EPA's enforcement docket, and data bases supporting the Government Performance and Results Act (GPRA), the Clean Water Needs Survey (CWNS), the National Water Quality Inventory, and the State Revolving Fund (SRF). Lastly, EPA collected CSO data and research results from a wide range of EPA programmatic offices with activities affecting CSOs such as the Office of Research and Development, the Office of Groundwater and Drinking Water, the Office of Science and Technology, and the Office of Wetlands, Oceans, and Watersheds.

3.2.2 NPDES Authorities and Other State Program Files

Individual NPDES authorities and associated state programs were the primary sources of regulatory information used in this report. This data collection effort included an assessment of information contained in permit files and other documentation related to implementation and enforcement activities. EPA and its contractors conducted site visits to 16 states and five EPA regional offices. To select the most appropriate targets for these visits EPA established the following priorities:

- Maximizing the number of CSO permits reviewed.
- Ensuring geographic distribution across states and EPA regional offices.
- Capturing a range of permitting, compliance assistance, enforcement and water quality standards review experiences.

EPA collected permit number, information on the number and location of outfalls, and requirements for CSO controls for all CSO communities. This information was supplemented with municipal case studies to capture the varying degrees of progress in CSO control implementation.

Photo: Wilmington Department of Public Works

- Maximizing the number of major metropolitan centers for which data were collected.

To complete the national assessment of CSO Control Policy implementation and enforcement, EPA needed a baseline of specific data on the status of CSO permits in all states. This core information included:

- NPDES permit number
- Number of outfalls
- Status of requirements to develop and implement NMC and LTCPs

For states EPA was unable to visit, EPA summarized the information available in its own files and verified this information with the appropriate CSO coordinators in each region or state.

3.2.3 Community-level Data Sources

EPA supplemented information from NPDES authorities with municipal case studies to illustrate community-level implementation of the CSO Control Policy. CSO communities were selected for case study analysis to:

- Capture a range of programmatic experiences.
- Capture the varying degrees of implementation and progress in construction of controls achieved by communities.
- Document results of CSO control activities within the community.
- Ensure geographic distribution across states and EPA regional offices.

In addition, AMSA and a CSO community offered to develop case studies. EPA accepted these offers and provided AMSA and the community with the draft outline the Agency had developed for the case studies.

3.2.4 External Sources

In February and March of 2001, EPA met with representatives from key stakeholder groups including AMSA, the CSO Partnership, NRDC, and WEF. During these meetings, EPA presented an overview of the congressional directive to report on implementation and enforcement of the CSO Control Policy and the Agency's planned response. EPA then solicited feedback on the proposed approach. The comments and suggestions of the stakeholder groups were incorporated into the final methodology presented in this report, as appropriate.

AMSA and the CSO Partnership also conducted independent surveys of their members during the spring of 2001. The surveys focused on quantifying activities undertaken by CSO communities implementing the CSO Control Policy. Both AMSA and the CSO Partnership furnished EPA with the results of their surveys. A summary of the results of these surveys is provided in Appendix G.

3.3 Data Collection

The primary sources of data for this report were existing data in NPDES authority files and federal data bases, and data obtained directly from municipalities in support of community case studies. In

addition, EPA performed a comprehensive literature search, and applied national assessment models, where appropriate.

The following sections describe EPA's data collection efforts.

3.3.1 Assessment of EPA Efforts

EPA's first step in implementing the information collection strategy was to assess the information in its own files on development, implementation, and enforcement of the CSO Control Policy, including an extensive set of files on local communities' CSO issues.

EPA used the federal docket as its principal source of information on administrative and civil judicial actions taken to address CSO violations. EPA initially created reports listing all violations of CWA sections 301 and 402 and then isolated cases specifically addressing CSOs, overflows, bypasses, and dry-weather discharges. (The cases examined included those resulting from the NMP, the CWA, and the CSO Control Policy.) EPA also evaluated CSO-specific information in the Lexis-Nexis database and the Federal Register in order to compile the CSO enforcement action statistics discussed in Chapter 4.

EPA also relied on existing Agency data systems wherever possible. These include PCS, GPRA, the CWNS, the National Water Quality Inventory, and SRF. Information obtained from these data systems is described in Chapter 4.

3.3.2 Assessment of Efforts by NPDES Authorities and Other State Programs

EPA's next step in implementing the information collection strategy was a series of visits to NPDES authorities in 16 states and five EPA regional offices. These visits allowed EPA to access permit files for nearly 90 percent of the CSO communities nationwide. EPA visited the following states and regions:

- California
- Georgia
- Illinois
- Indiana
- Iowa
- Kentucky
- Maine
- Massachusetts
- Michigan
- New Jersey
- New York
- Ohio
- Pennsylvania (three of six state regional offices)
- Vermont
- Washington
- West Virginia
- Region 1 (NPDES authority for Massachusetts, New Hampshire)

- Region 3 (NPDES authority for Washington, DC)
- Region 4
- Region 9 (NPDES co-permitting authority for City of San Francisco's CSOs)
- Region 10 (NPDES authority for Alaska)

During visits to regional offices, EPA also reviewed available CSO permit files for states not visited. Each visit to a state or EPA regional office began with a discussion with the CSO coordinator and other staff (typically water quality standards and enforcement officials) involved in the permitting of CSOs. In the interview, EPA collected general information on the NPDES authority's approach to CSO control, such as:

- Efforts to incorporate the CSO Control Policy into the permitting authority's existing programmatic framework.
- Established CSO-related policies or strategies.
- Activities to integrate water quality standards reviews with CSO control planning.
- Data management techniques.

After completing the discussion, EPA and its contractors reviewed CSO permit files and documentation of NMC and LTCP activities submitted to the NPDES authority. EPA used field data sheets to guide the discussions and file review process, and to ensure consistency in the information collected in each locale. The field data sheets are included in this report as Appendix H.

EPA also spoke with state and EPA regional staff to obtain CSO and NPDES inspection information. These data were supplemented with and checked against state and regional inspection information posted on the Internet, and reviews of inspection information in PCS and the federal docket.

3.3.3 Assessment of Community Efforts

Based on information collected during site visits and internal file review, EPA identified eight CSO communities for case study development. The case studies were selected to highlight a range of programmatic experiences and to reflect geographic diversity. EPA worked with the relevant NPDES authority to identify an appropriate contact in each CSO community selected as a case study.

EPA and its contractors then contacted an appropriate official in each community to seek support for case study development. Seven officials agreed to assist in development of case studies, and EPA identified an additional community to replace the one that declined.

EPA developed case studies of the following CSO programs:

- Bremerton, Washington
- Burlington, Iowa
- Muncie, Indiana
- North Bergen, New Jersey

- Randolph, Vermont
- Saginaw, Michigan
- South Portland, Maine
- Wheeling, West Virginia

The appropriate NPDES authority and EPA regional office reviewed each case study to ensure accuracy.

In addition, AMSA and one other CSO community contacted EPA and offered to assist in development of case studies. EPA accepted these offers, bringing the total number of municipal case studies to 17. The additional case studies were:

- Atlanta, Georgia
- Chicago, Illinois
- Columbus, Georgia
- Louisville and Jefferson County Municipal Sewer District, Kentucky
- Massachusetts Water Resources Authority, Boston, Massachusetts
- Richmond, Virginia
- Rouge River, Michigan
- San Francisco, California
- Washington, DC

The case studies appear in Appendix C of this report.

3.3.4 CSO Surveys from AMSA and the CSO Partnership

AMSA and the CSO Partnership surveyed their members during the spring of 2001 and furnished the anonymous results of these surveys to EPA. AMSA estimates that 58 of their members have combined sewer systems. AMSA received 27 responses to the survey, which was distributed to only those communities with combined sewers —a response rate of 47 percent. AMSA indicated that one respondent also completed the survey conducted by the CSO Partnership, and flagged those responses accordingly. The CSO Partnership, which has approximately 85 members, distributed its survey to its entire membership. The CSO Partnership received 23 responses, a response rate of 27 percent.

The surveys focused on quantifying communities' activities to implement the CSO Control Policy, and benefits attributed to CSO control. Although the surveys were conducted independently, a number of questions were duplicative. EPA combined the responses for duplicate questions, effectively doubling the response rate for those questions. Additional information on these surveys is provided in Appendix G.

EPA completed case studies of 17 community CSO control programs, including Atlanta, Georgia. As part of its LTCP, Atlanta is replacing a significant portion of its combined systems with new separate tunnels.

Photo: Atlanta Department of Public Works

3.4 Stakeholder Involvement

In July 2001, a facilitated stakeholder meeting was held in Chicago, Illinois. Participants included original members of the MAG and other CSO experts from EPA regions, states, CSO communities

and consultants, and local and national environmental groups. The purpose of the meeting was to:

- Provide a preliminary description of the report's methodology and findings.
- Discuss the implications of findings.
- Collect and share lessons learned from implementers of CSO controls.

EPA presented preliminary data and findings and held facilitated discussions regarding data sources, data interpretation, tone, and received input on the context around which these findings should be viewed. A summary of the meeting is included in Appendix I of this report.

Floatables control facility in North Bergen, New Jersey.

Photo: NJ Department of Environmental Protection

3.5 Data Considerations

Implementation of the information collection strategy identified several important data considerations. First, each NPDES permitting authority clearly had taken a somewhat different approach to integrating the CSO Control Policy into its existing programmatic and regulatory framework. For example, certain NPDES permitting authorities had CSO-related permit requirements that predated the CSO Control Policy. Although these permit requirements were often similar to NMC and LTCP requirements outlined in the CSO Control Policy, they were not necessarily identical. Further, few NPDES authorities immediately modified existing requirements when the CSO Control Policy was issued in 1994. EPA also found that some NPDES authorities required CSO controls outside the framework prescribed by the CSO Control Policy. These actions led to considerable variability in both terminology and actual permit requirements used to require CSO control. Therefore, a methodological challenge that EPA confronted throughout the development of this report was the selective merging of data from different programs to arrive at meaningful national estimates that accurately reflect efforts to control CSOs and implementation of the components of the CSO Control Policy.

A second consideration was that CSO reporting requirements were specific to the NPDES authority. For example, some NPDES authorities require CSO communities to submit annual reports on NMC and LTCP implementation activities. In contrast, others require only a single report to document NMC implementation, with little documentation of LTCP implementation activities prior to post-construction compliance monitoring.

Another data consideration was determining if progress in controlling CSOs was associated with implementation of the CSO Control Policy or should be more appropriately linked to pre-existing federal or state initiatives such as the NMP, state strategies emanating from the National CSO Control Strategy, or specific enforcement actions. In the final analysis, EPA concluded that attribution was far less important than optimizing the capture of all

meaningful results. Since the clear intent behind the CSO Control Policy was not to disrupt ongoing control efforts, EPA concluded that it should include any documented results of progress in controlling CSOs independent of the date of initiation of the control effort.

The final consideration was that most NPDES authorities have no data available on the annual volume, frequency, and duration of CSO discharges. Moreover, data on water quality improvements specifically attributable to CSO control efforts were absent in the NPDES authorities' files. This complicated EPA's assessment of the effectiveness of, and environmental benefits derived from, CSO control. EPA anticipates that this type of detailed information will be the focus of the December 2003 Report to Congress required by Section 112(d)(1) of P.L. 106-554.

Although the above considerations shaped the approach used to develop this report, the basic objective—to determine the status of implementation and enforcement of the CSO Control Policy—never varied.

3.6 Quality Control and Quality Assurance

A detailed data verification and interpretation process followed the data collection effort. Data sets were evaluated for missing and inconsistent information in accordance with a data collection and reporting quality assurance and control protocol. Summary reports from file reviews were prepared and distributed to appropriate EPA region and state CSO coordinators. In addition, each coordinator received a copy of the profile EPA developed for his or her state or regional program. Follow-up phone calls to each coordinator verified the accuracy and completeness of EPA's records used to develop the state profiles. Likewise, each municipal case study was reviewed by community officials and the appropriate state and EPA regional authorities.

Data from the AMSA and CSO Partnership surveys was not obtained directly by EPA, and hence was not subject to the same quality control as the EPA data.

3.7 Summary

Chapters 4 through 6 provide a detailed assessment of the data and materials collected in support of this report. The assessment includes:

- A broad national evaluation of federal, state, and municipal activities related to the implementation and enforcement of the CSO Control Policy.
- State fact sheets to describe activities of the 32 states with CSO communities.
- Detailed municipal case studies to illustrate community-level activities.

A bibliography of principle data sources appears at the end of this report.

Chapter 4

CSO Control Policy Status: EPA

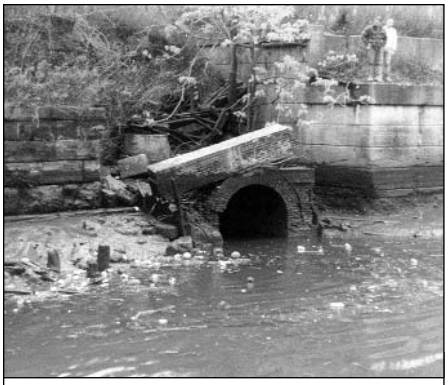
4.1 General Activities to Support CSO Control Policy Implementation

As described in Chapter 2 of this report, EPA's 1994 CSO Control Policy is designed to ensure that CSO controls meet the requirements of the CWA and are cost-effective. Under the CWA, any facility that discharges pollutants from a point source into waters of the United States must obtain an NPDES permit. NPDES permits must contain requirements based on treatment technology performance, but more stringent requirements may be imposed when technology-based requirements are insufficient to provide for attainment of water quality standards in receiving waters. The CWA authorizes EPA to implement the NPDES permit program or to authorize states, territories, or tribes to do so.

To ensure that the goals of the CWA are met, EPA is responsible for a number of activities, including:

- Developing new regulations or modifying existing regulations.
- Interpreting regulatory requirements and initiatives through policy as needed.
- Developing guidance documents and other forms of technical assistance.
- Communicating and coordinating with stakeholders.
- Providing program compliance and enforcement assistance.
- Providing financial assistance.
- Monitoring compliance status and targeting facilities for follow-up.
- Tracking environmental benefits from program implementation and enforcement.
- Managing information pertaining to the status of implementation and enforcement activities.

In this chapter:



Addressing deteriorating infrastructure, such as this crumbling CSO outfall, is one aspect of most CSO control programs.

Photo: NJ Department of Environmental Protection

- Providing general oversight for implementation and enforcement of the NPDES program.
- Reviewing state-issued NPDES permits and issuing NPDES permits in states not authorized to do so.
- Approving water quality standards.
- Commencing enforcement activities as appropriate.
- Promoting research and development.
- Promulgating water quality standards when states fail to do so.

EPA's Office of Water (OW) and Office of Enforcement and Compliance Assurance (OECA) share oversight responsibility for implementation and enforcement of the CSO Control Policy. Since issuing the CSO Control Policy in 1994, EPA has worked to interpret the Policy and ensure implementation by EPA regions and states. To this end, EPA has issued three memoranda to promote more effective implementation of the CSO Control Policy. The memoranda, summarized below, are provided in Appendix A.

- **CSO Deadline Memorandum**. On November 18, 1996, EPA issued a memorandum titled "January 1, 1997 Deadline for Nine Minimum Controls in Combined Sewer Overflow Control Policy." This document alerted EPA Water Management Division Directors, Regional Counsels, and Regional State Directors to the January 1, 1997, deadline for implementation of the NMC. The memorandum also specified that the first phase of implementation included development of an LTCP for CSOs to provide for attainment of water quality standards. EPA also stated that its approach of not seeking civil penalties for past CSO violations (as described in the CSO Control Policy) would not apply unless permittees implemented the NMC by January 1, 1997. The Agency further noted that OW intended to track implementation (during FY 1997) through a program performance plan developed under the GPRA (see related discussion in Section 4.7.2 of this report).
- **CSO Implementation Memorandum**. On May 19, 1998, EPA issued "Implementation of the CSO Control Policy." This memorandum discussed implementation of the CSO Control Policy and identified areas where increased efforts were deemed necessary. The memorandum observed that, although stakeholders continued to affirm the CSO Control Policy's key themes and EPA continued to work with stakeholders to foster implementation, numerous implementation challenges remained. The memorandum discussed implementation of the NMC, development of LTCPs, achievement of water quality standards, and measurement of program performance.

- **Water Quality- and Technology-Based CSO Requirements Memorandum**. On July 7, 1999, EPA issued "Water Quality-Based and Technology-Based CSO Requirements." This memorandum discussed water quality-based requirements; technology-based requirements; and coordination of enforcement, permitting, and water quality programs in enforcement cases.

The remainder of this chapter describes activities EPA has undertaken to ensure that CSO communities and NPDES authorities fully implement the CSO Control Policy. Information related to the activities of EPA regions as the permitting authority in non-authorized states is provided in Chapter 5.

4.2 NPDES Permitting

Under the NPDES permit program, any discharge of pollutants to waters of the United States must be authorized by an NPDES permit. Permits are issued to dischargers by EPA regional offices, or by states or territories or tribes authorized by EPA to administer a state permitting program that meets minimum federal requirements. To date, EPA has authorized 44 states and one territory to administer the NPDES program. EPA remains the permitting authority in the remaining six states (Alaska, Arizona, Idaho, Massachusetts, New Hampshire, and New Mexico), the District of Columbia, all U.S. territories (except the U.S. Virgin Islands), and all Federal Indian Reservations.

4.2.1 EPA Headquarters Responsibilities and Activities

EPA headquarters provides legal and technical support at the national level and is responsible for ensuring that the NPDES permit program is successfully implemented. EPA provides technical tools, training, and contract support to promote the issuance of timely and high-quality NPDES permits; tracks, manages, and reports permit issuance data; and evaluates and reports on the quality of permits across all EPA regions and authorized NPDES states. The activities described in Chapter 4 are related to EPA's efforts to address proper implementation of the CSO Control Policy.

Permit Quality Management

The Water Permits Division (WPD) of EPA's Office of Wastewater Management (OWM) recently developed several draft management tools for use by EPA regions and authorized states to ensure NPDES permit quality. These draft tools include central tenets of the NPDES permit program and a municipal permit review checklist, both of which include provisions that evaluate agreement with the CSO Control Policy. These draft tools are available at WPD's web site at www.epa.gov/npdes/issuance. In addition, WPD periodically conducts evaluations of permit quality in EPA regions and states. The evaluations assess implementation of the CSO Control Policy where applicable.

Revised NPDES Permit Application Form for Municipal Discharges

In 1999, EPA developed and issued a new "Form 2A" permit application for the discharge of municipal wastewater from a POTW at 40 CFR 122.21(j) (and associated regulations). A section in the new Form 2A is devoted to treatment works with CSSs and is designed to provide NPDES permit writers with information related to CSOs. In particular, the applicant is required to provide a description of the system; locate each CSO discharge point or outfall; document the outfall events (frequency, duration, and volume); describe the receiving waters that might be impacted; and describe any known water quality impacts caused by CSOs.

4.2.2 EPA Regional Office Responsibilities and Activities

For those states authorized to administer the NPDES program, EPA retains a program oversight role. The extent and type of interaction between an authorized state and an EPA region, including the types of NPDES permits to be reviewed, is typically summarized in a memorandum of understanding. In this oversight role, EPA ensures that NPDES permits issued by authorized states meet program requirements, including CSO requirements, and that state administration of the NPDES program is consistent with federal requirements. Two EPA regional offices have issued NPDES permit policies or strategies specific to CSO Control, as described below.

Region 1: NPDES Permit Policy

In July 1996, Region 1 issued modified fact sheet language, permit language, and guidance to implement the CSO Control Policy. The modified documents closely follow the NMC and LTCP elements of the CSO Control Policy. Region 1 issues NPDES permits in Massachusetts and New Hampshire. Until early 2001, Region 1 was also the permitting authority for Maine.

Region 5: NPDES Permit Strategy for Combined Sewer Systems

Issued in 1985, Region 5's strategy outlined a phased approach to implementation of CSO controls. Region 5 encouraged states to prioritize dischargers with combined sewer systems and to incorporate best management practices into permits. Under this strategy, dischargers causing significant water quality problems are targeted for additional controls. Many of the provisions outlined in Region 5's strategy served as bases for the 1989 National CSO Control Strategy.

4.3 Water Quality Standards

The CWA establishes the statutory framework governing the development of water quality standards and their use. The CWA requirements for water quality standards are further elaborated by EPA regulations for the program, found at 40 CFR 131. CWA Section 402(a) specifically requires NPDES permits to provide for the attainment of water quality standards.

State water quality standards must protect public health and the environment by enhancing and maintaining the quality of the water. To protect the uses designated in their water quality standards, states adopt: (1) a suite of criteria to protect the most sensitive of the designated uses; and (2) an anti-degradation policy including implementation procedures to protect water quality. However, states have considerable discretion to tailor water quality standards to particular climatic, hydrologic, and seasonal conditions. EPA regulations and guidance provide states with the flexibility to adapt their water quality standards and implementation procedures to reflect site-specific conditions, including those related to CSOs. EPA's Office of Water issued *Guidance for Coordinating CSO Long-Term Control Planning with Water Quality Standards Reviews*. This guidance describes the specific ways in which states may exercise their flexibility for water quality standards review in conjunction with development and implementation of LTCPs by CSO communities.

4.3.1 Section 303(d) and the Total Maximum Daily Load Program

Under CWA Section 303(d), states identify waters not attaining water quality standards, submit a list to EPA of those impaired waters, and develop TMDLs for them. EPA is responsible for approving or disapproving state impaired waters lists and TMDLs, and for establishing lists and TMDLs in the case of disapproval. Table 4.1 summarizes waters identified as impaired by CSOs or urban runoff in 1996 and 1998 assessments by states with active CSO permits. Information on segments impaired by urban runoff is included because not all states separate CSO impairments from those caused by urban runoff.

Based on information supplied by states as part of their list of impaired waters, CSOs have been found to contribute to non-attainment of water quality standards, particularly in urbanized areas. The contribution of pathogens in quantities that exceed water quality standards is of particular concern for CSOs.

In January 2001, the EPA Office of Wetlands, Oceans and Watersheds (OWOW) published a *Protocol for Developing Pathogen TMDLs* (EPA, 2001a) to reduce confusion arising from the complexity of developing TMDLs for pathogens. This protocol identifies CSOs as one of several categories of major point sources discharging pathogens to surface waters. The protocol notes that CSOs contribute significant pathogen loads during storm events. In addition, the protocol indicates that modeling CSO

San Francisco Bay and the Golden Gate Bridge are considered local and national treasures. San Francisco initiated CSO controls in the 1970s and has made significant improvements to local water quality.

Photo: Photodisc

Table 4.1

Summary of 303(d) List Impaired Waters in States With CSOs

Information on segments impaired by urban runoff is included because not all states separate CSO and urban runoff impairments.

Year	Segments Assessed	Impaired by CSOs	Impaired by Urban Runoff
1996	10,552	140	652
1998	15,598	150	1,233

impacts can be difficult due to the intermittent nature of pathogen loadings from CSOs and associated data limitations. The protocol acknowledges that the CSO Control Policy takes this into account through use of the presumption and demonstration approaches.

4.3.2 Section 305(b) and the National Water Quality Inventory Report to Congress

EPA established the CWA Section 305(b) program to inventory the health of waters of the United States. This program relies on states to assess representative subsets of their waters and to report on the causes of impairment, if any. The data generated by the 305(b) program are tabulated and made available to the public through STORET. The data were used to prepare the biennial *National Water Quality Inventory Report to Congress* from 1976 to 1998.

The *National Water Quality Inventory Report to Congress* is EPA's primary vehicle for informing Congress and the public about the quality of the nation's rivers, lakes, wetlands, estuaries, coastal waters, and ground waters, along with information on public health and aquatic life concerns. CSOs have been documented as a source of water quality impairment in each report. The most recent (1998) assessment of water quality impairment attributable to CSOs is summarized in Table 4.2.

Notwithstanding the limitations of state resources to fully assess all water, the subset captured in the 305(b) inventory and its associated water quality report will remain an important tool in assessing the progress in reducing impairment associated with CSOs.

One of the goals of EPA's water compliance and enforcement program is to ensure compliance with the CWA for point source discharges.

Photo: NJ Department of Environmental Protection

4.4 Compliance and Enforcement

The goal of EPA's water compliance and enforcement program is to ensure compliance with the CWA. EPA uses a systematic approach to meet five major objectives: provide compliance assistance tools and information to the regulated community, identify instances of noncompliance, return the violator to compliance, recover any

Table 4.2

Extent of CSOs as a Source of Impairment

Impairment attributed to CSOs in *National Water Quality Inventory - 1998 Report to Congress* (EPA, 2000a)

Water Body Category	Impairment Attributed to CSOs
Rivers and Streams	● 842,426 of 3,662,255 total miles of rivers and streams assessed ● CSOs were not a leading source of river and stream impairment
Estuary	● 28,687 of 90,465 total square miles of estuaries assessed ● 12,622 square miles are impaired for one or more uses ● 1,451 square miles of impaired estuaries are impaired by CSOs
Ocean Shoreline	● 3,130 of 66,645 of shoreline assessed ● CSOs were not a leading source of ocean impairment
Great Lakes Shoreline	● 4,950 of 5,521 total miles of shoreline assessed ● 4,752 miles of shoreline are impaired for one or more uses ● 102 miles of impaired shoreline are impaired by CSOs

economic advantage obtained by the violator's noncompliance, and deter other regulated facilities from noncompliance.

4.4.1 General NPDES Compliance and Enforcement Process

EPA maintains an inventory of NPDES point source dischargers in its Permit Compliance System (PCS). NPDES authorities enter facility information, permit requirements, self-monitoring data, inspection results, and enforcement action information into PCS. Region or state personnel identify violations by reviewing facility self-monitoring data, inspecting facilities, and investigating citizen complaints. The same personnel determine appropriate follow-up action to noncompliance. EPA's national enforcement guidance, Enforcement Management System, recommends using a scaled response to noncompliance considering such factors as the nature, frequency, and severity of the violation, potential harm to public health and the environment, and the compliance history of the facility. EPA's enforcement response guidelines range from an informal action such as a telephone call or warning letter to a formal administrative or civil judicial action.

4.4.2 National Compliance and Enforcement Priorities

With input from stakeholders such as regions and states, EPA has identified CSOs as a national enforcement priority since FY 1998. For FY 2002 and 2003, based on feedback from stakeholders, EPA issued a Federal Register notice soliciting comments on a draft list of 15 suggested priorities. The resulting list of priorities included retaining "wet weather" (i.e., CSOs, sanitary sewer overflows, storm water, and concentrated animal operations) as a national enforcement priority for FY 2002 and 2003. EPA is developing better measures to determine the results of compliance and enforcement activities in the national priority areas.

EPA's *Memorandum of Agreement (MOA) Guidance* (EPA, 2001b) serves as the basis for developing individual agreements between EPA headquarters and regions to enforce national priorities. Through the MOA process, EPA headquarters and regions outline relevant enforcement priorities, region-specific goals, and available enforcement tools for the two upcoming fiscal years. The FY 2000 and 2001 MOA recommended that regions assess CSO communities' implementation of the NMC and LTCPs, provide compliance assistance, and ensure that compliance schedules are met. The FY 2002 and 2003 MOA recommends that EPA regions continue to implement their compliance and enforcement response plans, which were to have been submitted pursuant to the *Compliance and Enforcement Strategy Addressing Combined Sewer Overflows and Sanitary Overflows*, described below.

4.4.3 NPDES Compliance and Enforcement Activities

Policies and Strategies

On April 27, 2000, EPA issued the *Compliance and Enforcement Strategy Addressing Combined Sewer Overflows and Sanitary Sewer Overflows*, requiring regions to submit

compliance and enforcement response plans (ERPs) within 60 days. The 2000 Strategy is intended to facilitate regional implementation and enforcement of the CSO Control Policy. The 2000 Strategy recommends that individual plans include a systematic approach to assess the current compliance status of each CSO permittee, including determining whether:

- The existing NPDES permits and administrative orders are properly written to require implementation of the NMC and development of an LTCP.
- The permittee is implementing the NMC.
- The permittee is developing an LTCP to comply with all CWA requirements.
- The permittee is implementing an LTCP.

ERPs should include a process and timetable for the region or state to inspect all CSO permittees by the end of FY 2001 and to take appropriate follow-up action. The 2000 Strategy suggests priorities that regions should consider in targeting enforcement efforts, such as: elimination of dry weather CSOs; beach and shellfish bed closures resulting from CSOs; source water protection; impaired watersheds and other sensitive areas; failure to implement the NMC and develop an LTCP; and failure to correct noncompliance with CSO provisions in a permit or an enforcement action.

The 2000 Strategy describes priorities for compliance assistance in small communities and available compliance assistance tools, such as the Local Government Environmental Assistance Network (LGEAN), which is described in more detail in Section 4.5.3 of this report. The 2000 Strategy also describes enforcement activities that regions may undertake in order to encourage implementation of CSO controls. These actions, which can be implemented in accordance with CWA Sections 308, 309, and 504, include notices of violation, administrative actions, and civil judicial actions.

To date, EPA headquarters has received ERPs from a majority of the regions with CSOs. The available regional ERPs vary in level of detail. Some outline an inspection program for compliance determination, while others depend on reporting from the regulated community. In other instances, the regional role for CSO enforcement consists of oversight and assistance in cases of significant noncompliance. Priorities for enforcement actions range from targeting facilities with persistent violations to protecting sensitive watersheds. Not all plans explicitly describe regional priorities for determining cases in which compliance assistance might be appropriate. In addition, not all the ERPs describe NPDES state enforcement activities. EPA headquarters is evaluating the substantive content of the ERPs.

Audit Policy

EPA's audit policy, formally known as *Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations* (65 FR 19618, April 11, 2000), was developed as an incentive for facilities to conduct self-audits to determine compliance with environmental laws. When applicable, the policy eliminates "gravity-based" penalties (penalties assessed based on the characteristics and consequences of the effluent violation) for facilities that voluntarily discover, promptly disclose, and expeditiously correct violations of federal environmental law. As of June 2001, no municipalities have used this policy, but it remains an option.

Inspections and Compliance Monitoring

CWA Section 308(a)(4)(B) authorizes EPA to conduct inspections at point sources. Most inspections are performed by authorized NPDES states. EPA headquarters conducts inspections when a case is particularly complex and additional resources are needed, when a case is of national significance, or when a case involves several jurisdictions. CSOs can be addressed as part of a broader NPDES inspection or as a targeted, CSO-specific inspection. The steps involved in conducting each type of inspection are nearly identical, although the CSO-specific inspection may include a review of all CSO data, verification of implementation of the NMC and development or implementation of an LTCP, a visit to the CSO outfalls, and use of a detailed CSO checklist of questions. Regional approaches to CSO inspections vary.

- Region 1 participates in joint inspections with states, as well as conducting its own, independent CSO inspections. Regional involvement is prompted if the region is checking an aspect of an LTCP or if it is a complex case. The region has no CSO-specific inspector training program, but does have a CSO checklist. Region 1 tracks all data in PCS and uses an independent tracking system to monitor CSO communities. The region also conducts quarterly meetings and teleconferences with the states to discuss instances of significant noncompliance and CSO issues.

- Region 2 tracks and oversees state CSO programs. Most inspections are conducted by the states. The region also conducts quarterly meetings and teleconferences with states to discuss instances of significant noncompliance.

- Region 3 conducts inspections under its CSO strategy for FY 2001, which addresses both enforcement and compliance assistance efforts. Using several criteria, including stream impairment, number of CSO outfalls, history of flow-limit violations, and citizen complaints, Region 3 targeted 35 CSO communities for inspection in FY 2001. As of October 2000, the region had conducted 14 CSO inspections, in addition to basic compliance-evaluation or pretreatment inspections at CSO facilities. The region expects to complete the remaining 21 inspections by the end of FY 2001.

Region 2 tracks and oversees state CSO programs. The State of New Jersey conducts the inspections of CSO facilities, including this new separated sewer tunnel in New Brunswick.

Photo: NJ Department of Environmental Protection

The region also holds quarterly conference calls with states to discuss issues of significant non-compliance that states encounter in their inspections.

Region 3 developed guidance for conducting inspections of combined sewer systems. This guidance outlines the elements of a CSO inspection and suggests questions inspectors might address during an inspection, with specific regard to NMC compliance.

- Region 4 has conducted several inspections in its states but, for the most part, defers to its states for inspections and relies on them to verify that all CSO facilities are in compliance. The region conducts annual reviews of state inspection processes to ensure that the inspectors are addressing all relevant aspects of CSO control.

- Region 5 assists states in conducting CSO inspections and basic NPDES wet weather compliance inspections. The region has an annual agreement with the states to conduct a certain number of inspections, and the states conduct annual CSO inspections within budget limitations, so that Region 5 can meet the desired goal of 100-percent coverage by the end of FY 2002. The region selects facilities for CSO inspections for a number of reasons, including compliance assistance (technical transfer), noncompliance, and enforcement support, consistent with the region's *Wet Weather CSO/SSO Compliance Enforcement Strategy*.

  The region holds quarterly noncompliance phone calls, from which the region's *Quarterly Noncompliance Report* is created. Region 5's CSO checklist, which it developed in 1994, is shared with the states. The region conducts a series of state wet weather inspector training programs leading to CSO inspector certification and conducts this training in the states. The region tracks all inspection activities by entering final inspection reports in PCS.

- Region 7 oversees most CSO inspections and has also conducted seven regional CSO inspections in the past two years and has scheduled several for FY 2002. The region issues CWA Section 308 information requests asking communities to clarify their NMC and LTCP implementation status as another method of compliance assurance. The region holds quarterly meetings with states to discuss CSO implementation and enforcement as states continue to finalize strategies and plans for CSO control.

- Region 8 oversees inspections conducted for CSO communities in the region.

- Region 9 oversees inspections conducted by California for the two CSO communities in the region.

- Region 10 is the NPDES authority in Alaska and recently completed a CSO inspection there. The region plays an oversight role in Oregon and Washington. The region usually defers to the states, but still conducts inspections and recently completed a CSO inspection in Oregon. Region 10's CSO inspections are targeted based on citizen complaints, the volume of potential CSO discharges, and information on potential violations. The region is working on a more concise version of its CSO inspection checklist.

Enforcement Actions

The CSO Control Policy recommends enforcement options to address CSO permit violations. The Federal Docket, Federal Register, and the Lexis-Nexis legal data base were used to compile data concerning EPA-initiated enforcement actions with CSO violations commenced after the CSO Control Policy. This research revealed several cases initiated as the result of the CWA or the CSO Control Policy.

Five judicial enforcement actions brought against municipalities in Regions 1, 3, 4, and 5 as a result of CSO violations are summarized in Appendix J. The enforcement actions were outgrowths of violations of the CWA, NPDES permits, or inadequate CSO control plans. Each case resulted in the issuance of consent decrees; financial penalties up to $3.2 million were assessed.

Thirty-two administrative CSO actions filed against municipalities in response to CSO violations are also listed in Appendix J. Twenty-eight cases occurred in Region 1, and four occurred in Region 5. The outcomes of these enforcement actions included issuance of administrative compliance orders, administrative penalty orders, and a judicial referral.

This number of cases is an estimate, based on the best information currently available, and may not include all actions taken to enforce the CSO Control Policy.

Examples of CSO Enforcement Activities

Atlanta, Georgia

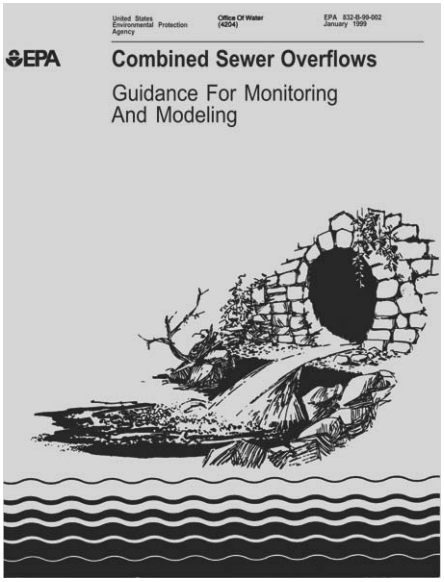
EPA and the State of Georgia consolidated enforcement efforts with citizen plaintiffs in the case of Upper Chattahoochee Riverkeeper Fund, Inc., et. al. v. the City of Atlanta. The City had violated NPDES permit requirements due to CSOs. Atlanta also had SSO, operation and maintenance, effluent limit, and pretreatment violations.

To resolve the CSO portion of the case, Atlanta agreed to implement a phased remedial action plan to: evaluate the character of CSO discharges; develop remedial measures to bring CSO discharges into compliance; and implement remedial measures by July 1, 2007.

Atlanta's preferred approach of storage and treatment will be compared with other alternatives such as sewer separation. EPA and Georgia will authorize the City to implement the final remedy. Other terms of the overall settlement include a $3.2 million total cash penalty, and implementation of a

EPA and the State of Georgia consolidated enforcement efforts to resolve CSO and other water quality violations in Atlanta. This new sewer tunnel is part of the city's remedial action plan.

Photo: City of Atlanta Department of Public Works



$27.5 million supplemental environmental project to create a greenway corridor and conduct a one-time clean-up along selected streams by March 31, 2007. This action followed 1992 and 1999 state fines totaling $20.7 million for previous delays in CSO abatement.

Hammond, Indiana

The federal government originally filed suit in 1993 against the Hammond Sanitary District. The resultant consent decree resolved claims that the Sanitary District, including the City of Hammond and the Town of Munster, were responsible for more than 19,000 violations of the CWA and the Rivers and Harbors Act through the discharge of untreated and improperly treated sewage into the west branch of the Grand Calumet River.

The settlement was reached after three consent decrees—one for the Town of Munster, one for the Hammond Sanitary District, and one for the City of Hammond—were lodged in April 1999. The settlement included a $2.1 million contribution to the Grand Calumet River Restoration Fund for sediment cleanup and $34 million in improvements to the sewer system, including storage and treatment systems for wet weather flows, pump station upgrades, sewer interceptors, sewer separation, sludge lagoon closures, and the implementation of a program to remove residential downspout connections to the sewer system.

In addition, the Hammond Sanitary District was required to pay $225,000 in cash penalties, split equally between the United States and the State of Indiana.

Port Clinton, Ohio

The City of Port Clinton experienced CSOs that contributed to beach closures associated with high levels of fecal coliform. A consent decree lodged in 1999 required Port Clinton to implement a program to inspect and sample its outfalls immediately following CSO events, establish a beach sampling program, develop a public information system (e.g., posting of warning signs) to protect human health, and develop and implement a plan to permanently improve or close CSO structures no later than June 1, 2000. In addition, Port Clinton was required to pay a $60,000 civil penalty. The settlement will protect water quality and beneficial uses, increase available data from CSOs, and raise local awareness regarding CSOs and water quality.

4.5 Guidance, Training, and Compliance and Technical Assistance

Since issuing the CSO Control Policy in 1994, EPA has developed and distributed information and technical resources needed by communities, permit writers, and other stakeholders to implement effective CSO controls. These resources include guidance

documents and compliance assistance tools like information sharing resources, training, research, and other technical materials.

4.5.1 Guidance

CSO Implementation Guidance

EPA developed and published eight guidance documents to assist municipalities, permitting authorities, and engineers in designing and implementing CSO controls in a manner consistent with the CSO Control Policy. Collectively, these guidance documents address the range of issues presented by CSOs, including implementation of the NMC, development of LTCPs, NPDES permitting, monitoring and modeling, funding options, and schedule development.

Table 4.3 describes the CSO guidance documents published by EPA. These documents are available through EPA's website, www.epa.gov/npdes/cso, as well as through NTIS.

In addition to the guidance developed by EPA headquarters, at least one EPA region also issued CSO guidance. Specifically, Region 3 issued *Guidance for Minimum Technology-Based CSO Control Measures* in April 1993 to provide interim guidance on applying the NMC while EPA headquarters finalized the CSO Control Policy. The Region 3 guidance presents low-cost

Table 4.3

EPA CSO Guidance Documents

These documents are available through EPA's website, www.epa.gov/npdes/cso and through NTIS.

Title of CSO Guidance	Document Information	Overview
Guidance for Nine Minimum Controls	EPA 832-B-95-003 (EPA, 1995b)	Describes and explains specific minimum controls that communities are expected to use to address CSO issues before LTCPs are implemented.
Guidance for Screening and Ranking	EPA 832-B-95-004 (EPA, 1995c)	Presents an informal tool designed to assist permitting authorities in establishing CSO permitting priorities.
Guidance for Funding Options	EPA 832-B-95-007 (EPA, 1995d)	Describes the options available for funding the capital, debt service, and operational costs of new or improved CSO controls.
Guidance for Permit Writers	EPA 832-B-95-008 (EPA, 1995e)	Intended for permitting authorities and permit writers. Provides guidance on how to develop and issue NPDES permits with CSO conditions that reflect the expectations of the CSO Control Policy.
Guidance for an LTCP	EPA 832-B-95-002 (EPA, 1995f)	Outlines how municipalities can develop comprehensive long-term plans that acknowledge the site-specific nature of its CSOs and its impact on local water quality.
Guidance on Financial Capability Assessment and Schedule Development	EPA 832-B-97-004 (EPA, 1997a)	Describes how a community's financial capability, along with other factors discussed in the CSO Control Policy, may be used to negotiate reasonable compliance schedules for implementation of CSO controls.
Guidance for Monitoring and Modeling	EPA 832-B-99-002 (EPA, 1999a)	Explains the role of monitoring and modeling in the development and implementation of an LTCP.
Guidance for Coordinating CSO Long-Term Control Planning With Water Quality Standards Reviews	EPA 833-D-00-002 (EPA, 2001)	Describes a process for facilitating integration of LTCP development and implementation with water quality standards reviews.

Guidance: Coordinating Long-term Planning with Water Quality Standards Reviews suggests that physical alterations, as shown in this photo, may justify the need for a review of applicable water quality standards.

Photo: City of Atlanta Department of Public Works

methods of identifying control measures that have remained useful even with the publication of national *Guidance for Nine Minimum Controls.*

Water Quality Standards Guidance

As discussed in Chapter 2 of this report, coordinating the development of LTCPs with the review of water quality standards is one of the key principles on which the CSO Control Policy is based. To lay a strong foundation for this principle, EPA published *Guidance: Coordinating CSO Long-term Planning with Water Quality Standards Reviews* (EPA, 2001c). The essence of the guidance is a process for facilitating the integration of LTCP development and implementation with water quality standards reviews. Integrating CSO control planning and implementation with water quality standards reviews requires greater coordination among CSO communities, states, EPA and the public, but provides greater assurance that an affordable, well-designed and operated CSO control program will support the attainment of appropriate water quality standards.

Additionally, in this guidance, EPA commits to establishing a data base tracking system for CSO permit requirements and water quality standards reviews. This data base will ensure the availability of accurate and timely data concerning permitting actions and other CSO program actions described in the CSO Control Policy.

Compliance Assistance and Enforcement Guidance

EPA developed compliance assistance and enforcement information resources to support effective implementation of the CSO Control Policy. For example, EPA developed a *Protocol for Conducting Environmental Compliance Audits for Municipal Facilities Under U.S. EPA's Wastewater Regulations* (EPA, 1997a).

This document identifies key compliance requirements at the federal, state, and local levels, including CSO requirements, and describes how compliance with such requirements can be reviewed. The protocol describes the records and features of a facility that should be reviewed and includes model audit checklists that address CSOs as part of the NPDES program elements. This protocol is intended to facilitate improved compliance with all regulatory requirements applicable to municipal facilities.

EPA also developed a Profile of Local Government Operations (January 1999). This document, which is one in a series published by EPA, provides information of general interest about environmental issues associated with local governments. It includes sections on local government structure and financing, operation, including wastewater management and water resources management, applicable federal laws and regulations, compliance history, major legal actions, and compliance assurance initiatives; it also includes an overview of the environmental requirements for CSO control.

Additionally, EPA has issued tools to guide inspectors in conducting NPDES and CSO-specific inspections. Such tools help promote more consistent and more effective compliance monitoring and assessment activities.

- *NPDES Compliance Inspection Manual* (EPA, 1994c) The manual explains all aspects of conducting an inspection. The manual is used by inspectors addressing NPDES permitted facilities. It is intended to provide information to regional and state inspectors. Within the manual is a chapter devoted to CSO inspections and a CSO Evaluation Checklist. The checklist is intended to help inspectors focus on the identification and evaluation of CSOs, dry weather overflows, records, operation and maintenance, and compliance schedules.

- *NPDES Compliance Inspection Training Program Student's Guide* (EPA, 1995g) The guide is a follow-up to the manual. It provides practice exercises and exams that are designed to help the inspector review inspection protocol. Chapter 12 is devoted to CSO policies and inspection procedures.

4.5.2 Training

EPA has developed training programs for NPDES permit writers, operators of wastewater treatment plants, and inspectors of CSO facilities. The training courses are intended to provide personnel working in and with CSO communities with an understanding of the intent and expectations of the CSO Control Policy and requirements of the CWA. In addition, the courses recommend ways to identify non-compliance.

Training for Permit Writers

EPA's "NPDES Permit Writers' Training Course" provides permit writers with an overview of the regulatory framework of the NPDES program. The course gives participants knowledge of permit components, effluent limits, permitting conditions, and tools and techniques for ensuring compliance with permit conditions. The course is designed to facilitate development of NPDES permits in general. CSOs are addressed in two modules of the course.

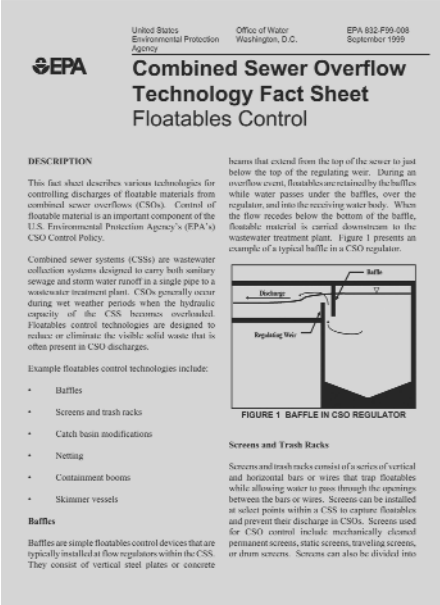
EPA's NPDES Permit Writers' Manual (EPA, 1996a) provides permit writers the technical and legal guidance to develop NPDES permits. The manual describes CSO policy provisions and discusses the phased permit process for CSOs and the suggested permitting conditions that correspond to each phase.

Training for Inspectors

With contract and technical assistance from EPA headquarters, Region 3 has taken the lead in developing a guidance and training program on CSOs for regional and state inspectors. Training on the compliance assistance tools for municipalities will be part of this training.

Training for Permittees

EPA, in cooperation with the WEF, sponsors a two-day training course titled "Participating in the NPDES Permit Process: A Workshop." This



United States Environmental Protection Agency | Office of Water Washington, D.C. | EPA 832-F99-008 September 1999

EPA

Combined Sewer Overflow Technology Fact Sheet
Floatables Control

DESCRIPTION

This fact sheet describes various technologies for controlling discharges of floatable materials from combined sewer overflows (CSOs). Control of floatable material is an important component of the U.S. Environmental Protection Agency's (EPA's) CSO Control Policy.

Combined sewer systems (CSSs) are wastewater collection systems designed to carry both sanitary sewage and storm water runoff in a single pipe to a wastewater treatment plant. CSOs generally occur during wet weather periods when the hydraulic capacity of the CSS becomes overloaded. Floatables control technologies are designed to reduce or eliminate the visible solid waste that is often present in CSO discharges.

Example floatables control technologies include:

- Baffles
- Screens and trash racks
- Catch basin modifications
- Netting
- Containment booms
- Skimmer vessels

Baffles

Baffles are simple floatables control devices that are typically installed at flow regulators within the CSS. They consist of vertical steel plates or concrete beams that extend from the top of the sewer to just below the top of the regulating weir. During an overflow event, floatables are retained by the baffles while water passes under the baffles, over the regulator, and into the receiving water body. When the flow recedes below the bottom of the baffle, floatable material is carried downstream to the wastewater treatment plant. Figure 1 presents an example of a typical baffle in a CSO regulator.

FIGURE 1 BAFFLE IN CSO REGULATOR

Screens and Trash Racks

Screens and trash racks consist of a series of vertical and horizontal bars or wires that trap floatables while allowing water to pass through the openings between the bars or wires. Screens can be installed at select points within a CSS to capture floatables and prevent their discharge in CSOs. Screens used for CSO control include mechanically cleaned permanent screens, static screens, traveling screens, or drum screens. Screens can also be divided into

course is designed to provide an overview of the scope and regulatory framework of the NPDES permit program, as well as to discuss the components of a permit and provide an overview of the permitting process. As part of this workshop, permit conditions related to CSOs are described along with a brief description of the CSO Control Policy.

4.5.3 Compliance and Technical Assistance

EPA has developed a number of mechanisms by which compliance assistance and other information can be tracked and shared, internally among EPA staff or externally with states, local governments, and others. Several of these tools have specific references and guidance for implementing the NMC and developing LTCPs.

CSO Technology Fact Sheets

As part of its efforts to provide technical assistance for CSO Control Policy implementation, EPA released 11 CSO Technology Fact Sheets in September 1999. The fact sheets provide technical information to CSO communities, permit writers, and other stakeholders on several topics:

- Alternative Disinfection Methods (EPA 832-F-99-033)
- Chlorine Disinfection (EPA 832-F-99-034)
- Floatables Control (EPA 832-F-99-008)
- Inflow Reduction (EPA 832-F-99-035)
- Maximization of In-Line Storage (EPA 832-F-99-036)
- Netting Systems for Floatables (EPA 832-F-99-037)
- Pollution Prevention (EPA 832-F-99-038)
- Proper Operation and Maintenance (EPA 832-F-99-039)
- Retention Basins (EPA 832-F-99-042)
- Screens (EPA 832-F-99-040)
- Sewer Separation (EPA 832-F-99-041)

LGEAN

LGEAN is the EPA-sponsored compliance assistance center for local municipal governments. LGEAN provides environmental management, planning, and regulatory information for elected and appointed officials, managers, and staff. LGEAN provides free research or inquiry services exclusively to local government officials. EPA provides technical and financial assistance to LGEAN. LGEAN, in turn, provides information on various technical and financial resources available to local governments, including: wet weather regulatory and legislative initiatives; workshops; websites; and publications to assist local governments in reducing wet weather pollution. LGEAN is located on the web at www.lgean.org.

National Compliance Assistance Clearinghouse

The National Compliance Assistance Clearinghouse is a website that provides links to compliance assistance tools, contacts, and other resources available from EPA and other public and private compliance assistance providers. Although currently, the Clearinghouse has links to only about eight CSO-specific resources, there are a number of wet weather resources and related information. It is located at www.epa.gov/clearinghouse.

4.5.4 Wet Weather Flow Research Plan

EPA's Office of Research and Development (ORD) conducts research to identify, understand, and solve current and future environmental problems. In an effort to direct wet weather flow research at EPA, ORD prepared the *Risk Management Research Plan for Wet Weather Flows* (EPA, 1996b) in 1996, which describes potential research projects EPA may pursue.

Wet weather research efforts by ORD cover CSOs, storm water, and SSOs. Wet weather research is organized into five areas:

- Characterization and Problem Assessment
- Watershed Management
- Toxic Substances Impacts and Control
- Control Technologies
- Infrastructure Improvement

Although several wet weather research projects evaluate wet weather discharges collectively, a number of research projects address CSOs. A summary of potential research projects is provided in Appendix K.

4.6 Communication and Coordination

Since 1994, EPA has maintained open lines of communication and coordinated with those involved in implementation and enforcement of the CSO Control Policy. This section describes specific activities by EPA to inform and obtain feedback from those most directly responsible for implementing and enforcing the CSO Control Policy.

4.6.1 Outreach to State and Regional CSO Coordinators

Following the issuance of the 1989 CSO Control Strategy, EPA asked each NPDES authority with CSO permits to appoint a CSO coordinator. The CSO coordinators serve as points of contact for EPA headquarters in disseminating information related to CSO control.

EPA's National CSO Program Manager hosts monthly conference calls with the CSO coordinators. The calls allow EPA headquarters to share information on programs and initiatives related to the implementation and enforcement of the CSO Control Policy. The calls are also a forum for information sharing across state and regional programs. The calls have spurred national CSO coordinator meetings in 1997 and 1999. The national meetings of CSO

The City of Richmond, VA won a National CSO Control Program Excellence Award in 1999 for its efforts to control CSO discharges, which include the construction of deep tunnels for storage, as shown.

Photo: City of Richmond Department of Public Works

coordinators allowed representatives from state and EPA regional programs to interact with EPA headquarters, share information on successful techniques for implementing and enforcing the CSO Control Policy, and obtain feedback on challenges to implementation of the CSO Control Policy.

4.6.2 CSO Awards Program

EPA has sponsored National CSO Control Program Excellence Awards since 1991. The awards recognize municipalities that are implementing innovative and cost-effective CSO control programs and projects. The awards are intended to heighten overall public awareness of CSO control measures and to encourage public support of CSO programs.

EPA regions and states nominate municipalities believed to be implementing cost-effective and innovative CSO control programs or projects. Nominations are screened by appropriate regional enforcement offices to ensure that nominated municipalities are in compliance. Qualified nominees are notified by EPA headquarters of their nomination and asked to submit materials to be used in assessing the details of their control programs. Winners receive public recognition through local press releases and coverage in various national publications. Appendix L provides a list of previous winners and describes their CSO control programs.

4.6.3 Listening Sessions to Support Development of Guidance on Implementing the Water Quality-Based Provisions of the CSO Control Policy

House Report 105-769 on EPA's FY 1999 appropriations urged the Agency to:

- Develop guidance, after public comment, to facilitate the conduct of water quality and designated use reviews for CSO-receiving waters.
- Provide technical and financial assistance to states and EPA regions to conduct these reviews.
- Report progress to relevant authorizing and appropriations committees by December 1, 1999. (This report was submitted to Congress on December 17, 1999.)

To address the objectives of *House Report 105-769*, EPA conducted a series of stakeholder meetings and conference calls during Spring 1999. This outreach effort allowed EPA to obtain a broad range of perspectives on perceived impediments to implementing the water quality-based provisions of the CSO Control Policy and actions EPA should take.

A total of 156 individuals participated in the stakeholder meetings and conference calls, including:

- 73 CSO community officials and/or their consultants
- 53 state agency staff from 15 different states

- 21 EPA regional and headquarters personnel
- Nine environmental interest groups and watershed associations

Based on this extensive stakeholder input, six general categories of impediments were identified as preventing full implementation of the water quality-based provisions of the CSO Control Policy:

- **The CSO Control Policy**. The water quality-based provisions of the CSO Control Policy are guidance, whereas the "fishable-swimmable" language of the CWA is law.
- **Water quality standards**. Many CSO communities and other stakeholders do not understand the water quality standards review process, the analyses required to revise the standards, and the role the public plays in influencing any revision to a standard.
- **The watershed approach**. States and CSO communities are presented with conflicting priorities and resource constraints as efforts are made to comply with several competing regulatory programs (e.g., CSOs, TMDLs, SSOs, storm water) applicable in any given watershed.
- **Resources**. States and CSO communities have insufficient resources and inadequate or missing tools (regulations, policies, guidance) and data to support water quality standards reviews.
- **Uncertainty**. The roles of EPA, state regulatory agencies, and CSO communities as they relate to coordination of LTCP and water quality standards review processes occur are poorly defined.
- **Small communities**. The financial and technical requirements of the CSO Control Policy are beyond the capabilities of many small communities.

EPA used this information to support the development of *Guidance: Coordinating CSO Long-Term Planning with Water Quality Standards Reviews*.

4.7 Information Management

EPA has established several information management and tracking systems that contain information related to CSOs. This section describes several of the key information sources.

4.7.1 Clean Water Needs Survey (CWNS)

EPA's CWNS is required by CWA Sections 205(a) and 516(b)(1). The CWNS summarizes estimated capital costs for water quality projects and serves as a basis for capitalization grants for the SRF program. Needs estimates are prepared for the following categories of wastewater treatment and water pollution control projects:

- Secondary wastewater treatment
- Advanced wastewater treatment
- Infiltration/inflow correction

- Replacement/rehabilitation of sewers
- New interceptor and collector sewers
- CSO control
- Storm water control
- Nonpoint source control

The 1996 CWNS was the twelfth survey completed since passage of the CWA in 1972 (EPA, 1997b). As part of the 1996 CWNS effort, EPA reviewed all facilities in the CWNS data base with documented CSO needs or identified as CSO facilities. EPA compared this list of facilities with a list of CSO facilities with NPDES permits. This enabled EPA to correct the CWNS data base by eliminating incorrectly identified CSOs and incorporating resolved CSO problems.

The CWNS cost-curve methodology was based on the presumption approach criterion for "adequate control," which is:

> *... the elimination or capture for treatment of no less than 85% of the wet weather flow by volume of the combined sewage collected in the CSS during precipitation events on a system-wide annual average basis.*

Table 4.4

Comparison of CSO and Total Needs

Source: *1996 Clean Water Needs Survey Report to Congress* (EPA, 1997b).

Year	CSO Needs (1996 $Billions)	Total Needs (1996 $Billions)
1988	20.2	103.3
1990	19.5	94.9
1992	46.6	143.6
1996	44.7	120.6

The cost curve uses rainfall patterns for each CSO community and a runoff coefficient to calculate flows resulting from storm events and to estimate required CSO control measures. The cost of the facilities required to provide additional treatment consisting of primary sedimentation, chlorine disinfection, and dechlorination was estimated with the cost curves. Estimated CSO needs from the the most recent surveys are summarized in Table 4.4.

4.7.2 Government Performance and Results Act (GPRA)

The 1993 GPRA requires federal agencies to develop performance plans to track progress by focusing on measurable goals and program objectives. GPRA requires federal agencies to develop annual performance plans and reports to measure progress in meeting their goals and objectives.

EPA selected the CSO program as a GPRA pilot program starting in government FY 1997. EPA OWM developed a "CSO Performance Plan for FY 1997" that contained three performance goals: 1) increase the number of communities implementing the CSO Control Policy; 2) reduce point source loadings from CSOs; and 3) reduce CSO contributions to receiving water impairment. The plan also contained three types of performance measures to track progress toward the goals:

- **Administrative Measures.** Percentage of CSO communities documenting the NMC and the percent of CSO cities required to develop LTCPs to provide for

water quality standards attainment.

- **End-of-Pipe Measures**. Pollutant loadings measured through CSO frequency and CSO volume.

- **Receiving Water Measures**. Impairments measured through the number of beach closures and shellfish bed closures per year attributable to CSOs.

On April 9, 1997, EPA issued its *Assessment of the GPRA Pilot Program* (EPA, 1997c). EPA found that:

- 96 of 918 (11 percent) CSO communities were "implementing the CSO Control Policy" as defined (i.e., documented implementation of the NMC and subject to a requirement to develop an LTCP). EPA found fewer CSO communities implementing the CSO Control Policy than expected and attributed this to several factors. First, some communities had completed sewer separation projects and were removed from the list of CSO communities. Second, several states emphasized implementation of the NMC or development of LTCPs, but not compliance with both of these criteria. Finally, some communities implemented the six minimum measures listed in the 1989 National CSO Control Strategy, but not the three remaining controls included in the CSO Control Policy.

- Considerable variation in implementation of the NMC hindered EPA's ability to track progress and report on program effectiveness.

4.7.3 Permit Compliance System (PCS)

EPA's PCS provides information on point sources holding NPDES permits to discharge wastewater. The data base contains NPDES permit issuance and expiration dates, discharge limits, and discharge monitoring data. PCS was developed to track compliance with NPDES permit conditions, specifically effluent limits. This design limits the ability of PCS to track non-numeric permit conditions such as those most commonly used for CSOs. Therefore, the CSO information available from PCS varies from state to state, and depends on specific reporting requirements established by each state. More information on state data available from PCS is provided in Chapter 5.

EPA is now modernizing PCS. The modernized system will allow entry of all data element fields needed to track every discharger, including CSOs. The modernized system will be capable of tracking additional relevant information, including permit requirements, inspections, and compliance and enforcement action data. EPA regions and states are involved in the PCS modernization process. Implementation is scheduled for completion by the end of 2003.

4.7.4 Statistically Valid Non-Compliance Rate Project

EPA has traditionally focused its enforcement activities at facilities in significant regulatory non-compliance. To determine a more accurate rate of

overall compliance, EPA initiated the Statistically Valid Noncompliance Rate Project in 1999. One regulatory area is addressed each year. CSO noncompliance is the focus for FY 2002. As part of the project, EPA headquarters is providing funding for Region 3's CSO-inspection training program and offering the training in Regions 3, 4, and 5. Inspectors will be trained on determining CSO non-compliance and baselines and will also be made aware of compliance assistance materials available to assist communities. The main focus of compliance determination will be the level of NMC implementation.

4.7.5 Other Information Management Activities

Compliance Assistance Planning Database (CAPD) and the Compliance Assistance Activity Plan

CAPD was created in 2000. It was designed to help EPA document compliance assistance activities that are being planned at the headquarters and regional levels. Once a year, the data base contents are captured and published in the form of the Compliance Assistance Activity Plan. The most current plan includes activities being undertaken during FY 2001. CSO-related activities listed in the current activity plan include the Great Lakes Wet Weather Control Project (multi-regional) and Technical Assistance to Regulated Entities on CSO and SSO Requirements (Region 5).

Reporting Compliance Assistance Tracking System (RCATS)

RCATS, developed in 1999, is an internal data base for tracking completed compliance assistance activities undertaken by EPA. It is a follow-up tool to CAPD, in that it tracks those planned activities that are now being implemented. RCATS reports on activities such as workshops and training, phone calls, on-site visits, mailed material, and compliance assistance tools developed by EPA. As of July 2001, Regions 1, 3, 5 and 10 had information entered in RCATS relating to CSO compliance assistance activities.

4.8 Financial Assistance

The CSO Control Policy recognizes the need to consider the relative importance of environmental and financial issues when developing implementation schedules for CSO controls. This section describes funding mechanisms EPA and other federal agencies have made available to CSO permittees to fund CSO abatement efforts.

4.8.1 The Clean Water SRF Program

With the passage of the 1987 CWA Amendments, each state was instructed to create a revolving loan fund to provide independent and permanent sources of low-cost financing for a range of water quality infrastructure projects. Funds to establish or capitalize the SRF programs were provided by federal (83 percent) and state (17 percent) governments. SRF programs are operating in all 50 states and Puerto Rico. The District of Columbia

participates in the SRF program by contributing annual funds to its SRF account and receiving federal matching funds, but the program is treated as a grant fund rather than a revolving loan program.

Capitalization began in 1988. Today, total assets of the SRF program stand at more than $34 billion. As payments are made on loans, funds are recycled to fund additional water protection projects.

Under the SRF, states have significant flexibility in selecting assistance available for clean water projects.

Options include:

- Loans
- Refinancing, purchasing or guaranteeing local debt
- Purchasing bond insurance

States set loan terms, including interest rates (from zero percent to market rate), repayment periods (up to 20 years), and many other features. SRF loans are also available to fund a wide variety of water quality projects including CSO control and abatement projects, as well as more traditional municipal wastewater treatment projects. In addition, states may customize loan terms to meet the needs of small and disadvantaged communities within certain parameters.

Table 4.5

SRF Loans for CSO Projects

SRF funding for CSO control projects peaked in 1994 and declined until 1998. Funding rates rebounded in 1999 and continued to increase in 2000.

Year	SRF Loans[1]	SRF Loans for CSOs[1]	% of SRF Spent on CSOs
1988	$6.2	$0	0%
1989	$255.9	$4.7	2%
1990	$788.9	$14.6	2%
1991	$1,976.1	$121.5	6%
1992	$1,688.7	$180.0	11%
1993	$1,311.2	$169.5	13%
1994	$2,455.3	$245.4	10%
1995	$2,157.2	$190.7	9%
1996	$1,959.8	$168.1	9%
1997	$1,772.5	$139.6	8%
1998	$2,283.0	$157.8	7%
1999	$2,159.2	$272.8	13%
2000	$3,367.4	$410.6	12%
Total	**$22,181.4**	**$2,075.3**	**9%**

[1]In Millions

Table 4.5 summarizes the total amount of SRF assistance provided by states each year since 1989 and SRF loans for CSO control projects.

4.8.2 Section 104(b)(3) Water Quality Cooperative Agreements

Under authority of CWA Section 104(b)(3), EPA makes grants to state water pollution control agencies, interstate agencies, and other nonprofit institutions, organizations, and individuals to prevent, reduce, and eliminate water pollution. Among the efforts eligible for funding under the Section 104(b)(3) program are research, investigations, experiments, training, environmental technology demonstrations, surveys, and studies related to the causes, effects, extent, and prevention of pollution. Funded projects include activities associated with CSO abatement and control.

Unlike the CWA Section 106 grant program described in Section 4.8.3 of this report, Section 104(b)(3) grants cannot fund ongoing programs or administrative activity. Table 4.6 highlights cooperative agreements for CSO projects funded by EPA since issuance of the CSO Control Policy. Additional information on the outcome of each grant is provided in Appendix M.

4.8.3 Section 106 Water Pollution Control Program Support Grants

CWA Section 106 authorizes EPA to provide assistance to states (including territories, the District of Columbia, and tribes) and interstate agencies to establish and implement water pollution control programs. The Section 106 program provides grants to these agencies to assist in the administration of programs for preventing, reducing, and eliminating water pollution.

Eligible activities include permitting, enforcement, water quality planning, monitoring, and assistance to local agencies developing pollution control programs.

Section 106 funds are used for a broad range of water quality programs. Neither CSOs nor any other specific

Table 4.6

EPA 104(b)(3) Grant Cooperative Agreements for CSO Projects

This funding is awarded for research, investigations, experiments, training, environmental technology demonstrations, surveys, and studies related to the causes, effects, extent, and prevention of pollution.

Grantee	Title	Federal $	Years
AMSA	Performance Measures for CSO Control	$294,000	9/94—1/97
City of Indianapolis	Wet Weather Public Education Program	$112,000	7/97—7/99
Low Impact Development Center	Feasibility of Applying LID Stormwater Micro-Scale Techniques to Highly Urbanized Areas to Control the Effects of Urban Stormwater Runoff in CSOs	$110,000	4/99—4/00
ORSANCO 7/97—12/01	Wet Weather Study of Ohio River	$1,383,000	
CSO Partnership	Information Outreach	$176,500	10/94—2/99
California State University	Training Video	$245,000	7/96—7/98
CSO Partnership	Development of CSO Handbook For Small Communities	$181,000	4/97—4/99

water quality programs are targeted by Section 106. EPA does not require states to report on how funds are used, and states use a variety of methods for funding programs (i.e., permit fees to fund NPDES program, or Section 106 funds allocated to support NPDES). Therefore, reliable identification of programs receiving Section 106 funds is impossible.

The national appropriation figures for Section 106 funds to state and interstate agencies, tribes, and territories from 1994 to 2001 are presented in Table 4.7.

4.8.4 Specific Line Items in EPA's Budget

From FY 1992 through FY 2000, Congress appropriated more than $600 million to 32 communities with CSSs (Table 4.8).

These funds were earmarked for a wide variety of structural CSO control projects including:

- Sewer separation
- Deep tunnel storage
- Satellite treatment facilities
- Concrete retention basins

Six communities received more than two-thirds of the total funds earmarked by Congress for CSO control. These communities are:

- Rouge River, MI—$253,000,000
- Newark, NJ—$44,300,000
- Onondaga County, NY—$41,089,000
- King County, WA—$35,000,000
- New York City, NY—$34,910,000
- Lackawanna County, PA—$30,000,000

Table 4.7

Annual Section 106 Grant Totals

Section 106 funds are used for a broad range of water quality programs. It is not possible to assess the amount of funds used for CSO control, since CSOs are not separately tracked, and EPA does not require states to report on how funds are used.

Fiscal Year	Grant Amount (Millions)
1994	$81.7
1995	$80.2
1996	$80.2
1997	$80.7
1998	$95.5
1999	$115.5
2000	$115.5
2001	$169.8
Total	**$819.1**

Table 4.8

Annual EPA Budget Line Items for CSO Control Projects

Each year, Congress earmarks funds for a wide variety of CSO control projects. In general, communities using these funds have made substantial progress in controlling CSOs.

Fiscal Year	Appropriation (Millions)
1992	$32.0
1993	$61.0
1994	$154.9
1995	$211.8
1996	$13.0
1997	$23.4
1998	$34.0
1999	$43.3
2000	$33.3
Total	**$606.7**

4.9 Performance Measures

A key EPA objective included in the National CSO Control Strategy and reiterated in the CSO Control Policy was to "minimize water quality, aquatic biota, and human health impacts from CSOs." As a result, the CSO Control Policy contains several provisions that, if properly implemented, would protect water quality and other human health and environmental benefits:

- Implementing the NMC.
- Developing LTCPs that consider a range of options to meet water quality standards. The CSO Control Policy provides for use of a presumption or demonstration approach for showing that selected CSO controls will achieve water quality standards.
- Encouraging communities to give the highest priority in controlling CSOs to sensitive areas. Sensitive areas include designated Outstanding National Resource Waters, National Marine Sanctuaries, waters with threatened or endangered species and associated habitat, waters with primary contact recreation, public drinking water intakes, or designated protection areas, and shellfish beds.

Moreover, NPDES authorities were encouraged to evaluate water pollution control needs on a watershed management basis and to coordinate CSO control efforts with other point and nonpoint source control activities.

This section describes EPA efforts to identify and report the benefits associated with implementation of the CSO Control Policy. It is important to note that these benefits are not tracked through an all-inclusive CSO program. CSO-specific measures, however, are tracked through a number of other programs.

4.9.1 Specific Efforts to Track Benefits Resulting from CSO Control Policy Implementation

EPA has initiated several efforts to track the benefits resulting from implementation of the CSO Control Policy.

Government Performance Results Act: CSO Performance Goals

As described in Section 4.7.2, EPA developed the GPRA Pilot Program to quantify benefits related to implementation of the CSO Control Policy. As shown in Table 4.9, specific performance goals related to benefits were established in response to GPRA. On April 9, 1997, EPA completed its assessment of the GPRA Pilot Program (EPA, 1997c). The results are also summarized in Table 4.9.

Since the 1997 report, EPA has initiated efforts to better track and report on GPRA performance measures. EPA has developed a model to predict pollutant and flow reductions attributable to implementation of CSO controls by CSO communities. This model, GPRACSO, estimates CSO flow volume and pollutant loadings based on hourly simulation of a typical rainfall year. It also estimates flow volume and pollutant reductions

under various CSO management scenarios. A discussion of some preliminary results from the GPRACSO model is provided in Section 7.3.1 of this report.

Assessment of CSO Characterization and Monitoring Efforts

The CSO Control Policy expects permittees to characterize, monitor, and model the CSS to predict the effectiveness of controls to reduce CSO frequency, volume, pollutant loadings, and impacts to receiving waters and designated uses. In addition, the CSO Control Policy anticipates post-construction monitoring to verify attainment of water quality standards and to verify the effectiveness of CSO controls.

PCS is used to track compliance with NPDES permit limitations and other permit conditions (described in Section 4.7.3 of this report). PCS contains CSO monitoring data for only a few permits. This is due in part to the fact that the system was designed to track compliance with effluent limitations, but not specifically CSO controls. Because individual states established CSO reporting requirements, the availability of CSO-related information varies from state to state.

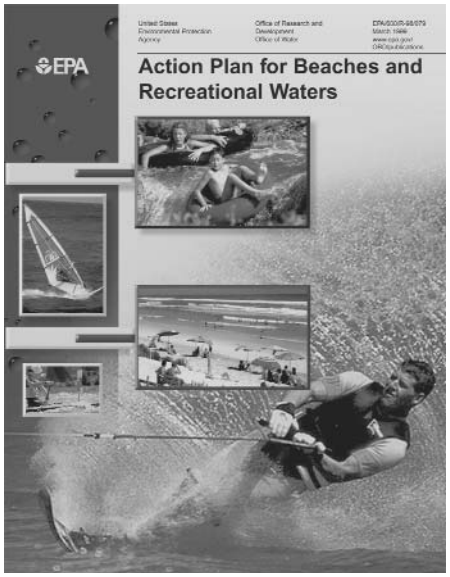
As a result, EPA has been unable to use PCS to track reductions in CSO frequency, CSO volume, and pollutant loadings at a national or state scale.

Table 4.9

Environmental Measurements from 1997 Pilot GPRA Performance Plan

Findings from this pilot study led EPA to initiate efforts to better track and report on CSO control program performance measures.

Performance Measure	Summary of Results
Reduce point source loadings by 3 percent	EPA found that insufficient data were available to estimate CSO loadings on a national basis or to provide a baseline. In addition, the Agency found that reporting methods were inconsistent among communities, and from state to state. Reasons that made it difficult to obtain end-of-pipe measurements include the fact that many communities are not required to monitor or report CSO data and a general lack of resources needed to support state reporting to EPA.
Reduce by 10 percent the extent to which CSOs restrict uses of receiving waters	EPA found it difficult to report on the performance measure related to beach closures and shellfish bed closures, given that there was no consistent national approach to assessing and tracking beach closures. The Agency recommended retaining this measure for upcoming assessments and suggested that EPA develop guidance on beach assessment (see discussion related to the EPA BEACH Program in Section 4.9.2). With respect to counting shellfish bed closures attributable to CSOs, EPA found that the current five-year rotating cycle approach to assessing shellfish bed closures used by NOAA's National Shellfish Sanitation Program is not conducive to annual tracking of CSO impacts. EPA has recommended discontinuing this measure in future performance evaluations.



Although EPA has been unable to track environmental benefit information at a national or state scale, EPA has continually solicited monitoring data to gauge the effectiveness of the CSO Control Policy. EPA has participated in a number of internal and external outreach efforts to collect information on the effectiveness of the CSO Control Policy in reducing CSO frequency, volume, and pollutant loadings (described in Section 4.7 of this report). In addition, during the data collection phase for this report, EPA identified a number of documented instances in which implementation of the CSO Control Policy has resulted in environmental benefits. These results are described further in Section 6.7 of this report.

4.9.2 Other Agency Initiatives to Document Environmental Results Related to CSO Control

Several other EPA programs directly or indirectly track environmental results related to CSO control. These efforts, although not the direct result of the CSO Control Policy, show how offices, programs, and initiatives can be coordinated to help identify, define, and remediate CSO-related discharges. This section describes several efforts addressing CSOs.

Beaches Environmental And Coastal Health (BEACH) Program

The goal of EPA's BEACH program, announced in 1997, is to reduce the risk of disease to users of recreation waters by focusing on several key objectives: strengthening water quality standards for bathing beaches, improving state and local government beach programs, better informing the public, and promoting scientific research to better protect the health of public beach users.

Initial efforts focused on current water quality standards, improving understanding of current state and local programs through national and local conferences, and identifying scientific needs. EPA also started its annual survey of state and local agencies that monitor water quality at beaches. The voluntary National Health Protection Survey of Beaches collected information about local beach monitoring, agencies responsible for beach programs, and detailed information about advisories and closures at specific beaches. In March 1999, EPA published the *Action Plan for Beaches and Recreational Waters* (EPA, 1999b), a multi-year strategy describing the Agency's programmatic and scientific research efforts to improve beach programs and research.

The scope of these activities changed on October 10, 2000. The BEACH Act amended the CWA, in part, to include Sections 303(i) and 406. The amendment addresses fecal contamination in coastal recreation waters. Three significant provisions of the BEACH Act amended the CWA to:

- Include Section 303(i), which requires states and authorized tribes having coastal recreation waters to adopt new or revised water quality standards by April 2004 for pathogens and pathogen indicators for which EPA has published criteria under CWA Section 304(a). The BEACH Act

further directs EPA to promulgate such standards for states that fail to do so.

- Sections 104(v)and 303(i) also require EPA to study issues associated with pathogens and human health and to publish new or revised CWA Section 304(a) criteria for pathogens and pathogen indicators for coastal recreational waters based on that study. Within three years after EPA's publication of the new or revised Section 304(a) criteria, states with coastal recreation waters must adopt new or revised water quality standards for all pathogens and pathogen indicators, to which EPA's new or revised Section 304(a) criteria apply, that are as protective of human health as those published by EPA. If they are not as protective, EPA shall propose regulations for the state for its coastal recreation waters.

- Include a new Section 406, which authorizes EPA to award grants to states and authorized tribes for the purpose of developing and implementing a program to monitor for pathogens and pathogen indicators in coastal recreation water adjacent to beaches used by the public, and to notify the public if water quality standards for pathogens and pathogen indicators are exceeded. To be eligible for the implementation grants, states and authorized tribes must develop monitoring and notification programs consistent with performance criteria published by EPA under the Act. The BEACH Act also requires EPA to perform monitoring and notification activities for waters in states that lack a program consistent with EPA's performance criteria, using grants funds that would otherwise have been available to those states.

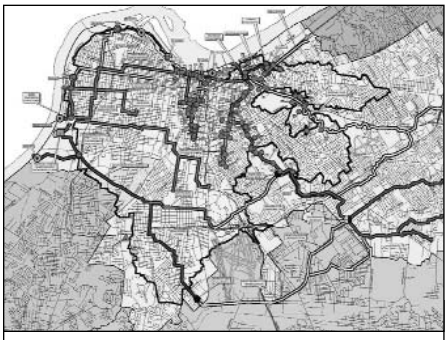
Source Water Protection Program

EPA's Office of Ground Water and Drinking Water (OGWDW) seeks to protect public health by ensuring safe drinking water and protecting ground water. The Source Water Protection Program aims to prevent contamination of drinking water supplies. OGWDW's source water protection guidance identifies CSOs as a source of pollution in source water.

In addition, under OGWDW's Source Water Assessment Program (SWAP), states should analyze existing and potential threats to the quality of the public drinking water and submit a SWAP to EPA for review and approval. A state SWAP includes: a delineation of the source water protection area; a contaminant source inventory; a determination of susceptibility of the public water supply to contamination from the inventoried sources; and release of results of the assessments to the public. EPA has approved 52 SWAP programs. EPA expects states to complete all assessments no later than three years after EPA approval of the program. Sewer lines, including CSOs, are identified in EPA's *State Source Water Assessment and Protection Guidance* (EPA, 1997d) as potential sources of drinking water contaminants.

4.9.3 Promoting the Use of Watershed Approach

Since the late 1980s, EPA has initiated several programs and activities designed to foster protection of water quality on a watershed basis. In 1994 EPA signed the *NPDES Watershed Strategy* to encourage watershed-based permitting and program integration (EPA, 1994c). The *NPDES Watershed Strategy* specifically established a framework and plan to integrate NPDES programs with other water programs for a more effective and efficient application of resources.



Louisville, KY has received EPA and state grants to develop a watershed approach to sewer system management. CSO control planning, information management, water quality monitoring, and customer service are organized by watershed within the service area. GIS data, such as the service area map shown, are available online.

Graphic: Louisville-Jefferson County Metropolitan Sewer District

More recently, EPA and the U.S. Department of Agriculture (USDA) issued the *Clean Water Action Plan: Restoring and Protecting America's Waters* (EPA, 1998). The Plan provides a blueprint for restoring the nation's waterways. A key tool for achieving clean water goals is the watershed approach, which helps identify cost-effective pollution control strategies.

In developing the CSO Control Policy, EPA and CSO stakeholders acknowledged the importance of encouraging the evaluation of proposed CSO control needs on a watershed basis and in coordination with other point and nonpoint source controls required to protect water quality. The CSO Control Policy also acknowledged the site- and watershed-specific considerations that exist for CSOs, and provided flexibility in how pollutants contained in CSOs would be reduced to meet the objectives and requirements of the CWA. As described further in Chapter 5, several states have used this flexibility to address CSOs on a watershed basis.

Although EPA has provided a variety of technical assistance related to implementing programs on a watershed basis, guidance on using the watershed approach while developing long-term CSO control plans has been limited. OECA's 2000 *Compliance and Enforcement Strategy for Combined Sewer Overflows and Sanitary Sewer Overflows*, which is described in more detail in Section 4.4.3 of this report, also encourages regions to develop CSO/SSO response plans that recognize wet weather planning on a watershed basis.

4.10 Findings

CSO Program Support

- EPA has issued guidance, supported communication and outreach, and provided compliance assistance and financial support for CSO control. Guidance on the NMC, monitoring and modeling, financial capability, LTCPs, and permit writing was issued in a timely manner. Other guidance lagged and may have hindered full implementation of the CSO Control Policy.
- EPA issued *Guidance for Coordinating CSO Long-Term Planning with Water Quality Standards Reviews* on August 2, 2001.
- EPA has fostered technical research activities in CSO control through support of and funding for ORD initiated research and community demonstration programs.

Compliance and Enforcement

- EPA issued the *Compliance and Enforcement Strategy for Addressing Combined Sewer Overflows and Sanitary Sewer Overflows* in 2000.

- EPA has taken 32 administrative actions and 35 civil judicial actions (five since issuance of the CSO Control Policy, 16 under the National Municipal Policy, and 13 other) related to CSO controls. Cases brought under the National Municipal Policy were an important force in bringing about early CSO control initiatives at major municipalities.